SAFETY.CAT.COM™

MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

CATERPILLAR®

CATERPILLAR®

SEBU7881-16
October 2010

Operation and Maintenance Manual

140M Motor Grader

B9D1-Up (Machine)
B9G1-Up (Machine)
D9G1-Up (Machine)
B9M1-Up (Machine)

i04110550

Maintenance Interval Schedule

SMCS Code: 1000; 7000

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

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

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

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

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Cat dealer for details.

When Required

Every 10 Service Hours or Daily

Initial 100 Service Hours

Every 100 Service Hours or 2 Weeks

Initial 250 Service Hours (or at first oil change)

Every 250 Service Hours

Initial 500 Service Hours (or at first oil change)

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

Every 500 Service Hours or 3 Months

Every 1000 Service Hours or 6 Months

Every 1000 Service Hours or 1 Year

Every 2000 Service Hours or 1 Year

Every 2000 Service Hours or 2 Years

Every Year

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

Every 3000 Service Hours or 3 Years

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i02784922

All Wheel Drive Motor Supply Hose - Inspect/Replace (If Equipped)

SMCS Code: 3154-040-YW; 3154-510-YW; 4351-040-YW; 4351-510-YW

S/N: B9G1-Up

S/N: D9G1-Up

⚠ WARNING

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

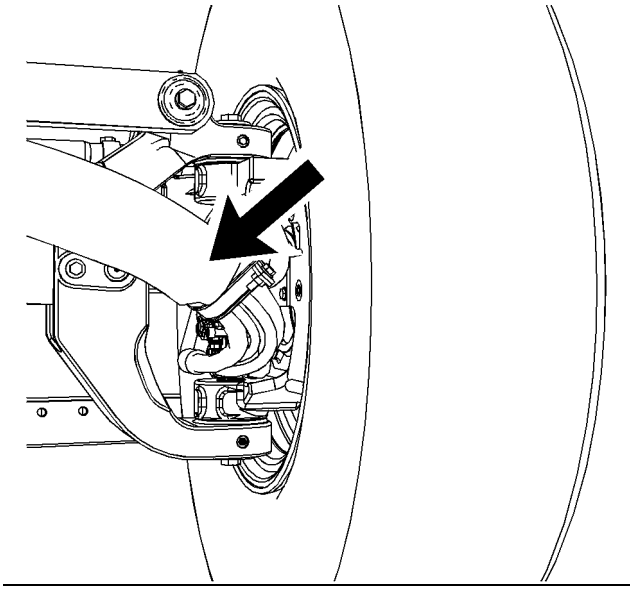


Illustration 125 g01263171

Supply hoses for the all wheel drive motors

1. Clean the area around each hose before you begin inspection.
2. Inspect each hose for the following conditions:
   - Leaks
   - Wear
   - Damage
3. Correct any leaks.
4. Replace any worn hoses. Replace any damaged hoses.

i02525595

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the articulation bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe all the fittings before you apply lubricant through the fittings.

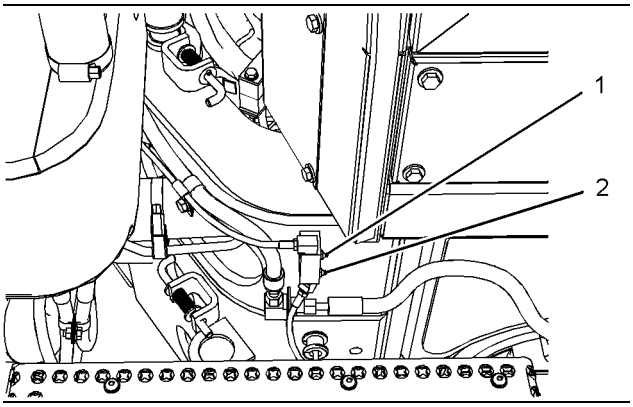


Illustration 126 g01263278

The fittings for the articulation bearings are located on the front left side of the rear frame.

Apply the appropriate lubricant through fitting (1) for the upper articulation bearing.

Apply the appropriate lubricant through fitting (2) for the lower articulation bearing.

i04000941

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268; 4313

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the axle oscillation bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fitting before you apply lubricant through the fitting.

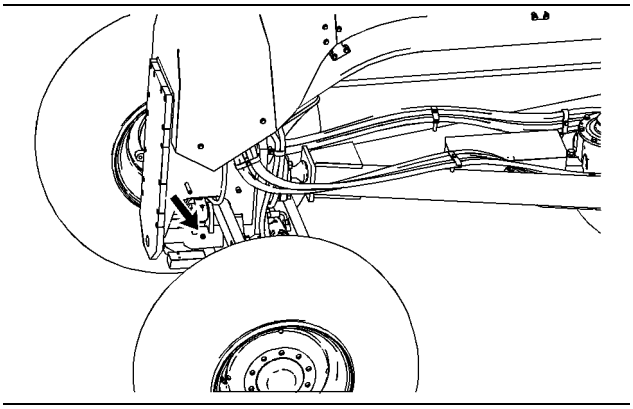


Illustration 127 g01073624

Typical Example Shown

The fitting for the axle oscillation bearings is located in the middle of the front axle.

Apply the appropriate lubricant through the fitting in order to lubricate the axle oscillation bearings.

i03627273

Backup Alarm - Test

SMCS Code: 7406-081

The backup alarm is on the rear of the machine.

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

Apply the service brake. Disengage the parking brake. Move the transmission control switch to a REVERSE position.

The backup alarm should start to sound immediately. The alarm alerts the personnel behind the machine that the machine is backing up. The backup alarm will continue to sound until the transmission control switch is moved to the NEUTRAL position or to any FORWARD position.

i00993589

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i01770781

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-510; 1402-510

1. Turn the engine start switch key to the OFF position. Turn all the switches to the OFF position.
2. Turn the key for the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the negative battery cable at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.

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

4. Disconnect the negative battery cable from the battery.
5. Disconnect the positive battery cable from the battery.
6. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
7. If necessary, make repairs. If necessary, replace the battery cable or the battery.
8. Connect the positive battery cable at the battery.
9. Connect the negative battery cable at the battery.
10. Connect the battery cable at the battery disconnect switch.
11. Install the key for the battery disconnect switch. Turn the battery disconnect switch to the ON position.

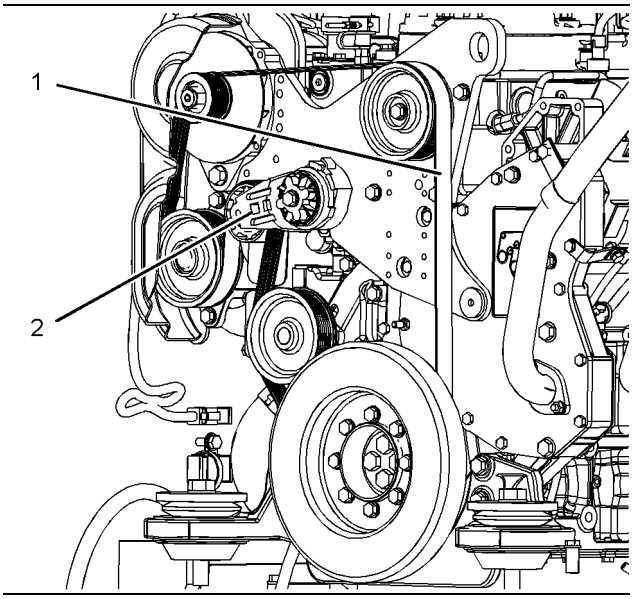
i03674422

Belt - Inspect

SMCS Code: 1357-040; 1397-040

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

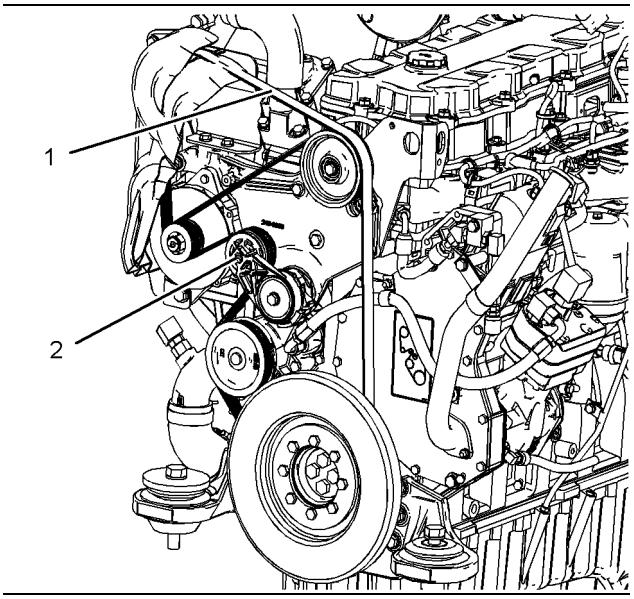
1. Stop the engine.
2. Open the engine access door on the right side of the machine.



g01162613

Illustration 128

C7 Engine



g01303273

Illustration 129

C9 Engine

3. Inspect the condition of belt (1).

Note: Removal of the alternator guard is not necessary to inspect the belt.

4. Replace the belt if any of the following conditions exist:

- excessive cracking
- excessive wear
- excessive damage

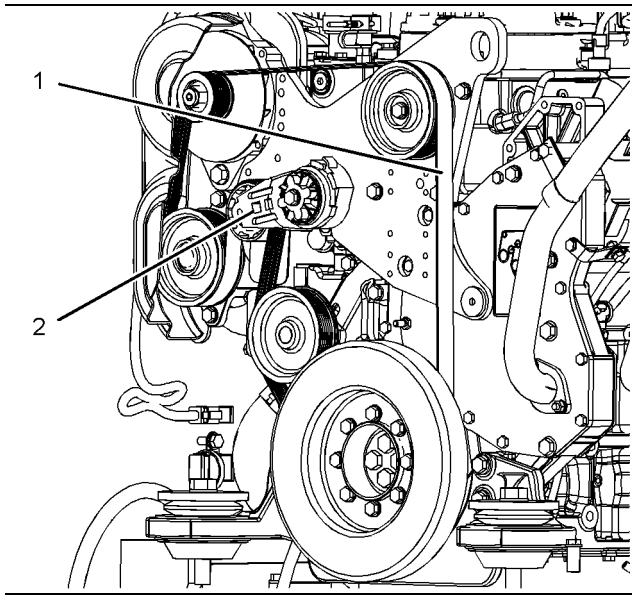
5. Inspect the free arm stop of belt tensioner (2). The free arm stop must be aligned with the green zone which is on the decal of the belt tensioner. If the free arm stop is in either of the red zones, replace the belt.

i03674424

Belt - Replace

SMCS Code: 1357-510; 1397-510

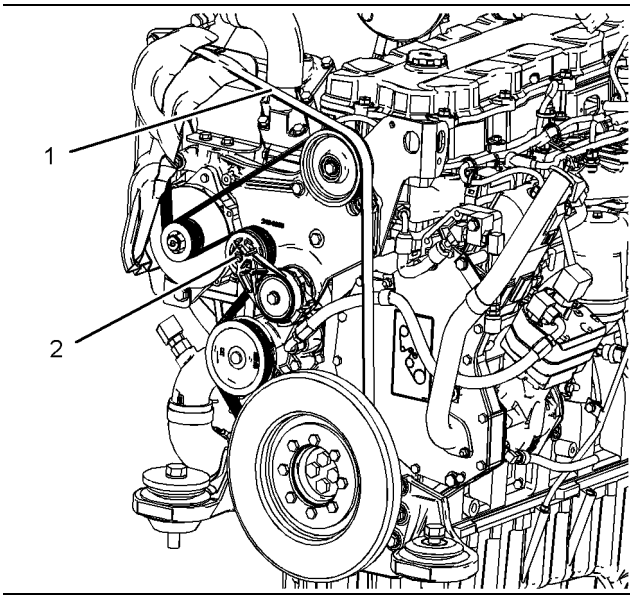
Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.



g01162613

Illustration 130

C7 Engine



g01303273

Illustration 131
C9 Engine

1. Release the tension on belt (1). Insert a 12.7 mm (0.50 inch) ratchet into the square hole in belt tensioner (2) and pry the belt tensioner in a counterclockwise direction.

2. Remove the belt.

Note: Removal of the alternator guard is not necessary to remove the belt.

3. Install the new belt around the pulleys.

4. Inspect the free arm stop of the belt tensioner. The free arm stop must be aligned with the green zone which is on the decal of the belt tensioner.

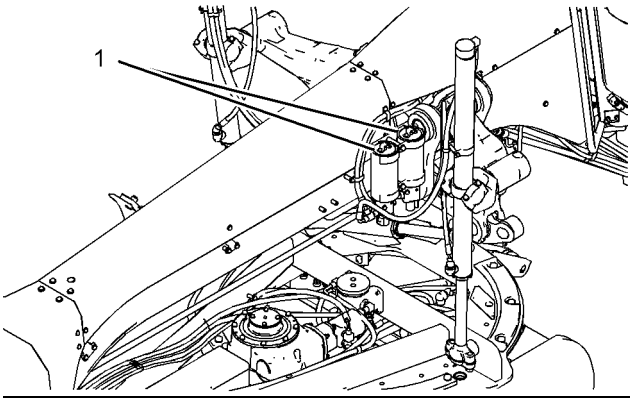
5. Check the belt tension after 30 minutes of operation.

Note: The break-in period for the belt is considered to be 30 minutes.

i04000948

Blade Cushion Accumulator - Check

SMCS Code: 5077-535-BG



g01296656

Illustration 132
Typical Example Shown

Blade cushion accumulators (1) are located on the left side of the front frame.

Consult your Cat dealer for the correct checking procedure, the correct filling procedures, and the recommended pressure.

i02527178

Blade Lift Cylinder Socket - Check/Adjust/Replace

SMCS Code: 5102-025; 5102-510; 5102-535; 5103-025; 5103-510; 5103-535

1. Rotate the blade. Position the blade at an angle of 90 degrees to the frame. Lower the blade to the ground.

2. Operate the blade lift cylinders. Observe the socket. If the socket moves without blade movement, adjustment is necessary.

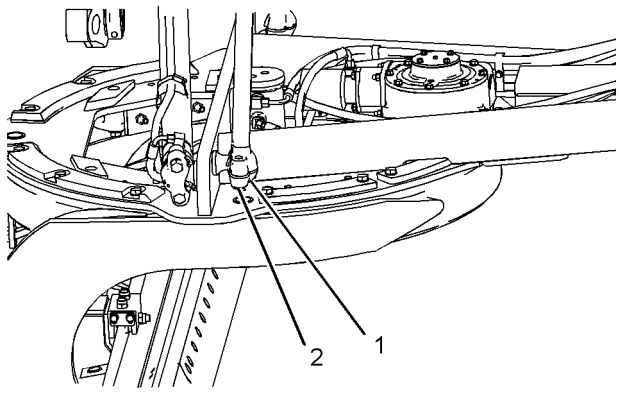


Illustration 133 g01071359

3. Remove bolts (2) from cap (1). Remove cap (1).

4. Remove one shim from either side of the inserts in order to reduce clearance.

Note: If you need to remove two shims, then remove one shim from each side of the inserts.

5. Install the cap. Install the bolts and tighten the bolts.

6. Check the socket for movement. If you observe movement in the socket, repeat Step 3 through Step 5.

Note: If no shims remain, install new inserts. Install two shims on each side of the inserts. Add additional shims, as needed.

i02527187

Blade Lift Cylinder Socket - Lubricate

SMCS Code: 5102-086; 5103-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the blade lift cylinder sockets. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe all the fittings before you apply lubricant through the fittings.

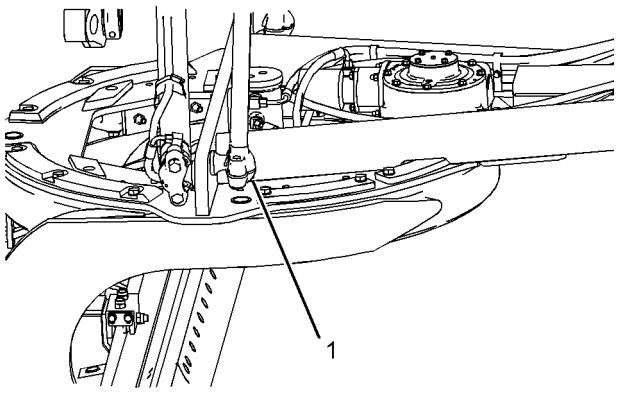


Illustration 134 g01071490

There are two blade lift cylinder sockets. Each blade lift cylinder socket has one fitting.

Apply the appropriate lubricant through fitting (1) in order to lubricate the blade lift cylinder sockets.

i02837232

Brake Accumulator - Check

SMCS Code: 4263-535

WARNING

Cold ambient temperatures could result in the loss of secondary braking capability due to inadequate hydraulic accumulator nitrogen pre-charge. The loss of the secondary braking system as well as the main hydraulic pressure will result in little or no braking capability and a potential for injury or death.

It is recommended to perform a brake accumulator check anytime the machine has been idle for longer than two hours below −25 °C (−13 °F). Refer to Operation and Maintenance Manual before performing any check of the brake accumulator.

1. Move the engine start switch to the ON position.

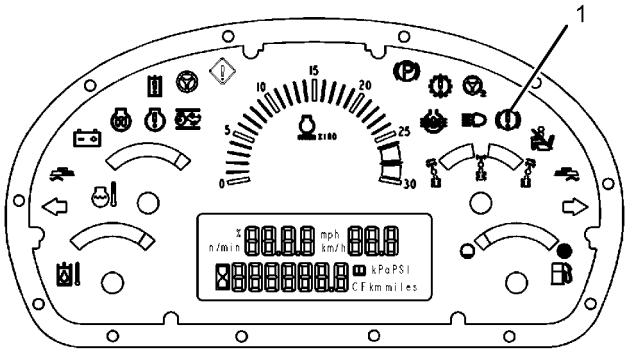


Illustration 135 g01257893

Note: Alert indicator (1) will illuminate if the brake system is not at the normal operating pressure.

2. Start the engine and run the engine for one minute in order to increase the accumulator pressure. Alert indicator (1) should turn off. Stop the engine.

3. Apply the service brake pedal and release the service brake pedal in order to decrease the accumulator pressure. Apply the service brake pedal and release the service brake pedal for a minimum of five applications, until alert indicator (1) illuminates.

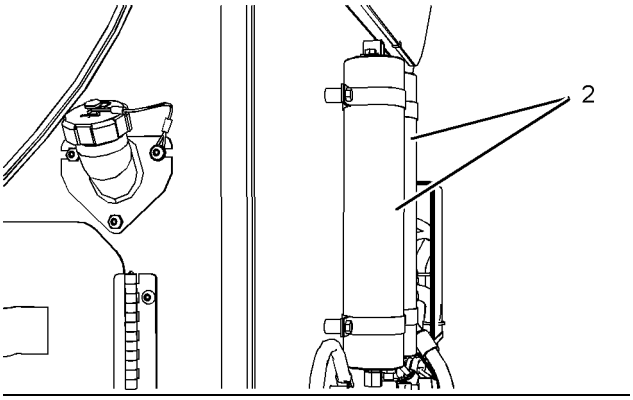


Illustration 136 g01296741

4. If alert indicator (1) illuminates with less than five applications of the service brake pedal, measure the nitrogen precharge pressure of accumulators (2). Consult Systems Operation, Testing and Adjusting, “Brake Accumulator - Test and Charge” for the following information:

   - The correct checking procedure
   - The correct filling procedure
   - The recommended pressure

   Your Caterpillar dealer has the appropriate tools for measuring the precharge pressure of the brake accumulators.

Note: Only use dry nitrogen gas to recharge the brake accumulators.

i02514369

Brakes, Indicators and Gauges - Test

SMCS Code: 4251-081; 4267-081; 4269-081; 7000-081; 7450-081; 7490-081

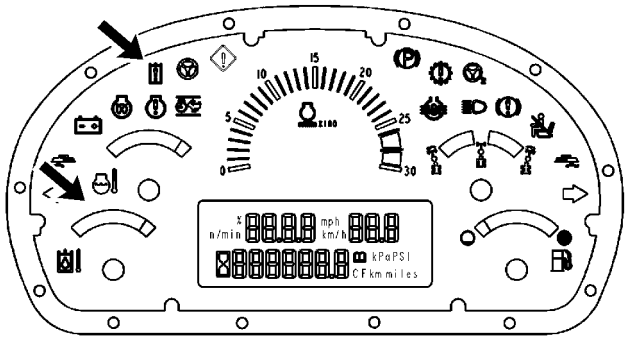


Illustration 137 g01257920

Look for broken lenses on the gauges, broken indicator lights or broken switches, etc.

Start the engine. Run the engine until the gauges have stabilized.

Look for inoperative gauges.

Turn on all of the machine lights. Check for proper operation.

Sound the horn.

Move the machine forward and test the service brakes. If the service brakes do not function properly, refer to Operation and Maintenance Manual, “Braking System - Test”.

Stop the engine.

Make any needed repairs before you operate the machine.

i02662777

Braking System - Test

SMCS Code: 3077-081; 4011-081; 4250-081; 4251-081; 4267-081

Service Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

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

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

NOTICE
If the machine moved while testing the service brake consult your Caterpillar dealer.

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

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

Test the service brake on a dry level surface.

Fasten your seat belt before you test the brakes.

Use the following test in order to determine whether the service brake is functional. This test is not intended to measure the maximum holding ability of the service brake.

1. Start the engine. Raise the blade slightly. Depress the transmission modulator control (inching pedal). Apply the service brake control.
2. Select the FIFTH SPEED FORWARD position on the transmission. Set the throttle hold mode switch to the MANUAL position. Push the top of the throttle set/accel switch in order to set the engine speed to high idle.
3. Gradually release the transmission modulator control (inching pedal). The machine should not move. The engine should stall.
4. Reduce the engine speed to low idle. Engage the parking brake control. Lower the blade to the ground. Stop the engine.

Note: The friction material for the brake may require replacement. The new friction material for the brake may require conditioning for maximum performance. Consult your Caterpillar dealer or see Special Instruction, SEHS9187 for the procedure for conditioning.

Parking Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

It the machine begins to move during test, reduce the engine speed immediately and engage the service brake control.

NOTICE
If the machine moved while testing the parking brake, consult your Caterpillar dealer.

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

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

Test the parking brake on a hard dry surface.

Fasten the seat belt before you test the parking brake.

Use the following test to determine whether the parking brake is functional. This test is not intended to measure the maximum holding ability of the parking brake.

1. Position the machine on a slope of 20 percent.
2. Engage the parking brake control. Release the service brake control. The wheels should not rotate. If the wheels rotate, engage the service brake control.

i02638988

Cab Air Filter - Clean/Replace

SMCS Code: 7311-070-FI; 7311-510-FI; 7342-070; 7342-510

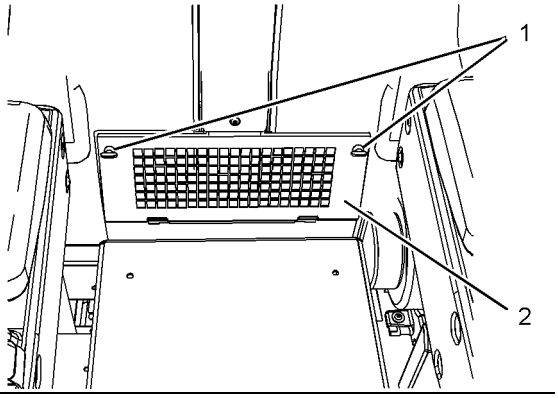


Illustration 138 g01299060

The operator's seat has been removed for ease of viewing.

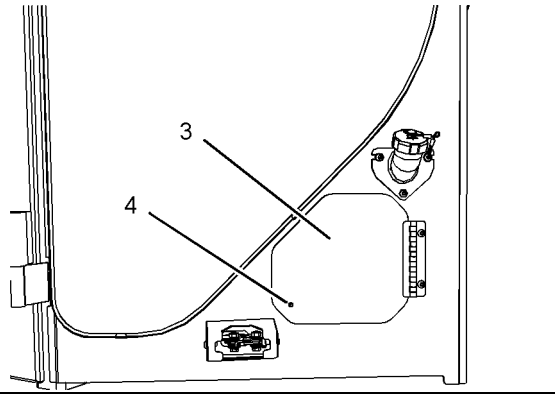


Illustration 139 g01323235

The inside cab air filter is located behind the operator's seat. The outside cab air filter is located behind access cover (3).

Note: Clean the cab air filters more often in dusty conditions.

Inside Filter

1. Turn thumb screws (1) counterclockwise in order to remove the thumb screws.
2. Remove filter cover (2).
3. Remove the filter element. Clean the filter element with pressure air or wash the filter element in warm water and in a nonsudsing household detergent.
4. Rinse the filter element in clean water. Thoroughly air dry the filter element.
5. After you clean the filter element, inspect the filter element. Do not use a filter element with damaged pleats or a damaged seal. If the filter element is damaged, replace the filter element.
6. Install the filter element.
7. Install filter cover (2).
8. Turn thumb screws (1) clockwise in order to install the thumb screws.

