

SAFETY.CAT.COM™

MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt



Operation and Maintenance Manual

120H and 135H Motor Graders

1241-Up (Machine)
CBC1-Up (Machine)
CAF1-Up (Machine)
AMX1-Up (Machine)
ALZ1-Up (Machine)

i02703160

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, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

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

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

When Required

Battery - Recycle	82
Belt - Replace	83
Blade Lift Cylinder Socket - Check/Adjust/ Replace	84
Centershift Cylinder Socket - Check/Adjust/ Replace	86
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Engine Crankcase Breather - Replace	106
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Evaporator Coil and Heater Coil - Clean	110
Fuel System - Fill	112
Fuel System - Prime	113
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Moldboard Wear Strip - Inspect/Adjust/Replace ..	122
Oil Filter - Inspect	122
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Scarifier Lift Link Socket - Lubricate	126
Scarifier Teeth - Inspect/Replace	126

Window Washer Reservoir - Fill	135
Window Wiper - Inspect/Replace	136
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Every 10 Service Hours or Daily

Air Tank Moisture and Sediment - Drain	81
Backup Alarm - Test	82
Brakes, Indicators and Gauges - Test	84
Circle Drive Pinion Teeth - Lubricate	91
Circle Top - Lubricate	92
Cooling System Coolant Level - Check	97
Engine Air Filter Service Indicator - Inspect	103
Engine Air Precleaner - Clean	105
Engine Oil Level - Check	106
Fuel System Water Separator - Drain	114
Seat Belt - Inspect	127
Transmission and Differential Oil Level - Check ..	133

Initial 100 Service Hours

Transmission and Differential Oil Filter and Screens - Replace/Clean	131
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Every 100 Service Hours or 2 Weeks

Articulation Bearings - Lubricate	81
Axle Oscillation Bearings - Lubricate	81
Belt - Inspect	82
Blade Lift Cylinder Socket - Lubricate	84
Cab Air Filter - Clean/Replace	86
Centershift Cylinder Socket - Lubricate	87
Centershift Lock Bar - Clean/Lubricate	87
Drawbar Ball and Socket - Lubricate	100
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Ripper Cylinder Bearings - Lubricate	125
Scarifier Lift Link Socket - Lubricate	126
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Tire Inflation - Check	130
Wheel Bearing Oil Level (Front) - Check	134
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Wheel Lean Bearings - Lubricate	135
Wheel Lean Cylinder Bearings - Lubricate	135

Initial 500 Service Hours (or at first oil change)

Battery or Battery Cable - Inspect/Replace	82
Engine Valve Lash - Check	110

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

Cooling System Coolant Sample (Level 2) - Obtain	94
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Every 500 Service Hours or 3 Months

Air Dryer - Check	80
Braking System - Test	85

Cooling System Coolant Sample (Level 1) -
 Obtain 93
 Engine Air Filter Service Indicator -
 Inspect/Replace 104
 Engine Oil Sample - Obtain 106
 Engine Oil and Filter - Change 107
 Fuel System Secondary Filter - Replace 113
 Fuel System Water Separator Element -
 Replace 114
 Fuel Tank Cap and Strainer - Clean 115
 Hydraulic System Oil Filter - Replace 119
 Hydraulic System Oil Sample - Obtain 121
 Parking Brake - Drain 123
 Tandem Breather - Clean/Replace 128
 Tandem Drive Oil Sample - Obtain 129
 Transmission and Differential Oil Filter and Screens -
 Replace/Clean 131
 Transmission and Differential Oil Sample -
 Obtain 133

Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add 96

Every 12 000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change 94

Every 1000 Service Hours or 6 Months

Blade Cushion Accumulator - Check 83
 Rollover Protective Structure (ROPS) - Inspect .. 126
 Steering Accumulator - Check 128
 Transmission and Differential Oil - Change 130

Every 2000 Service Hours or 2 Years

Air Dryer Desiccant - Replace 80
 Battery or Battery Cable - Inspect/Replace 82
 Circle Drive Oil - Change 90
 Condenser (Refrigerant) - Clean 92
 Cooling System Pressure Cap - Clean/Replace ... 97
 Crankshaft Vibration Damper - Inspect 99
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 Engine Valve Rotators - Inspect 110
 Evaporator Coil and Heater Coil - Clean 110
 Final Drive Preload - Check 111
 Refrigerant Dryer - Replace 124
 Tandem Drive Oil - Change 128
 Wheel Bearing Oil (Front) - Change 134

Every Year

Cooling System Coolant Sample (Level 2) -
 Obtain 94

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

Seat Belt - Replace 127

Every 3000 Service Hours or 3 Years

Cooling System Water Temperature Regulator -
 Replace 98

Every 4000 Service Hours

Hydraulic System Oil - Change 118

i01862160

Air Dryer - Check

SMCS Code: 4285-535

WARNING

The air lines to and from the air dryer must be at atmospheric pressure. If the air lines are not at atmospheric pressure, personal injury could result. Release the air pressure from the air system completely before performing maintenance.

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

The air dryer is positioned on the left side at the rear of the machine.

1. Open the access door in order to service the air dryer.

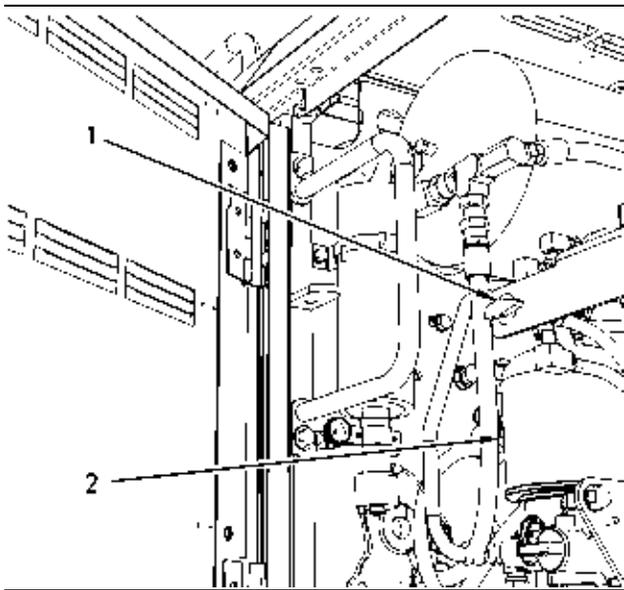


Illustration 77

g00949269

2. Turn drain valve (1) to the 3:00 position in order to drain one air tank. Turn drain valve (1) to the 9:00 position in order to drain the other air tank. The air tanks are positioned in the service center at the rear of the machine.
3. Check for moisture in the air tanks. Close the drain valve for the air tanks.
4. If moisture is present in the air tanks, replace the desiccant cartridge for air dryer (2). Consult your Caterpillar dealer for information about replacing the desiccant cartridge.

5. Close the access door.

Note: Small amounts of moisture may be in the system due to condensation in the system. Moisture may also be in the system if an air dryer is installed on a machine that has been operating without an air dryer. Several weeks may be required in order to completely dry the system.

i01862178

Air Dryer Desiccant - Replace

SMCS Code: 4285-510

WARNING

The air lines to and from the air dryer must be at atmospheric pressure. If the air lines are not at atmospheric pressure, personal injury could result. Release the air pressure from the air system completely before performing maintenance.

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

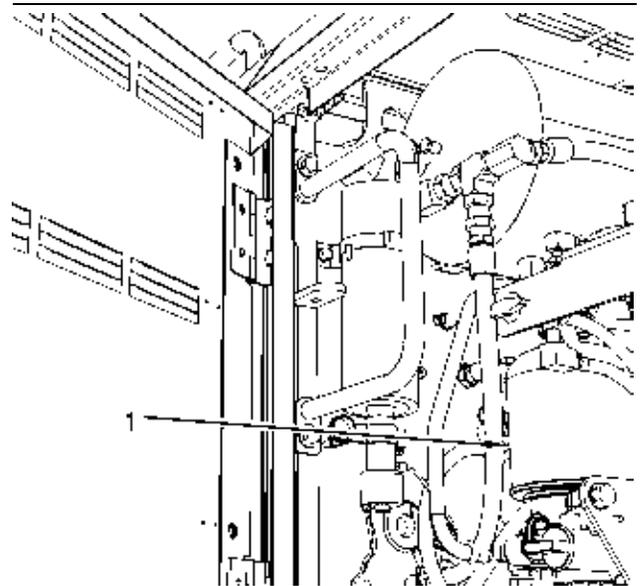


Illustration 78

g00949272

Air dryer (1) is positioned on the left side at the rear of the machine.

1. Open the access door in order to service the air dryer.
2. Replace the air dryer desiccant cartridge when the water can not be absorbed. Consult your Caterpillar dealer for service or for replacement parts.

3. Close the access door.

i01862632

Air Tank Moisture and Sediment - Drain

SMCS Code: 4272-543-M&S; 5505-543

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the access doors.

1. Open the access door in order to service the drain valve for moisture and sediment.

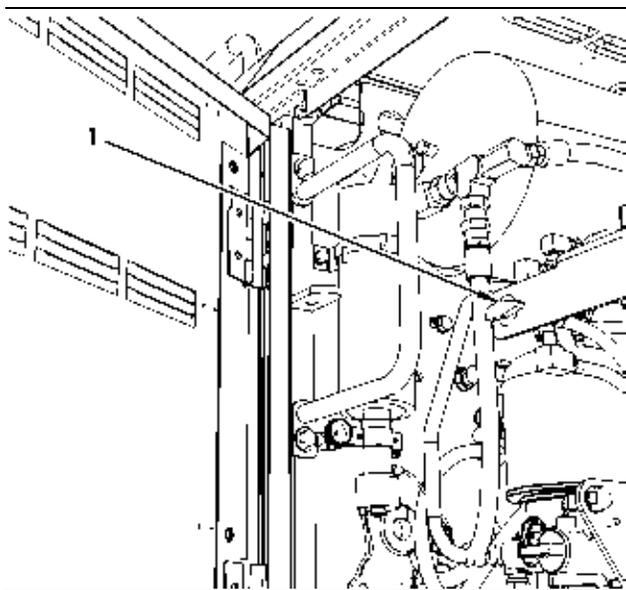


Illustration 79

g00949522

2. The air tanks are located in the rear compartment of the machine behind the left side of the engine. Turn drain valve (1) to the 3:00 position in order to drain one air tank. Turn drain valve (1) to the 9:00 position in order to drain the other air tank. Close the drain valve.
3. Close the access door.

i01671010

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD

Wipe all the fittings before you apply lubricant through the fittings. The fittings for the articulation bearings are located under the cab on the left side of the machine.

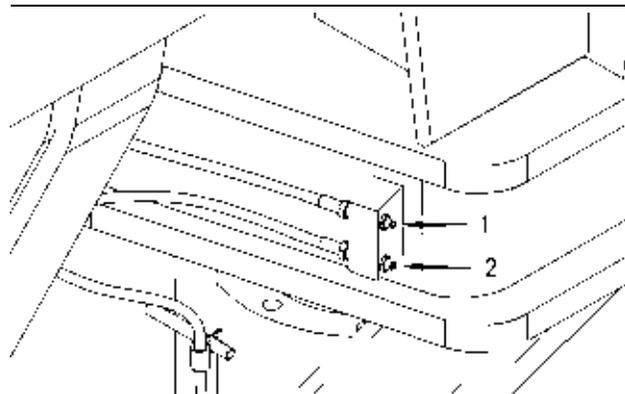


Illustration 80

g00811301

The upper articulation bearing has one fitting (1). In order to lubricate the upper articulation bearing, use 183-3424 Grease Cartridge to apply lubricant through fitting (1).

The lower articulation bearing has one fitting (2). In order to lubricate the lower articulation bearing, use 183-3424 Grease Cartridge to apply lubricant through fitting (2).

i01671028

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268; 4313

The lubrication fitting is located in the middle of the front axle. Wipe the fitting before you apply lubricant to the fitting.

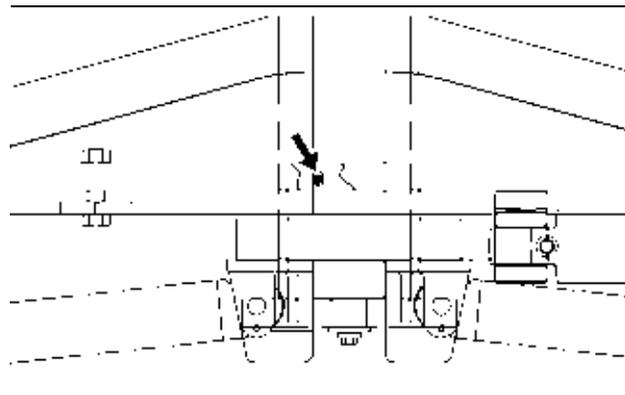


Illustration 81

g00811688

In order to lubricate the axle oscillation bearings, use 183-3424 Grease Cartridge to apply lubricant to the one fitting.

i02307698

Backup Alarm - Test

SMCS Code: 7406-081

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

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

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

The backup alarm is located at the rear of the machine.

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.

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.

i01547509

Belt - Inspect

SMCS Code: 1357-040; 1397-040

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

Note: If a new belt is installed, check the film on belt tightener (2) after 30 minutes of operation. A belt is considered to be used after 30 minutes of operation.

1. Stop the engine in order to inspect the belt.
2. Open the access door in order to service the belt.

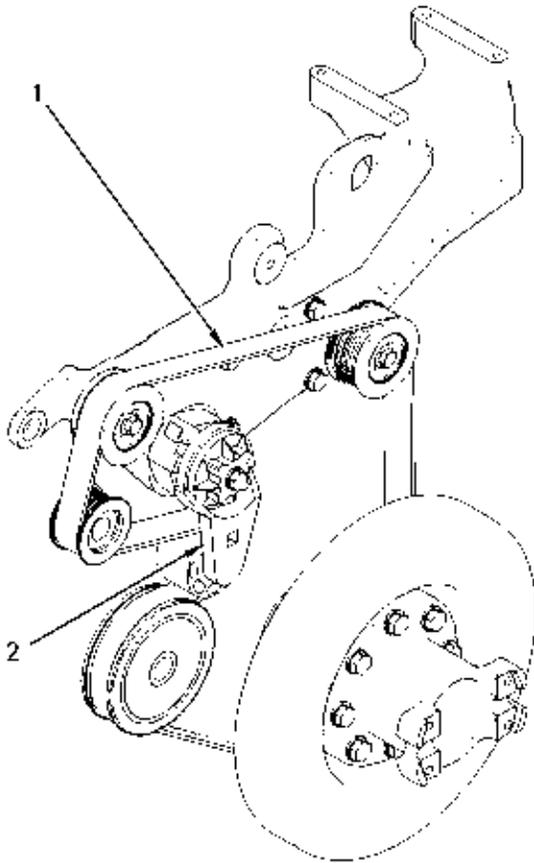


Illustration 82

g00804338

3. Inspect the condition of belt (1).
4. Make sure that the free arm stop on the arm of the belt tightener is aligned with the heavy black line on the decal that is on belt tightener (2). If the free arm stop is in the red area, replace the belt.

i01547516

Belt - Replace

SMCS Code: 1357-510; 1397-510

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

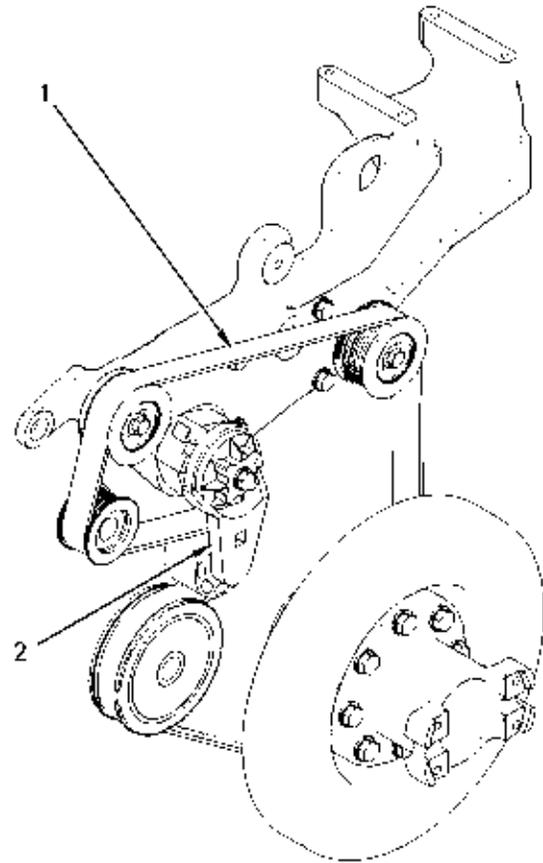


Illustration 83

g00804338

1. Release the tension on belt (1). Insert a 12.7 mm (0.50 inch) ratchet into the square hole in belt tightener (2) and pry the belt tightener in a clockwise direction.
2. Remove the belt.
3. Install the new belt around the pulleys. This is shown in Illustration 83.

i01564804

Blade Cushion Accumulator - Check

SMCS Code: 5077-535-BG

Consult your Caterpillar dealer for the following information:

- The correct checking procedure
- The correct filling procedures

- The recommended pressure

i01862399

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.

