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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

CATERPILLAR®

CATERPILLAR®

SEBU8020-06
October 2010

Operation and Maintenance Manual

277C, 287C and 297C Multi Terrain Loaders

JWF1-Up (277C)
MAS1-Up (287C)
GCP1-Up (297C)

i04112628

Maintenance Interval Schedule

SMCS Code: 7000

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

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

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

Note: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

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

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

When Required

Every 10 Service Hours or Daily

Initial 250 Service Hours

Every 250 Service Hours

Every 250 Service Hours or Monthly

Every 500 Service Hours

Every 500 Service Hours or 6 Months

Every 500 Service Hours or 1 Year

Every 1000 Service Hours

Every 1000 Service Hours or 6 Months

Every 1000 Service Hours or 1 Year

Every 2000 Service Hours

Every 2000 Service Hours or 1 Year

Every Year

Every 3000 Service Hours or 2 Years

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

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i02555053

Aftercooler Core - Inspect/Clean

SMCS Code: 1064-571; 1064-571-Z3

S/N: GCP1-Up

Inspect

Note: Adjust the frequency of inspection according to the effects of the operating environment. Clean the aftercooler core when you clean the radiator core.

The aftercooler is located behind the cab and in front of the engine.

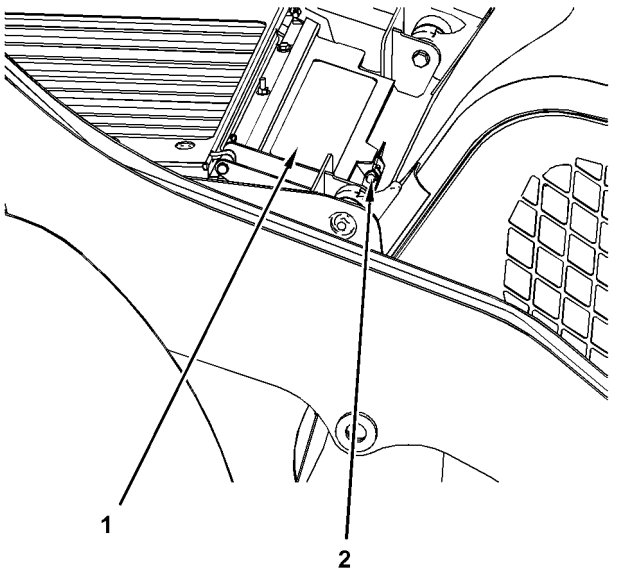

Illustration 110 g01279112

1. Stop the engine.
2. Clean the grill before you access the aftercooler core.
3. Remove the pin (2) that holds the grill (1) and lift the grill.

Note: If parts of the aftercooler system may appear to be damaged or if parts of the aftercooler system are repaired, a leak test is highly recommended. Consult your Caterpillar dealer for the most current information about the aftercooler.

Inspect the fins and tubes of the aftercooler for damage. Some fins and tubes may be worn from abrasive material that has passed through the aftercooler cores. Bent fins may be opened with a “comb”.

Inspect these items for good condition: welds, mounting brackets, air lines, connections, clamps, and seals. Make repairs, if necessary.

Clean

For air-to-air aftercoolers, use the same methods that are used for cleaning radiators.

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

NOTICE
When you are using compressed air or high pressure water to clean the radiator fins, ensure that the air or water is directed parallel to the fins. If the compressed air or high pressure water is not directed parallel to the radiator fins, the radiator fins could be bent or damaged.

Pressurized air is the preferred method for removing loose debris. Hold the nozzle approximately 6 mm (0.25 inch) away from the fins. Slowly move the air nozzle in a direction that is parallel with the tubes. The air nozzle should point in the opposite direction of the flow of the fan. This will remove debris that is between the tubes.

Pressurized water may also be used for cleaning. The maximum water pressure for cleaning purposes must be less than 275 kPa (40 psi). Use pressurized water in order to soften mud.

Use a degreaser and steam for removal of oil and grease. Wash the core with detergent and hot water. Thoroughly rinse the core with clean water.

After cleaning, start the engine and accelerate the engine to high idle rpm. This will help in the removal of debris and drying of the core. Stop the engine. Use a light bulb behind the core in order to inspect the core for cleanliness. Repeat the cleaning, if necessary.

Note: Adjust the frequency of cleaning according to the effects of the operating environment. If there is an extreme amount of debris, you may need to remove the air conditioning condenser or the cover plate from the fan housing for the aftercooler.

Close the grill and replace the retaining pin.

i02559029

Aftercooler Intake Screen - Clean

SMCS Code: 1063-070-Z3

S/N: GCP1-Up

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

Note: Adjust the frequency of cleaning according to the effects of the operating environment.

Note: Pressurized air is the preferred method for removing loose debris. Pressurized water may also be used for cleaning. Use pressurized water in order to soften mud. Clean the screen from both sides. The maximum water pressure for cleaning purposes must be less than 275 kPa (40 psi).

1. Turn off the engine.

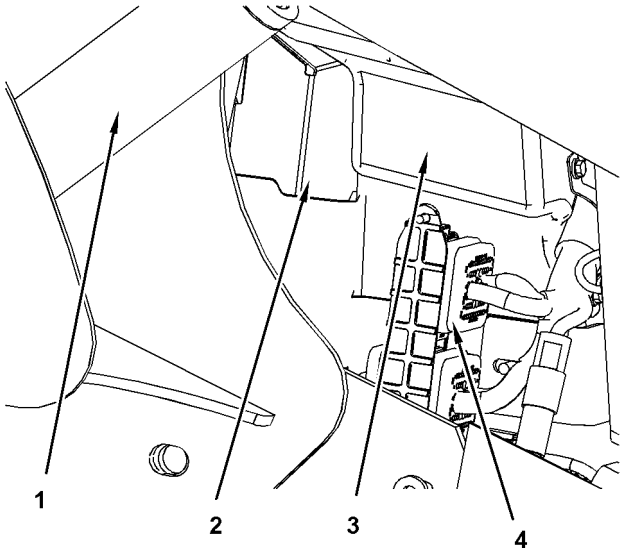

Illustration 111 g01281019

(1) Cylinder for the lift arm
(2) Air inlet screen
(3) Hydraulic tank
(4) Electrical connectors

2. Access the screen from the right side of the machine. Hold the nozzle approximately 6 mm (0.25 inch) away from the screen. Ensure that the spray nozzle is past the electrical connections.

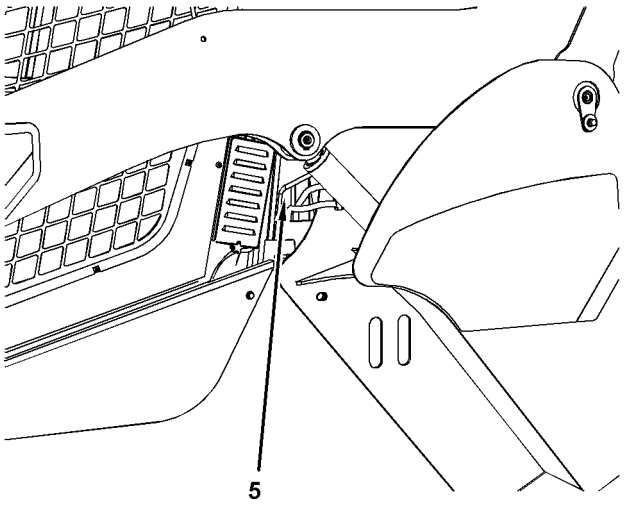

Illustration 112 g01281018

(5) Air inlet screen

3. Access the screen from the left side of the machine. Hold the nozzle approximately 6 mm (0.25 inch) away from the screen.

4. If water is used to clean the screen, ensure that the screen is dry before the engine is started. If necessary, use compressed air to dry the screen.

i02939506

Air Cleaner Dust Valve - Clean/Inspect

SMCS Code: 1051-571-VL

Service the air filter elements when the alert indicator for air filter restriction lights. Refer to Operation and Maintenance Manual, “Alert Indicators” for information about the indicator.

1. Open the engine access door.

2. The air filter housing is located on the right side of the engine compartment.

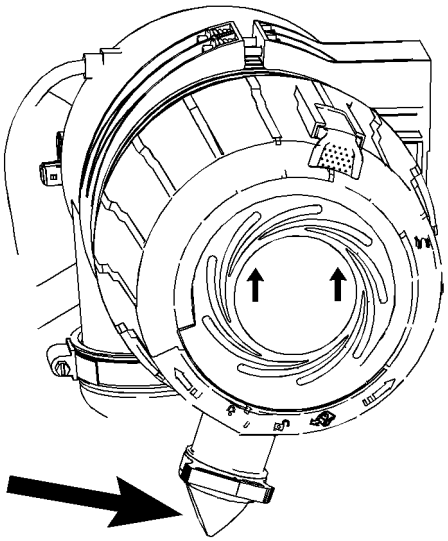

Illustration 113 g01280861

3. Check the dust valve after every ten service hours or at the end of each day. Actuate the valve by squeezing the lips of the valve in order to remove any accumulated debris.

i02916544

Air Conditioner Condenser - Clean (If Equipped)

SMCS Code: 1805-070

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

246C, 256C, 262C, 277C, 287C, 279C, and 289C

The air conditioner condenser is located behind the engine on the frame.

Open the engine access door.

Inspect the air conditioner condenser for the following conditions:

- Damaged fins
- Buildup of debris
- Plugged areas

Remove any debris. Clean the condenser with low pressure air or low pressure water. The maximum water pressure for cleaning purposes must be less than 275 kPa (40 psi).

272C, 297C, and 299C

The air conditioner condenser is attached to the side of the fan housing for the aftercooler.

1. Remove the 3 bolts that retain the condenser to the fan housing for the aftercooler.
2. Lift the core and remove the core from the retaining lip.
3. Clean the condenser core in the opposite direction of the air flow.
4. Reinstall the core in reverse order.

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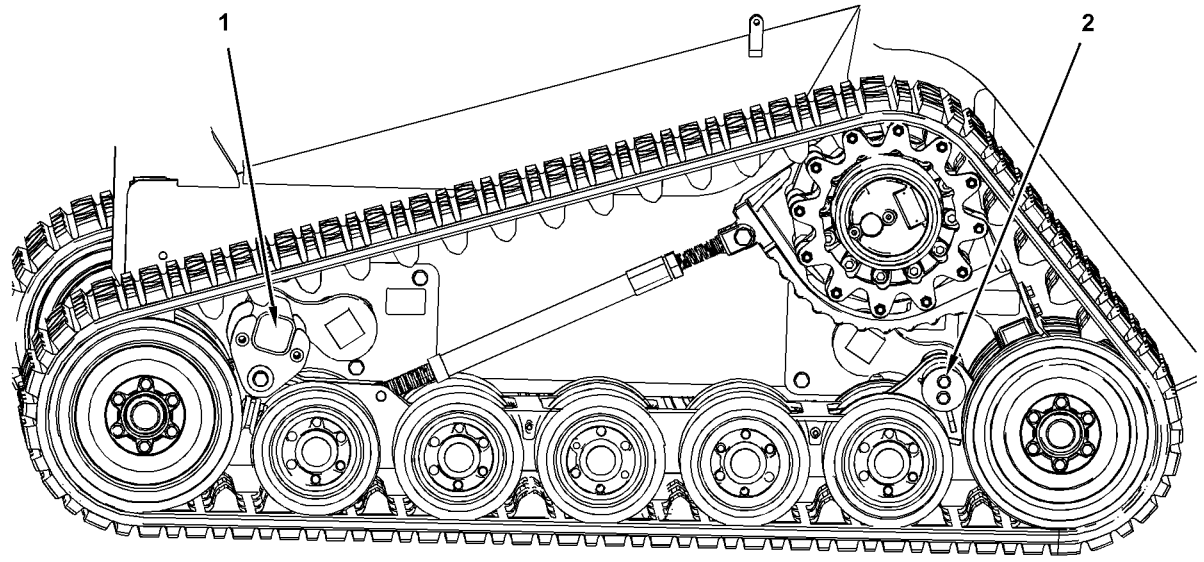
Axle Bearings - Lubricate

SMCS Code: 3282-086-BD

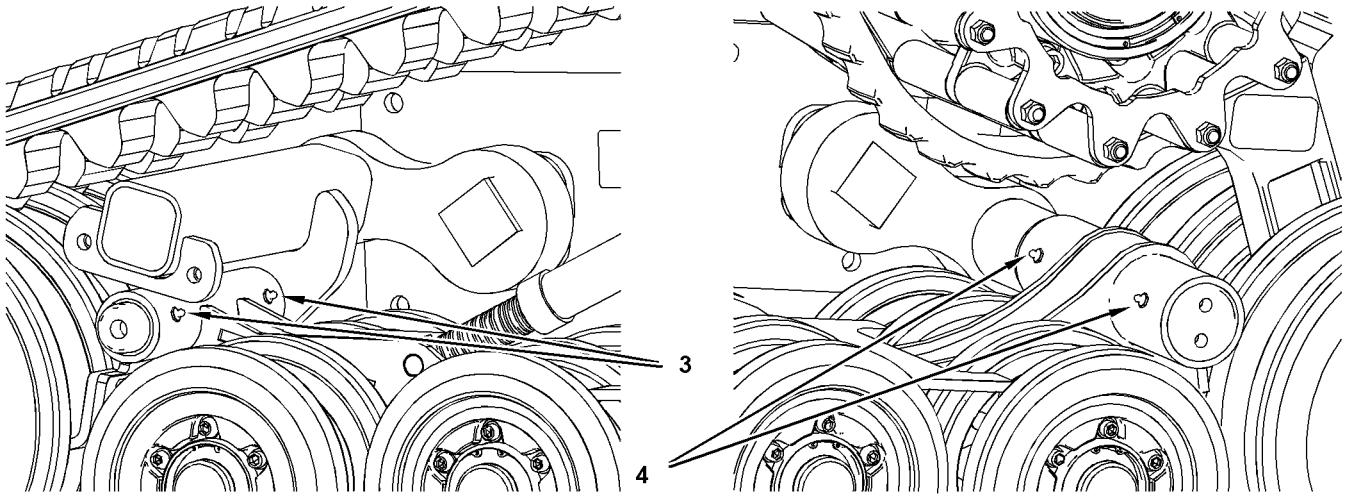


g01282148

Illustration 114

Single Level Suspension (SLS) undercarriage

(1) Front pivot (2) Rear pivot



g01284542

Illustration 115

(3) Front grease zerks (4) Rear grease zerks

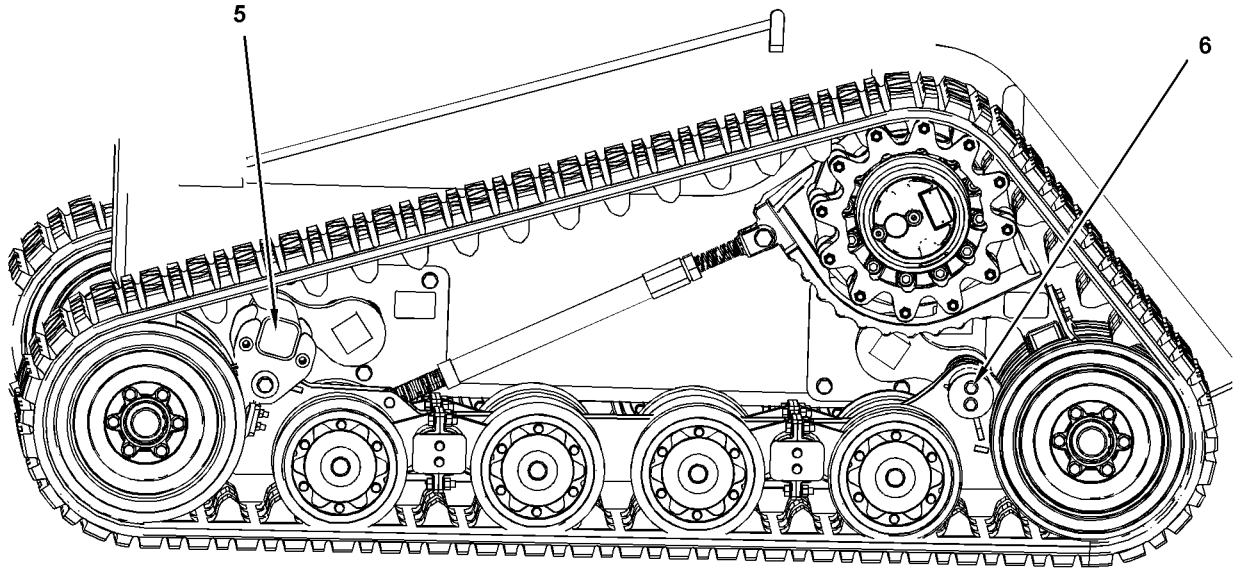


Illustration 116 g01282149

Dual Level Suspension (DLS) undercarriage

(5) Front pivot (6) Rear pivot

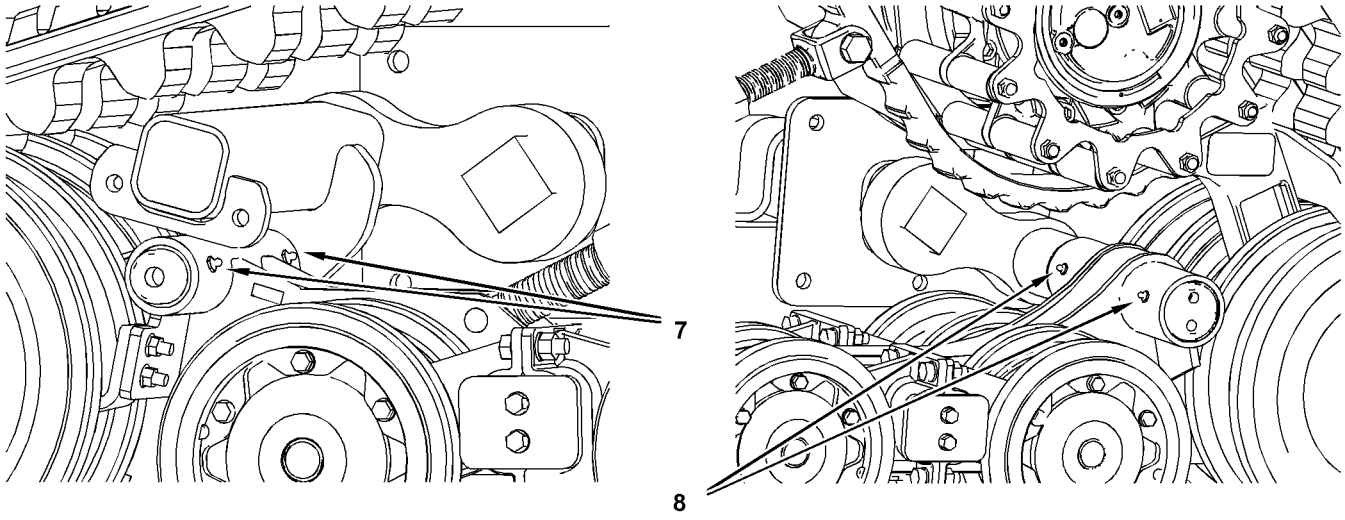


Illustration 117 g01284545

(7) Front grease zerks (8) Rear grease zerks

Apply lubricant to all grease fittings.