Outside Filter

1. Turn thumb screw (4) counterclockwise in order to remove the thumb screw.
2. Open access cover (3).
3. Remove the filter element. Clean the filter element with pressure air or wash the filter element in warm water and in a nonsudsing household detergent.
4. Rinse the filter element in clean water. Thoroughly air dry the filter element.
5. After you clean the filter element, inspect the filter element. Do not use a filter element with damaged pleats or a damaged seal. If the filter element is damaged, replace the filter element.
6. Install the filter element.
7. Close access cover (3).
8. Turn thumb screw (4) clockwise in order to install the thumb screw.

i03653715

Camera - Adjust (If Equipped)

SMCS Code: 7348-025

WARNING

Failure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera could result in slipping and falling which could result in personal injury or death. Be sure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera.

⚠ WARNING

Unexpected machine movement can cause injury or death.

In order to avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, "Do Not Operate" or similar warning tag to the hydraulic lockout control.

When maintenance or servicing of the rear view camera is required follow these steps.

1. Park the machine on a level surface.
2. Turn the engine start switch to the OFF position and remove the engine start switch key.
3. Turn the battery disconnect switch to theOFF position.

Adjust the Area of Visibility

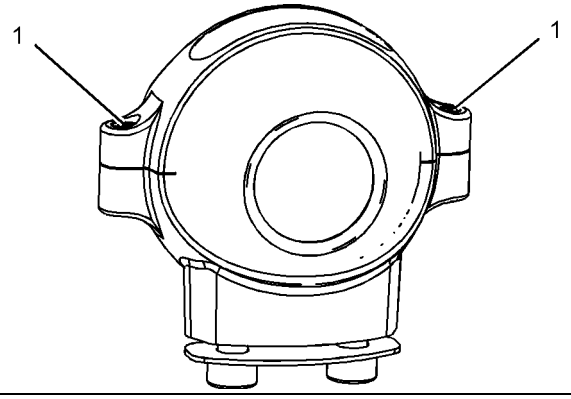


Illustration 140 g01960631

Aim the camera downward in order to show a portion of the rear of the machine.

To adjust the camera, loosen bolts (1) and move the camera for your desired view.

i02103440

Centershift Cylinder Socket - Check/Adjust/Replace

SMCS Code: 5223-023; 5223-025; 5223-535

1. Rotate the blade. Place the blade at an angle of 90 degrees to the frame. Lower the blade to the ground.
2. Operate the centershift cylinder. Observe the socket. If the socket moves without movement of the drawbar, adjustment is necessary.

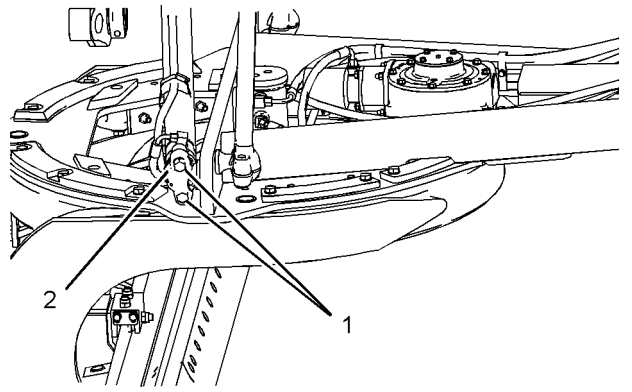


Illustration 141 g01071500

3. Remove bolts (1) from cap (2). Remove cap (2).
4. Remove one shim from either side of the inserts in order to reduce clearance.

Note: If you need to remove two shims, then remove one shim from each side of the inserts.

5. Install the cap and bolts and tighten the bolts.
6. Check the socket for movement. If you observe movement in the socket, repeat Step 3 through Step 5.

Note: If no shims remain, install new inserts. Install two shims on each side of the socket. Add additional shims, as needed.

i02527356

Centershift Cylinder Socket - Lubricate

SMCS Code: 5223-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the centershift cylinder socket. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on molybdenum grease.

Wipe all the fittings before you apply lubricant through the fittings.

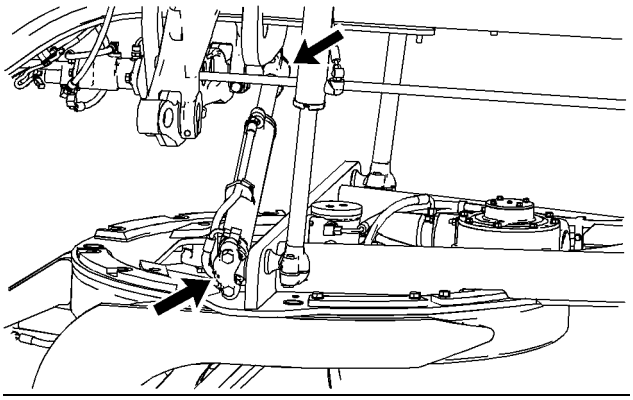


Illustration 142 g01071609

There are two centershift cylinder sockets. Each centershift cylinder socket has one fitting.

Apply the appropriate lubricant through the fittings in order to lubricate the centershift cylinder sockets.

i02327869

Centershift Lock Bar - Clean/Lubricate

SMCS Code: 5221-070; 5221-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the centershift lock bar. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

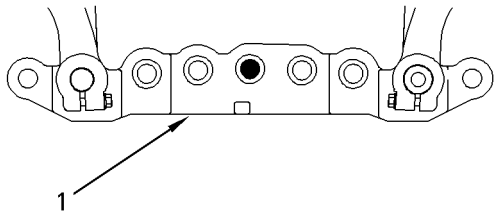


Illustration 143 g00811486

Centershift lock bar (1) is located under the front frame and above the circle.

Clean the dirt, the lubricant and the rust from the holes in the centershift lock bar.

Apply the appropriate lubricant to the holes in the centershift lock bar.

i02327897

Circle Clearances - Check/Adjust

SMCS Code: 6152-025; 6152-535; 6153-025; 6153-535; 6154-025; 6154-535; 6155-025; 6155-535

Note: In order to improve the accuracy for all adjustments, remove debris and abrasive material from the entire blade circle.

Blade Circle and Drawbar

1. Rotate the blade. Place the blade at an angle of 90 degrees to the frame.

⚠ WARNING

Personal injury or death can result from blade falling.

2. Lift the blade 10 mm (0.39 inch) off the ground.

3. Engage the parking brake. Stop the engine.

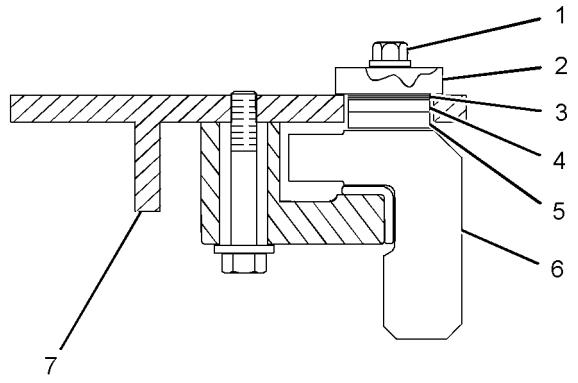


Illustration 144 g01141116

4. Remove plate retainer bolts (1) and remove retainer plates (2).

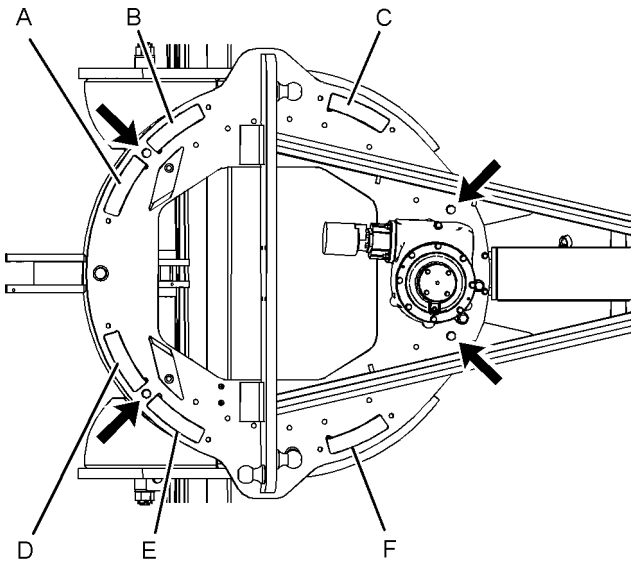


Illustration 145 g01150053

5. Reinstall two bolts in the drawbar without the retainer plates. Remove the two pusher bolts near the circle drive. Reinstall the pusher bolts into drawbar (7) without the spacers. Refer to Illustration 145 for the correct locations. This ensures that blade circle (6) is properly seated on the circle shoes.

6. Remove shims (3), spacer plates (4), and drawbar wear strips (5).

7. Inspect the wear strips. Inspect the drawbar. Measure the thickness of the drawbar wear strips. Replace the wear strips if there is uneven wear. The wear strips should be in complete contact at all points with the blade circle. If any wear strip is not in complete contact with the blade circle, replace the wear strip.

8. If the wear strips can be reused, switch wear strip (A) with wear strip (C). Switch wear strip (D) with wear strip (F). This will help keep the wear on the wear strips even.

9. Reinstall the wear strips, spacer plates, and the shims. Install shims until the shims are flush with the top surface of the drawbar.

10. Remove the two rear bolts separately. Immediately after removing one of the bolts, install the corresponding retainer plate. Install all of the retainer plates and bolts.

Note: The shims must not be on the top surface of the drawbar before the retainer plates are installed. The shims must be within the inside of the pocket.

11. Remove the two pusher bolts from the drawbar. Reinstall the pusher bolts with the spacers.

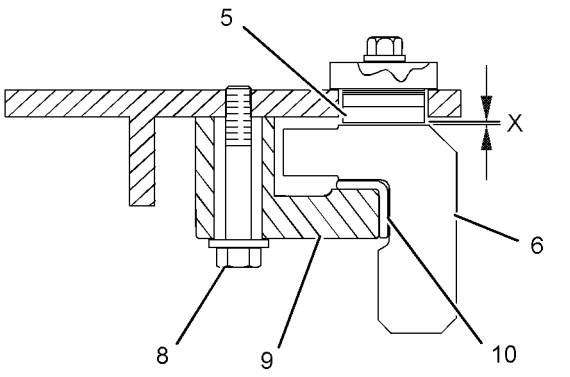


Illustration 146 g01141311

12. Measure clearance (X) between the top of blade circle (6) and the bottom of drawbar wear strips (5). Maintain a maximum clearance of 0.5 mm (0.02 inch).

Note: Make sure that shoe wear strips (10) are completely seated in circle shoes (9). Shoe mounting fasteners (8) must be tight.

Note: After all the adjustments have been performed, the blade circle must rotate freely without binding.

13. Lubricate the blade circle and the drawbar. Refer to Operation and Maintenance Manual, “Circle Top - Lubricate” for the proper procedure.

Circle Pinion and Circle Teeth

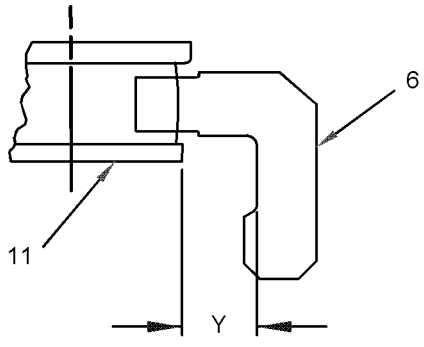


Illustration 147 g01141365

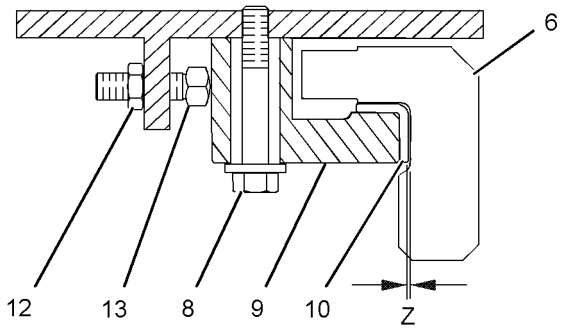


Illustration 148 g01141043

Note: The engagement of circle pinion (11) and the circle teeth is affected by the adjustment of circle shoes (9).

1. Rotate the blade. Place the blade at an angle of 90 degrees to the frame.
2. Lower the blade to the ground.
3. Apply the service brake as you slowly inch the machine in a forward direction. This will hold a light load between shoe wear strips (10) for the front circle shoes and blade circle (6).
4. Engage the parking brake. Stop the engine.
5. Measure clearance (Y) that is between the bottom flange of the circle pinion and the inner machined surface of the blade circle. If the clearance is not within 49.5 to 52.5 mm (1.95 to 2.07 inch), then adjust the clearance.

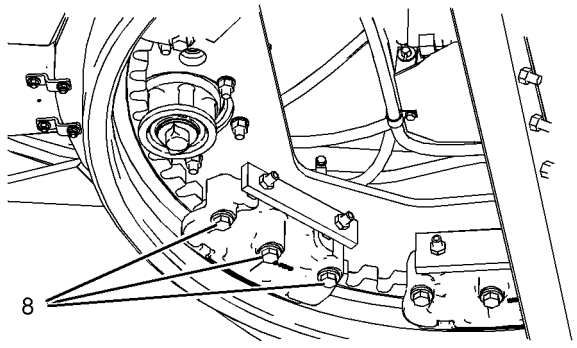


Illustration 149 g01141357

6. In order to inspect the shoe wear strips, remove shoe mounting fasteners (8).

Note: Remove each circle shoe (9) one at a time.

7. Inspect the shoe wear strips one at a time. Measure the thickness of the shoe wear strips on both contact sides. Replace the shoe wear strips if there is uneven wear. The shoe wear strips should be in complete contact at all points with the blade circle. If any wear strip is not in complete contact with the blade circle, replace the wear strip.
8. Install shoe mounting fasteners (8). Tighten all shoe mounting fasteners.
9. Loosen the shoe mounting fasteners by one quarter turn. Loosen locknuts (12).

Note: Adjust the front circle shoes one at a time. Adjust the clearance equally for each front circle shoe.

10. Turn adjusting bolts (13) inward or turn adjusting bolts (13) outward in order to attain 49.5 to 52.5 mm (1.95 to 2.07 inch).

Note: If the circle shoes are moved outward, it may be necessary to slowly inch the machine in a forward direction in order to place a light load between the wear strips for the front circle shoes and the blade circle.

11. After adjustments have been made to any circle shoe, check the circle shoes for proper clearance. If you cannot attain the correct clearance measurement due to worn front shoe wear strips, replace the worn shoe wear strips. Then, repeat Step 10.
12. Tighten the shoe mounting fasteners and locknuts for the front circle shoes.

Note: The adjusting bolts must be tight against the circle shoes before you tighten the mounting fasteners and the locknuts.

13. Set all of the circle shoes (front, side, and rear) to contact the blade circle. There will be no clearance between the circle shoes and the blade circle.
14. When the pinion clearance is set and the front circle shoes are in contact with the blade circle, measure distance (Z) between each wear strip and the blade circle. The clearance should be a maximum of 0.8 mm (0.03 inch).
15. Tighten all shoe mounting fasteners (8) to a torque of 530 ± 70 N·m (390 ± 50 lb ft).
16. Tighten locknuts (12) to a torque of 200 ± 30 N·m (150 ± 22 lb ft).

Note: After all the adjustments have been performed, the blade circle must rotate freely without binding.

17. Lubricate the circle pinion and the circle teeth. Refer to Operation and Maintenance Manual, “Circle Drive Pinion Teeth - Lubricate” for the proper procedure.

i02517027

Circle Drive Oil - Change

SMCS Code: 5207-510-OC

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

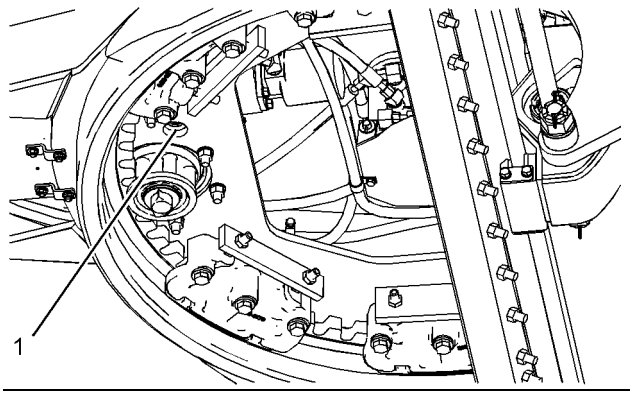


Illustration 150 g01070293

Bottom view of the blade circle

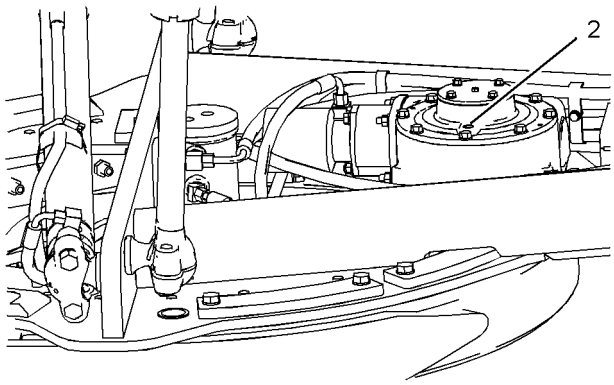


Illustration 151 g01070350

Top view of the blade circle

Note: Clean the area around the drain plug and clean the area around the check/fill plug before you remove the plugs.

1. Remove drain plug (1). Remove check/fill plug (2). Allow the oil to drain into a suitable container.

2. Clean the drain plug and install the drain plug.

3. Fill the circle drive housing with oil. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

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

5. Start the engine. Operate the machine for a few minutes. Check the circle drive housing for leaks.

6. Stop the engine. Remove the check/fill plug and check the oil level. Maintain the oil level to the bottom of the filler opening. If necessary, add oil.

7. Install the check/fill plug.

i02100323

Circle Drive Oil Level - Check

SMCS Code: 5207-535-OC

If a leak develops or you suspect a leak, check the oil level.

Wipe the surfaces around the opening for the check/fill plug before you check the oil and before you add oil.

The check/fill plug is located on top of the circle drive housing at the front of the circle.

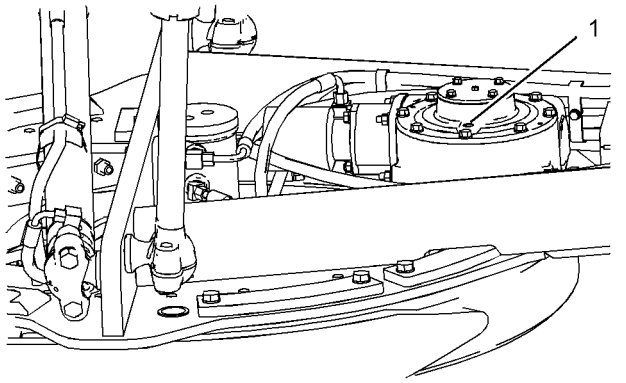


Illustration 152 g01070369

1. Remove check/fill plug (1).
2. Maintain the oil level to the bottom of the opening for the check/fill plug.
3. Install check/fill plug (1).

i02527479

Circle Drive Pinion Teeth - Lubricate

SMCS Code: 5207-086-PI

⚠ WARNING

Contact with a moving attachment may cause injury or death.

Avoid contact with a moving attachment when lubricating or maintaining the attachment.

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the circle drive pinion teeth. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

The circle drive pinion teeth are located under the circle drive housing.

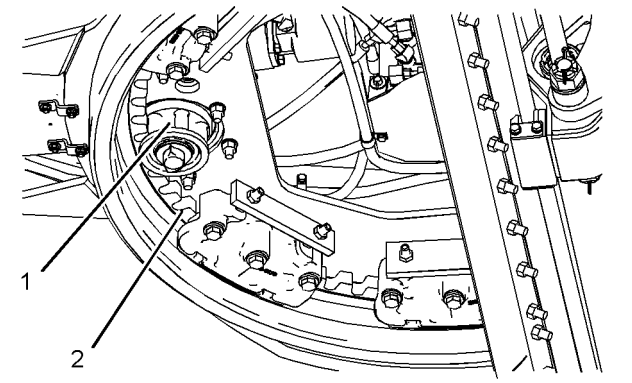


Illustration 153 g01071611

1. Clean the dirt and the old lubricant from circle drive pinion teeth (1) and from blade circle (2).
2. Apply the appropriate lubricant to circle drive pinion teeth (1) and blade circle (2).

i02103680

Circle Top - Lubricate

SMCS Code: 6154-086-TP

1. Park the machine on a level surface and engage the parking brake.
2. Stop the engine. Lower the blade and any attachments to the ground.

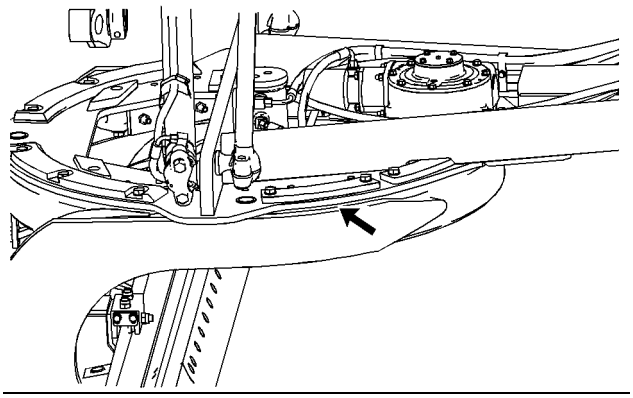


Illustration 154 g01071683

3. Apply a dry film lubricant to the 5 mm (0.2 inch) gap between the circle and the drawbar yoke. Apply the dry film lubricant around the entire circle. See Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”, “Dry Film Lubricant” for further information.

i02519424

Circuit Breakers - Reset

SMCS Code: 1417-529; 1420-529

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

Circuit Breaker Resets – Push the buttons inward in order to reset the circuit breakers. If the system is working properly, the buttons will remain depressed. If the buttons do not stay depressed, check the appropriate electrical circuit.

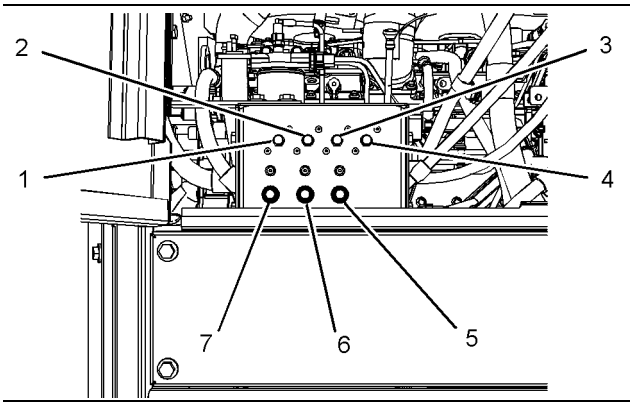


Illustration 155 g01260787

The circuit breaker resets are located in the left front compartment of the machine.

AccuGrade Circuit Breaker (1) – The accugrade circuit breaker is 20 amp. This circuit breaker is an attachment.

Transmission/Chassis Control Circuit Breaker (2) – The transmission/chassis control circuit breaker is 15 amp.

Keyswitch Circuit Breaker (3) – The keyswitch circuit breaker is 15 amp.

Engine Control Circuit Breaker (4) – The engine control circuit breaker is 20 amp.

Alternator Circuit Breaker (5) – The alternator circuit breaker is 150 amp. This circuit breaker is standard.

Main Circuit Breaker (6) – The main circuit breaker feeds power to the fuses in the cab that are turned on with the ignition key. The main circuit breaker is 80 amp.

Load Circuit Breaker (7) – The load circuit breaker feeds power to the fuses in the cab that are continuously on. The load circuit breaker is 80 amp.

i02792884

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

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

Repair the fins if found defective.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

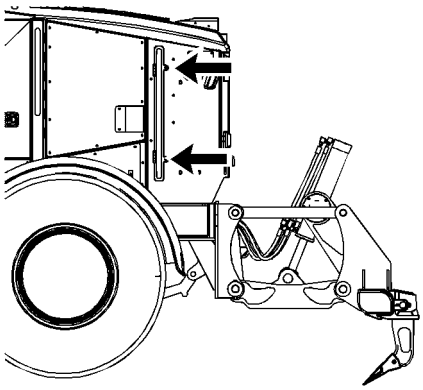


Illustration 156 g01394578

Refrigerant condenser (1) is located in front of the radiator at the rear of the machine.

1. Remove the two bolts on the access cover on the left rear of the machine.
2. Open the rear access cover on the left rear of the machine.
3. Inspect the condenser for debris. If necessary, clean the condenser.
4. Use clean water in order to wash off all dust and dirt from the condenser.
5. Close the access cover.
6. Install the bolts on the access cover.

i04111789

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL; 1350-544-NL; 1395-044-NL

⚠ WARNING

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

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

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and allow sufficient time for the cooling system to cool.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

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

NOTICE
Mixing ELC with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs see the topic Extended Life Coolant (ELC) in the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

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

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

Dispose of all fluids according to local regulations and mandates.

If the coolant in the machine is changed to Extended Life Coolant from another type of coolant, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”, “Extended Life Coolant (ELC) Cooling System Maintenance”.

If the coolant is dirty or if you observe any foaming in the cooling system, change the coolant before the recommended interval.