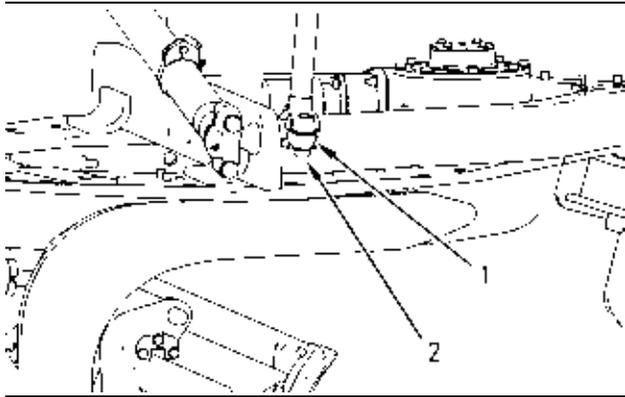


Illustration 84

g00949365

3. Remove two bolts (2) from each cap (1). Remove the 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.

i01862405

Blade Lift Cylinder Socket - Lubricate

SMCS Code: 5102-086; 5103-086

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

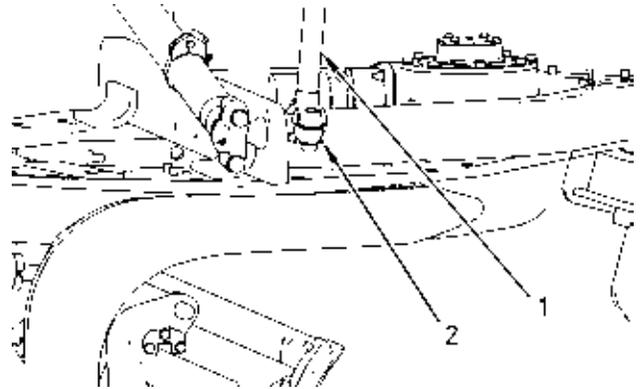


Illustration 85

g00949369

There are two blade lift cylinders (1).

Each blade lift cylinder socket has one fitting (2). In order to lubricate the blade lift cylinder sockets, use 183-3424 Grease Cartridge to apply lubricant to each fitting.

i01828321

Brakes, Indicators and Gauges - Test

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

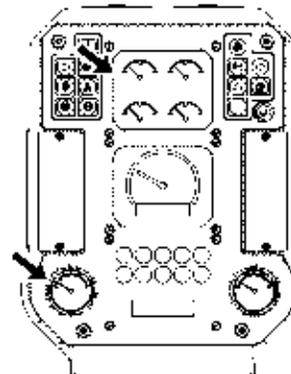


Illustration 86

g00932610

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, see Operation and Maintenance Manual, "Braking System - Test" in the Maintenance Interval Schedule of this manual.

Stop the engine.

Make any needed repairs before you operate the machine.

i01998856

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. Apply the service brake control.
2. Move the transmission control (lever) to FIFTH SPEED FORWARD. Increase the engine speed to high idle.
3. Gradually release the transmission modulator control. 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 burnishing for maximum performance. For the procedure to burnish the new friction material for the brake, consult your Caterpillar dealer.

Parking 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 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.

i01829689

Cab Air Filter - Clean/Replace

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

Note: The cab air filters are an optional attachment on this machine.

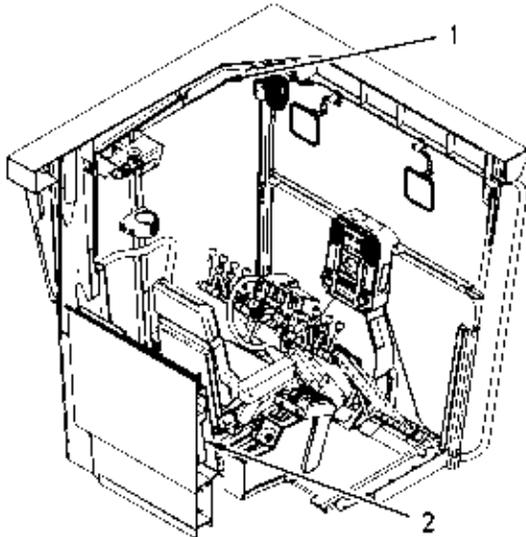


Illustration 87

g00933775

- (1) Outside filter
- (2) Inside filter

Clean the Filters

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

The cab air system has two outside filters. There is one outside filter above each cab door.

The filter for the inside cab air system is positioned behind the operator's seat.

1. Remove the filter cover.
2. Remove the filter elements. Clean the filter elements with pressure air or wash the filter elements in warm water and in a nonsudsing household detergent.

3. Rinse the filter elements in clean water. Thoroughly air dry the filter elements.
4. Install the filter elements. Install the filter cover.

Replace the Filters

Note: Replace the cab air filters, as required.

1. Remove the filter covers.
2. Remove the filter elements. Discard the filter elements.
3. Install the new filter elements.
4. Install the filter covers.

i01828752

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.

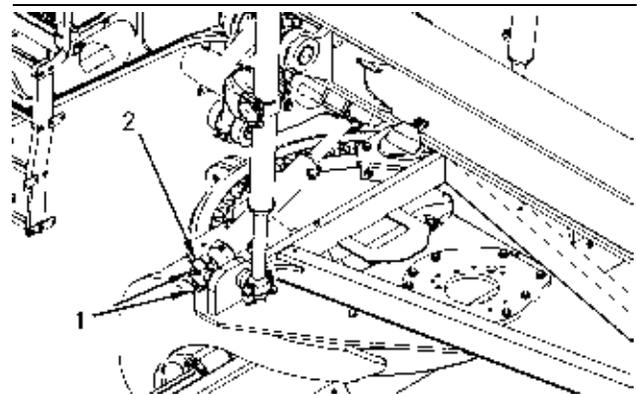


Illustration 88

g00932998

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.

i01862638

Centershift Cylinder Socket - Lubricate

SMCS Code: 5223-086

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

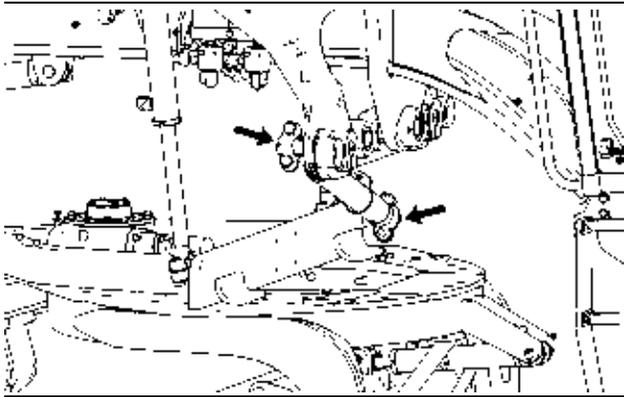


Illustration 89

g00949526

The centershift cylinder has one fitting on each end. In order to lubricate the centershift cylinder sockets, use 183-3424 Grease Cartridge (5% Molybdenum Disulfide) to apply lubricant to the fittings.

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.

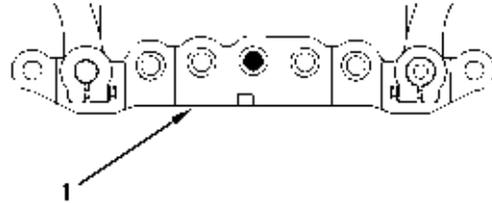


Illustration 90

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.

i01865351

Circle Clearances - Check/Adjust

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

Blade Circle and Drawbar

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

Note: Install the C-clamps before you lower the blade to the ground.

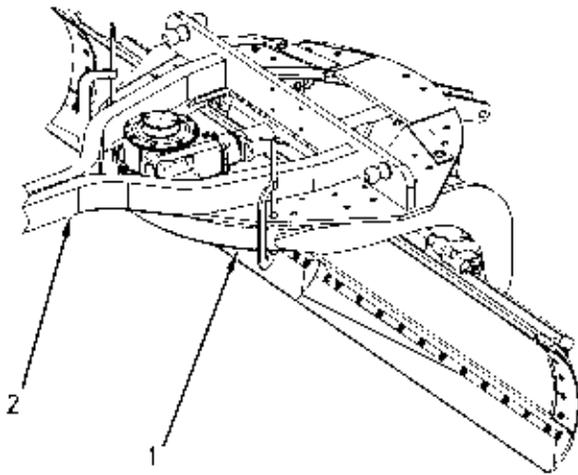


Illustration 91

g00950750

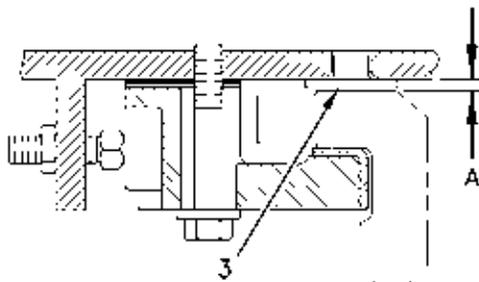


Illustration 92

g00774795

2. Clamp two C-clamps onto the front of the blade circle (1) and the drawbar (2). This will fasten the blade circle and the drawbar together. Tighten the two C-clamps until the wear strips (3) are in contact with the top of the blade circle and the wear strips (3) are in contact with the bottom of the drawbar.
3. Lower the blade to the ground. Stop the engine.
4. Measure the distance (A) that is between the top surface of the blade circle and the bottom surface of the drawbar. Replace the wear strip (3), if the distance between the top surface of the blade circle and the bottom surface of the drawbar is less than 1.5 mm (0.06 inch).
5. Inspect the wear strip (3). Inspect the drawbar. The wear strip (3) should be in complete contact at all points with the blade circle. If the wear strip (3) is not in complete contact with the blade circle, replace the wear strip (3).

Blade Circle to Shoe Clearance

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

Note: Install the C-clamps before you lower the blade to the ground.

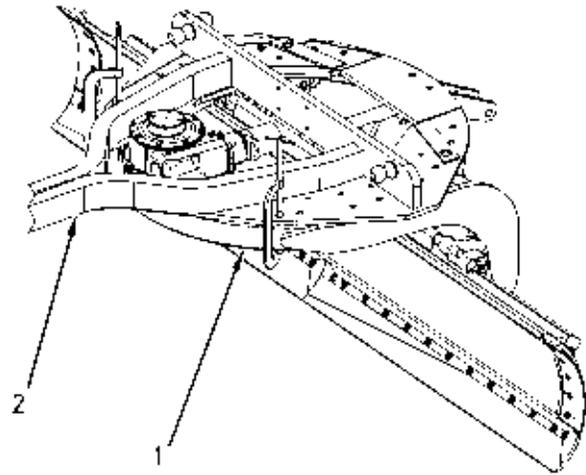


Illustration 93

g00950750

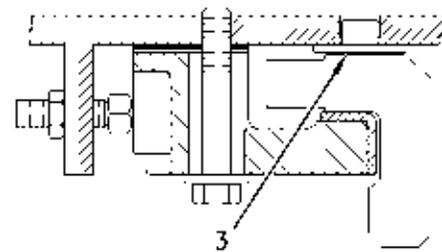


Illustration 94

g00774796

2. Clamp two C-clamps onto the front of the blade circle (1) and the drawbar (2). Tighten both C-clamps until the wear strips (3) contact the top of the circle and the bottom of the drawbar.
3. Lower the blade to the ground. Stop the engine.

Note: Check the wear strips (3) around the entire circumference of the blade circle. The wear strips (3) should be in complete contact with the blade circle and the drawbar.

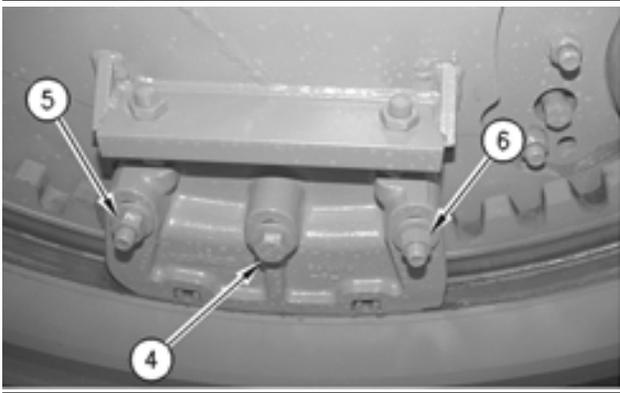


Illustration 95

g00108090

- Shoe mounting fastener (4), shoe mounting fastener (5) and shoe mounting fastener (6) must be tight. Make sure that the shoe wear strips (3) are completely seated in the circle shoes.

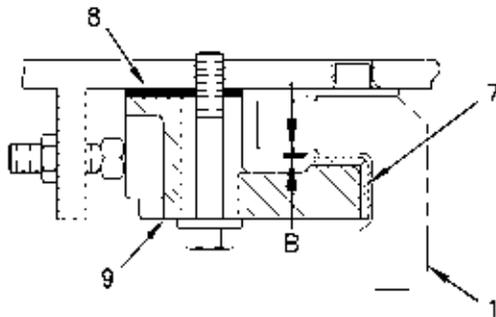


Illustration 96

g00774798

- Measure the clearance (B) between the bottom of the circle (1) and the top of the shoe wear strip (7). Maintain a maximum clearance of 0.5 mm (0.02 inch). Maintain the proper clearance by adding shims (8) or by removing shims (8).

Note: The proper clearance will permit the blade circle to freely rotate for 360 degrees.

Adjust the circle shoes (9) one at a time.

- Loosen shoe mounting fastener (6). Remove shoe mounting fastener (4) and remove shoe mounting fastener (5).
- Add shims or remove shims, as required.
- Install shoe mounting fastener (4) and install shoe mounting fastener (5). Tighten the shoe mounting fasteners.

- After all the circle shoes (9) have been adjusted, check the circle shoes (9) for proper clearance. If necessary, perform adjustments to the circle shoes (9).

Note: After all the adjustments have been performed, the blade circle (1) must rotate freely without binding .

Circle Pinion and Circle

Note: The engagement of the circle pinion and the circle teeth is determined by the adjustment of the circle shoes. Clean the circle and the pinion. Remove any dirt and any abrasive material. This will reduce wear to the circle pinion and to the circle teeth. Also, this will improve the accuracy of the adjustment of the circle shoes. After the adjustment, apply clean lubricant to the circle pinion and to the circle teeth.

- Rotate the blade. Place the blade at an angle of 90 degrees to the frame. Lower the blade to the ground. As you slowly inch the machine in a forward direction, apply the service brake. This will hold a light load between the wear strips for the front circle shoes and the circle. Engage the parking brake. Stop the engine.

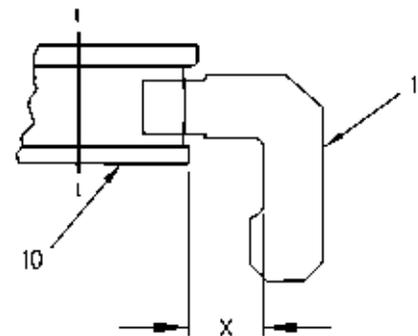


Illustration 97

g00775404

- Measure the clearance (X) that is between the bottom flange of pinion (10) and the inner machined surface of circle (1). If the clearance is less than 49.5 to 52.5 mm (1.95 to 2.07 inch), then adjust the clearance.

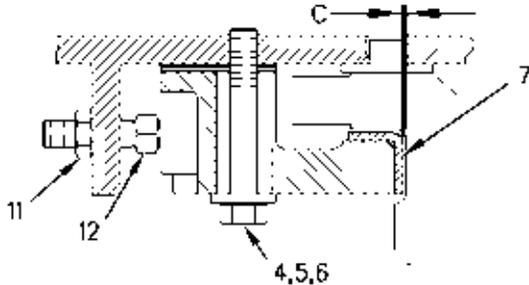


Illustration 98

g00774800

3. Loosen shoe mounting fastener (4), shoe mounting fastener (5), shoe mounting fastener (6) and locknuts (11) on the front circle shoes.
4. Loosen the shoe mounting fasteners and the locknuts for the rear circle shoes.
5. Loosen the shoe mounting fasteners and the locknuts for the side circle shoes, if equipped.
6. Adjust the front circle shoes one at a time. Turn the adjusting bolts (12) inward or turn the adjusting bolts (12) outward in order to attain 49.5 to 52.5 mm (1.95 to 2.07 inch). Adjust the other front circle shoe.

