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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

Operation and Maintenance Manual

416C, 426C, 428C, 436C and 438C Backhoe Loaders

5YN16590-Up (Machine)
7WN1100-Up (Machine)
8RN4990-Up (Machine)
9JN1050-Up (Machine)
9KN1400-Up (Machine)
1ER900-Up (Machine)
1GR950-Up (Machine)
1JR1150-Up (Machine)
1NR1050-Up (Machine)
1RR1100-Up (Machine)
1TR1850-Up (Machine)
1XR2250-Up (Machine)
1ZR1000-Up (Machine)
2BR1000-Up (Machine)
2CR19310-Up (Machine)
2DR3450-Up (Machine)

i01126021

Maintenance Interval Schedule

SMCS Code: 7000

Note: All safety information, warnings, and instructions must be read and understood before you perform any operation or any maintenance procedure.

Before each consecutive interval is performed, all of the maintenance requirements from the previous interval must also be performed.

The normal oil change interval is Every 500 Service Hours or Three Months. If the engine is operated under severe conditions or if the oil is not Caterpillar oil, change the oil after Every 250 Service Hours or after One Month. Severe conditions include the following factors: high temperatures, continuous high loads, and extremely dusty conditions.

Refer to the results of the S-O-S oil analysis in order to determine if the oil change interval should be decreased to 250 hours. Consult your Caterpillar Dealer for detailed information regarding the optimum oil change interval.

Note: Certain machines are equipped with engines that require the engine valve lash to be checked every 1000 service hours or 6 months. Refer to the Operation and Maintenance Manual, "Engine Valve Lash - Check" for further information.

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Every 250 Service Hours or Monthly

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Transmission Oil Filter - Replace	229

Every 500 Service Hours or 3 Months for Machines Used in Severe (50% or more of loader work) Applications

Differential Oil (Rear) - Change	203
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Every 1000 Service Hours or 6 Months

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Every 2000 Service Hours or 1 Year

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Every 3000 Service Hours or 2 Years

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Every 6000 Service Hours or 4 Years

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i00079668

Air Conditioner - Test (If Equipped)

SMCS Code: 7320

NOTICE

Refrigerant in the air conditioner system can cause personal injury. Avoid any contact with refrigerant.

Check the refrigerant before warm weather begins. Check the refrigerant when the system does not work properly.

The system should be checked with pressure gauges by a qualified technician. Consult your Caterpillar dealer for proper installation when the system needs refrigerant.

Operate the air conditioner at least monthly in order to lubricate the compressor seals. Set the controls on MAXIMUM for 15 minutes.

i00595214

Axle Universal Joint (Front) - Lubricate

SMCS Code: 3251



Illustration 265

g00290595

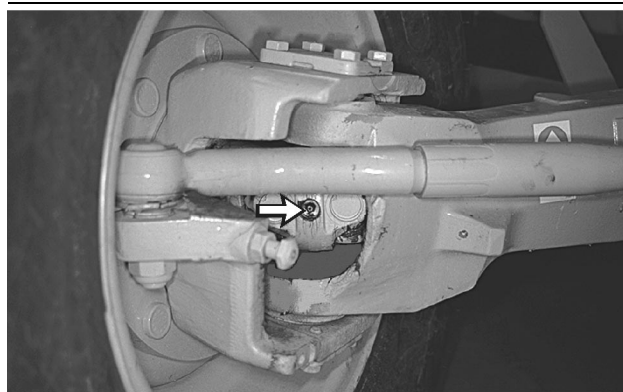


Illustration 266

g00290596

Apply lubricant to the grease fittings for the drive shaft to the final drives. There are two grease fittings for each drive shaft.

i00613528

Axle Universal Joint (Rear) - Lubricate (All Wheel Steer Machines Only)

SMCS Code: 3251



Illustration 267

g00287245

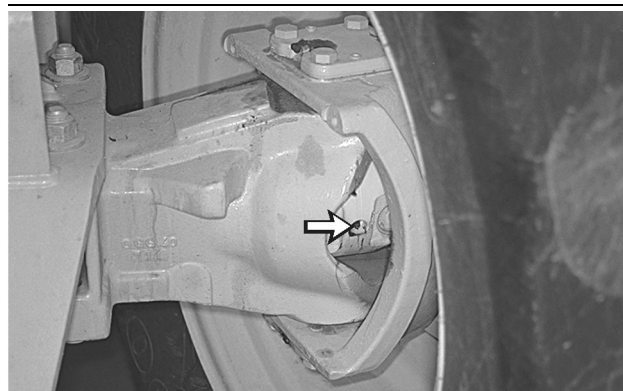


Illustration 268

g00287244

Apply lubricant to the grease fittings for the universal joints of each drive shaft to the final drives. There are two grease fittings for each universal joint.

i01179717

Backhoe Boom, Stick, Bucket, and Cylinder Bearings - Lubricate

SMCS Code: 6501; 6502; 6503; 6510; 6511; 6512; 6513; 6533



Illustration 269

g00633021

Position the backhoe into the service position.

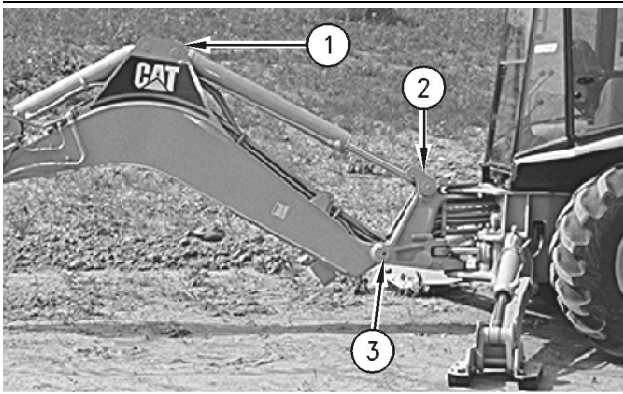


Illustration 270

g00287247

Apply lubricant to the grease fitting (1) for the head end of the boom cylinder. Apply lubricant to the grease fitting (2) for the rod end of the boom cylinder.

Apply lubricant to the grease fitting (3) for the boom pivot. There is one grease fitting on each side of the machine.

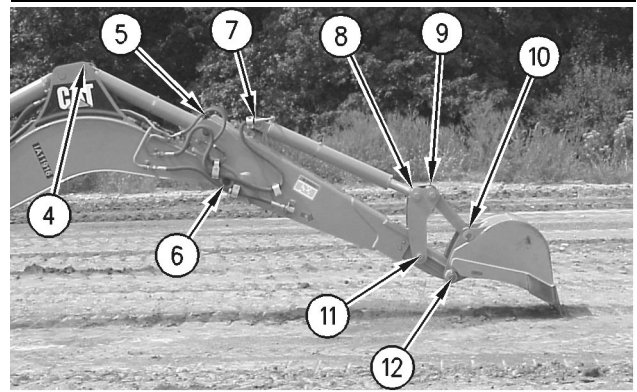


Illustration 271

g00632950

Apply lubricant to the grease fitting (4) for the head end of the stick cylinder. Apply lubricant to the grease fitting (5) for the rod end of the stick cylinder.

Apply lubricant to the grease fitting (6) for the pivot pin for the stick.

Apply lubricant to the grease fitting (7) for the head end of the bucket cylinder. Apply lubricant to the grease fitting (8) for the rod end of the bucket cylinder.

Apply lubricant to the grease fitting (9) for the top of the link.

Apply lubricant to the grease fitting (10) for the bottom of the link.

Apply lubricant to the grease fitting (11) for the pivot pin.

Apply lubricant to the grease fitting (12) for the bucket pivot pin.

i00080741

Backup Alarm - Test

SMCS Code: 7406

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

Apply the service brake. Move the transmission direction control lever to REVERSE position.

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

i01176086

Battery - Recycle

SMCS Code: 1401

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

i00588592

Battery Electrolyte Level - Check

SMCS Code: 1401

Table 119

THE TABLE FOR THE BATTERY ELECTROLYTE	
Battery	Interval
Conventional	100 Hours
Low Maintenance	250 Hours
Maintenance Free	Maintenance Free

Tighten the battery retainers on all of the machines. Tighten the battery retainers at every 1000 hours.

Check the following items at every 1000 hours. If necessary, check the following items more often.

- Clean the top of the batteries with a clean cloth.
- Clean the battery terminals. As needed, coat the battery terminals with petroleum jelly.

A battery should not require more than 30 cc (1 oz) of water per cell per week. This should exist with the proper charging rate and with a moderate climate.

In extreme temperatures, check the water in the cells weekly.



Illustration 272

g00282160

1. Open the battery access cover that is located on the right side of the machine.
2. Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the post with petroleum jelly.
3. 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.
4. Close the battery access cover.

i00596682

Battery or Battery Cable - Replace

SMCS Code: 1401

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.
2. Disconnect the negative battery cable from the frame.

Note: Do not allow the disconnected battery cable to contact the frame of the machine.

3. Disconnect the negative battery cable at the battery.
4. Perform the necessary repairs. Replace the cable or the battery, as needed.
5. Connect the negative battery cable at the battery.
6. Connect the battery cable to the frame of the machine.

7. Install the engine start switch key.

i00667135

Brake Reservoir Oil Level - Check

SMCS Code: 4291-535

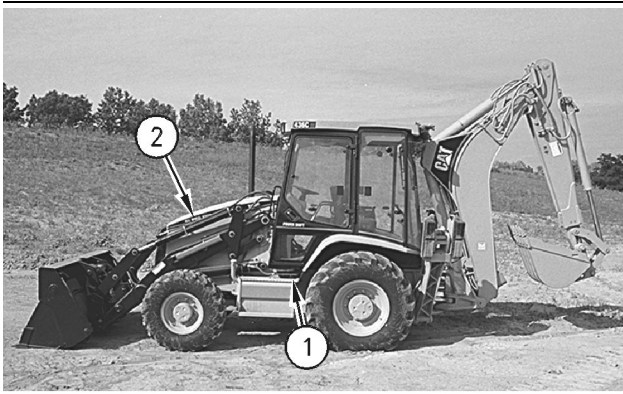


Illustration 273

g00287385

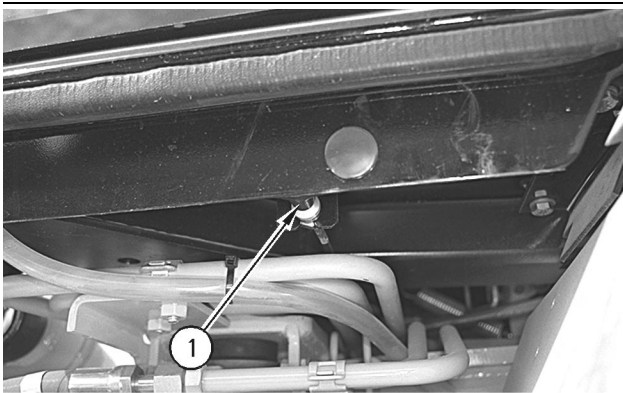


Illustration 274

g00287410

Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

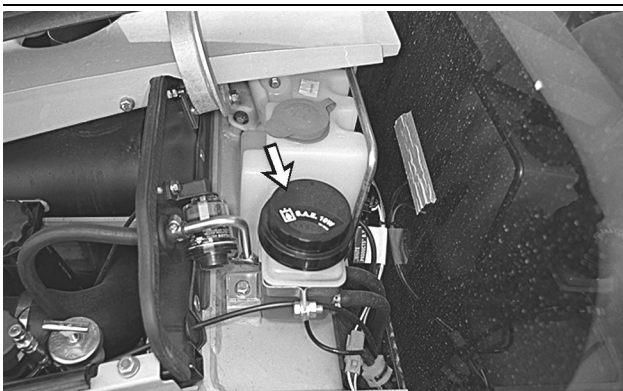


Illustration 275

g00292107

Maintain the oil level between the "MIN" mark and "MAX" mark on the brake reservoir. Add oil, if necessary.

i00651426

Braking System - Test

SMCS Code: 4251; 4267; 7000

Service Brake Holding Ability Test

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

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

The following tests are used to determine if the service brake is functional. These tests are not intended to measure the maximum brake holding effort. The brake holding effort that is required to sustain a machine at a specific engine rpm varies depending on the machine. The variations are the differences in the engine setting, in the power train efficiency, and in the brake holding ability, etc.

1. Start the engine. Raise the bucket slightly.
2. Apply the service brake. Release the parking brake.
3. Move the transmission control lever to THIRD SPEED FORWARD.
4. Gradually increase the engine speed to high idle. The machine should not move.

WARNING

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

5. Reduce the engine speed to low idle. Move the transmission to NEUTRAL. Engage the parking brake. Lower the bucket to the ground. Stop the engine.

NOTICE

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

Secondary Brake Holding Ability Test

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

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

The following tests are used to determine if the parking brake is functional. These tests are not intended to measure the maximum brake holding effort. The brake holding effort that is required to sustain a machine at a specific engine rpm varies depending on the machine. The variations are the differences in the engine setting, in the power train efficiency, and in the brake holding ability, etc.

1. Start the engine. Raise the bucket slightly.
2. Engage the parking brake.
3. Move the transmission control lever to THIRD SPEED FORWARD.

Note: The parking brake indicator light should come on and the parking brake alarm should sound.

4. Gradually increase the engine speed to high idle. The machine should not move.

WARNING

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

5. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the bucket to the ground. Stop the engine.

NOTICE

If the machine moved while testing the brakes, contact your Caterpillar dealer.

Have the dealer inspect and, if necessary, repair the parking brakes before returning the machine to operation.

i00058453

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Raise the bucket. Place a block under the bucket.
2. Lower the bucket to the blocking.

Do not block up the bucket too high. Block up the bucket so that the bucket is high enough to remove the cutting edges and the end bits.
3. Remove the bolts. Remove the cutting edge and the end bits.
4. Clean the contact surfaces.
5. Use the opposite side of the cutting edge, if this side is not worn.
6. Install a new cutting edge, if both edges are worn.
7. Install the bolts. Tighten the bolts to the specified torque. Refer to Operation and Maintenance Manual, "Torques for Ground Engaging Tool Bolts".
8. Raise the bucket. Remove the blocks.
9. Lower the bucket to the ground.
10. After a few hours of operation, check the bolts for proper torque.

i00081131

Bucket Tips - Inspect/Replace

SMCS Code: 6805

WARNING

Block the bucket before changing the bucket teeth.

To prevent possible injury to the eyes, wear a protective face shield when striking the pin.

The pin, when struck, can fly out and cause injury to nearby personnel.

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. Replace any damaged parts. Install the retainer in the groove.
3. The bucket tip should be installed over the retainer. Install the bucket tip in the runner position or in the digger position.
4. Drive the pin through the retainer, through the adapter, and through the bucket tip from the side that is opposite the retainer.

i00621342

Cab Air Filter - Clean/Replace

SMCS Code: 7311; 7342

Clean the Filter Element

NOTICE

Do not clean the elements by bumping or tapping them.

Inspect the elements after cleaning. Do not use an element with damaged pleats, gaskets or seals.

When cleaning with pressure air, use 205 kPa (30 psi) maximum to prevent element damage by too much air pressure.

When cleaning with pressure water, use 280 kPa (40 psi) maximum to prevent element damage.

Clean the filter element weekly, but clean the filter element daily when there is a reduction of air circulation.



Illustration 276

g00287370

1. Remove the filter cover that is located at the bottom of the right hand console.
2. Remove the filter element.
3. Clean the filter element with compressed air or pressure water. Direct the air or the water along the pleats of the element. You can also wash the element with clean water and nonsudsing household detergent.
4. Rinse the filter element thoroughly with clear water.
5. Allow the filter element to air dry. Inspect the element for damage. If the filter element is damaged, replace the filter element.
6. Install the filter element.
7. Install the filter cover.