It is important to replace the thermostat in order to avoid any unexpected failure of the thermostat. Removing the thermostat is a good preventive maintenance practice that reduces the chances of unscheduled downtime. Failure to replace the thermostat on a regularly scheduled basis could cause severe engine damage.

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

Always operate Caterpillar engines with a thermostat because these engines have a shunt design cooling system.

Note: Thermostats can be reused if the thermostats meet certain test specifications. The tested thermostats must not be damaged and the tested thermostats must not have an excessive buildup of deposits.

1. Stop the engine and allow the engine to cool.

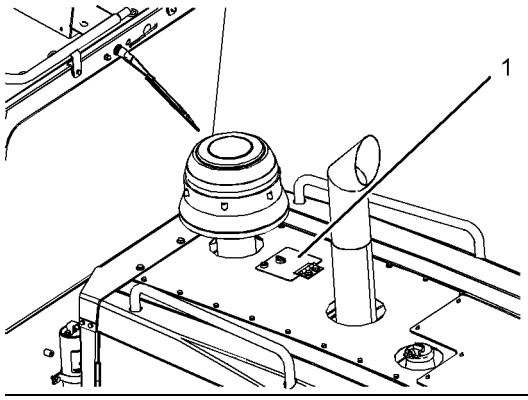


Illustration 157 g01292893

2. Open cover (1).

3. Clean the area around the cooling system pressure cap of any dirt or debris. This must be done before the cooling system pressure cap can be removed.

4. Slowly remove the cooling system pressure cap in order to relieve pressure.

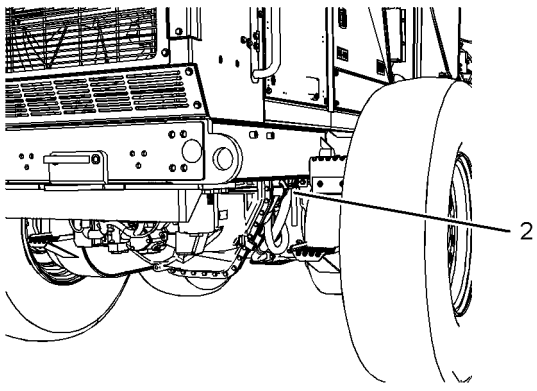


Illustration 158 g01950973

5. Open the drain valve (2). The drain valve is located at the right rear of the machine. Allow the coolant to drain into a suitable container.

6. Flush the cooling system with clean water until the draining water is transparent.

7. Close the drain valve.

8. Add the Extended Life Coolant. Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

Note: Make sure that the cooling system pressure cap is removed for Steps 9 through 10.

9. Start the engine and run the engine until the thermostat opens and the coolant level stabilizes.

10. Maintain the coolant level between the “FULL” mark and the “ADD” mark on the coolant tank.

11. Install the cooling system pressure cap. Close cover (1).

12. Check the radiator for any external leaks. Check for air bubbles in the radiator.

13. Stop the engine.

i04111790

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-045; 1352-535; 1352-544; 1352-544-NL; 1395-081

⚠ WARNING

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

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

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and allow sufficient time for the cooling system to cool.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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

1. Stop the engine and allow the engine to cool.

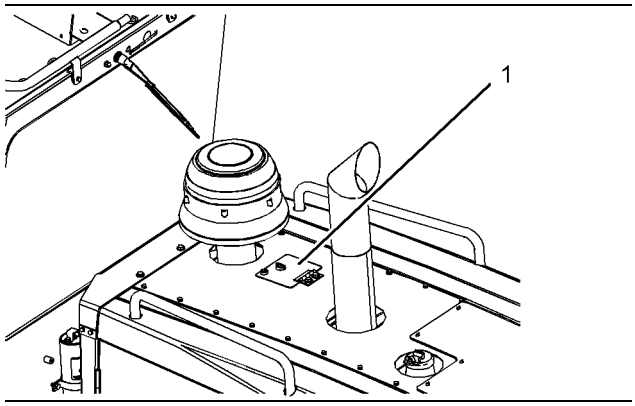


Illustration 159 g01292893

2. Open cover (1).

3. Clean the area around the cooling system pressure cap of any dirt or debris. Cleaning the area around the pressure cap must be done before the cooling system pressure cap can be removed.

4. Remove the cooling system pressure cap slowly in order to relieve the pressure.

5. Drain some coolant from the radiator into a suitable container. Draining some coolant will allow space for additional cooling system coolant extender.

6. In order to add cooling system coolant extender, refer to Special Publication, SEBU6250, “Extended Life Coolant (ELC)”. Refer to the table for the correct amount of Caterpillar Extended Life Coolant (ELC) Extender that needs to be added to the cooling system.

7. Install the cooling system pressure cap. Close the cover.

i04111791

Cooling System Coolant Level - Check

SMCS Code: 1350-040; 1350-040-HX; 1350-535-FLV; 1350-535; 1353-535-FLV; 1354-535; 1395-082; 1395-535-FLV; 1395-535

⚠ WARNING

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

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

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and allow sufficient time for the cooling system to cool.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

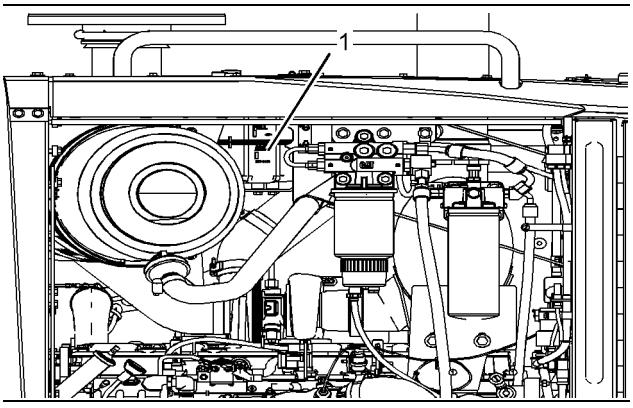


Illustration 160 g01294047

1. Maintain the coolant level between the “FULL” mark and the “ADD” mark on coolant tank (1).

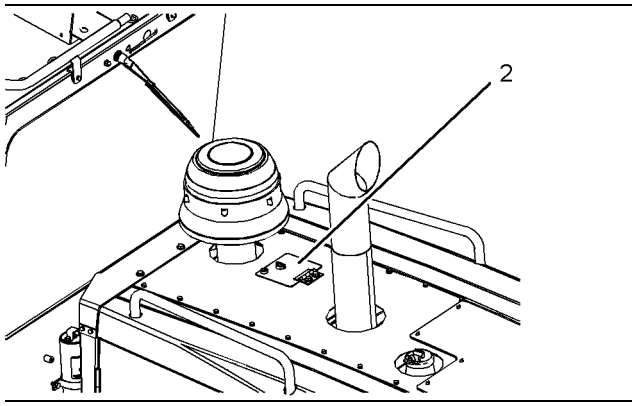


Illustration 161 g01295120

2. If necessary, add the appropriate coolant mixture.
3. Open cover (2).
4. Clean the area around the filler cap of any dirt or debris. Cleaning the area around the cap must be done before the filler cap can be removed.
5. Remove the filler cap slowly in order to relieve pressure.
6. Add coolant through the filler tube.
7. Install the filler cap. Close the cover.

i03674440

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1395-554

Note: Obtaining a Coolant Sample (Level 1) is optional if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

Note: Obtain a Coolant Sample (Level 1) if the cooling system is filled with any other coolant instead of Cat ELC. This includes the following types of coolants:

- Commercial long life coolants that meet the Caterpillar Engine Coolant Specification -1 (Caterpillar EC-1)
- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty antifreeze/coolant

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

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

Dispose of all fluids according to local regulations and mandates.

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

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

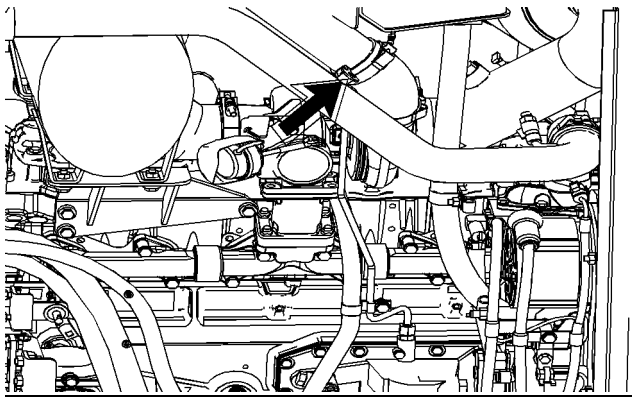


Illustration 162 g01294622
C7 Engine

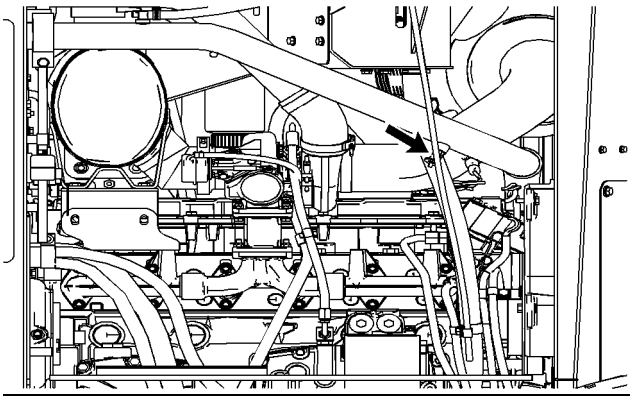


Illustration 163 g01302535
C9 Engine

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

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

Use the following guidelines for proper sampling of the coolant:

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

Submit the sample for Level 1 analysis.

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

i04057749

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1395-554

⚠ WARNING

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

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

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

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

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

Note: Ensure that the engine is warmed up to operating temperature and running in order to obtain the sample.

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

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

Dispose of all fluids according to local regulations and mandates.

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

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

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

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

Submit the sample for Level 2 analysis.

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

i04111792

Cooling System Pressure Cap - Clean/Replace

SMCS Code: 1382-070; 1382-510

⚠ WARNING

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

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

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and allow sufficient time for the cooling system to cool.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

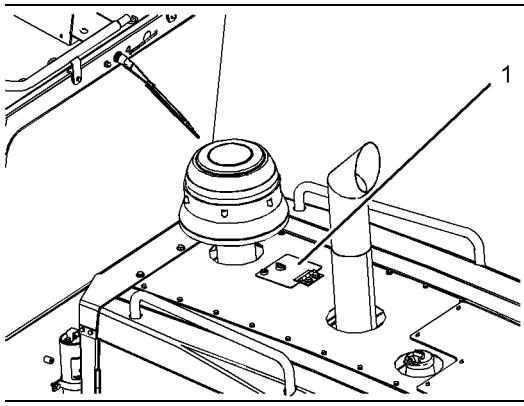


Illustration 164 g01292893

The cooling system pressure cap is located on top of the engine compartment.

1. Open cover (1).
2. Clean the area around the pressure cap of any dirt or debris. Cleaning the area around the cap must be done before the pressure cap can be removed.
3. Remove the pressure cap slowly in order to relieve pressure.
4. Inspect the cap and the cap seal for damage, deposits, and foreign material. Clean the cap with a clean cloth. Replace the cap if the cap is damaged.
5. Install the cap. Close the cover.

i04111794

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-070; 1355-510; 1393-010

⚠ WARNING

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

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

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and allow sufficient time for the cooling system to cool.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

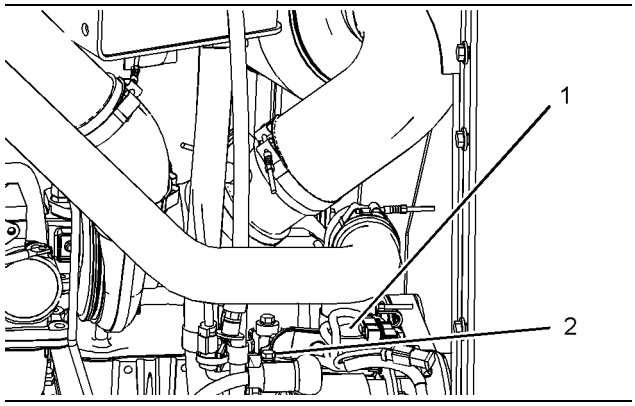
Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

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

The water temperature regulator should be replaced after the cooling system has been cleaned. Replace the water temperature regulator while the cooling system is drained or while the coolant is drained to a level below the housing assembly for the water temperature regulator.

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

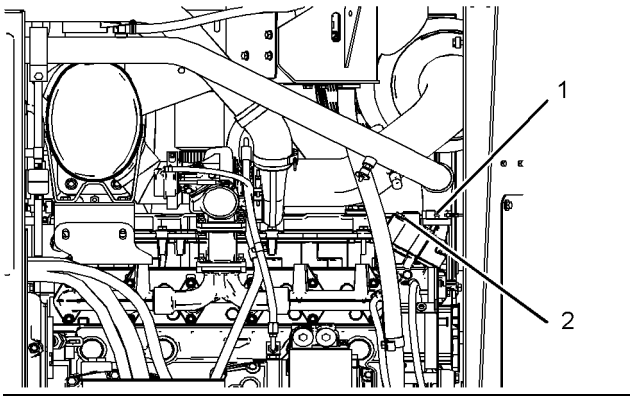
Note: When replacing the water temperature regulator, drain the cooling system coolant to a level that is below the housing assembly for the water temperature regulator.



g01162907

Illustration 165

C7 Engine



g01303365

Illustration 166

C9 Engine

1. Loosen hose clamp (1) and remove the hose from the water temperature regulator housing.
2. Remove bolts (2) from the water temperature regulator housing and remove the water temperature regulator housing.
3. Remove the gasket and remove the water temperature regulator from the water temperature regulator housing.

NOTICE
The water temperature regulators may be reused if the water temperature regulators are within test specifications, are not damaged, and do not have excessive buildup of deposits.

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

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

NOTICE
If the water temperature regulator is installed incorrectly, it will cause the engine to overheat.

4. Install a new water temperature regulator and a new gasket. Install the water temperature regulator housing.

5. Install the water temperature regulator housing and the hose. Tighten the hose clamp.

6. Add the cooling system coolant. Refer to Operation and Maintenance Manual, “Cooling System Coolant Level - Check” for further information.

i03674481

Crankshaft Vibration Damper - Inspect

SMCS Code: 1205-040

Damage to the vibration damper or failure of the vibration damper will increase torsional vibrations. These vibrations will result in damage to the crankshaft and to the other engine components. A deteriorating vibration damper will cause excessive gear train noise at variable points in the speed range.

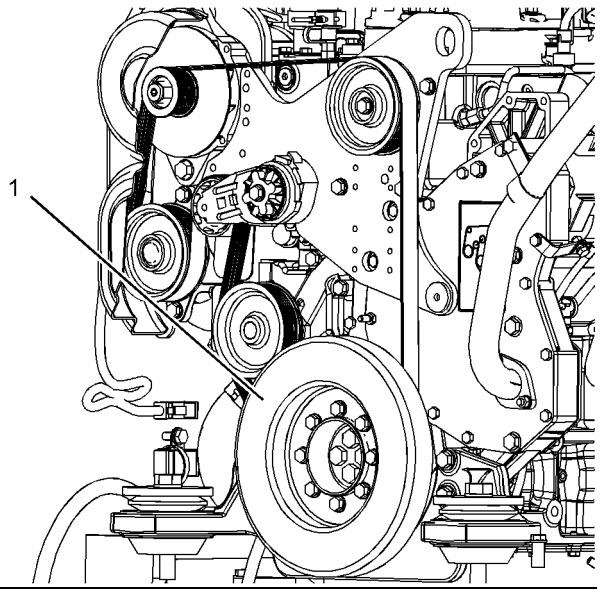


Illustration 167 g01162930
C7 Engine

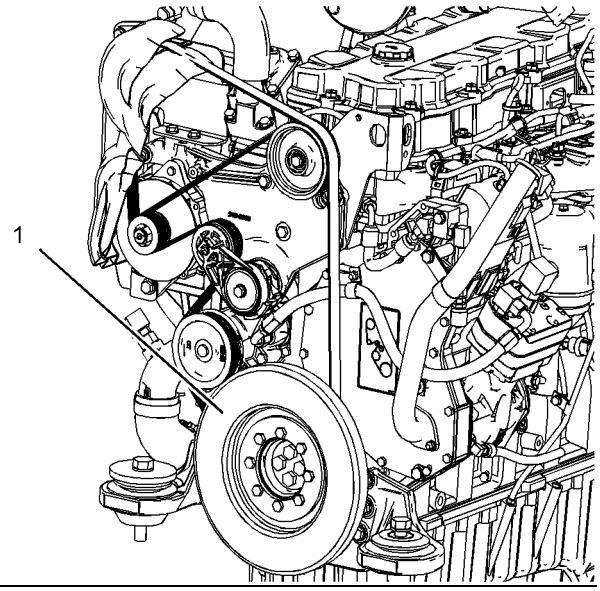


Illustration 168 g01303381
C9 Engine

Caterpillar recommends replacing vibration damper (1) for any of the following reasons:

- The engine has had a failure because of a broken crankshaft.
- The S·O·S analysis detected a worn crankshaft front bearing.
- The S·O·S analysis detected a large amount of gear train wear that is not caused by a lack of oil.
- Fluid leakage is detected during inspection.

- The housing is damaged.

Refer to Disassembly and Assembly, “Vibration Damper and Pulley - Remove and Install” for the procedure to remove the damper and for the procedure to install the damper.

The vibration damper can be used again if none of the above conditions are found or if the vibration damper is not damaged.

Note: Contact your Caterpillar dealer for further information.

i03653685

Cutting Edges and End Bits - Inspect/Replace (Includes Overlays)

SMCS Code: 6801-040; 6801-510; 6804-040; 6804-510

⚠ WARNING

Personal injury or death can result from the blade falling.

Block the blade before changing blade tips.

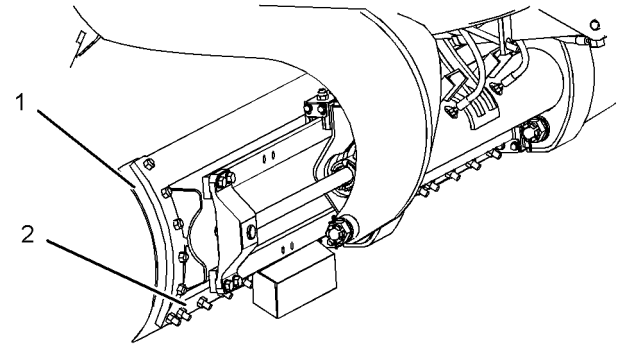


Illustration 169 g01071858

End bits (1) and/or cutting edges (2) may be damaged. The end bits and/or the cutting edges may be worn excessively. Replace the end bits and/or the cutting edges, as needed.

1. Place blocks under the blade. Lower the blade onto the blocks. Do not block up the blade too high. Just use enough blocks so that the end bits and the cutting edges can be removed.
2. Remove the end bits and/or the cutting edges.
3. Install new end bits and/or new cutting edges.
4. Raise the blade and remove the blocks.

i02730438

Display and Camera - Clean (If Equipped with Work Area Vision System)

SMCS Code: 7347-070; 7348-070

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

Display

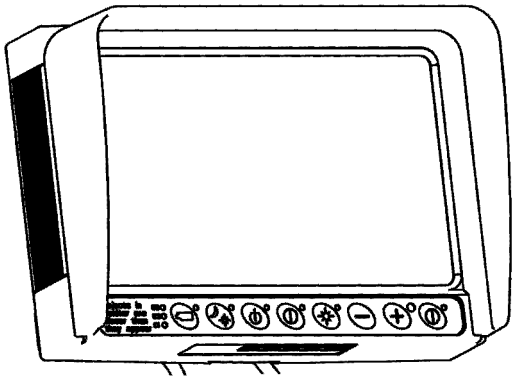


Illustration 170 g01223034

WAVS display

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

Camera

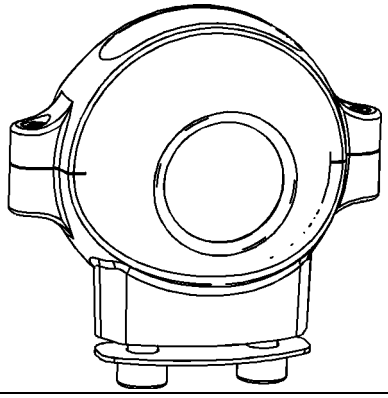


Illustration 171 g01223051

The WAVS camera is located on the rear of the machine on the engine enclosure.

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

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

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

i02585421

Drawbar Ball and Socket - Lubricate

SMCS Code: 6170-086; 6171-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the drawbar ball and socket. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fitting before you apply lubricant through the fitting.

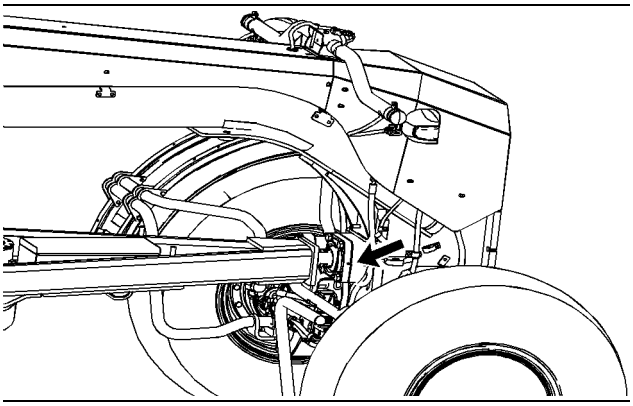


Illustration 172 g01294398

Apply the appropriate lubricant through the fitting in order to lubricate the drawbar ball and socket.

i02585430

Drawbar Ball and Socket End Play - Check/Adjust

SMCS Code: 6170-025; 6170-535; 6171-025; 6171-535

Check

Rotate the blade so that the blade is placed at an angle of 90 degrees to the frame. Lower the blade to the ground. While you maintain a light load between the ball and the socket, inch the machine slowly to the rear. Stop the machine and shut off the engine.

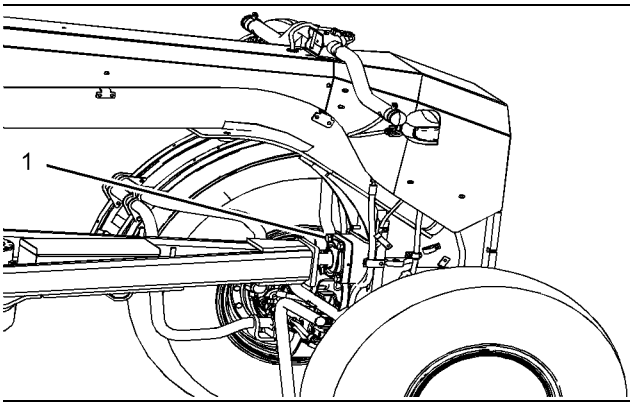


Illustration 173 g01294408

Measure the end play that is between ball (2) and cap (3). The end play should be 0.6 ± 0.2 mm (.02 ± .01 inch). Adjust the end play, if necessary.

Adjust

1. Support the drawbar and support the circle.
2. Remove bolts (1) that hold the drawbar to the bolster. Move the drawbar backward or move the machine forward.

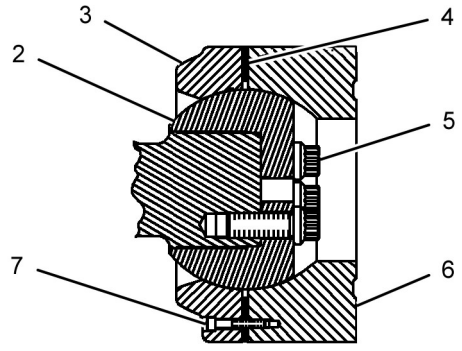


Illustration 174 g01265363

3. Remove capscrews (7) from cap (3) that holds the drawbar and adapter (6) together. Remove the adapter.

4. As required, remove shims (4) or install shims (4) in order to attain an end play of 0.6 ± 0.2 mm (.02 ± .01 inch).

5. Install capscrews (7) in cap (3) and adapter (6). Rotate cap (3) by hand. The socket should rotate freely on ball (2).

6. Check the torque on bolts (5) that hold ball (2) in place. The correct torque is 500 ± 65 N·m (370 ± 50 lb ft).

7. Assemble the drawbar to the bolster. Tighten bolts (1) to a torque of 950 ± 50 N·m (701 ± 37 lb ft).

i01649392

Electronic Unit Injector - Inspect/Adjust

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

⚠ WARNING

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting the unit injectors.

The electronic unit injectors use high voltage. Disconnect the unit injector enable circuit connector in order to prevent personal injury. Do not come in contact with the injector terminals while the engine is running.

NOTICE
Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar dealer for the complete valve lash adjustment procedure.

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

The initial adjustment to the unit injector is recommended at the initial 500 hour interval. The unit injector adjustment should then be made at every 2000 hour interval. The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

i04071569

Engine Air Filter Primary Element - Clean/Replace

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

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

Note: Use caution when removing and installing an air filter. Make sure not to damage the inner tube within the air filter housing. Also make sure that air filters are installed properly so that the air filters function properly.