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 circle.

Note: Adjust the front shoes so that the front circle shoes have the same clearance measurement.

7. If you cannot attain the correct clearance measurement due to worn front shoe wear strips (7), replace the worn shoe wear strips (7). Then, repeat Step 6.
8. 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.

9. Set all of the circle shoes (front, side and rear) to contact the circle. There will be no clearance between the circle shoes and the circle.
10. When the pinion clearance is set and the front circle shoes are in contact with the blade circle, measure the distance (C) between each wear strip (7) and the blade circle. The clearance should be a maximum of 0.8 mm (0.03 inch).

11. Tighten all shoe mounting fasteners (4), shoe mounting fasteners (5) and all shoe mounting fasteners (6) to a torque of 475 ± 60 N·m (350 ± 44 lb ft).

12. Tighten all locknuts (11) to a torque of 200 ± 30 N·m (150 ± 22 lb ft).

i01862702

Circle Drive Oil - Change

SMCS Code: 5207-510-OC

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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



Illustration 99

g00108105

Bottom view of the blade circle.

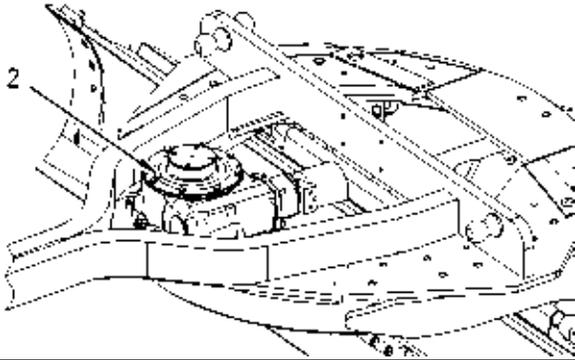


Illustration 100

g00949554

1. Remove drain plug (1). Remove the 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. See 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.

i01862720

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.

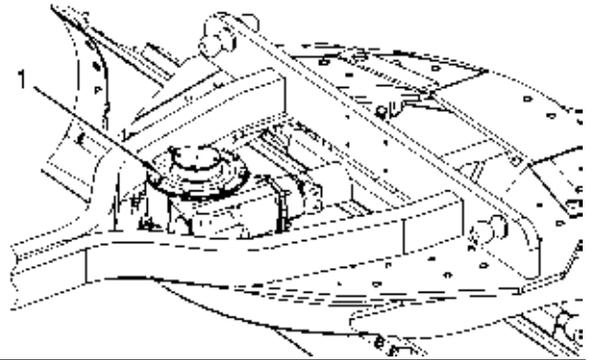


Illustration 101

g00949563

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).

i01674538

Circle Drive Pinion Teeth - Lubricate

SMCS Code: 5207-086-PI

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

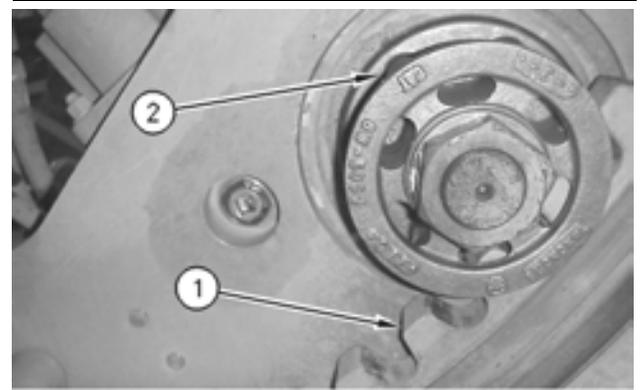


Illustration 102

g00774664

1. Clean the dirt and the old lubricant from blade circle (1) and from circle drive pinion teeth (2).
2. Use 183-3424 Grease Cartridge (5% Molybdenum Disulfide) in order to apply lubricant to blade circle (1). Also use 183-3424 Grease Cartridge (5% Molybdenum Disulfide) in order to apply lubricant to circle drive pinion teeth (2).

i01863885

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.

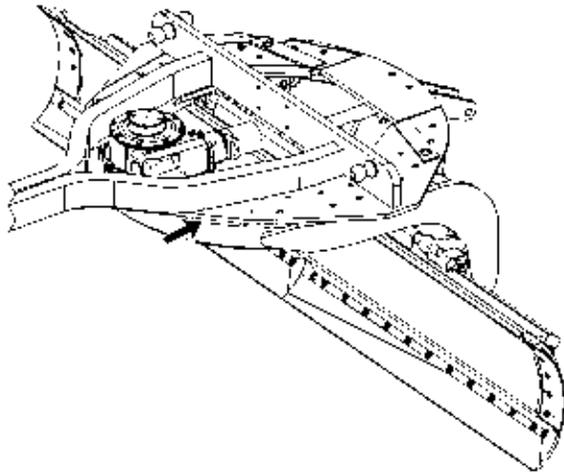


Illustration 103

g00805334

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.

i01828809

Circuit Breakers - Reset

SMCS Code: 1417-529; 1420-529

Refer to the 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.

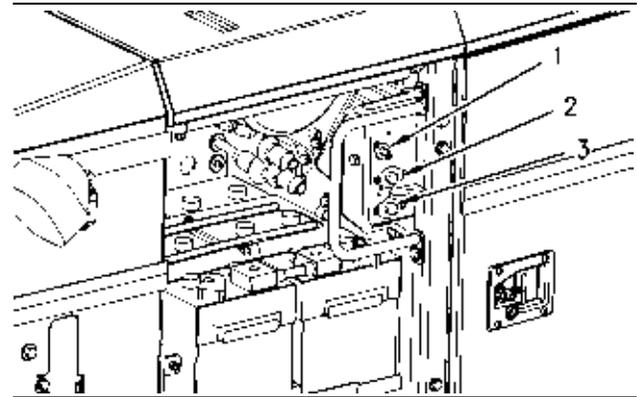


Illustration 104

g00933043

The circuit breaker resets are located in the right rear compartment of the machine.



Engine Circuit Breaker (1) – The circuit breaker for the engine control is 15 amp.



Main Circuit Breaker (2) – The main circuit breaker is 80 amp.



Alternator (3) – The circuit breaker for the alternator is 80 amp.



i01863729

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 the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

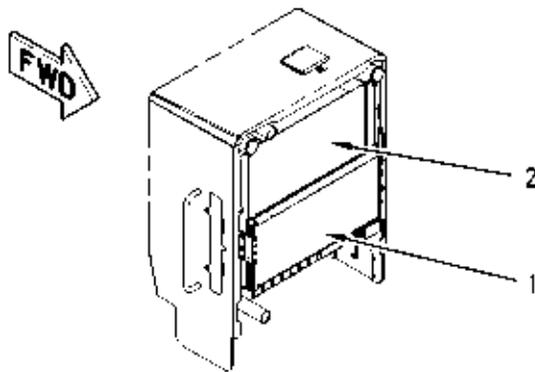


Illustration 105

g00950115

The refrigerant condenser (2) is located in front of the radiator (1) at the rear of the machine.

1. Open the access door at the rear of the machine on the left side of the machine.
2. Inspect the condenser for debris. If necessary, clean the condenser.
3. Use clean water in order to wash off all dust and dirt from the condenser.
4. Close the access door.

i01889947

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1395-554

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.

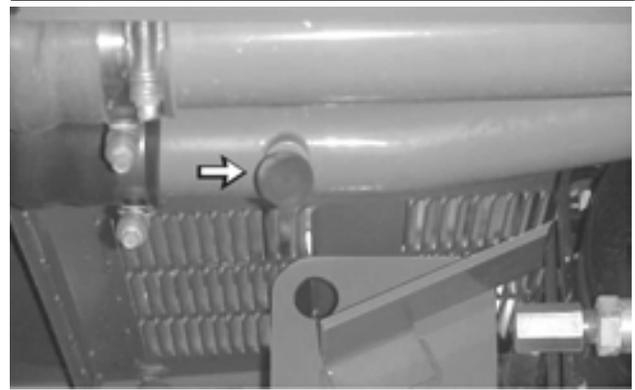


Illustration 106

g00809372

Refer to the 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 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.

i01892490

i01830361

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1395-554

NOTICE

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

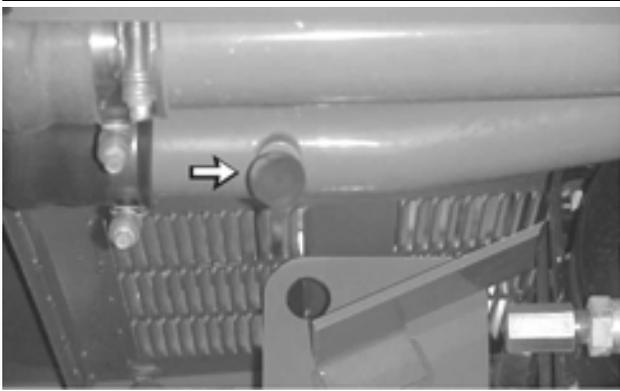


Illustration 107

g00809372

Refer to the 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.

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

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 cooling system pressure 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 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 Cat Extended Life Coolant (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 Cat Extender with Cat ELC. Failure to follow these recommendations could result in damage to the cooling systems components.

If ELC cooling system contamination occurs, refer to Operation and Maintenance, "Extended Life Coolant (ELC)" under the topic ELC Cooling System Contamination.

This machine was factory filled with Cat Extended Life 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 Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

If the coolant in the machine is changed to Extended Life Coolant from another type of coolant, see Special Publication, SEBU6250, "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. This 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.

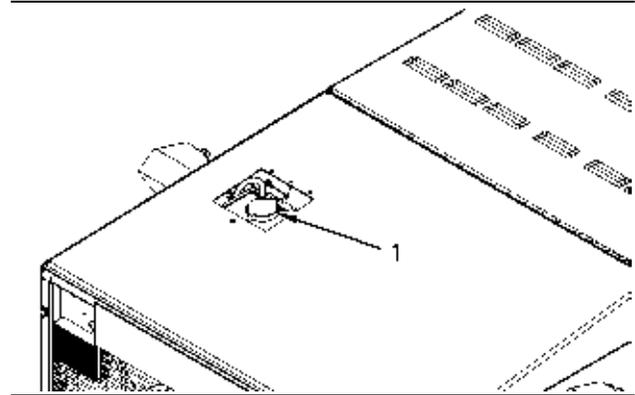


Illustration 108

g00934396

2. Open the cover. Slowly remove cooling system pressure cap (1) in order to relieve pressure.

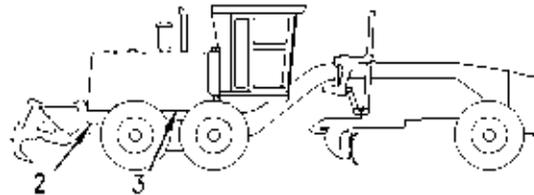


Illustration 109

g00779160

3. Open drain valve (3). Drain valve (3) is located on the water line at the lower right side of the engine. Open drain valve (2). Drain valve (2) is located under the left side of the radiator. Allow the coolant to drain into a suitable container.
4. Flush the cooling system with clean water until the draining water is transparent.
5. Close the drain valves.
6. Add the Extended Life Coolant. Refer to Operation and Maintenance Manual, "Capacities (Refill)".

Note: Make sure that cooling system pressure cap (1) is removed for Steps 7 through 8.

7. Start the engine and run the engine until the thermostat opens and the coolant level stabilizes.
8. Maintain the coolant level within 13 mm (.5 inch) of the bottom of the filler tube.
9. Install cooling system pressure cap (1). Close the cover.

10. Check the radiator for any external leaks. Check for air bubbles in the radiator.
11. Stop the engine.

i01830643

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-045; 1352-535; 1352-544-NL;
1352-544; 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 cooling system pressure 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 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, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

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

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

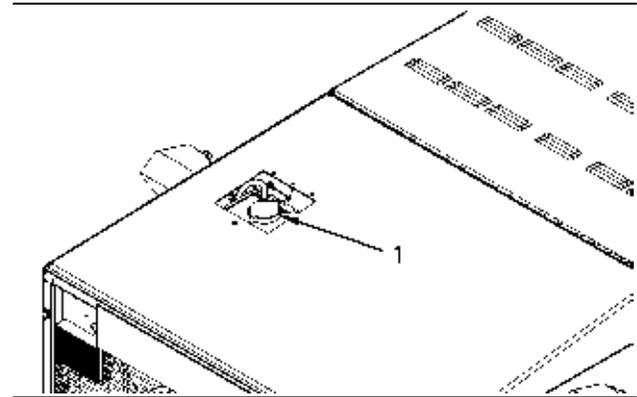


Illustration 110

g00934396

2. Open the cover. Remove cooling system pressure cap (1) slowly in order to relieve the pressure.
3. Drain some coolant from the radiator into a suitable container. This will allow space for additional cooling system coolant extender.
4. In order to add cooling system coolant extender, refer to the Special Publication, SEBU6250, "Extended Life Coolant (ELC)". Refer to the table for the correct amount of Caterpillar Extended Life Coolant (ELC) Extender that is needed to be added to the cooling system.
5. Install cooling system pressure cap (1). Close the cover.

i01889958

Cooling System Coolant Level - Check

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

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.

The sight gauge for the cooling system is located on the left side of the machine at the rear of the machine.

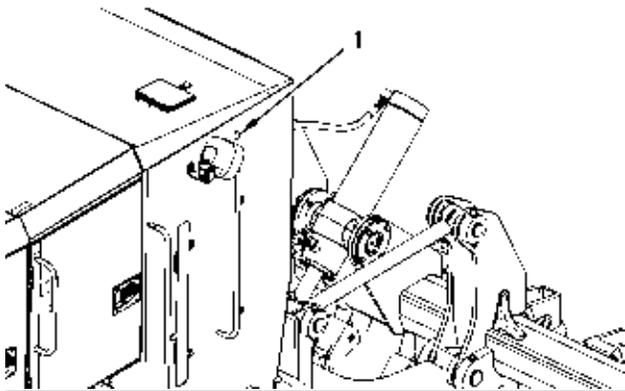


Illustration 111

g00934460

1. Maintain coolant level so that coolant is visible in sight gauge (1).

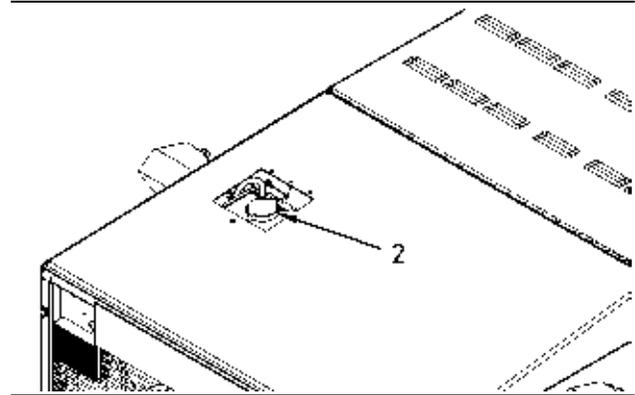


Illustration 112

g00936997

2. If necessary, add the appropriate coolant mixture. Open the cover. Remove filler cap (2) slowly in order to relieve pressure. Add coolant through the filler tube.
3. Install filler cap (2). Close the cover.

i01834310

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 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.

Cooling system pressure cap (1) is positioned in the left rear of the hood.

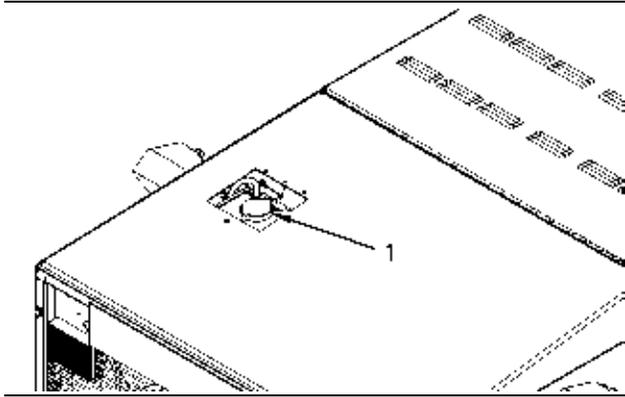


Illustration 113

g00934396

1. Open the cover. Remove pressure cap (1) slowly in order to relieve pressure.
2. 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.
3. Install the cap. Close the cover.

i00350379

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 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.

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

NOTICE

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

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

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

Former water temperature regulators may be used, if they meet test specifications and are not damaged or have excessive buildup or 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. Maintain the coolant level within 13 mm (.5 inch) of the bottom of the filler tube.

i01547904

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.

