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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

Operation and Maintenance Manual

950F Series II Wheel Loader

4DJ1-Up (Machine)
5SK1-Up (Machine)
8TK1-Up (Machine)
2LM1-Up (Machine)

i01754730

Maintenance Interval Schedule

SMCS Code: 7000

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Every 5000 Service Hours or 3 Years

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Every 6000 Service Hours or 4 Years

Cooling System Coolant (ELC) - Change	101
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i01514850

i01558281

Air Conditioner - Test

SMCS Code: 7320-081

WARNING

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.

1. Start the engine and run the engine at high idle.
2. Set the air conditioning system to maximum cooling. Turn the fan to high speed.
3. Allow the air conditioning system to stabilize for two minutes.

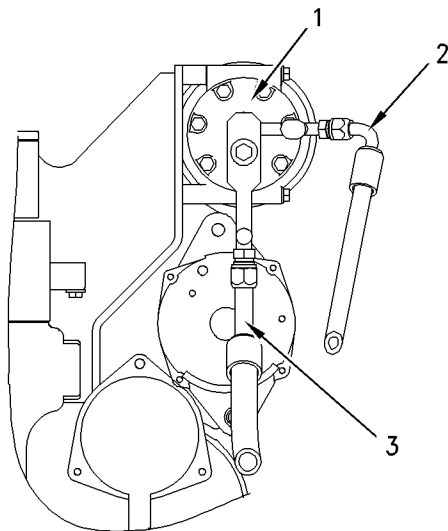


Illustration 128

g00786118

4. Open the engine access door on the left side of the machine. The compressor (1) is located on the left side of the engine.
5. To check the system for refrigerant, feel suction line (3) and discharge line (2).

If the system contains refrigerant, the discharge line will be warmer than the suction line.

If the system does not contain refrigerant or the system is very low on refrigerant, poor cooling will result.

Articulation Bearings - Lubricate

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

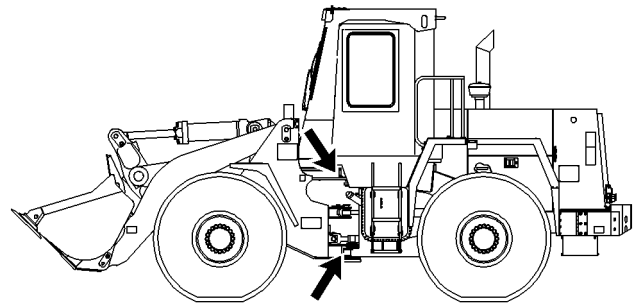


Illustration 129

g00809796

1. Wipe all fittings before lubrication is applied.
2. Apply grease to two fittings for the articulation bearings.

i01558351

Axle Oscillation Bearings - Lubricate

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

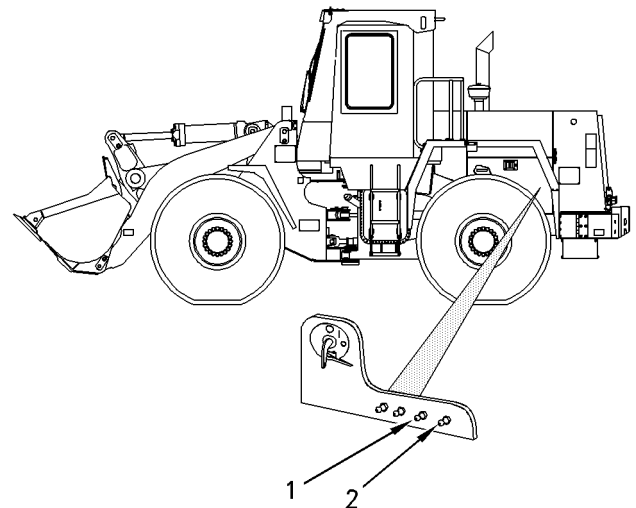


Illustration 130

g00809800

Note: The oscillation bearings are lubricated by using two remote grease fittings. These fittings are located behind the small access door on the left side of the machine.

1. Wipe all fittings before any lubricant is applied.
2. Fitting (1) lubricates the front oscillation bearing of the rear axle. Fitting (2) lubricates the rear oscillation bearing of the rear axle.

i01713195

Backup Alarm - Test

SMCS Code: 7406-081

1. Turn the engine start switch key to the ON position in order to perform the test.
2. Apply the service brake.

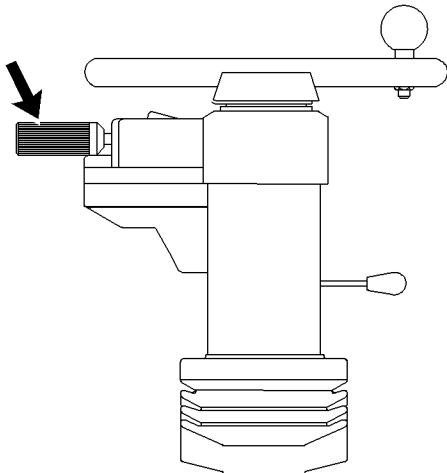


Illustration 131

g00783907

3. Move the transmission direction control lever to the REVERSE position.

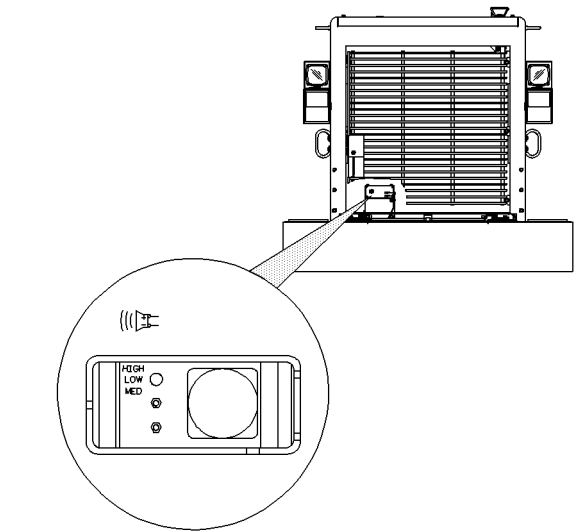


Illustration 132

g00782208

The alarm should start to sound immediately. The alarm will continue to sound until the transmission direction control lever is moved to the NEUTRAL position or to the FORWARD position.

Reference: For more information, refer to Operation and Maintenance Manual, "Backup Alarm".

i01558375

Battery - Clean

SMCS Code: 1401-070

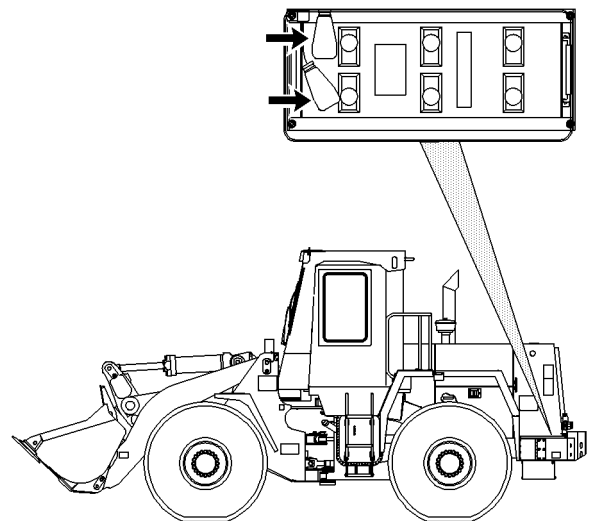


Illustration 133

g00809805

One battery is located on each side of the machine under the access door. Clean the battery terminals and the surfaces of the batteries with a clean cloth. Coat the battery terminals with petroleum jelly. Make sure that the battery cables are installed securely.

i01559715

Battery - Recycle

SMCS Code: 1401-561

1. Always recycle a battery. Never discard a battery.
2. Always return used batteries to one of the following locations.
 - A battery supplier
 - An authorized battery collection facility
 - Recycling facility

i01558401

Battery Electrolyte Level - Check

SMCS Code: 1401-535-FLV

Check the electrolyte level according to the following table.

Table 13

Battery Electrolyte Levels	
Battery	Interval
Conventional	100 Hours
Low Maintenance	250 Hours
Maintenance Free Battery	No maintenance is necessary.

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

Each battery cell should not require more than 30 cc (1 oz) of water weekly. This usage of water is typical with the proper charging rate and with a moderate climate.

When you are operating the machine in extreme temperatures, check the water in the battery cells weekly.

Inspect the electrolyte level in each battery cell. (A maintenance free battery does not require inspection.) Maintain the electrolyte level to the bottom of the filler openings. Use distilled water. If distilled water is not available, use clean drinking water.

i01558385

Battery Hold-Down - Tighten

SMCS Code: 7257-527

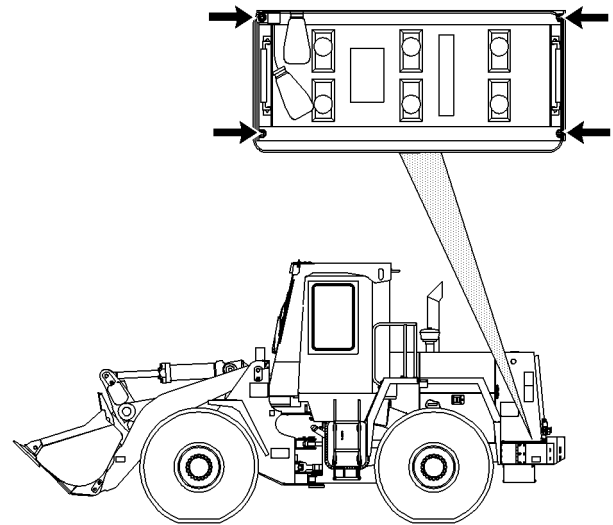


Illustration 134

g00809817

Open the battery compartment on both sides of the machine.

Over time, the vibration of an operating machine can cause the battery hold-downs to loosen. To help to prevent loose batteries and the possibility of loose cable connections, tighten the eight nuts on the two hold-downs to a torque of 12 ± 3 N·m (8.9 ± 2.2 lb ft).

i00587243

Battery, Battery Cable or Battery Disconnect Switch - Replace

SMCS Code: 1401-510; 1402-510; 1411-510

1. Turn the engine start switch key OFF. Turn all of the switches OFF.
2. Turn the battery disconnect switch OFF. Remove the key.

3. Disconnect the negative battery cable from the disconnect switch.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Disconnect the negative battery cable at the battery.
5. Disconnect the positive battery cable at the battery.
6. Make any necessary repairs. If necessary, replace the battery. If necessary, replace the battery cables.
7. Connect the positive battery cable at the battery.
8. Connect the negative battery cable at the battery.
9. Connect the battery cable at the battery disconnect switch.
10. Install the key and turn the battery disconnect switch ON.

i01557085

Belts - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510

Note: Stop the engine before you perform any of the following procedures.

Alternator Belt

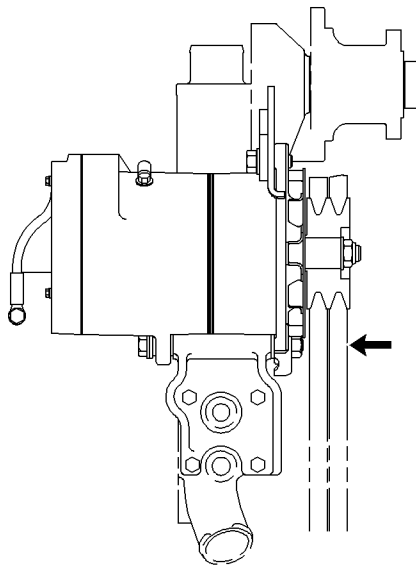


Illustration 135

g00809512

1. Access the alternator from the left side of the machine.
2. Inspect the condition of the alternator belt. If the belt is cracked or frayed, replace the belt.
3. Use a BT-33-97 Borroughs Gauge to check the tension of the alternator belt.

The tension of a used belt with more than 30 minutes of operation at rated speed should be 400 ± 44 N (90 ± 10 lb). The tension of a new belt with 30 minutes of operation or less at rated speed should be 534 ± 22 N (120 ± 5 lb).

Adjusting the Tension of the Alternator Belt

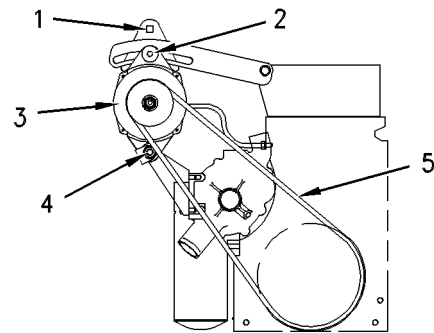


Illustration 136

g00592143

1. Loosen one mounting bolt (4) and adjustment bolt (2).
2. Insert a ratchet with a square drive into the hole in mounting bracket (1). Use the ratchet as a lever to rotate alternator (3). Rotate the alternator until the correct belt tension is reached.
3. Tighten adjustment bolt (2) and mounting bolt (4).
4. Recheck the tension of belt (5). If the tension of the belt is incorrect, repeat the adjustment procedure.

Air Conditioner Belt

1. Access the compressor from the right side of the machine.
2. Inspect the condition of the air conditioner belt. If the belt is cracked or frayed, replace the belt.
3. Use a BT-33-97 Borroughs Gauge to check the tension of the air conditioner belt.

The tension of a used belt with more than 30 minutes of operation at rated speed should be 400 ± 44 N (90 ± 10 lb). The tension of a new belt with 30 minutes of operation or less at rated speed should be 534 ± 22 N (120 ± 5 lb).

Adjusting the Tension of the Air Conditioner Belt

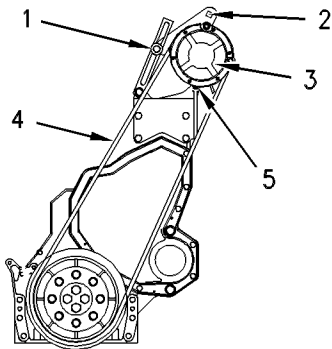


Illustration 137

g00592145

1. Loosen one mounting bolt (5) and adjustment bolt (1).
2. Insert a ratchet with a square drive into the hole in mounting bracket (2). Use the ratchet as a lever to rotate compressor (3). Rotate the compressor until the correct belt tension is reached.
3. Tighten adjustment bolt (1) and mounting bolt (5).
4. Recheck the tension of belt (4). If the tension of the belt is incorrect, repeat the adjustment procedure.

Water Pump Drive Belt

1. Inspect the condition of the water pump drive belt. If the belt is cracked or frayed, replace the belt.
2. Use a BT-33-97 Borroughs Gauge to check the tension of the water pump drive belt.

The tension of a used belt with more than 30 minutes of operation at rated speed should be 400 ± 44 N (90 ± 10 lb). The tension of a new belt with 30 minutes of operation or less at rated speed should be 534 ± 22 N (120 ± 5 lb).