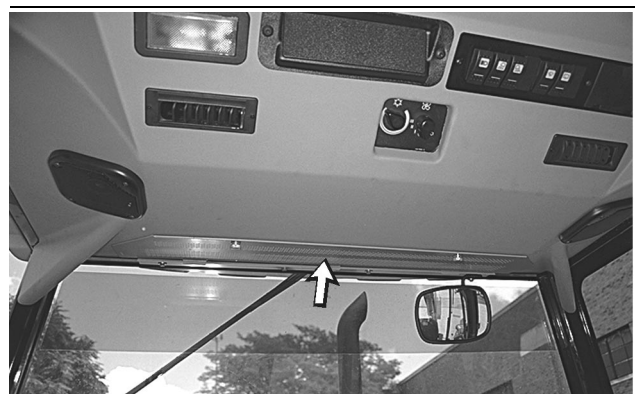


Illustration 277

g00293554

8. Remove the filter cover that is located on the headliner by the front windshield.

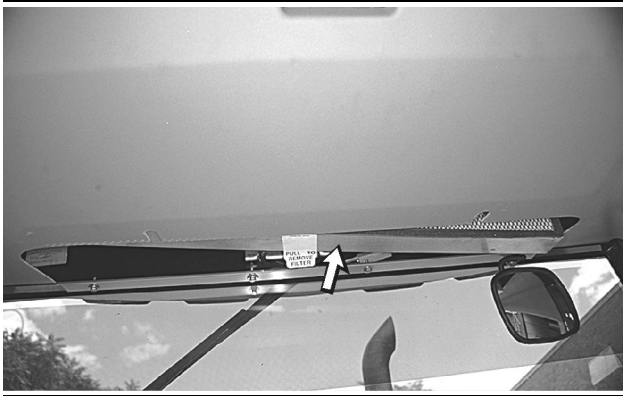


Illustration 278

g00293552

9. Remove the filter element.
10. Clean the filter element with compressed air or pressure water. Direct the air or the water along the pleats of the element. You can also wash the element with clean water and nonsudsing household detergent.
11. Rinse the filter element thoroughly with clear water.
12. Allow the filter element to air dry. Inspect the element for damage. If the filter element is damaged, replace the filter element.
13. Install the filter element.
14. Install the filter cover.

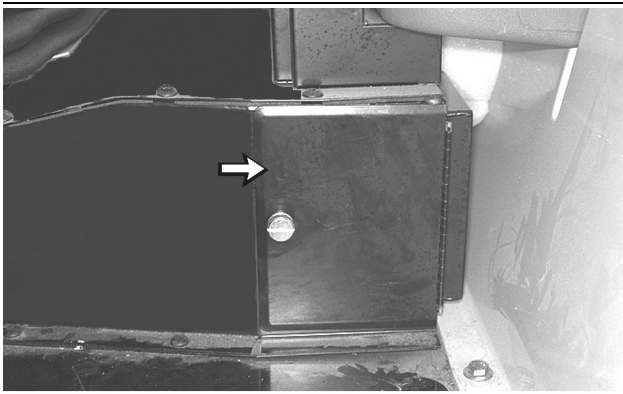


Illustration 279

g00293555

15. Open the door for the filter that is located at the bottom of the right hand console.

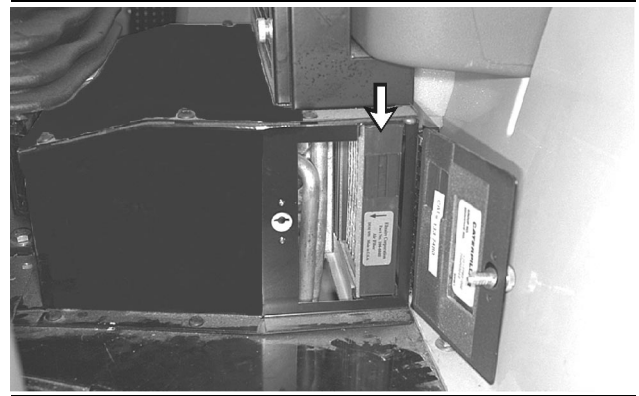


Illustration 280

g00293553

16. Remove the filter element.
17. Clean the filter element with compressed air or pressure water. Direct the air or the water along the pleats of the element. You can also wash the element with clean water and nonsudsing household detergent.
18. Rinse the filter element thoroughly with clear water.
19. Allow the filter element to air dry. Inspect the element for damage. If the filter element is damaged, replace the filter element.
20. Install the filter element.
21. Close the door.

i00598002

Cooling System Coolant (DEAC) - Change

SMCS Code: 1352; 1353; 1395

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.

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

NOTICE

Do not change the coolant until you read and understand the material in the Cooling System Specifications section.

1. Empty the bucket. Remove the pin that secures the loader lift arm brace to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the loader lift arm brace over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the loader lift arm brace and install the cotter pin.
4. Slowly lower the loader arms until the loader lift arm brace contacts the top of the lift cylinder and the bosses on the loader arm.

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

The radiator cap is located under the access panel on the top of the engine compartment.

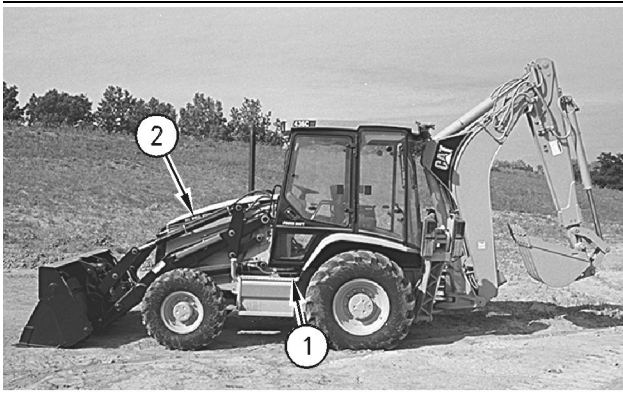


Illustration 281

g00287385

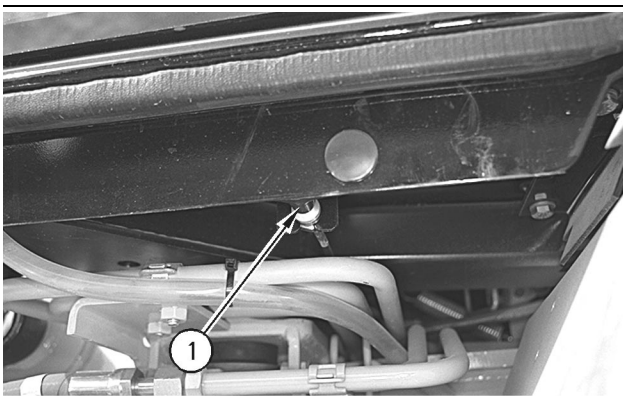


Illustration 282

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

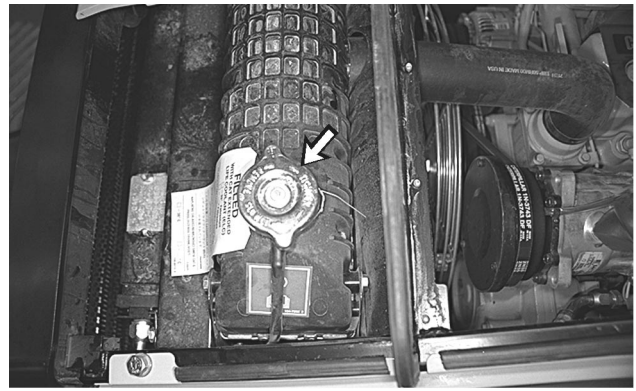


Illustration 283

g00287415

2. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.



Illustration 284

g00293558

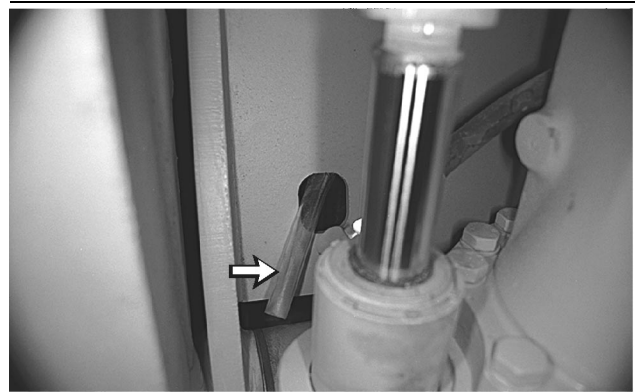


Illustration 285

g00293559

3. Pull the drain hose for the radiator through the hole under the radiator.



Illustration 286

g00287238



Illustration 287

g00293560

4. Remove the access panel on the left side of the engine compartment. The drain valve is located in an access port of the fan shroud. Open the drain valve. Allow the coolant to drain into a suitable container.
5. Close the drain valve. Fill the system with a solution which consists of clean water and of 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. Stop the engine. Drain the cleaning solution into a suitable container.
7. While the engine is stopped, flush the system with water. Flush the system until the draining water is transparent.
8. Close the drain valve.
9. Add the coolant solution. See the following topics:
 - Operation and Maintenance Manual, "Cooling System Specifications"
 - Operation and Maintenance Manual, "Refill Capacities"

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

10. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.
11. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.
12. Install the radiator cap. Replace the radiator cap if the gasket is damaged.
13. Stop the engine.
14. Replace the access panel. Close the access door.

i00095660

Cooling System Coolant (ELC) - Change

SMCS Code: 1353; 1395

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

Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants and Caterpillar Extender.

For information about the addition of Extender to your cooling system, see the Operation and Maintenance Manual, "Cooling System Extended Life Coolant Extender - Add" or consult your Caterpillar dealer.

Flushing the Extended Life Coolant From the Cooling System

Some engines utilize Extended Life Coolant. See the Operation and Maintenance Manual, "Maintenance Interval Schedule" in order to determine the service interval. If a Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required.

Flushing a Standard Coolant From the Cooling System

If you change the coolant of a machine to Extended Life Coolant from another type of coolant, use a Caterpillar cleaning agent to flush the cooling system. After you drain the cooling system, thoroughly flush the cooling system with clean water. **All of the cleaning agent must be removed from the cooling system.**

Note: See the Operation and Maintenance Manual, "Cooling System Coolant (DEAC) - Change" for the draining procedure and for the flushing procedure.

i00599502

Cooling System Coolant Additive (DEAC) - Add

SMCS Code: 1352; 1353; 1395

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.

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) and machines that are maintained with Extended Life Coolant (ELC).

See Operation and Maintenance Manual, "Cooling System Specification" for all cooling system requirements.

Use **8T-5296** Coolant Test Kit in order to check the concentration.

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.

Liquid Supplemental Coolant Additive

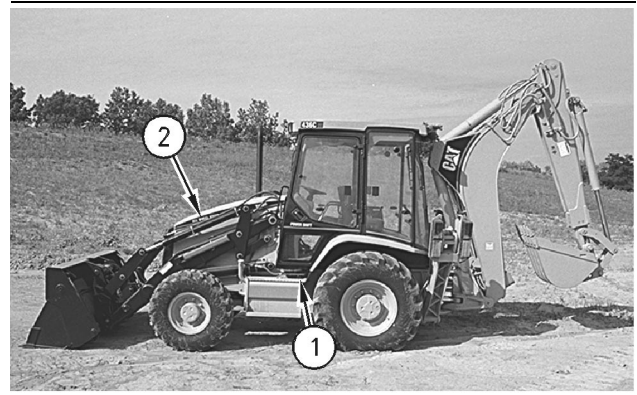


Illustration 288

g00287385

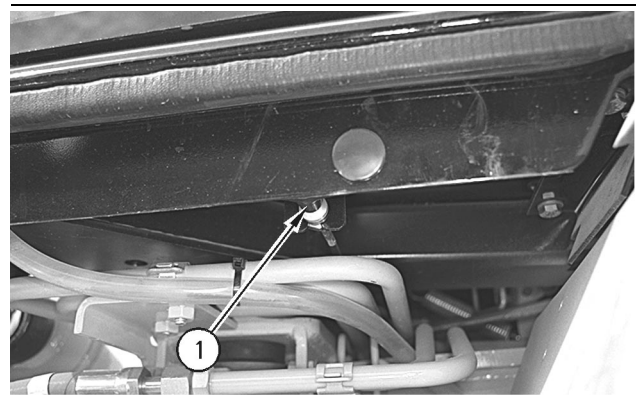


Illustration 289

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

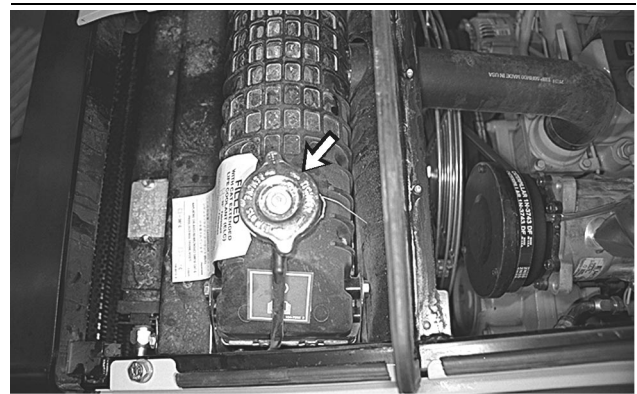


Illustration 290

g00287415

2. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.
3. If necessary, drain enough coolant from the radiator in order to allow the addition of the liquid coolant additive.

4. Add 0.24 Liters (.50 pint) of cooling system additive for every 38 Liters (10 US Gallons) of engine cooling capacity.

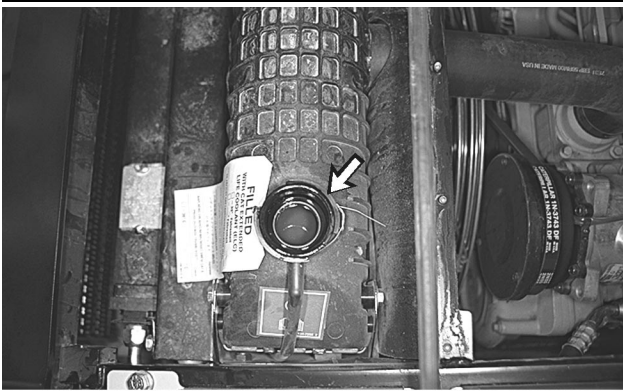


Illustration 291

g00290601

5. Maintain the coolant level within 13 mm (0.5 inch) from the bottom of the filler tube.
6. Install the radiator cap. Close the access door.

i00095664

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

WARNING

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

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

Table 120

RECOMMENDED AMOUNT OF EXTENDER BY COOLING SYSTEM CAPACITY	
Cooling System Capacity	Recommended Amount of Extender
22 to 30 L (6 to 8 US gal)	0.57 L (.60 qt)
30 to 38 L (8 to 10 US gal)	0.71 L (.75 qt)
38 to 49 L (10 to 13 US gal)	0.95 L (.95 qt)
49 to 64 L (13 to 17 US gal)	1.18 L (1.25 qt)

For additional information on the addition of extender, see Operation and Maintenance Manual, "Caterpillar Coolant Recommendations" or consult your Caterpillar dealer.

i00599514

Cooling System Level - Check

SMCS Code: 1353; 1395

WARNING

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

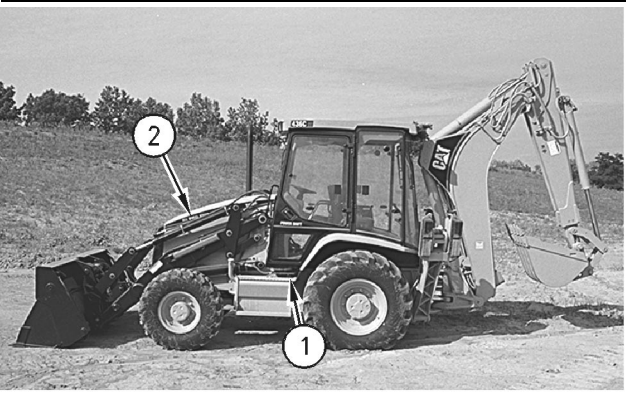


Illustration 292

g00287385

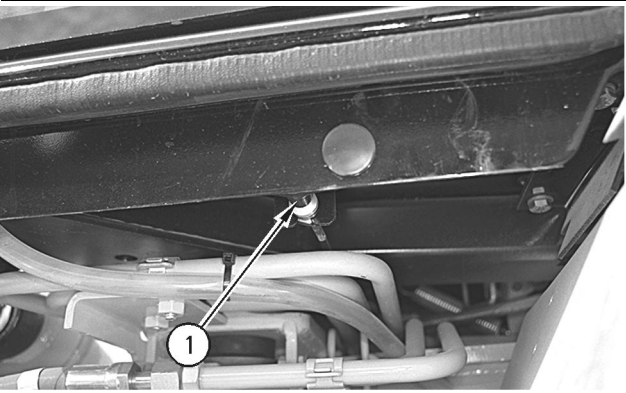


Illustration 293

g00287410

Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

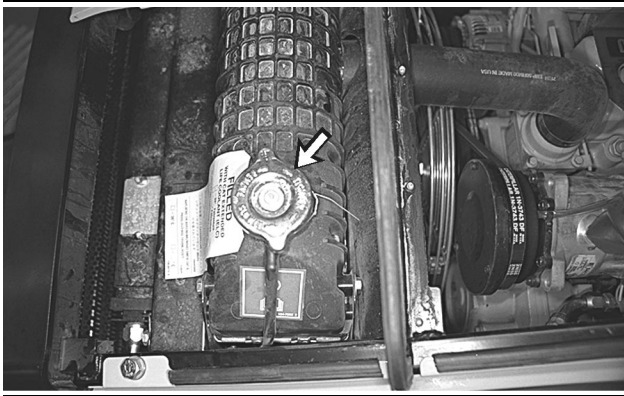


Illustration 294

g00287415

1. The radiator cap is located on the top of the radiator on the left side of the machine. Remove the radiator cap slowly in order to relieve system pressure.