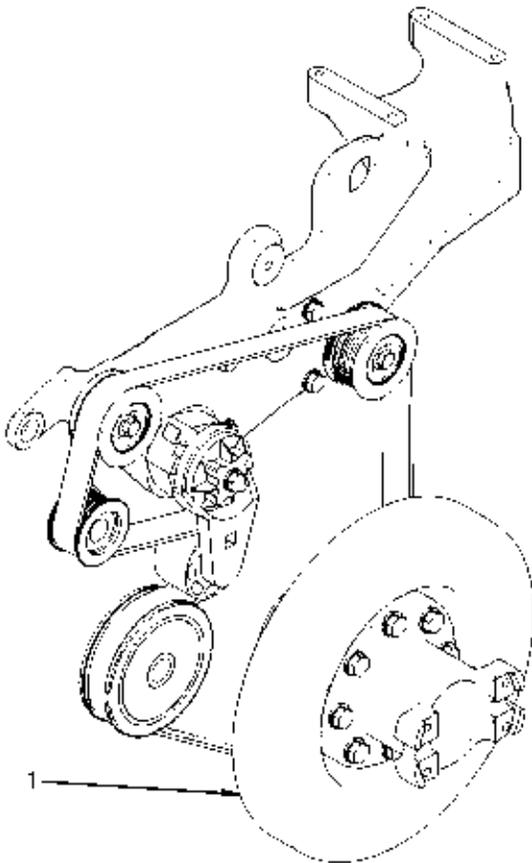


Illustration 114

g00807816

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, "Damper & Crankshaft Pulley" for the procedure to remove the damper and 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.

i01569254

Cutting Edges and End Bits - Inspect/Replace

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.

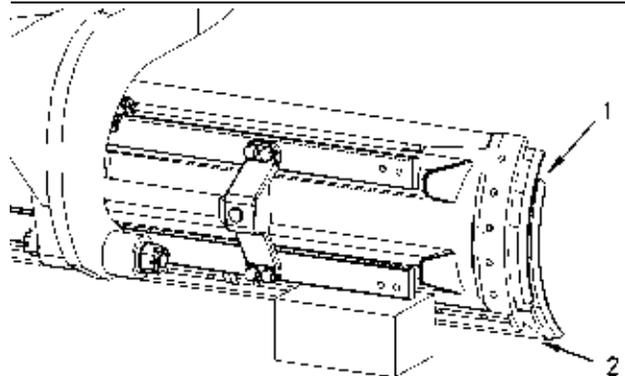


Illustration 115

g00811262

End bits (1) and/or cutting edges (2) may be damaged. End bits (1) and/or cutting edges (2) may be worn excessively. Replace the end bits (1) and/or the cutting edges (2), 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 end bits (1) and cutting edges (2) can be removed.
2. Remove end bits (1) and/or cutting edges (2).
3. Install new end bits (1) and/or new cutting edges (2).
4. Raise the blade and remove the blocks.

i02528905

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.

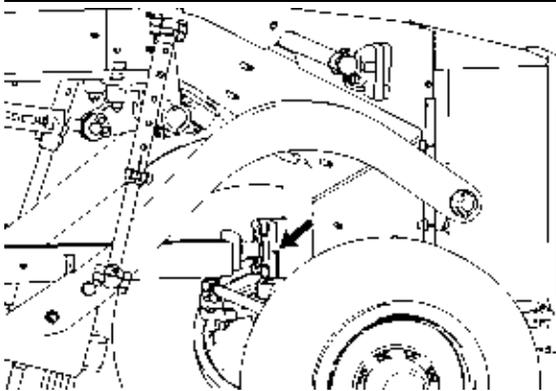


Illustration 116

g00949567

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

i02528988

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.

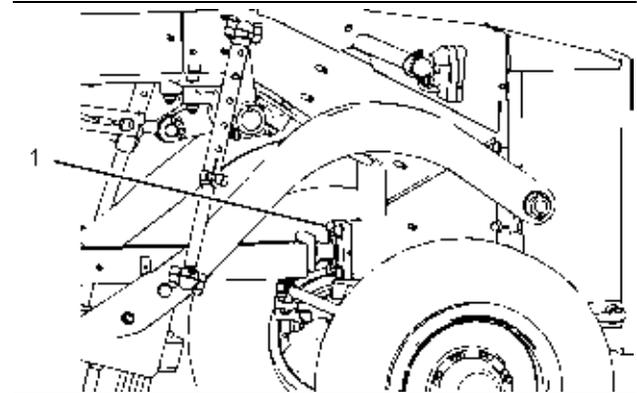


Illustration 117

g01265355

Measure the end play that is between ball (2) and cap (3). The end play should be 0.6 ± 0.2 mm ($.02 \pm .01$ 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.

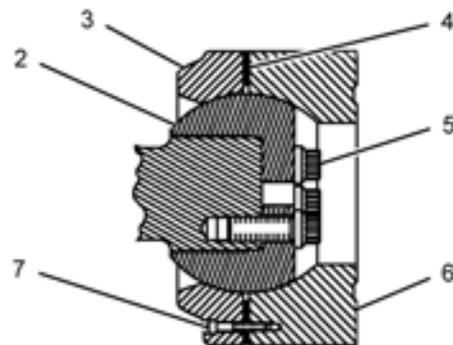


Illustration 118

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 ($.02 \pm .01$ 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).

i01631934

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.

Service the air cleaner filter element when the yellow piston on the engine air filter service indicator enters the red zone or the indicator reads 63.5 cm (25 inch) of water. Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator - Inspect".

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

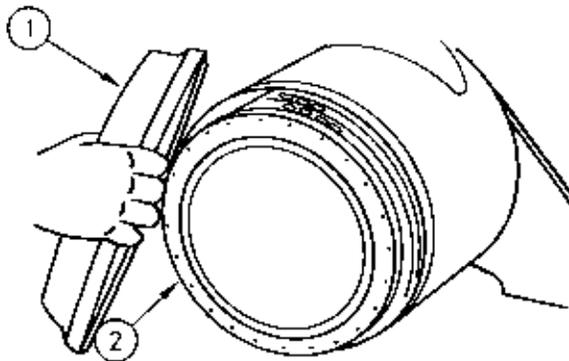


Illustration 119

g00102316

2. Remove cover (1) for the air filter housing .

3. Remove primary filter element (2) from the air filter housing.
4. Clean the inside of the air filter housing.
5. If the machine is equipped with a vacuator valve, clean the vacuator valve on the cover for the air filter housing.
6. Install a clean primary air filter element. Install the cover for the air filter housing.

Note: Refer to "Cleaning Primary Air Filter Elements".

7. Reset the engine air filter service indicator.
8. Close the access door.

If the yellow piston in the indicator moves into the red zone 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 piston remains in the red zone 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 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).

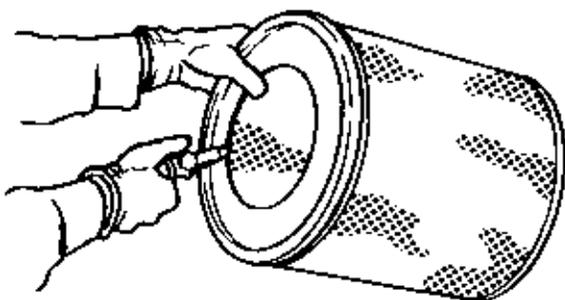


Illustration 120

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

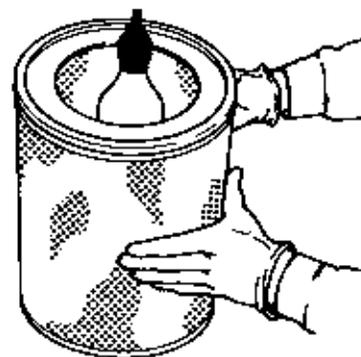


Illustration 121

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.

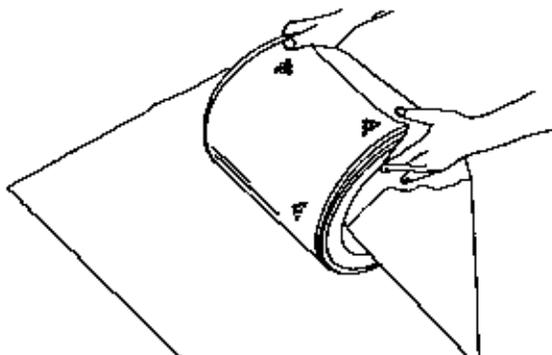


Illustration 122

g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An airflow 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.

i01562943

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.

Refer to the 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 one year.

1. Open the access door on the left side of the engine compartment. Remove the air cleaner cover and the primary element.

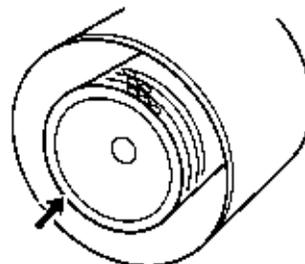


Illustration 123

g00039214

2. Remove the secondary element.
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 left side engine compartment door.

Note: When you replace the air filter element, you must replace the filter screen. Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator Screen - Check/Replace".

i01567539

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040; 7452-040-DJ;
7452-040-ENG

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

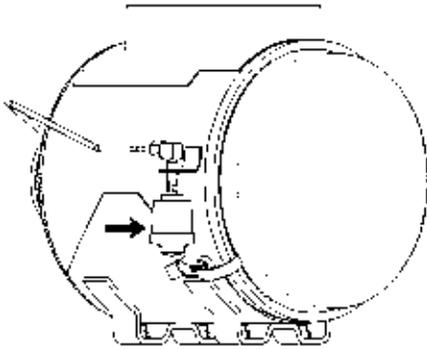


Illustration 124

g00814560

1. Start the engine.
2. Run the engine at high idle.
3. Open the left side engine compartment door.
4. If the yellow piston in the engine air filter service indicator enters the red zone, service the air cleaner.
5. Stop the engine.

Note: See the Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace". See the Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace".

Note: Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator - Inspect/Replace" in order to check an engine air filter service indicator that is faulty.

i01563032

Engine Air Filter Service Indicator - Inspect/Replace

SMCS Code: 7452-040; 7452-510

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

1. Open the access door.

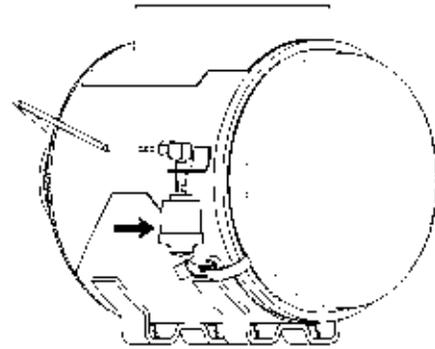


Illustration 125

g00814560

2. Stop the engine. Check the operation of the service indicator by pressing the reset button on the bottom of the service indicator. This should require three pushes or less of the reset button.
3. Next, check the movement of the yellow piston in the service indicator. Start the engine and accelerate the engine to high idle for a few seconds. After the accelerator control (pedal) is released, the yellow piston should remain at the highest position that was achieved during acceleration.

Note: The air filter indicator should be replaced during engine overhauls. The air filter indicator should also be replaced during replacement of any major engine component. Replace the air filter indicator at least one time per year.

4. If the indicator will not reset easily, replace the service indicator. If the yellow piston of the indicator will not latch at the highest vacuum that is attained, replace the service indicator. Tighten the indicator to a torque of 2 N·m (18 lb in). Excessive tightening force may crack the top of the indicator. For more information on the air filter indicator, refer to Video Tape, PEVN1736, "Caterpillar Air Filter Service Indicator".

Note: If you still believe that the service indicator is working improperly, refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator Screen - Check/Replace".

5. Close the left side engine compartment door.

i01507598

Engine Air Filter Service Indicator Screen - Check/Replace

SMCS Code: 7452-510-Z3; 7452-535-Z3

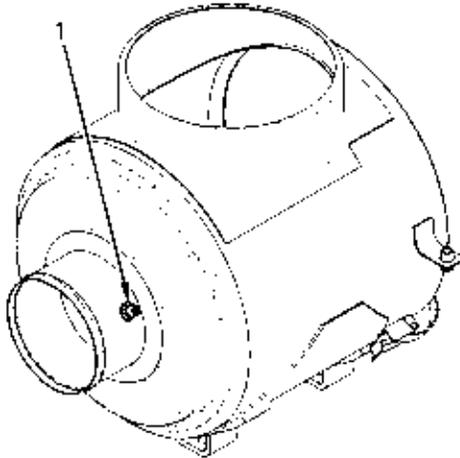


Illustration 126
Typical Example

g00782634

Check

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

1. Set an 8N-2694 Air Filter Service Indicator to indicate a restricted indicator screen.
2. Screw the indicator onto a 1/8 inch NPT pipe nipple.
3. Open the access door in order to service the indicator screen.
4. Screw the other end of the nipple into the fitting in the tube assembly. Normally, filter screen (1) is located in the tube assembly.
5. Depress the reset button on the 8N-2694 Air Filter Service Indicator.
6. If the indicator resets, filter screen (1) is not plugged. If the indicator does not reset, filter screen (1) is plugged. Filter screen (1) should be replaced.

Replace

1. Remove the air cleaner from the air cleaner housing. Removing the air cleaner from the air cleaner housing will provide access to the hole inside the tube assembly. Filter screen (1) is installed inside the tube assembly.
2. A 50.8 mm (2.00 inch) piece of 3.18 mm (0.125 inch) drill rod is needed in order to push filter screen (1) from the inside of the tube assembly to the outside.
3. After the plugged filter screen (1) has been removed, install a new filter screen (1) in the hole on the outside of the tube assembly. Use a piece of 6.4 mm (0.25 inch) drill rod to lightly seat the filter element in the bottom of the bore.

i01550089

Engine Air Precleaner - Clean

SMCS Code: 1055-070; 1055-070-DJ

NOTICE

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

The engine air precleaner is positioned on top of the engine compartment.

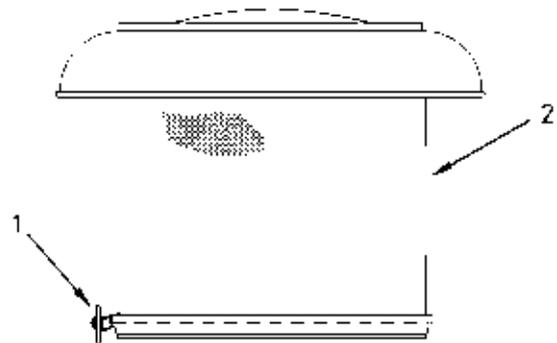


Illustration 127

g00805907

1. Loosen clamp (1) at the bottom of engine air precleaner (2).
2. Remove engine air precleaner (2) and inspect the opening for dirt and debris. Clean the tubes, if necessary.
3. Clean engine air precleaner (2) with pressure air or wash the engine air precleaner (2) in clean warm water.
4. Install engine air precleaner (2). Tighten clamp (1).

i01632265

Engine Crankcase Breather - Replace

SMCS Code: 1317-510

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

i01892889

Engine Oil Level - Check

SMCS Code: 1000-535-FLV; 1302-535-FLV;
1326-535-OC; 1326-535-FLV; 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 the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

1. Open the access door.
2. Clean the area around the dipstick and clean the area around the oil filler cap before you remove the dipstick and the oil filler cap.

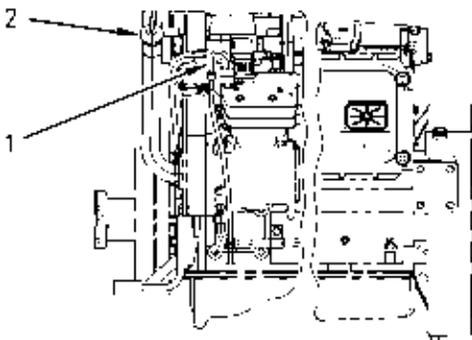


Illustration 128

g00985409

3. Before starting the engine, check the "ENGINE STOPPED" side of dipstick (1) while the engine is stopped. Maintain the oil level between the "ADD" mark and the "FULL" mark.
4. Remove oil filler cap (2). If necessary, add oil.

5. Clean the oil filler cap and install the oil filler cap.
6. Close the access door.

i01893113

Engine Oil Sample - Obtain

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

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

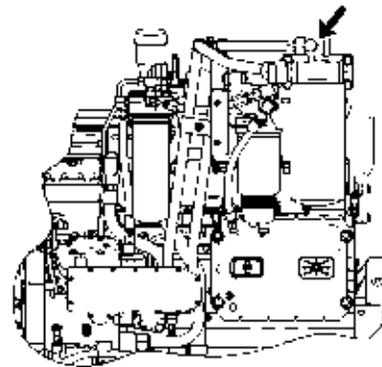


Illustration 129

g00985412

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

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

i01893190

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

This machine is equipped with an engine that meets EPA Tier 2, Euro Stage II, or MOC Step 2 emission regulations. A 500 hour engine oil change interval is available, provided that 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 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.