Service the air cleaner filter element when the Check Engine alert indicator is activated. The indicator is located inside the cab. The alert indicator will activate when there is an inlet air restriction, and the Messenger display will provide a message regarding the specific problem. Refer to Operation and Maintenance Manual, "Monitoring System" for further information.

1. Open the access door for the air filter housing. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

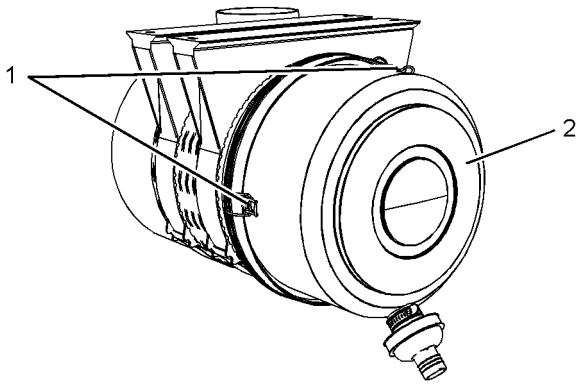


Illustration 175 g02281853

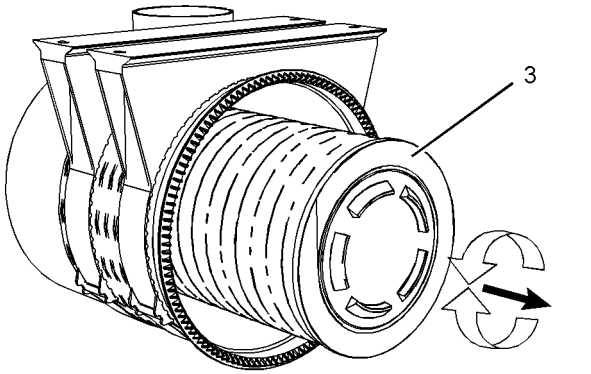


Illustration 176 g02281873

2. Unlock wire fasteners (1) and remove cover (2).

3. Remove primary filter element (3) from the air filter housing, turning slightly counterclockwise.

4. Clean the inside of the air filter housing with a damp cloth.

5. Install a clean primary air filter element. Install the cover for the air filter housing. Ensure that the discharge valve that is attached to the cover is located on the bottom when installing the cover.

Note: If the cover is not positioned correctly or no filter element has been installed, the wire fasteners will not fully lock.

Note: Under no circumstance should the inner support tube, that is permanently fixed to the air filter housing, be removed. The support tube is essential for proper operation of the air filter.

Note: Refer to “Cleaning Primary Air Filter Elements”.

6. Close the access door.

If the alert indicator activates after starting the engine or the exhaust smoke is still black after installation of a clean primary filter element, install a new primary filter element. If the alert indicator remains activated, replace the secondary element.

Cleaning Primary Air Filter Elements

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

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

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

Do not wash the filter element.

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

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

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

NOTICE
Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

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

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

- Pressurized air
- Vacuum cleaning

Pressurized Air

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

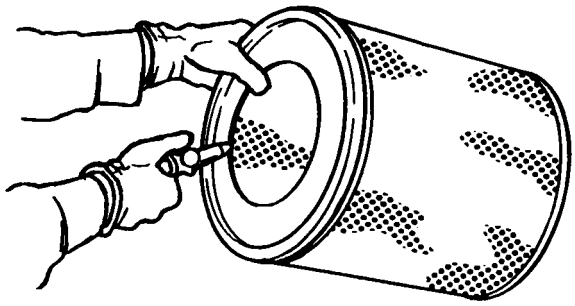


Illustration 177 g00281692

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

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

Vacuum Cleaning

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

Inspecting the Primary Air Filter Elements

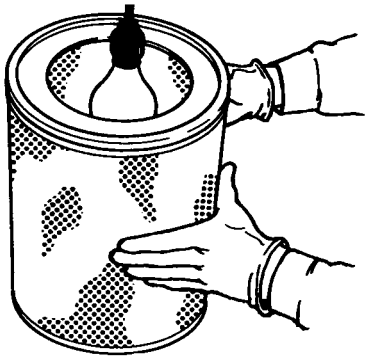


Illustration 178 g00281693

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

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

Storing Primary Air Filter Elements

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

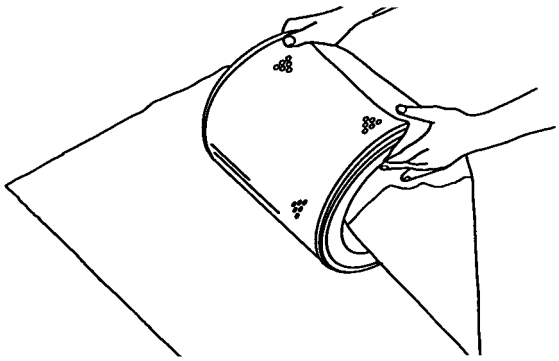


Illustration 179 g00281694

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

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

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i04072229

Engine Air Filter Secondary Element - Replace

SMCS Code: 1051-510-SE; 1054-510-SE

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Use caution when removing and installing an air filter. Make sure not to damage the inner tube within the air filter housing. Also make sure that air filters are installed properly so that the air filters function properly.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

Note: Replace the engine air filter secondary element when you service the engine air filter primary element for the third time. Replace the secondary element if the exhaust smoke remains black and a clean primary element has been installed. Also, replace the secondary element if the element has been in service for 1 year.

1. Open the access door for the air filter housing. Remove the air cleaner cover and the primary element.

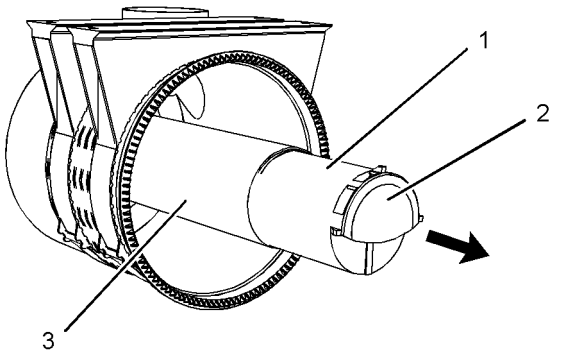


Illustration 180 g02282454

2. Remove the secondary element (1). Pull the secondary from the inner support tube (3) using the outer grip (2) of the element.

Note: Under no circumstance should the inner support tube, that is permanently fixed to the air filter housing, be removed. The support tube is essential for proper operation of the air filter.

3. Cover the air inlet opening. Clean the inside of the air cleaner housing.

4. Uncover the air inlet opening. Install a new secondary element.

5. Install the primary element and the air cleaner cover.

6. Close the access door.

i01632265

Engine Crankcase Breather - Replace

SMCS Code: 1317-510

Only replace the engine crankcase breather when you rebuild the engine.

i03674500

Engine Oil Level - Check

SMCS Code: 1000-535-FLV; 1302-535-FLV; 1326-535-FLV; 1326-535-OC; 1348-535-FLV

⚠ WARNING

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

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

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

Clean the area around the oil level gauge and clean the area around the oil filler cap before you remove the oil level gauge and before you remove the oil filler cap.

1. Open the front left access door.

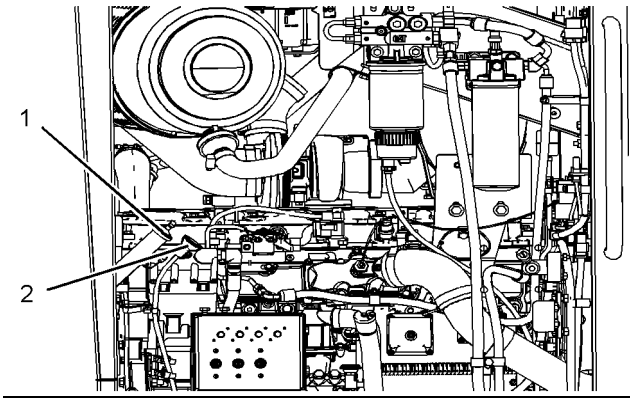


Illustration 181 g01294504
C7 Engine

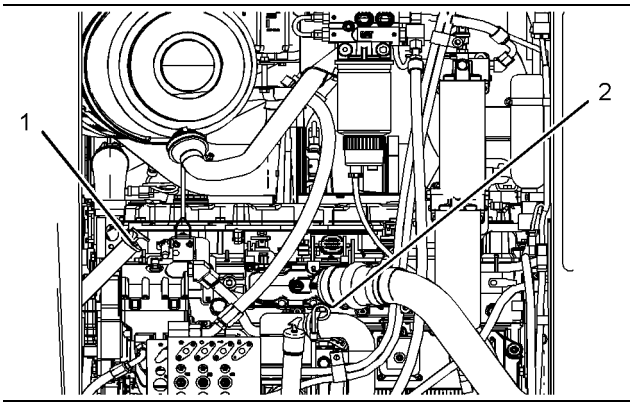


Illustration 182 g01302725
C9 Engine

2. Before starting the engine, check oil level gauge (2). Maintain the oil level between the marks on the oil level gauge.

3. If necessary, remove oil filler cap (1) in order to add oil.

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

5. Close the access door.

i03674504

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 1348-554-SM; 7542-008; 7542-554-OC, SM

⚠ WARNING

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

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

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

Dispose of all fluids according to local regulations and mandates.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

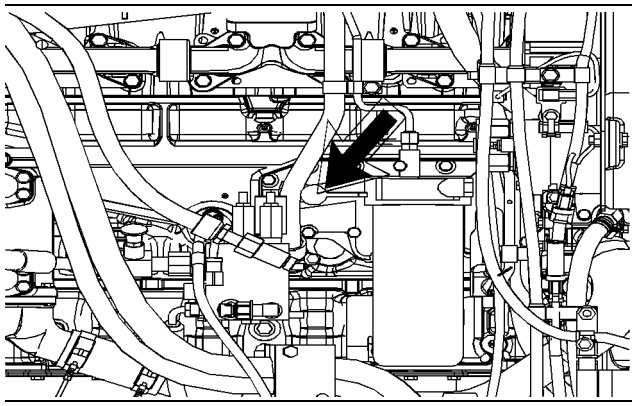


Illustration 183 g01295216
C7 Engine

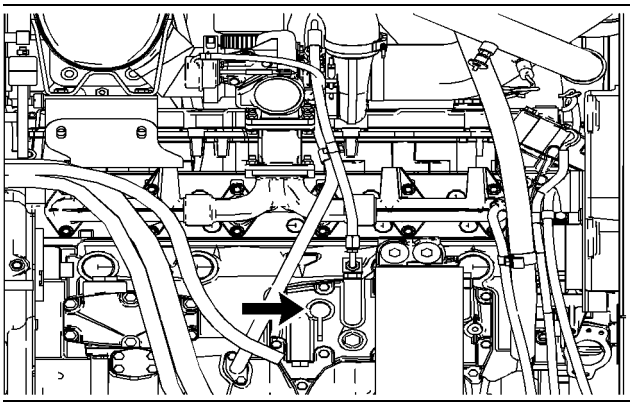


Illustration 184 g01302692

C9 Engine

The sampling valve for the engine oil is located on the right side of the engine compartment.

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

i03674509

Engine Oil and Filter - Change

SMCS Code: 1302-044-OC; 1308-510; 1318-510; 1326-535-OC; 1348-044

Selection of the Oil Change Interval

NOTICE

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

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

Caterpillar oil filters are recommended.

Recommended multigrade oil types are listed in Table 20. Do not use single grade oils.

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or extremely dusty conditions may require a reduction in engine oil change intervals from the recommendations in Table 20. Also refer to Special Publication, SEBU5898, “Cold Weather Recommendations”. Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. See your Caterpillar dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Table 20

Engine Oil Change Interval[1]				
Multigrade Oil Type	**Operating Conditions**			
	Normal[2]	High Load Factor[3]	**Severe**	
			Fuel Sulfur from 0.3% to 0.5%[4]	**Altitude above 1830 m (6000 ft)**
Cat DEO Preferred	500 hr	500 hr	500 hr	250 hr[6]
Cat ECF-1 11.0 minimum TBN[4] Preferred	500 hr	500 hr	500 hr	250 hr[6]
Cat ECF-1 TBN[4] below 11.0	500 hr	500 hr	250 hr[5]	250 hr[6]
API CG-4	500 hr	250 hr[5]	250 hr[5]	250 hr[6]

(1) The traditional oil change interval for engines is 250 hours. The standard oil change interval in this machine is 500 hours, if the operating conditions and recommended oil types that are listed in this table are met. Improvements in the engine allow this engine oil change interval. This new standard interval is not permitted for other machines. Refer to the applicable Operation and Maintenance Manuals for the other machines.

(2) Normal conditions include these factors: Fuel sulfur below 0.3%, altitude below 1830 m (6000 ft), and good air filter and fuel filter maintenance. Normal conditions do not include high load factor, harsh operating cycles, or harsh environments.

(3) High load factors can shorten the service life of your engine oil. Continuous heavy load cycles and very little idle time result in increased fuel consumption and oil contamination. These factors deplete the oil additives more rapidly. If the average fuel consumption of your machine exceeds 24 L (6.4 US gal) per hour, follow the “High Load Factor” recommendations in Table 20. To determine average fuel consumption, measure average fuel consumption for a period of 50 to 100 hours. If the application of the machine is changed, the average fuel consumption may change.

(4) For sulfur content above 0.5%, refer to Special Publication, SEBU6250, “Total Base Number (TBN) and Fuel Sulfur Levels for Direct Injection (DI) Diesel Engines”.

(5) In order to verify an oil change interval of 500 hours, refer to “Program A” below.

(6) Use “Program B” below to determine an appropriate interval.

Adjustment of the Oil Change Interval

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

Program A

Verification for an Oil Change Interval of 500 Hours

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

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

- Shorten the oil change interval to 250 hours.
- Proceed to Program B.
- Change to a preferred oil type in Table 20.

Program B

Optimizing Oil Change Intervals

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

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

Procedure for Changing the Engine Oil and Filter

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE

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

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

Park the machine on a level surface and engage the parking brake. Stop the engine.

Note: Drain the crankcase while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

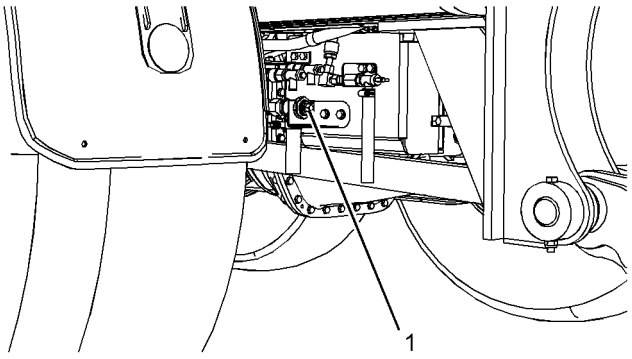


Illustration 185 g01265545

1. Open crankcase drain valve (1). Allow the oil to drain into a suitable container.
2. Close crankcase drain valve (1).

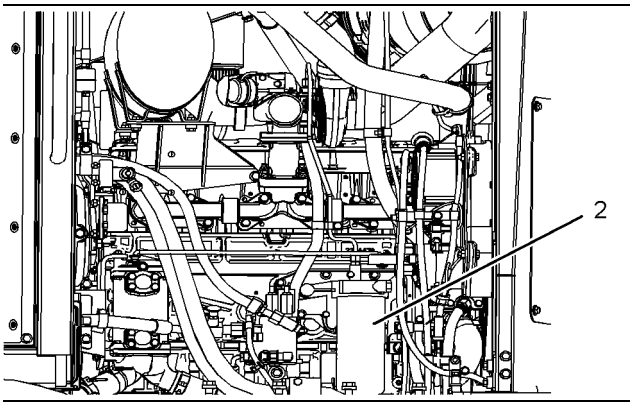


Illustration 186 g01294218

C7 Engine

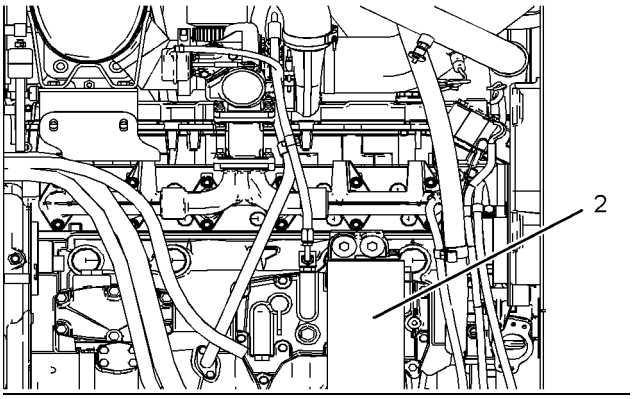


Illustration 187 g01302764

C9 Engine

3. Open the right side access door.

4. Clean the area around engine oil filter (2) before you remove the engine oil filter. Remove the engine oil filter with a strap type wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”.

5. Clean the base of the engine oil filter housing. Make sure that all of the old filter gasket is removed.

6. Apply a thin film of engine oil to the gasket of the new filter.

7. Install the new filter by hand until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

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

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

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

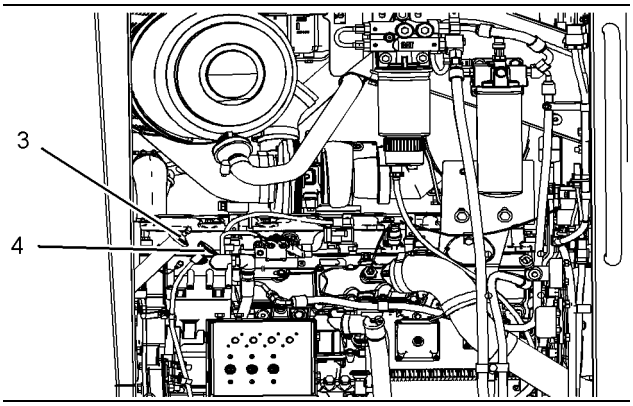


Illustration 188 g01294219

C7 Engine

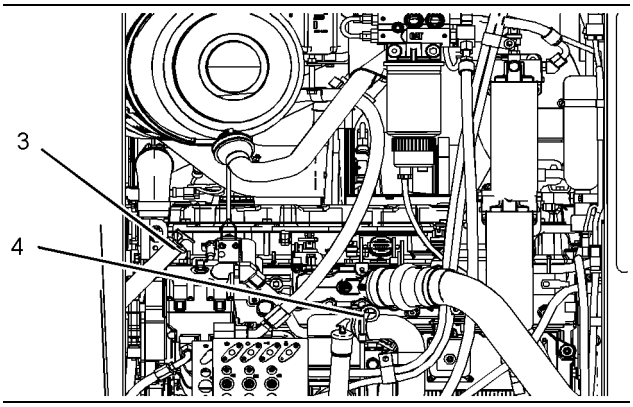


Illustration 189 g01302771

C9 Engine

9. Clean the area around oil filler cap (3) before you remove the oil filler cap. Clean the area around oil level gauge (4) before you remove the oil level gauge. Remove the oil filler cap. Fill the crankcase with new oil. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

10. Clean the filler cap and install the filler cap.

11. Start the engine and allow the oil to warm. Check the engine for leaks.

12. Check the oil level. If necessary, add oil. Refer to Operation and Maintenance Manual, “Engine Oil Level - Check” for more information.

13. Stop the engine. Close all access doors.

i02210900

Engine Overheating

SMCS Code: 1000; 1350; 1353

If your machine experiences an engine overheating problem, perform the following maintenance procedures in the order that is listed:

1. Operation and Maintenance Manual, “Cooling System Coolant Level − Check”

2. Operation and Maintenance Manual, “Radiator - Clean”

3. Operation and Maintenance Manual, “Belt - Inspect”

4. Operation and Maintenance Manual, “Belt - Replace”

5. Operation and Maintenance Manual, “Cooling System Pressure Cap - Clean/Replace”

6. Operation and Maintenance Manual, “Radiator Core - Clean”

7. Operation and Maintenance Manual, “Cooling System Water Temperature Regulator - Replace”

If the engine overheating problem is not corrected, consult your Caterpillar dealer.

i02488454

Engine Power Loss

SMCS Code: 1000; 1051; 1250

If your machine experiences an engine power loss, perform the following maintenance procedures in the order that is listed:

1. Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”

2. Operation and Maintenance Manual, “Engine Air Filter Secondary Element - Replace”

3. Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”

4. Operation and Maintenance Manual, “Fuel Tank Cap and Strainer - Clean”

5. Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) Element - Replace”

6. Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace”

If the problem with engine power loss is not corrected, consult your Caterpillar dealer.

i02885845

Engine Shutdown Switch - Check

SMCS Code: 7418-535-ZS

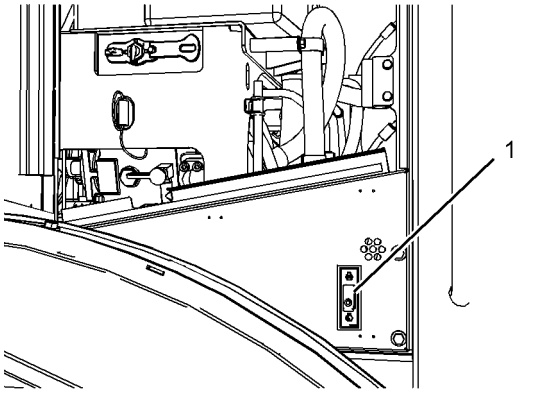


Illustration 190 g01436602

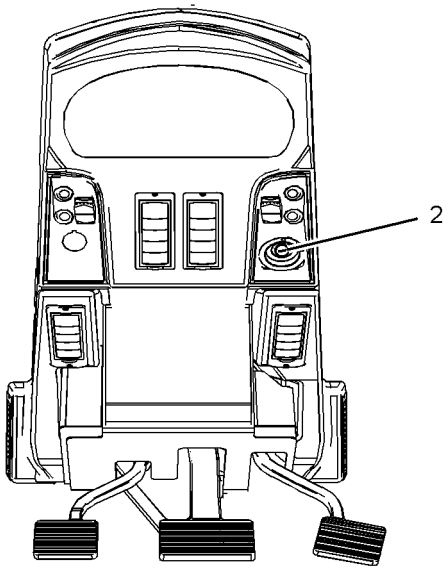


Illustration 191 g01436725

The engine shutdown switch (1) is located on the left rear of the machine.

1. While the engine is running, move the engine shutdown switch (1) to the STOP position. The engine will shut down.
2. Move the engine shutdown switch (1) to the RUN position.
3. Turn the engine start switch (2) to the OFF position.
4. Restart the engine.

i04093750

Engine Valve Lash - Check

SMCS Code: 1105-535

WARNING

Ensure that the engine cannot be started while this maintenance is being performed. To help prevent possible injury, do not use the starting motor to turn the flywheel.

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

NOTICE

Only qualified service personnel should perform this maintenance. Refer to the Systems Operation/Testing and Adjusting Manual, “Valve Lash and Valve Bridge Adjustment” article or consult your Caterpillar dealer for the complete valve lash adjustment procedure.

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

The adjustment is necessary due to the initial wear of the valve train components and to the seating of the valve train components.

This maintenance is recommended by Caterpillar as part of a lubrication and preventive maintenance schedule in order to help provide maximum engine life.

Ensure that the engine is stopped before you measure the valve lash. To obtain an accurate measurement, allow the valves to cool before you perform this maintenance.

Remove the cover in order to access the rear of the engine. Check the valve lash. For the correct adjustment procedure, refer to Systems Operation, Testing and Adjusting, “Engine Valve Lash - Inspect/Adjust”.

i00128925

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

WARNING

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

Inspect the engine valve rotators after the valve clearances have been set.

1. Start the engine and run the engine at low idle.
2. Watch the top surface of each valve rotator. When the intake valve or the exhaust valve closes, the engine valve rotator should turn slightly.

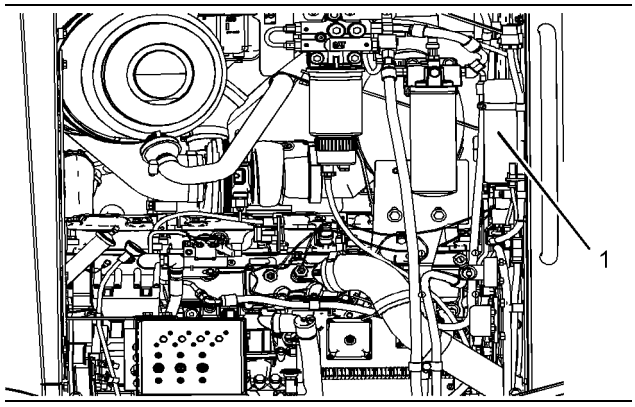
If an intake valve or an exhaust valve fails to rotate, consult your Caterpillar Dealer.

i03674520

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.



g01294347

Illustration 192

C7 Engine

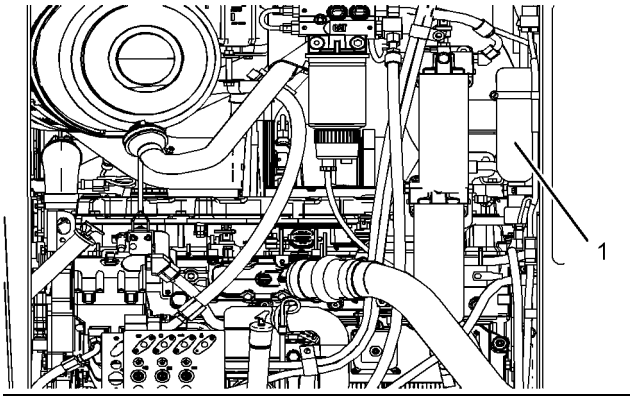


Illustration 193 g01302662

C9 Engine

1. Open the right side access door.
2. Loosen the retaining clamp on ether starting aid cylinder (1). Remove the empty ether starting aid cylinder. Properly discard the empty ether starting aid cylinder.
3. Remove the used gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
4. Install the new ether starting aid cylinder. Tighten the ether starting aid cylinder hand tight. Tighten the retaining clamp on the ether starting aid cylinder securely.
5. Close the access door.

i02591928

Evaporator Coil and Heater Coil - Clean

SMCS Code: 7309-070; 7343-070

The evaporator coil and the heater coil are located under the seat in the cab.