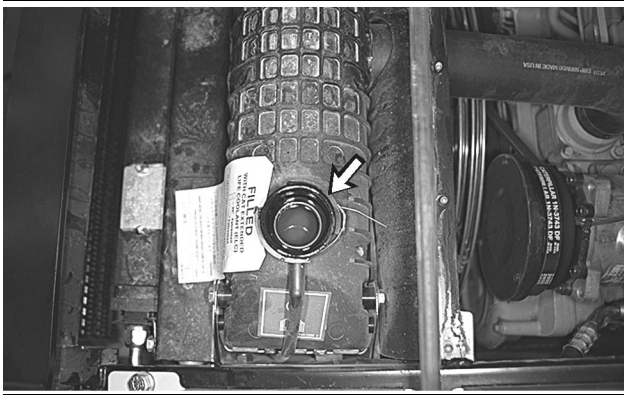


Illustration 295

g00290601

2. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler tube. If you need to add coolant daily, check the cooling system for leaks.
3. Inspect the radiator cap seal. Replace the radiator cap seal if the radiator cap seal is damaged.
4. Install the radiator cap. Close the access panel.

i00599779

Cooling System Water Temperature Regulator - Clean/Replace

SMCS Code: 1355; 1393

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system. Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

The thermostat should be replaced after the cooling system has been cleaned. Replace the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

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

Caterpillar engines incorporate a shunt design cooling system. It is mandatory to always operate the engine with a thermostat.

1. Empty the bucket. Remove the pin that secures the loader lift arm brace to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the loader lift arm brace over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the loader lift arm brace and install the cotter pin.
4. Slowly lower the loader arms until the loader lift arm brace contacts the top of the lift cylinder and the bosses on the loader arm.



Illustration 296

g00287241

5. Remove the engine access panel on the right side of the machine.

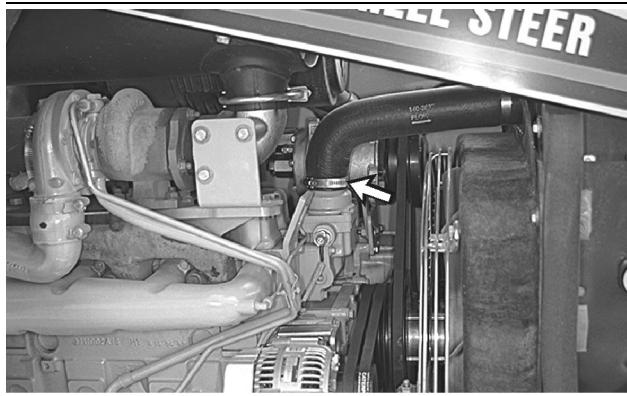


Illustration 297

g00290684

6. Loosen the hose clamp and remove the hose from the thermostat housing assembly.
7. Remove the bolts from the thermostat housing assembly. Remove the thermostat housing assembly.
8. Remove the gasket, the thermostat, and the seal from the thermostat housing assembly.
9. Install a new seal in the thermostat housing assembly. Install a new thermostat and a new gasket. Install the thermostat housing assembly on the engine cylinder head.

The thermostats can be reused under the following conditions.

- The thermostat is tested and the thermostat meets test specifications.
- The thermostat is not damaged.
- The thermostat does not have excessive buildup of deposits.

10. Install the hose. Tighten the hose clamp.
11. Refill the cooling system. Refer to Operation and Maintenance Manual, "Cooling System Specifications" and Operation and Maintenance Manual, "Refill Capacities".

i00601036

Differential Oil (Front) - Change

SMCS Code: 3258

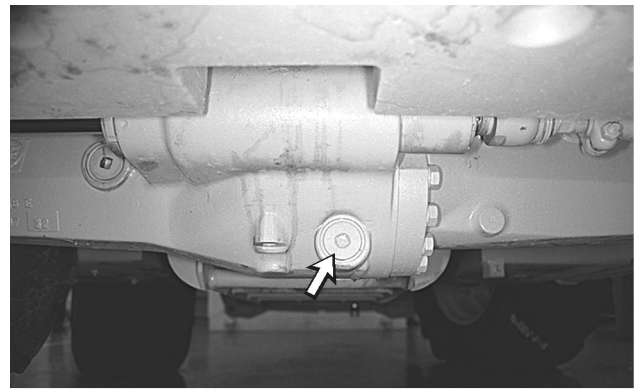


Illustration 298

g00290687

1. Remove the oil drain plug and drain the oil into a suitable container.
2. Clean the drain plug and install the drain plug.



Illustration 299

g00290688

3. Remove the oil level/fill plug. Refer to Operation and Maintenance Manual, "Lubricant Specifications" and Operation and Maintenance Manual, "Refill Capacities" for oil.
4. Add oil until the oil is level with the threads for the filler plug.
5. Clean the filler plug and install the filler plug.

i00601241

Differential Oil (Rear) - Change

SMCS Code: 3258

Rear Axle

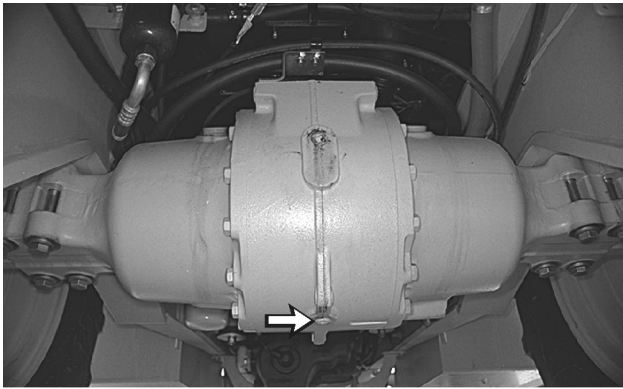


Illustration 300

g00290691

1. Remove the oil drain plug and drain the oil into a suitable container.
2. Clean the drain plug and install the drain plug.

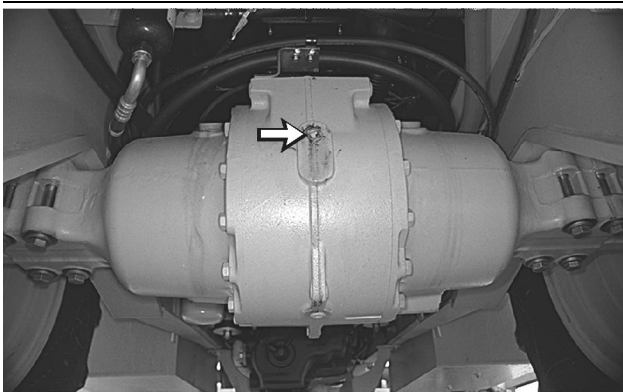


Illustration 301

g00290697

3. Remove the oil level/fill plug. Refer to Operation and Maintenance Manual, "Lubricant Specifications" and Operation and Maintenance Manual, "Refill Capacities" for oil.
4. Add oil until the oil is level with the threads for the filler plug.
5. Clean the filler plug and install the filler plug.

Rear Axle with All Wheel Steer (AWS)

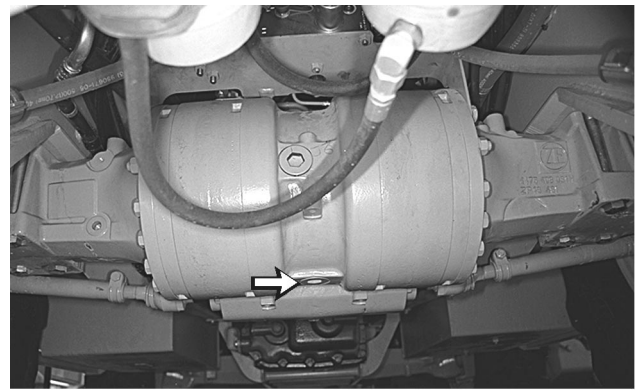


Illustration 302

g00290698

1. Remove the oil drain plug and drain the oil into a suitable container.
2. Clean the drain plug and install the drain plug.

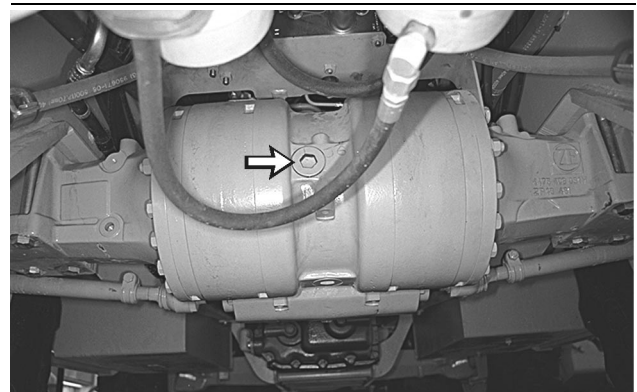


Illustration 303

g00290699

3. Remove the oil level/fill plug. Refer to Operation and Maintenance Manual, "Lubricant Specifications" and Operation and Maintenance Manual, "Refill Capacities" for oil.
4. Add oil until the oil is level with the threads for the filler plug.
5. Clean the filler plug and install the filler plug.

i00602597

Differential Oil Level (Front) - Check

SMCS Code: 3258

The oil level/fill plug is located near the middle of the front axle.



Illustration 304

g00290688

1. Remove the oil level/fill plug in order to check the oil.
2. The oil level should be at the bottom of the plug threads.
3. Clean the oil level/fill plug and install the oil level/fill plug.

i00602602

Differential Oil Level (Rear) - Check

SMCS Code: 3258

The oil level/fill plug is located near the middle of the rear axle.

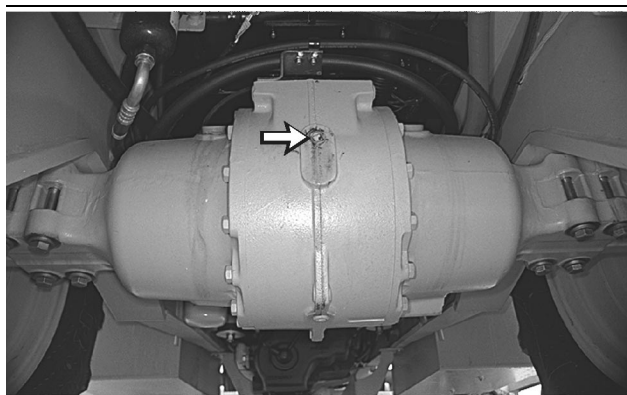


Illustration 305

g00290697

Filler plug on standard rear differential

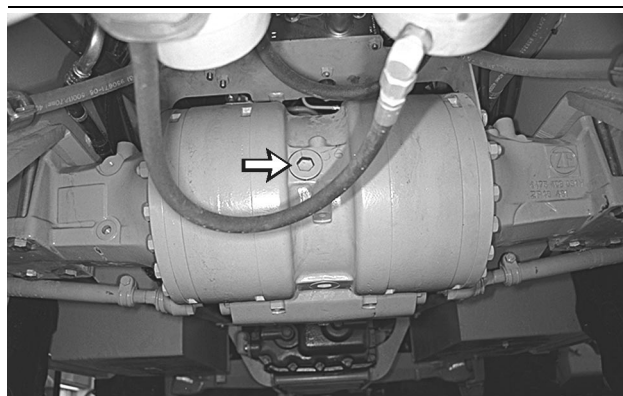


Illustration 306

g00290699

Filler plug on rear differential for All Wheel Steer

1. Remove the oil plug in order to check the oil.
2. The oil level should be at the bottom of the plug threads.
3. Clean the oil plug and install the oil plug.

i00604375

Drive Shaft Spline - Lubricate

SMCS Code: 3253



Illustration 307

g00290705

Access the grease fittings for the drive shaft spline from the bottom of the machine.

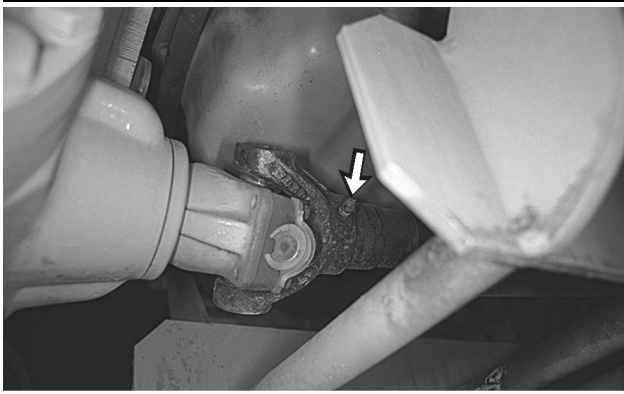


Illustration 308

g00290703

Apply lubricant to the grease fitting for the drive shaft spline of the front drive shaft.

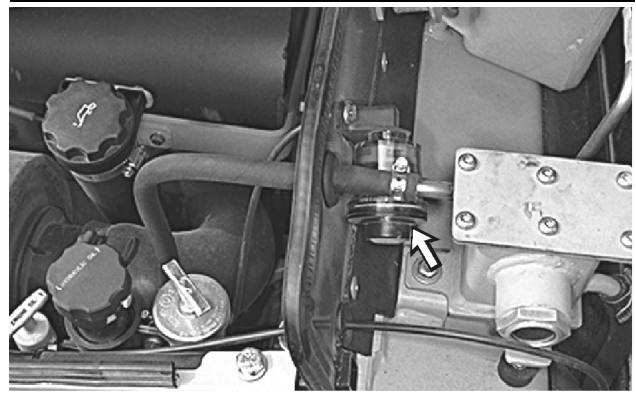


Illustration 310

g00287382

Service the air cleaner filter elements when the yellow piston enters the red zone.

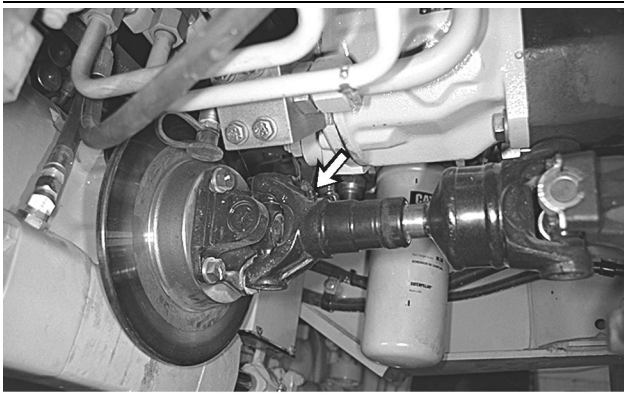


Illustration 309

g00290704

Apply lubricant to the grease fitting for the drive shaft spline of the rear drive shaft.

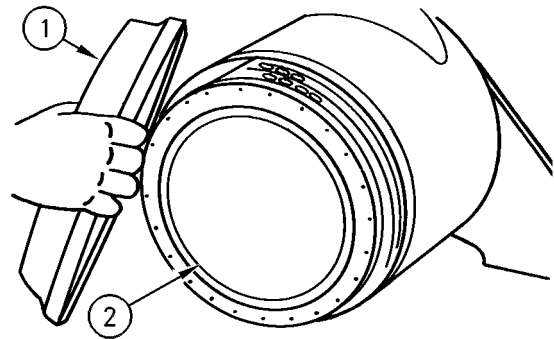


Illustration 311

g00101864

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

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1051; 1054

NOTICE

Never service the air cleaner when the engine is running, to avoid engine damage.

NOTICE

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

Make sure the cleaned filter elements are completely dry before installing into the filter housing. Water remaining in the elements can cause false indications of contamination in Scheduled Oil Sampling test results.

3. Clean the primary filter element.

The filter elements can be cleaned by using the following methods:

- pressure air
- pressure water
- detergent washing

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

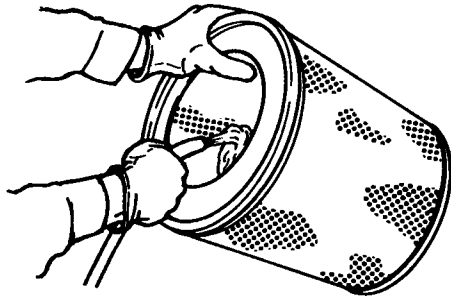


Illustration 312

g00038608

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

The element can be washed in a solution that consists of warm water and of nonsudsing household detergent. Fully rinse the pleats. Allow the filter to air dry completely.