Cat oil filters are recommended.

Recommended multigrade oil types are listed in Table 9. Do not use single grade oils.

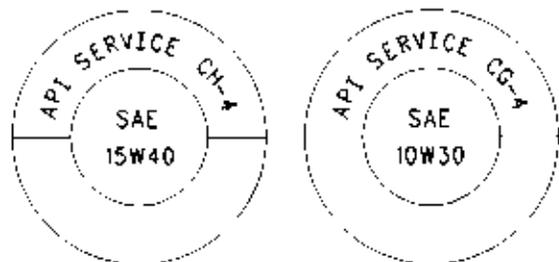


Illustration 130

g00753767

API Trademark

Commercial oils that are licensed by the American Petroleum Institute (API) bear this trademark. Commercial oils that do not bear this trademark are not licensed and these oils are not recommended. Oils that are not listed in Table 9 are not recommended.

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 9. 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 9

H-Series Emissions Motor Graders Engine Oil Change Interval⁽¹⁾

Operating Conditions

Multigrade Oil Type	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⁾
API CH-4 11.0 minimum TBN ⁽⁴⁾ Preferred	500 hr	500 hr	500 hr	250 hr ⁽⁶⁾
API CH-4 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⁾
API CF-4	250 hr ⁽⁵⁾	250 hr ⁽⁶⁾	250 hr ⁽⁶⁾	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. 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 9.

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.

References

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

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

Reference: Special Publication, PEDP7076, "Understanding S-O-S Services Test"

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 Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

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

Refer to the 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.

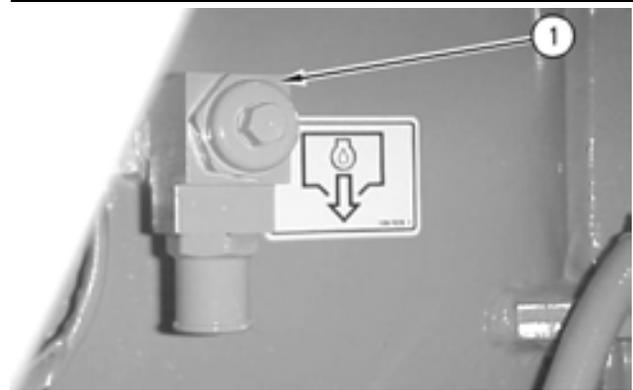


Illustration 131

i01900293

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

Note: Discard any drained fluids and discard any filter elements according to local regulations.

2. Close crankcase drain valve (1).
3. Open the left side access door in order to service the oil filter.

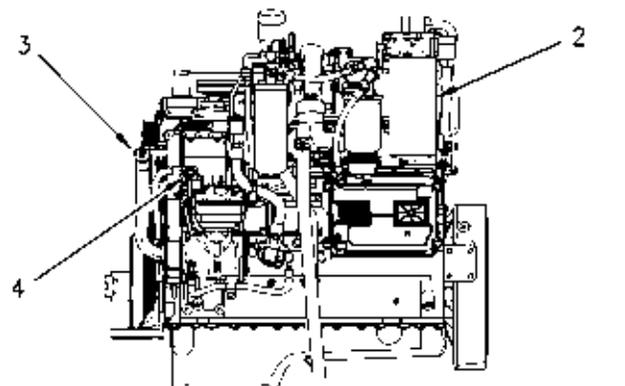


Illustration 132

g00985474

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. See 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 light coat of engine oil to the gasket of the new engine oil filter.
7. Install the new engine oil filter by hand. Additionally tighten the engine oil filter by 3/4 of a turn, after the gasket contacts the filter base.
8. Clean the area around dipstick (4) before you remove the dipstick. Clean the area around oil filler cap (3) before you remove the oil filler cap. Remove oil filler cap (3). Fill the crankcase with new oil. See Operation and Maintenance Manual, "Capacities (Refill)". Clean the filler cap and install the filler cap.
9. Start the engine and allow the oil to warm. Check the engine for leaks.
10. Stop the engine. Check the "ENGINE STOPPED" side of dipstick (4) while the engine is stopped. Maintain the oil level between the "ADD" mark and the "FULL" mark. If necessary, add oil.
11. Close the left side access door on the machine.

Engine Overheating

SMCS Code: 1000; 1350; 1353

If your machine experiences an engine overheating problem, do 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, "Cooling System Pressure Cap - Clean/Replace"
5. Operation and Maintenance Manual, "Radiator Core - Clean"
6. Operation and Maintenance Manual, "Cooling System Water Temperature Regulator - Replace"

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

i01900299

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 Service Indicator - Inspect"
2. Operation and Maintenance Manual, "Engine Air Precleaner - Clean"
3. Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace"
4. Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace"
5. Operation and Maintenance Manual, "Fuel Tank Water and Sediment - Drain"
6. Operation and Maintenance Manual, "Fuel Tank Cap and Strainer - Clean"
7. Operation and Maintenance Manual, "Fuel System Water Separator Element - Replace"

8. Operation and Maintenance Manual, "Fuel System
Secondary Filter - Replace"

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

i01498587

Engine Valve Lash - Check

SMCS Code: 1105-535

WARNING

Ensure that the engine can not 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 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.

NOTICE

Do not use the yoke that comes out of the front of the engine in order to turn over the engine. Damage to the crankshaft vibration damper can occur.

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.

i01827363

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.
2. Remove both of the covers.

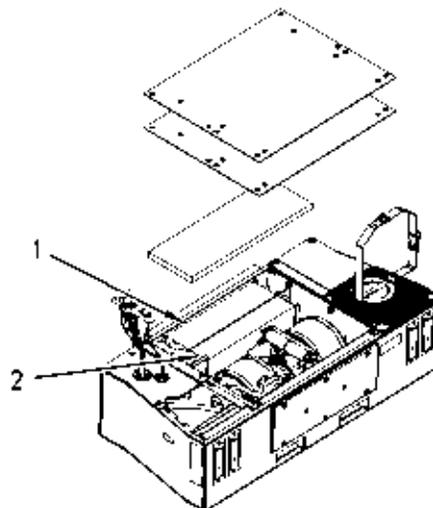


Illustration 133

g00931904

3. Clean evaporator coil (1) and clean heater coil (2).
Replace both coils.
4. Replace both of the covers and replace 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.

i01893215

Final Drive Preload - Check

SMCS Code: 4050-535-ZP

Table 10

Part Number	Required Tools	
	Description	Quantity
6V - 4074	Wrench for 120H	1
	Wrench for 135H	
9U - 5015	Torque Wrench Gp (3/4 Inch Drive)	1

Table 11

Bearing Preload for the Final Drive	
Sales Model	Final Torque
120H	102 N·m (75 lb ft)
135H	

1. Park the machine on a level surface.
2. Refer to the Operation and Maintenance Manual, "Jacking Locations" for the proper lifting points. Support the machine so that the rear tires are off the ground. The machine must be in a stable position in order to be able to turn the rear tires.
3. Unlock the differential.
4. Stop the engine.
5. Drain the oil below the level of the outer cover.

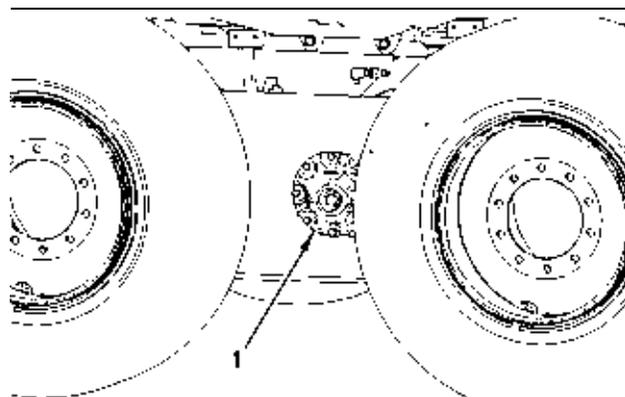


Illustration 134

g00949715

6. Remove outer cover (1).

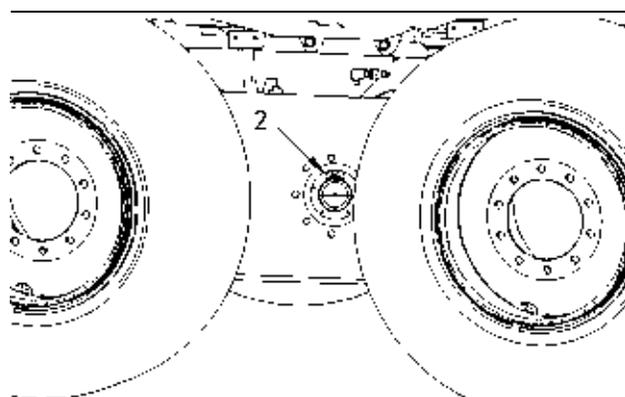


Illustration 135

g00949716

7. Remove lock (2).

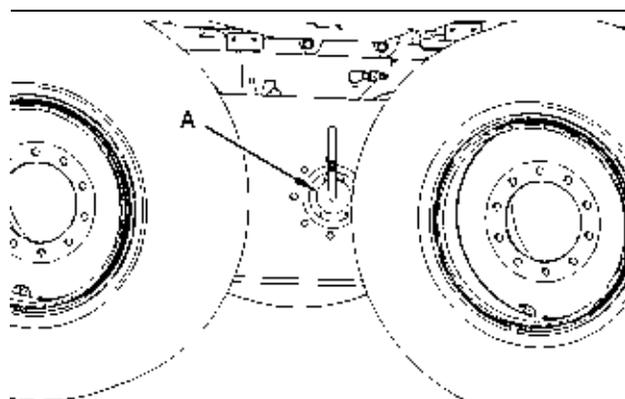


Illustration 136

g00985487

8. Install the wrench for your machine to the appropriate torque wrench.
9. Check the torque. Refer to Table 11.
10. Refer to the adjustment procedure in the Power Train Systems Operation, Testing and Adjusting, "Final Drive Bearings - Adjust" if the torque is incorrect.

i02573704

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: See Operation and Maintenance Manual, "Capacities (Refill)" for the capacity of the fuel tank for your machine.

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

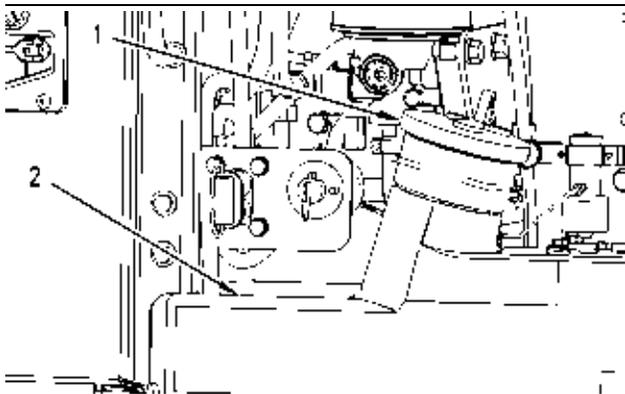


Illustration 137

g00933829

1. Clean filler cap (1) and the surrounding area.
2. Remove filler cap (1).
3. Fill fuel tank (2) with fuel.

4. Install filler cap (1).

Note: Prime the fuel system. See 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.

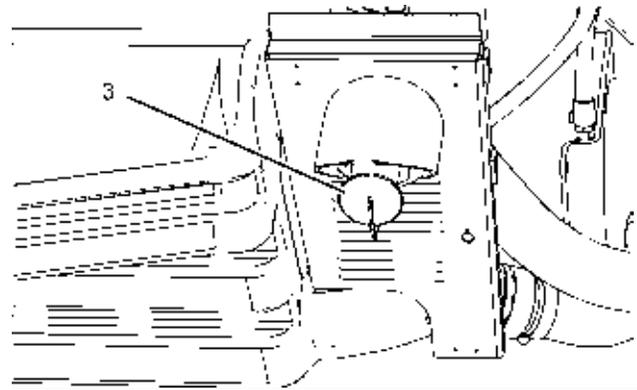


Illustration 138

g01288825

Typical example

1. Park the machine on a level surface.
2. Remove dust cover (3), if equipped.

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. See Operation and Maintenance Manual, "Fuel System - Prime" for more information.

i01893653

i01892756

Fuel System - Prime

SMCS Code: 1250-548; 1258-548

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

The fuel system is primed in order to fill the fuel filter. The fuel system is also primed in order to purge trapped air.

The fuel priming pump is located on the top of the water separator on the right side of the machine. The fuel priming is automatically controlled by the engine ECM.

1. Turn the start switch key to the ON position in order to fill the filter element with fuel.

Note: The fuel system should be primed within two minutes. If the time was more than two minutes, change the filter element and repeat the priming procedures.

2. Start the engine. If the engine starts but the engine runs rough, allow the engine to run at low idle. Continue to run the engine at low idle until the engine runs smoothly.
3. Stop the engine.

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

S/N: CBC1-Up

S/N: CAF1-Up

S/N: AMX1-Up

S/N: ALZ1-Up

NOTICE

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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

1. Open the access door.

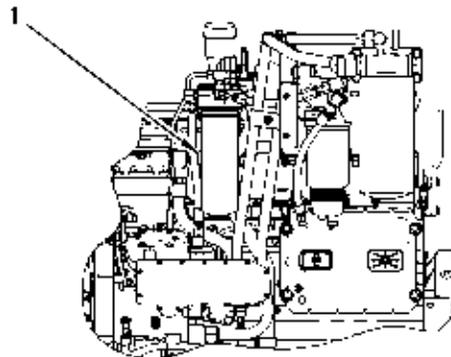


Illustration 139

g00985199

2. Remove fuel filter (1).

3. Drain the fuel from fuel filter (1) into a suitable container.

Note: Discard any drained fluids according to local regulations.

4. Clean the mounting base for the fuel filter. Make sure that you remove all of the old seal.
5. Coat the seal of the new fuel filter with clean diesel fuel.
6. Install the new fuel filter by hand. Tighten the new fuel filter until the seal contacts the mounting base. Then tighten the new fuel filter by an additional 3/4 of a turn.

Use the rotation index marks on the new fuel filter as a guide for tightening the filter. These rotation index marks are spaced at intervals of 1/4 turn.

7. Close the access door.

i01892803

Fuel System Water Separator - Drain

SMCS Code: 1263-543

S/N: CBC1-Up

S/N: CAF1-Up

S/N: AMX1-Up

S/N: ALZ1-Up

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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

1. Open the access door.

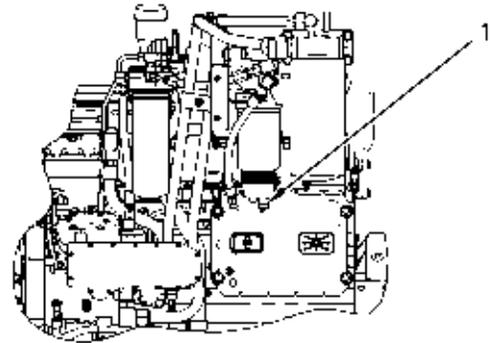


Illustration 140

g00985249

2. Open drain (1) and allow the water and sediment to drain into a suitable container.
3. Close drain (1).
4. Close the access door.

i01892728

Fuel System 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

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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

1. Open the access door.

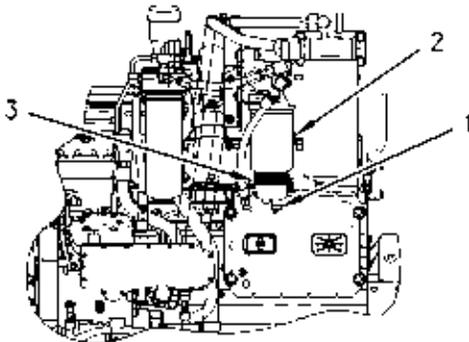


Illustration 141

g00985190

2. In order to drain filter (2), open drain valve (1) on water separator bowl (3). The water separator bowl is under filter (2). Catch the fuel in a suitable container.
3. Remove filter (2) and water separator bowl (3).
4. Remove water separator bowl (3) from the filter element (2).
5. Wash water separator bowl (3) in a clean nonflammable solvent. Use pressure air to dry water separator bowl (3).
6. Install the clean water separator bowl onto a new filter element.
7. Clean the filter housing base.
8. Coat the seal of the new filter element with clean diesel fuel.