Adjusting the Tension of the Water Pump Drive Belt

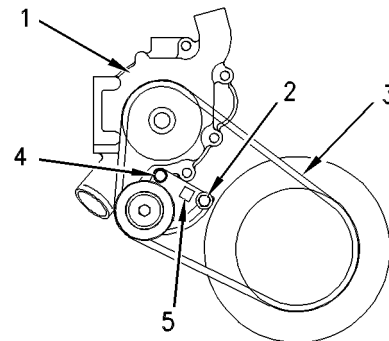


Illustration 138

g00592146

1. Loosen one mounting bolt (4) and adjustment bolt (2).
2. Insert a ratchet with a square drive into the hole in mounting bracket (5). Use the ratchet as a lever to rotate water pump (1). Rotate the water pump until the correct belt tension is reached.
3. Tighten adjustment bolt (2) and mounting bolt (4).
4. Recheck the tension of belt (3). If the tension of the belt is incorrect, repeat the adjustment procedure.

i01714079

Brake Accumulator - Check

SMCS Code: 4263-535

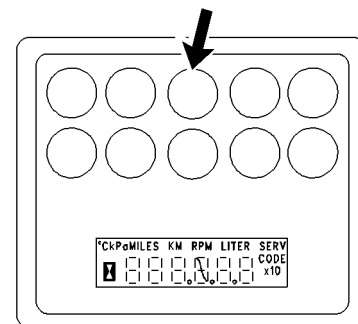


Illustration 139

g00882020

1. Turn the engine start switch to the ON position. The alert indicator for brake oil pressure should come on if the braking system is not at normal operating pressure.

2. Start the engine. Run the engine at half speed for two minutes in order to increase the accumulator pressure. The alert indicator for brake oil pressure should go off.
3. Stop the engine. Apply the service brake pedal and release the service brake pedal until the alert indicator for brake oil pressure comes on. This will decrease the accumulator pressure. A minimum of five applications of the service brake pedal are required.
4. If the alert indicator comes on after less than five applications of the brake, measure the accumulator precharge pressure. An authorized Caterpillar dealer can measure the nitrogen gas pressure in the accumulator. Use only dry nitrogen gas for recharging.

i01557277

Brake Air Tank Moisture and Sediment - Drain

SMCS Code: 4272-543-M&S

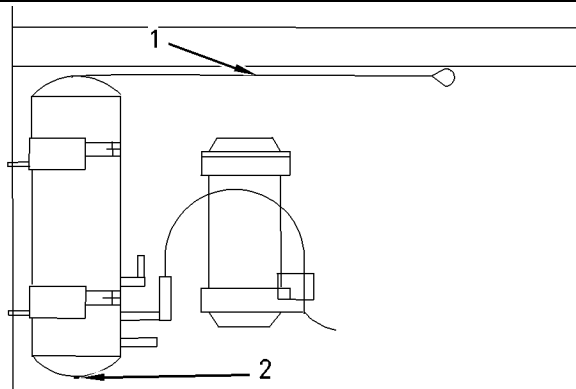


Illustration 140

g00809555

1. Pull on cable (1) in order to drain the condensation from the tank.
2. Release the cable.
3. Open drain valve (2).
4. Drain the moisture and sediment from the air tank.
5. Install the drain valve.

i01557322

Brake Oil Reservoir - Clean/Refill (If Equipped)

SMCS Code: 4291-070; 4291-544

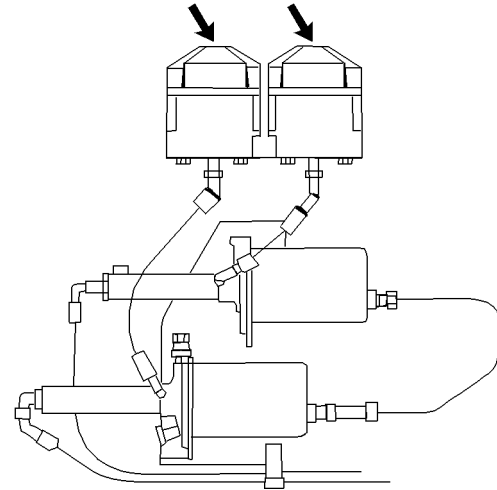


Illustration 141

g00809673

1. Remove the covers from the oil reservoirs.
2. The oil level should be within 1 cm (0.4 inch) from the top of the reservoir.
3. Install the covers.

i01118779

Braking System - Test

SMCS Code: 4251-081; 4267-081

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

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

Service Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

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

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

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

Parking Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

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

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

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

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

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

i01697186

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

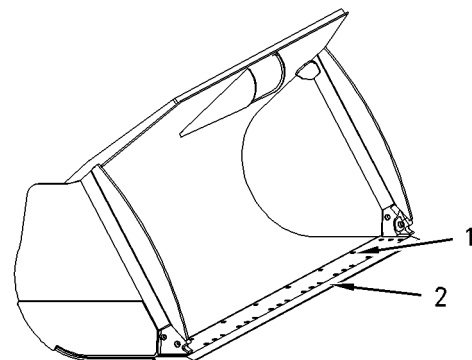


Illustration 142

g00764365

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

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

If both sides are worn, install a new cutting edge.

6. Install bolts (1). Tighten the bolts to the specified torque.

Reference: Refer to Operation and Maintenance Manual, "Torques for Ground Engaging Tool Bolts".

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

i01556929

Bucket Pivot Bearings - Lubricate

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

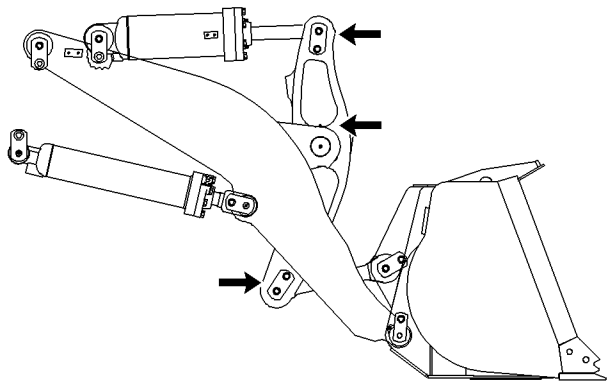


Illustration 143

g00809402

Lubricate three fittings on the tilt linkage.

i01098716

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

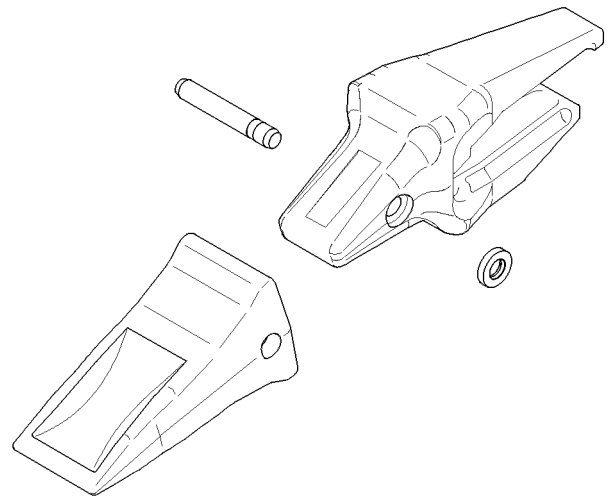


Illustration 144

g00486023

Inspect the bucket tips. If wear or damage is evident, use the following procedure to replace a bucket tip.

1. Drive the pin out of the bucket tip from the retainer side of the bucket tip. Remove the bucket tip and the retainer.
2. Clean the adapter, the pin, and the retainer. Install the retainer in the groove.
3. Install the bucket tip over the retainer.
4. Drive the pin through the bucket tip from the side that is opposite the retainer.

i01709216

i01521741

Bucket Wear Plates - Inspect/Replace

SMCS Code: 6120-040; 6120-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket wear plates.

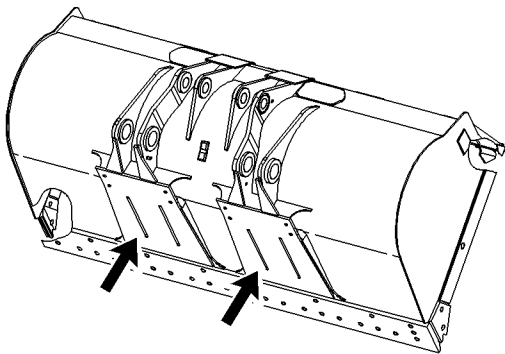


Illustration 145

g00879740

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

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

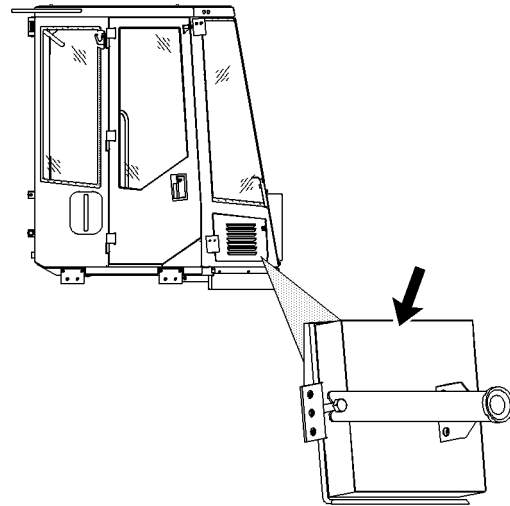


Illustration 146

g00790441

Open the access door that is located on both sides of the cab. Remove the two air filters.

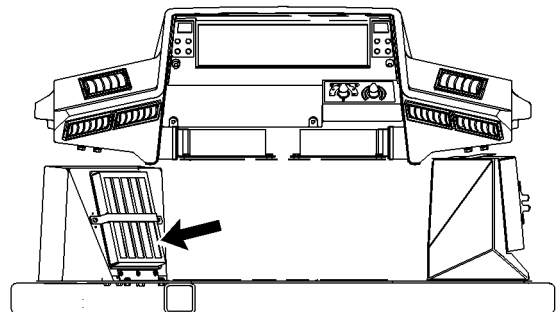


Illustration 147

g00790464

Remove the air filter that is located on the inside of the cab.

Clean the filter elements with pressure air or wash the filter elements in warm water with a nonsudsing household detergent. If water and detergent are used to clean the filter elements, rinse the filter elements in clean water and allow the filter elements to air dry thoroughly.

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

Install the filter elements. Install the filter covers and close the access doors.

i01558427

Circuit Breakers - Reset

SMCS Code: 1420-529



Circuit Breaker Reset – Push the button in order to reset the circuit breakers. The button will stay depressed if the circuit is working properly. Check the appropriate electrical circuit if the button does not stay depressed.

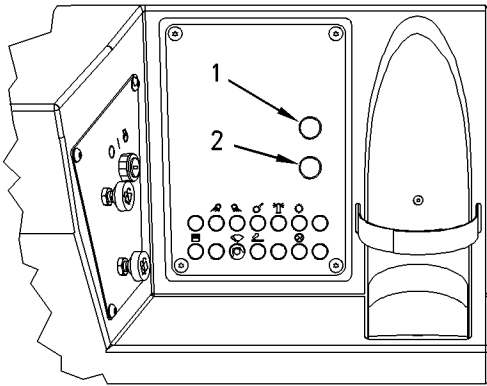


Illustration 148

g00809834

Circuit breakers are located on the fuse panel at the rear of the cab.



Seat Air Compressor (1) – 15 amp



Fan Motor (2) – 15 amp

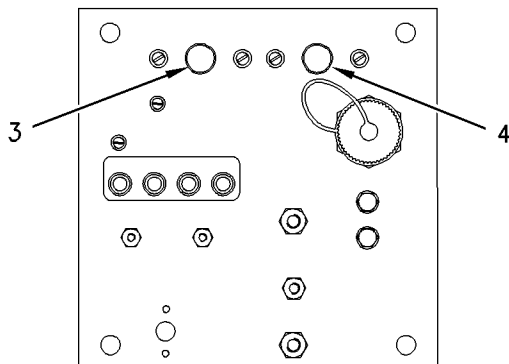


Illustration 149

g00809837

Two circuit breakers are located on the right side of the engine compartment below the air cleaner.



Alternator (3) – 80 amp



Main Circuit (4) – 80 amp

i01558459

Cooling System Coolant (DEAC) - Change

SMCS Code: 1350-044

WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Note: This procedure pertains to Caterpillar Diesel Engine Antifreeze/Coolant (DEAC) only. This procedure does not pertain to machines that are shipped from the factory with Extended Life Coolant (ELC) or to machines that are maintained with Extended Life Coolant (ELC).

Drain the coolant whenever the coolant is dirty or whenever the coolant is foaming.

1. Stop the engine and allow the engine to cool.
2. Slowly loosen the cooling system pressure cap in order to relieve system pressure.
3. Remove the drain plug on the bottom left side of the radiator. Allow the coolant to drain from the cooling system into a suitable container. Install the drain plug.
4. Replace the water temperature regulator.

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

5. Fill the cooling system with a solution which consists of clean water and cooling system cleaner. The concentration of the cooling system cleaner in the solution should be between 6 percent and 10 percent.
6. Start the engine. Run the engine for 90 minutes.
7. Stop the engine. Drain the cleaning solution into a suitable container for disposal.
8. While the engine is stopped, flush the cooling system with water. Flush the system until the draining water is clear. Install the drain plug.
9. Add the coolant solution.

Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the capacity of the cooling system.

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

10. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.
11. Clean the cooling system pressure cap and install the cooling system pressure cap.
12. Stop the engine. Close the engine hood.

i01558476

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL

WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE

Mixing ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

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

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

Reference: For information about the addition of Extender to your cooling system, see Operation and Maintenance Manual, “Cooling System Coolant Extender (ELC) - Add” or consult your Caterpillar dealer.

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

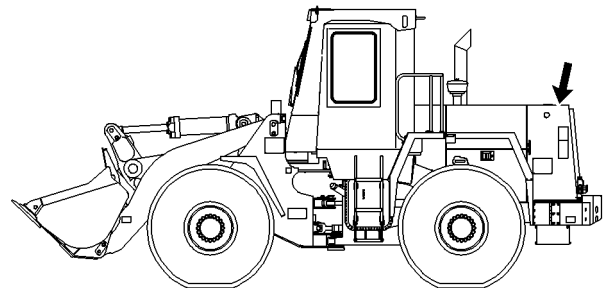


Illustration 150

g00809863

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

1. Slowly loosen the cooling system pressure cap in order to relieve system pressure.
2. Open the drain valve on the bottom of the radiator. The drain valve can be accessed from the left side of the machine. Allow the coolant to drain into a suitable container.
3. Flush the cooling system with clean water until the draining water is clean. Close the drain valve.
4. Replace the water temperature regulator.