- b. Inspect the filter elements after you clean the filter elements. Do not use a filter if the pleats, the gaskets or the seals are damaged.

- c. Cover the clean filter elements. Store the elements in a clean, dry location.

Replace the primary element after the primary element has been cleaned six times. Also replace the primary element if the primary element has been in service for one year.

4. Install a clean filter element and install the cover.
5. Tighten the cover screws finger tight. Do not use a tool to tighten the cover screws.

i00606478

Engine Air Filter Secondary Element - Replace

SMCS Code: 1051; 1054

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.

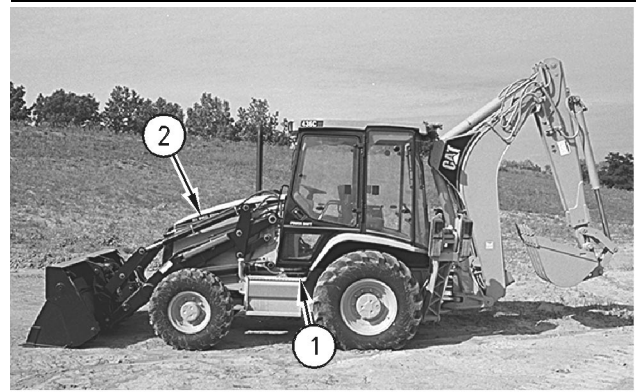


Illustration 313

g00287385

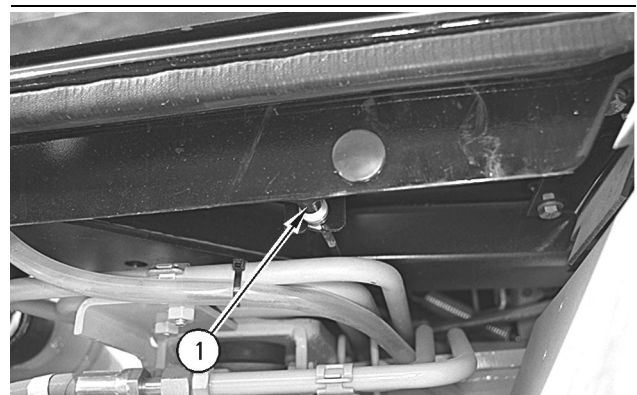


Illustration 314

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

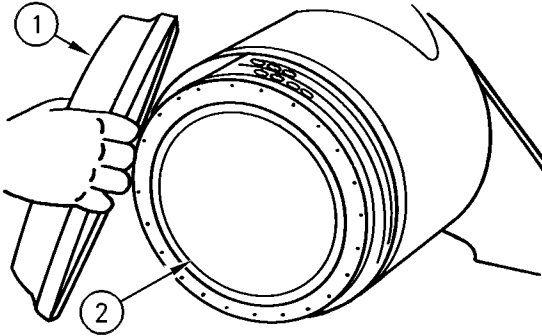


Illustration 315

g00101864

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

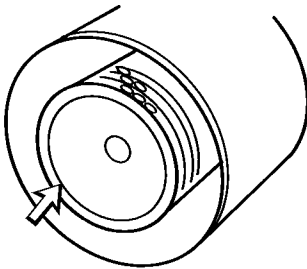


Illustration 316

g00038606

4. Remove the secondary filter element.

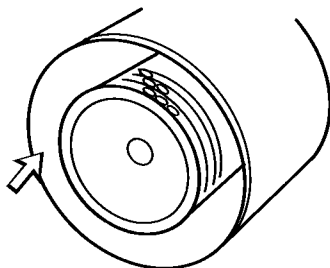


Illustration 317

g00101865

5. Cover the air inlet opening. Clean the inside of the air cleaner housing.
6. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.

7. Uncover the air inlet opening. Install a new secondary element.
8. Install the primary element and the air cleaner housing cover. Fasten the clips in order to secure the air cleaner housing cover.

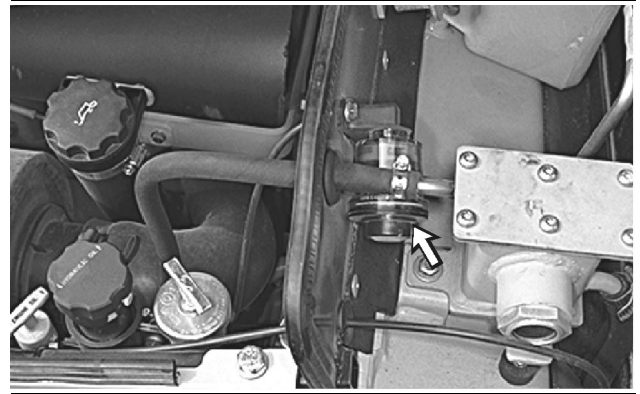


Illustration 318

g00287382

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

i00606530

Engine Air Filter Service Indicator - Inspect

SMCS Code: 1051; 1054; 7452

NOTICE

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

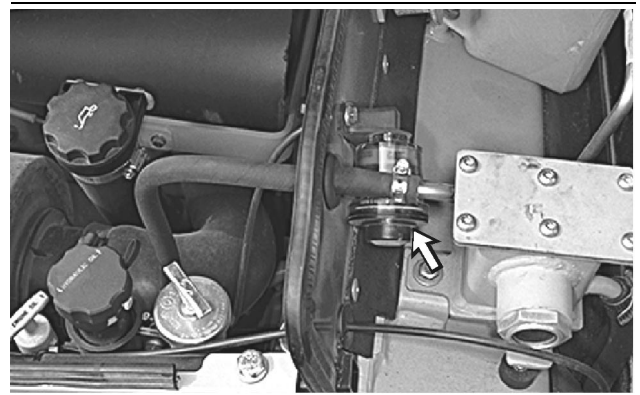


Illustration 319

g00287382

The filter service indicator is located under the engine access door on the top of the machine.

Start the engine. Run the engine at high idle. If the yellow piston in the filter service indicator enters the red zone, service the air cleaner. Stop the engine.

i00606534

Engine Oil Level - Check

SMCS Code: 1302; 1318; 1326

NOTICE

Do not overfill the crankcase. Engine damage can result.

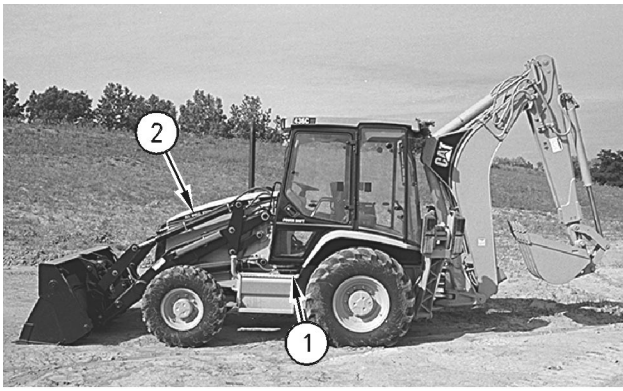


Illustration 320

g00287385

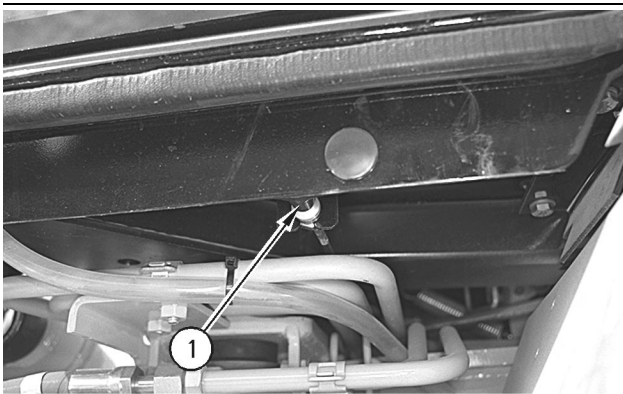


Illustration 321

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

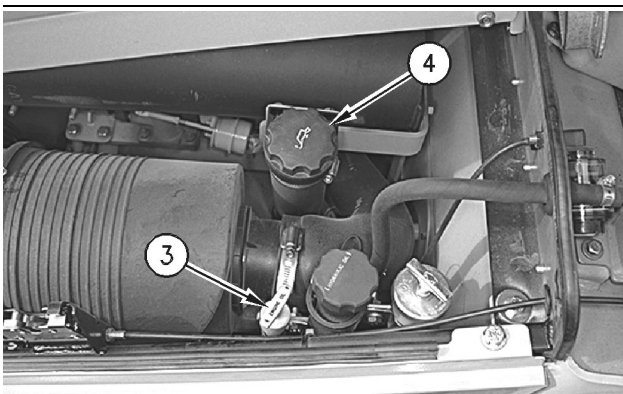


Illustration 322

g00287411

2. While the engine is stopped, maintain the oil level between the "ADD" mark and the "FULL" mark on the engine oil dipstick (3).
3. If necessary, remove the oil filler cap (4) and add oil.
4. Clean the oil filler cap and install the oil filler cap.
5. Close the engine access door.

i00606560

Engine Oil and Filter - Change

SMCS Code: 1302; 1318; 1326

Note: If the sulfur content in the fuel is greater than 1.5% by weight, use an oil with a TBN of 30. With the high sulfur fuel, change the oil and the filter element after every 250 hours or after every month. If the API category is CF-4 or less, change the oil and filter element after every 250 hours or after every month. Otherwise, change the oil and the filter element after every 500 hours or after every three months.

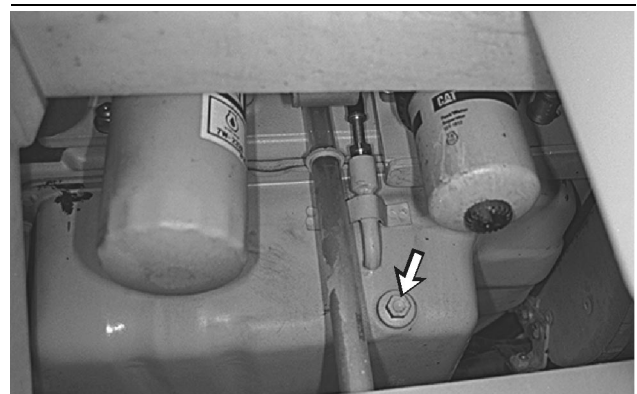


Illustration 323

g00290413

The crankcase drain plug is on the left side of the oil pan.

1. Remove the crankcase drain plug and drain the oil into a suitable container. Clean the crankcase drain plug and replace the crankcase drain plug.



Illustration 324

g00287238

2. Remove the engine access panel on the left side of the machine.

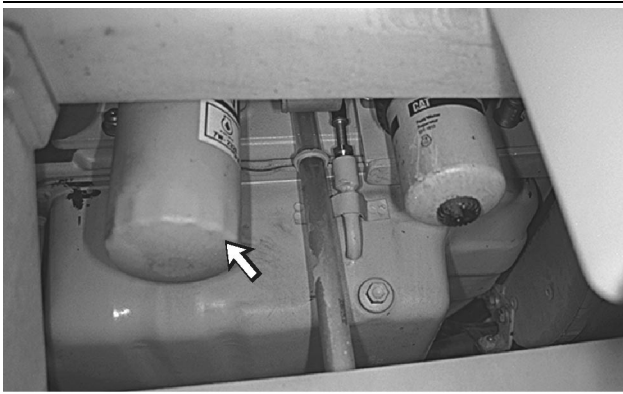


Illustration 325

g00290708

3. Remove the filter element with a strap type wrench. Refer to Operation and Maintenance Manual, "Oil Filter - Inspect".
4. Clean the filter mounting base with a clean cloth. Make sure that the old filter gasket has been removed.
5. Apply a thin film of clean engine oil to the sealing surface of the new filter element.
6. Install the new filter element by hand. When the gasket contacts the filter base, tighten the filter for an additional $\frac{3}{4}$ turn.

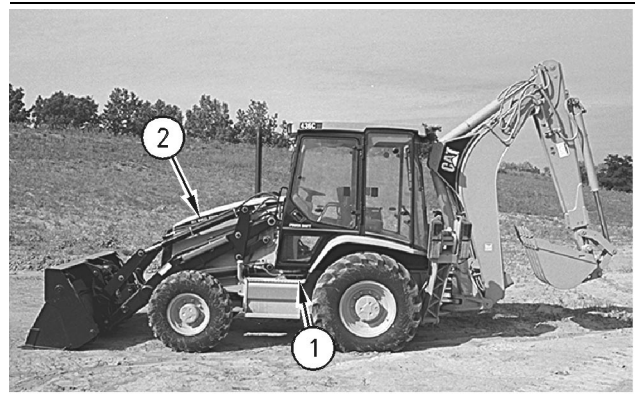


Illustration 326

g00287385

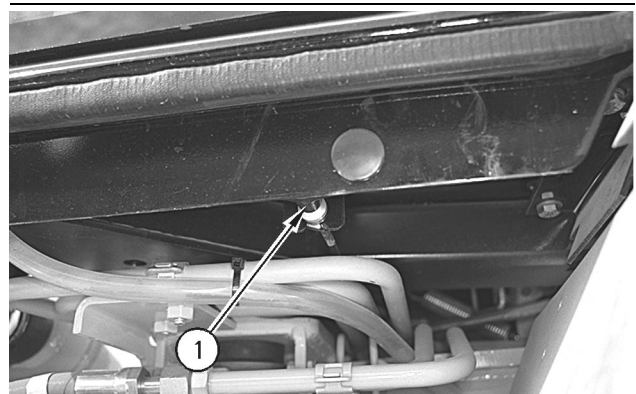


Illustration 327

g00287410

7. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.

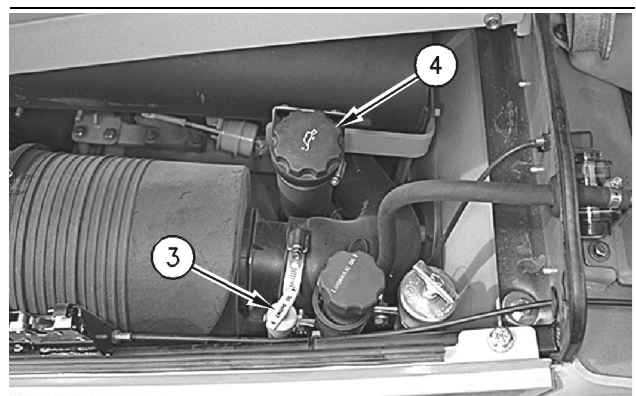


Illustration 328

g00287411

8. Remove the oil filler cap (4). Fill the crankcase with new oil. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities". Clean the oil filler cap and install the oil filler cap.
9. Start the engine and allow the oil to warm. Check for leaks.

10. Stop the engine and allow the oil to drain back into the oil pan. Maintain the oil level in the crosshatched region of the engine oil dipstick (3). Add oil, if necessary.
11. Replace the engine access panel and close the engine access door.

i01010167

Engine Valve Lash - Check

SMCS Code: 1102-082; 1102-535; 1102; 1209-082; 1209

Note: A qualified service person should perform the valve lash check and/or the valve lash adjustment. Special tools and training are required.

Check the engine valve lash after every 1000 service hours or 6 months on machines that are equipped with the following engine arrangements:

- 122-8803 Primary Engine Arrangement
- 122-8804 Engine Arrangement
- 122-8805 Engine Arrangement
- 122-8806 Engine Arrangement

The engine arrangement number is located on the engine serial number plate.

Check the engine valve lash after every 2000 service hours or 1 year on machines that are not equipped with the engine arrangements that are listed above.

Refer to your machine's Service Manual for complete instructions.

i01184251

Extendable Stick Pads - Inspect/Replace (If Equipped)

SMCS Code: 6533-040-JP; 6533-510-JP

Inspect Wear Pads



Illustration 329

g00634728

Check the extendable stick for slop. Shim the extendable stick pads in order to maintain an acceptable fit and reduce slop.

Note: Do not apply an excessive amount of a silicone based lubricant. Dirt can be attracted to the lubricant and dirt can cause abrasion to the pad assemblies and wear to the pad assemblies.

The extendable stick pads do not normally require any lubrication. If the extendable stick becomes noisy, a small amount of a silicone based lubricant may be applied.

Adjustment for Top Upper Wear Pad

1. Extend the extendable stick to one half of the fully extended position.
2. Move the stick and move the boom down against the ground. This will take pressure off the wear pad.