9. Install the filter element onto the filter housing.
10. Close the access door.

i01863218

Fuel Tank Cap and Strainer - Clean

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

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

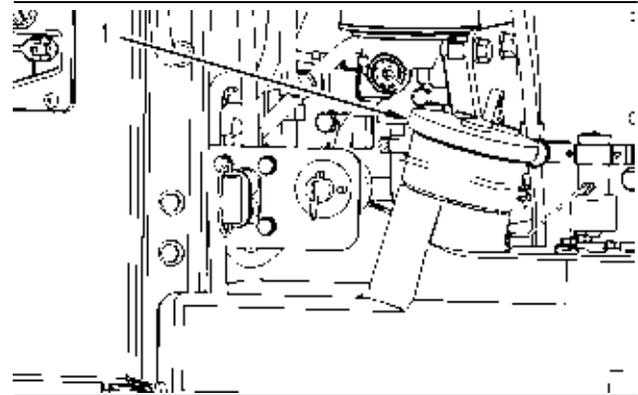


Illustration 142

g00949816

1. Remove fuel tank cap (1) and disassemble the fuel tank cap.
2. 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.
3. Replace the elements on the fuel tank cap.
4. Remove the strainer from the filler opening.
5. Wash the strainer in clean nonflammable solvent.
6. Install the strainer.
7. Install fuel tank cap (1).

i01830349

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

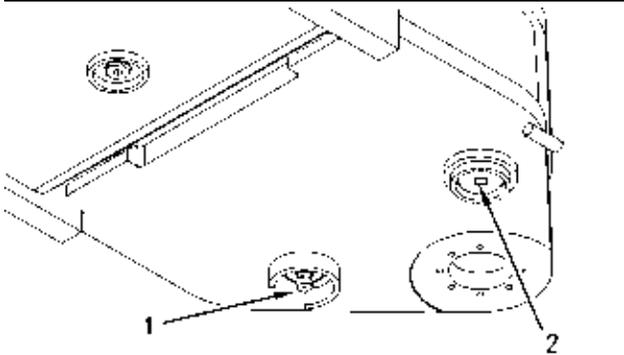


Illustration 143

g00934388

Drain valve (1) is located under the rear frame on the left side of the machine.

1. Open drain valve (1). Drain the water and sediment into a suitable container.

Note: Discard any drained fluids according to local regulations.

2. Close the drain valve.

Note: If you need to flush the fuel sump, use drain valve (2) that is located under the rear frame on the right side of the machine.

i01863227

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.

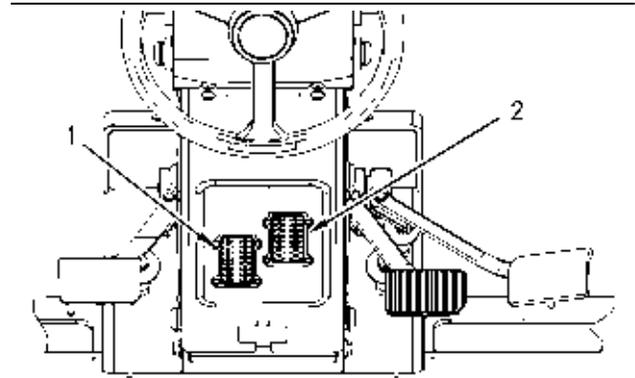


Illustration 144

g00935115

- (1) Fuse panel on the steering console (unswitched power)
- (2) Fuse panel on the steering console (switched power)

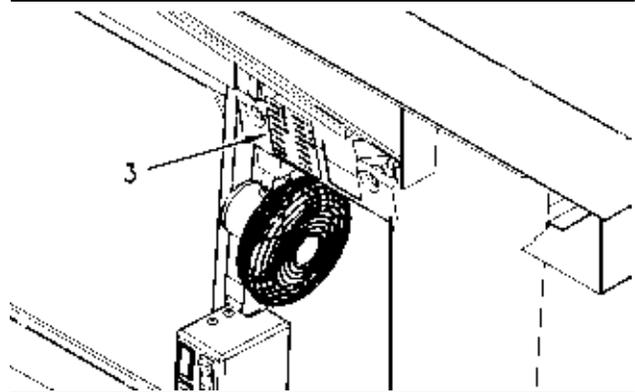


Illustration 145

g00935093

- (3) Overhead fuse panel

There are three fuse panels. Two fuse panels are positioned in the base of the steering column. The other fuse panel is near the top of the cab at the right side of the operator.

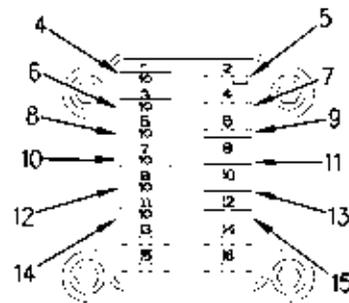


Illustration 146

g00778429

Fuse panel on the steering console (unswitched power)



Tail Lights and Panel Lights (4) (If Equipped) – 10 amp

-  **Secondary Steering (Test) (5) – 10 amp**
-  **Key Switch (6) – 10 amp**
-  **Auxiliary Power Port (7) (If Equipped) – 10 amp**
-  **Horn (8) – 10 amp**
-  **Turn Signals and Hazard Lamps (9) (If Equipped) – 10 amp**
-  **Lighter (10) – 10 amp**
-  **Communication Radio (11) (If Equipped) – 15 amp**
- Stop Lamps (12) – 10 amp**
-  **Radio (13) (If Equipped) – 10 amp**
-  **Dome Lamp (14) – 10 amp**
-  **Product Link (15) – 10 amp**

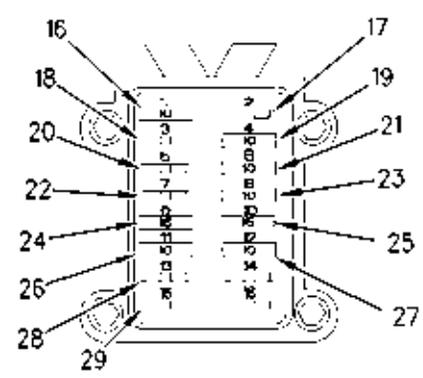


Illustration 147 g00778430
Fuse panel on the steering console (switched power)

-  **Digital Electrical Monitoring System (16) – 10 amp**
-  **Blade Floodlights (17) (If Equipped) – 10 amp**
-  **Rear Floodlights (18) (If Equipped) – 10 amp**
-  **All Wheel Drive (19) (If Equipped) – 10 amp**
-  **Air Dryer (20) – 10 amp**
-  **Differential Lock (21) – 10 amp**
-  **Heating and Air Conditioning System (22) – 15 amp**
-  **Blade Cushion (If Equipped) and Centershift Lock Pin (23) – 10 amp**
-  **Transmission Control (24) – 15 amp**
-  **Front Floodlights (25) (If Equipped) – 15 amp**

-  **Parking Brake (26)** – 10 amp
-  **Fuel System (27)** – 10 amp
-  **Secondary Steering (28) (If Equipped)** – 10 amp
-  **Beacon (29) (If Equipped)** – 10 amp

-  **Rear Window Defroster (36)** – 10 amp
-  **Exterior Heated Mirrors (37) (If Equipped)** – 10 amp

i01902074

Hydraulic System Oil - Change

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

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Note: If the hydraulic oil is not being monitored by the Caterpillar S-O-S Oil Analysis program or an equivalent oil sampling program, change the hydraulic 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 hydraulic system oil tank is positioned behind the operator station at the center of the machine.

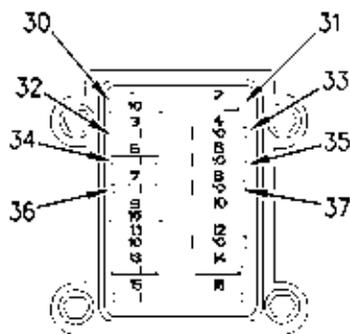


Illustration 148

g00778432

Overhead fuse panel

-  **Front Windshield Wiper/Washer (30)** – 15 amp
-  **Auxiliary Backup Lights (31) (If Equipped)** – 10 amp
-  **Rear Window Wiper and Washer (32)** – 10 amp
-  **Snow Wing Light (33) (If Equipped)** – 10 amp
-  **Front Windshield Defroster (34)** – 10 amp
-  **Moldboard Lights (35) (If Equipped)** – 10 amp

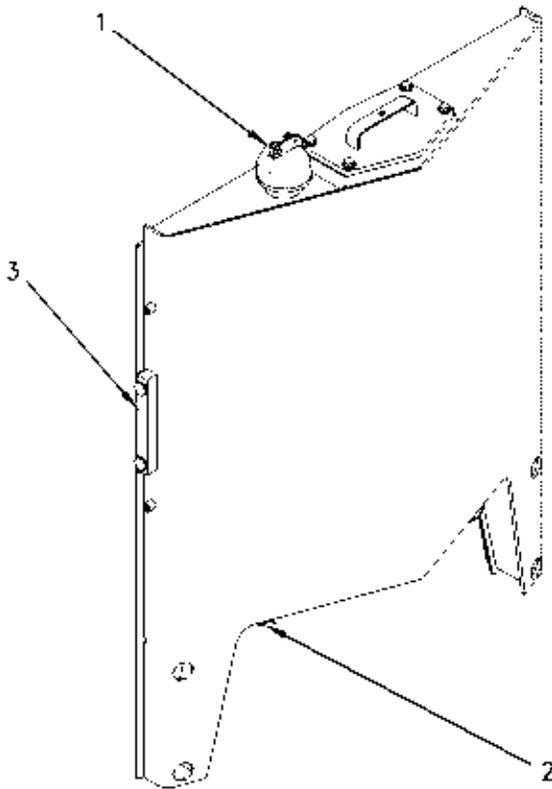


Illustration 149

g00932315

1. Slowly remove hydraulic oil filler cap (1).
2. Drain plug (2) is positioned in the bottom of the hydraulic oil tank. Remove the drain plug. Drain the oil into a suitable container.
3. Replace the filter for the hydraulic system oil. See Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace" in the Maintenance Interval Schedule.
4. 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.
5. Clean the drain plug and install the drain plug.
6. Install the filler screen.
7. Fill the hydraulic system oil tank. See Operation and Maintenance Manual, "Capacities (Refill)".
8. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket.

9. Install the hydraulic oil filler cap.

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

11. Maintain the oil level above the "MIN" mark on sight gauge (3). 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.

12. Stop the engine.

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

i01827858

Hydraulic System Oil Filter - Replace

SMCS Code: 5056-510-FI; 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 Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

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.

i01827874

Clean the area around the filler cap before you remove the filler cap. Clean the area around the filter cover before you remove the filter cover.

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.

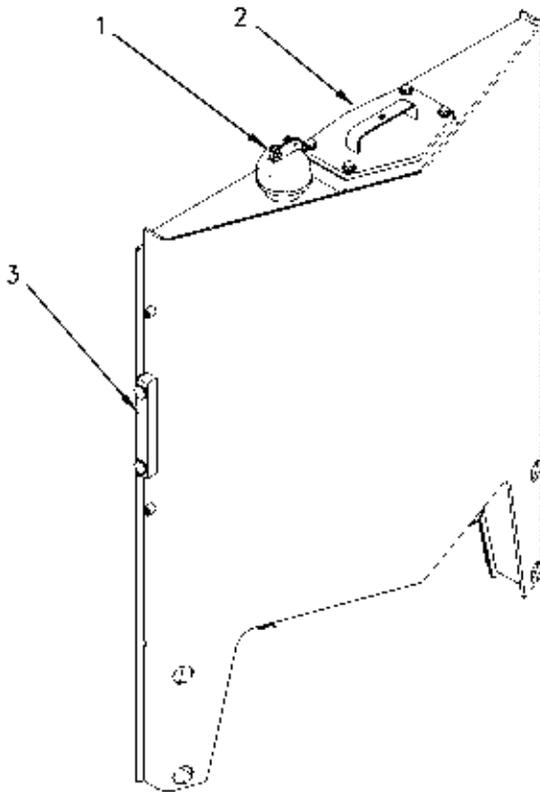


Illustration 150

g00932333

1. Slowly remove hydraulic oil filler cap (1) in order to relieve the tank pressure.
2. Remove filter cover (2) from the hydraulic system oil tank.
3. Inspect the seal for the cover. If necessary, replace the seal.
4. Remove the filter element and discard the filter element.
5. Install a new filter element.
6. Install cover (2).
7. Maintain the hydraulic oil level above the "MIN" mark on sight gauge (3).
8. Inspect the filler cap gasket. If the filler cap gasket is damaged, replace the filler cap gasket. Install the oil filler cap.

i01886347

Hydraulic System Oil Sample - Obtain

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

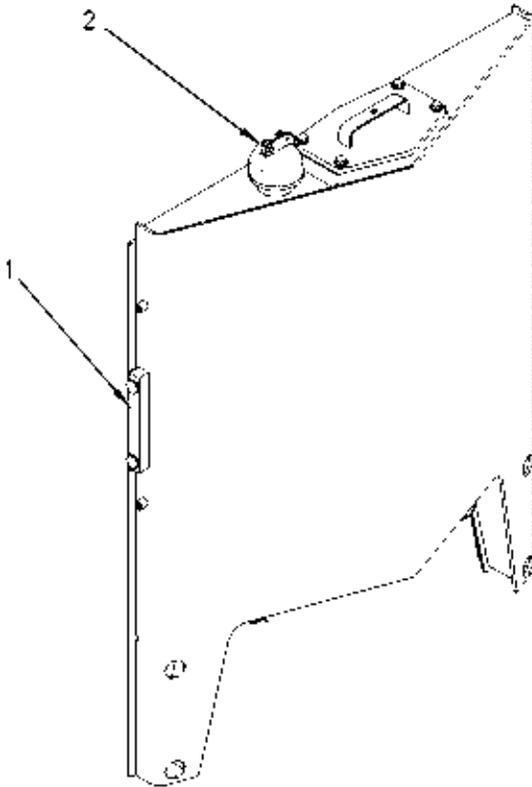


Illustration 151

g00932336

1. Maintain the oil level above the "MIN" mark on sight gauge (1).
2. If necessary, add oil. Slowly loosen the filler cap in order to relieve the tank pressure. Remove filler cap (2). Add oil through the filler tube.
3. Clean the filler cap and install the filler cap.

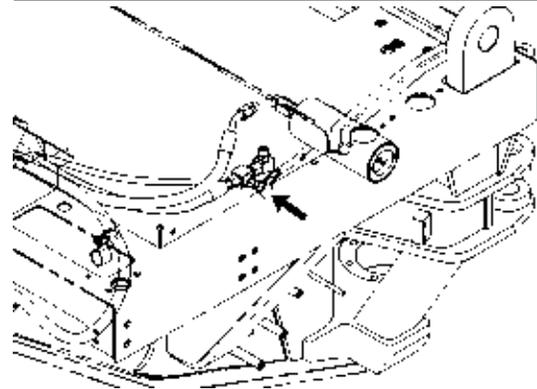


Illustration 152

g00979019

The sampling valve for the hydraulic oil is located underneath the operator's compartment on the left side of the machine.

Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the 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.

i01886332

Kingpin Bearings - Lubricate

SMCS Code: 4314-086

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

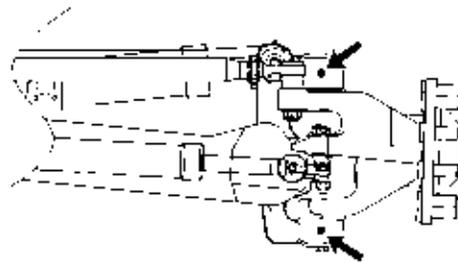


Illustration 153

g00979000

The kingpins are located to the inside of the front wheels. Each front wheel has a kingpin. Each kingpin has two fittings. In order to lubricate the kingpin bearings, use 183-3424 Grease Cartridge to apply lubricant to the fittings.

i01830090

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 the ground. Stop the engine.

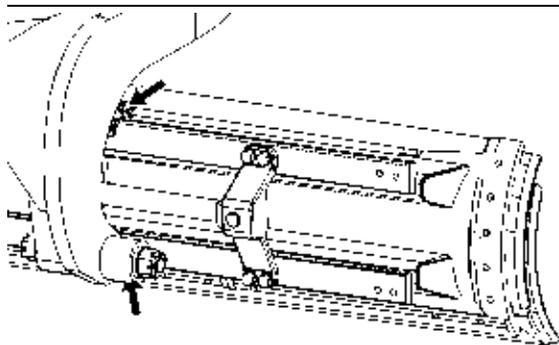


Illustration 154

g00934204

2. Remove the top retaining plates and the bottom retaining plates. Visually inspect the wear strips. If the wear strips are worn close to the moldboard, replace the wear strips.
 3. Install shims between the moldboard rail and the wear strips at the location of minimum clearance. Add shims in order to provide a clearance of 0.13 mm (0.005 inch) to 0.89 mm (0.035 inch).
- Note:** The shims that are required should be divided evenly between the upper wear strips and the lower wear strips.
4. Install the top retaining plate and install the bottom retaining plate.
 5. Start the engine. Raise the blade, so that the blade will clear the ground. Sideshift the blade through the entire limit of travel. Measure the clearance between the wear strips and the blade. This will allow you to determine the location of the minimum clearance.