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

5. Add the Extended Life Coolant.

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

6. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.
7. Maintain the coolant level in the sight gauge of the radiator.
8. Install the cooling system pressure cap. Stop the engine.

i01558454

Cooling System Coolant Additive (DEAC) - Add

SMCS Code: 1352-544

WARNING

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

NOTICE

Excessive additive (greater than the recommended 6% initial fill) together with concentrations of antifreeze greater than 60% cause deposits to form and can result in radiator tube blockage and overheating.

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.

Note: This procedure pertains to Caterpillar Diesel Engine Antifreeze/Coolant (DEAC) only. This procedure does not pertain to machines that are shipped from the factory with Extended Life Coolant (ELC) or to machines that are maintained with Extended Life Coolant (ELC).

Use an **8T-5296** Test Kit to check the concentration of the coolant.

1. Open the rear engine hood. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the cooling system pressure cap.
2. If necessary, drain enough coolant from the radiator in order to allow the addition of the liquid supplemental coolant additive. The coolant drain valve is located on the bottom left side of the radiator.
3. Add 0.24 L (0.25 qt) of liquid supplemental coolant additive to the cooling system.
4. Clean the cooling system pressure cap and install the cooling system pressure cap. Close the engine hood.

i01558469

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE

Mixing ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

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

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

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

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

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

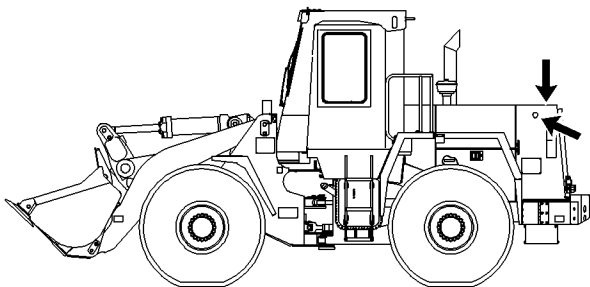


Illustration 151

g00809857

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

1. Slowly loosen the cooling system pressure cap in order to relieve any system pressure. Remove the cooling system pressure cap.
2. If necessary, drain enough coolant from the radiator in order to allow the addition of the Extender to the cooling system. The cooling system drain valve is located on the lower left side of the radiator.
3. Add 0.95 L (32 fl oz) of Extender to the cooling system.

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

4. Check the coolant level.

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

5. Install the cooling system pressure cap.

i01558482

Cooling System Level - Check

SMCS Code: 1350-535-FLV

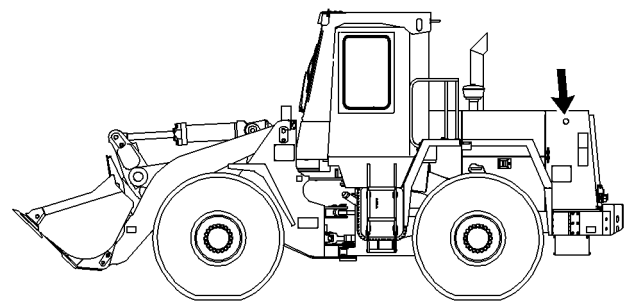


Illustration 152

g00809871

The coolant level sight gauge is located on the left side of the machine. Maintain the coolant level within the sight gauge. Add coolant, if necessary.

Note: If it is necessary to add coolant daily, inspect the cooling system for leaks.

i01562542

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

WARNING

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

NOTICE

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

NOTICE

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

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

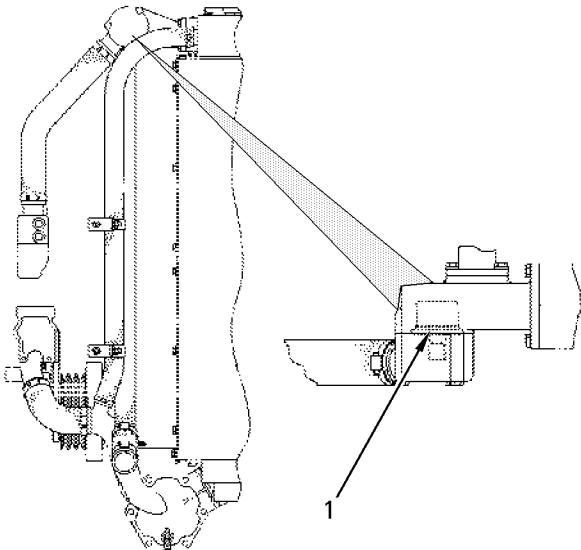


Illustration 153

g00811615

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

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

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

Reference: Refer to the Disassembly and Assembly Manual for the correct procedure for replacing the water temperature regulator.

i01564685

Differential and Final Drive Oil - Change

SMCS Code: 3278-044; 4011-044

NOTICE

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

Refer to Special Publication, NENG2500, "Caterpillar 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.

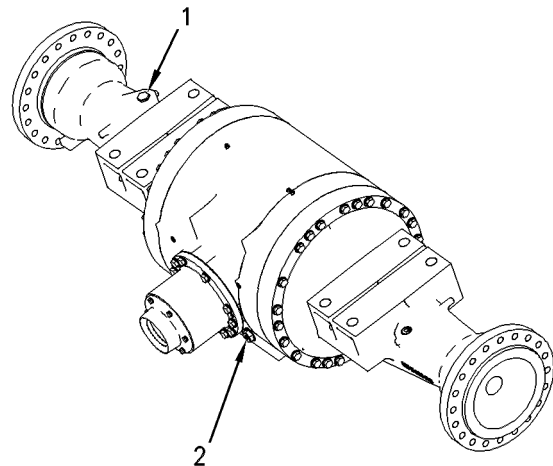


Illustration 154

g00287529

Typical Example

Front Axle

i01102280

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4011-535-FLV

Note: Before you measure the oil level, operate the machine for a few minutes in order to equalize the oil level.

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

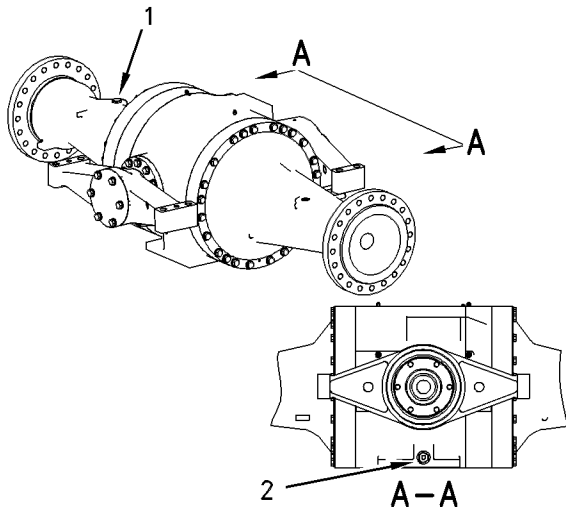


Illustration 155

g00287531

Typical Example
Rear Axle

Note: The axle housings are equipped with magnetic drain plugs.

1. Remove drain plugs (2). Allow the oil to drain into a suitable container.
2. Clean the drain plugs and install the drain plugs.
3. Wipe off dipstick/fill plugs (1) and the surfaces around dipstick/fill plugs (1).
4. Remove the dipstick/fill plugs. Fill the axles with oil.

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

5. Clean the dipstick/fill plugs and install the dipstick/fill plugs.
6. Run the machine on level ground for a few minutes in order to equalize the oil level in the axle. Check the oil level in the axle.

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

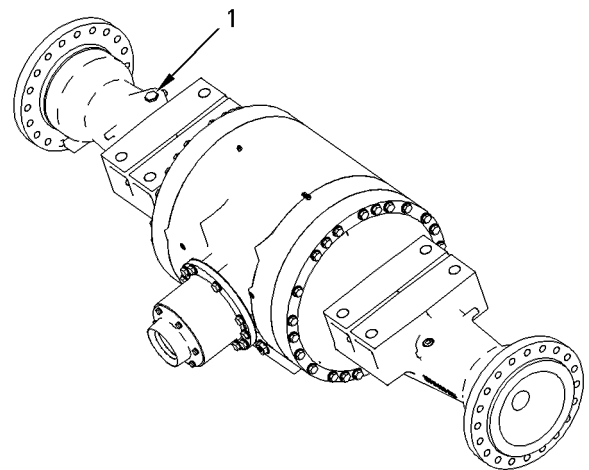


Illustration 156

g00285312

Front Axle

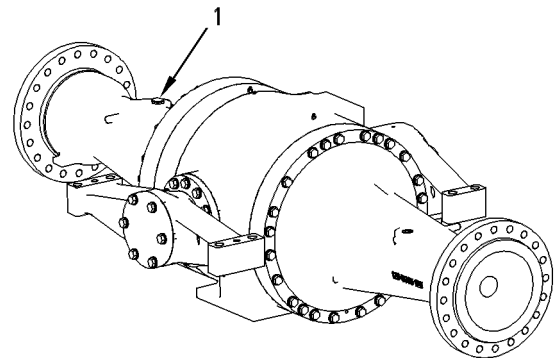


Illustration 157

g00287527

Rear Axle

2. Remove dipstick/fill plug (1) on the left side of the axle. Wipe off the level gauge with a clean cloth and reinsert the plug. This will ensure a more accurate measurement of the oil level.

Note: Make sure that the plug is installed completely before you check the oil level. If the plug is not installed completely, an incorrect oil level reading can occur.

3. Remove dipstick/fill plug (1) again and check the oil level. Maintain the oil level between the ADD mark and the FULL mark. Add oil, if necessary.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the type of lubricant and for the refill capacity.

4. Clean the plug and install the plug.

i01562087

Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

Note: For better access to the fitting, articulate the machine to the right or to the left. Since the steering frame lock cannot be connected in this case, remove the engine start switch key and turn the battery disconnect switch to the OFF position.

Wipe off the fitting before you apply any lubricant.

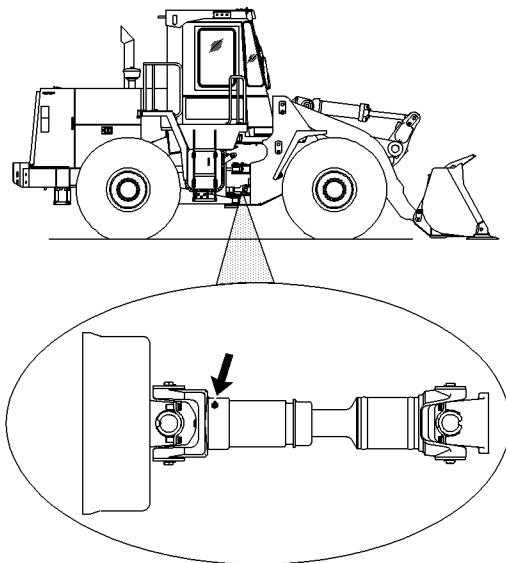


Illustration 158

g00811338

Apply lubricant through the fitting for the center drive shaft spline.

i01562133

Drive Shaft Support Bearing - Lubricate

SMCS Code: 3267-086-BD

Wipe off the fitting before any lubricant is applied.

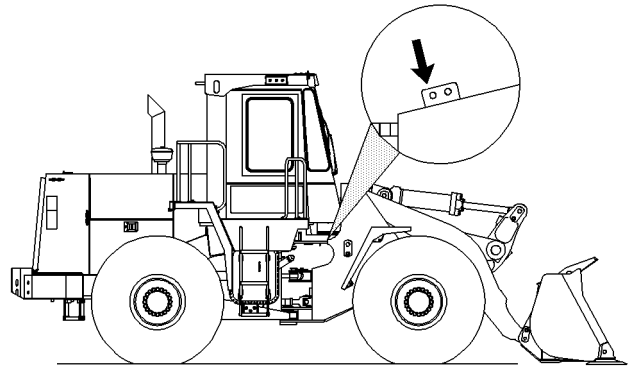


Illustration 159

g00811351

Apply lubricant through the remote fitting on the right side of the machine. Use the fitting that is toward the rear of the machine.

i01119388

Drive Shaft Universal Joints - Lubricate

SMCS Code: 3251-086

Wipe off all fittings before any lubricant is applied.

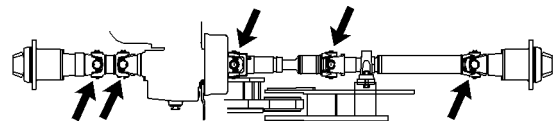


Illustration 160

g00291135

Apply lubricant through one fitting on each universal joint. There is a total of five fittings.

i01562179

Engine Air Filter Primary Element - Clean/Replace

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

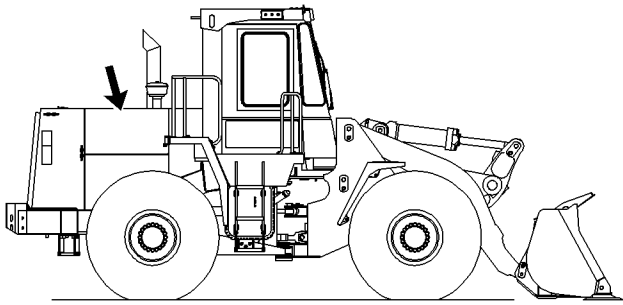


Illustration 161

g00811400

1. The air filter is located on the right side of the machine.

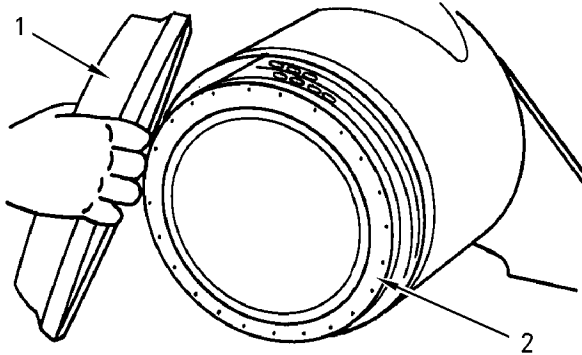


Illustration 162

g00811403

2. Remove cover (1) from the air filter housing.
3. Remove primary element (2) from the air filter housing.

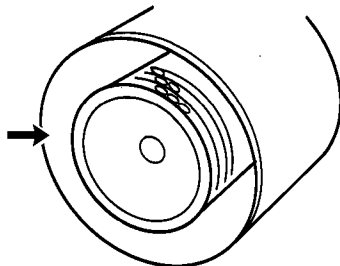


Illustration 163

g00039201

4. Clean the inside of the air filter housing.
5. Inspect the primary element. If the pleats, the gaskets, or the seals are damaged, discard the element and replace the element with a clean primary element.

NOTICE

Do not clean the primary elements by bumping or tapping them. Do not use primary elements with damaged pleats, gaskets or seals. Engine damage can result.

Make sure the cleaned primary elements are completely dry before installing them into the filter housing. Water remaining in the elements can cause false indications of contamination in S-O-S Analysis test results.