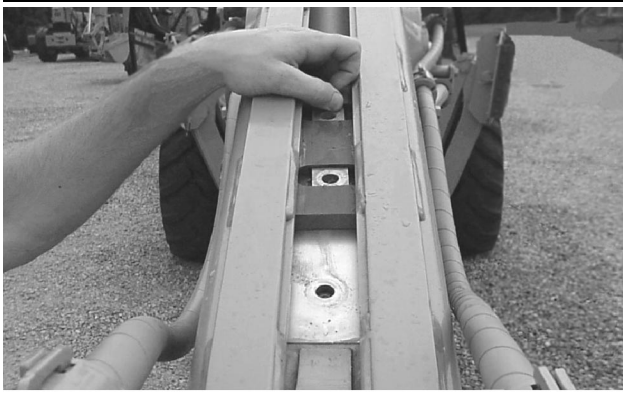


Illustration 330

g00635137

3. Remove the bolts that secure the wear pad. Slide the pad toward the boom. There will be enough space in order to remove the pad. Either replace the wear pads or stack shims behind the pad.
4. Shim the wear pad to 1 mm (0.04 inch) .

Note: In order to make adjustments to the remaining upper wear pads, refer to Disassembly and Assembly Manual, SENR1209, "Stick, Extendable Stick, Extendable Stick Cylinder".

Adjustment for Lower Pads

1. Extend the extendable stick out until there is enough clearance in order to remove the pads.

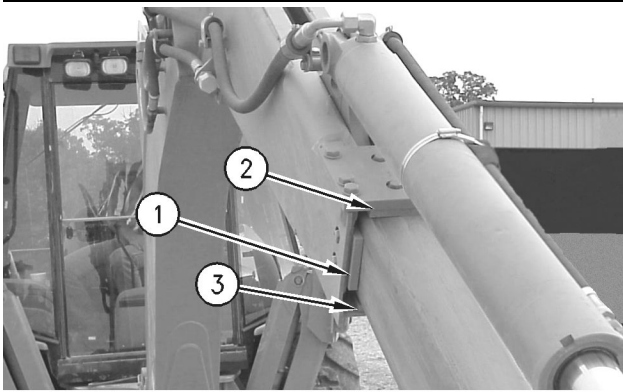


Illustration 331

g00635788

2. The side pads (1) can be shimmed without moving the stick or without moving the boom.
3. Adjust the boom and adjust the stick in order to take pressure away from the top pad (2). Adjust the wear pads by shimming or replacing. Shim the wear pads to 1 mm (0.04 inch).
4. Adjust the boom and adjust the stick in order to take the pressure away from the lower pad (3).

Note: Place the bucket on the ground. Apply slight pressure toward the ground with the stick. Shim the lower pad or replace the lower pad.

i00609504

Final Drive Oil (Front) - Change

SMCS Code: 4050



Illustration 332

g00287533

1. Position the oil fill/drain plug at the bottom. Remove the oil fill/drain plug and drain the oil into a suitable container.



Illustration 333

g00287534

2. Position the plug hole at a horizontal position. Use the line on the final drive as a reference.
3. Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, "Lubricant Specifications" and Operation and Maintenance Manual, "Refill Capacities" for the oil.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i00609505

Final Drive Oil (Rear) - Change

SMCS Code: 4050



Illustration 334

g00287536

1. Position the oil fill/drain plug at the bottom. Remove the oil fill/drain plug and drain the oil into a suitable container.



Illustration 335

g00287537

2. Position the plug hole at a horizontal position. Use the line on the final drive as a reference.
3. Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, "Lubricant Specifications" and Operation and Maintenance Manual, "Refill Capacities" for the oil.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i00609508

Final Drive Oil Level (Front) - Check

SMCS Code: 4050



Illustration 336

g00287534

1. Position the oil fill/drain plug at a horizontal position in order to check the oil level.
2. Remove the oil fill/drain plug in order to check the oil level.
3. The oil should be level with the bottom of the plug threads.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i00609510

Final Drive Oil Level (Rear) - Check

SMCS Code: 4050



Illustration 337

g00287537

1. Position the oil fill/drain plug at a horizontal position in order to check the oil level.

2. Remove the oil fill/drain plug in order to check the oil level.
3. The oil should be level with the bottom of the plug threads.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i00609513

Fuel System - Prime

SMCS Code: 1258

Air can enter the system under the following conditions.

- The fuel tank is drained during normal operation.
- The low pressure fuel lines are disconnected.
- A part of the low pressure fuel system leaks during engine operation.

If air enters the fuel system, the air must be eliminated from the system before the engine can be started.

If the engine has been stopped by air in the fuel system, perform the following procedures:

- Make sure that fuel has been added to the tank.
 - Make sure that the leakage problem has been corrected.
 - Make sure that the electrical stop control is connected.
 - Operate the starter motor until the engine starts.
1. Make sure the electrical stop control is connected. Turn the engine start switch key to the ON position.



Illustration 338

g00291785

2. Remove the access panel on the right side of the machine.



Illustration 339

g00291786

3. Operate the lever of the fuel lift pump slowly for approximately two minutes. If the drive cam of the fuel lift pump is at the point of maximum cam lift, the priming lever will not operate. In this situation, the crankshaft must be turned one revolution.
4. Operate the starter motor until the engine starts. Refer to Operation and Maintenance Manual, "Starting Above 0°C (32°F)" and Operation and Maintenance Manual, "Starting Below 0°C (32°F)".
5. Check for air in the fuel system if the engine runs roughly after the engine runs correctly for a short period of time. Check for air in the fuel system if the engine stops after the engine runs correctly for a short period of time. If there is air in the fuel system, check the low pressure fuel system for a leak. Correct the problem and repeat Step3 through Step4.

i00609515

Fuel System Filter - Replace

SMCS Code: 1261

1. Empty the bucket. Remove the pin that secures the loader lift arm brace to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the loader lift arm brace over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the loader lift arm brace and install the cotter pin.
4. Slowly lower the loader arms until the loader lift arm brace contacts the top of the lift cylinder and the bosses on the loader arm.

5. Stop the engine.



Illustration 340

g00287238

6. Remove the access panel from the left side of the machine.

The machine uses fuel filters with a push and twist collar.

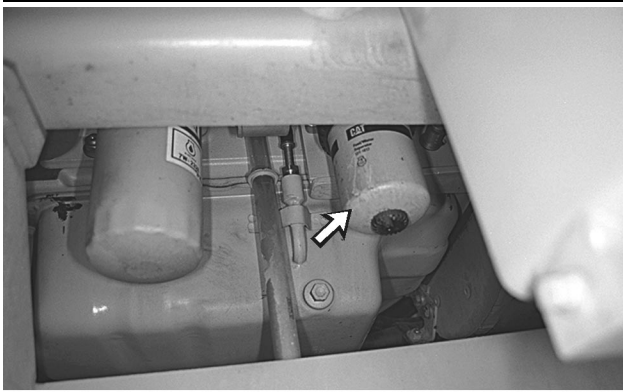


Illustration 341

g00291787

7. Remove the primary fuel filter that is located next to the crankcase drain plug under the machine. Rotate the locking ring counterclockwise in order to remove the filter element. Discard the filter properly.
8. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
9. Coat the seal of the new filter element with clean diesel fuel.
10. Install the new filter element. Rotate the locking ring clockwise in order to fasten the filter to the mounting base.

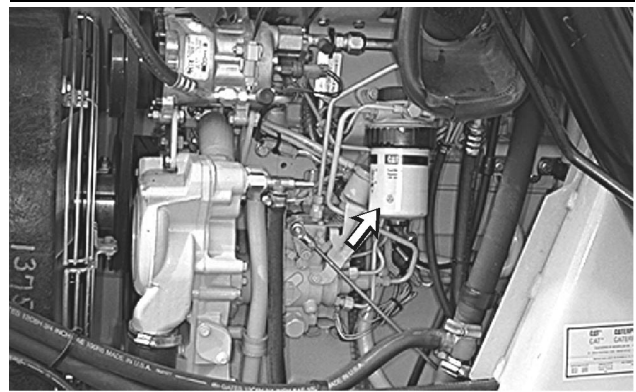


Illustration 342

g00291788

11. Remove the secondary fuel filter. Rotate the locking ring counterclockwise in order to remove the filter element. Discard the filter properly.
12. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
13. Coat the seal of the new filter element with clean diesel fuel.
14. Install the new filter element. Rotate the locking ring clockwise in order to fasten the filter to the mounting base.
15. Prime the fuel system in order to fill the filter elements with fuel. Refer to Operation and Maintenance Manual, "Fuel System - Prime".
16. Replace the access panel.

i00669721

Fuel System Water Separator - Drain

SMCS Code: 1263-543; 1263



Illustration 343

g00293550

The water separator is located by the drain plug for the engine crankcase.

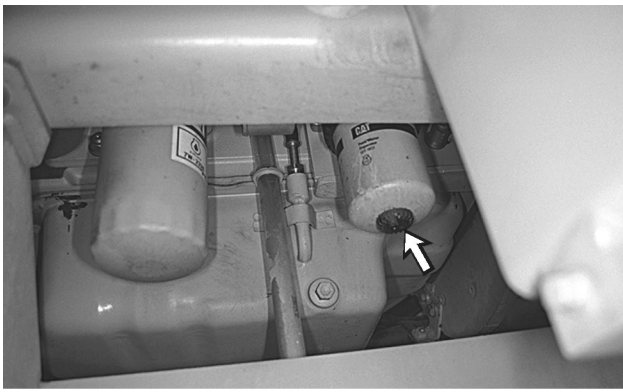


Illustration 344

g00293551

1. Loosen the drain valve on the bottom of the fuel filter. Allow the water and the sediment to drain into a suitable container.
2. Tighten the drain valve.
3. If the engine fails to start, change the fuel filter. If there is a power loss, change the fuel filter.

i00675934

Fuel System Water Separator Element - Replace

SMCS Code: 1263-510-FQ

The water separator element is located next to the crankcase drain plug under the machine.

The machine uses water separator elements with a push and twist collar.

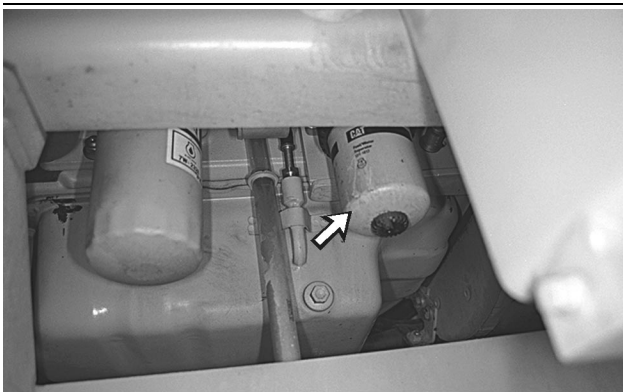


Illustration 345

g00291787

1. Remove the water separator element. Rotate the locking ring counterclockwise in order to remove the filter element. Discard the filter element properly.

2. Clean the filter element mounting base . Remove any part of the filter element gasket that remains on the filter element mounting base.
3. Coat the seal of the new filter element with clean diesel fuel.
4. Install the new filter element. Rotate the locking ring clockwise in order to fasten the filter to the mounting base.
5. Prime the fuel system in order to fill the filter element with fuel. Refer to Operation and Maintenance Manual, "Fuel System - Prime".

i00669722

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S



Illustration 346

g00292670

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

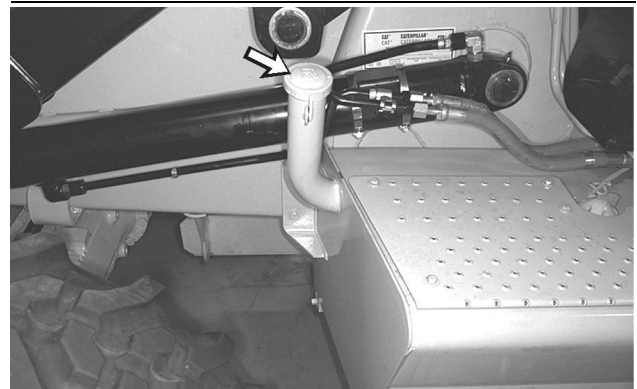


Illustration 347

g00292671

Slowly remove the fuel tank cap in order to relieve pressure.

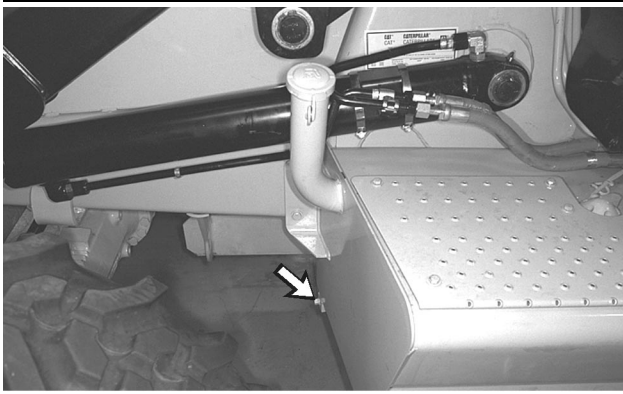


Illustration 348

g00292692

The fuel tank drain valve is located on the lower right corner on the front of the fuel tank. Remove the fuel tank drain plug. Allow the water and sediment to drain into a suitable container. Install the fuel tank drain plug. Replace the fuel tank cap.

i00609834

Fuses - Replace

SMCS Code: 1417

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

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 may exist. Contact your Caterpillar dealer



Illustration 349

g00287569

Remove the cover on the steering console in order to access the main fuse panel.

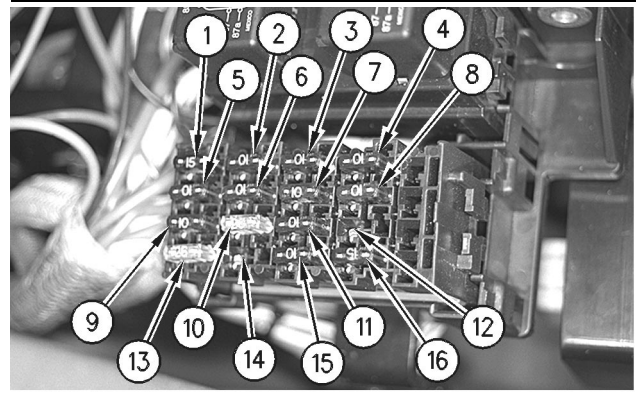


Illustration 350

g00287570

Engine Start Switch (1) – 15 Amp

Horns (2) – 10 Amp

Lighter (3) – 10 Amp

Hazard Lights (4) – 10 Amp

Backup Alarm (5) – 10 Amp

Transmission (6) – 10 Amp

Bucket Positioner (7) – 10 Amp

All Wheel Steer (8) – 10 Amp

All Wheel Drive (9) – 10 Amp

Heater Fan (10) – 10 Amp

Gauges (11) – 10 Amp

Spare (12) – Open

Main Lights (13) – 30 Amp

Spare (14) – Open

Main Air Conditioner (15) – 25 Amp

Main Windshield Wipers (16) – 20 Amp

Note: Some of the main fuses are tied together with the fuses in the headliner. For example, if all of the lights are not functioning, check the main fuse for the lights in the steering console. If one light is not functioning, check the fuse in the headliner for the specific light.

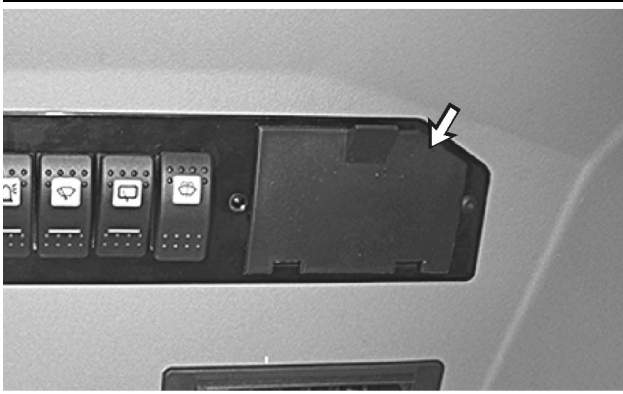


Illustration 351 g00287571

The fuse panel is located in the switch panel on the headliner of the cab.

Remove the cover in order to access the fuses.