1. Remove the seat from the seat base.
2. Remove the seat base.
3. Remove the top cover.

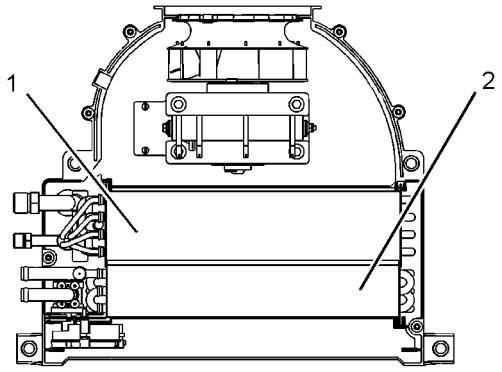


Illustration 194 g01102120

4. Clean evaporator coil (1) and clean heater coil (2). If necessary, replace both coils.
5. Install the top cover.
6. Install the seat base.
7. Install the seat.

Note: If you are operating the machine under harsh conditions or with the cab door open, it may be necessary to clean the coils more often.

i04001035

Fuel System - Fill

SMCS Code: 1250-544

⚠ WARNING

Personal injury or death may result from failure to adhere to the following procedures.

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

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

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

NOTICE

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

Dispose of all fluids according to local regulations and mandates.

Reference: Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the fuel tank capacity of your machine.

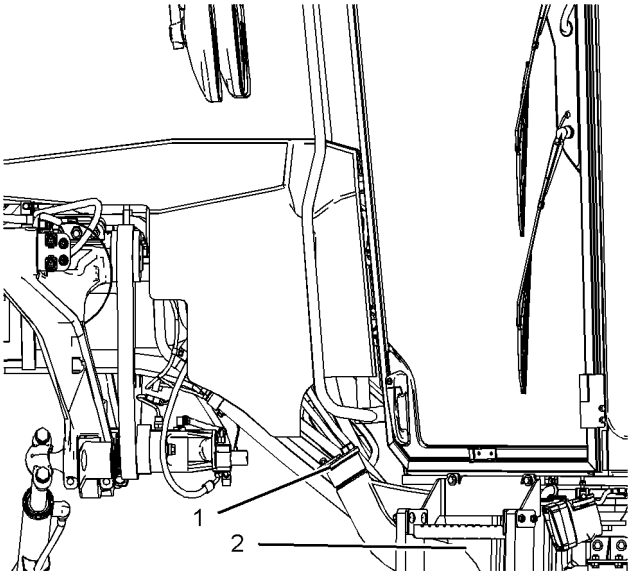


Illustration 195 g01331302

Typical Example Shown

1. Clean filler cap (1) and the surrounding area.

2. Remove the filler cap.

3. Fill fuel tank (2) with fuel.

4. Install the filler cap.

Note: Prime the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime” for more information.

Machines that are Equipped with a Fast Fill Fuel Arrangement

NOTICE
Use only a Caterpillar approved fast fill system to fuel machines. Over pressurization may cause tank deformation and fuel spillage.

Contact your Cat dealer for fast fill system availability.

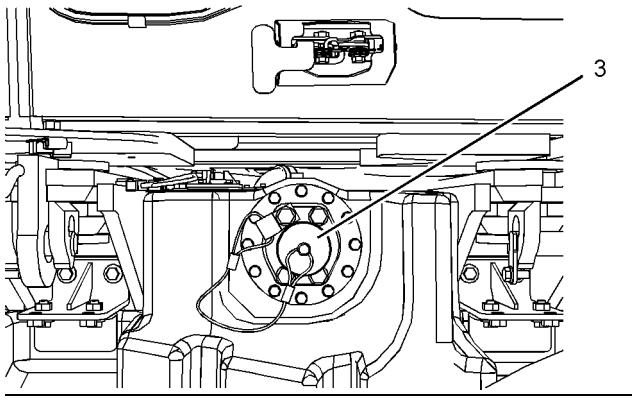


Illustration 196 g01289047

1. Park the machine on a level surface.

2. Remove dust cover (3).

Note: The maximum fuel flow rate for the fast fill fuel arrangement is 375 L/min (100 US gpm).

3. Fill the fuel tank through the fast fill fuel adapter.

Note: Prime the fuel system. Refer to Operation and Maintenance Manual, “Fuel System - Prime” for more information.

i02096133

Fuel System - Prime

SMCS Code: 1250-548; 1258-548

NOTICE
Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

1. Turn the engine start switch to the ON position. Leave the engine start switch in the ON position for two minutes.

2. Verify that the water separator is full of fuel.

3. If the water separator is not full of fuel, turn the engine start switch OFF and then turn the engine start switch ON. This will cycle the fuel priming pump again.

4. When the water separator is full of fuel, attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate at low idle until the engine is running smoothly. If the engine cannot be started, or if the engine continues to misfire or smoke, repeat Step 1.

i03674523

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

⚠ WARNING

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

Turn the disconnect switch OFF when draining and/or removing any fuel system components.

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE
Do not fill the fuel filters with fuel before installing the fuel filters. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

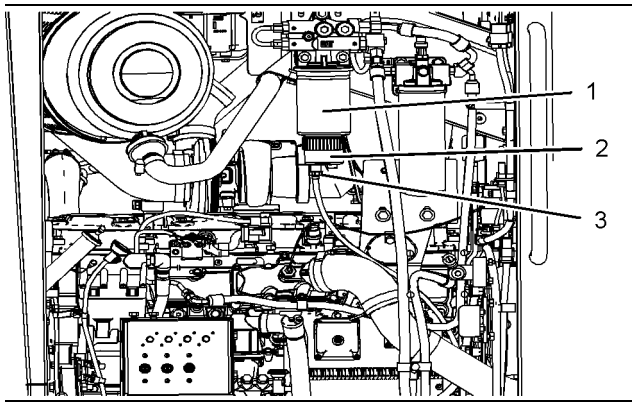


Illustration 197 g01294251
C7 Engine

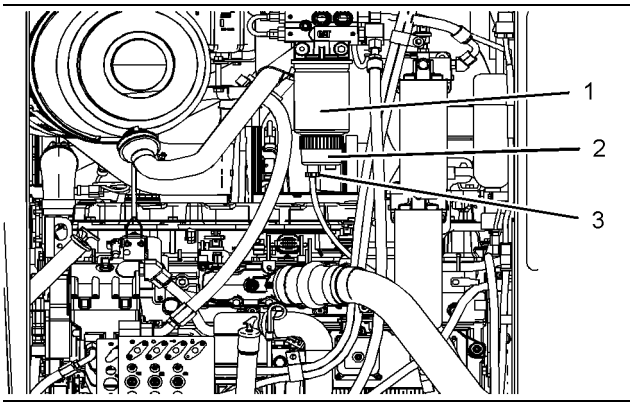


Illustration 198 g01301636
C9 Engine

The primary fuel filter is located inside the engine compartment on the left side of the machine.

1. In order to drain the primary fuel filter, open drain valve (3) on water separator bowl (2). The water separator bowl is under primary fuel filter (1). Catch the fuel in a suitable container.

2. Remove primary fuel filter (1) and water separator bowl (2). Clean the filter housing base.

3. Remove the water separator bowl from the primary fuel filter.

Note: Check the water separator bowl for damage. Reuse the water separator bowl if no damage is present.

4. Clean the water separator bowl and clean the groove for the O-ring. Wash the water separator bowl in a clean nonflammable solvent. Use pressure air to dry the water separator bowl.

5. Lubricate the O-ring with clean diesel fuel or lubricate the O-ring with clean motor oil. Place the O-ring in the groove on the water separator bowl.

6. Install the clean water separator bowl onto a new filter by hand.

7. Apply clean diesel fuel to the seal of the new filter.

8. Install the new filter hand tight until the seal of the filter contacts the filter mounting base. Note the position of the index marks on the filter in relation to a fixed point on the filter mounting base.

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

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

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

10. Prime the fuel system. See Operation and Maintenance Manual, “Fuel System - Prime” for the proper procedure.

Note: The secondary fuel filter should also be changed at this time. See Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for further instructions.

11. Start the engine and check for leaks.

12. Close the access door.

i03674540

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

⚠ WARNING

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

Turn the disconnect switch OFF when draining and/or removing any fuel system components.

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

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

Dispose of all fluids according to local regulations and mandates.

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

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

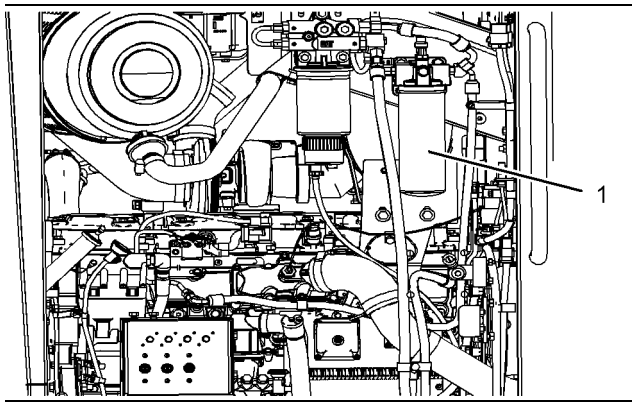


Illustration 199 g01294261
C7 Engine

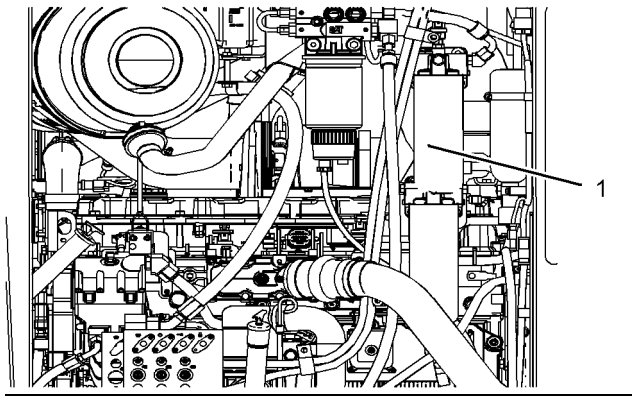


Illustration 200 g01301628
C9 Engine

The secondary fuel filter is located inside the engine compartment on the left side of the machine.

1. Remove secondary fuel filter (1).

2. Drain the fuel from the secondary fuel filter into a suitable container.

3. Clean the mounting base for the secondary fuel filter. Make sure that you remove all of the old seal.

4. Apply clean diesel fuel to the seal of the new filter.

5. Install the new filter by hand until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

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

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

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

7. Prime the fuel system. See Operation and Maintenance Manual, “Fuel System - Prime” for the proper procedure.

8. Close the access door.

i03674542

Fuel System Water Separator - Drain

SMCS Code: 1263-543

⚠ WARNING

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

Turn the disconnect switch OFF when draining and/or removing any fuel system components.

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

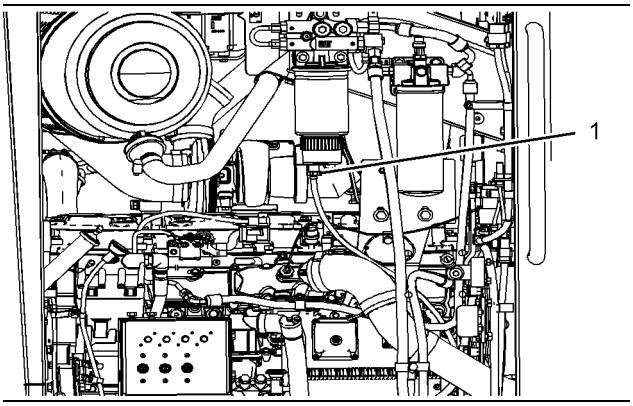


Illustration 201 g01294267

C7 Engine

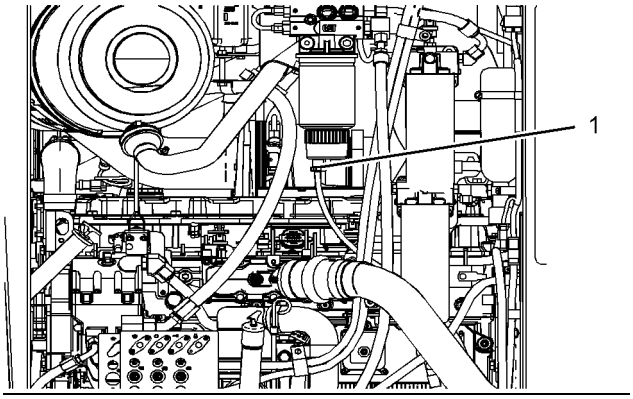


Illustration 202 g01301612

C9 Engine

The fuel system water separator is located inside the engine compartment on the left side of the machine.

1. Open drain (1) and allow the water and sediment to drain into a suitable container.

2. Close the drain.

3. Close the access door.

i04001041

Fuel Tank Cap and Strainer - Clean

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

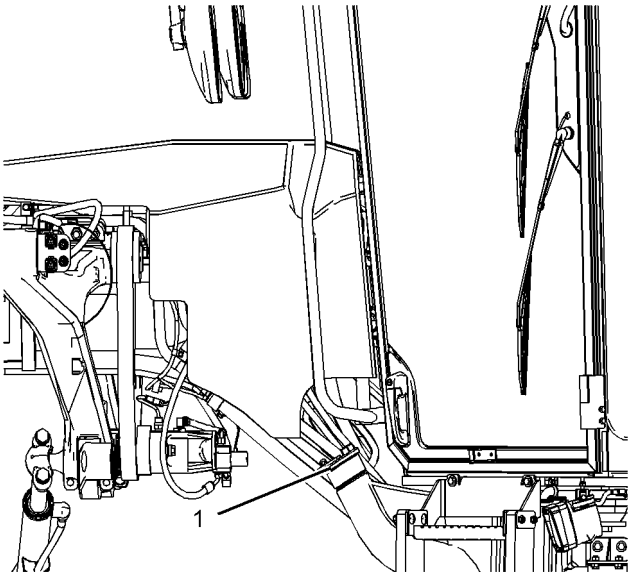


Illustration 203 g01331323

Typical Example Shown

1. Clean fuel tank cap (1) and the surrounding area.
2. Remove the fuel tank cap and disassemble the fuel tank cap.
3. Inspect the seal on the fuel tank cap for damage. If the seal is damaged, replace the seal. Lubricate the seal on the fuel tank cap.
4. Replace the element on the fuel tank cap.
5. Remove the strainer from the filler opening.
6. Wash the strainer in clean nonflammable solvent.
7. Install the strainer.
8. Install the fuel tank cap.

i03434444

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

⚠ WARNING

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

Turn the disconnect switch OFF when draining and/or removing any fuel system components.

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

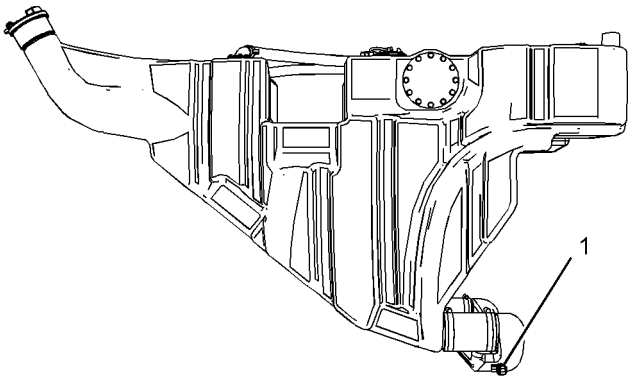


Illustration 204 g01265849

Drain valve (1) is located at the bottom of the fuel tank behind the left tandem housing.

1. Remove the fuel tank drain plug. Drain the water and sediment into a suitable container.
2. Install the fuel tank drain plug.

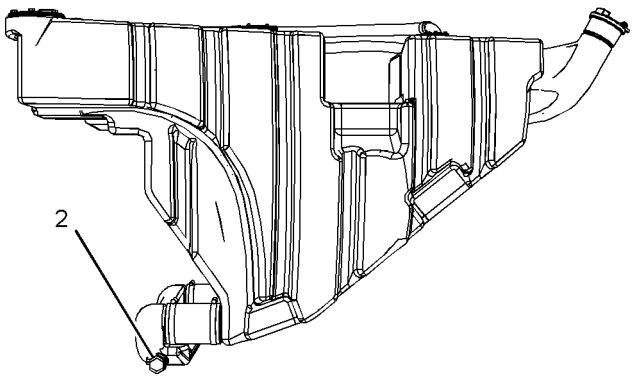


Illustration 205 g01265860

Note: If you need to flush the fuel sump, use drain valve (2) which is located at the bottom of the fuel tank behind the right tandem housing.

i02598641

Fuses - Replace

SMCS Code: 1417-510

Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Replace the fuse if the element is separated. Check the circuit if the element is separated in a new fuse. Repair the circuit.

NOTICE
Replace the fuses with the same type and size only.

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

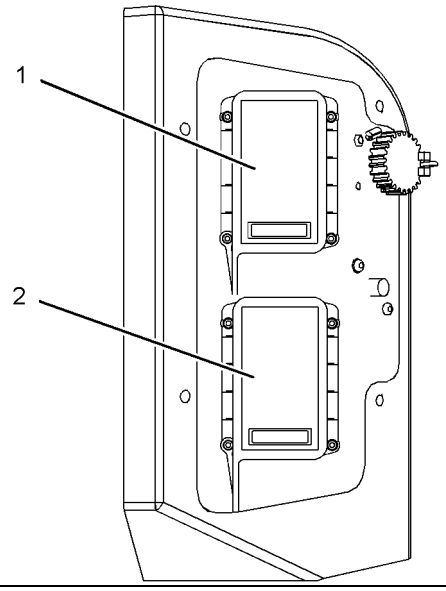


Illustration 206 g01265895

There are two fuse panels. The fuse panels are positioned to the left side of the operator on the cab floor.

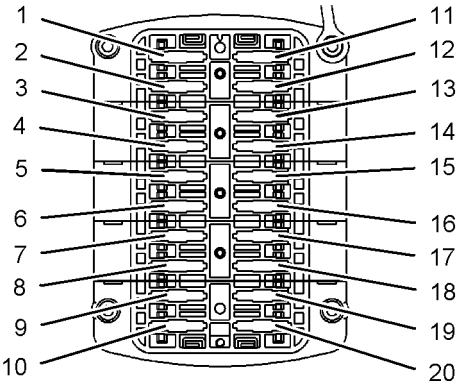


Illustration 207 g01113131
Fuse panel (1)

Spare (1) – 15 amp

Spare (2) – 10 amp

Implement Control 2 (3) – 15 amp

Horn (4) – 10 amp

Backlight (5) – 10 amp

Monitoring (6) – 10 amp

All Wheel Drive (AWD) Controller (7) – 15 amp

Spare (8) – 10 amp

Implement Control 3 (9) – 15 amp

Spare (10) – 10 amp

Lighter (11) – 10 amp

Radio (12) – 15 amp

Communication Radio (13) – 20 amp

Product Link (14) – 10 amp

Dome Lamp (15) – 10 amp

Implement Control (16) – 15 amp

Steering (17) – 10 amp

Secondary Condenser Fan (18) – 15 amp

Air Filter (19) – 15 amp

Primary Condenser Fan (20) – 15 amp

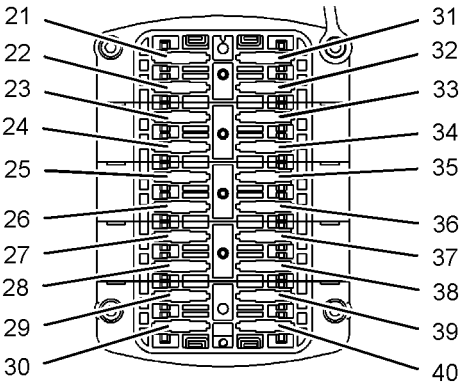


Illustration 208 g01114786

Fuse panel (2)

Front Windshield Wiper and Rear Windshield Wiper (21) – 15 amp

Side Windshield Wiper (22) – 15 amp

Turn Signals (23) – 10 Amp

Primary Blade Work Lights (24) – 15 amp

Work Area Vision System (WAVS) (25) – 10 amp

Heating and Air Conditioning System (26) – 15 amp

Beacon (27) – 10 amp

Defrost Fan (28) – 10 amp

Secondary Blade Work Lights (29) – 10 amp

Rear Work Lights (30) – 15 amp

Heated Mirror (31) – 10 amp

Autolube System (32) – 10 amp

Right Door Wiper (33) – 15 amp

Backup Alarm (34) – 10 amp

Cab Floodlights (35) – 15 amp

Centershift and Blade Cushion (36) – 10 amp

Sensor Power (37) – 10 amp

Seat (38) – 15 amp

Differential Lock (39) – 10 amp

Left Door Wiper (40) – 15 amp

i02773201

Gear Group (All Wheel Drive) Oil - Change (If Equipped)

SMCS Code: 4351-044-OC; 4355-044-OC

S/N: B9G1-Up

S/N: D9G1-Up

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Note: If the all wheel drive oil is not being monitored by the Caterpillar S·O·S Services program or an equivalent oil sampling program, change the all wheel drive oil at every 2000 service hour interval.

WARNING

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

Operate the machine until the oil is warm.

Park the machine on a level surface with the front wheel straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean bolt. Engage the parking brake. Stop the engine.

The all wheel drive system has an oil fill/drain plug and an oil check plug on each front wheel. The all wheel drive oil must be changed on both wheels.

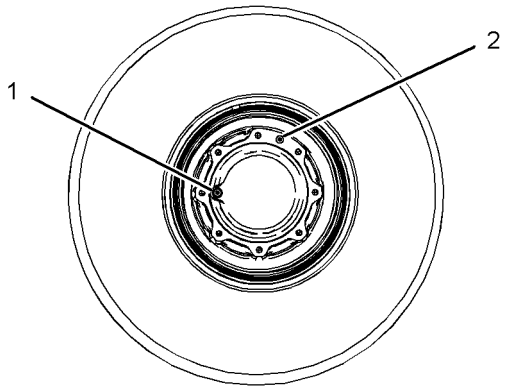


Illustration 209 g01360462

Note: Position the wheel so the oil fill/drain plug (2) is at the six o'clock position.

1. Clean the area around the all wheel drive oil check plug (1) and the all wheel drive oil fill/drain plug (2).
2. Slowly remove the all wheel drive oil check plug in order to relieve the pressure.
3. Open the fill/drain plug (2). Drain the oil into a suitable container.
4. Replace the fill/drain plug and tighten the fill/drain plug. Clean the area around the fill/drain plug.
5. Position the wheel so the oil check plug is at the nine o'clock position.
6. Open the check plug (1).
7. Fill the all wheel drive oil gearbox through the fill/drain plug to a level even with the check plug.
8. Replace the check plug and tighten the check plug.
9. Repeat these steps on the other wheel.

i02773212

Gear Group (All Wheel Drive) Oil Level - Check (If Equipped)

SMCS Code: 4351-535-FLV; 4355-535-FLV

S/N: B9G1-Up

S/N: D9G1-Up

⚠ WARNING

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

Operate the machine until the oil is warm.

Park the machine on a level surface with front wheels straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean bolt. Engage the parking brake. Stop the engine.

Check the all wheel drive oillevel by opening the oil filler plug. The oil filler plug is located on the front wheel of the machine. There is an oil filler plug on each front wheel of the machine.

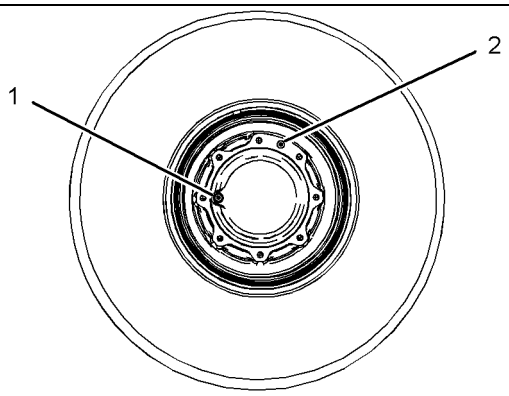


Illustration 210 g01360462

Note: Position the wheel so the oil check plug (1) is at the nine o'clock position.

1. Clean the area around the all wheel drive oil check plug of any dirt or debris. This must be done before the all wheel drive oil check plug can be removed.
2. Open the oil check plug (1).