6. If the primary element is not damaged, clean the primary element.

The primary element can be cleaned by using the following methods:

- Pressure air
- Pressure water
- Detergent washing

Note: If the element has been used for one year or the element has been cleaned for the sixth time, replace the primary element.

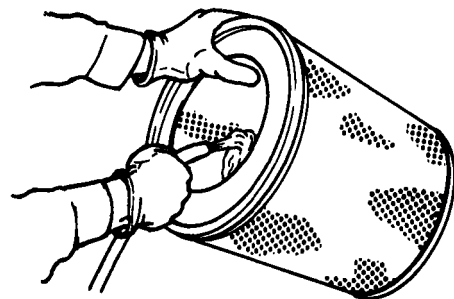


Illustration 164

g00039203

7. When you clean the inside pleats and the outside pleats, direct the air or the water along the pleats.

If you use pressure air, the maximum air pressure is 205 kPa (30 psi). If you use pressure water, the maximum water pressure is 280 kPa (40 psi).

The primary element can be washed in warm water with a nonsudsing household detergent. Fully rinse the pleats. Allow the primary element to air dry completely.

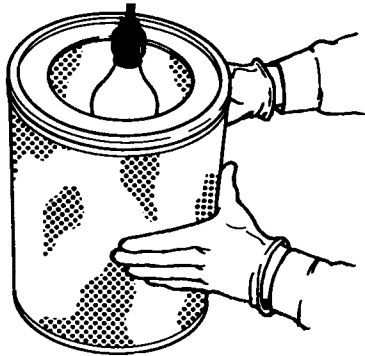


Illustration 165

g00038610

8. Inspect the primary element after you clean the element. Do not use an element if the pleats, the gaskets or the seals are damaged.
9. Cover the clean primary element. Store the element in a clean, dry location.
10. Install a clean primary element.
11. Clean the cover and install the cover on the air filter housing. Fasten the clips in order to secure the cover.
12. Close the engine access door.

i01562201

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

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

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

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

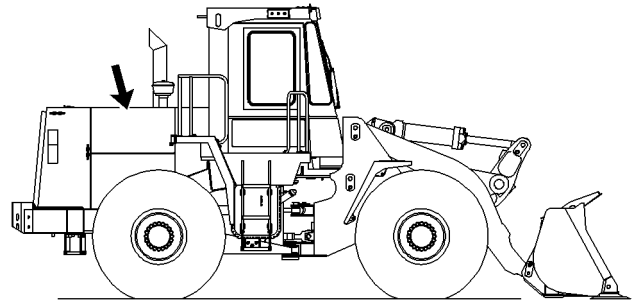


Illustration 166

g00811400

1. Open the engine access door. The air filter is located on the right side of the machine.

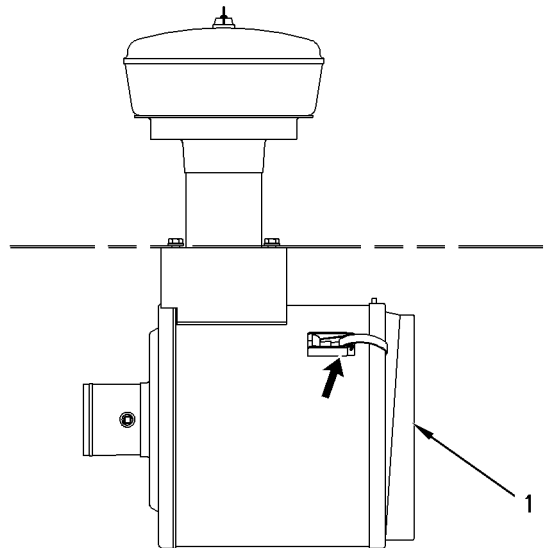


Illustration 167

g00811418

2. Loosen the clips which hold the cover (1) on the air filter housing. Remove the cover from the air filter housing.

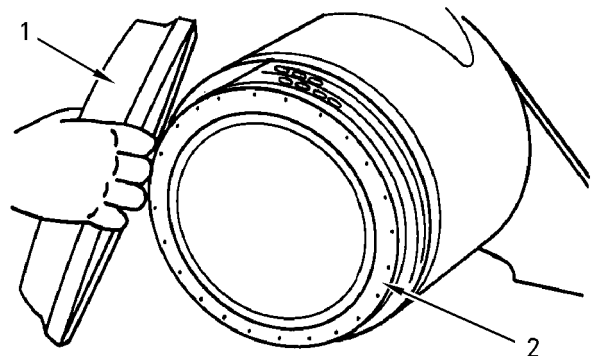


Illustration 168

g00811403

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

Note: Refer to Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace" for the procedure to remove the primary filter element.

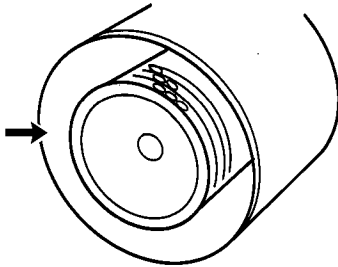


Illustration 169

g00039201

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

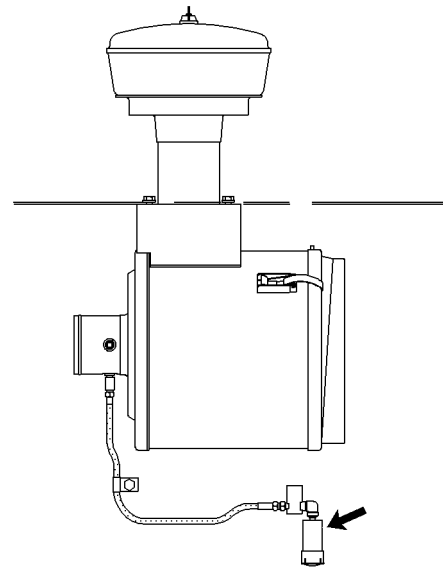


Illustration 170

g00809894

10. Reset the filter element indicator.
11. Close the engine access door.

i01558540

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040

NOTICE

Service the air cleaner only with the engine stopped. Engine damage could result.

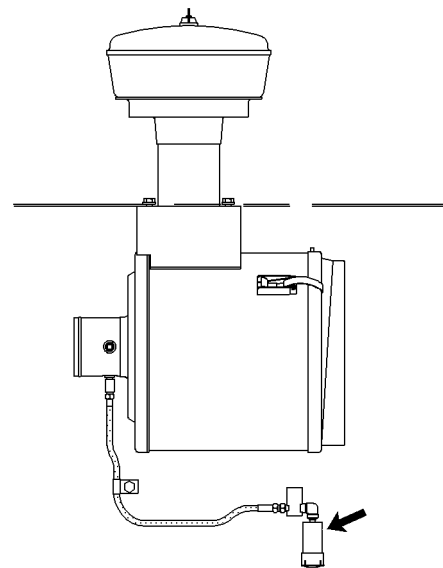


Illustration 171

g00809894

Open the access door on the right side of the machine in order to access the service indicator.

Service the air cleaner when the yellow piston in the service indicator is in the red zone. The service indicator can be checked when the engine is running or stopped.

i01558543

Engine Air Filter Service Indicator - Inspect/Replace

SMCS Code: 7452-040; 7452-510

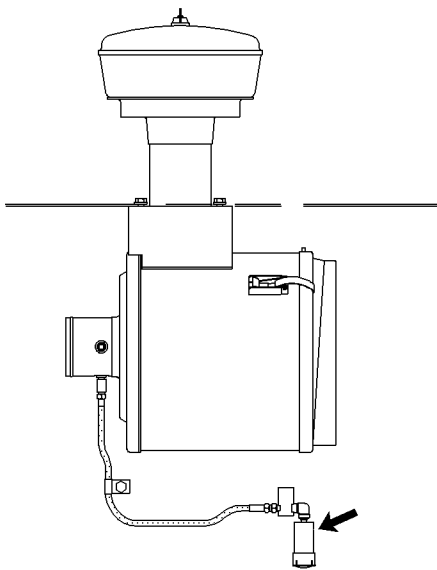


Illustration 172

g00809894

To check the condition of the service indicator, try resetting the service indicator. This should require less than three pushes of the reset button.

Next, check the movement of the yellow piston in the service indicator. Start the engine and accelerate the engine to high idle for a few seconds. After the governor control pedal is released, the yellow piston should remain at the highest position that was achieved during acceleration.

If either of these conditions are not met, replace the service indicator.

i01562193

Engine Air Precleaner - Clean

SMCS Code: 1055-070

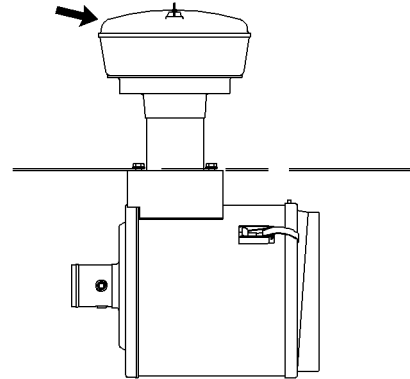


Illustration 173

g00811409

1. Empty the precleaner bowl whenever the dirt reaches the full mark.
2. Loosen the wing nut on the cover and remove the cover. Empty and wash the bowl and the cover.
3. Install the bowl and the cover. Tighten the wing nut finger tight. Do not use a tool.

i01562463

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

The crankcase breather is located on the top of the engine on the right side.

i01562332

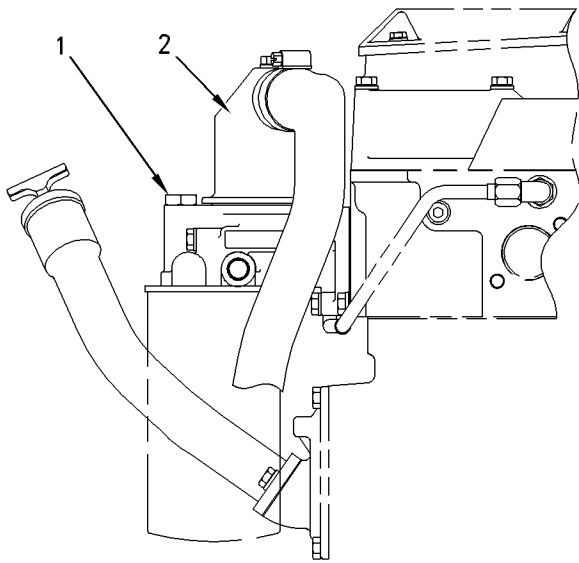


Illustration 174

g00811569

1. Remove the four bolts (1) that hold the breather cover (2). Remove the breather.
2. Check the condition of the cover seal. Replace the seal if the seal is damaged.
3. Wash the breather and the filter element in a clean nonflammable solvent.
4. Shake the breather or use pressure air in order to dry the breather.
5. Inspect the hose for damage. Replace the hose if it is necessary.
6. Install the breather assembly. Install the hose and install the hose clamp.
7. Close the access door.

Engine Governor Oil Supply Screen - Clean/Inspect/Replace

SMCS Code: 1264-510-Z3; 1264-571-Z3

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.

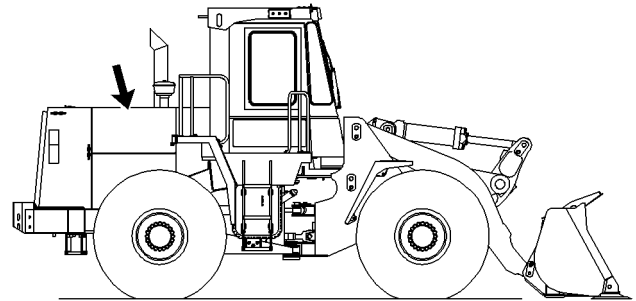


Illustration 175

g00811400

1. Open the engine access door. The engine governor is on the right side of the machine.

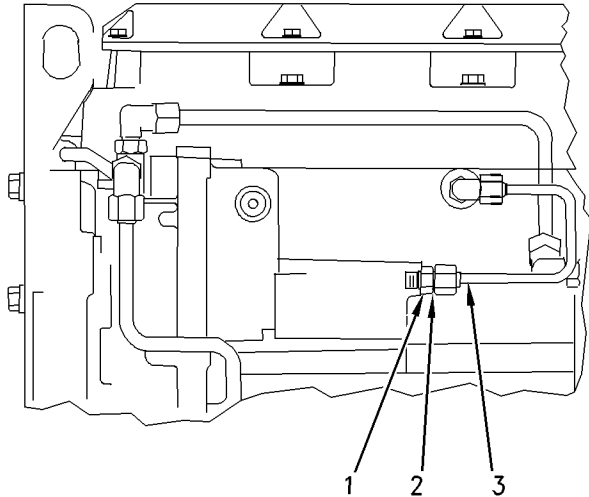


Illustration 176

g00811500

2. Remove oil supply tube (3) from the governor.
3. Remove fitting (1) and seal (2) from the governor housing.

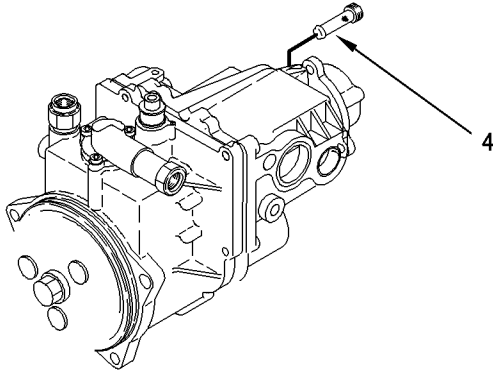


Illustration 177

g00811528

4. Use a 6 mm hexagon wrench to remove screen (4).
5. Wash the screen in a clean, nonflammable solvent. Inspect the screen and the seal for damage. Replace the screen and/or the seal, if necessary.
6. Install the screen far enough into the governor housing in order to allow clearance for the seal and for the fitting.
7. Install seal (3), fitting (2), and oil supply tube (1).
8. Start the engine and check the engine governor for leaks. Stop the engine and make any necessary repairs.

9. Close the engine access door.

i01562646

Engine Oil Level - Check

SMCS Code: 1000-535-FLV

NOTICE

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

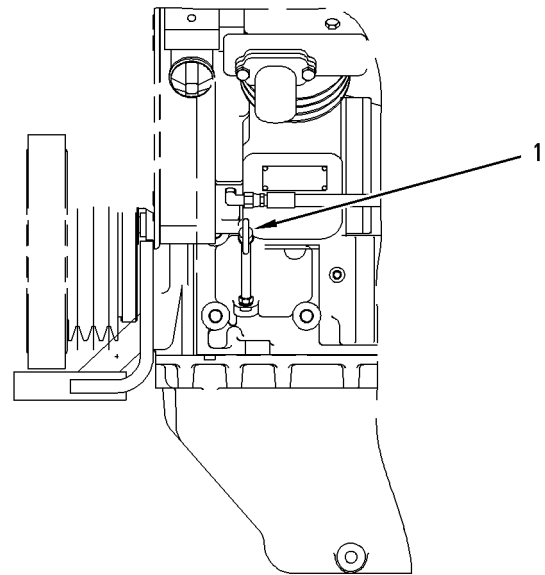


Illustration 178

g00811672

1. Open the engine access door on the right rear side of the machine. The engine oil dipstick (1) is located on the left side of the engine.
2. Remove engine oil dipstick (1) and wipe the dipstick with a clean cloth. Then, insert the dipstick and remove the dipstick again. This will ensure a more accurate measurement of the engine oil level.

i01562849

3. While the engine is stopped, check the "ENGINE STOPPED" side of engine oil dipstick (1). Maintain the oil level between the marks on the dipstick.