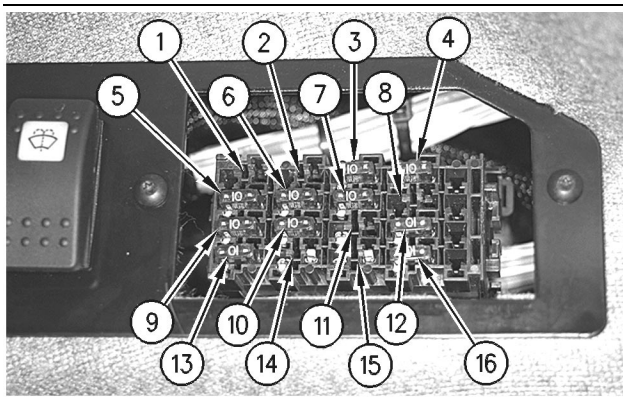


Illustration 352 g00287572

Spare (1) – Open

Spare (2) – Open

Left Tail Light (3) – 10 Amp

Right Tail Light (4) – 10 Amp

Rear Flood Lights (5) – 10 Amp

Auxiliary Rear Flood Lights (6) – 10 Amp

Radio Memory (7) – 10 Amp

Auxiliary Front Flood Lights (8) – 10 Amp

Front Windshield Wiper (9) – 10 Amp

Rear Windshield Wiper (10) – 10 Amp

Spare (11) – Open

Rotating Beacon (12) – 10 Amp

Dome Light (13) – 10 Amp

Radio Power (14) – 10 Amp

Air Conditioner Compressor (15) – 10 Amp

Air Conditioner Blower (16) – 10 Amp

i00611301

Hydraulic System Oil - Change

SMCS Code: 5056

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

The machine should be level . Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

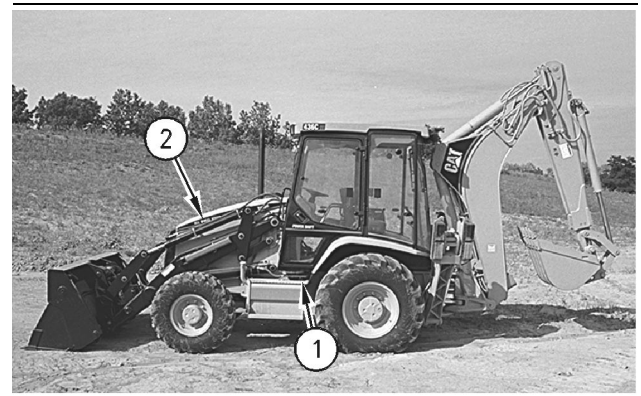


Illustration 353 g00287385

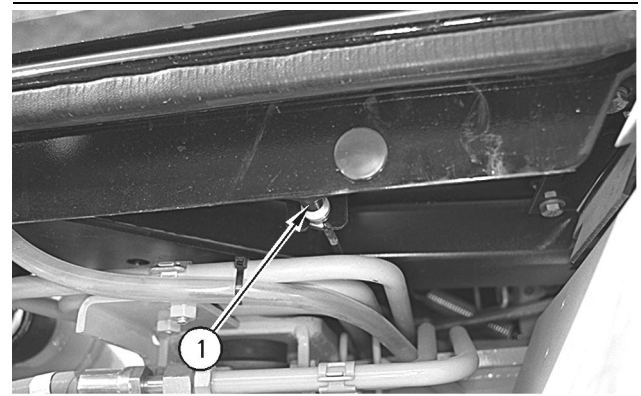


Illustration 354 g00287410

The hydraulic tank filler cap is located under the access door on the top of the engine compartment.

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.



Illustration 355

g00290718

2. Remove the hydraulic tank filler cap.



Illustration 356

g00290721



Illustration 357

g00290722

3. Remove the drain plug on the flange that is located on the hydraulic pump. Allow the oil to drain into a suitable container.
4. Clean the drain plug and replace the drain plug. Tighten the drain plug to a torque of 90 ± 10 N·m (66 ± 7 lb ft).
5. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Change".

6. Inspect the hydraulic tank breather that is located on a hose from the overflow container. Replace the breather, if necessary.
7. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".



Illustration 358

g00290845

8. Maintain the hydraulic oil level in the sight gauge between the "MIN" mark and the "MAX" mark.

Check the hydraulic oil level with the loader on the ground and with the backhoe in the transport position.

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

9. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.
10. Install the hydraulic tank filler cap.
11. Close the access door.

i00609992

Hydraulic System Oil Filter - Replace

SMCS Code: 5056; 5068

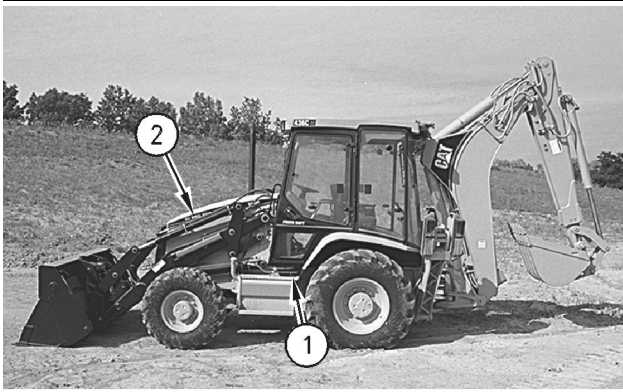


Illustration 359

g00287385

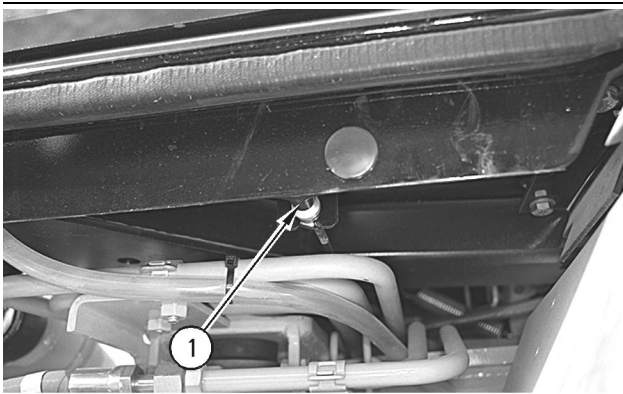


Illustration 360

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.



Illustration 361

g00290718

2. Remove the hydraulic tank filler cap that is located under the access panel on the top of the engine compartment.



Illustration 362

g00290721

3. The hydraulic oil filter is located on the left side of the machine.

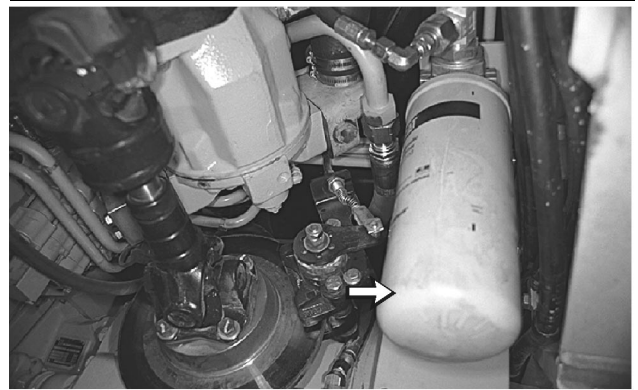


Illustration 363

g00290851

4. Remove the filter element with a strap type wrench.
5. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
6. Apply a light coat of oil to the gasket of the new filter element.
7. Install the new filter element by hand. When the gasket contacts the filter element mounting base, tighten the filter element for an additional three quarters of a turn.
8. Remove the hydraulic tank breather. Replace the old breather with a new breather.



Illustration 364

g00290845

9. Maintain the hydraulic oil level in the sight gauge between the "MIN" mark and the "MAX" mark. Add oil, if necessary.
10. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.
11. Install the hydraulic tank filler cap.
12. Close the access door.

i00609994

Hydraulic System Oil Level - Check

SMCS Code: 5056; 7479



Illustration 365

g00290845

The sight gauge for the hydraulic tank is located on the left side of the machine. Move the backhoe to the transport position and lower the loader bucket to the ground.

Turn off the engine. Wait about five minutes before you check the hydraulic system oil level.

Maintain the oil level in the sight gauge between the "MIN" mark and the "MAX" mark.

i00661454

Kingpin Bearings (Front) - Lubricate (Two-Wheel Drive)

SMCS Code: 4314

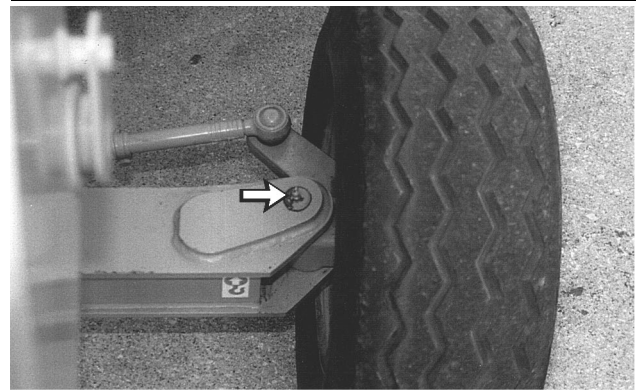


Illustration 366

g00291789

Apply lubricant to the grease fitting on the top of each kingpin.

i00661457

Kingpin Bearings (Rear) - Lubricate (All Wheel Steer)

SMCS Code: 4314

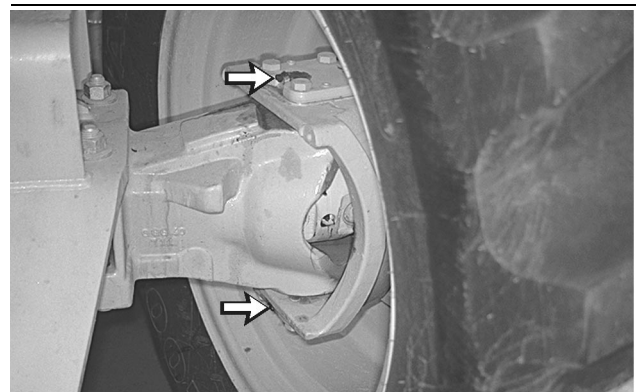


Illustration 367

g00291790

Apply lubricant to the grease fittings for the kingpin bearings of the rear steerable axle. There is a total of four grease fittings.

i01035226

Loader Bucket, Cylinder, and Linkage Bearings - Lubricate

SMCS Code: 7069; 7070; 7071

Single Tilt Machines

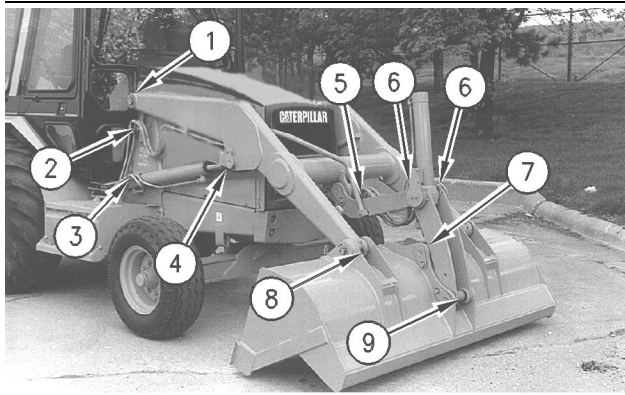


Illustration 368

g00291110

Apply lubricant to the grease fittings (1) for the frame and for the lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fitting (2) for the pivot for the linkage of bucket positioner and lift kickout.

Apply lubricant to the grease fittings (3) for the head end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (4) for the rod end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (5) for the pivot pin at the loader lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (6) for the pivot bearings for the bucket tilt cylinder. There is a grease fitting in each linkage (four total).

Apply lubricant to the grease fitting (7) for the rod end of the tilt cylinder.

Apply lubricant to the grease fittings (8) for the lower pivot pins. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (9) for the upper pivot pin. There is a grease fitting for each side of the machine.

There is a total of 17 grease fittings.

Parallel Lift Machines

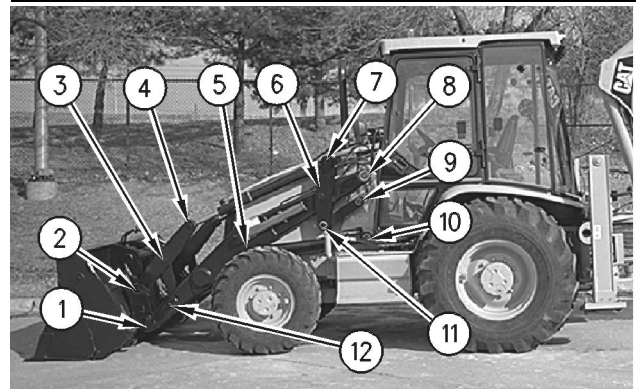


Illustration 369

g00291114

Apply lubricant to the grease fittings (1) for the lower pivot pin of the quick coupler assembly. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (2) for the upper pivot pin of the quick coupler assembly. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (3) for the upper pivot pin of the tilt linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (4) for the rod end of the tilt cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (5) for the rod end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (6) for the center pivot pin of the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (7) for the head end of the tilt cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (8) for the frame and for the lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (9) for the frame and for the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (10) for the head end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (11) for the lower pivot pin of the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (12) for the lower pivot pin of the tilt linkage. There is a grease fitting for each side of the machine.

There is a total of 24 grease fittings.

i00052234

Oil Filter - Inspect

SMCS Code: 1318; 3067; 5068

Inspect A Used Filter for Debris

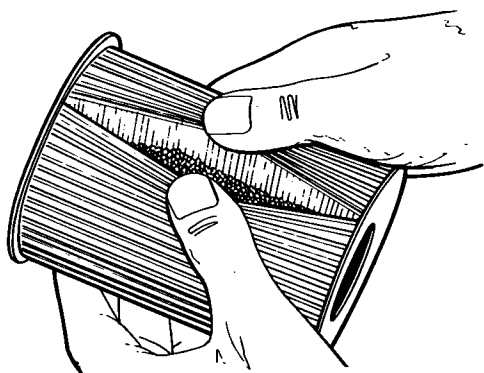


Illustration 370

g00100013

The element is shown with debris.

Use a **4C-5084** 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.

i00999998

Parking Brake - Check/Adjust

SMCS Code: 4267

Check Procedure

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

Check the brakes on a dry, level surface.

Fasten the seat belt before you check the brakes.

The following checks are used to determine if the parking brake is functional. These checks are not intended to measure the maximum brake holding effort. The brake holding effort that is required to sustain a machine at a specific engine rpm varies depending on the machine. The variations are the differences in the engine setting, in the power train efficiency, and in the brake holding ability, etc.

1. Start the engine. Raise the bucket slightly.

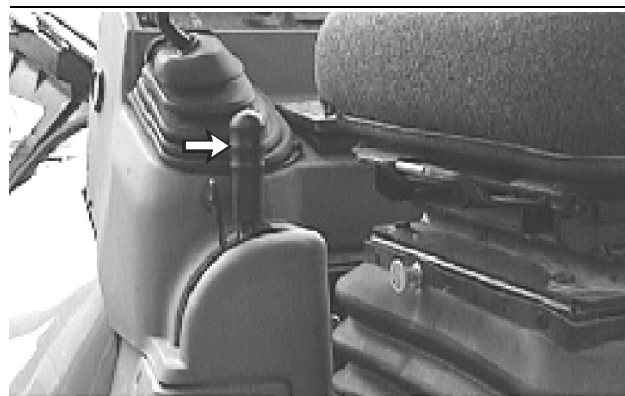


Illustration 371

g00514581

2. Engage the parking brake.

3. If the machine is equipped with the standard transmission, move the transmission speed shift lever to THIRD gear. Move the transmission direction control lever to FORWARD, to NEUTRAL, and back to FORWARD. If the machine is equipped with a power shift transmission move the transmission control lever to FOURTH SPEED FORWARD, to NEUTRAL, and back to FOURTH SPEED FORWARD. This is done in order to override the transmission neutralizer for this test.

Note: Place machines that are equipped with all wheel drive into two-wheel drive mode.

Note: The parking brake indicator light should come on and the parking brake alarm should sound.

4. Gradually increase the engine speed to high idle. The machine should not move.

⚠ WARNING

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

5. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the blade to the ground. Stop the engine.

⚠ WARNING

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

6. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the bucket to the ground. Stop the engine.

Adjustment Procedure

If the machine moved during the test, perform the following procedure in order to adjust the parking brake.

1. Apply the service brakes.

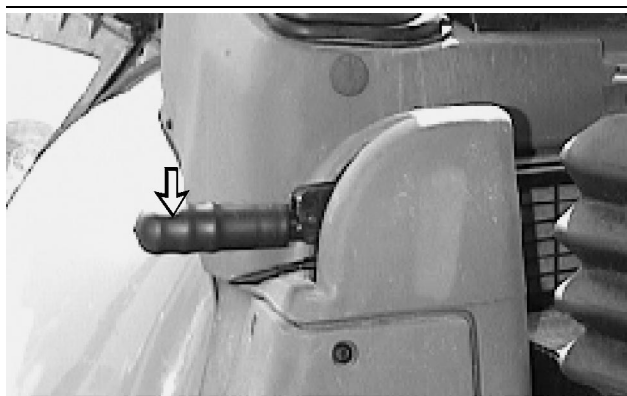


Illustration 372

g00514571

2. Disengage the parking brake.
3. As you view the parking brake adjuster knob from the operator seat, turn the knob counterclockwise for one quarter of a turn.
4. Repeat steps 1 to 6 in the check procedure.