Repeat the process for the opposite side of the machine.

i02580453

Backup Alarm - Test

SMCS Code: 7406-081

To prevent injury, make sure that no people are working on the machine or near the machine. To prevent injury, keep the machine under control at all times.

1. Get into the operator's seat. Fasten the seat belt and pull the armrests downward.

2. Start the engine.

3. Disengage the parking brake.

4. Move the joystick control to the REVERSE position.

   The backup alarm should sound immediately. The backup alarm should continue to sound until the joystick control is returned to the NEUTRAL position or to the FORWARD position.

i03659214

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1401-561; 1402-040; 1402-510

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.

2. The battery is located on the left side of the machine under the cab. Raise the cab. Refer to Operation and Maintenance Manual, “Cab Tilting” for information on raising the cab.

3. Disconnect the negative battery cable at the battery.

Note: Do not allow the disconnected battery cable to contact the negative battery post.

4. Disconnect the negative battery cable from the frame in order to inspect the cable.

5. Disconnect the positive battery cable at the battery.

6. Perform the necessary repairs. Replace the cables or the battery, as needed.

7. Connect the positive battery cable at the battery.

8. Connect the negative battery cable to the frame of the machine.

9. Connect the negative battery cable at the battery.

10. Lower the cab. Refer to Operation and Maintenance Manual, “Cab Tilting” for information on lowering the cab.

Recycle the Battery

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

i02715751

Belts - Inspect/Adjust/Replace

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

If a new belt is installed, check the belt adjustment after 30 minutes of operation. A belt is considered to be used after 30 minutes of operation.

Belts

1. Stop the engine in order to inspect the belt.

2. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

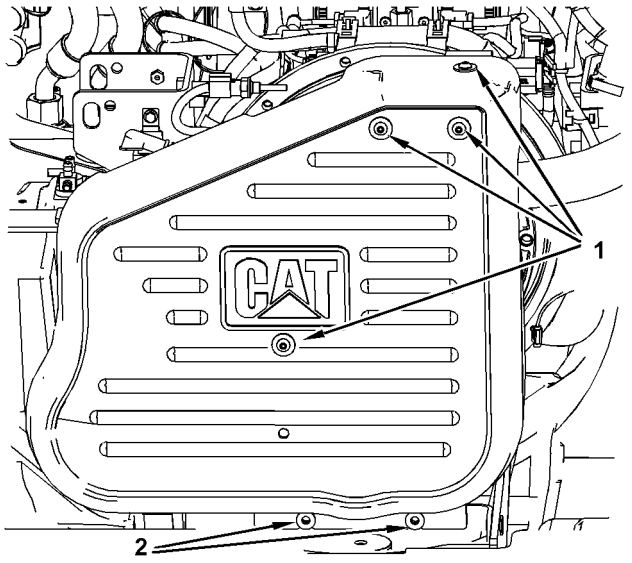


Illustration 118 g01209498

3. Remove the four bolts (1) on the top of the guard. Loosen the two bolts (2) on the bottom of the guard.

4. Slide the guard upward from bottom bolts. Remove the guard for the V-belt.

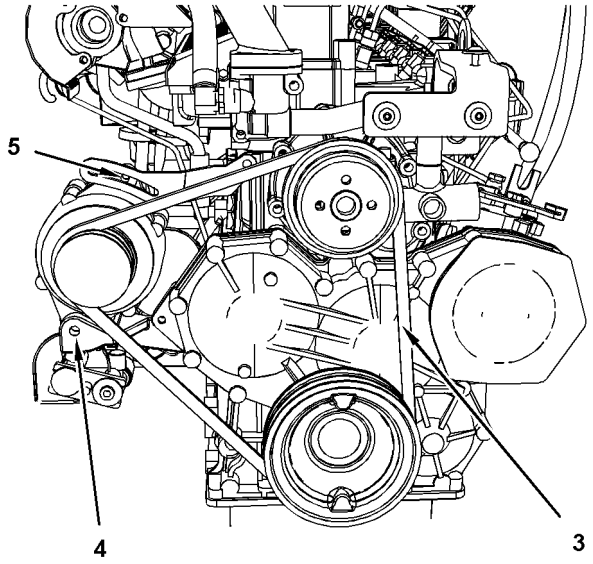


Illustration 119 g01209499

5. Inspect the condition of the belt (3) and the adjustment of the belt. The belt should deflect 10 mm (0.39 inch) under a straight pull of 44 N (10 lb). This measurement should be taken between the alternator pulley and the crankshaft pulley.

Note: A 144-0235 Borroughs Belt Tension Gauge may be used to measure belt tension. This measurement should be taken between the alternator pulley and the crankshaft pulley. Refer to the following table for belt tension.

Table 31

Belt Tension Initial	Belt Tension Used
534 ± 22 N (120 ± 5 lb)	400 ± 44 N (90 ± 10 lb)

6. Loosen the mounting bolt (4). Loosen the adjusting locknut (5).

7. Move the alternator until the correct tension is reached.

8. Tighten the adjusting locknut. Tighten the mounting bolt.

9. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 5 to step 8.

Air Conditioner (if equipped)

Note: If your machine is equipped with an air conditioner, use the same procedure and the same measurements for the belt tension.

1. Inspect the condition of the belt and the adjustment of the belt. The belt should deflect 10 mm (0.39 inch) under a straight pull of 44 N (10 lb). This measurement should be taken between the air conditioner compressor pulley and the crankshaft pulley.

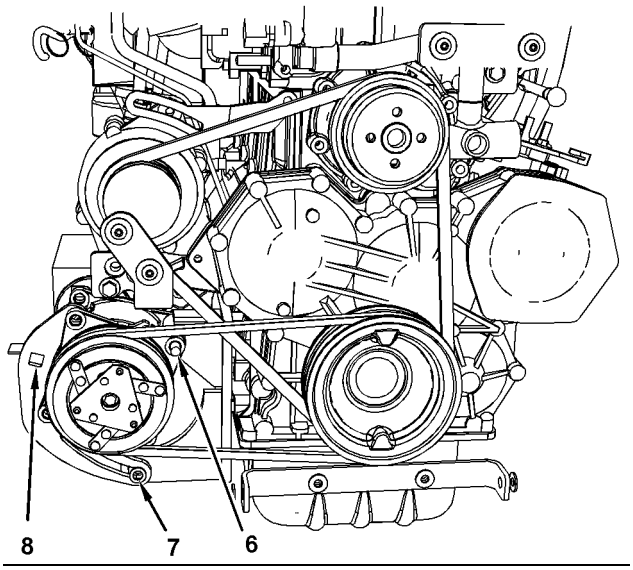


Illustration 120 g01279933

2. Loosen the mounting bolt (6) for the air conditioner compressor. Loosen the adjusting locknut (7) for the air conditioner compressor.

3. Move the air conditioner compressor until the correct tension is reached.

Note: A hole (8) in the bracket has been provided in order to aid with the adjustment of the tension.

4. Tighten the adjusting locknut. Tighten the mounting bolt.

5. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 2 to step 4.

Finish

1. Apply thread lock compound to the threads on bolts (1).

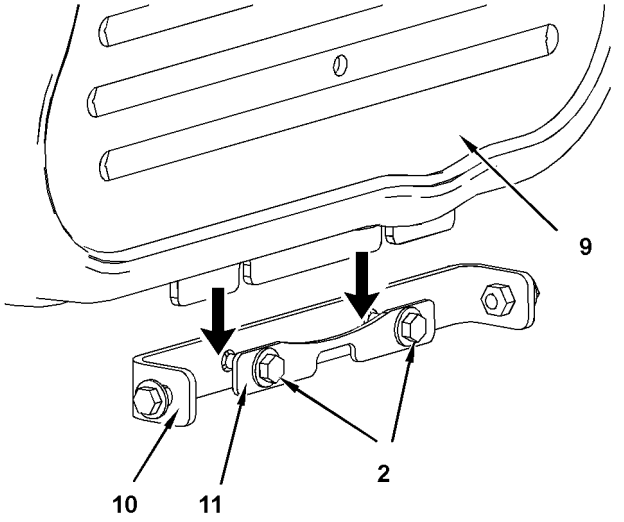


Illustration 121 g01364054

2. Install the guard for the V-belt (9). Ensure that the guard is inserted between the mounting bracket (10) and the spreader plate (11) before you tighten the bolts (2). Tighten the bolts (2) to 15 ± 3 N·m (11 ± 2 lb ft).

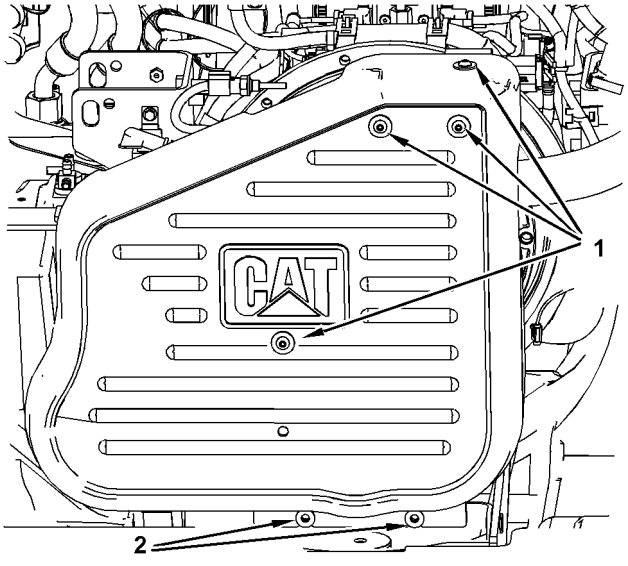


Illustration 122 g01209498

3. Tighten the bolts (1) to 12 ± 3 N·m (9 ± 2 lb ft).

Note: Start all the bolts (1) in the holes before you start tightening the bolts. This helps align all the holes.

4. Close the engine access door.

i02549571

Blade Frame - Adjust

SMCS Code: 6060-025-BG

Height Adjustment

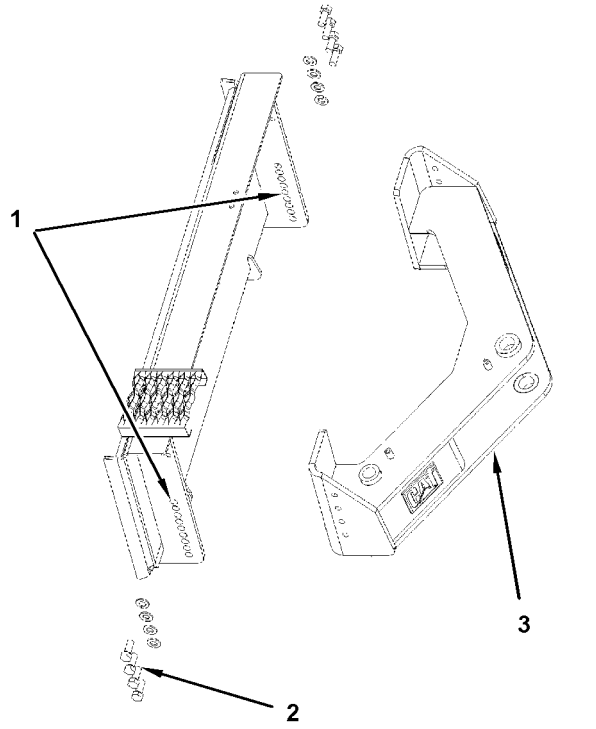


Illustration 123 g01161532

(1) Height Adjustment for the Frame
(2) Adjusting Bolts
(3) Frame

The height of the frame may be adjusted in order to compensate for the wear on the cutting edge. The front portion of the frame needs to be lowered as the cutting edge wears. Remove the bolts (2) and lower the frame (3). Install the bolts. This will keep the blade level with the ground and this will prevent the blade from digging into the ground.

Note: In order to properly adjust the blade, the work tool coupler needs to be vertical. The position of the pivot point of the blade is perpendicular to the ground. Follow this procedure in order to ensure that the cutting edge will remain flat on the ground during operation.

Trunnion Joint

Note: The trunnion is a dry joint. Adding grease to the trunnion simply attracts abrasive particles. The tightness of the joint should be monitored. Shims should be removed when the joint becomes too loose. This may be indicated by excessive movement in the blade.

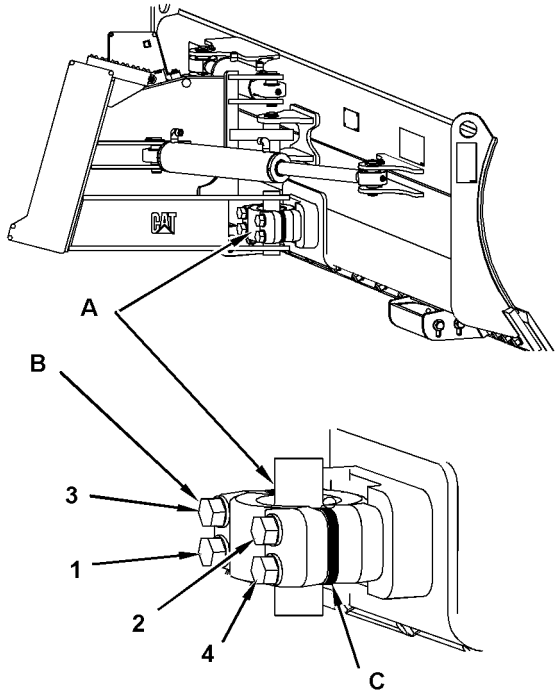


Illustration 124 g01173519

(A) Trunnion Joint
(B) Bolts
(C) Shims

- Remove the four retaining bolts (B) and the cap.
- Remove the necessary shims.
- Replace the cap and bolts.
- The tightening sequence is shown in illustration 124.
- Torque the bolts to 530 ± 70 N·m (391 ± 52 lb ft).

Note: Some noise is typical and the noise does not indicate a problem.

i03469002

Bogie and Idler - Inspect/Replace

SMCS Code: 4159-040; 4159-510; 4192-040; 4192-510

Inspect

Clean the undercarriage before inspecting the bogies and the idlers.

Inspect the bogies and idlers for damage and wear.

Note: Minor damage to the rubber on the bogies and idlers is acceptable. Minor damage includes nicks, cuts, small pieces that are missing, and small grooves. This minor damage is normal and acceptable. Minor damage will not adversely affect machine performance.

The bogies and the idlers should be replaced when the damage to the rubber wheels adversely affects machine performance. Replace the bogies and the idlers when the rubber is worn beyond the minimum specifications that are listed below.

Note: The hubs for the bogies and the hubs for the idlers on the 277C, 287C and 297C contain oil. The hubs are sealed for life. Periodically, inspect the hubs for leaks or for excessive end play. Contact your Caterpillar dealer if either leaks or excessive end play is found.