While the engine is running, check the "ENGINE RUNNING" side of engine oil dipstick (1). Maintain the oil level between the marks on the dipstick.

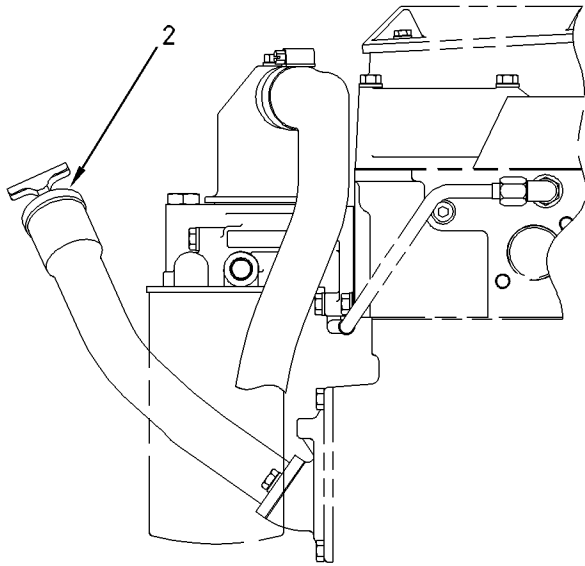


Illustration 179

g00811673

4. If necessary, remove oil filler plug (2) and add oil through the oil filler tube.
5. Clean the oil filler plug and install the oil filler plug.
6. Close the engine access door.

Engine Oil and Filter - Change

SMCS Code: 1318-510

NOTICE

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

Refer to Special Publication, NENG2500, "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.

1. Open the access door that is located on the left side of the machine.

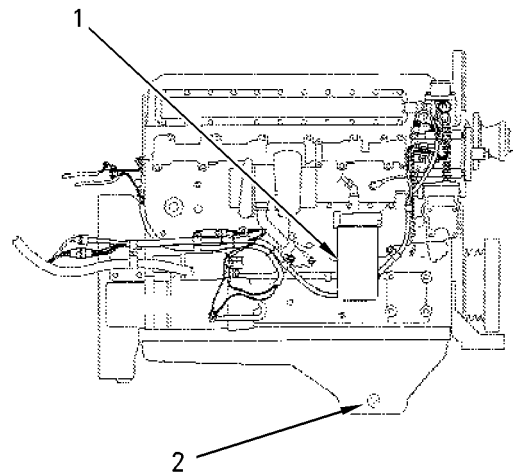


Illustration 180

g00811715

2. Remove the filter element (1) with a strap type wrench. Inspect the filter.

Reference: Refer to Operation and Maintenance Manual, "Oil Filter - Inspect".

3. Clean the filter mounting base with a clean cloth. Make sure that the used filter gasket has been completely removed.

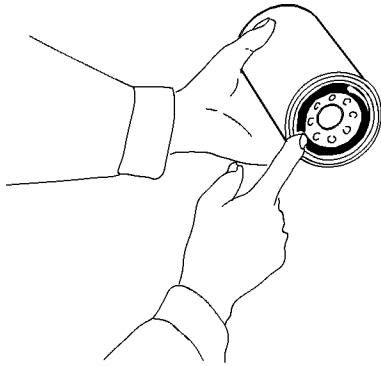


Illustration 181

g00101318

4. Apply a thin film of clean engine oil to the sealing surface of the new filter element.
5. Install the new filter element by hand. When the gasket contacts the filter base, tighten the filter by an additional 3/4 turn.
6. Open the crankcase drain valve (2). Allow the oil to drain into a suitable container. Close the crankcase drain valve.

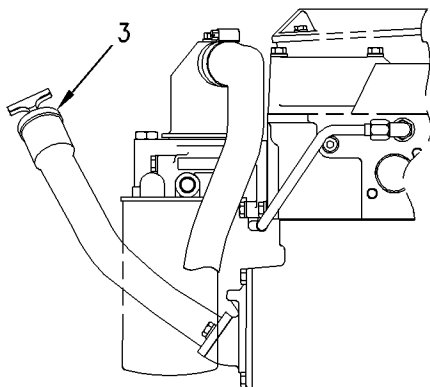


Illustration 182

g00811744

7. Open the access door that is located on the right side of the machine. Remove oil filler plug (3). Fill the crankcase with new oil.

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

8. Clean the oil filler plug and install the oil filler plug.
9. Start the engine and allow the oil to warm. Check for leaks.

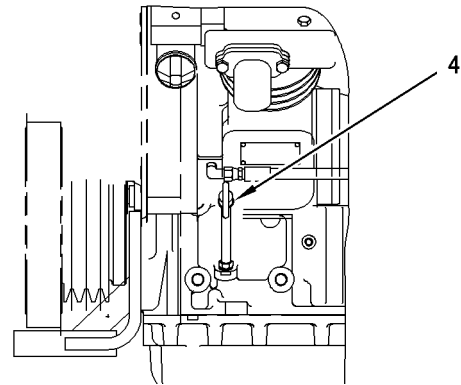


Illustration 183

g00811749

10. Check the engine oil level in dipstick (4).

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

11. Stop the engine. Close the engine access doors.

i01181536

Engine Valve Lash - Check

SMCS Code: 1105-535

For the correct procedure, refer to the appropriate Service Manual module for your machine's engine or consult your Caterpillar dealer.

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

i01558514

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

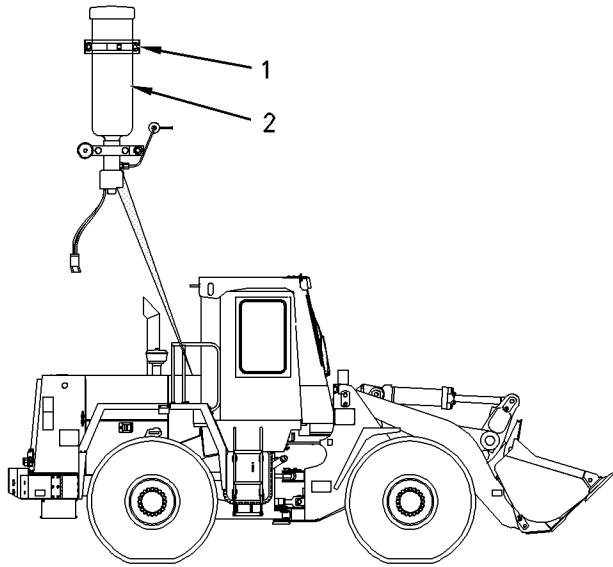


Illustration 184

g00809884

1. Open the access door. The ether starting aid cylinder is mounted on the right side of the machine.
2. Loosen retaining clamp (1) and unscrew ether starting aid cylinder (2).
3. Remove the gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
4. Install new ether starting aid cylinder (2) hand tight. Tighten retaining clamp (1) securely.
5. Close the access door.

i00643879

Fuel Injection Timing - Check

SMCS Code: 1290-531-FT

Refer to the Service Manual for the complete adjustment procedure for the Fuel injector timing.

Note: The correct fuel timing specification is found on the Engine Information Plate. Fuel timing specifications may vary for different engine applications and/or for different power ratings.

A qualified mechanic should adjust the fuel injector timing because special tools and training are required.

i01380757

Fuel System - Prime

SMCS Code: 1250-548

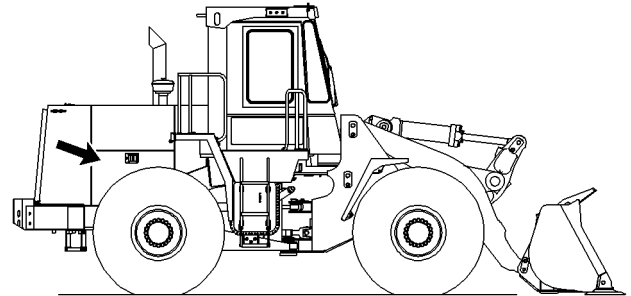


Illustration 185

g00729143

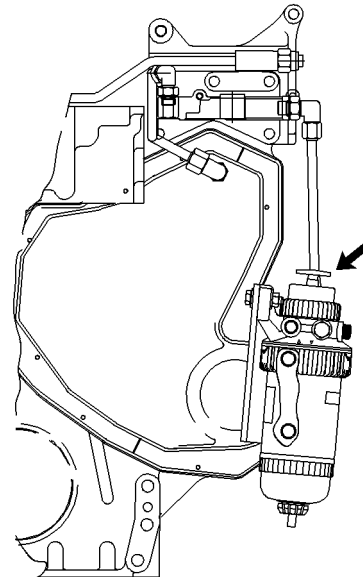


Illustration 186

g00729156

1. Open the engine access door on the right side of the machine in order to access the fuel priming pump. The fuel priming pump is located above the primary fuel filter.
2. Turn the priming pump plunger counterclockwise and pull out the priming pump plunger. Operate the priming pump plunger until resistance is felt. This indicates that the fuel filter is full of fuel.
3. Push the priming pump plunger inward and turn clockwise in order to lock the priming pump plunger.

4. Start the engine. Look for leaks around the fuel filter assembly. If the engine does not start, or if the engine misfires, more priming is necessary.

i01556371

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

S/N: 5SK1990-Up

S/N: 8TK3231-Up

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.

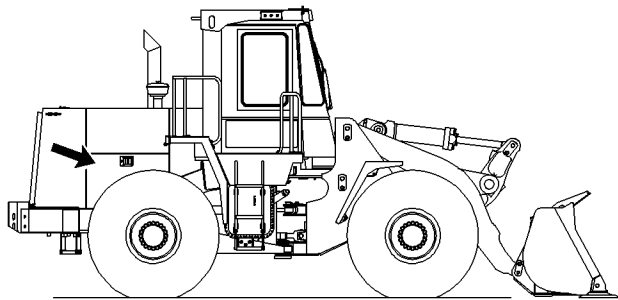


Illustration 187

g00729143

1. Open the engine access door on the right side of the machine. The water separator is located on the bottom of the primary fuel filter.

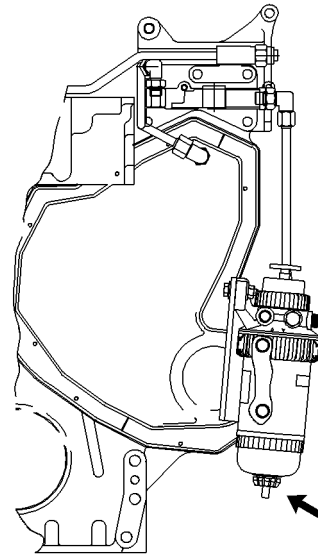


Illustration 188

g00808970

2. Open the drain valve on the bottom of the water separator bowl. Allow the water and the fuel to drain into a suitable container.

3. Close the drain valve.

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

4. Close the engine access door.

i01556387

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510; 1263-510-FQ

S/N: 5SK1990-Up

S/N: 8TK3231-Up

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE

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

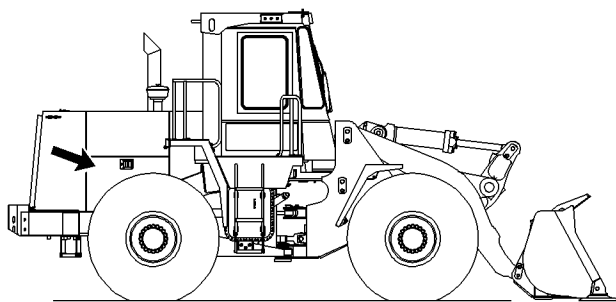


Illustration 189

g00729143

1. Open the engine access door on the right side of the machine.

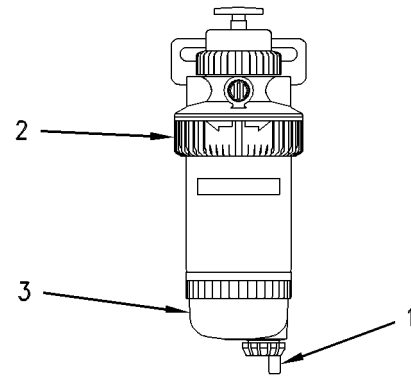


Illustration 190

g00284523

2. Open drain valve (1) on the bottom of water separator bowl (3). Allow the water and the fuel to drain into a suitable container.
 3. Support the water separator element and rotate the retaining ring (2) counterclockwise. Remove the retaining ring (2).
 4. Remove the water separator element from the mounting base.
 5. Remove water separator bowl (3) from the filter element. Clean the water separator bowl and the O-ring groove.
- Note:** The water separator bowl is reusable. Do not discard the water separator bowl.
6. Inspect the O-ring seal on the water separator bowl. Replace the O-ring seal, if necessary.
 7. Lubricate the O-ring seal with clean diesel fuel or with engine oil. Place the O-ring seal in the water separator bowl.
 8. Install water separator bowl (3) onto the new filter element by hand until the filter element is snug. Do not use tools to tighten the filter element.
 9. Install the new filter element. Rotate retaining ring (2) clockwise in order to fasten the filter to the mounting base. Continue to turn the retaining ring until an audible click is heard. If a click is not heard, the retaining ring has not been rotated far enough and the filter element is not in the locked position.
 10. Close drain valve (1).