3. Maintain the oil level even with the oil check plug (1).

4. If necessary, add oil through the oil fill/drain plug (2) opening.

5. Clean the oil check plug and install the oil check plug.

i02773233

Gear Group (All Wheel Drive) Oil Sample - Obtain (If Equipped)

SMCS Code: 4351-008-OC; 4355-008-OC

S/N: B9G1-Up

S/N: D9G1-Up

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

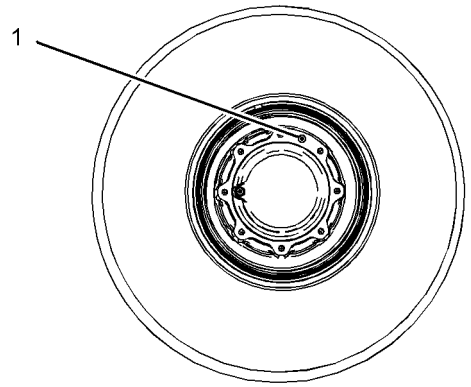


Illustration 211 g01360715

The all wheel drive oil fill/drain plug (1) is located on the front wheel of the machine.

Refer to Special Publication, SEBU6250, “S·O·S Services Oil Analysis” for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the hydraulic oil.

i03837953

Hydraulic System Oil - Change

SMCS Code: 5050-044; 5056-044; 5095-044

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Note: The normal hydraulic oil change interval is at every 2000 Service Hours or 1 Year. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 Service Hours or 2 Years. S·O·S oil analysis must be performed at every 500 Service Hours or 3 Months in order to extend the hydraulic oil change interval. The results from the S·O·S oil analysis will determine if the hydraulic oil change interval may be extended. If S·O·S oil analysis is not available, the hydraulic oil change interval must remain at every 2000 Service Hours or 1 Year . Refer to the Operation and Maintenance Manual, “S·O·S Information”.

Note: Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval for machine hydraulic systems (3000 hours versus 2000 hours) over second and third choice oils - when following the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. Contact your Cat dealer for details.

Operate the machine until the oil is warm.

Park the machine on a level surface with the front wheel straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean bolt. Engage the parking brake. Stop the engine.

The hydraulic system oil tank is positioned behind the left rear access door on the machine.

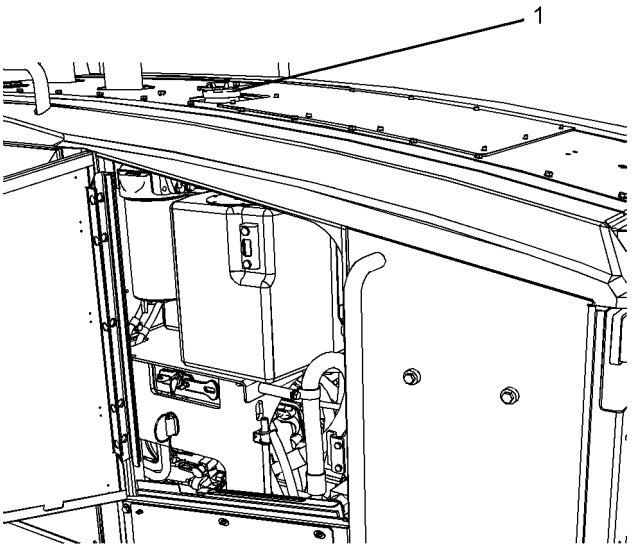


Illustration 212 g01293895

1. Open cover (1).
2. Clean the area around the hydraulic oil filler cap of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.
3. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.

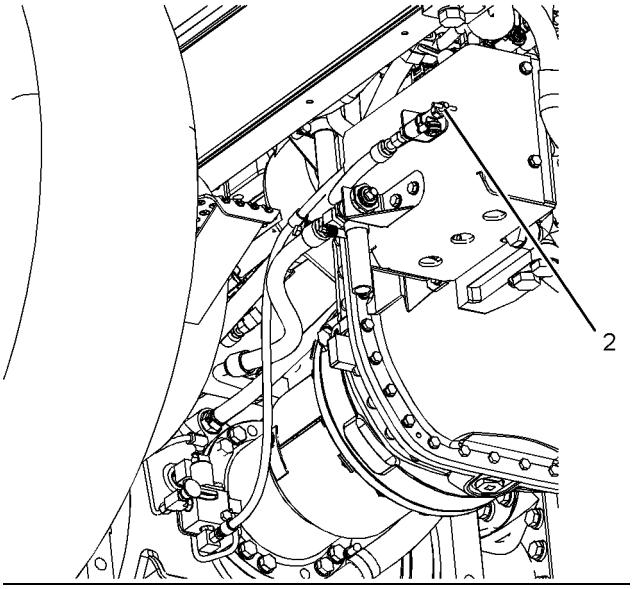


Illustration 213 g01163329

4. Open drain valve (2). Drain the oil into a suitable container.
5. Close the drain valve. Clean the area around the drain valve.
6. Replace the filters for the hydraulic system oil. Refer to the following procedures:
   - Operation and Maintenance Manual, “Oil Filter (Hydraulic Tank Return) - Replace”
   - Operation and Maintenance Manual, “Oil Filter (Implement Controls) - Replace”
7. Remove the filler screen from the filler tube in the hydraulic oil tank. Wash the filler screen in clean nonflammable solvent. Allow the filler screen to dry.
8. Install the filler screen.

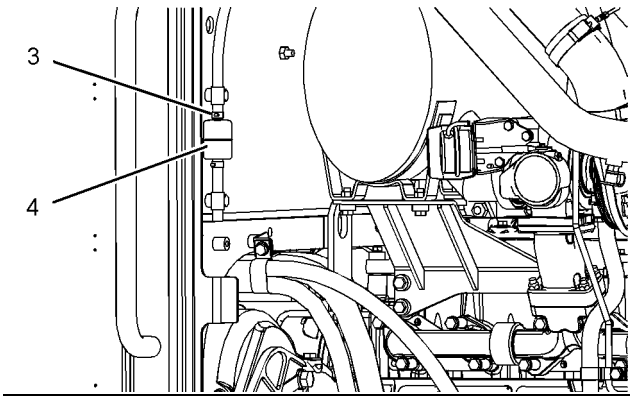


Illustration 214 g01163333

9. Loosen hose clamp (3) on each side of breather (4) and remove breather (4).

10. Wash the breather in clean nonflammable solvent.

11. Install the clean breather, and reattach the hose. Tighten the hose clamps.

12. Fill the hydraulic system oil tank. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

Note: Confirm that the oil type that is added is the same oil type that is shown in Messenger. Confirm that the oil type is noted on the hydraulic system oil film.

13. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket.

14. Install the hydraulic oil filler cap.

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

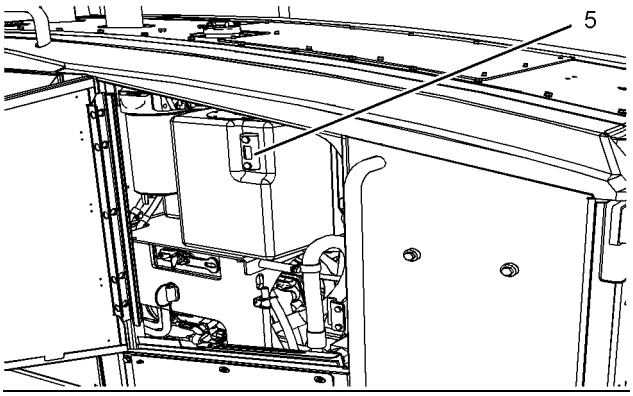


Illustration 215 g01293902

16. Maintain the oil level above the “MIN” mark on sight gauge (5). If necessary, add oil through the filler tube.

Note: The oil must be free from bubbles. If there are bubbles in the oil, then air is entering the hydraulic system. Inspect the suction hoses and inspect the clamps.

17. Stop the engine.

18. If necessary, tighten any loose clamps and tighten any loose connections. Replace any damaged hoses.

i03827244

Hydraulic System Oil - Change (Alternate Viscosity)

SMCS Code: 5050-044; 5056-044; 5095-044

WARNING

The steering circuit temperature monitoring system, if equipped, will alert you when reduced steering performance is detected due to cold temperatures. Failure to respond to this warning could result in injury or death. Ensure that the hydraulic oil type installed in the machine is matched to the hydraulic oil type setting in Messenger.

If an alternate hydraulic oil viscosity is desired contact your local Caterpillar dealer for this service so that a proper hydraulic system flush is completed and the proper oil type is configured in Messenger.

i03837970

Hydraulic System Oil Level - Check

SMCS Code: 5050-535-FLV; 5056-535-FLV; 5095-535-FLV; 7479-535

WARNING

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

Operate the machine until the oil is warm.

Park the machine on a level surface with front wheels straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean bolt. Engage the parking brake. Stop the engine.

The hydraulic tank sight gauge is positioned on the left side of the machine.

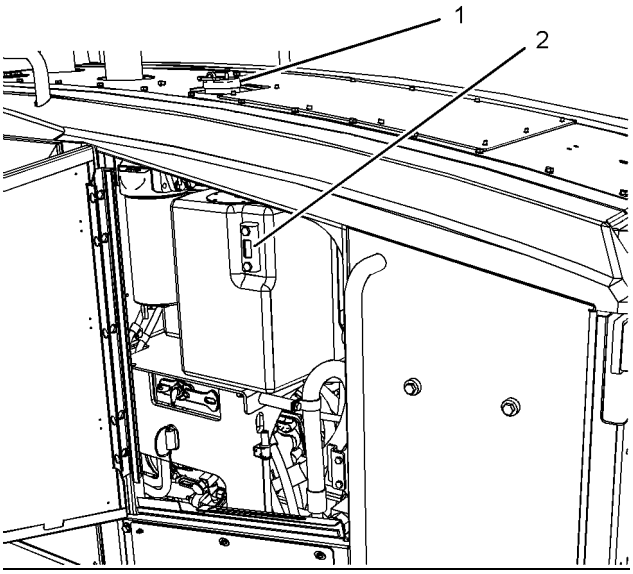


Illustration 216 g01263224

1. Operate the machine until the oil is warm.
2. Park the machine on a level surface with the front wheels straight ahead.
3. Lower all attachments to the ground. Apply a slight downward pressure to the attachments.
4. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame.
5. Move the front wheels to vertical and install the wheel lean locking bolt.
6. Engage the parking brake. Stop the engine.
7. Maintain the oil level above the “MIN” mark on sight gauge (2).
8. If necessary, add oil. Clean the area around hydraulic oil filler cap (1) of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.

Note: Confirm that the oil type added is the same oil type shown in Messenger and on the hydraulic system oil film.

9. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.
10. Add oil through the filler tube.
11. Clean the hydraulic oil filler cap and install the hydraulic oil filler cap.

i02533919

Hydraulic System Oil Sample - Obtain

SMCS Code: 4129-008; 5050-008; 5056-008; 5095-008; 5095-SM

S/N: B9D1-Up

S/N: B9M1-Up

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

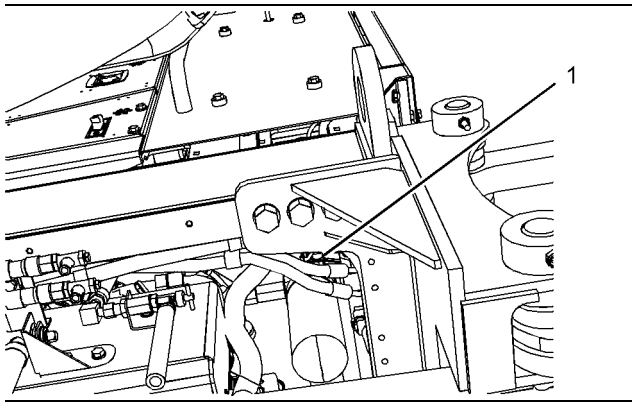


Illustration 217 g01267459

Hydraulic oil sampling valve (1) is located under the left rear of the machine.

Refer to Special Publication, SEBU6250, “S·O·S Services Oil Analysis” for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the hydraulic oil.

i04093709

Kingpin Bearings - Lubricate

SMCS Code: 4314-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the kingpin bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe all the fittings before you apply lubricant through the fittings.

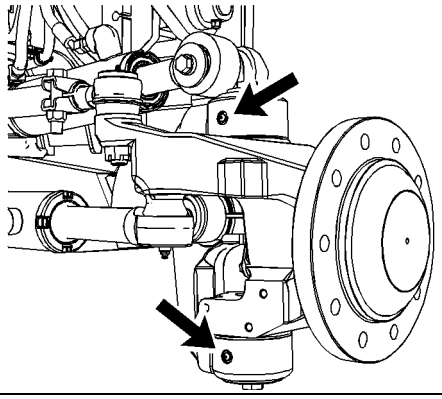


Illustration 218 g01267710

The wheel has been removed for ease of viewing.

Each front wheel has two kingpins. Each kingpin has two fittings. Apply the appropriate lubricant through the fittings in order to lubricate the kingpin bearings.

i02704846

Moldboard Wear Strip - Inspect/Adjust/Replace

SMCS Code: 6174-025; 6174-040; 6174-510

1. Rotate the blade. Position the blade at an angle of 90 degrees to the frame. Lower the blade to 10 mm (0.40 inch) above the ground. Engage the parking brake. Stop the engine.

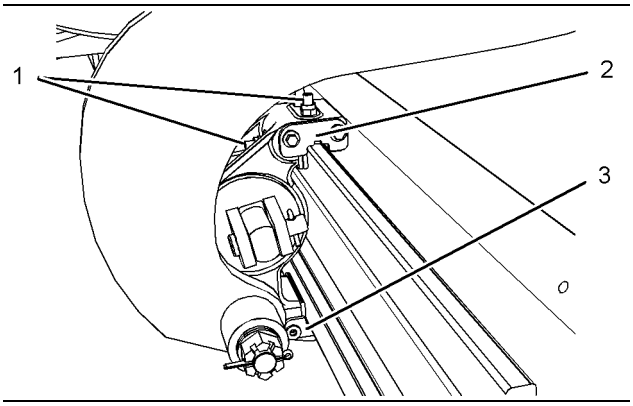


Illustration 219 g01298017

2. Visually inspect the wear strips through the cutout feature that is provided on top retaining plate (2) and bottom retaining plate (3). If the wear strips are worn close to the moldboard, replace the wear strips.

3. Remove top retaining plate (2) and bottom retaining plate (3).

4. Loosen the locknuts on set screws (1).

5. Start the engine. Sideshift the blade through the entire limit of travel. Measure the clearance between the wear strips and the blade at four equally spaced points. This will allow you to determine the location of the minimum clearance.

6. Sideshift the blade to the location of the minimum clearance.

7. Stop the engine.

8. Tighten the set screws in order to obtain 0.13 to 0.89 mm (0.005 inch to 0.035 inch) clearance between the moldboard rail and the wear strips at the location of minimum clearance.

9. Tighten the locknuts on the set screws. Refer to Specifications, SENR3130, “Torque Specifications” for the recommended torque.

10. Install the top retaining plate and install the bottom retaining plate.

11. Repeat Steps 2 through 10 for the opposite side of the moldboard.

Note: Keeping the wear strips adjusted to specifications regularly will prolong life of components.

i02782451

Oil Filter (All Wheel Drive) - Replace (If Equipped)

SMCS Code: 5068-510-YW

S/N: B9G1-Up

S/N: D9G1-Up

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

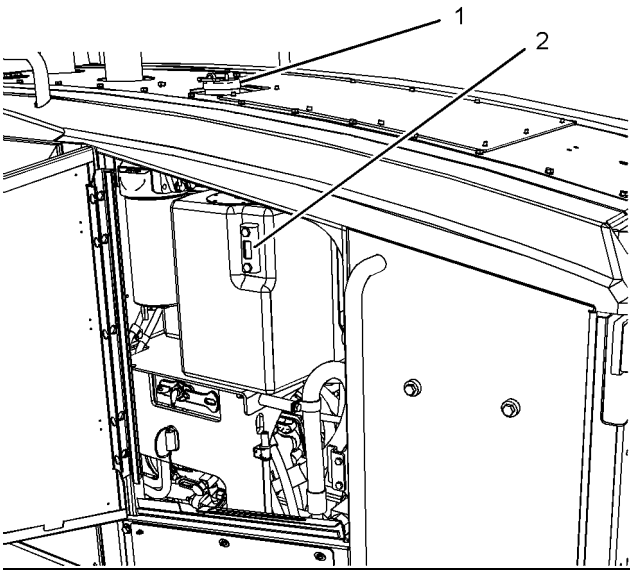


Illustration 220 g01263224

1. Clean the area around hydraulic oil filler cap (1) of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.

2. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.

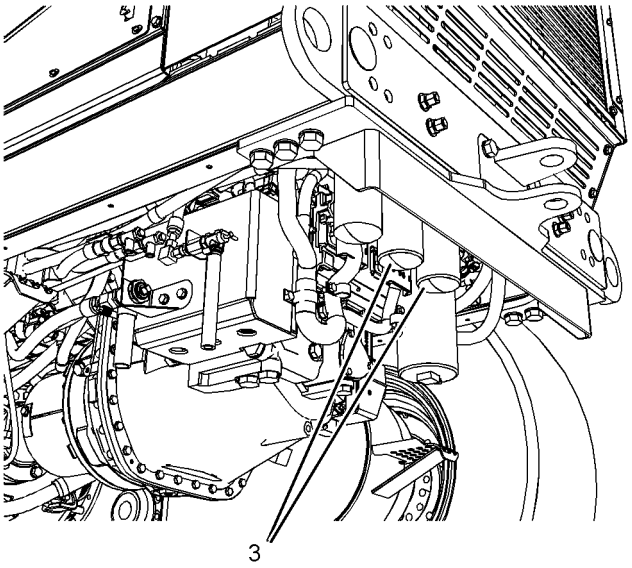


Illustration 221 g01263264

3. Clean the area around filters (3). This must be done before the filters can be removed.

4. Remove the filters with a strap type wrench. See Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used filters properly.

5. Clean the filter bases. Check for any pieces of the seal from the old filters. Remove any pieces of the seal from the old filters.

6. Apply a thin coat of clean hydraulic oil to the seal of the new filters.

7. Install the new filters by hand until the seals of the new filters contact the bases. Note the position of the index marks on the filters in relation to a fixed point on the filter mounting bases.

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

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

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

9. Maintain the hydraulic oil level above the “MIN” mark in sight gauge (2).

10. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket.

11. Install the hydraulic oil filler cap.

i03036729

Oil Filter (Hydraulic Tank Return) - Replace

SMCS Code: 5068-510

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Park the machine on a level surface with front wheels straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean locking bolt. Engage the parking brake. Stop the engine.

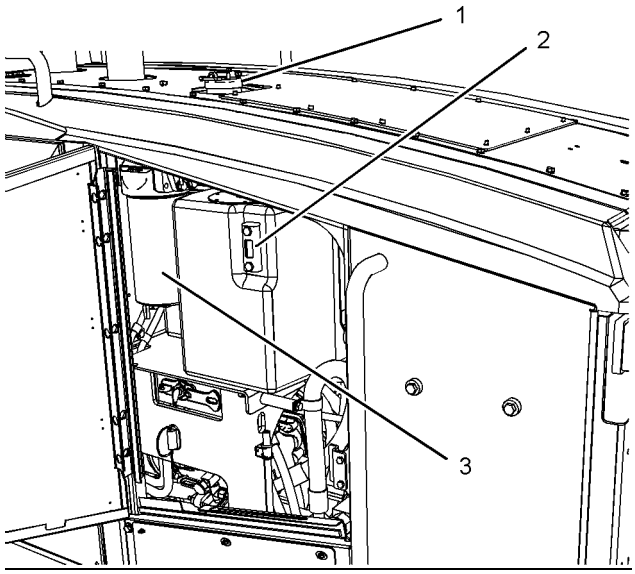


Illustration 222 g01267806

1. Clean the area around hydraulic oil filler cap (1) of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.

2. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.

3. Clean the area around filter housing (3). This must be done before the filter can be removed.

4. Use a strap type wrench to remove the filter housing (3).

5. Remove the filter element. Dispose of the used filter element properly.

6. Clean the filter mounting base.

7. Check the condition of the seal. If the seal is damaged, replace the seal with a new seal.

8. Insert a new filter element and install the filter housing.

9. Maintain the hydraulic oil level above the “MIN” mark in sight gauge (2).

10. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket.

11. Install the hydraulic oil filler cap.

i02534401

Oil Filter (Implement Controls) - Replace

SMCS Code: 5068-510

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Park the machine on a level surface with front wheels straight ahead. Lower all attachments to the ground. Apply a slight downward pressure to the attachments. Center the articulation of the machine and install the frame lock pin. The frame lock pin must move freely in the frame. Move the front wheels to vertical and install the wheel lean locking bolt. Engage the parking brake. Stop the engine.

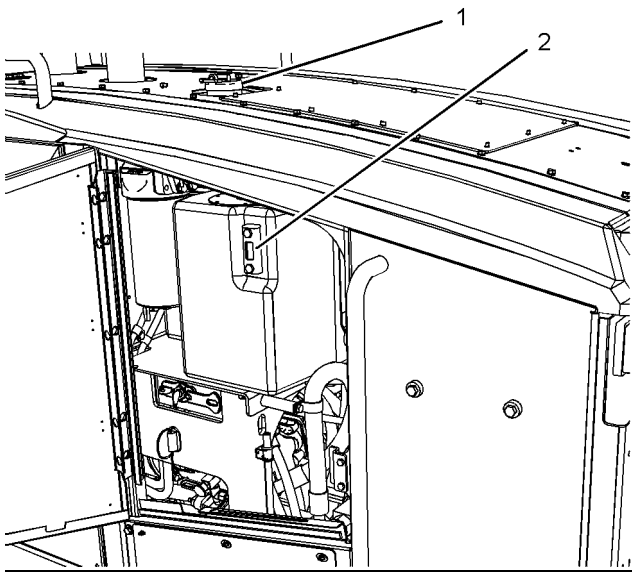


Illustration 223 g01263224

1. Clean the area around hydraulic oil filler cap (1) of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.

2. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.

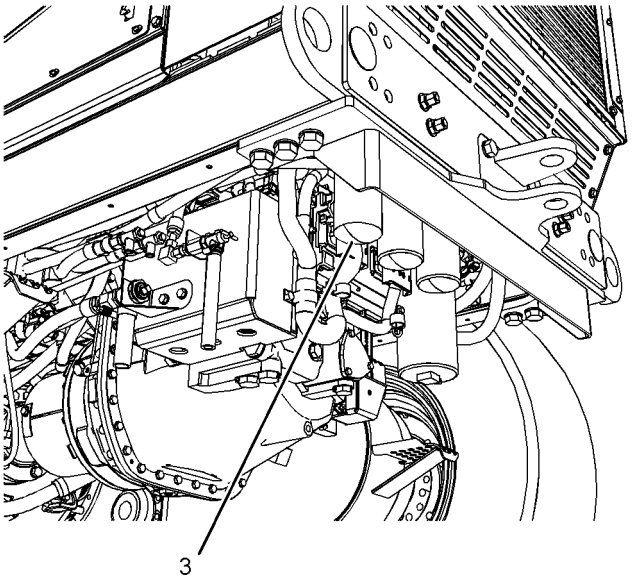


Illustration 224 g01267876

3. Clean the area around filter (3). This must be done before the filter can be removed.

4. Remove the filter with a strap type wrench. See Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used filter properly.

5. Clean the filter base. Check for any pieces of the seal from the old filter. Remove any pieces of the seal from the old filter.

6. Apply a thin coat of clean hydraulic oil to the seal of the new filter.

7. Install the new filter by hand until the seal of the new filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter mounting base.

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

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

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

9. Maintain the hydraulic oil level above the “MIN” mark in sight gauge (2).

10. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket.

11. Install the hydraulic oil filler cap.

i02106227

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

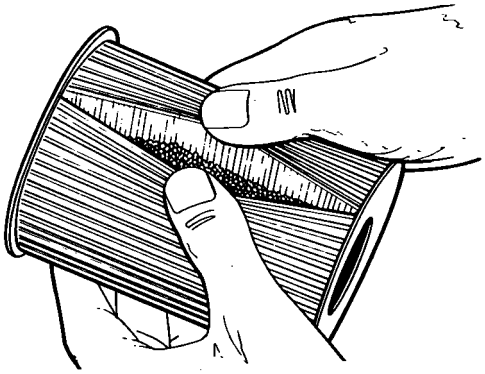


Illustration 225 g00100013

The element is shown with debris.

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

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

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

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

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

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

i02792849

Radiator - Clean

SMCS Code: 1353-070; 1805-070; 1810-070

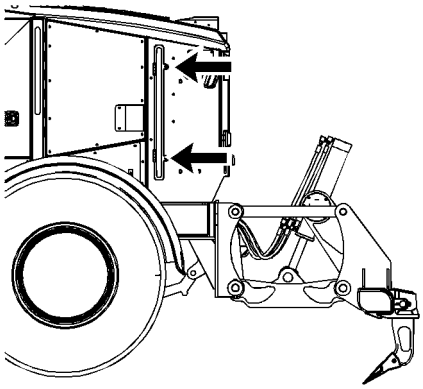


Illustration 226 g01394578

1. Remove the two bolts on the access cover on the left rear of the machine. Remove the two bolts on the access cover on the right rear of the machine.