Table 32

Bogie Wheels and Idler Wheels Wear Limits		
	Minimum Width	Minimum Thickness
254 mm (10 inch)	15 mm (0.59 inch)	1 mm (0.04 inch)
381 mm (15 inch)	15 mm (0.59 inch)	1 mm (0.04 inch)

Loosen the Track

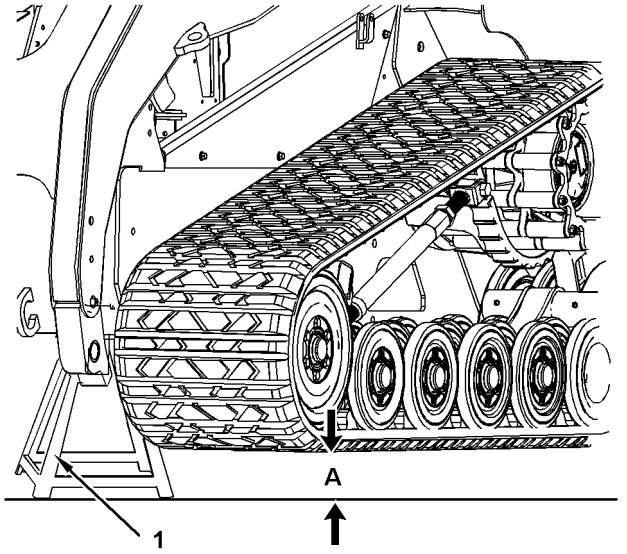


Illustration 125 g01286300

Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands (1) in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inches) (A) off the ground.

Loosen the track in order to work on the bogies and idlers. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust” for the procedure.

Note: The track may be removed in the illustrations for clarity.

Single Level Suspension

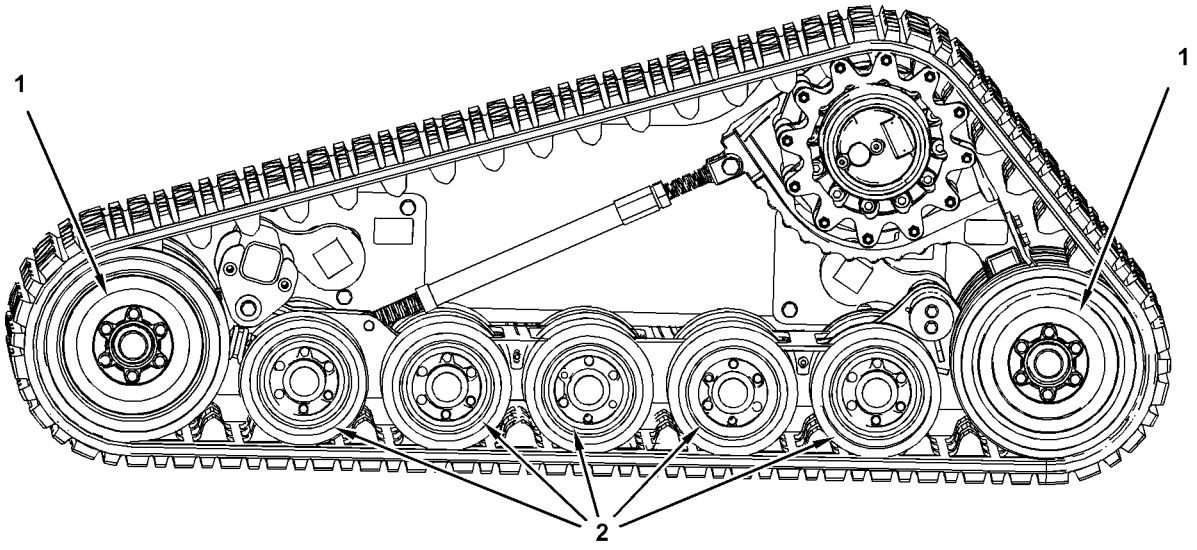


Illustration 126 g01282884

(1) Idler wheels (2) Bogie wheels

Idler wheels

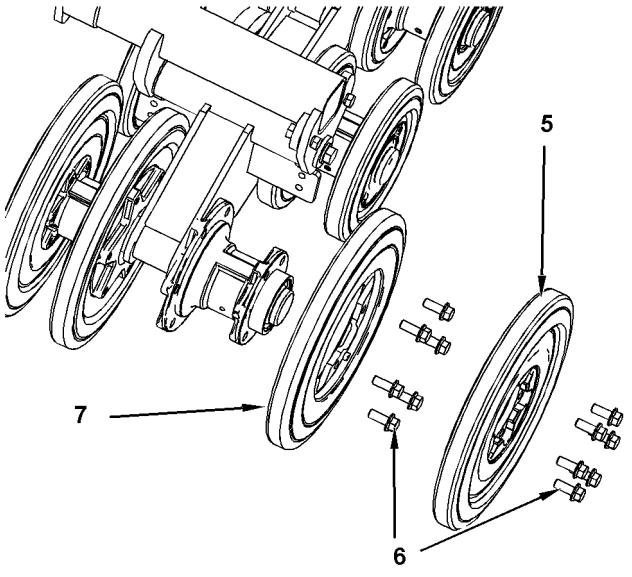


Illustration 127 g01285489

(5) Outer idler wheel
(6) Bolts and washers for the wheels
(7) Inner idler wheel

1. Remove the bolts (6) and the washers for the outer idler wheel.

2. Remove the outer idler wheel.

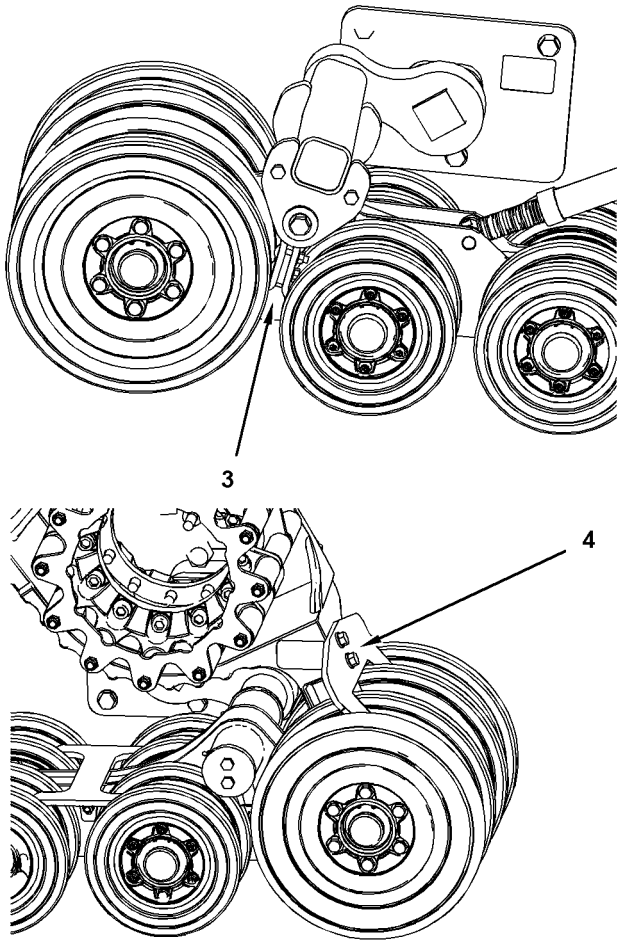


Illustration 128 g01285492

(3) Front scraper plate
(4) Rear scraper plate

3. If the inner idler wheel needs to be removed, you will need to remove the scraper plate. Remove the bolts that hold each scraper plate.

4. If necessary, remove the bolts and the washers for the inner idler wheel and remove the wheel.

5. Install the wheels in reverse order. Tighten the bolts in a star pattern to a torque of 50 ± 5 N·m (37 ± 3.7 lb ft). Tighten the bolts an additional 45 degrees ± 5 degrees in the same star pattern.

6. If necessary, install the scraper plates.

Note: The torque for the bolts for the scraper plate on the rear idler is 120 ± 20 N·m (89 ± 15 lb ft). All other torque values for the bolts for the scraper plates are standard torque values.

Bogie wheels

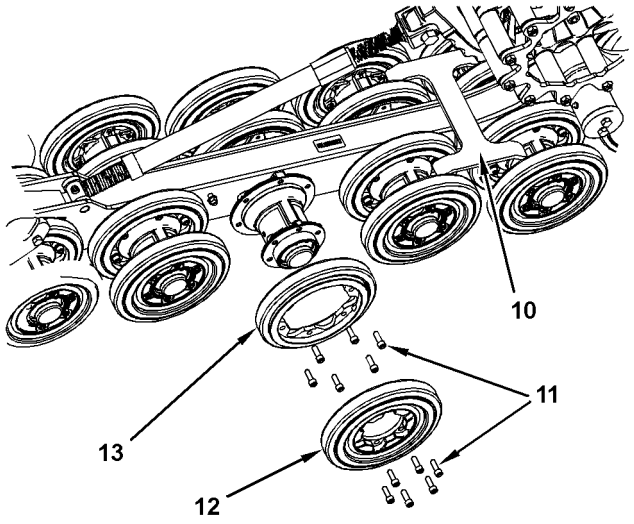


Illustration 129 g01285491

(10) Scraper plate
(11) Bolts and washers for the wheels
(12) Outer bogie wheel
(13) Inner bogie wheel

1. Remove the bolts (11) and the washers for the outer bogie wheel.

2. Remove the outer bogie wheel.

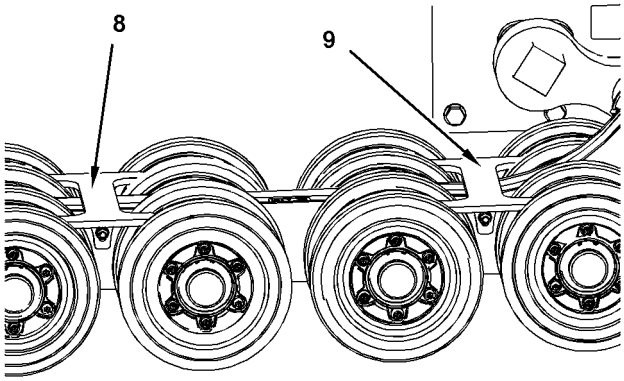


Illustration 130 g01285490

(8) Front scraper plate
(9) Rear scraper plate

3. If the inner bogie wheels need to be removed, you will need to remove the scraper plate. Remove the bolts that hold each scraper plate.

4. If necessary, remove the bolts and the washers for the inner bogie wheel and remove the wheel.

5. Install the wheels in reverse order. Tighten the bolts in a star pattern to a torque of 50 ± 5 N·m (37 ± 3.7 lb ft).

6. If necessary, install the scraper plates.

Note: All torque values for the bolts for the scraper plates are standard torque values.

Dual Level Suspension

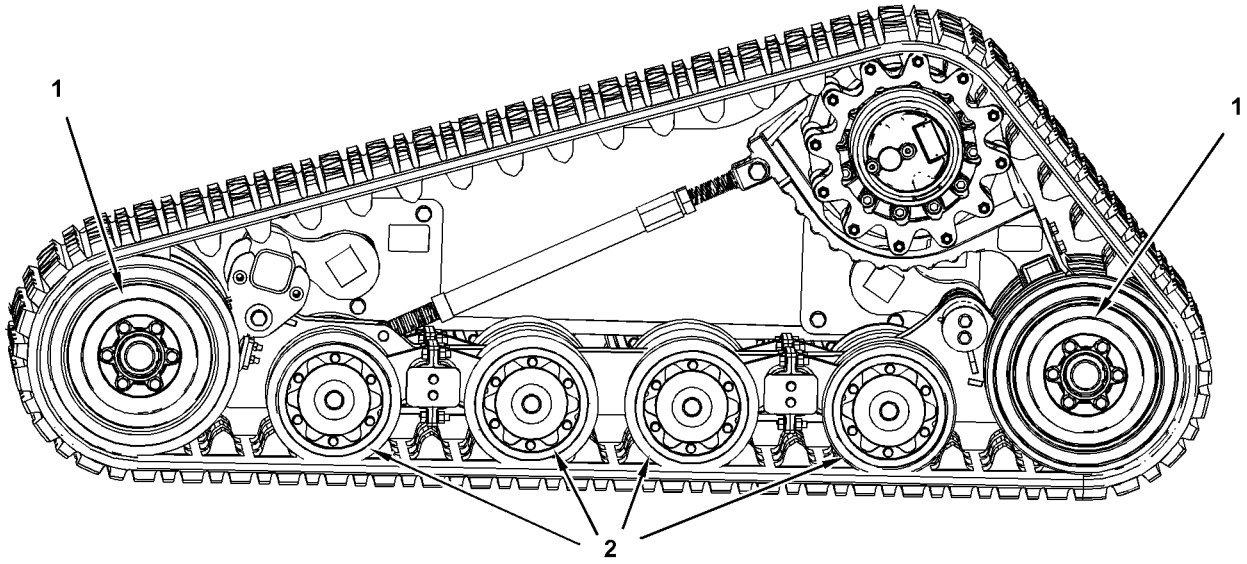


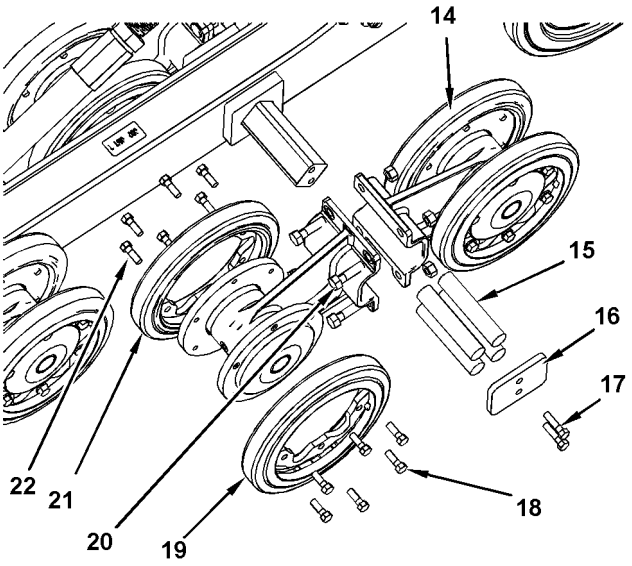
Illustration 131 g01282887

(1) Idler wheels (2) Bogie wheels

Idler wheels

The idler wheels are removed and installed with the same procedure as the Single Level Suspension.

Bogie wheels



g01285573

Illustration 132

(14) Bogie wheel assembly
(15) Rubber inserts
(16) Cover plate
(17) Bolts and washers for cover plate
(18) Outer wheel bolts and washers
(19) Outer wheel
(20) Bolts for the bogie assembly
(21) Inner wheel
(22) Inner wheel bolts and washers

1. Remove the bolts (18) and the washers for the outer bogie wheel (19).
2. Remove the outer bogie wheel.
3. Install the new wheel. Tighten the bolts in a star pattern to a torque of 50 ± 5 N·m (37 ± 3.7 lb ft).
4. In order to remove the inner bogie wheels, you must remove the bogie suspension group from the frame. Remove the 2 bolts and 2 washers (17) that hold the cover plate.
5. Remove the bolts (20), washers, and nuts for the suspension group.

Note: There are 4 rubber inserts between the two suspension groups. Retain these inserts for installation later.

6. Remove the suspension group and the rubber inserts from the frame.
7. Remove the bolts (22) and the washers for the inner bogie wheel (21).
8. Install the new wheel. Tighten the bolts in a star pattern to a torque of 50 ± 5 N·m (37 ± 3.7 lb ft).
9. Loosely install the bolts (20), washers, and nuts on the suspension group.
10. Slide the suspension group onto the frame.
11. Lubricate the rubber inserts and slide the rubber inserts into the suspension group.
12. Tighten the bolts (20) to a torque of 120 ± 20 N·m (89 ± 15 lb ft).
13. Install the cover plate (16), 2 bolts, and 2 washers (17). Tighten the bolts to a torque of 50 ± 10 N·m (37 ± 7 lb ft).
14. Tighten the track to the proper tension. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust” for the procedure.

i01743875

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

⚠ WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Lower the lift arms fully. Tilt back the bucket so that the bucket cutting edge is accessible.
2. Place blocks under the raised edge of the bucket.
3. Remove the bolts. Remove the cutting edge and the end bits.
4. Clean the contact surfaces.
5. Use the opposite side of the cutting edge, if this side is not worn.
6. Install a new cutting edge, if both edges are worn.
7. Install the bolts.
8. Remove the blocks that are under the bucket.
9. After a few hours of operation, check the bolts for proper torque.

i01764331

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

⚠ WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Lower the lift arms fully. Tilt back the bucket so that the bucket tips are accessible.
2. Place blocks under the raised edge of the bucket.
3. Remove the mounting bolts. Remove the bucket tips.
4. Clean the mounting surface.
5. Replace the bucket tips.
6. Install the bolts.
7. Remove the blocks that are under the bucket.
8. After a few hours of operation, check the bolts for proper torque.

i02417532

Cab Air Filter - Clean/Replace (If Equipped)

SMCS Code: 7342-070; 7342-510

Fresh Air Filter

Note: The cover for the cab air filter is located on the left hand side of the machine behind the cab.