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

11. Prime the fuel system in order to fill the water separator element with fuel.

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

12. Close the engine access door.

i01380766

Fuel System Primary Filter - Clean/Replace

SMCS Code: 1260-070; 1260-510

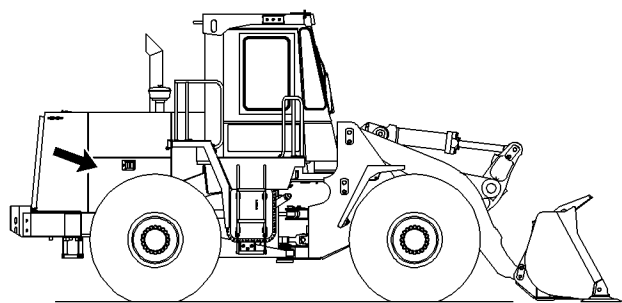


Illustration 191

g00729143

1. Open the engine access door on the right side of the machine.

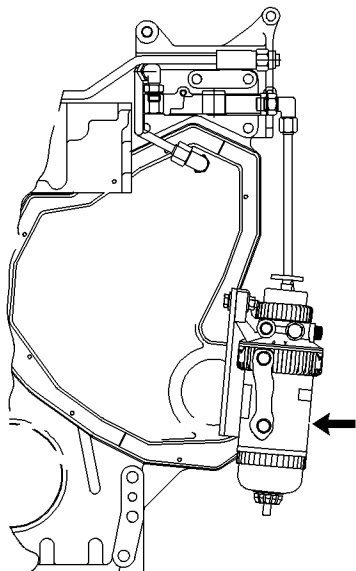


Illustration 192

g00729161

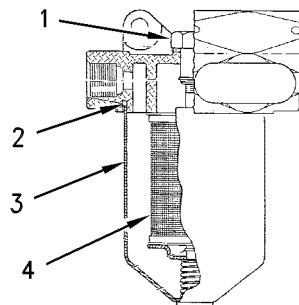


Illustration 193

g00283342

2. Loosen retaining bolt (1).
 3. Remove filter housing (3) and filter element (4).
 4. Wash the filter element and the filter housing in a clean, nonflammable solvent.
 5. Dry the filter element with pressure air.
 6. Clean the filter housing base.
 7. Inspect seal (2). Replace the seal if the seal is damaged.
 8. Insert the clean filter element into the filter housing.
- NOTICE**
- Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.
9. Install the filter housing onto the filter housing base.
 10. Tighten retaining bolt (1) to a torque of 24 ± 4 N·m (18 ± 3 lb ft).

i01380733

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

S/N: 4DJ1-Up

S/N: 5SK1-742

S/N: 8TK1-Up

S/N: 2LM1-Up

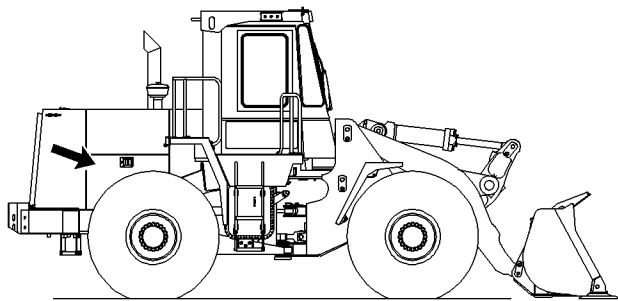


Illustration 194

g00729143

1. Open the engine access door on the right side of the machine.

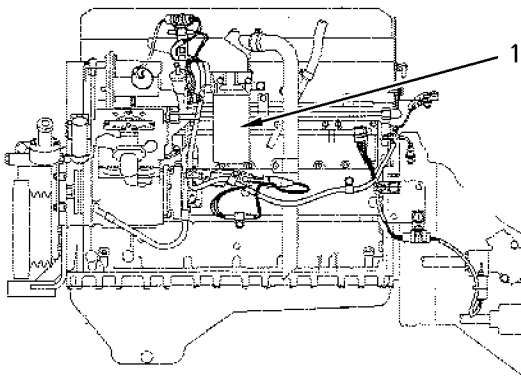


Illustration 195

g00729144

2. Remove fuel filter (1). Dispose of the used filter properly.
3. Clean the filter mounting base. Make sure that all of the used gasket is removed.
4. Lubricate the gasket of a new filter with clean diesel fuel.
5. Install the new filter by hand. When the gasket contacts the filter base, tighten the filter by an additional 3/4 turn.

There are rotation index marks on the filter at 90 degree intervals. Use these marks as a guide for proper tightening.

NOTICE

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

6. Prime the fuel system.

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

7. Close the engine access door.

i01559511

Fuel System Secondary Filter Number One - Replace

SMCS Code: 1261-510-SE

S/N: 5SK743-Up

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 filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

Open the engine access door. The secondary fuel filter is located on the right side of the machine.

Note: This machine is equipped with two secondary spin-on filters on a single filter base. The upper filter is upside-down. Always drain the inverted filter before you remove either filter.

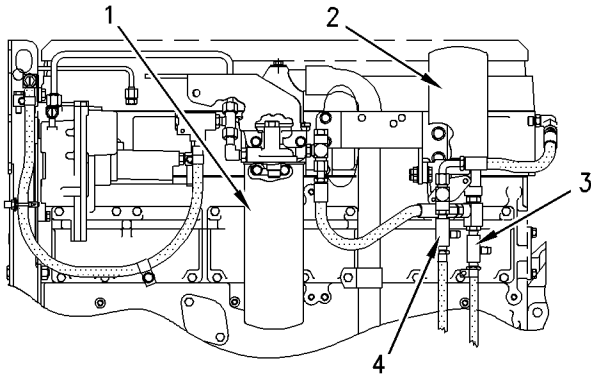


Illustration 196

g00810175

1. To drain upper filter (2) (inverted filter), place a suitable container under the drain valves and open drain valve (3). Then, immediately open drain valve (4) and allow the fuel to drain into the suitable container.

When the fuel stops draining, keep the drain valves open and loosen upper filter (2) by a 1/4 turn. As the filter is loosened, additional fuel may drain from the drain valves. Keep turning the filter by 1/4 turns until fuel does not drain from the drain valves. Then, close the drain valves and properly dispose of the fuel.

Note: Make sure that the drain valves are opened in the proper order. If you open the wrong drain valve first, an air lock in the fuel system may occur. This will not allow fuel to drain from the upper filter.

2. Hand tighten the upper filter until the seal contacts the filter base. Then, tighten upper filter (2) by an additional 3/4 turn.

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.

3. Remove lower filter (1).

Note: Lower filter (1) has not been drained. The filter contains fuel. When you remove the lower filter, use caution in order to avoid spilling the fuel.

4. Inspect the fuel filter element for debris by cutting the filter open. Discard the used fuel filter element properly.
 5. Clean the filter mounting base. Make sure that all of the used seal is removed from the filter mounting base.
-

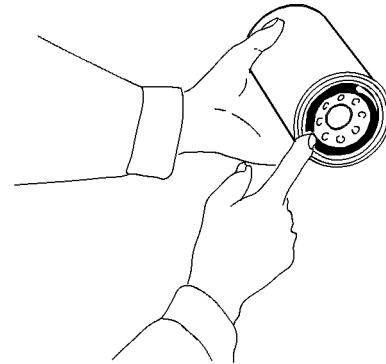


Illustration 197

g00101318

6. Apply a thin coat of clean diesel fuel to the sealing surface of the new fuel filter element.
7. Install the new fuel filter element by hand. When the seal contacts the filter base, tighten the fuel filter element by an additional 3/4 turn. This will tighten the fuel filter element sufficiently.

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.

8. Prime the fuel system.

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

9. Close the engine access door.

i01559538

Fuel System Secondary Filter Number Two - Replace

SMCS Code: 1261-510-SE

S/N: 5SK743-Up

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 filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

Open the engine access door. The secondary fuel filter is located on the right side of the machine.

Note: This machine is equipped with two secondary spin-on filters on a single filter base. The upper filter is upside-down. Always drain the inverted filter before you remove either filter.

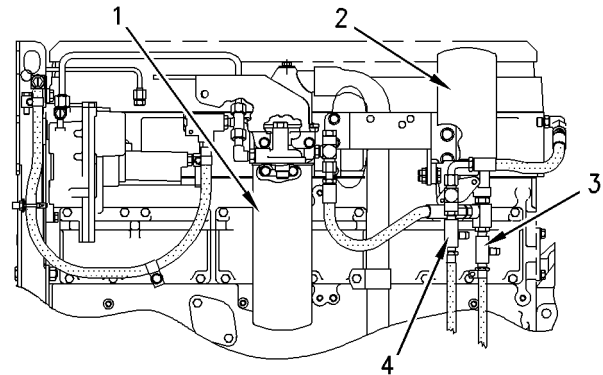


Illustration 198

g00810175

1. To drain upper filter (2) (inverted filter), place a suitable container under the drain valves and open drain valve (3). Then, immediately open drain valve (4) and allow the fuel to drain into the suitable container.

When the fuel stops draining, keep the drain valves open and loosen the inverted filter by a 1/4 turn. As the filter is loosened, additional fuel may drain from the drain valves. Keep turning the filter by 1/4 turns until fuel does not drain from the drain valves. Then, close the drain valves and properly dispose of the fuel.

Note: Make sure that the drain valves are opened in the proper order. If you open the wrong drain valve first, an air lock in the fuel system may occur. This will not allow fuel to drain from the upper filter.

2. Remove upper filter (2).
3. Inspect the fuel filter element for debris by cutting the filter open. Dispose of the used fuel filter element properly.
4. Clean the filter mounting base. Make sure that all of the used seal is removed from the filter mounting base.

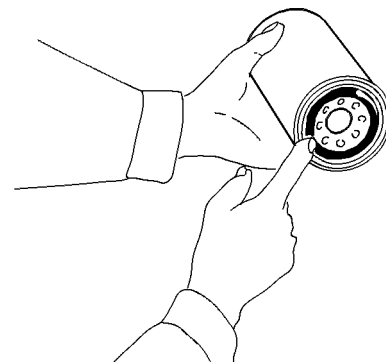


Illustration 199

g00101318

5. Apply a thin coat of clean diesel fuel to the sealing surface of the new fuel filter element.
6. Install the new fuel filter element by hand. When the seal contacts the filter base, tighten the fuel filter element by an additional 3/4 turn. This will tighten the fuel filter element sufficiently.

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. Prime the fuel system.

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

8. Close the engine access door.

i01557069

Fuel Tank Cap and Strainer - Clean

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

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

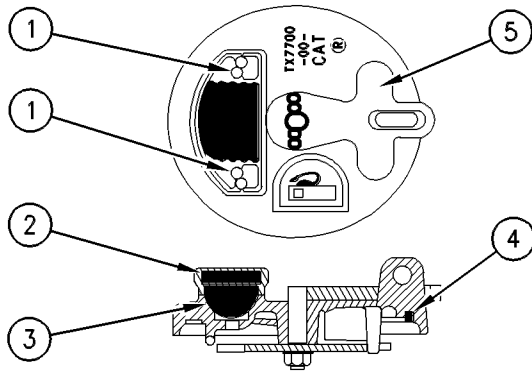


Illustration 200

g00100737

1. Lift lever (5) and turn the lever counterclockwise until the lever stops. Remove the fuel tank cap.
2. Inspect seal (4) for damage. Replace the seal, if necessary.
3. Remove screws (1), filter assembly (2), valve (3) and the gaskets.
4. Remove the strainer from the filler tube.
5. Wash the fuel tank cap and the strainer in a clean, nonflammable solvent.

6. Install a new cap filter kit. Install the other components in reverse order.
7. Install the strainer and the fuel tank cap.

i01464158

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

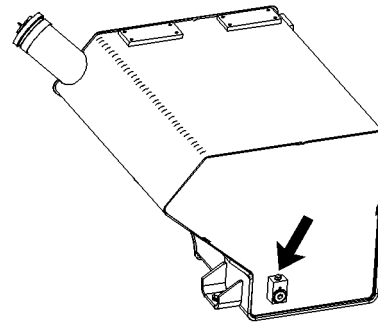


Illustration 201

g00765256

The drain valve is located under the fuel tank.

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

Note: If water and sediment are regularly found at weekly maintenance intervals, drain the sediment daily.

i01557031

Fuses - Replace

SMCS Code: 1417-510

NOTICE

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

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



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

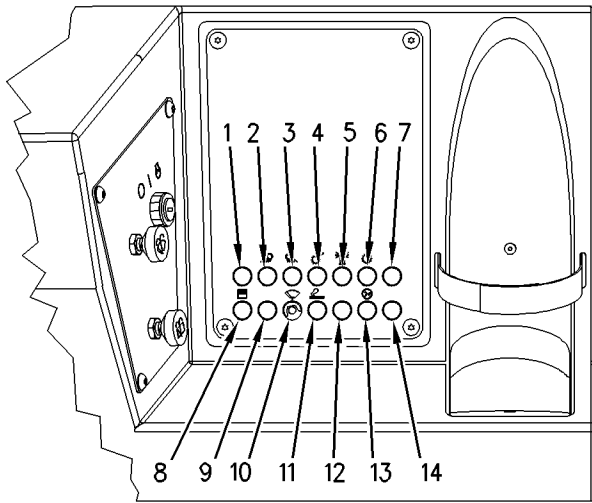








Illustration 202

g00809454

The fuse panel is located at the right of the operator compartment.

-  Electric Converter (1) – 10 amp
-  Payload Measurement System (2) – 10 amp
-  Window Wipers (3) – 10 amp
-  Transmission Control (4) – 10 amp
-  Turn Signals and Rotating Beacon (5) – 10 amp
-  Ride Control (6) – 10 amp
-  Rear Defroster (7) – 10 amp
-  Monitoring System (8) – 10 amp

-  Front Floodlights (9) – 10 amp
-  Rear Floodlights (10) – 10 amp
-  Lighter (11) – 10 amp
-  Autoshift (12) – 10 amp
-  Implement Kickout (13) – 10 amp
-  Diverter Valve (14) – 10 amp

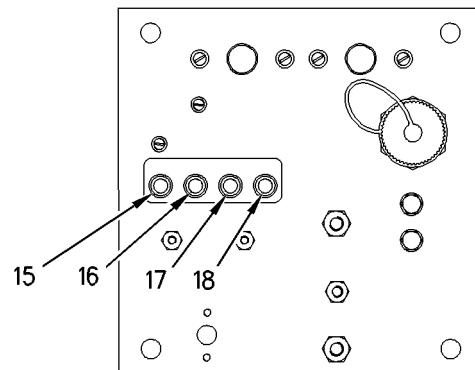






Illustration 203

g00809465

Additional fuses are located in the engine compartment on the right side of the machine.

-  Stop Lights (15) – 10 amp
-  Backup Alarm (16) – 10 amp
-  Engine Start Switch (17) – 10 amp
-  Horn (18) – 10 amp

i01561960

Hydraulic System Oil - Change

SMCS Code: 5056-044

NOTICE

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

Refer to Special Publication, NENG2500, "Caterpillar 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.