6. Stop the engine.

7. Remove the top retaining plate from the center wear strip bracket. Visually inspect the wear strips. If the wear strips are worn close to the moldboard, replace the wear strips.
8. Install shims between the moldboard rail and the wear strips at the location of minimum clearance. Add shims in order to provide a clearance of 0.13 mm (0.005 inch) to 0.89 mm (0.035 inch).
9. Install the top retaining plate for the center wear strip bracket.

i02106227

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

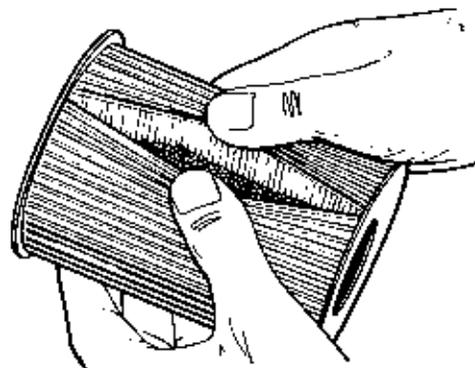


Illustration 155

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.

i01863714

Parking Brake - Drain

SMCS Code: 4267-543-M&S

WARNING

Sudden movement of the machine or release of air under pressure can cause injury to persons on or near the machine. To prevent possible injury, perform the procedure that follows before testing and adjusting the air system and brakes.

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

1. Move the machine to a smooth horizontal location. Move away from operating machines and move away from personnel. Lower all implements to the ground.
2. Install the wheel lean locking bolt in the front axle. Install the frame lock pin. Engage the parking brake and stop the engine.
3. Permit only one operator on the machine. Keep all other personnel away from the machine. Also, all personnel should be visible to the operator.
4. Place chocks in front of the wheels and behind the wheels.

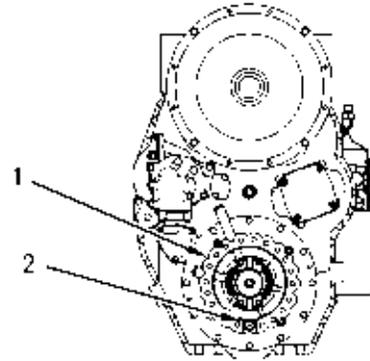


Illustration 156

g00950101

- (1) Parking brake
- (2) Outer plug

1. Remove outer plug (2) and an inner plug (not shown) behind outer plug (2).
2. Start the engine. Make sure that the air system pressure reaches 965 ± 34 kPa (140 ± 5 psi).

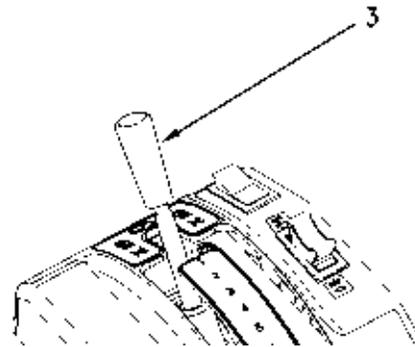


Illustration 157

g00950104

- (3) Transmission control (lever)

3. Make sure that the service brake control (pedal) is down. Move lever (3) from PARKING BRAKE ENGAGED position to the NEUTRAL position and back to the PARKING BRAKE ENGAGED position.
4. Continue to move lever (3) from PARKING BRAKE ENGAGED position to the NEUTRAL position and back to the PARKING BRAKE ENGAGED position. This will drain the moisture from parking brake (1).
5. Stop the engine and allow the air to escape from the system. Replace the inner plug and outer plug (2).

i01863242

i01827882

Radiator - Clean

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

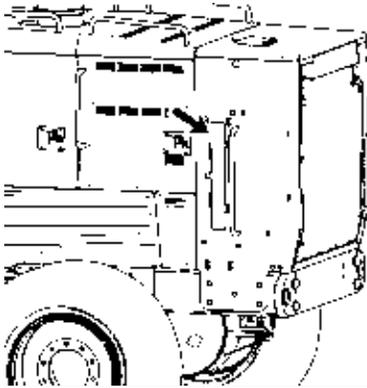


Illustration 158

g00949836

1. Remove the access cover on the left rear of the machine. Remove the access cover on the right rear of the machine.
2. Remove any dirt from the area around the radiator. Remove any debris from the area around the radiator.
3. Install 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.

Refrigerant Dryer - Replace

SMCS Code: 7322-510

WARNING

Personal injury can result from contact with refrigerant.

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

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

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

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

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

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

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

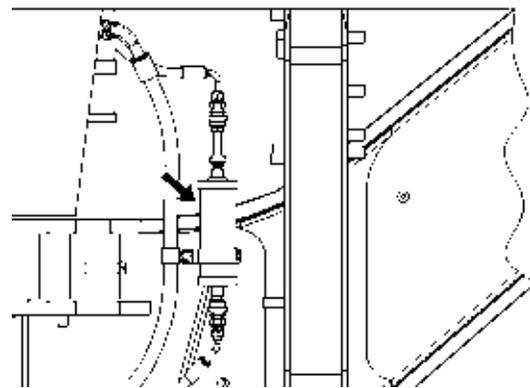


Illustration 159

g00812585

The in-line refrigerant dryer is located under the cab on the right side.

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

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

i01863759

Ripper Cylinder Bearings - Lubricate

SMCS Code: 5352-086; 6325-086

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

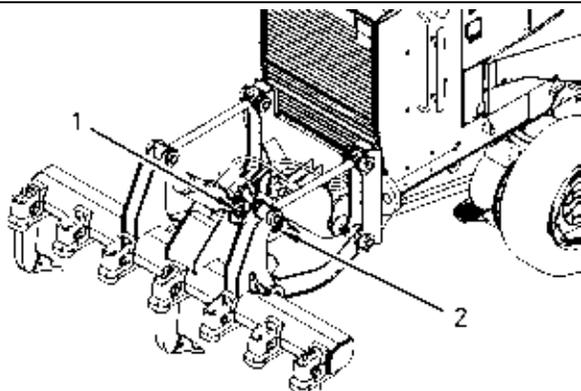


Illustration 160

g00853256

The trunnion has one fitting (1) on each side. Use 183-3424 Grease Cartridge to apply lubricant to each fitting (1).

One fitting (2) is mounted on the rod end of the ripper cylinder. Use 183-3424 Grease Cartridge to apply lubricant to fitting (2).

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 161

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.

i01831248

i01863262

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.

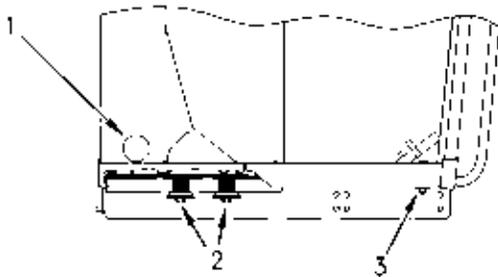


Illustration 162

g00935191

1. There are two retaining pins for the ROPS. One retaining pin is located on each side of the cab. Remove the access covers (1) from the retaining pin locations.
2. Inspect the retaining pins. Inspect the keeper bolt. Replace any damaged keeper bolts or any missing keeper bolts with only original equipment parts.
3. Install the access covers.
4. Inspect the ROPS for any loose bolts or any damaged bolts. Replace any damaged bolts or any missing bolts with only the original equipment parts. Tighten the four rear bolts (2) to a torque of 430 ± 60 N·m (320 ± 45 lb ft). Tighten the nuts (3) for the two front bolts to a torque of 240 ± 40 N·m (180 ± 30 lb ft).

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

5. 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.

Scarifier Lift Link Socket - Lubricate

SMCS Code: 6162-086-LNK

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

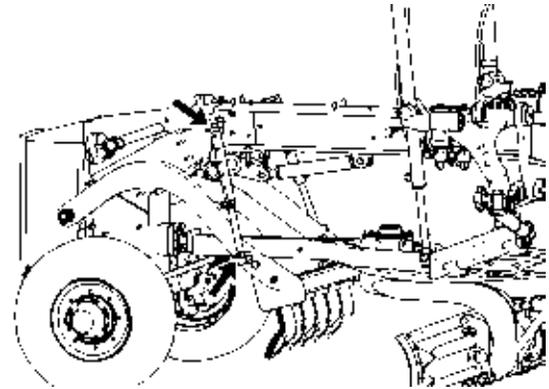


Illustration 163

g00949846

The machine has two fittings on each side.

In order to lubricate the scarifier lift link socket, use 183-3424 Grease Cartridge (5% Molybdenum Disulfide) to apply lubricant through the fittings.

i01863797

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.

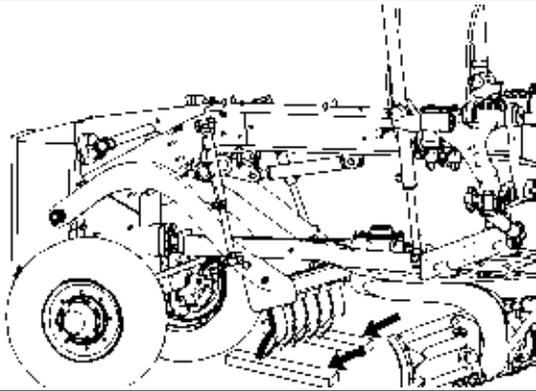


Illustration 164

g00950158

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.

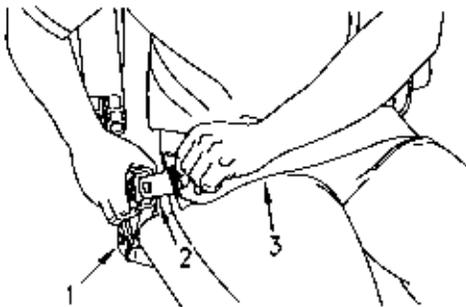


Illustration 165

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.

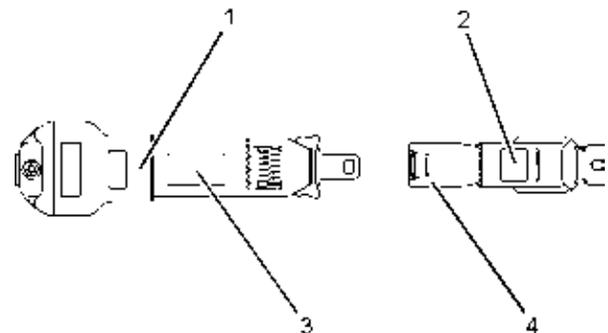


Illustration 166

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.

i01886419

Steering Accumulator - Check (If Equipped)

SMCS Code: 4331-535

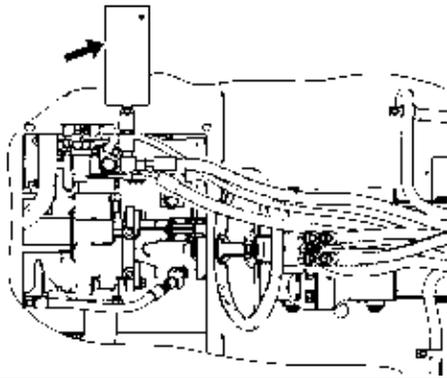


Illustration 167

g00938287

The steering accumulator is located under the operator's platform on the left side of the machine.

Steer the machine to the left and steer the machine to the right. If the movement of the steering system is abnormal, check the nitrogen precharge. Operate the hydraulic equipment. If the movement of the steering is abnormal, check the nitrogen precharge. If necessary, add nitrogen. Consult your Caterpillar dealer for the correct checking procedure, the correct filling procedure and the recommended pressure.

i02402581

Tandem Breather - Clean/Replace

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

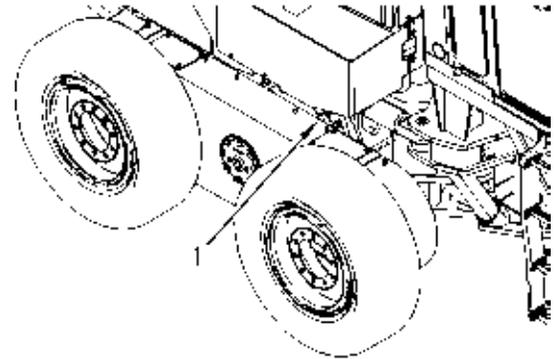


Illustration 168

g00933727

Typical example

Note: The tandem breather for your machine may be located closer to the front of the tandem housing.

1. Remove breathers (1) from both tandems.
2. Wash breathers (1) in clean, nonflammable solvent.
3. Use pressure air to dry breathers (1).
4. Install breathers (1) in both tandems.

Note: Replace breathers (1) if the breathers are damaged.

i01829602

Tandem Drive Oil - Change

SMCS Code: 4071-510

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Clean the surface area around the oil check plug before you check the oil level.

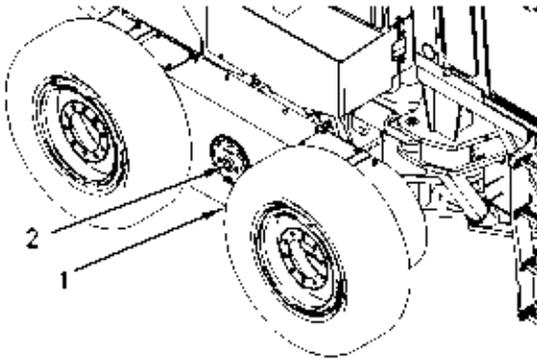


Illustration 169

g00933690

1. Remove drain plug (1). Remove oil check plug (2). Allow the oil to drain into a suitable container.
2. 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 (1) and install the drain plug (1).
4. Open the cover on the top of the tandem drive housing. Fill the tandem drive housing with new oil. See Operation and Maintenance Manual, "Capacities (Refill)".
5. Close the cover on the top of the tandem drive housing.
6. Clean the oil check plug (2) and install the oil check plug (2).
7. Start the engine. Operate the machine for a few minutes. Check the tandem drive housing for leaks.
8. Stop the engine. Remove the oil check plug (2). Check the oil level. Maintain the oil level to the bottom of the opening for the oil check plug (2). If necessary, add oil. Install the oil check plug (2).
9. Repeat Step 1 through Step 8 for the other side.

i01829619

Tandem Drive Oil Level - Check

SMCS Code: 4071-535

Clean the surface area around the oil check plug before you check the oil level.

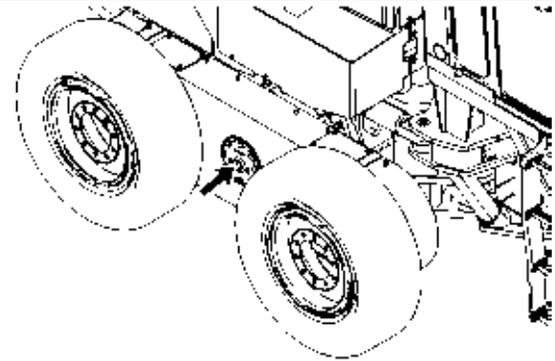


Illustration 170

g00933714

1. Remove the oil check plug.
2. Maintain the oil level at the bottom of the opening for the oil check plug. If necessary, add oil. Open the cover on the top of the tandem drive housing and add oil. Close the cover on the top of the tandem drive housing.
3. Install the oil check plug.

i01958878

Tandem Drive Oil Sample - Obtain

SMCS Code: 4071-008

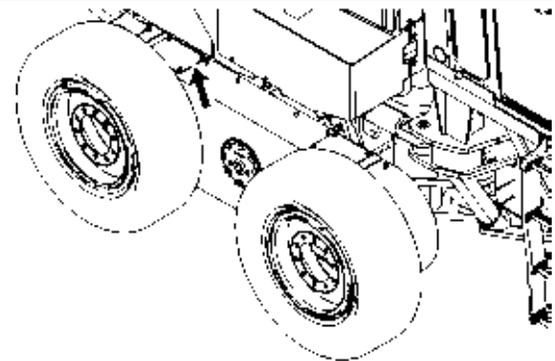


Illustration 171

g00933718

The oil sample for the tandem drive should be taken from the housing by removing one of the plates that are located on the top of the tandem housing.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S-O-S 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-PX; 4203-535-AI

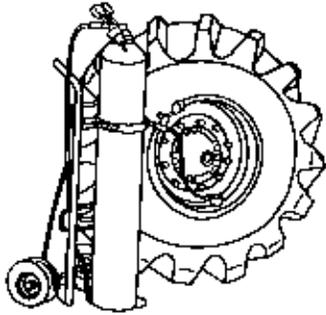


Illustration 172

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"

i01895796

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 Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

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

Clean the area around the drain plug for the differential and the transmission before removing the drain plug. Clean the area around the dipstick/fill cap before removing the dipstick/fill cap.