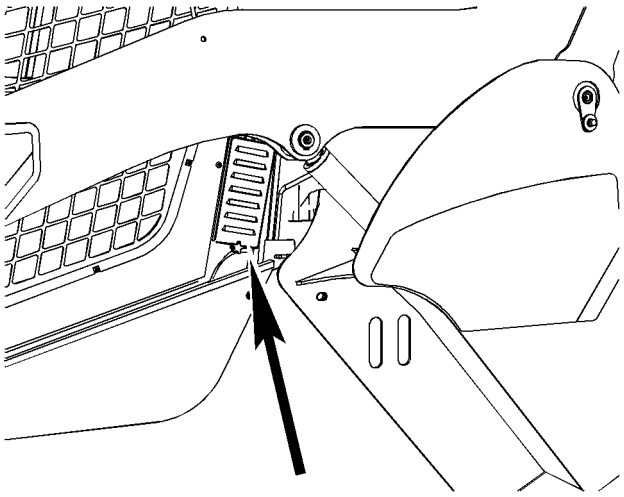


Illustration 133 g01287414

1. Turn the thumb screw until the thumb screw is free from the duct. Lift up on the cover and remove the cover.
2. Remove the air filter element from the duct and clean the filter element with low pressure air (maximum 207 kPa (30 psi)). Direct the air flow up the pleats and down the pleats from the side of the filter opposite of the air flow. Replace the element if the element is damaged or if the element seal is damaged. Replace the element if the air conditioner performance is low.

Note: Do not use water for cleaning the filter.

3. Install the element. Replace the cover and tighten the thumb screw.

Recirculation Filter

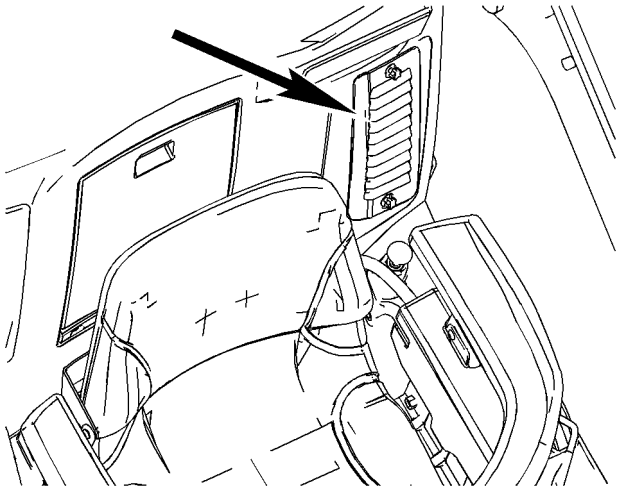


Illustration 134 g01209486

1. Turn the thumb screws until the thumb screws are free from the duct. Remove the cover.

2. Remove the air filter element from the duct and clean the filter element with low pressure air (maximum 207 kPa (30 psi)). Direct the air flow up the pleats and down the pleats from the side of the filter opposite of the air flow. Replace the element if the element is damaged or if the element seal is damaged. Replace the element if the air conditioner performance is low.

Note: Do not use water for cleaning the filter.

3. Install the element. Replace the cover and tighten the thumb screws.

i02616708

Cab Interior - Clean

SMCS Code: 7301-070

The floor mat is removable. The floor mat has sides in order to help retain the material.

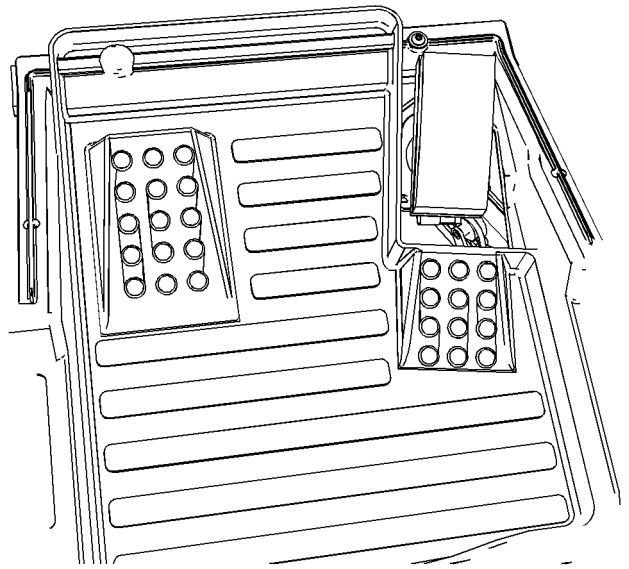


Illustration 135 g01312450

Floor mat in the cab

The floor mat does not protect the foot pedal and the pedal linkage. Debris may accumulate around the foot pedal. The foot pedal must be kept clear of excessive dirt and debris in order to ensure proper activation of the pedal. Debris must be cleaned from the area around the pedal. This can be done after you remove the floor mat.

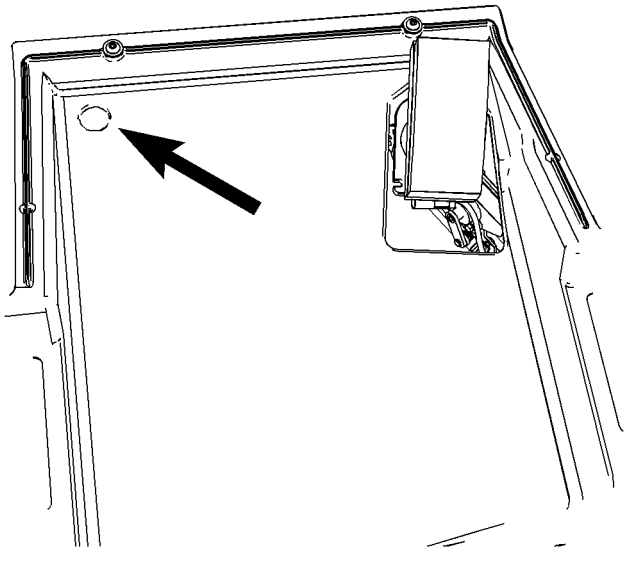


Illustration 136 g01312452

The drain on the left side of the machine

You can wash the floor of the cab with water. There is a drain in the front, left corner of the floor of the cab.

i02807909

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044-NL

⚠ WARNING

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

NOTICE

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

This could result in damage to cooling system components.

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

Note: The machine was shipped from the factory with Extended Life Coolant (ELC) in the cooling system.

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

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

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

Allow the machine to cool before you change the coolant.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Raise the radiator guard. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

Note: The radiator cap is located on the right side of the radiator.

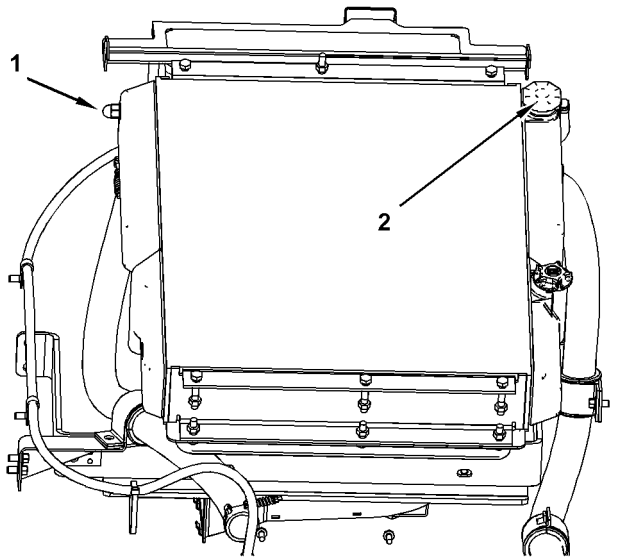


Illustration 137 g01210063

(1) Sight gauge
(2) Radiator cap

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

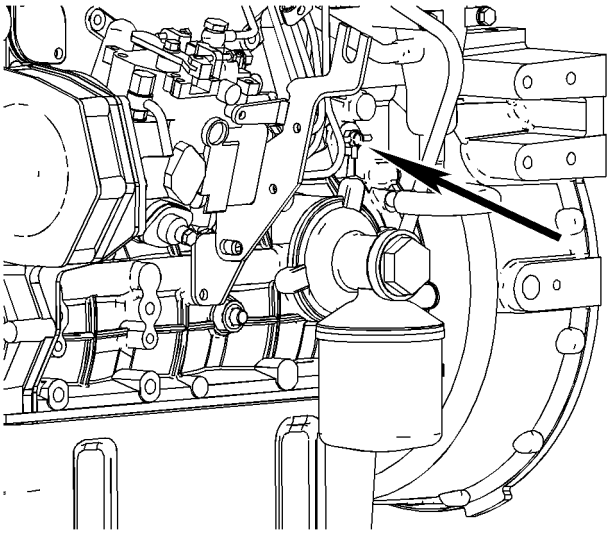


Illustration 138 g01279512

Coolant drain

4. Locate the drain hose for the coolant system. The drain hose is attached to the drain valve that is shown in illustration 138.

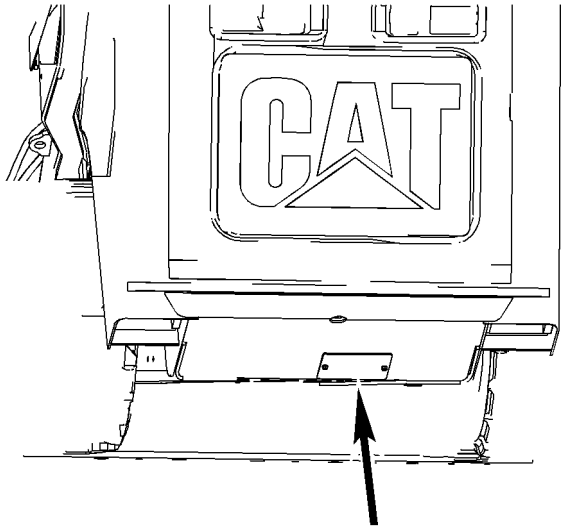


Illustration 139 g01264593

5. Remove the access panel under the rear of the machine. Pull the drain hose through the access hole.

6. Open the drain and allow the coolant to drain into a suitable container.

7. Close the drain.

8. Push the hose back into the engine compartment. Replace the access panel.

9. Replace the thermostat. See Operation and Maintenance Manual, “Cooling System Water Temperature Regulator - Replace” for the process for replacing the thermostat.

10. Add the coolant solution directly to the radiator. Do not use the coolant overflow reservoir as a filler for the coolant. Refer to Operation and Maintenance Manual, “Capacities - (Refill)”. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

Note: Premix the coolant solution before filling the cooling system. The coolant solution should contain 50 percent coolant and 50 percent distilled water.

Note: Add the coolant solution at a maximum rate of five liters per minute. This will reduce the chance of trapping air inside the engine block. A large amount of trapped air can cause localized heating to occur upon start-up. Localized heating may result in engine damage, which may lead to failure of the engine.

11. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes. If necessary, add coolant.

Note: The sight gauge for the coolant level is located on the left side of the radiator.

12. Check the coolant level in the sight gauge on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position.

13. Stop the engine. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.

14. Pull the radiator guard downward.

15. Close the engine access door.

i02417747

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

⚠ WARNING

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

When a Caterpillar Extended Life Coolant is used, an extender must be added to the cooling system periodically.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

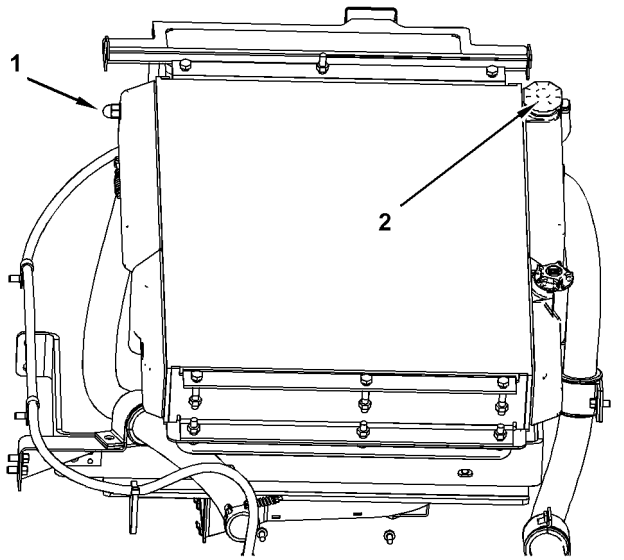


Illustration 140 g01210063

(1) Sight gauge
(2) Radiator cap

Note: The radiator cap is located on the right side of the radiator.

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

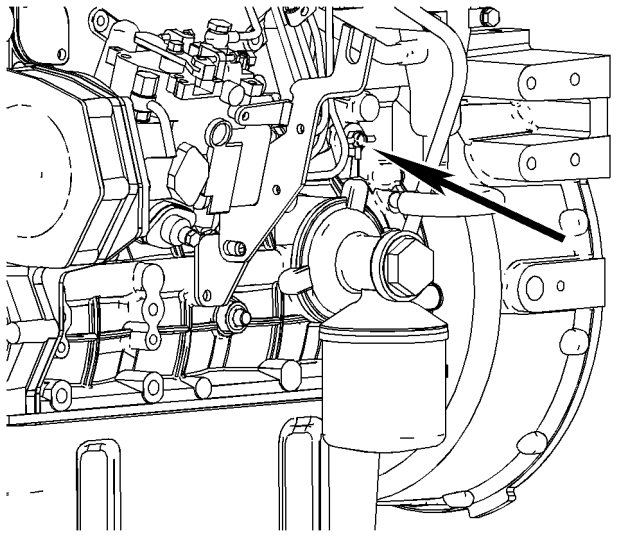


Illustration 141 g01279512

Coolant drain

4. If necessary, drain enough coolant from the radiator in order to allow the addition of the coolant additive.

5. Add 0.17 L (0.18 qt) of cooling system additive.

6. Inspect the radiator cap and the gasket. If the cap or the gasket is damaged, replace the cap. Install the radiator cap.

Note: The sight gauge for the coolant is located on the left side of the radiator on machines that are equipped with the 3044 engine.

7. Check the coolant level in the sight gauge on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position.

8. Add the extender directly to the radiator. Do not use the coolant overflow reservoir as a filler for the extender.

9. Tilt the radiator guard downward.

10. Close the engine access door.

For additional information on the addition of extender, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

i02664591

Cooling System Coolant Sample (Level 1) - Obtain

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

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

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

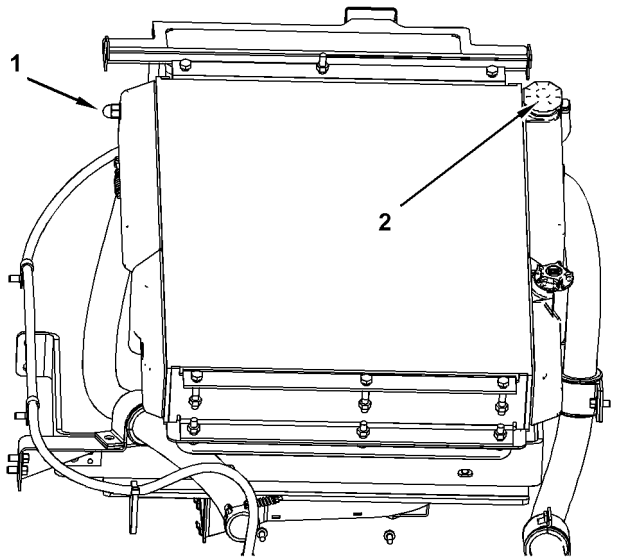


Illustration 142 g01210063

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

⚠ WARNING

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

Obtain the sample of the coolant from the radiator. When the system is cool, slowly remove the radiator cap (2).

Note: Do not take the sample from the Coolant Overflow Reservoir.

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:

- Keep the unused sampling bottles stored in plastic bags.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Use a designated pump to collect the sample in order to avoid contamination.
- Obtain coolant samples directly from the coolant tank. You should not obtain the samples from any other location.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- 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.

i02664598

Cooling System Coolant Sample (Level 2) - Obtain

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

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

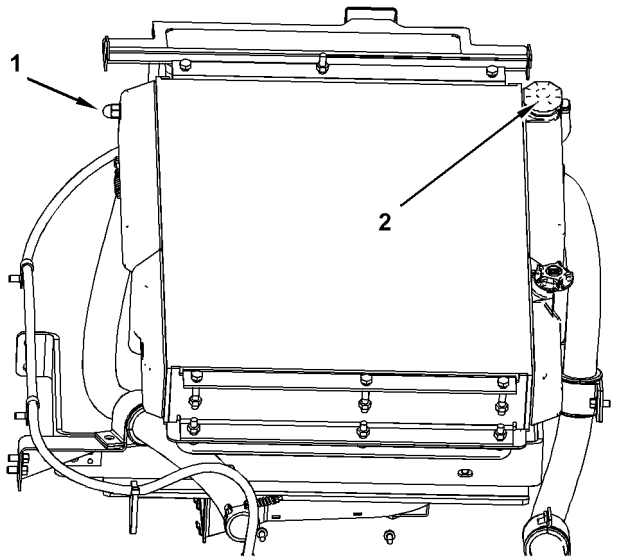


Illustration 143 g01210063

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

⚠ WARNING

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

Obtain the sample of the coolant from the radiator. When the system is cool, slowly remove the radiator cap (2).