1. Operate the machine in order to warm the hydraulic oil.
2. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

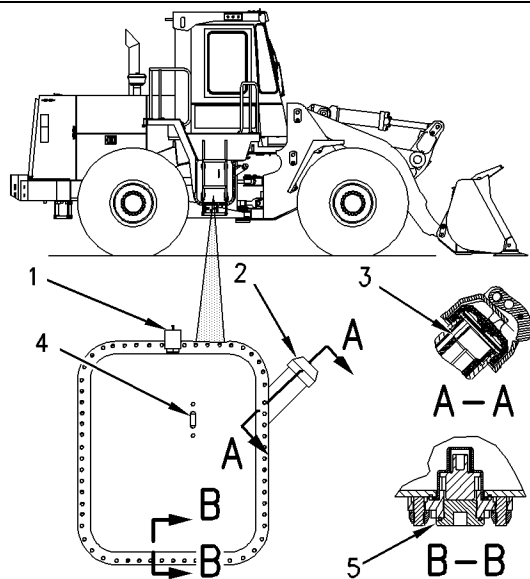


Illustration 204

g00811281

3. The hydraulic tank is located on the right side of the machine. Press the button on the breaker relief valve (1) in order to relieve any tank pressure.
4. Remove the hydraulic tank filler cap (2) and the filler strainer (3). Wash the filler cap and the strainer in a clean, nonflammable solvent. Install the strainer.

5. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.
6. Remove the drain plug (5) from the bottom of the hydraulic tank. Wash the drain plug in a clean, nonflammable solvent.
7. The hydraulic tank is equipped with an ecology drain valve. Attach a hose to a 126-7914 Oil Drain Coupling. Install the threaded end of the coupling into the drain valve in order to unseat the internal drain valve.

NOTICE

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

8. Close the drain valve. Install the drain plug.
9. Change the hydraulic oil filter.
Reference: Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace" for the correct procedure.
10. Fill the hydraulic tank with clean oil. Make sure that the oil level is at the "FULL" mark on the sight gauge (4). Install the filler cap.

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

11. Start the engine and run the engine for at least ten seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.
12. Start the engine and run the engine at low idle. Cycle the implements so that all hydraulic systems are filled with oil.

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

13. Add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge.
14. Stop the engine. Top off the hydraulic tank so that the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.

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

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

i01556975

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

NOTICE

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

Refer to Special Publication, NENG2500, "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.

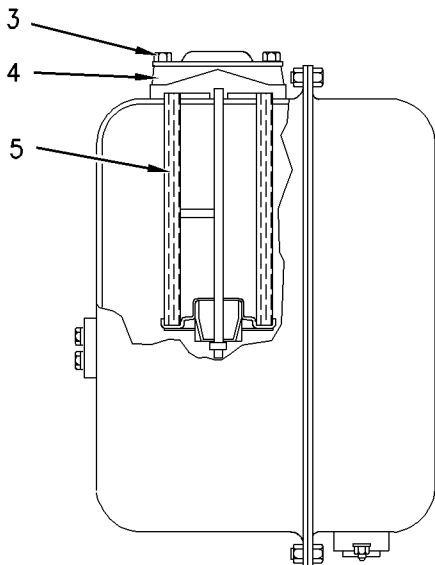


Illustration 205

g00813398

The hydraulic oil filters are located in the hydraulic oil tank. The hydraulic oil tank is located behind the platform on the right side of the machine.

1. Remove the three bolts (2) and swing the platform (1) away from the machine.

2. Remove the four bolts (3) from each of the covers (4). Remove both of the covers.
3. Remove the filter elements. Discard the old elements.
4. Clean the covers. Inspect the condition of the seals. Replace the seals, if necessary.
5. Install new filter elements and install the covers. Tighten the bolts to 58 ± 4 N·m (42.8 ± 2.9 lb ft).
6. Check the level of the hydraulic oil tank. Add oil, if necessary.
7. Close the platform and install the three bolts.

i01561998

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV

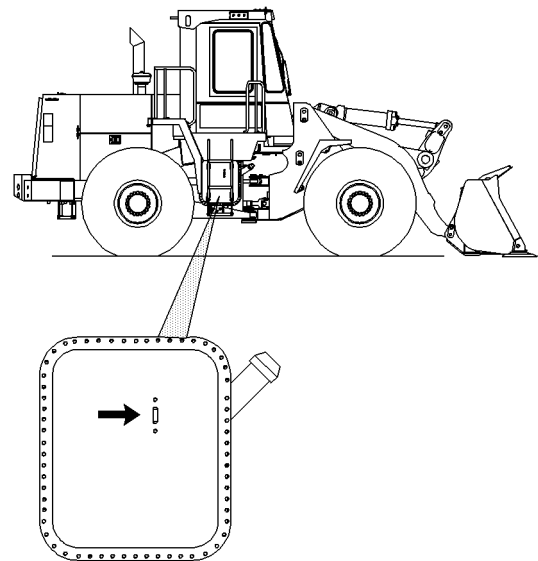


Illustration 206

g00811304

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

Maintain the oil level above the "ADD COLD" mark on sight gauge (2). If necessary, remove filler cap (1) slowly and add oil.

i01562008

Hydraulic Tank Breaker Relief Valve - Clean

SMCS Code: 5118-070

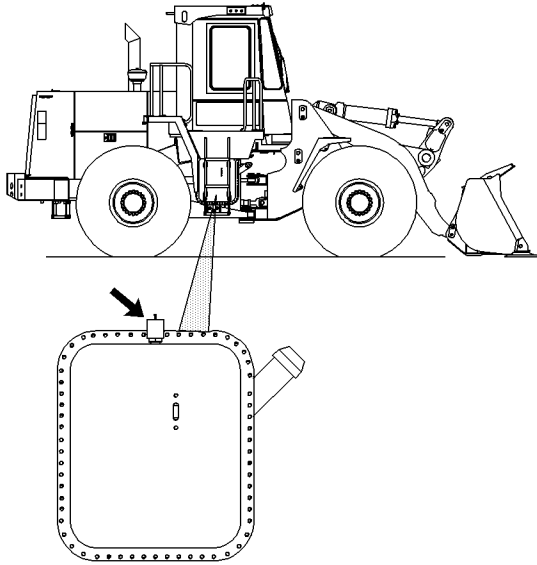


Illustration 207

g00811305

The hydraulic tank breaker relief valve is located on the top of the hydraulic tank on the right side of the machine.

1. Press the button on the top of the hydraulic breaker in order to relieve the pressure in the hydraulic tank. Remove the hydraulic tank breaker relief valve.
2. Clean the hydraulic tank breaker relief valve in a clean, nonflammable solvent. Shake the breaker relief valve dry or use pressure air to dry the breaker relief valve.
3. Install the hydraulic tank breaker relief valve.

i01556950

Lift Arm and Cylinder Linkage - Lubricate

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

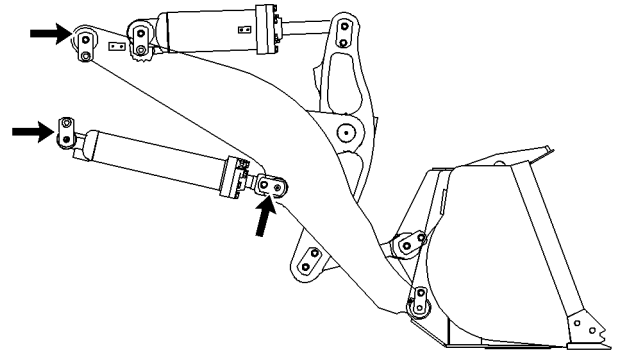


Illustration 208

g00809393

Lubricate two fittings on each lift arm.

Lubricate the fitting on the cylinder linkage knuckles of each side of the machine.

Note: There is a total of six fittings.

i01562023

Logging Fork Clamp - Lubricate

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

Wipe off all fittings before any lubricant is applied.

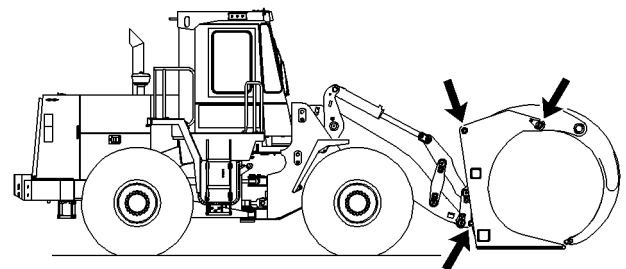


Illustration 209

g00811307

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

There is a total of six fittings.

i01719384

i01562425

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

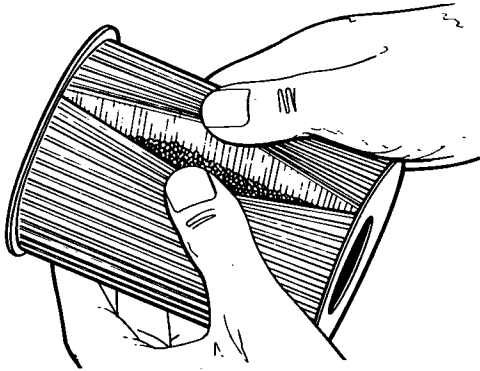


Illustration 210

g00100013

The element is shown with debris.

Use a **4C-5084** Filter Cutter or a **175-7546** Oil 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.

Radiator Core - Clean

SMCS Code: 1353-070-KO

Open the rear grill in order to access the radiator.

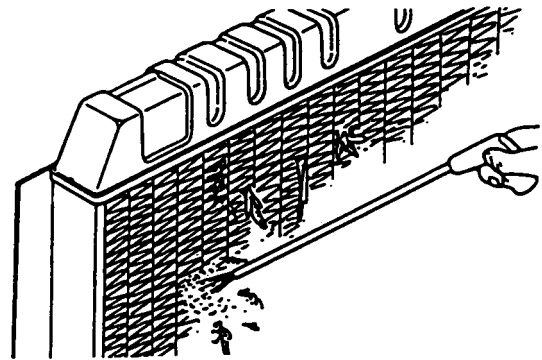


Illustration 211

g00100062

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

Reference: Refer to Special Publication, SEBU0518, "Know Your Cooling System" for the complete procedure for cleaning the radiator core.

i01555494

Ride Control Accumulator - Check

SMCS Code: 5077-535-R6

Note: When the ride control accumulator is properly charged, the fore and aft motion of the machine is reduced by the ride control accumulator.

Special tools and equipment are required in order to test the accumulator.

Reference: For more information, refer to Testing and Adjusting, SENR4932, "950f Wheel Loader and 950F Series II Wheel Loader Hydraulic System", "Accumulator (Ride Control) - Test and Charge" or consult your Caterpillar dealer.

i01457015

Roading Fender Hinges - Lubricate

SMCS Code: 7252-086-HNG

Wipe off the fitting before any lubricant is applied.

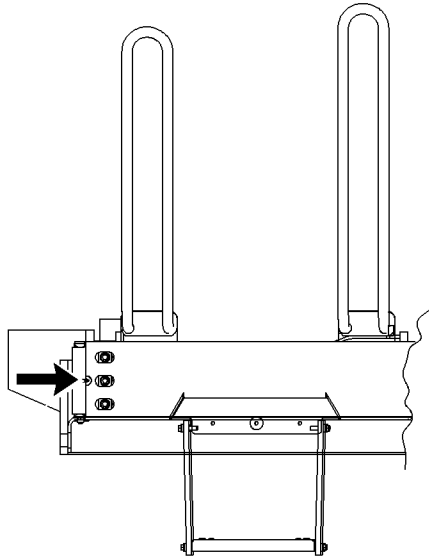


Illustration 212

g00761700

Swing open the roading fender. Apply lubricant through one fitting on the hinge. There is one hinge on each side of the machine.

i01555496

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

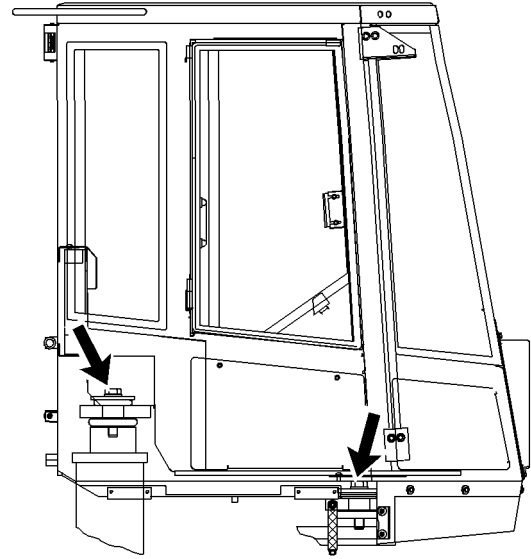


Illustration 213

g00813410

Inspect the ROPS for bolts that are loose or damaged. Use original equipment parts only to replace bolts that are damaged or missing. Tighten the four cab mounting bolts to a torque of 425 ± 50 N·m (315 ± 37 lb ft).

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

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

i01625445

Seat Belt - Replace

SMCS Code: 7327-510

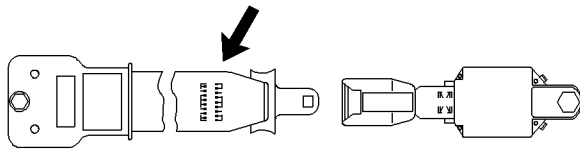


Illustration 214

g00841400

Regardless of the appearance of the seat belt, the seat belt should be replaced at every three year interval. A date label is attached to each seat belt. Use this label in order to determine the age of the seat belt.

Consult your Caterpillar dealer for replacement of the seat belt.

i01555430

Service Brake Disc Wear - Check

SMCS Code: 4255-535

Reference: For information about checking the service brake wear indicator, refer to Testing and Adjusting, SENR4930, "950F Series II Wheel Loader Air System and Brakes" or consult your Caterpillar dealer.

i01555371

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

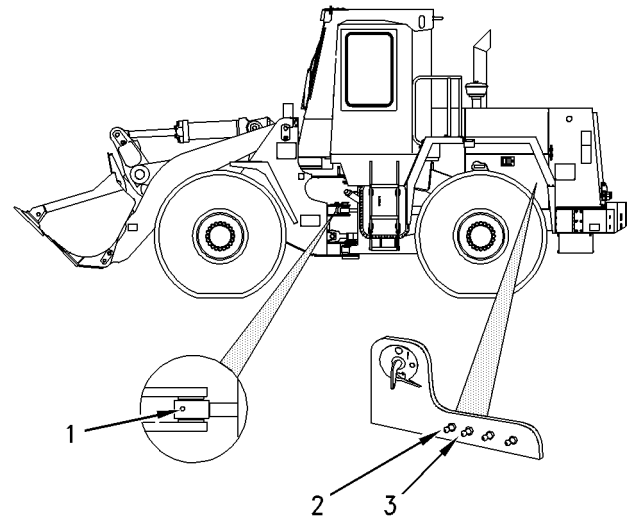


Illustration 215

g00808420

Wipe all fittings before lubrication.

The rod end of the steering cylinders are lubricated by using a grease fitting (1) that is located on the cylinder.

The head end of the steering cylinders are lubricated by using remote grease fittings. These fittings (2) and (3) are located on the left side of the machine.

There is a total of four fittings.

i01562042

Tilt Cylinder Bearings and Bucket Linkage Bearings - Lubricate

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

Wipe off all fittings before any lubricant is applied.