If the machine moves during the parking brake test, then perform the adjustment procedure again. If you run out of adjustment on the parking brake adjuster knob, refer to Systems Operation, Testing and Adjusting, SENR1259, "Parking Brake Control - Adjust".

i00611590

Radiator Core - Clean

SMCS Code: 1353



Illustration 373

g00287717

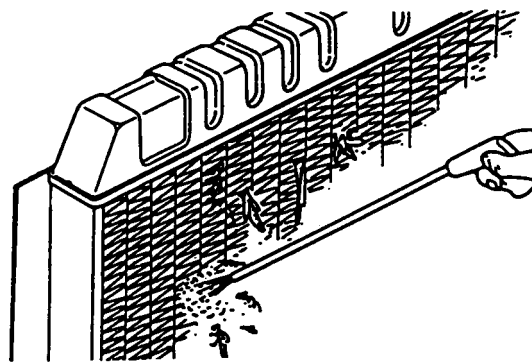


Illustration 374

g00101939

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

Note: If necessary, tilt the oil cooler away from the radiator in order to remove dust and debris between the radiator and the oil cooler.

i01035235

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325

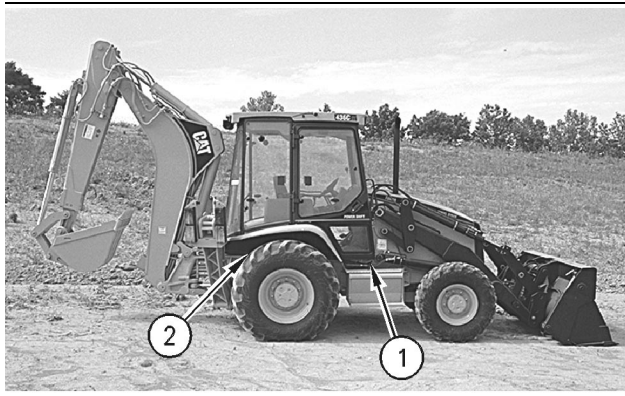


Illustration 375

g00293549

Tighten the M16 bolts (1) to a torque of $165 \pm 30 \text{ N}\cdot\text{m}$ ($122 \pm 22 \text{ lb}\cdot\text{ft}$). Tighten the M24 bolts (2) to a torque of $524 \pm 100 \text{ N}\cdot\text{m}$ ($386 \pm 74 \text{ lb}\cdot\text{ft}$).

Note: Apply oil to all ROPS bolt threads before you install the bolts. Failure to apply oil to the bolt threads can result in improper bolt torque.

2. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS emits a noise. Replace the ROPS mounting supports if the ROPS rattles.

Do not straighten the ROPS. Do not repair the ROPS by welding reinforcement plates to the ROPS.

Consult your Caterpillar dealer for repair of any cracks in the ROPS.

i00317205

Seat Belt - Inspect

SMCS Code: 7327

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

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.

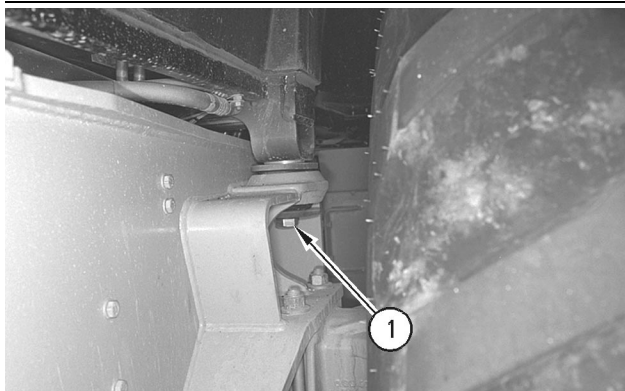


Illustration 376

g00293546

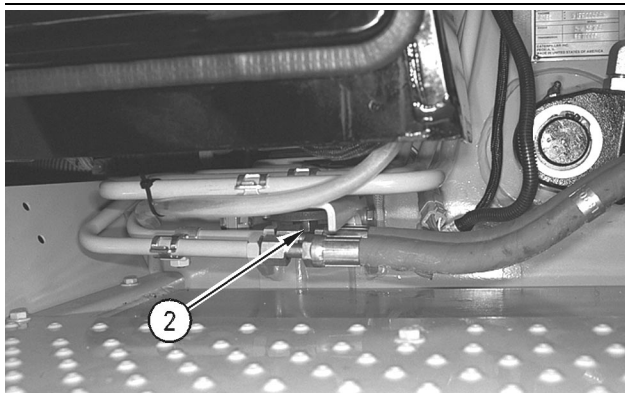


Illustration 377

g00293545

1. Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

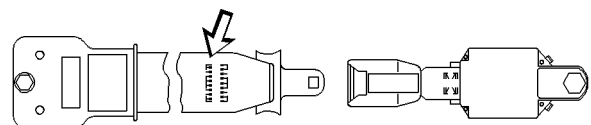


Illustration 378

g00215958

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

Check the buckle for wear or for damage. If the buckle is worn or damaged, replace the seat belt and/or the buckle.

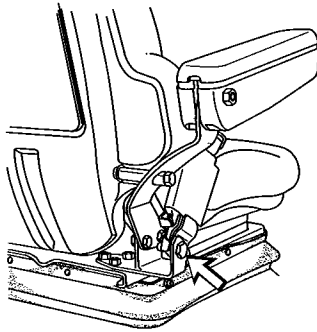


Illustration 379

g00038621

Check the seat belt mounting hardware for wear or for damage. If the seat belt mounting hardware is worn or damaged, replace the seat belt mounting hardware. Make sure that the mounting bolts are tight.

i00615000

Secondary Steering Test (If Equipped)

SMCS Code: 4324

If hydraulic pressure is lost during machine operation, the secondary steering system will become active.

Note: With the machine at rest, the steering during this test cycle may require more effort than normal steering. Both hands may be required to steer.

Before you start the engine, turn the steering wheel while the vehicle weight is on the front wheels. Turn the front wheels from the center position to each stop and return to the center position. Failure of the front wheels to complete the above cycle indicates a malfunction of the secondary steering system. The machine should not be driven until the problem is corrected.

All Wheel Steer (AWS) Machines

On AWS machines, the steering control will default to the front wheels if the steering system hydraulic pressure is lost.

Sideshift Stabilizer Wear Pads - Inspect

SMCS Code: 7222-040



Illustration 380

g00292882

Check the stabilizers for slop. Shim the stabilizer pads in order to maintain an acceptable fit and reduce slop. Refer to the Service Manual for the correct procedure.

Note: Do not excessively apply a silicone based lubricant. Dirt can be attracted to the lubricant and dirt can cause abrasion to the pad assemblies and wear to the pad assemblies.

The stabilizer pads do not normally require any lubrication. If the stabilizers become noisy, a small amount of a silicone based lubricant may be applied.

i00615050

Stabilizer and Cylinder Bearings - Lubricate

SMCS Code: 5468; 7222



Illustration 381

g00287719

Position the stabilizer, as shown.

Apply lubricant to the grease fitting for the head end of the cylinder.

Repeat for the other stabilizer.

There is a total of two grease fittings.

i00615422

Swing Frame and Cylinder Bearings - Lubricate

SMCS Code: 5105; 6506; 6507; 7063

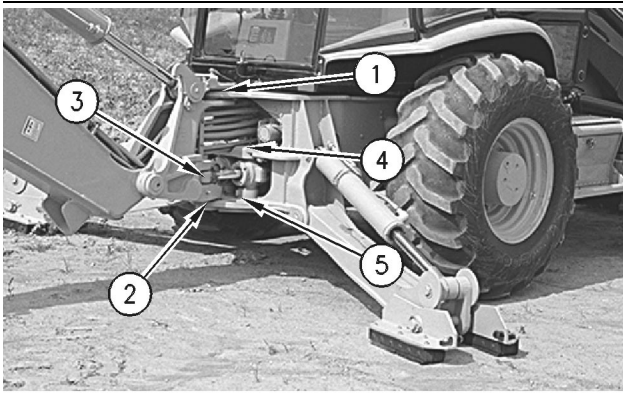


Illustration 382

g00287723

Apply lubricant to the grease fitting (1) for the top swing pin.

Apply lubricant to the grease fitting (2) for the bottom swing pin.

Apply lubricant to the grease fitting (3) for the eye of the swing cylinder. Repeat for the other swing cylinder.

Apply lubricant to the grease fitting (4) for the bearing on the top of the swing cylinder. Repeat for the other swing cylinder.

Apply lubricant to the grease fitting (5) for the bearing on the bottom of the swing cylinder. Repeat for the other swing cylinder.

There is a total of eight grease fittings.

Tire Inflation - Check

SMCS Code: 4203



Illustration 383

g00287414

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

Inflate the tires, if necessary. Refer to Operation and Maintenance Manual, "Tire Inflation with Air" and Operation and Maintenance Manual, "Tire Inflation with Nitrogen".

i00615434

Transmission Magnetic Screen - Clean

SMCS Code: 3030

1. Drain the transmission oil. Refer to Operation and Maintenance Manual, "Transmission Oil - Change".

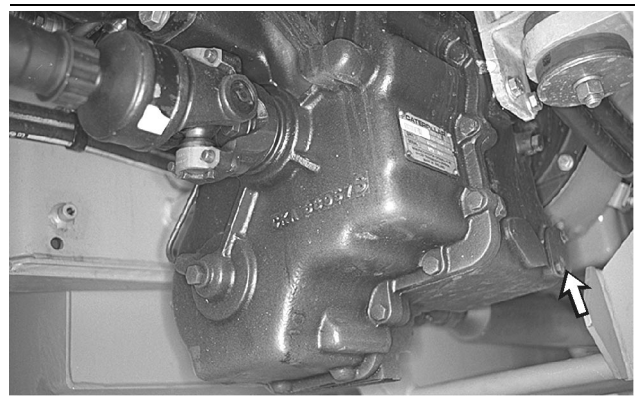


Illustration 384

g00293338

Magnetic strainer cover for the standard transmission

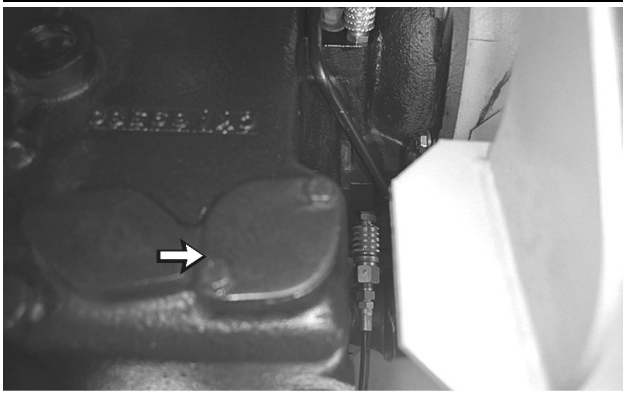


Illustration 385 g00293340
Magnetic strainer cover for the power shift transmission

2. Remove the magnetic strainer cover.
3. Remove the magnets from the housing.
4. Remove the screen from the housing.
5. Wash the tube and the screen in a clean, nonflammable solvent.

NOTICE

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

6. Clean the magnets with a cloth, with a stiff bristle brush, or with pressure air.
7. Install the magnets and the tube assembly into the magnetic screen.
8. Install the magnetic screen.
9. Clean the cover and inspect the seal. Replace the seal, if the seal is damaged.
10. Install the cover. Tighten the cover bolts.
11. Fill the transmission. Refer to Operation and Maintenance Manual, "Transmission Oil - Change".

i00999666

Transmission Oil - Change

SMCS Code: 3030; 3080

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

The machine should be level. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

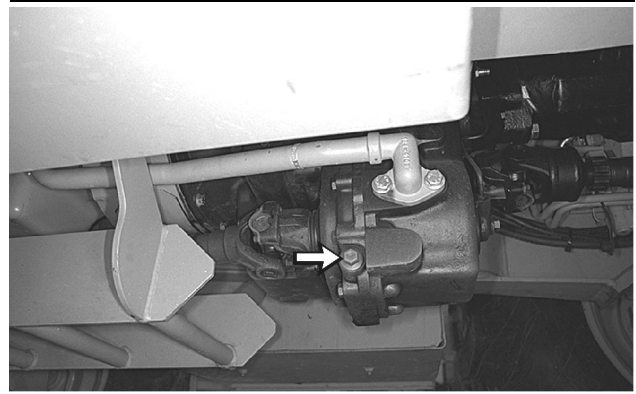


Illustration 386 g00290414
Drain plug for standard transmission

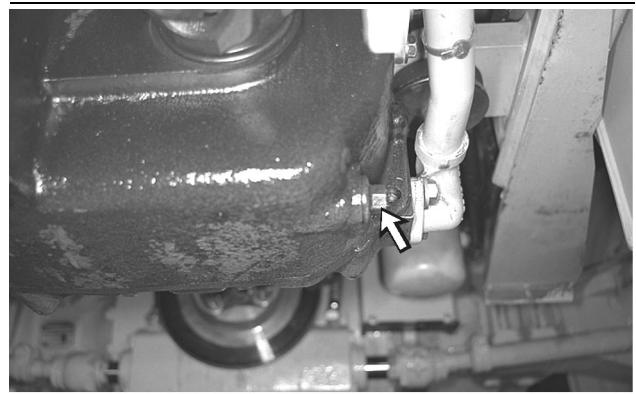


Illustration 387 g00291272
Drain plug for power shift transmission

1. Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container. Clean the transmission drain plug and install the transmission drain plug.
2. Change the transmission oil filter element. Refer to Operation and Maintenance Manual, "Transmission Oil Filter - Replace".
3. Clean the transmission magnetic screen. Refer to Operation and Maintenance Manual, "Transmission Magnetic Screen - Clean".

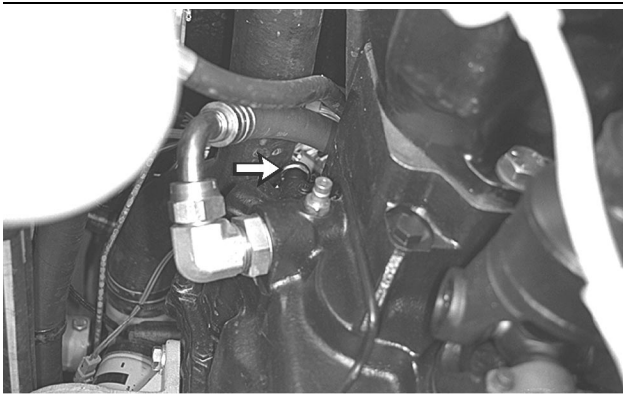


Illustration 388

g00293359

4. Remove the transmission breather from the top of the transmission case. Clean the breather in clean nonflammable solvent and allow the breather to dry. Replace the breather.

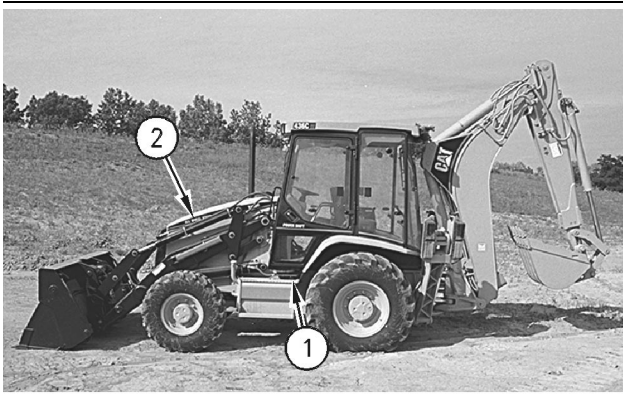


Illustration 389

g00287385

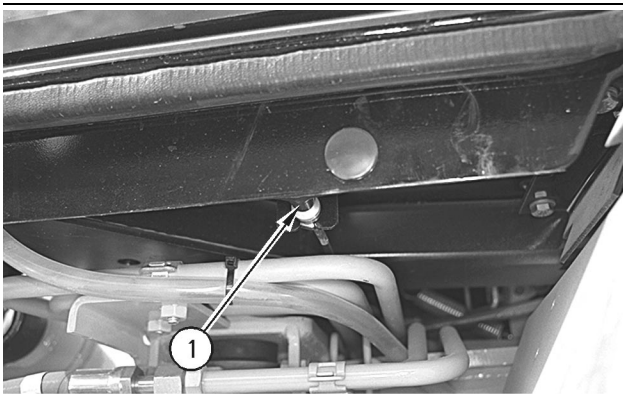


Illustration 390

g00287410

5. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.