Note: Do not take the sample from the Coolant Overflow Reservoir.

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.

i02417701

Cooling System Level - Check

SMCS Code: 1350-040-HX; 1350-535-FLV; 1382-070; 1382-510

⚠ WARNING

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

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Tilt the radiator guard upward.

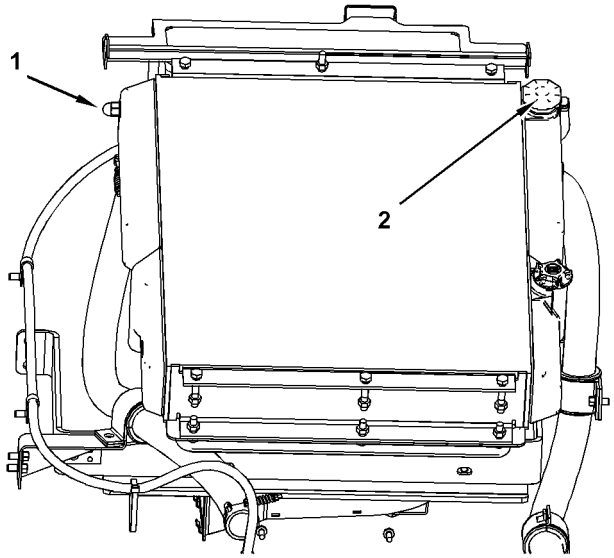


Illustration 144 g01210063

(1) Sight gauge
(2) Radiator cap

3. Check the coolant level in the sight gauge (1) on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position. If you need to add coolant, add the coolant directly to the radiator. Remove the radiator cap (2) slowly in order to relieve system pressure.

Note: The radiator cap is located on the right side of the radiator. Inspect the cooling system hoses for any leaks, cracks, or signs of deterioration. Replace any damaged hoses.

4. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.

5. Tilt the radiator guard downward.

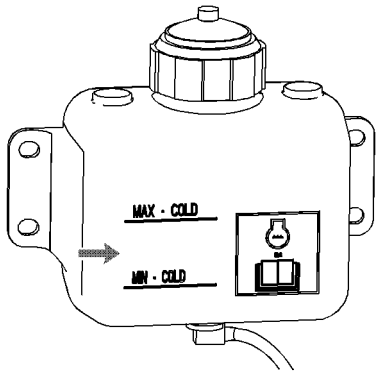


Illustration 145 g01018341

6. The coolant overflow reservoir is located on the rear door. Maintain the coolant level in the coolant overflow reservoir between the “MIN” and “MAX” lines.

7. Close the engine access door.

i03880044

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

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

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

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

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Drain the coolant from the machine. See Operation and Maintenance Manual, “Cooling System Coolant (ELC) - Change” for the procedure to drain the cooling system.

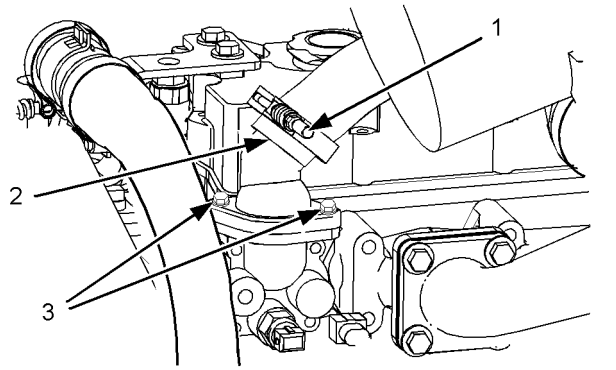


Illustration 146 g01018412
C2.2

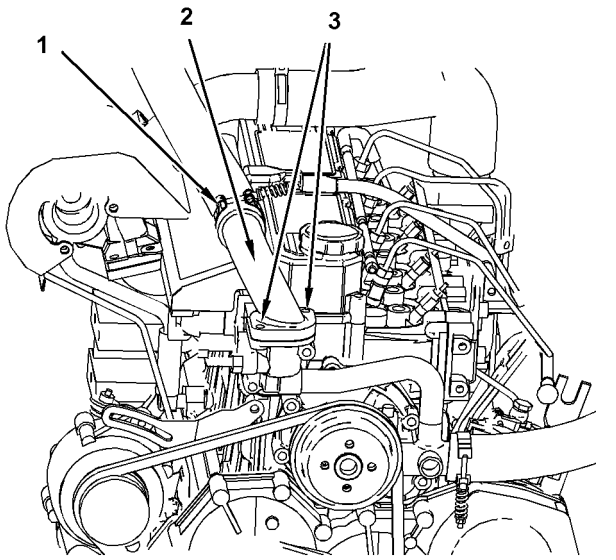


Illustration 147 g01210045
C3.4

3. Loosen the hose clamp (1) and remove the hose from the thermostat housing assembly (2).

4. Remove the two bolts (3) from the thermostat housing assembly. Remove the thermostat housing assembly.

5. Remove the seal and the thermostat from the thermostat housing assembly.

6. Install a new thermostat and a new seal. Install the thermostat housing assembly on the engine cylinder head.

7. Install the hose. Tighten the hose clamp.

8. Refill the cooling system. Refer to Operation and Maintenance Manual, “Capacities - (Refill)”. Refer to Operation and Maintenance Manual, “Cooling System Coolant (ELC) - Change” for information about refilling the cooling system. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluid Recommendations” for coolant information.

9. Close the engine access door.

i02417909

Engine Air Filter Primary Element - Clean/Replace

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

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

NOTICE
Caterpillar recommends certified air filter cleaning services that are available at 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.

Service the air filter elements when the alert indicator for air filter restriction lights. Refer to Operation and Maintenance Manual, “Alert Indicators” for information about the indicator.

Clean

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

1. Open the engine access door.

2. The air filter housing is located on the right side of the engine compartment.

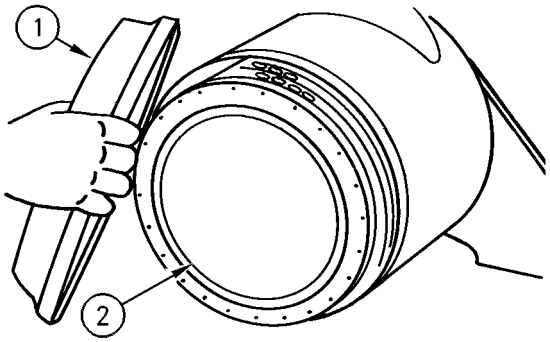


Illustration 148 g00101864

3. Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.

4. Remove the primary filter element (2).

5. If it is appropriate, clean the primary filter element. Use air pressure to clean the primary filter elements. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

Note: When the primary filter elements are cleaned, always begin with the inside in order to force dirt particles toward the 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 filter element.

6. Inspect the cleaned, 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.

Note: 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.

7. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.

8. Install the primary filter element into the filter housing.

9. Install the cover for the filter housing.

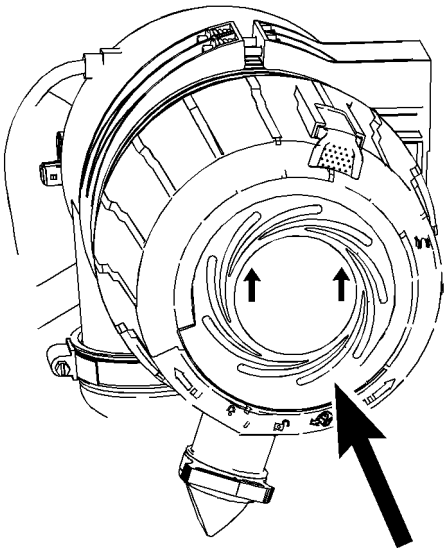


Illustration 149 g01276795

10. Rotate the cover clockwise and latch the cover.

Note: Make sure that the cover is properly positioned. The arrows on the air filter cover should point upward when the cover is in the locked position.

11. Close the engine access door.

12. Start the engine. The alert indicator for air filter restriction should turn off. If the alert indicator continues to light, replace the secondary air filter. Refer to Operation and Maintenance Manual, “Engine Air Filter Secondary Element - Replace”.

Replace

The primary filter element should be replaced at least one time per year. **You can clean the primary filter up to three times.**

1. Open the engine access door.

2. The air filter housing is located on the right side of the engine compartment.

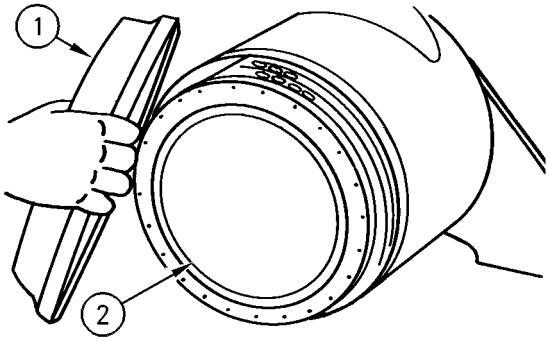


Illustration 150 g00101864

3. Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.

4. Remove the primary filter element (2).

5. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.

6. Install a new primary filter element into the filter housing.

7. Install the cover for the filter housing.

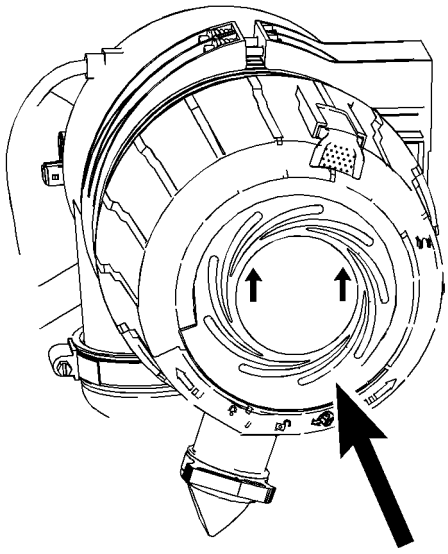


Illustration 151 g01276795

8. Rotate the cover clockwise and latch the cover.

Note: Make sure that the cover is properly positioned. The arrows on the air filter cover should point upward when the cover is in the locked position.

9. Close the engine access door.

10. Start the engine. The alert indicator for air filter restriction should turn off. If the alert indicator continues to light, replace the secondary air filter. Refer to Operation and Maintenance Manual, “Engine Air Filter Secondary Element - Replace”.

i02417939

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

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

When the primary filter element is cleaned for the third time, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the restricted Air Filter indicator comes on after the installation of a clean primary filter element or if the exhaust smoke is still black.

1. Open the engine access door.

2. The air filter housing is located on the right side of the engine compartment.

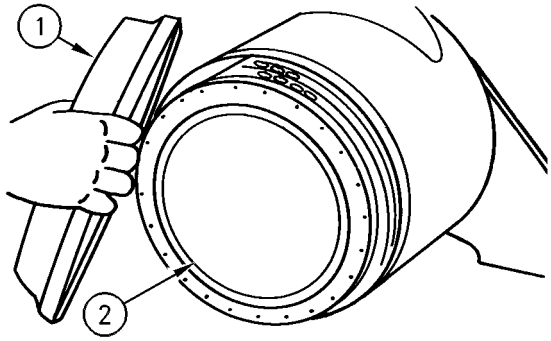


Illustration 152 g00101864

3. Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.

4. Remove the primary filter element (2).

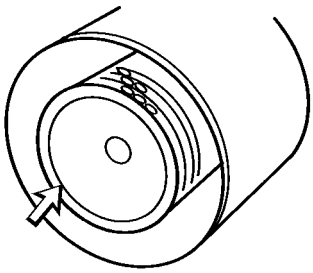


Illustration 153 g00038606

5. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.

6. Remove the secondary filter element.

7. Cover the air inlet opening.

8. Clean the inside of the air cleaner housing with a damp cloth, if necessary. Do not use compressed air to clean the housing.

9. Uncover the air inlet opening.

10. Install a new secondary element.

11. Install the primary element.

12. Install the cover for the filter housing.

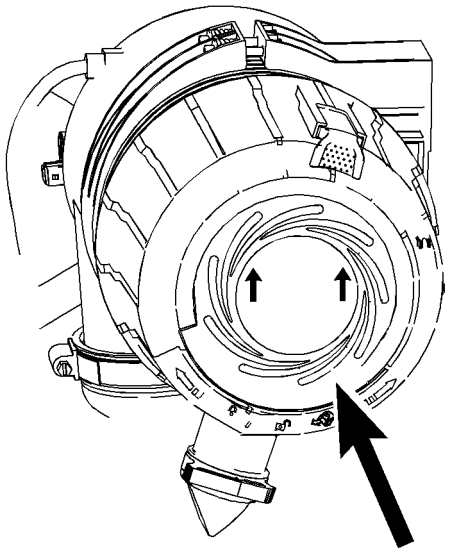


Illustration 154 g01276795

13. Rotate the cover clockwise and latch the cover.

Note: Make sure that the cover is properly positioned. The arrows on the air filter cover should point upward when the cover is in the locked position.

14. Close the engine access door.

i02520141

Engine Compartment - Clean

SMCS Code: 1000-070

Inspect the engine compartment for dirt buildup or debris. Remove any dirt or debris from the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

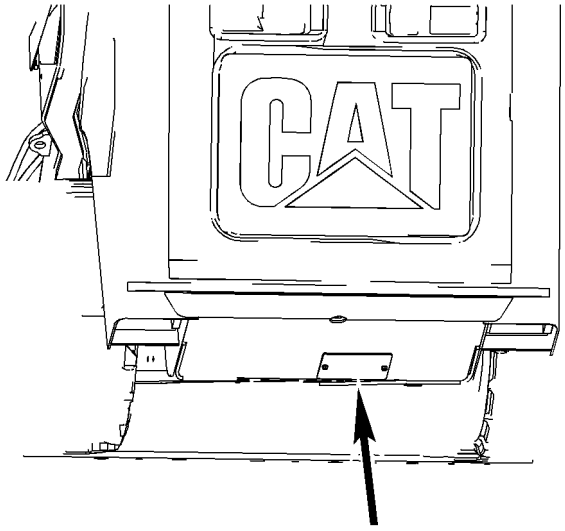


Illustration 155 g01264593

2. Remove any debris or dirt from the engine compartment. If necessary, remove the access panel in order to clean out the engine compartment.

Note: Use care when you clean the engine compartment. Damage to the machine may occur.

3. Install the access panel. Close the engine access door.

i02417992

Engine Oil Level - Check

SMCS Code: 1348-535-FLV

NOTICE
Do not overfill the crankcase. Engine damage can result.

1. Stop the engine and allow the oil to drain back into the oil pan.

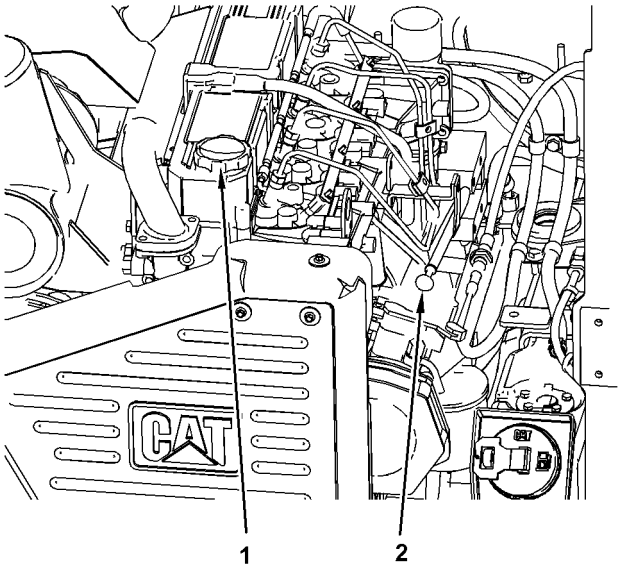


Illustration 156 g01209758

(1) Oil Filler Cap
(2) Dipstick

2. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

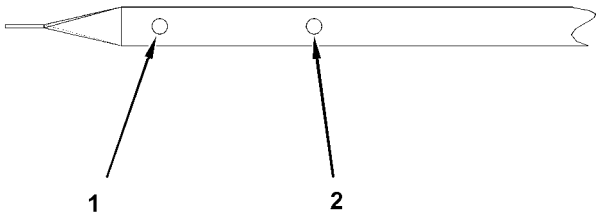


Illustration 157 g01277108

(1) Oil level add mark
(2) Full mark

3. Maintain the oil level between the “ADD” (1) mark and the “FULL” (2) mark on the dipstick.

4. If oil is necessary, tilt the radiator upward. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

5. Remove the oil filler cap (1) and add oil.

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

7. Tilt the radiator downward.

8. Close the engine access door.

i02743337

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

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 Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

The normal oil change interval for the machine is Every 500 Service Hours or every year when the following conditions are met:

- Use an engine oil in the Operation and Maintenance Manual, “Lubricant Viscosities”.
- Caterpillar filters are used.
- The altitude does not exceed 2300 m (7545 ft).
- Sulfur content in the fuel is between 0.05% and 0.50%.