2. Open the access cover on the left rear of the machine. Open the access cover on the right rear of the machine.

3. Remove any dirt from the area around the radiator. Remove any debris from the area around the radiator.

4. Close the access covers.

5. Install the bolts on the access covers.

i01671005

Radiator Core - Clean

SMCS Code: 1353-070; 1353-070-KO

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

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

i02667695

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510

⚠ WARNING

Personal injury can result from contact with refrigerant.

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

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

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

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

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

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

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

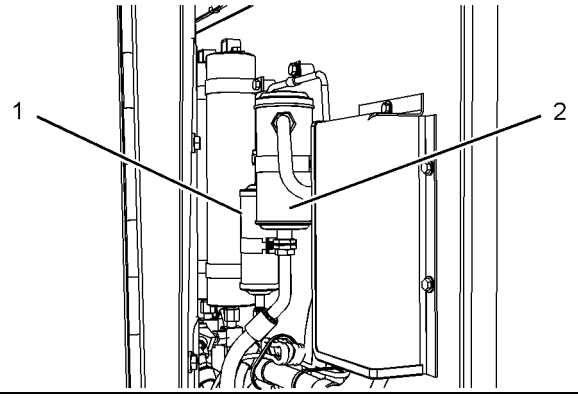


Illustration 227 g01268854

In-line refrigerant dryer (1) and refrigerant accumulator (2) are located behind the cab on the right side.

Refer to Service Manual, SENR5664, “Air Conditioning and Heating with R-134a for All Caterpillar Machines”, “In-Line Refrigerant Dryer - Remove and Install” for the replacement procedure of the in-line refrigerant dryer.

Refer to Service Manual, SENR5664, “Air Conditioning and Heating with R-134a for All Caterpillar Machines”, “Refrigerant Accumulator - Remove and Install” for the replacement procedure of the refrigerant dryer.

i02598720

Ripper Cylinder Bearings - Lubricate

SMCS Code: 5352-086; 6325-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the ripper cylinder bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe all the fittings before you apply lubricant through the fittings.

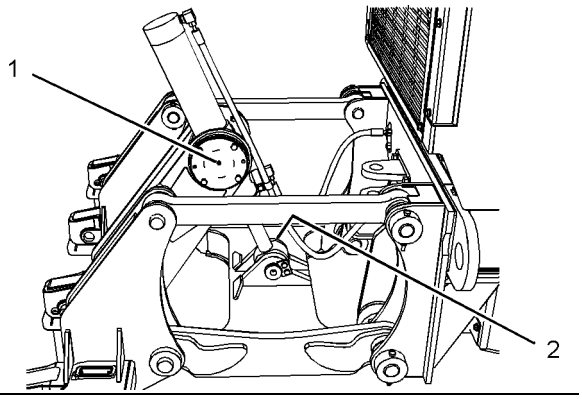


Illustration 228 g01287430

Fitting (1) is on each side of the trunnion. Apply the appropriate lubricant through each fitting in order to lubricate the trunnion.

Fitting (2) is mounted on the left side rod end of the ripper cylinder. Apply the appropriate lubricant through the fitting in order to lubricate the rod end of the ripper cylinder.

i01563909

Ripper Tip - Inspect/Replace

SMCS Code: 6808-040; 6808-510

⚠ WARNING

Personal injury or death can result from the ripper falling.

Block the ripper before changing teeth.

⚠ WARNING

Retainer pin, when struck with force, can fly out and cause injury to nearby people.

Make sure the area is clear of people when driving retainer pins.

To avoid injury to your eyes, wear protective glasses when striking a retainer pin.

Inspect the ripper tips. Replace the ripper tips if the tips are damaged or the tips are worn excessively.

1. Block up the ripper to a height that is adequate for the removal of the tips.

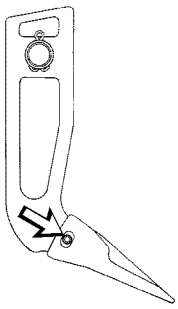


Illustration 229 g00110460

2. Drive out the retainer pin from the retainer side of the ripper tip. Remove the ripper tip and the retainer.
3. Clean the adapter, the retainer pin, and the retainer. Install the retainer in the groove.
4. Install the new ripper tip over the retainer.
5. Drive the retainer pin through the retainer, through the adapter, and through the ripper tip from the opposite side of the retainer.
6. Repeat Step 2 through Step 5 in order to replace additional ripper tips.
7. Raise the ripper. Remove the block. Lower the ripper to the ground.

i02538048

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

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

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

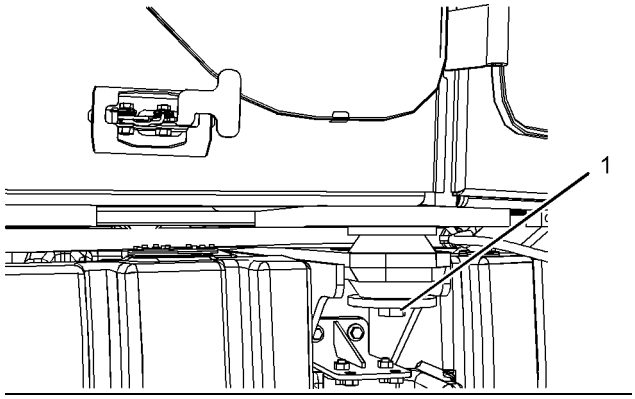


Illustration 230 g01270477

1. There are four mounting bolts (1) for the ROPS. Two mounting bolts are located on each side of the cab.
2. Inspect the ROPS for any loose bolts or any damaged bolts. Replace any damaged mounting bolts or any missing mounting bolts with only original equipment parts.
3. If necessary, tighten the four mounting bolts. Refer to Specifications, SENR3130, “Torque Specifications” for the recommended torque.
4. When you operate the machine on a rough surface, the ROPS may rattle or the ROPS may make a noise. If the ROPS rattles or if the ROPS makes a noise, replace the ROPS mounting supports.

i02588674

Scarifier Lift Link Socket - Lubricate (If Equipped)

SMCS Code: 6162-086-LNK

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the scarifier lift link socket. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

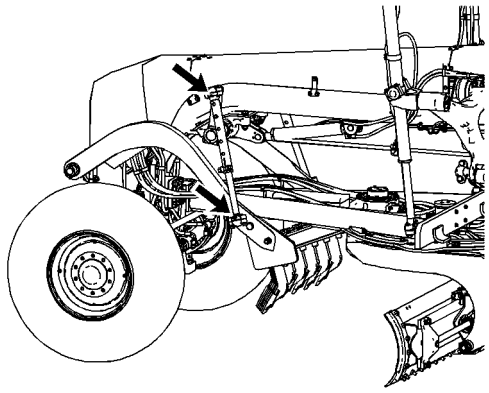


Illustration 231 g01073062

The machine has two fittings on each side. Apply the appropriate lubricant through the fittings in order to lubricate the scarifier lift link socket.

i02589744

Scarifier Teeth - Inspect/Replace

SMCS Code: 6807-040; 6807-510

⚠ WARNING

Personal injury or death can result from the scarifier falling.

Block the scarifier before changing the teeth.

⚠ WARNING

Flying objects can cause injury or death.

Make sure the area is clear of people when removing/installing scarifier teeth.

To avoid injury to your eyes, wear protective glasses when removing/installing scarifier teeth.

If the scarifier teeth are damaged or worn excessively, then change the scarifier teeth.

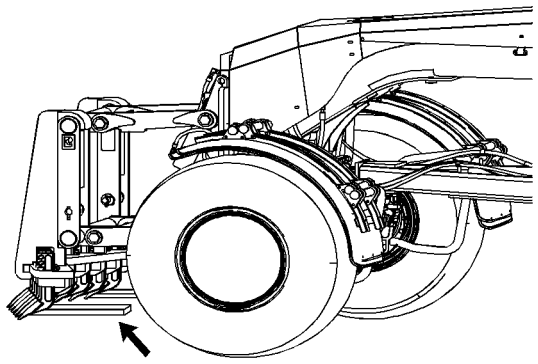


Illustration 232 g01296557

1. Block up the scarifier. Do not block up the scarifier too high. Block up the scarifier to a height that allows you to remove the teeth.
2. Remove the scarifier tooth from the shank.
3. Clean the shank.
4. Install the new scarifier tooth over the shank.
5. Drive the scarifier tooth onto the shank.
6. Repeat Step 2 through Step 5 in order to replace additional scarifier teeth.
7. Raise the scarifier and remove blocking.

i02588690

Scarifier Teeth - Inspect/Replace (If Equipped)

SMCS Code: 6807-040; 6807-510

⚠ WARNING

Personal injury or death can result from the scarifier falling.

Block the scarifier before changing the teeth.

⚠ WARNING

Flying objects can cause injury or death.

Make sure the area is clear of people when removing/installing scarifier teeth.

To avoid injury to your eyes, wear protective glasses when removing/installing scarifier teeth.

If the scarifier teeth are damaged or worn excessively, then change the scarifier teeth.

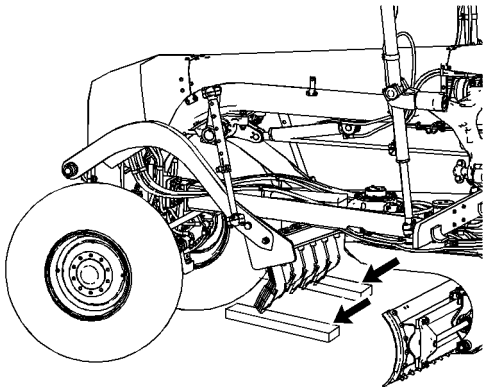


Illustration 233 g01073079

1. Block up the scarifier. Do not block up the scarifier too high. Block up the scarifier to a height that allows you to remove the teeth.
2. Remove the scarifier tooth from the shank.
3. Clean the shank.
4. Install the new scarifier tooth over the shank.
5. Drive the scarifier tooth onto the shank.
6. Repeat Step 2 through Step 5 in order to replace additional scarifier teeth.
7. Raise the scarifier and remove blocking.

i02429589

Seat Belt - Inspect

SMCS Code: 7327-040

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

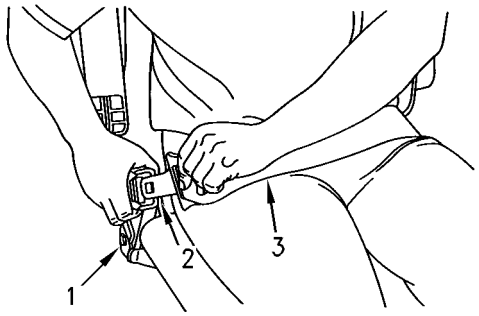


Illustration 234 g00932801

Typical example

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

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

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

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

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

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

i02429594

Seat Belt - Replace

SMCS Code: 7327-510

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

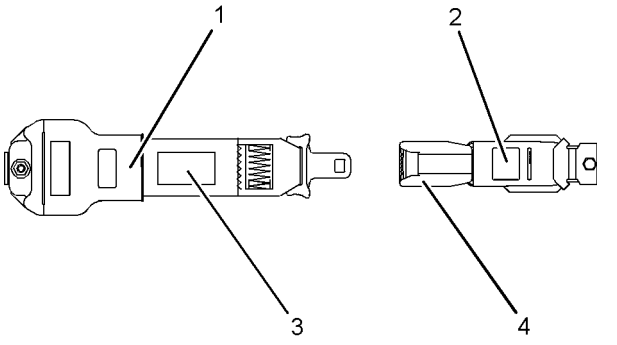


Illustration 235 g01152685

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

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

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

i03827304

Secondary Steering - Test

SMCS Code: 4300-081-SST

⚠ WARNING

If the secondary steering activates during operation, immediately park the machine ina safe location. Inspect the machine and correct the condition which made the use of the secondary steering necessary.

Do not continue to operate the machine using the secondary steering.

Personal injury or death can occur if steering is lost completely during operation.

The test for the secondary steering verifies the supplemental steering pump and the secondary steering valves.

Note: Before the test for the secondary steering is performed, the machine must meet the following conditions:

- The engine must be operating.
- The parking brake must be engaged.
- The transmission control switch must be in NEUTRAL.
- The area around the front wheels must be clear of obstacles and of personnel.

1. Ensure that the battery disconnect switch is in the ON position.

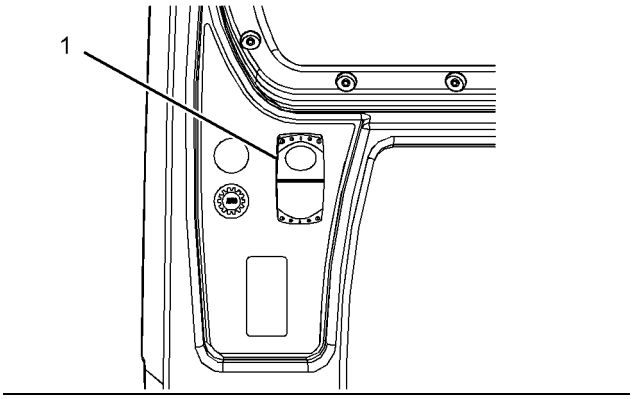


Illustration 236 g01257946

2. Push the top of switch (1) and hold. This is the TEST position.

3. While switch (1) is held in the TEST position, provide the following steering inputs with the left hand joystick:

- Steer left
- Steer center
- Steer right

Verify that the movement of the front wheel aligns with each steering input.

Note: If the steer wheels do not move according to the joystick command, contact your local Caterpillar dealer.

Note: In order to protect the secondary steering pump, the secondary steering test will shut off if switch (1) is held in the TEST position for more than 10 seconds. If the secondary steering test shuts off, alert indicator (2) will not be amber in color.

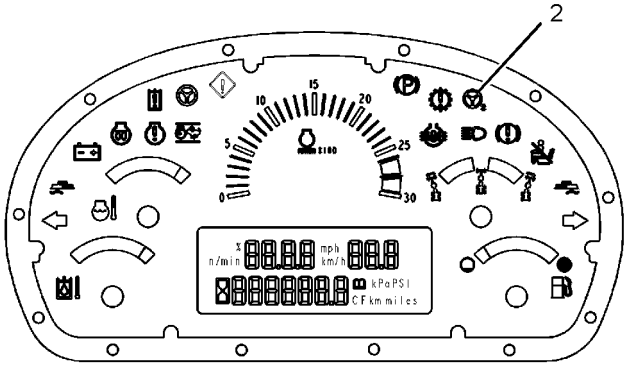


Illustration 237 g01257960

4. Alert Indicator (2) will become amber in color during the test. If the alert indicator is not illuminated after the test, the test was successful and the steering performance was normal.

Note: If the alert indicator is red in color, the test has failed. The warning level that is issued will provide instructions that must be followed.

Refer to the troubleshooting section in Specifications, Systems Operation, Troubleshooting, Testing and Adjusting, RENR8472 for further information.

i04001045

Steering Cylinder Ends and Tie Rods - Lubricate

SMCS Code: 4303-086-BD; 4318-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the cylinder ends and the tie rods. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

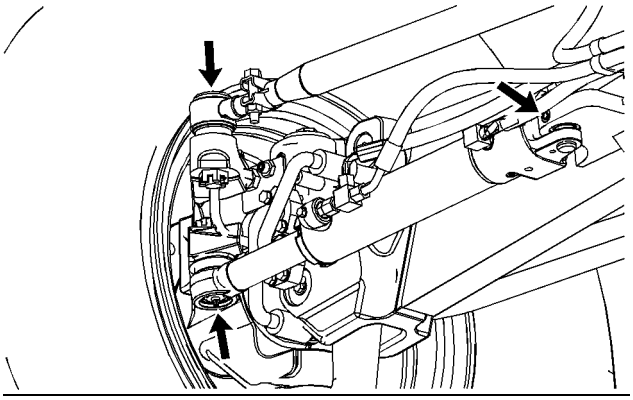


Illustration 238 g01142294

Typical Example Shown

Both steering cylinders have two fittings. Both tie rods have one fitting. Apply the appropriate lubricant through the fittings in order to lubricate the cylinder ends and the tie rods.

i02593781

Tandem Breather - Clean/Replace

SMCS Code: 4062-070-BRE; 4062-510-BRE

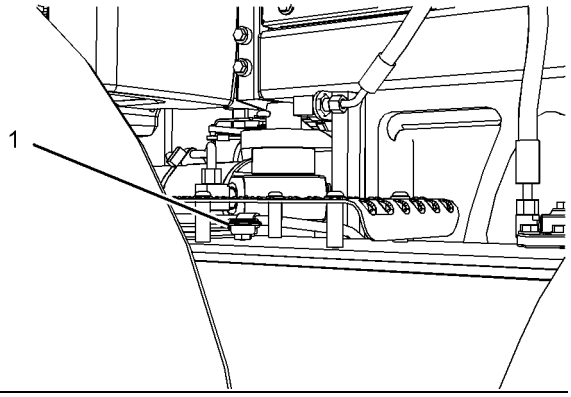


Illustration 239 g01298118

The tandem breathers are located on the top of each tandem.

1. Remove a plate from the walkway that is located on top of the tandem drive housings. This must be done in order to access breathers (1) on the top of the tandem drive housings.

2. Clean the area around the breathers of any dirt or debris. This must be done before the breathers are removed.

3. Remove breather (1) from both tandems.

4. Wash the breathers in clean, nonflammable solvent.

5. Use pressure air to dry the breathers.

6. Install the breathers in both tandems.

Note: Replace the breathers if the breathers are damaged.

7. Install the plate to the walkway.

i02593825

Tandem Drive Oil - Change

SMCS Code: 4071-510

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

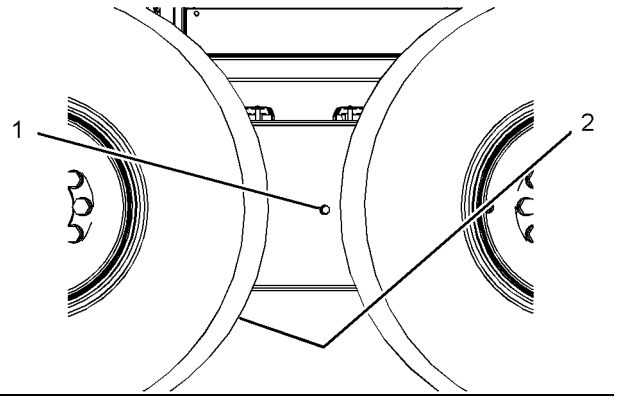


Illustration 240 g01298140

1. Clean the surface area around oil check plug (1).

2. Remove drain plug (2). Remove the oil check plug. Allow the oil to drain into a suitable container.

Note: When you change the tandem drive oil, use diesel fuel in order to clean the housing of the sludge and flush the housing of the sludge.

3. Clean the drain plug and install the drain plug.

4. Remove a plate from the walkway that is located on top of the tandem drive housing. This must be done in order to access one of the covers on the top of the tandem drive housing.

5. Clean the area around one of the covers of any dirt or debris. This must be done before the cover is removed.

6. Remove a cover from the top of the tandem drive housing. Fill the tandem drive housing with new oil. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

7. Clean the cover and install the cover on the top of the tandem drive housing.

8. Install the plate to the walkway.

9. Clean the oil check plug and install the oil check plug.

10. Start the engine. Operate the machine for a few minutes. Check the tandem drive housing for leaks.

11. Stop the engine. Remove the oil check plug.

12. Check the oil level. Maintain the oil level to the bottom of the opening for the oil check plug. Add oil, if necessary.

13. Install the oil check plug.

14. Repeat Step 1 through Step 13 for the other side of the machine.

i02593951

Tandem Drive Oil Level - Check

SMCS Code: 4071-535

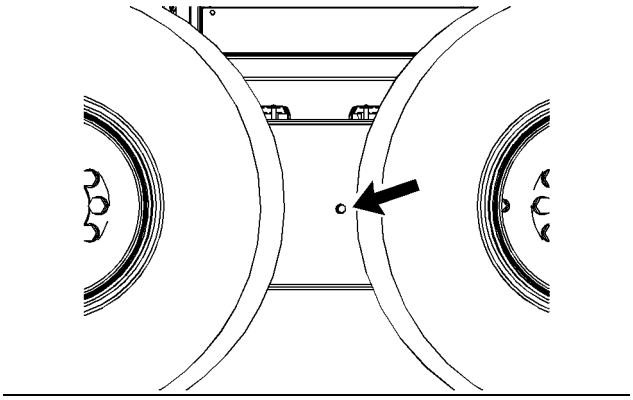


Illustration 241 g01298219

1. Clean the surface area around the oil check plug.
2. Remove the oil check plug.
3. Maintain the oil level to the bottom of the opening for the oil check plug. If additional oil is necessary, perform the following Steps:
   a. Remove a plate from the walkway that is located on top of the tandem drive housing. This must be done in order to access one of the covers on the top of the tandem drive housing.
   b. Clean the area around one of the covers of any dirt or debris. This must be done before the cover is removed.
   c. Remove a cover from the top of the tandem drive housing. Fill the tandem drive housing with new oil. Refer to the following topics:
      - Operation and Maintenance Manual, “Lubricant Viscosities”
      - Operation and Maintenance Manual, “Capacities (Refill)”
   d. Clean the cover and install the cover on the top of the tandem drive housing.
   e. Install the plate to the walkway.
4. Clean the oil check plug and install the oil check plug.

i02772093

Tandem Drive Oil Sample - Obtain

SMCS Code: 4071-008

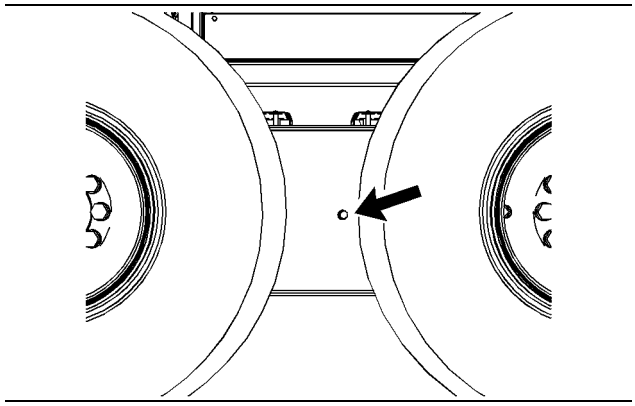


Illustration 242 g01298219

1. Clean the surface area around the oil check plug.
2. Remove the oil check plug in order to obtain an oil sample.
3. Clean the oil check plug and install the oil check plug.

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

i00149440

Tire Inflation - Check

SMCS Code: 4203-535-AI; 4203-535-PX

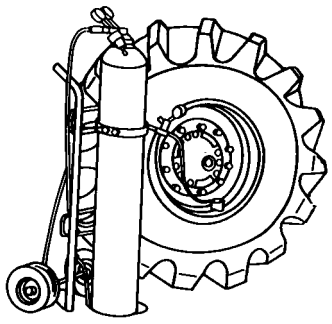


Illustration 243 g00103147

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

If necessary, inflate the tires. Refer to the following additional information about tire inflation:

- Operation and Maintenance Manual, “Tire Inflation with Nitrogen”
- Operation and Maintenance Manual, “Tire Shipping Pressure”
- Operation and Maintenance Manual, “Tire Inflation Pressure Adjustment”

i03674565

Transmission and Differential Oil - Change

SMCS Code: 3080-510; 3258-510-OC

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.

Clean the area around the differential drain plug and the area around the transmission drain plug. Refer to Illustration 244 for the location of drain plugs. Clean the area around the oil level gauge/fill cap. Refer to Illustration 245 for the location of the oil level gauge/fill cap.

Operate the engine until the transmission oil and the differential oil are warm. Park the machine on a level surface and engage the parking brake. Lower the blade and apply slight down pressure to the blade. Stop the engine.

Note: Drain the transmission case and drain the differential case while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the case. The particles will not be removed by draining the oil and the particles will recirculate in the lubrication system with the new oil.

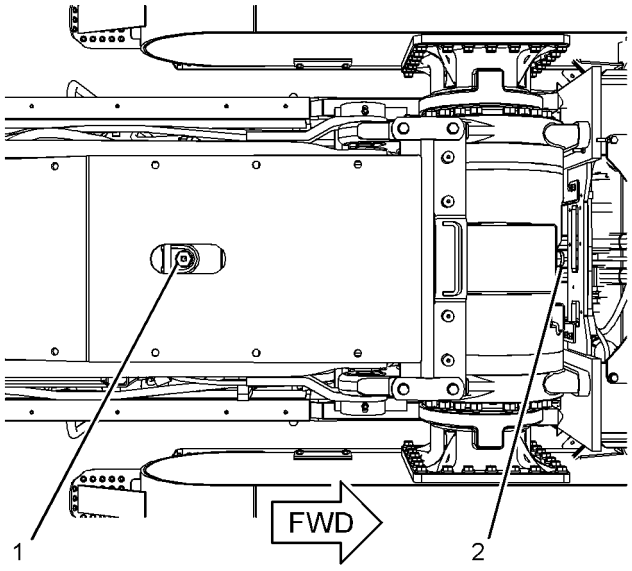


Illustration 244 g01271184

Bottom view

1. Remove transmission drain plug (1) and remove differential drain plug (2). Drain the oil into a suitable container.
2. Change the filter element and clean the screens. Refer to Operation and Maintenance Manual, “Transmission and Differential Oil Filter and Screens - Replace/Clean” for the proper procedure.
3. Clean the drain plugs and install the drain plugs.
4. Open the front left access door.