Operate the engine until the transmission and differential oil is 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 and 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.

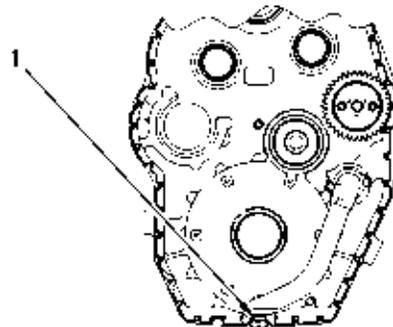


Illustration 173

g00986407

1. Remove drain plug (1) for the differential and transmission case. Drain the oil into a suitable container.

i01893231

2. Change the filter element and clean the screens. See the Operation and Maintenance Manual, "Transmission and Differential Oil Filter and Screens - Replace/Clean".
3. Clean the drain plug and install the drain plug for the differential and transmission case.

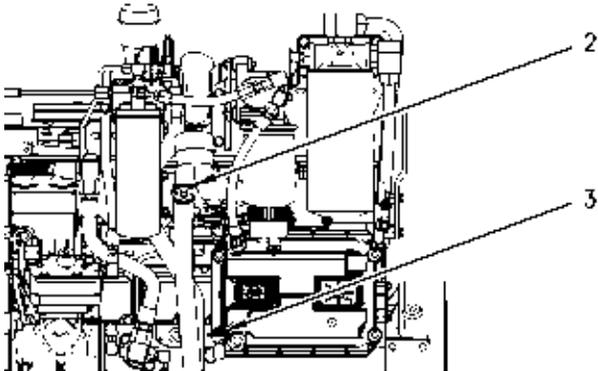


Illustration 174

g00986408

4. Open the access door.
5. Fill the transmission and differential case with oil through filler tube (2). See Operation and Maintenance Manual, "Capacities (Refill)".
6. Remove transmission breather (3) 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 (pedal). Slowly operate the transmission control lever in order to circulate the oil.
9. With the engine at low idle, maintain the oil level between the marks on the dipstick. If necessary, add oil through the filler tube.
10. Stop the engine.
11. Close the access door.

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 Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

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

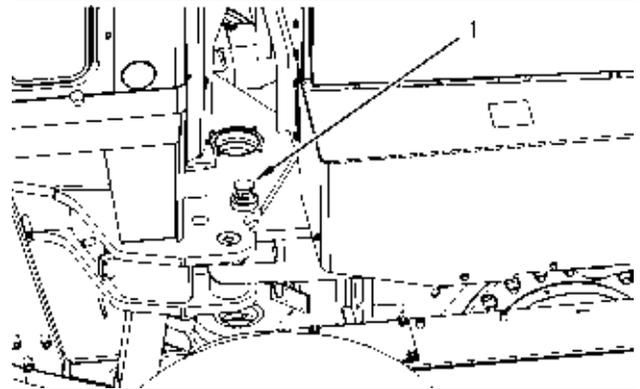


Illustration 175

g00930709

1. Install frame lock pin (1).

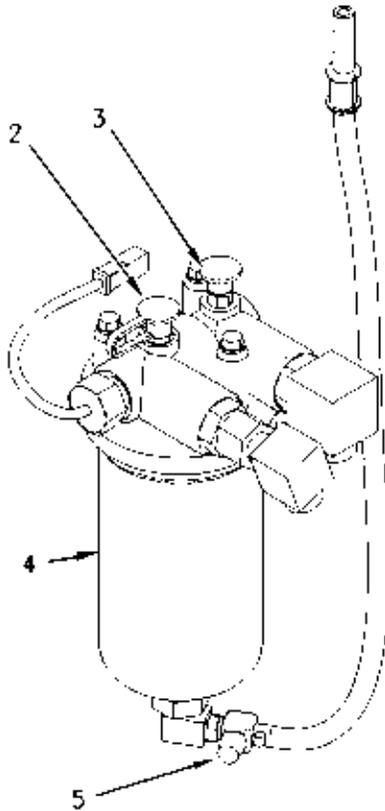


Illustration 176

g00777843

2. Open drain valve (5) on oil filter housing (4).
3. Loosen pressure test port (2) or oil sample valve (3) in order to vent oil filter housing (4).
4. Remove oil filter housing (4).
5. Remove the used element and discard the used element.
6. Clean oil filter housing (4) with a clean nonflammable solvent.
7. Clean the base of oil filter housing (4).
8. Insert a new filter element into filter housing (4).
9. Replace the filter housing base seal.
10. Install filter housing (4).
11. Close drain valve (5) on oil filter housing (4).

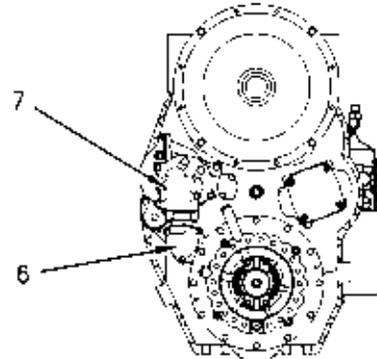


Illustration 177

g00795948

12. Slowly remove the cover for magnetic screen (6). Slowly remove the cover for supplemental magnetic screen (7). Allow the oil to drain into a suitable container.
13. Remove the magnetic screen tube assemblies.
14. Separate the magnets and the tube assemblies from the screens. Wash the screens and the tube assemblies in clean nonflammable solvent. Allow the screens to dry and allow the tube assemblies to dry.

NOTICE

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

15. Clean the magnets with a cloth or clean the magnets with a firm brush. Allow the magnets to dry.
16. Install the magnets and tube assemblies into the screens.
17. Install the screens.
18. Inspect the cover seals. If the cover seals are damaged, replace the cover seals.
19. Install the covers and tighten the bolts.
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.

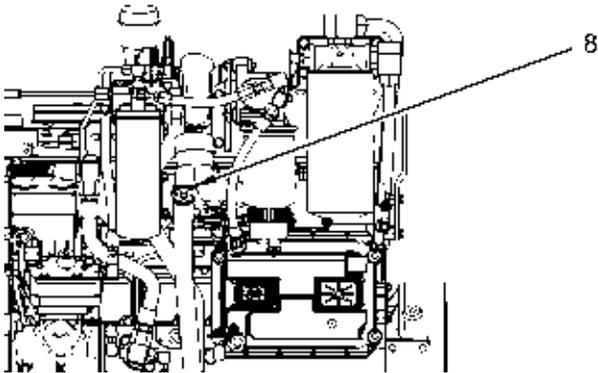


Illustration 178

g00986356

23. With the engine at low idle, maintain the oil level between the marks on dipstick (8). If necessary, add the oil through the filler tube .

24. Stop the engine.

25. Remove frame lock pin (1) and store the frame lock pin.

i01896026

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 the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

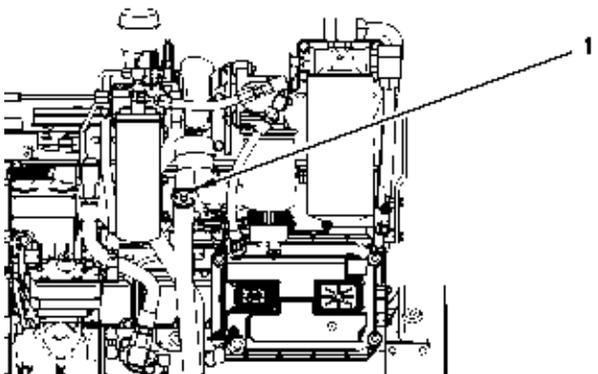


Illustration 179

g00986419

Clean the area around dipstick/fill cap (1) before you remove the cap.

1. Run the engine at low idle. Remove cap (1). Maintain the oil between the "LOW" mark and the "FULL" mark on the dipstick.
2. If necessary, add oil.
3. Clean cap (1) and install cap (1).

i01863633

Transmission and Differential Oil Sample - Obtain

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

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

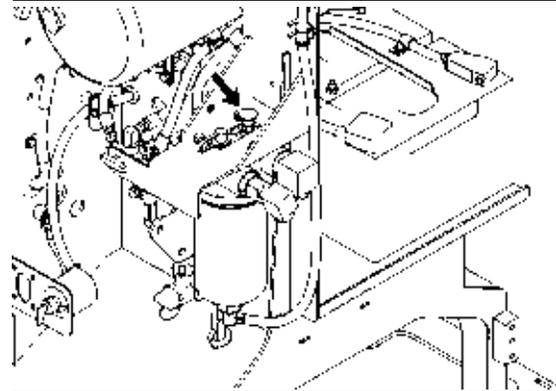


Illustration 180

g00950029

The oil sample for the transmission and the differential should be taken from the sampling valve above the transmission filter.

Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the transmission and differential oil.

i01829992

Wheel Bearing Oil (Front) - Change

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

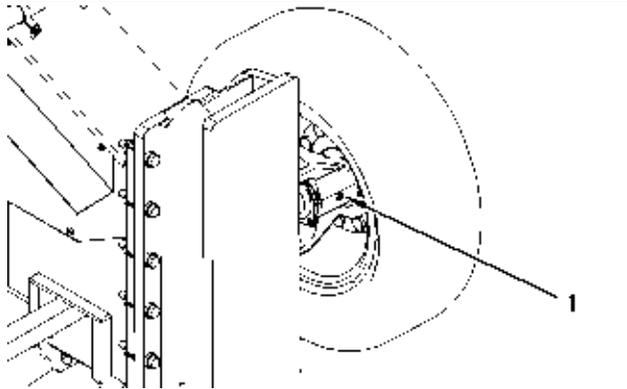


Illustration 181

g00934106

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

Clean the surface around each check/fill plug before you change the oil.

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

1. Remove check/fill plug (1).
2. Use a 1U-7683 Suction Gun in order to remove the oil from the housing for the wheel bearing.
3. Add oil to the housing for the wheel bearing until the oil level is at the bottom of the opening for check/fill plug (1).
4. Install check/fill plug (1).
5. Repeat Step 1 through Step 4 for the other wheel bearing.

i01830000

Wheel Bearing Oil Level (Front) - Check

SMCS Code: 4205-535-FLV; 4208-535-FLV;
4234-535-FLV; 7551-535-FLV

Clean the surface area around the check/fill plug before you check the oil level.

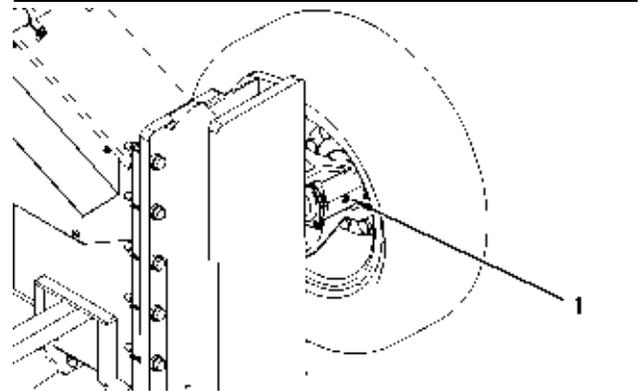


Illustration 182

g00934106

1. Remove check/fill plug (1).
2. Maintain the oil level to the bottom of the opening for the check/fill plug. If necessary, add oil.
3. Install plug (1).
4. Repeat Step 1 through Step 3 for the other wheel bearing.

i01671089

Wheel Lean Bar Bearings - Lubricate

SMCS Code: 5225-086-BD

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

i01893509

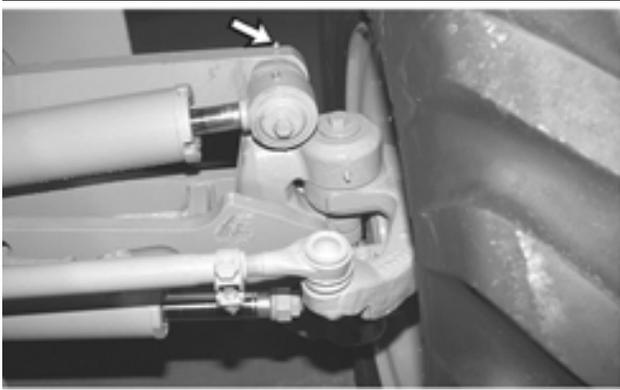


Illustration 183

g00118004

Each front wheel has one fitting. In order to lubricate the wheel lean bar bearings, use 183 - 3424 Grease Cartridge to apply lubrication to the fittings.

i01674473

Wheel Lean Bearings - Lubricate

SMCS Code: 5225-086-BD

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

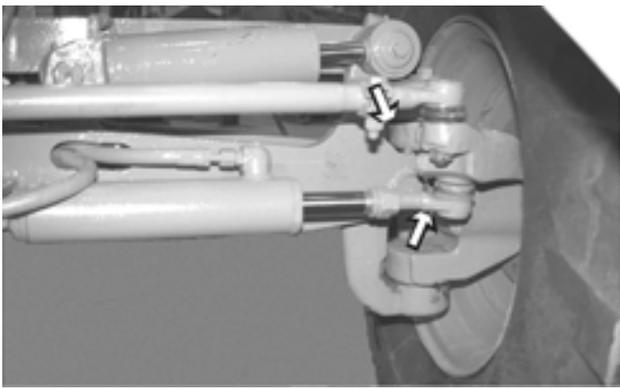


Illustration 184

g00115441

Each front wheel has two fittings. In order to lubricate the wheel lean bearings, use 183 - 3424 Grease Cartridge (5% Molybdenum Disulfide) to apply lubricant to the fittings.

Wheel Lean Cylinder Bearings - Lubricate

SMCS Code: 5211-086-BD

Wipe all fittings before you apply lubricant to the fittings.

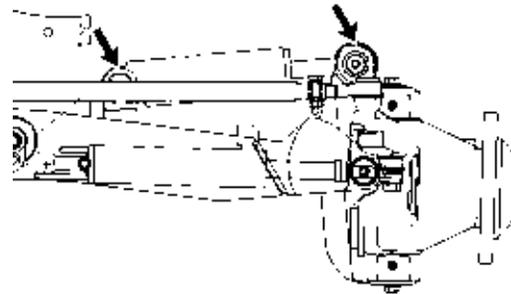


Illustration 185

g00985581

Each end of the wheel lean cylinder has one fitting. In order to lubricate the bearings for the wheel lean cylinder, use 183 - 3424 Grease Cartridge (5% Molybdenum Disulfide) to apply lubricant to the fittings.

i01834467

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.

1. Remove the access cover for the windshield washer reservoir.

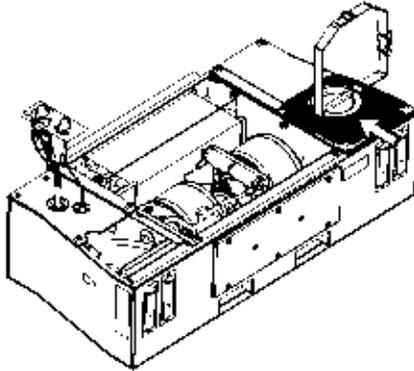


Illustration 186

g00937113

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.
5. Install the access cover.

Note: The window washer nozzles can be adjusted so that the window washer solvent will be sprayed in the desired direction.

i01494015

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

Inspect the upper front windshield wiper blade (1). Inspect the lower front windshield wiper blades (2). If the machine is equipped with a wiper for the rear window, inspect the wiper blade for the rear window (3). If any of the wiper blades are streaking any of the windshields, replace the wiper blade. Also, replace the wiper blade if the wiper blade is streaking the rear window.

i01494089

Windows - Clean

SMCS Code: 7310-070; 7340-070

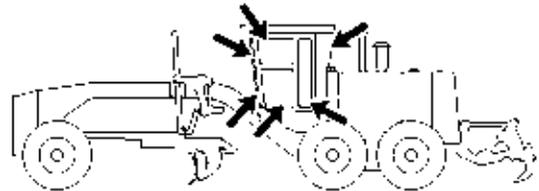


Illustration 188

g00775840

Use commercially available window cleaning solutions to clean the windows. Stand on the ground in order to clean the outside windows, unless handholds are available.

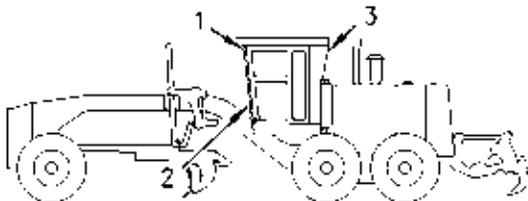


Illustration 187

g00775786