Illustration 391

g00291275

6. Remove the dipstick/fill cap and fill the transmission with transmission oil. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".
7. Start the engine and run the engine at low idle. Apply the service brake. Slowly operate the transmission controls in order to circulate the oil.
8. Move the transmission control lever to NEUTRAL and engage the parking brake. Inspect the transmission for leaks.
9. Maintain the transmission oil level within the crosshatched region on the "CHECK WITH OIL WARM" side of the dipstick when the transmission is warm. Add transmission oil through the transmission filler tube, if necessary.

Note: The transmission can be checked with cold transmission oil. Check the oil level with the cold oil check side of the dipstick. The engine must be stopped in order to do a cold oil check.

10. Install the dipstick/fill cap and install the engine access door.
11. Stop the engine.

i00617243

Transmission Oil Filter - Replace

SMCS Code: 3067



Illustration 392

g00293353

The transmission filter is located on the left side of the machine .

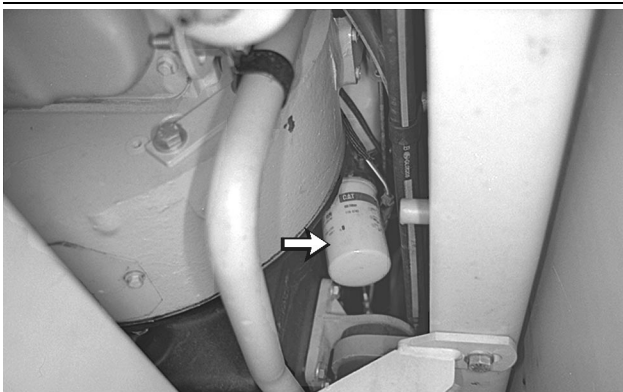


Illustration 393

g00293355

1. Remove the transmission oil filter element with a strap type wrench.
2. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
3. Apply a light coat of oil to the gasket of the new filter element.
4. Install the new filter element by hand. When the gasket contacts the mounting base, tighten the filter element for an additional three quarters of a turn.
5. Start the engine and apply the service brake. Slowly operate the transmission controls in order to circulate the transmission oil.

6. Move the transmission control lever to NEUTRAL and engage the parking brake. Inspect the filter element for leaks.



Illustration 394

g00291275

7. Maintain the transmission oil level within the crosshatched region on the "CHECK WITH WARM OIL" side of the dipstick when the transmission is warm. Add transmission oil, if necessary.
8. Stop the engine.

i00999735

Transmission Oil Level - Check

SMCS Code: 3030; 3080; 3081

Check the transmission oil level while the machine is on a level surface.

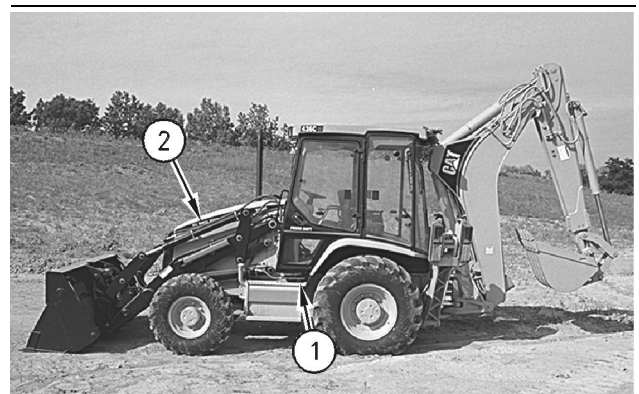


Illustration 395

g00287385

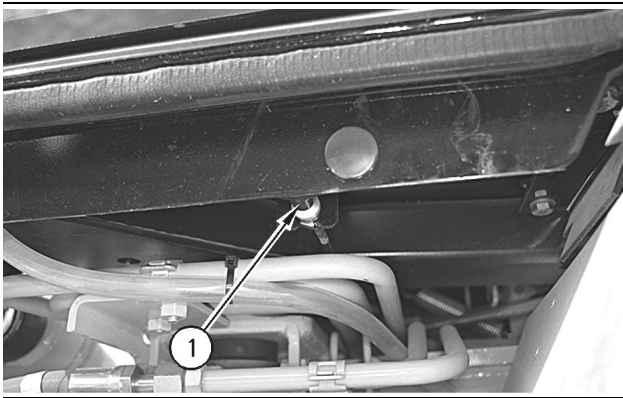


Illustration 396

g00287410

1. Pull the hood release lever (1) in order to open the engine access door (2) on the top of the machine.



Illustration 397

g00291275

2. Remove the dipstick/fill plug for the transmission.
3. Maintain the oil level within the crosshatched region on the "CHECK WITH OIL WARM" side of the dipstick/fill plug when the transmission is warm. Add transmission oil, if necessary.

Note: The transmission can be checked with cold transmission oil. Check the oil level with the cold oil check side of the dipstick. The engine must be stopped in order to do a cold oil check.

4. Clean the dipstick/fill plug and install the dipstick/fill plug.

V-Belts - Inspect/Adjust/Replace

SMCS Code: 1357

If new belts are installed, check belt adjustment after 30 minutes of operation. For multiple belt drive applications, always replace the belts in matched sets. Replacing only one belt of a matched set will cause the new belt to carry more load because the older belts are stretched. The additional load on the new belt could cause the new belt to break.

1. Empty the bucket. Remove the pin that secures the loader lift arm brace to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the loader lift arm brace over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the loader lift arm brace and install the cotter pin.
4. Slowly lower the loader arms until the loader lift arm brace contacts the top of the lift cylinder and the bosses on the loader arm.
5. Stop the engine in order to inspect the belts.



Illustration 398

g00287238

6. Remove the engine access panel on the left side of the machine.

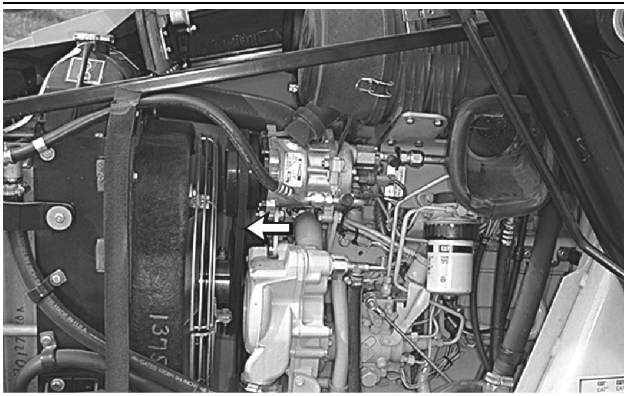


Illustration 399

g00287234

7. Inspect the condition of the air conditioner belt and the adjustment of the air conditioner belt. The air conditioner belt should deflect 10 mm (0.38 inch) under 110 N (25 lb) of force.

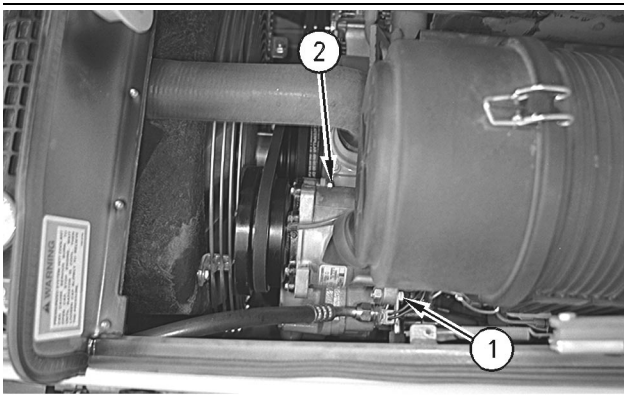


Illustration 400

g00287235

8. Loosen the adjusting locknut (1). Loosen the compressor bracket mounting bolt (2).
9. Move the compressor until the correct belt tension is reached.
10. Tighten the adjusting locknut (1). Tighten the compressor bracket mounting bolt (2).
11. Recheck the belt deflection. If the amount of deflection is incorrect, repeat Step 8 to Step 10.
12. Install the engine access panel.



Illustration 401

g00287241

13. Remove the engine access panel on the right side of the machine.

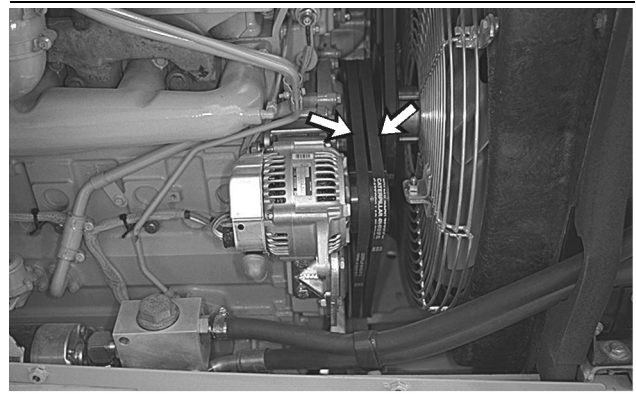


Illustration 402

g00287242

14. Inspect the condition of the alternator belts and the adjustment of the alternator belts. The alternator belts should deflect 10 mm (0.38 inch) under 110 N (25 lb) of force.

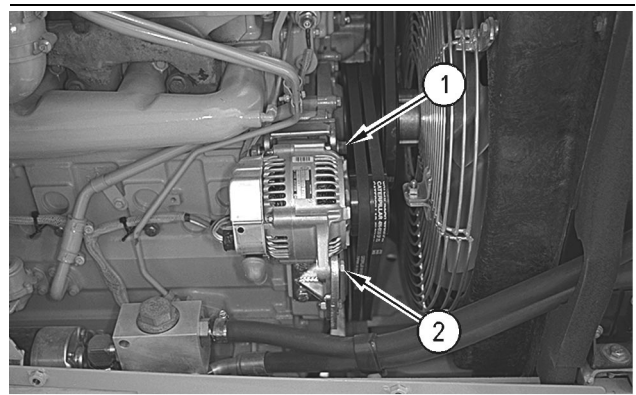


Illustration 403

g00287243

15. Loosen the mounting bolt (1). Loosen the adjusting locknut (2).
16. Move the alternator until the correct tension is reached.

17. Tighten the adjusting locknut (2). Tighten the mounting bolt (1).
18. Recheck the belt deflection. If the amount of deflection is incorrect, repeat Step 15 to Step 17.
19. Install the engine access panel.
20. Start the engine. Raise the loader arms to the maximum height.
21. Remove the pin and replace the loader lift arm brace to the stored position on the loader lift arm.
22. Lower the bucket to the ground.

i00615722

Walk-Around Inspection

SMCS Code: 7000

NOTICE

Accumulated grease and oil on a machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours or each time any significant quantity of oil is spilled on a machine.

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. If leaks are observed, check the fluid levels more frequently than the recommended intervals.

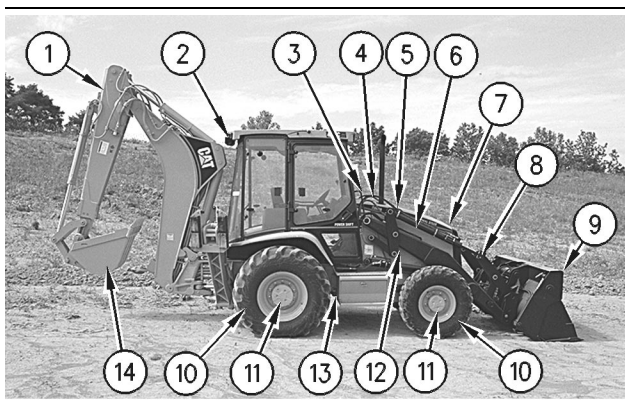


Illustration 404

g00291276

Inspect the backhoe bucket (14) for damage or for excessive wear. Inspect the backhoe linkage (1) for damage or for excessive wear. Repair the bucket or the linkage, if necessary. Replace any bucket teeth, if necessary.

Inspect the loader bucket (9) for damage or for excessive wear. Inspect the linkage (8) for damage or for excessive wear. Repair the bucket or the linkage, if necessary. Replace any bucket teeth, if necessary.

Inspect the transmission (13) for leaks. Inspect the torque converter for leaks. Correct any leaks. Check the hoses around the transmission.

Inspect the hydraulic system for leaks. Inspect the hydraulic tank (4), cylinder rod seals, hoses and tubes. Also inspect plugs, couplings and fittings. Correct any leaks.

Inspect the engine compartment (6) for trash buildup. Remove any trash buildup that is in the engine compartment. Clean the screens on the engine access doors.

Inspect the belts for the engine attachments (12) for worn belts, for cracked edges or for frayed edges. Replace any damaged belts.

Inspect the cooling system for leaks, for faulty hoses, and for trash buildup. Correct any leaks and remove any trash buildup from the radiator (7).

Inspect the tires (10) for damage and for proper inflation. Replace any missing valve caps. Tighten any loose bolts.

Inspect the axles (11) for leaks. Inspect the front differential for leaks and the rear differential for leaks.

Check the torque on new wheels or repaired wheels. Refer to Operation and Maintenance Manual, "Wheel Nut Torque - Check".

Inspect the engine air cleaner (5) for dirt buildup. Remove the dirt from the engine air cleaner.

Service the air filter elements when the yellow piston enters the red zone on the filter service indicator.

Inspect the steps and handholds (3). These objects must be clean. Also, these objects must be in good condition. Inspect the Rollover Protective Structure (ROPS) for damage. Notify your Caterpillar dealer for repairs, if necessary. Tighten any loose bolts on the ROPS.

Make sure that the access covers and the guards are secured. Inspect the access covers for damage and the guards for damage.

Inspect the lights (2) for broken bulbs and for broken lenses. Replace the bulbs or lenses, if necessary.

Inspect the operator's compartment for cleanliness. Keep the operator's compartment clean.

Adjust the rearview mirrors for best visibility.

i00615726

Wheel Bearings (Front) - Lubricate (Two-Wheel Drive)

SMCS Code: 4205; 4208

Use the following procedure for both wheels.

1. Raise the front wheels slightly off the ground.
2. Install sufficient blocking under the frame and lower the machine to the blocking.
3. Remove the nuts and both wheels.

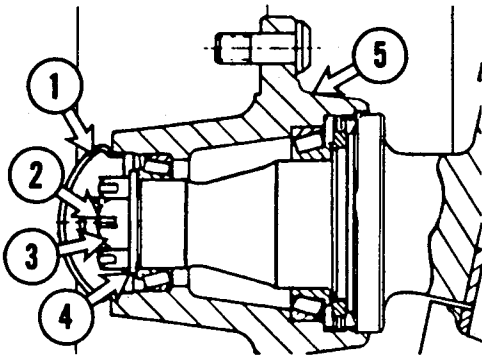


Illustration 405

g00107659

4. Remove the hub cap (1).
5. Remove the cotter pin (2), nut (3), and washer (4).
6. Pull the hub assembly (5) until the cone and roller assembly come out of the hub assembly. Then, pull off the hub all the way.
7. Clean all of the parts in clean, nonflammable solvent and allow the parts to air dry. Do not use pressure air.
8. Inspect the roller assemblies for heat discoloration and for wear. Inspect the seals for damage. Replace any damaged parts.
9. Make sure that the grease gets packed between the rollers and the cage on both bearings.

Force the grease through the bearing from the large end of the rollers.

10. Pack a 6 mm (0.25 inch) layer of grease between the bearing assemblies in the hub. Do not fully pack the hub with grease.
11. Apply a 6 mm (0.25 inch) thick film of grease on the spindle surface.
12. Install the hub, the bearings, the washer, the nut and the wheel.
13. While you turn the wheel, tighten the nut (3) until a slight drag is noticed. Back off the nut to the nearest slot and install the cotter pin.
14. All bearing surfaces must make contact. The wheel should turn freely within 0.025 to 0.25 mm (0.001 to 0.010 inch) end play.
15. Install the hub cap.
16. Tighten the lug nuts to a torque of 400 ± 40 N·m (295 ± 30 lb ft).

i00615727

Wheel Nut Torque - Check

SMCS Code: 4051; 4199; 4200



Illustration 406

g00287728

Check the torque on new wheels or repaired wheels after every ten service hours until the specified torque is maintained.

Put a drop of oil on all wheel studs on reassembly.

Torque the nuts to 400 ± 40 N·m (295 ± 30 lb ft). Use a star pattern when you torque the nuts.

Check the nuts on all four wheels.

i00615728

Windows - Clean

SMCS Code: 7310; 7340



Illustration 407

g00287727

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

i01193237

Window Wipers - Inspect/Replace

SMCS Code: 7305

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