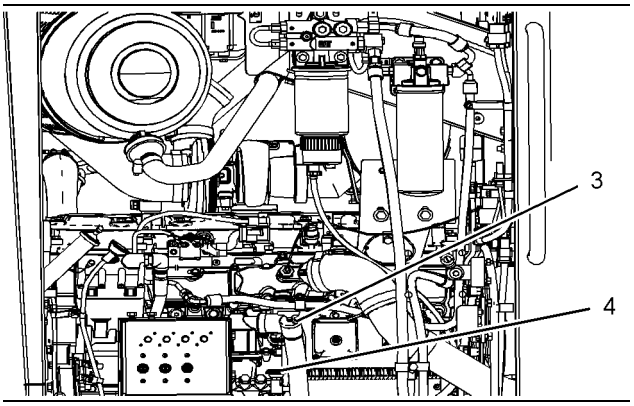


Illustration 245 g01294176

C7 Engine

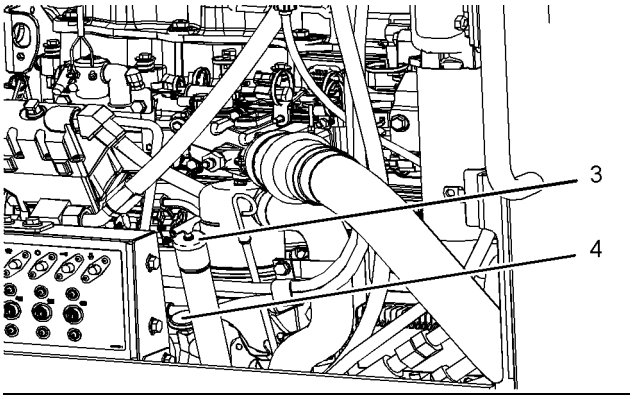


Illustration 246 g01301574

C9 Engine

5. Fill the transmission case and the differential case with oil through oil level gauge/fill cap (3). Refer to the following topics:

   - Operation and Maintenance Manual, “Lubricant Viscosities”
   - Operation and Maintenance Manual, “Capacities (Refill)”

6. Remove transmission breather (4) and discard the transmission breather. Install a new transmission breather.

7. Start the engine and run the engine at low idle. Inspect the transmission and differential components for leaks.

8. Engage the transmission modulator control (inching pedal). Slowly operate the transmission in order to circulate the oil.

9. With the engine at low idle, maintain the oil level between the marks on the oil level gauge. If necessary, add oil through oil level gauge/fill cap (3).

10. Stop the engine.

11. Close the access door.

i03674570

Transmission and Differential Oil Filter and Screens - Replace/Clean

SMCS Code: 3030-070-Z3; 3030-510-Z3; 3067-070; 3067-510; 3258-070-FI; 3258-070-Z3; 3258-510-Z3; 3258-510-FI

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

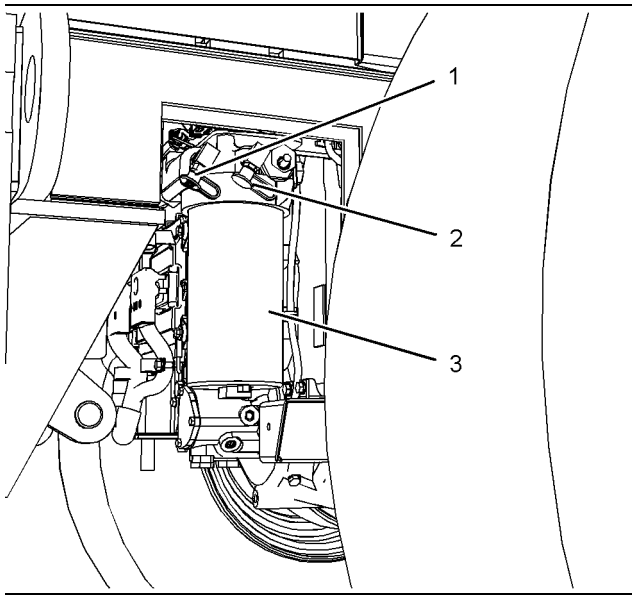


Illustration 247 g01271420

Cutaway view

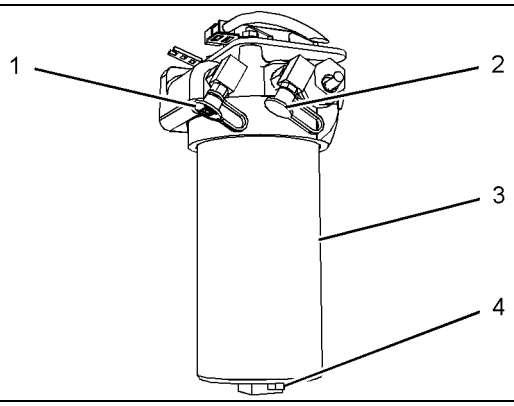


Illustration 248 g01271423

1. Remove drain plug (4) on transmission oil filter housing (3). Allow the oil to drain into a suitable container.

2. Loosen oil sampling valve (1) or pressure test port (2) in order to vent the transmission oil filter housing.

3. Remove the transmission oil filter housing.

4. Remove the used element and discard the used element.

5. Clean the transmission oil filter housing with a clean, nonflammable solvent.

6. Clean the base of the transmission oil filter housing.

7. Insert a new filter element into the transmission oil filter housing.

8. Replace the filter housing base seal.

9. Install the transmission oil filter housing.

10. Install drain plug (4) in transmission oil filter housing (3).

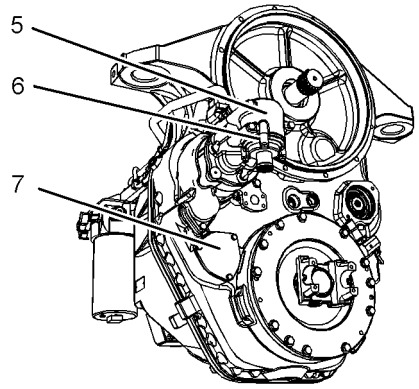


Illustration 249 g01440673

11. Remove the three bolts of the cover for magnetic screen (6). Slowly remove the cover from the housing (5) for the magnetic screen. Allow the oil to drain into a suitable container.

12. Remove the magnetic screen tube assembly.

13. Separate the magnet and the tube assembly from the screen. Wash the screen and the tube assembly in clean, nonflammable solvent. Allow the screen to dry and allow the tube assembly to dry.

NOTICE
Do not drop or rap magnets on hard objects, or damage can result. Replace damaged magnets.

14. Clean the magnet with a cloth or clean the magnet with a firm brush. Allow the magnet to dry.

15. Install the magnet and the tube assembly into the screen.

16. Install the screen.

17. Inspect the cover seals. If the cover seals are damaged, replace the cover seals.

18. Install the covers and tighten the bolts.

19. Repeat steps 11 through 18 for the transmission suction screen (7).

20. Start the engine.

21. With the parking brake engaged, run the engine at low idle in order to circulate the transmission oil.

22. Inspect all of the transmission components for leaks.

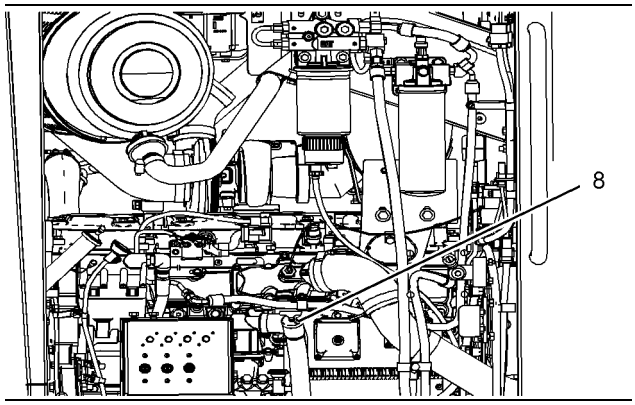
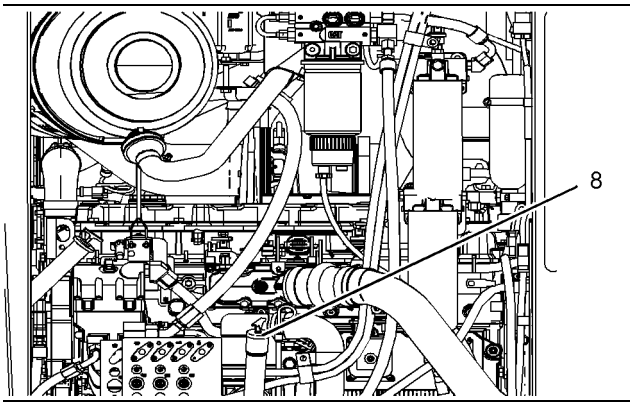


Illustration 250 g01441716
C7 Engine



g01441722

Illustration 251

C9 Engine

23. Clean the area around oil level gauge/fill cap (8).

24. With the engine at low idle, maintain the oil level between the marks on the oil level gauge. If necessary, add oil through oil level gauge/fill cap (8).

25. Stop the engine.

i03674581

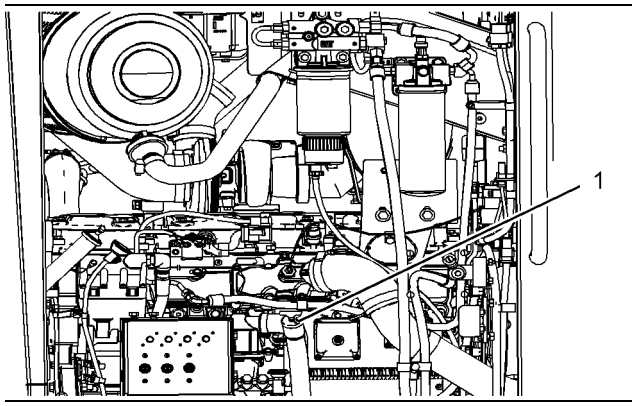
Transmission and Differential Oil Level - Check

SMCS Code: 3030-535-FLV; 3080-535-FLV; 3258-535-FLV

⚠ WARNING

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

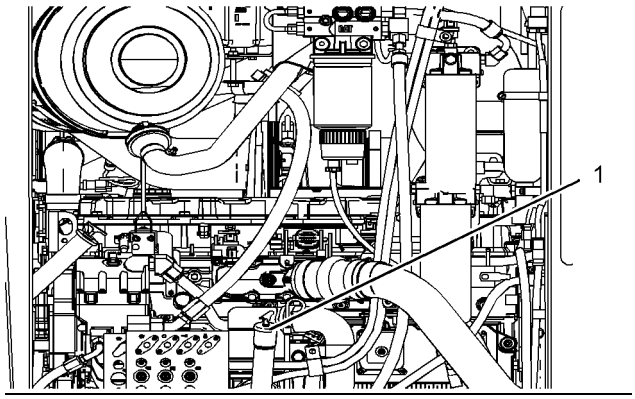
Refer to Operation and Maintenance Manual, “Access Doors and Covers” for the location of the service points.



g01294168

Illustration 252

C7 Engine



g01301196

Illustration 253

C9 Engine

1. Open the front left access door.

2. Clean the area around oil level gauge/fill cap (1).

3. Start the engine and run the engine at low idle. Remove the oil level gauge/fill cap.

4. With the oil at an operating temperature of 90° C (194° F), maintain the oil level between the marks on oil level gauge/fill cap (1). If necessary, add oil.

5. Stop the engine.

6. Close the access door.

i02540233

Transmission and Differential Oil Sample - Obtain

SMCS Code: 3006-008; 3030-008; 3080-008; 3258-008; 7542

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

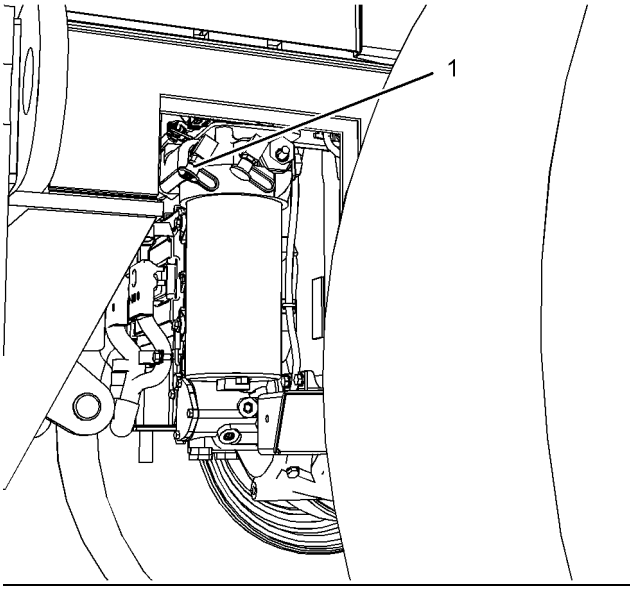


Illustration 254 g01271753

Sampling valve (1) for the transmission and differential oil is located on the transmission filter. The transmission filter is located on the right, rear of the transmission.

Refer to Special Publication, SEBU6250, “S·O·S Services Oil Analysis” for information that pertains to obtaining a sample of the transmission and differential oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the transmission and differential oil.

i03399645

Wheel Bearing Oil (Front) - Change (If Equipped)

SMCS Code: 4205-044; 4208-044; 4234-044; 7551-044-WHL

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

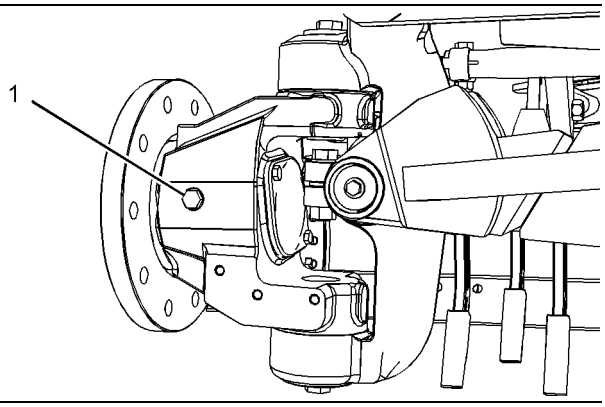


Illustration 255 g01271804

Typical example

The wheel has been removed for ease of viewing.

The front wheel bearings are located on the inner side of each front wheel. Check/fill plug (1) is located on the housings of each front wheel bearing.

1. Clean the surface around the check/fill plug.
2. Remove the check/fill plug.
3. Use a 1U-7683 Suction Gun in order to remove the oil from the housing for the wheel bearing.
4. Add oil to the housing for the wheel bearing until the oil level is at the bottom of the opening for the check/fill plug. Refer to the following topics:
   - Operation and Maintenance Manual, “Lubricant Viscosities”
   - Operation and Maintenance Manual, “Capacities (Refill)”
5. Install the check/fill plug.
6. Repeat Step 1 through Step 5 for the other wheel bearing.

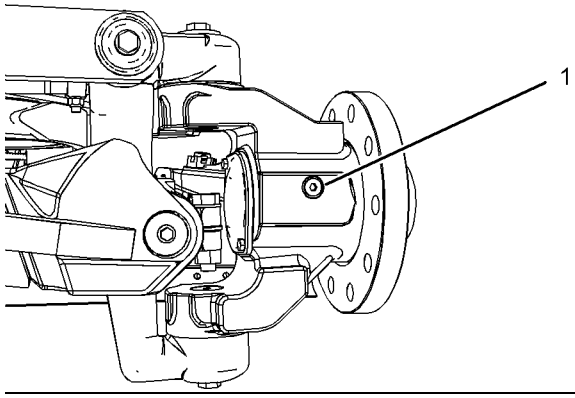
i03399644

Wheel Bearing Oil Level (Front) - Check (If Equipped)

SMCS Code: 4205-535-FLV; 4208-535-FLV; 4234-535-FLV; 7551-535-FLV

⚠ WARNING

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



g01299786

Illustration 256

Typical example

The wheel has been removed for ease of viewing.

1. Clean the surface around check/fill plug (1).
2. Remove the check/fill plug.
3. Maintain the oil level to the bottom of the opening for the check/fill plug. If necessary, add oil.
4. Install the check/fill plug.
5. Repeat Step 1 through Step 4 for the other wheel bearing.

i03399642

Wheel Bearing Oil Sample (Front) - Obtain (If Equipped)

SMCS Code: 4205-008; 4234-008; 7542

⚠ WARNING

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

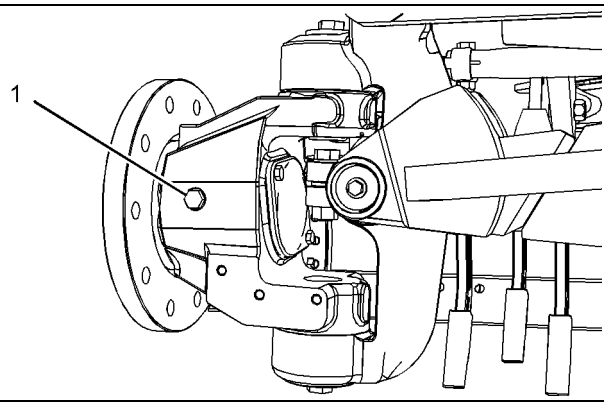


Illustration 257 g01271804

Typical example

The wheel has been removed for ease of viewing.

The wheel bearing sample plug (1) is located on the inner side of each front wheel of the machine.

Refer to Special Publication, SEBU6250, “S·O·S Services Oil Analysis” for information that pertains to obtaining a sample of the oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the hydraulic oil.

i02622524

Wheel Lean Bar Bearings - Lubricate

SMCS Code: 5225-086-BD

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the wheel lean bar bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

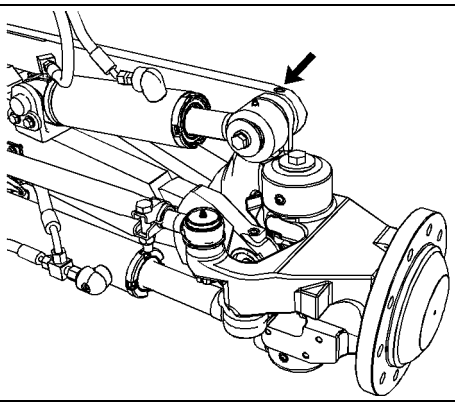


Illustration 258 g01271900

The wheel has been removed for ease of viewing.

Each front wheel has one fitting. Apply the appropriate lubricant through the fittings in order to lubricate the wheel lean bar bearings.

i02540560

Wheel Lean Bearings - Lubricate

SMCS Code: 5225-086-BD

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the wheel lean bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

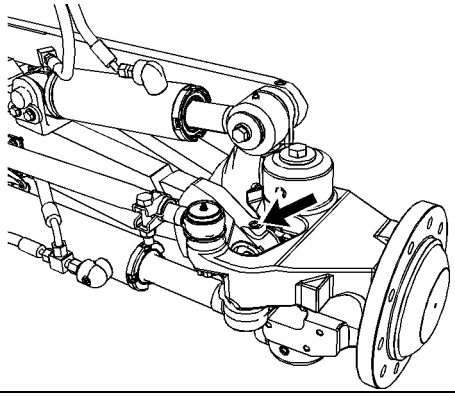


Illustration 259 g01271922

The wheel has been removed for ease of viewing.

Each front wheel has two fittings. Apply the appropriate lubricant through the fittings in order to lubricate the wheel lean bearings.

i02540570

Wheel Lean Cylinder Bearings - Lubricate

SMCS Code: 5211-086-BD

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the wheel lean cylinder bearings. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

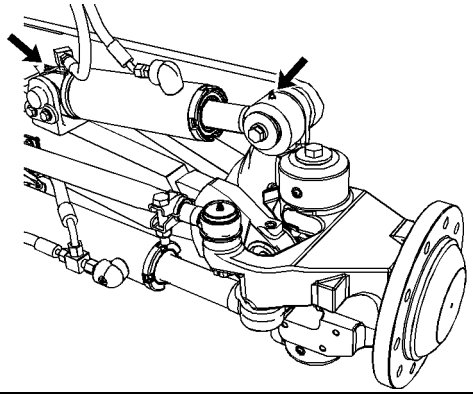


Illustration 260 g01271952

The wheel has been removed for ease of viewing.

The right front wheel has two fittings on the wheel lean cylinder. Apply the appropriate lubricant through the fittings in order to lubricate the wheel lean cylinder bearings.

i02639345

Window Washer Reservoir - Fill

SMCS Code: 7306-544-KE

NOTICE
Use Caterpillar nonfreezing window washer solvent or a commercially available windshield washer fluid in order to prevent freezing of the windshield washer system.

The windshield washer reservoir is positioned in the seat support to the left of the operator's seat. The level of windshield washer fluid can be viewed through the reservoir.

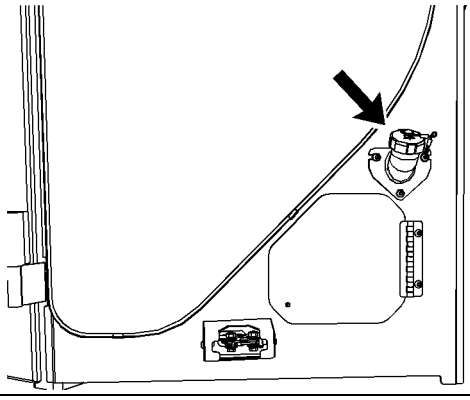


Illustration 261 g01323517

1. Clean the filler cap and the surrounding area.
2. Remove the filler cap for the windshield washer reservoir.
3. Fill the window washer reservoir with window washer solvent through the filler cap opening.
4. Install the filler cap.

Note: The window washer nozzles can be adjusted so that the window washer solvent will be sprayed in the desired direction.

i04001049

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

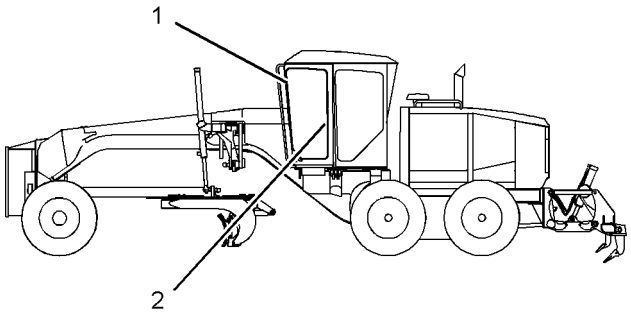


Illustration 262 g01293778

Typical Example Shown

Inspect front window wiper blade (1). Inspect left window wiper blade (2). If equipped, inspect the right window wiper blade and the rear window wiper blade. If any of the wiper blades are streaking any of the windows or the rear window, replace the wiper blade.

i04093669

Windows - Clean

SMCS Code: 7310-070; 7340-070

⚠ WARNING

When cleaning the windows, use the recommended procedure in this manual. Serious injury or death could result from falling if the appropriate procedure and equipment is not used.

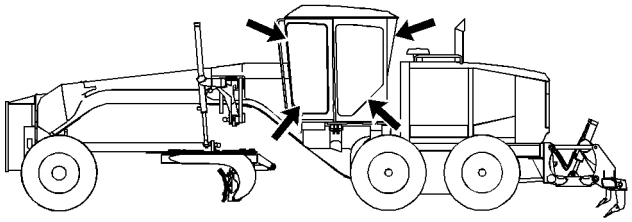


Illustration 263 g01293786

Typical Example Shown

Clean the front, left side, and right side windows of the cab while you are standing on the ground or on a stable work platform. Use the appropriate equipment in order to reach the windows. If you are standing on the ground, use a squeegee with an extension handle.

Clean the rear window from the top of the left tandem housing. Access this area by using the step that is located at the rear of the tandem housing. Be sure to use the area of the walkway that is covered with a slip resistant walkway. Use the provided handholds on the engine enclosure to maintain a secure position. If necessary, use a squeegee with an extension handle to reach across the rear window.

Use commercially available window cleaning solutions to clean the windows.

i02589851

Work Tool Lift - Lubricate

SMCS Code: 6700-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the work tool lift. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe the fittings before you apply lubricant through the fittings.

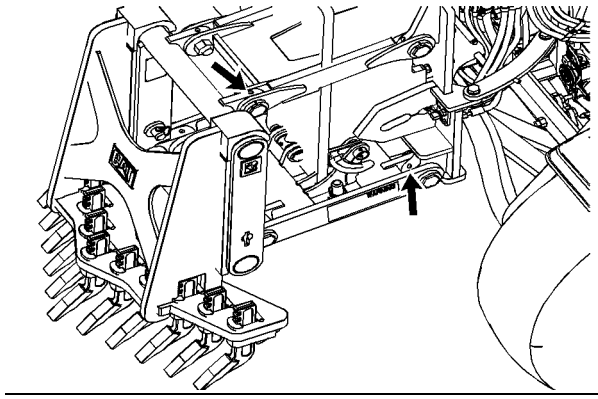


Illustration 264 g01296618

The machine has eleven fittings. Apply the appropriate lubricant through the fittings in order to lubricate the work tool lift.