An oil change interval of Every 250 Service Hours or every six months is required when the following conditions occur:

- Use an engine oil in the Operation and Maintenance Manual, “Lubricant Viscosities”.
- The altitude exceeds 2300 m (7545 ft).
- Sulfur content in the fuel is between 0.50% and 1.00%.

An oil change interval of Every 125 Service Hours is required when the following condition occurs:

- Sulfur content in the fuel is above 1.00%.

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

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Tilt the radiator upward. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

Note: The crankcase drain is located on the right side of the oil pan.

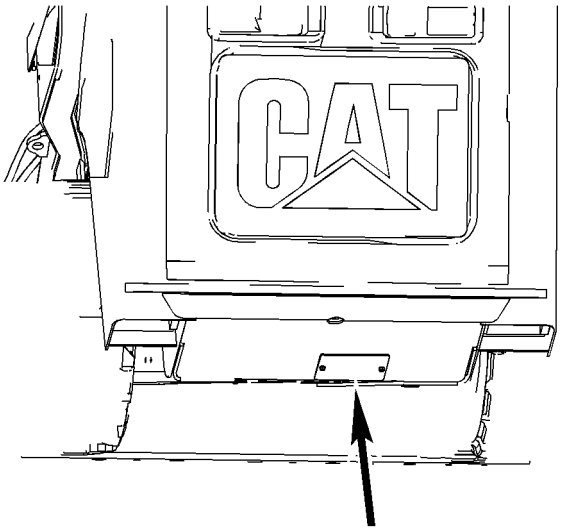


Illustration 158 g01264593

3. Remove the access panel that is located below the drain plug. Remove the drain plug and allow the oil to drain into a suitable container. Install the drain plug and install the access panel.

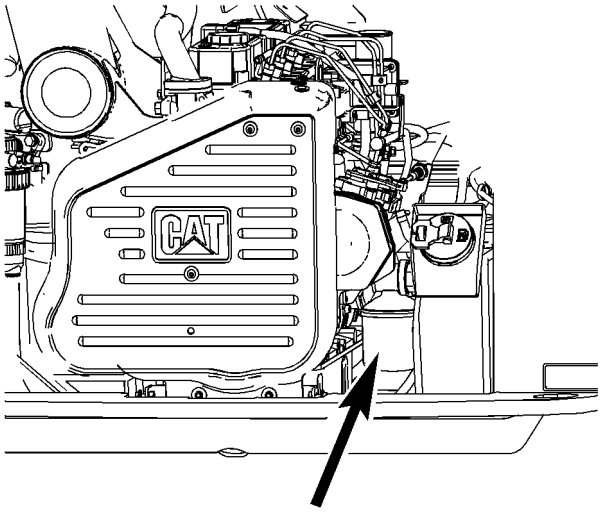


Illustration 159 g01209695

4. Remove the filter element with a 187-2718 Filter Wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect” in order to inspect the used filter for debris.

5. Apply a thin film of clean engine oil to the sealing surface of the new filter element.

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

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

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

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

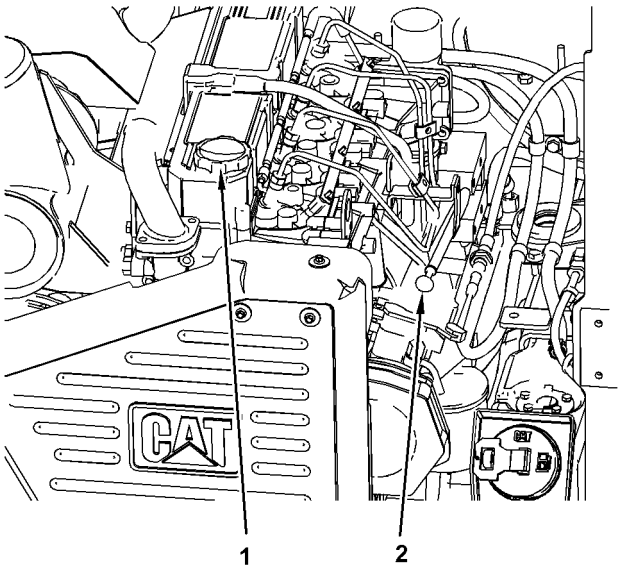


Illustration 160 g01209758

(1) Oil Filler Cap
(2) Dipstick

8. Remove the oil filler cap (1). Fill the crankcase with new oil. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Refill Capacities” for information about the oil. Clean the oil filler plug and install the oil filler plug.

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

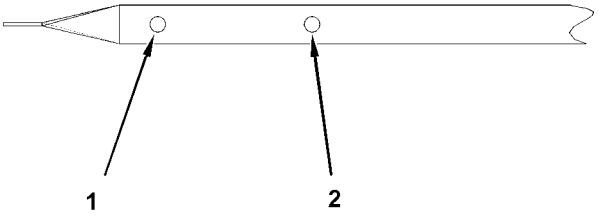


Illustration 161 g01277108

(1) Oil level add mark
(2) Full mark

10. Stop the engine and allow the oil to drain back into the oil pan. Fill the crankcase to the “FULL” mark (2) on the dipstick. **Do not exceed the “FULL” mark on the dipstick.** Add oil or drain oil if it is necessary.

11. Tilt the radiator downward.

12. Close the engine access door.

i01020861

Engine Valve Lash - Check

SMCS Code: 1105-025

Refer to the Service Manual for the complete adjustment procedure for the engine valve lash.

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

i02808037

Equipment Lowering Control Valve - Check

SMCS Code: 5147-MA

⚠ WARNING

Personal injury or death can result from a work tool falling.

Keep personnel away from the front of the machine when lowering the work tool.

Before lowering any equipment, clear the area around the equipment of all personnel.

1. Lower arms to the fully lowered position. Turn the keyswitch to the OFF position.
2. Slide the seat forward. Slide the left hand armrest forward.

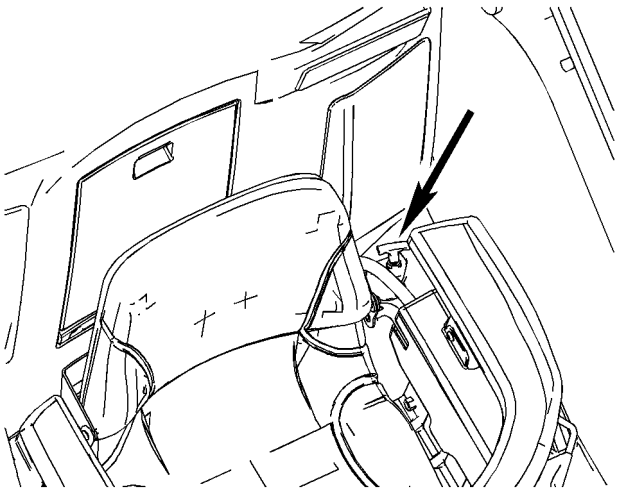


Illustration 162 g01400888

3. Pull up on the red handle in order to fully actuate the valve.
4. Push the red handle to the original position. Ensure that the handle is fully seated.

i02939717

Final Drive Oil - Change

SMCS Code: 4050-044-OC

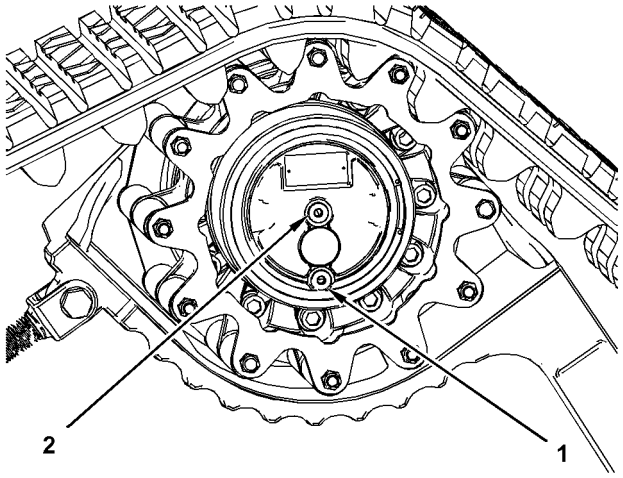


Illustration 163 g01291697

(1) Oil fill/drain plug
(2) Oil check plug

1. Position one final drive so that the oil fill/drain plug (1) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

2. Use an 8 mm (5/16 inch) allen wrench. Remove the oil plugs (1) and (2). Allow the oil to drain into a suitable container.
3. Check the drained oil for metal chips or for particles. If there are any chips or particles, consult your Caterpillar dealer.

Note: Dispose of drained fluids according to local regulations.

4. Clean the plugs and inspect the plugs. Replace a worn plug or a damaged plug.
5. Position the final drive so that the oil fill/drain plug (1) is at the top.

6. Add oil through the opening for the oil fill/drain plug (1) that is now at the top.

7. Fill the final drive to the bottom of the opening for the oil plug (2). Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

8. Install the oil plugs. Tighten the oil plugs to a torque of 27 ± 1 N·m (20 ± 0.7 lb ft).

9. Perform Step 1 to Step 8 on the other final drive.

10. Completely remove any oil that has spilled.

11. Start the engine and allow the final drives to operate through several cycles.

12. Stop the engine.

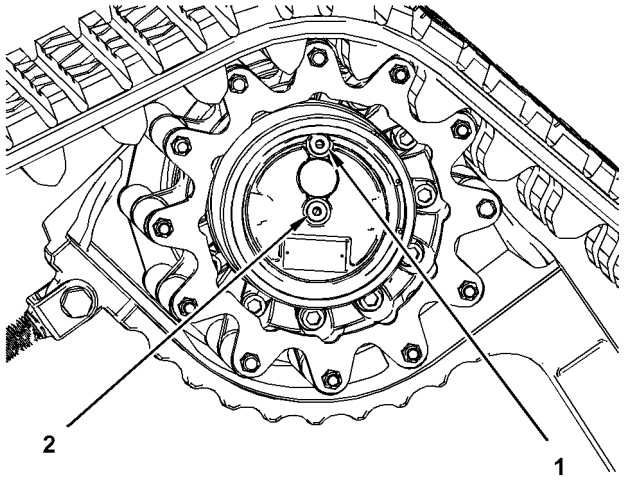
13. Check the oil level.

14. Maintain the oil level to the bottom of the opening for the oil check plug (2).

i02939714

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV



g01457026

Illustration 164

(1) Oil fill/drain plug
(2) Oil check plug

1. Position one final drive so that the oil fill/drain plug (1) is at the top.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Use an 8 mm (5/16 inch) allen wrench. Remove the oil check plug (2).

3. Check the oil level. The oil should be near the bottom of the opening for the oil check plug (2).

4. Add oil through the opening for the oil fill/drain plug (1), if necessary.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive. This may contaminate the final drive.

5. Clean the oil plugs.

6. Install the oil plugs. Tighten the oil plugs to a torque of 27 ± 1 N·m (20 ± 0.7 lb ft).

7. Repeat the procedure for the other final drive.

i00916186

Fuel Injection Timing - Check

SMCS Code: 1251-531

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

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

Refer to the Service Manual for the complete adjustment procedure for the fuel injection timing. Refer to your Caterpillar dealer for the complete adjustment procedure for the fuel injection timing.

i02520136

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

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

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

Dispose of all fluids according to local regulations and mandates.

The fuel system water separator is located in the left side of the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

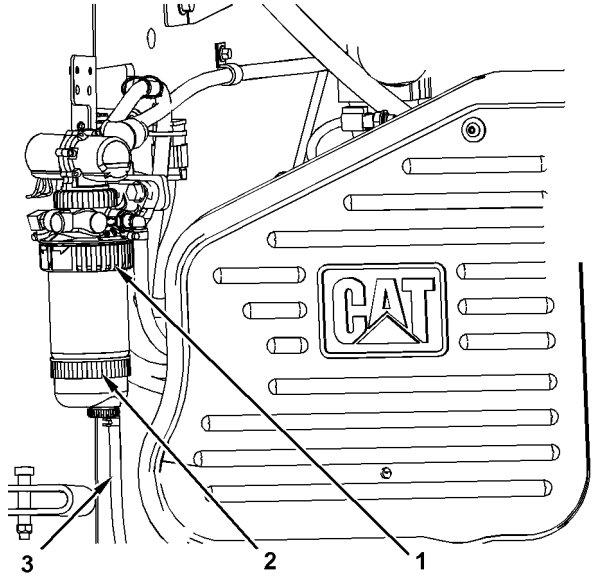


Illustration 165 g01264527

The Fuel Filter/Water Separator is located on the left side of the engine compartment.

2. Insert the drain hose (3) into a suitable container. Loosen the drain valve on the bottom of the water separator.
3. Tighten the drain valve by hand. Do not tighten the drain valve with a tool. Damage to the valve or to the seals may occur.
4. Close the engine access door.
5. Dispose of the water and sediment according to local regulations.

i02520124

Fuel System Primary Filter (Water Separator) Element - Replace

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

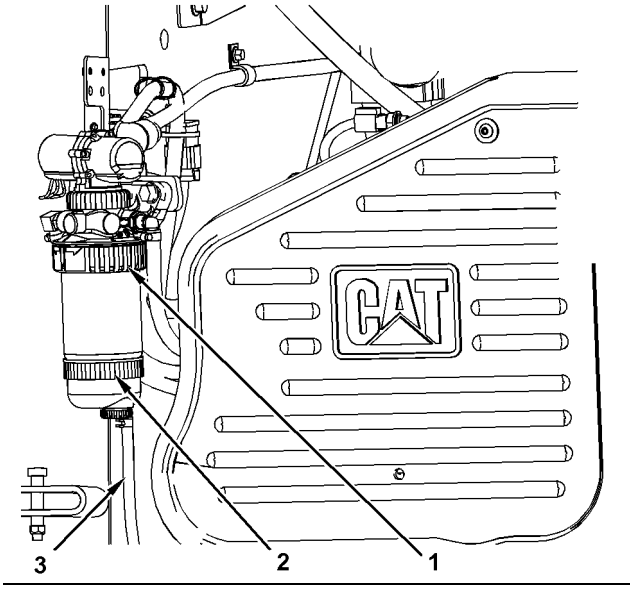
NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

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

Dispose of all fluids according to local regulations and mandates.

Note: This unit has a dual purpose. The element serves as a water separator and a fuel filter.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.



g01264527

Illustration 166

The Fuel Filter/Water Separator is located on the left side of the engine compartment.

2. Open the drain on the fuel filter/water separator (3). Allow the water and fuel to drain into a suitable container.

3. Close the drain valve by hand. Do not tighten the drain valve with a tool. Damage to the valve or to the seals may occur.

4. Support the fuel filter/water separator and rotate the locking ring (1) counterclockwise. Remove the fuel filter/water separator.

5. Rotate the locking ring (2) counterclockwise. Remove the bowl assembly.

6. Clean the mounting base for the fuel filter/water separator.

7. Clean the bowl assembly for the fuel/water separator.

8. Install the bowl assembly onto the new fuel/water separator and rotate the locking ring clockwise.

9. Install the new fuel filter/water separator onto the mounting base. Rotate the locking ring clockwise in order to fasten the fuel filter/water separator to the mounting base.

10. Prime the fuel system in order to fill the fuel filter/water separator with fuel. Refer to Operation and Maintenance Manual, “Fuel System Priming Pump - Operate”.

11. Close the engine access door.

i02418180

Fuel System Priming Pump - Operate

SMCS Code: 1258-548

This machine is equipped with a fuel transfer pump that is electric. Two examples that may cause the fuel system to lose prime are listed here:

- The machine runs completely out of fuel.
- The Fuel System Filter/Water Separator Element is replaced.

Follow the steps below in order to prime the fuel system.

1. Ensure that the engine start switch is in the OFF position. Turn the engine start switch to the ON position.

Note: Do not start the engine. This operation only starts the fuel pump.

2. Locate the Primary Fuel Filter. This is located in the left side of the engine compartment.

3. Examine the clear bowl. The bowl must be completely full of fuel. If the bowl is not full of fuel, repeat Steps 1 and 2.

4. Attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate the engine at low idle until the engine runs smoothly.

Note: If the engine fails to start or if the engine continues to misfire or smoke, stop the engine and repeat the procedure. If the problem persists after repeating the procedure, consult your Caterpillar dealer.

i01819309

Fuel Tank Cap - Clean

SMCS Code: 1273-070-Z2

1. Remove the fuel cap.

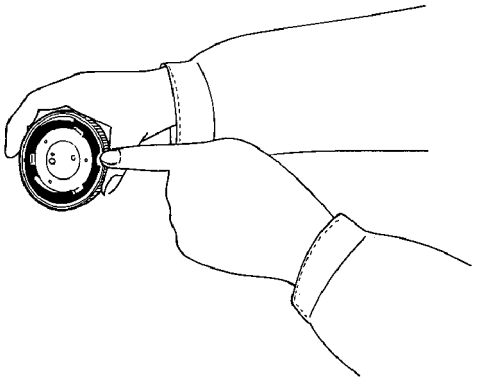


Illustration 167 g00104238

2. Inspect the cap. Replace the cap if the cap is damaged.

3. Wash the fuel cap in a clean, nonflammable solvent and dry the fuel cap.

4. Put a light coating of fuel on the cap gasket.

5. Install the fuel cap.

i02418544

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

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

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

Dispose of all fluids according to local regulations and mandates.