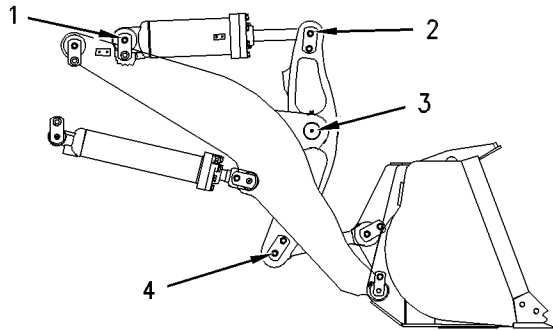


Illustration 216

g00291870

Apply lubricant through three fittings (2), (3) and (4).

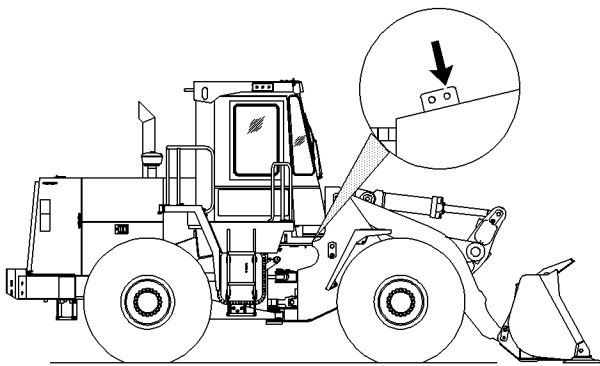


Illustration 217

g00811314

For pin joint (1), apply lubricant through a remote fitting on the right side of the machine. Use the fitting that is toward the front of the machine.

There is a total of four fittings.

i01467938

Tire Inflation - Check

SMCS Code: 4203-535-AI

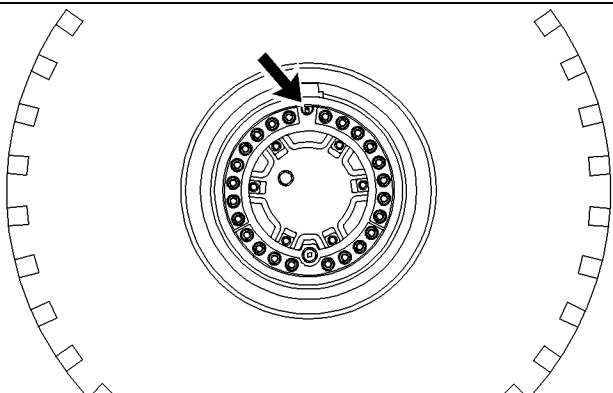


Illustration 218

g00766043

Measure the tire pressure on each tire. Consult your Caterpillar dealer for the correct load rating and for the correct operating pressures.

Inflate tires, if necessary. See Operation and Maintenance Manual, "Tire Inflation Information".

i01556862

Transmission Oil - Change

SMCS Code: 3030-044

NOTICE

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

Refer to Special Publication, NENG2500, "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.

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

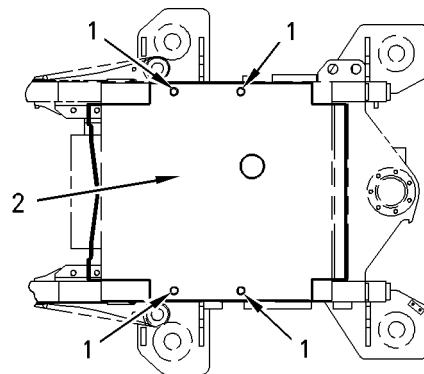


Illustration 219

g00766059

Typical Example

Note: Remove the bolts (1) that hold the transmission guard (2). Remove the transmission guard on the underside of the machine in order to access the magnetic strainer.

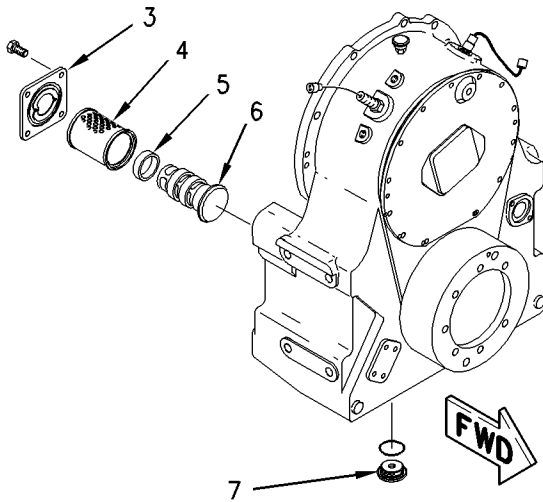


Illustration 220

g00766094

3. Remove transmission oil drain plug (7). Allow the oil to drain into a suitable container. Clean the drain plug and install the drain plug.
4. Remove four cover bolts and magnetic strainer cover (3).
5. Remove suction screen (4) and tube (6) from the housing. Remove three magnets (5) from the tube.
6. Wash the tube and the screen in a clean, nonflammable solvent.
7. Use a cloth, a stiff bristle brush or pressurized air to clean the magnets.

NOTICE

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

8. Clean the cover and inspect the cover seal. Replace the seal, if necessary.
9. Install three magnets (5) on the tube. Insert suction screen (4) and tube (6) in the housing.
10. Install the cover and the cover bolts.
11. Replace the transmission oil filter.

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

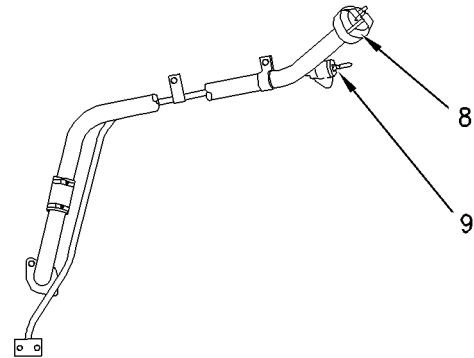


Illustration 221

g00809376

12. The filler tube for the transmission is located near the center hitch. Remove the filler cap (8) and fill the transmission with oil.
- Reference:** Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the correct type of oil and for the correct amount of oil.
13. Remove the transmission breather from the top of the transfer case. Wash the breather in a clean, nonflammable solvent. Install the breather.
 14. Start the engine. Slowly operate the transmission controls in order to circulate the oil.
 15. Move the transmission control to the NEUTRAL position. Stop the engine. Inspect the transmission for leaks.
 16. Check the transmission oil level. The dipstick (9) is located near the filler tube. The oil should be between marks on the dipstick.

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

i01562428

Transmission Oil Filter - Replace

SMCS Code: 3067-510

NOTICE

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

Refer to Special Publication, NENG2500, "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.

1. Park the machine on a hard, level surface. Lower the bucket to the ground with a slight downward pressure. Engage the parking brake and stop the engine.

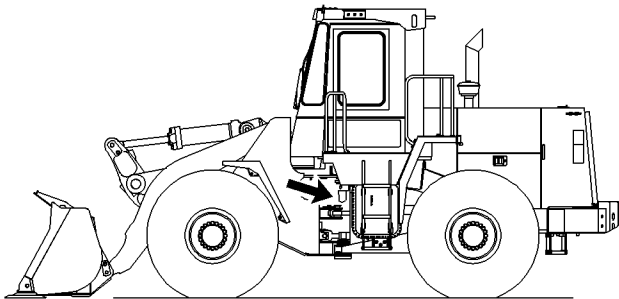


Illustration 222

g00811546

2. The transmission oil filter is located on the left side of the machine near the articulation joint. Use a strap type wrench to remove the transmission oil filter. Dispose of the used oil filter properly.
3. Clean the filter mounting base. Remove all of the used filter gasket from the filter mounting base.

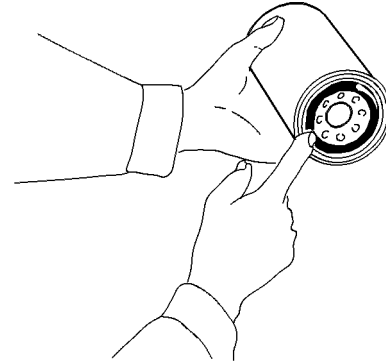


Illustration 223

g00101318

4. Apply a thin coat of clean transmission oil to the gasket of the new filter element. Install the new filter element by hand. When the gasket contacts the filter mounting base, tighten the transmission oil filter by an additional 3/4 turn.
5. Start the engine. Slowly operate the transmission controls in order to circulate the transmission oil.
6. Move the transmission control to the NEUTRAL position. Inspect the transmission oil filter for leaks.
7. Check the transmission oil level.

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

i01556432

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

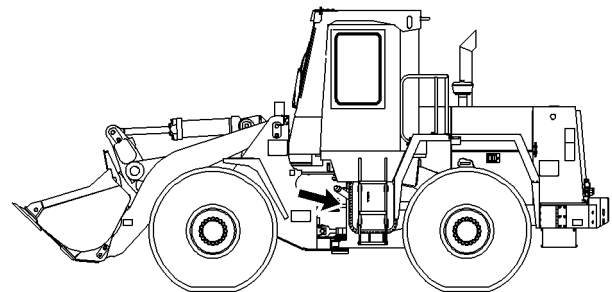


Illustration 224

g00809008

The dipstick for the transmission oil level is located on the left side of the machine near the articulation joint.

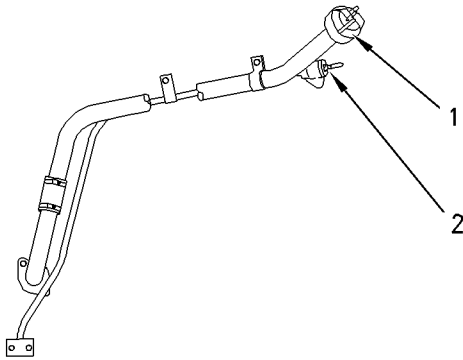


Illustration 225

g00809013

Note: Before the machine is started, the transmission oil level should be above “MIN START” mark on the dipstick (2).

1. Operate the machine for a few minutes in order to warm the transmission oil.
2. Park the machine on a hard, level surface. Put the transmission control into the NEUTRAL position. Lower the bucket to the ground with a slight downward pressure. Engage the parking brake.
3. Check the oil level while the engine is running at low idle.

While the engine is running at low idle, the transmission oil level should be between the “MIN” mark and the “MAX” mark.

4. If necessary, remove the filler cap (1) and add oil.

i01708329

Walk-Around Inspection

SMCS Code: 7000-040

Note: Inspect the machine for leaks. If leaks are observed, find the source of the leak and correct the leak. If leaks are suspected, check the fluid levels more frequently than the recommended intervals.

- Inspect the cooling system for leaks and for faulty hoses. Fix any leaks and replace hoses, as needed. Remove any debris buildup from the radiator. For more information, refer to Operation and Maintenance Manual, “Radiator Core - Clean”.
- Inspect the engine compartment. Remove any debris buildup from the engine compartment. Clean the engine access doors.
- Inspect the engine for any obvious component damage.
- Inspect the precleaner bowl for dirt buildup. Clean the precleaner bowl if dirt has accumulated to the “FULL” mark. For more information, refer to Operation and Maintenance Manual, “Engine Air Precleaner - Clean”.
- Inspect the tires for damage. Replace any missing valve caps.
- Inspect the axles, the differentials, the wheel brakes and the transmission for leaks. Fix any leaks.
- Inspect the hydraulic system for leaks. Check the hydraulic tank, all hoses and all tubes. Also, check all plugs, all seals, all couplings and all fittings. Fix any leaks and replace hoses, as needed.
- Inspect all attachments and the linkages for wear and for damage.
- Make sure that all access doors, all access covers and all guards are secured. Inspect the access doors, the access covers and the guards for damage.
- Inspect the steps, the walkways and the handholds. Remove any debris. Repair any damage or replace any damaged parts.
- Inspect the Rollover Protective Structure (ROPS) for obvious damage. Consult your Caterpillar dealer for repairs.
- Inspect the lights. Replace any broken bulbs and any broken lenses.
- Inspect the operator compartment. Remove any trash buildup. Keep the operator compartment clean.
- Inspect the dash panel for broken gauges and for broken indicator lights. Replace any broken parts.
- Inspect the seat belt, the buckle and the mounting hardware. Replace any components that are worn or damaged. For more information, refer to Operation and Maintenance Manual, “Seat Belt - Replace”.
- Adjust the mirrors for best visibility.

- Inspect the windows. Make sure that the operator's vision is not impaired by dust, by mud, or by other foreign materials. Clean the windows, if necessary. For more information, refer to Operation and Maintenance Manual, "Windows - Clean".

i01554406

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE

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

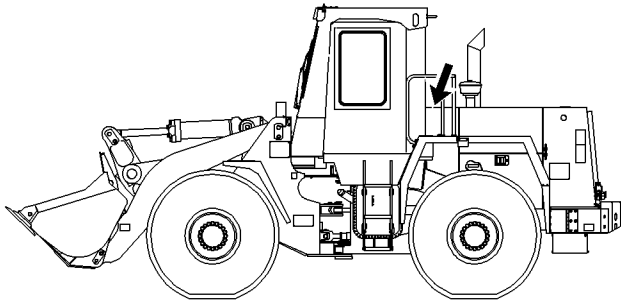


Illustration 226

g00808309



Window Washer Reservoir – The window washer reservoir is located behind the operator compartment on the firewall. Open the cover in order to access the reservoir.

i01562053

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

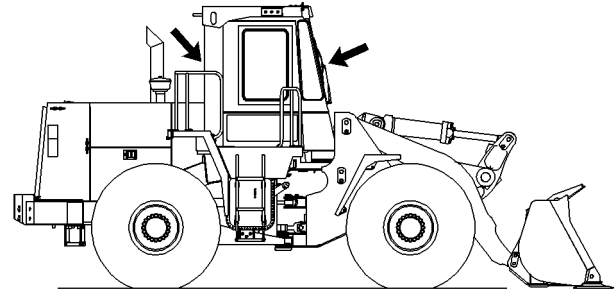


Illustration 227

g00811317

Inspect the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i00037755

Windows - Clean

SMCS Code: 7310-070

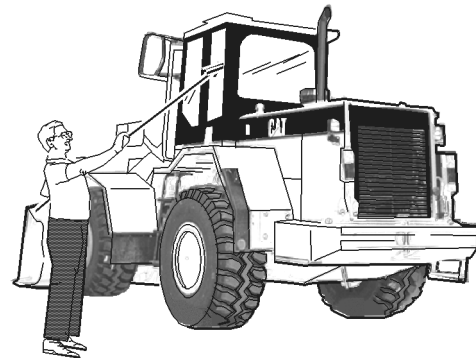


Illustration 228

g00038949

Use commercially available window cleaning solutions in order to clean the windows. Clean the outside windows from the ground unless handholds are available.