Note: Drain the water and the sediment from the fuel tank when the tank is almost empty.

1. Slowly remove the fuel tank cap in order to allow the tank to vent while you drain the tank.

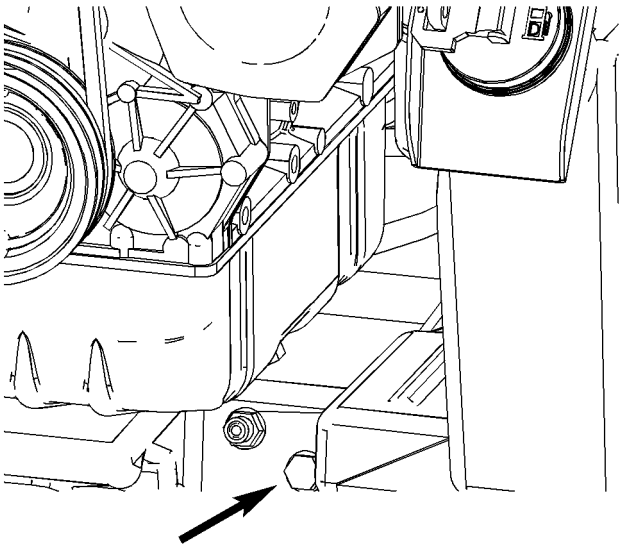


Illustration 168 g01209601

2. The fuel tank drain plug is located on the bottom of the fuel tank in the engine compartment on the right side of the machine. Remove the plug.

3. Allow the water and the sediment to drain into a suitable container.

4. Install the fuel tank drain plug.

Note: Apply 5P-3413 Pipe Sealant to the threads on the drain plug.

5. Install the fuel tank cap.

i02417559

Fuses - Replace

SMCS Code: 1417-510; 1417; 7528

Fuses

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

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

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

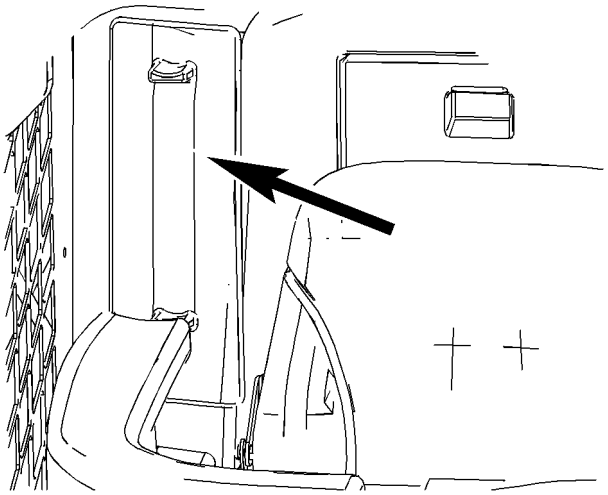


Illustration 169 g01287527

The fuse panel is located behind the seat on the right side.

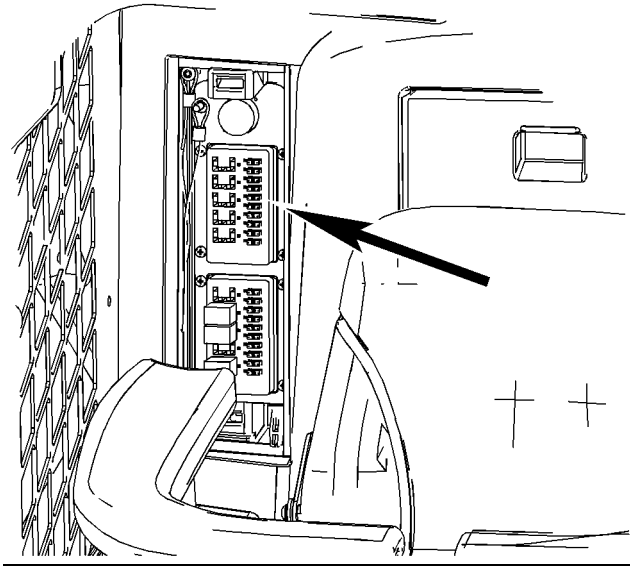


Illustration 170 g01210555

Remove the cover in order to access the fuse panel.

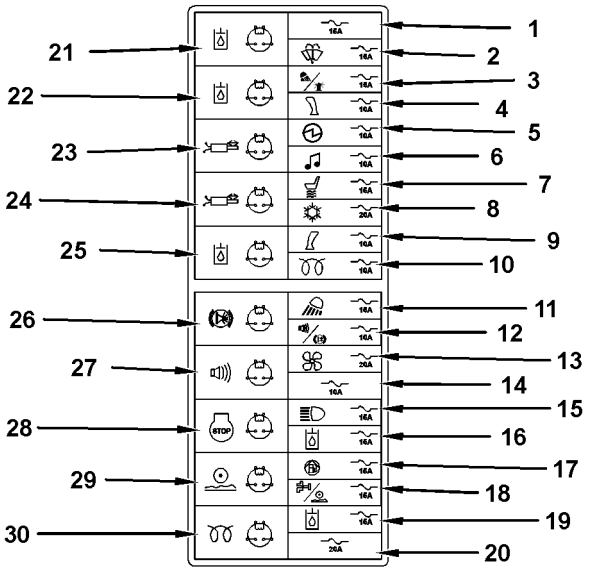


Illustration 171 g01262480

The following is a list of the fuses in the panel:

1 – Spare

2 – Wiper

3 – Front Work Lights and Beacon

4 – Right Joystick

5 – 12 volt power socket

6 – Radio

7 – Solenoid for the Compressor

8 – Air Conditioner

9 – Left Joystick

10 – Cold Start

11 – Rear Work Lights

12 – Backup Alarm and Brake Lights

13 – HVAC Blower Fan

14 – Spare

15 – Headlights

16 – Hydraulic Solenoid

17 – Fuel Shutoff and Secondary Engine Shutoff

18 – Hydraulic Quick Coupler

19 – Hydraulic Solenoid

20 – Spare

Solenoids

21 – Auxiliary Electrical Control “AUX6(C1)”

22 – Auxiliary Electrical Control “AUX5(C2)”

23 – Secondary Auxiliary Electrical Control “(C+)”

24 – Secondary Auxiliary Electrical Control “(C−)”

25 – Auxiliary Electrical Control “AUX7”

26 – Stop Lamp

27 – Backup Alarm

28 – Fuel Shutoff

29 – Self-Level and Ride Control

30 – Glow Plugs

Main Fuse

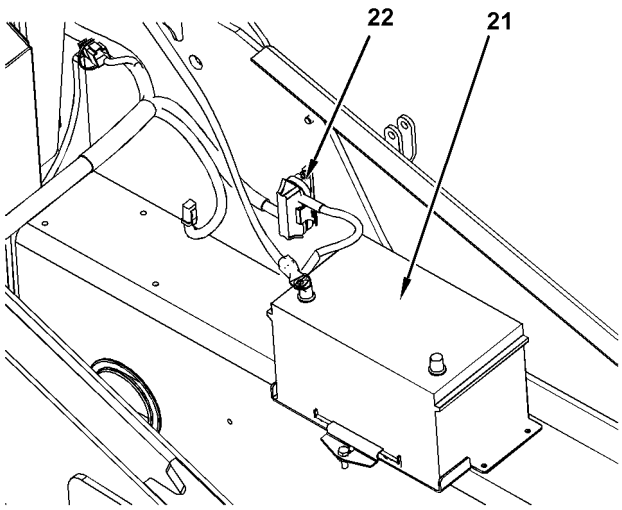


Illustration 172 g01279310

(21) Battery
(22) Main fuse

The main fuse (22) is located behind the battery (21) on the left side of the machine under the cab. This is a 105 amp fuse. You must disconnect the negative battery cable before you replace this fuse.

Fuse panel behind cab

There is an additional fuse panel behind the cab on the right side of the machine.

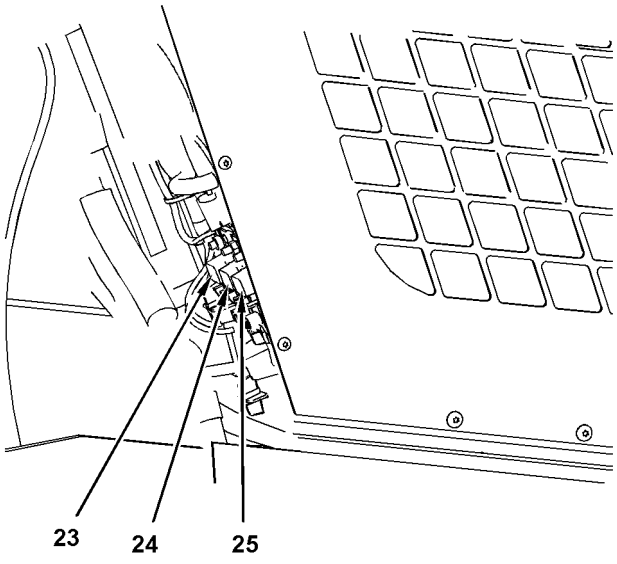


Illustration 173 g01279419

(23) First Pair
(24) Second Pair
(25) Third Pair

This panel has 6 fuses. In order to change these fuses, push up on the locking tab on the fuse cover. Pull the cover away from the back of the cab.

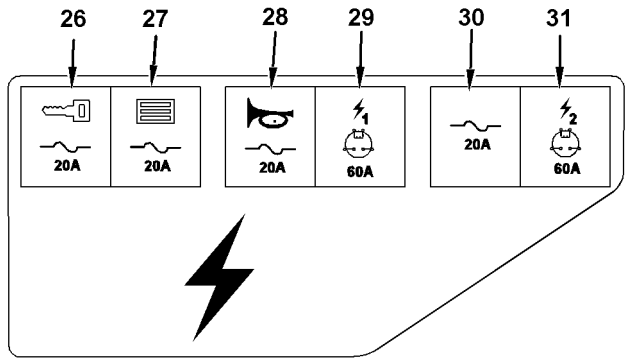


Illustration 174 g01279483

26 – Ignition switch

27 – ECM

28 – Horn

29 – Main power relay 1

30 – Miscellaneous cab accessories

31 – Main power relay 2

i03741200

Hydraulic System Oil - Change

SMCS Code: 5095-044

Selection of the Oil Change Interval

Your machine may be able to use a 4000 hour interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is 2000 hours. The oil should be monitored during intervals of 500 hours. The extended 4000 hour interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Caterpillar machine hydraulic and hydrostatic transmission systems when ambient temperature is between −20 °C (−4 °F) and 40 °C (104 °F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Caterpillar oil filters are recommended. The interval for changing the oil filter should be 500 hours.

Oil

The 6000 hour interval for changing the oil is specific to HYDO Advance 10.

The 4000 hour interval for changing the oil is for the following oil types.

- Caterpillar Hydraulic Oil (HYDO)
- Caterpillar Transmission and Drive Train Oil (TDTO)
- Caterpillar TDTO-TMS
- Caterpillar Diesel Engine Oil
- Caterpillar Biodegradable Hydraulic Oils (HEES)
- Caterpillar Multipurpose Tractor Oil (MTO)
- Heavy-duty diesel engine oils with a minimum zinc content of 900 ppm

If Caterpillar oils cannot be used, use heavy-duty oils with the following classification: Caterpillar ECF-1, API CG-4, API CF, and TO-4. These oils must have a minimum zinc additive of 0.09 percent (900 ppm).

Note: Industrial hydraulic oils are not recommended in Caterpillar hydraulic systems.

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Caterpillar's standard SOS Fluids Analysis or an equivalent oil sampling program should be used.

The current guidelines for cleanliness of the oil should be observed. Refer to “Measured Data”.

If an oil sampling program is not available, the standard 2000 oil change interval should be used.

Measured Data

The following information should be monitored through sampling of the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- Significant changes in the following additives should be monitored: zinc, calcium, magnesium, and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 parts per million for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Caterpillar machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed the normal by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.

- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity of 100 °C (212 °F) oil should not exceed a change of more than 2 cSt from new oil.

Procedure for Changing the Hydraulic 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 Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

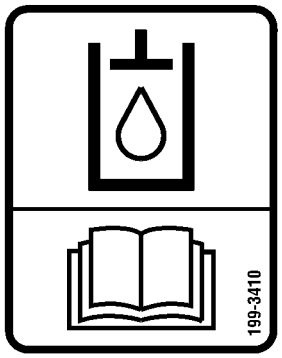


Illustration 175 g00956818

Note: This film is located near the hydraulic filler cap on machines that are filled with arctic oil.

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

⚠ WARNING

Personal injury or death can result without releasing all of the hydraulic pressure.

Release all the pressure from the hydraulic system before any lines are disconnected.

The machine should be on level ground. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine. Keep the armrest lowered. Turn the engine start switch key to the ON position. Push the parking brake switch. Move all of the joystick controls while you press several times on each side of the auxiliary hydraulic control (if equipped) in order to relieve hydraulic pressure. Move the engine start switch key to the OFF position.

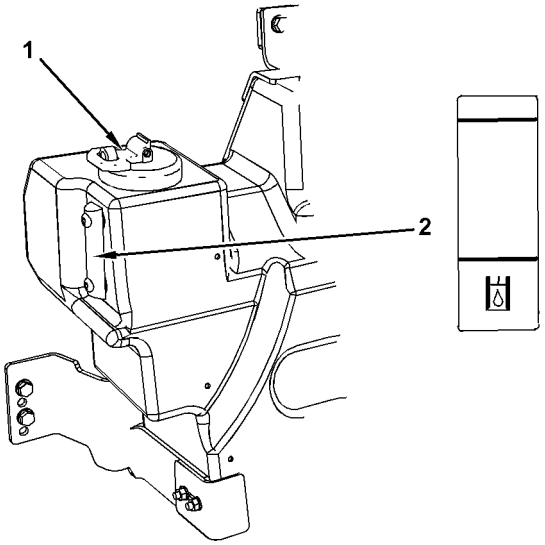


Illustration 176 g01280697

(1) Hydraulic Tank Filler Cap
(2) Sight Gauge

1. Remove the hydraulic tank filler cap (1).

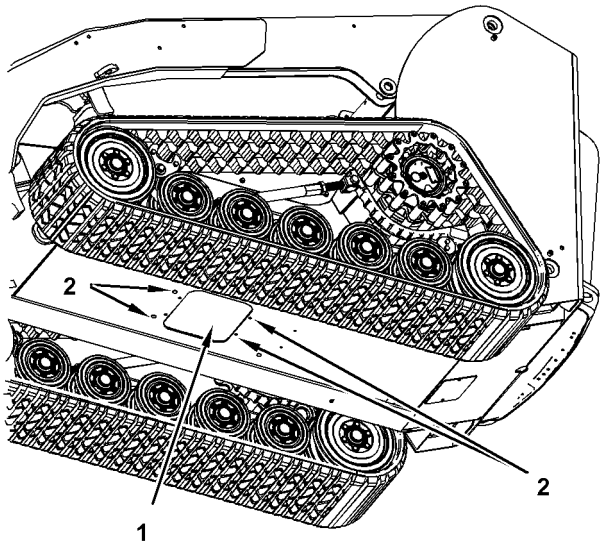


Illustration 177 g01291067

(1) Access panel
(2) Retaining bolts

2. Remove the access panel in the belly guard underneath the machine.

3. The hose is located on the right side. Pull the drain hose through the access hole in the belly guard. Remove the plug from the end of the drain hose. Drain the oil into a suitable container.

4. Install the drain plug into the drain hose. Tighten to 22 ± 3 N·m (16 ± 2 lb ft). Pull the drain hose back into the machine.

5. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Filter - Change”.

6. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

7. Maintain the hydraulic oil level approximately in the middle of the sight gauge (2).

   Check the oil level with the loader arms in the fully lowered position.

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

8. Install the hydraulic tank filler cap.

i02743340

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

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

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

Dispose of all fluids according to local regulations and mandates.

The hydraulic oil filter is located in the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Remove the hydraulic tank filler cap.

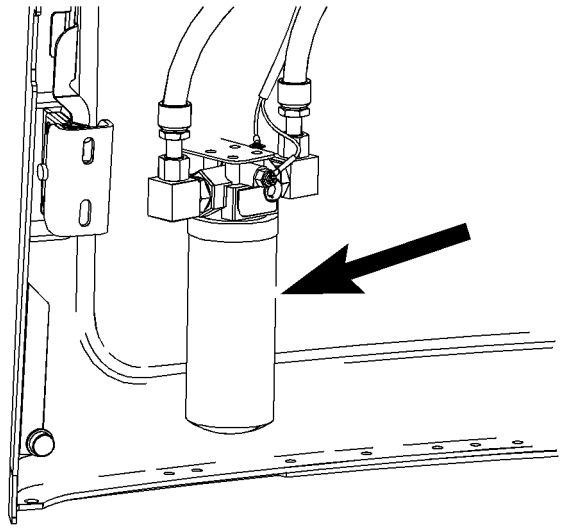


Illustration 178 g01209326
The hydraulic filter is located on the rear door.

3. Remove the filter with a strap type wrench.

Note: Place a suitable nonconductive container under the hydraulic oil filter. Use this container in order to catch any oil that may spill from the filter or the filter element mounting base.

4. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.

5. Apply a light coat of oil to the gasket of the new filter element gasket.

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

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

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

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

8. Maintain the hydraulic oil level to the middle of the sight gauge. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”. **Do not overfill the hydraulic tank.**

9. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the hydraulic tank filler cap, if necessary. Install the hydraulic tank filler cap.

10. Close the engine access door.

i02418557

Hydraulic System Oil Level - Check

SMCS Code: 5095-535-FLV

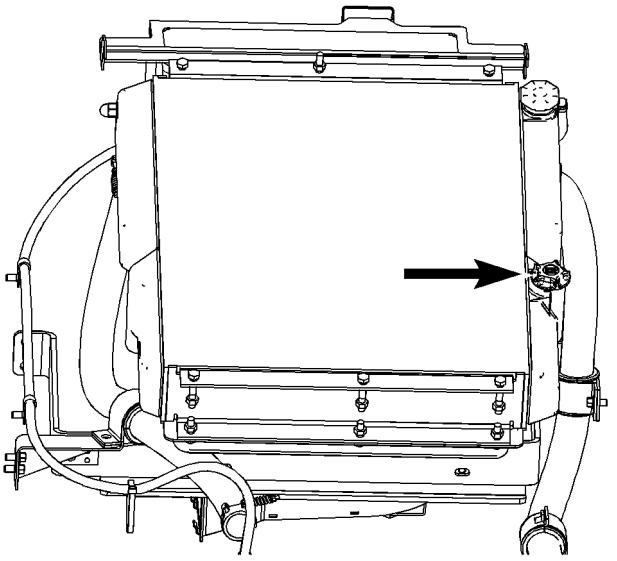


Illustration 179 g01306294

Filler for adding hydraulic oil

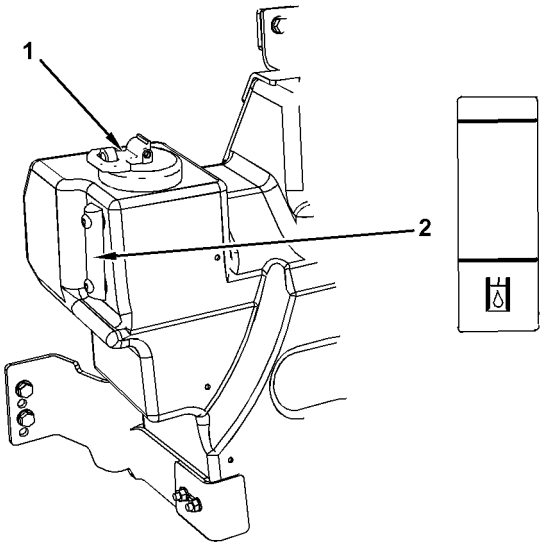


Illustration 180 g01280697

(2) Sight gauge on right side of tank

1. Park the machine on level ground.

2. Lower the work tool to the ground. Turn off the engine.

3. Wait for about five minutes before checking the level of the hydraulic oil.

4. Use the hydraulic oil filler on the radiator in order to top off the hydraulic oil.

5. Maintain the oil level to the middle of the two lines on the sight gauge. **Do not overfill the hydraulic tank.**

i02920120

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

Open the rear access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers” for information about the rear door.

Raise the radiator. Refer to Operation and Maintenance Manual, “Radiator Tilting” for information about the radiator.

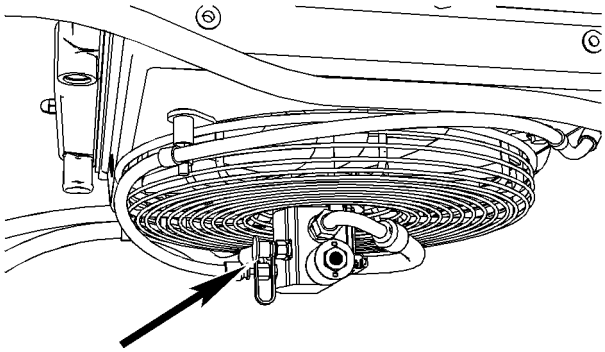


Illustration 181 g01280271

The sampling port for the hydraulic oil is located on the fan motor.

i02557991

Hydraulic Tank Breather - Replace

SMCS Code: 5050-510-BRE; 5056-510-BRE

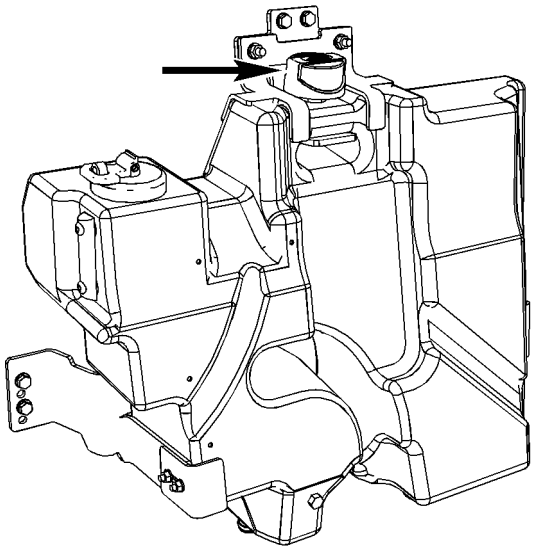


Illustration 182 g01280304

The breather for the hydraulic tank is located on the top of the hydraulic tank.

1. Raise the cab. Refer to Operation and Maintenance Manual, “Cab Tilting” for the procedure to raise the cab.
2. Remove the breather.
3. Install the new breather and tighten to 20 ± 3 N·m (15 ± 2 lb ft).

i02418559

Lift Arm and Cylinder Linkage - Lubricate

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

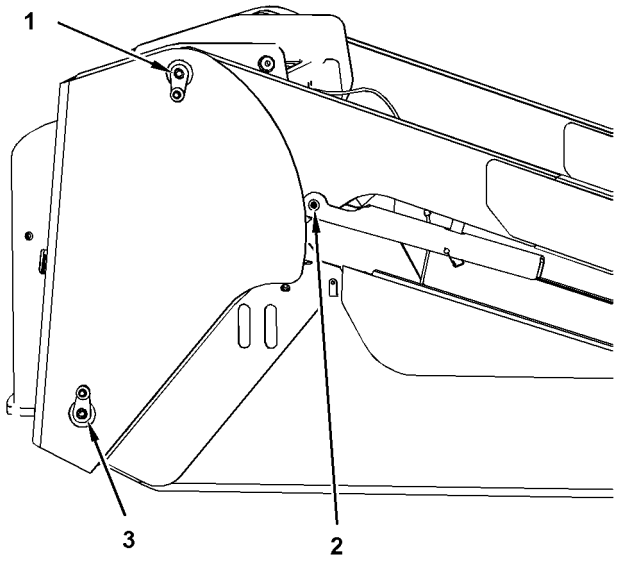


Illustration 183 g01210414

Radial Lift

(1) Lift Arm Pivot
(2) Lift Cylinder Rod End
(3) Head End Fitting

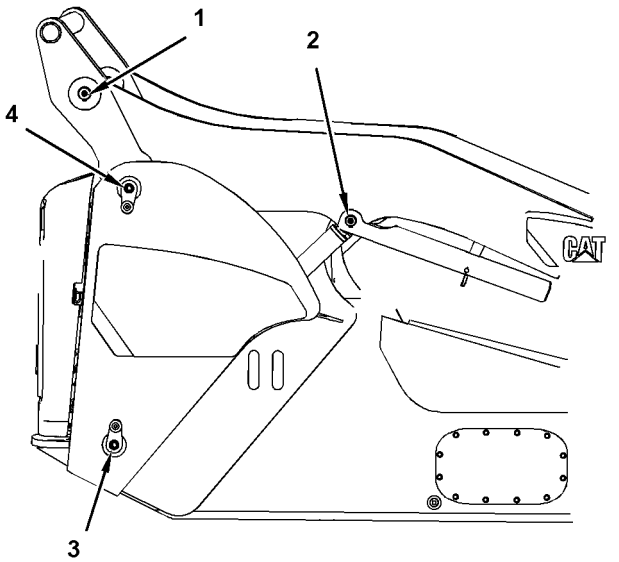


Illustration 184 g01210415

Vertical Lift

(1) Lift Arm Pivot
(2) Lift Cylinder Rod End
(3) Head End Fitting
(4) Link Arm

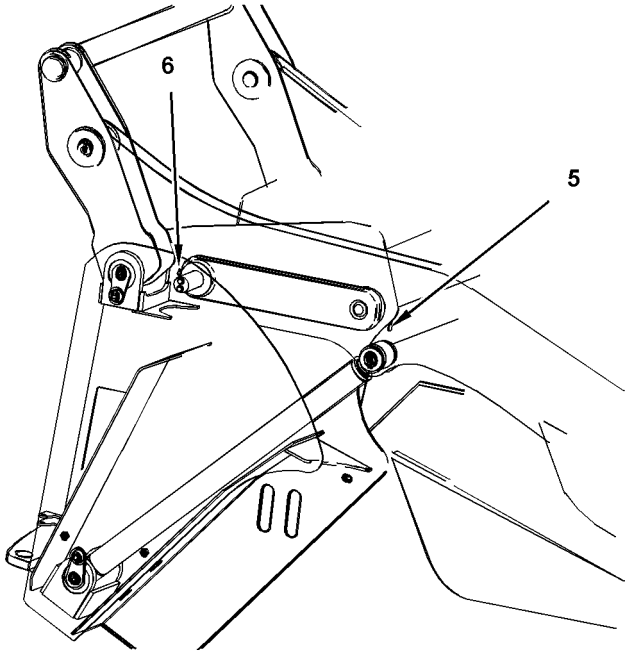


Illustration 185 g01210416

The Link Arm is located behind the loader arm.

(5) Mounting for Link Pin
(6) Rear of Link Arm

Apply lubricant to all the grease fittings on one side.

Repeat the process for the opposite side of the machine.

i02576463

Lower Machine Frame - Clean

SMCS Code: 7050-070

1. Tilt the cab upward. Refer to Operation and Maintenance Manual, “Cab Tilting”.

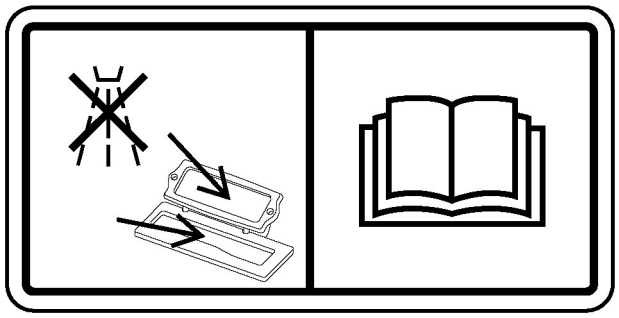


Illustration 186 g01270620

This film is located in the air duct.

NOTICE
Do not spray water or cleaning fluids into the ventilation ducts. Cover the opening in order to prevent foreign material or fluid from entering the ventilation ducts.

2. Seal the opening of the ventilation ducts with plastic.

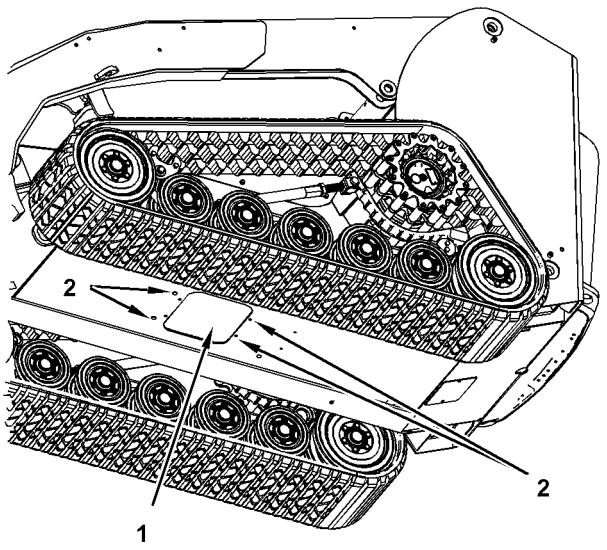


Illustration 187 g01291067

(1) Access panel
(2) Retaining bolts

3. The access panel (1) is located in the frame underneath the machine.

4. Remove the four retaining bolts (2).

5. Slide the panel forward or slide the panel rearward. Pull the panel downward and remove the access panel from the machine.

6. Remove any debris or dirt from the inside of the frame.

7. Reinstall the access panel.

8. Remove the cover from the ventilation ducts.

9. Tilt the cab downward.

i02106227

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

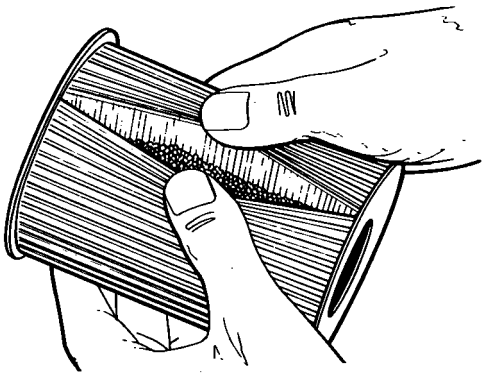


Illustration 188 g00100013

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.

i02634143

Quick Coupler - Clean/Inspect

SMCS Code: 6129-040; 6129-070

⚠ WARNING

Personal injury or death can result from improperly checking for a leak.

Always use a board or cardboard when checking for a leak. Escaping air or fluid under pressure, even a pin-hole size leak, can penetrate body tissue causing serious injury, and possible death.

If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury.

Note: Do not weld on the quick coupler without consulting your Caterpillar dealer.

1. Clean the quick coupler prior to inspection in order to properly inspect the quick coupler.

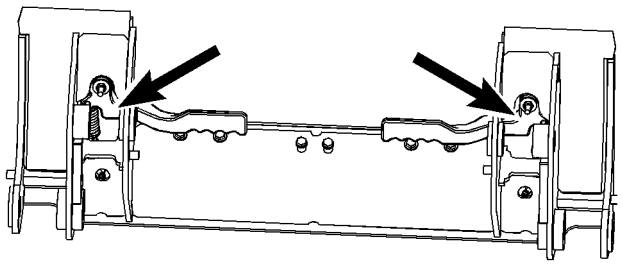


Illustration 189 g01322438

This is the back side of the quick coupler. The lift arm and the tilt cylinder are removed for clarity.

2. Tilt the quick coupler all the way forward in order to clean the debris away from the pins.

3. Move the quick coupler levers. Ensure that the levers are not bent or broken.

4. Make sure that the coupler pins extend through the bottom of the quick coupler assembly. Check the pins for wear and check the pins for damage.

5. Check the top edges of the quick coupler assembly for wear or for damage. Check the face of the quick coupler assembly for wear or for damage.

6. Inspect the components inside the quick coupler for the following problems:loose bolts, oil leaks, broken parts, missing parts, and cracked components

7. Inspect the hydraulic lines and the hydraulic fittings for damage or for wear. Repair any worn components or replace any worn components. Repair any leaking components.

8. Inspect the steel material of the quick coupler for cracks.

Note: Perform all repairs before placing the quick coupler back into operation.

i02575087

Radiator Core - Clean

SMCS Code: 1353-070-KO

The radiator is located at the rear of the machine above the engine compartment.

Note: Adjust the frequency of cleaning according to the effects of the operating environment. On models 272C and 297C, clean the aftercooler core when you clean the radiator core.

1. Stop the engine. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

NOTICE
When you are using compressed air or high pressure water to clean the radiator fins, ensure that the air or water is directed parallel to the fins. If the compressed air or high pressure water is not directed parallel to the radiator fins, the radiator fins could be bent or damaged.

Note: Pressurized air is the preferred method for removing loose debris. Hold the nozzle approximately 6 mm (0.25 inch) away from the fins. Slowly move the air nozzle in a direction that is parallel with the tubes. The air nozzle should point in the opposite direction of the flow of the fan. This will remove debris that is between the tubes. Pressurized water may also be used for cleaning. The maximum water pressure for cleaning purposes must be less than 275 kPa (40 psi). Use pressurized water in order to soften mud. Use a degreaser and steam for removal of oil and grease. Wash the core with detergent and hot water. Thoroughly rinse the core with clean water.

3. Clean the radiator core from the top toward the fan.

Note: If parts of the cooling system appear to be damaged or if parts of the cooling system are repaired, a leak test is highly recommended. Consult your Caterpillar dealer for the most current information about the cooling system.

4. After cleaning, start the engine and accelerate the engine to high idle rpm. This will help in the removal of debris and drying of the core. Stop the engine. Use a light bulb behind the core in order to inspect the core for cleanliness. Repeat the cleaning, if necessary.

5. Inspect the fins and tubes of the radiator core for damage. Some fins and tubes may be worn from abrasive material that has passed through the radiator core . Bent fins may be opened with a “comb”.

NOTICE
Do not clean a rotating fan with high pressure water. Fan blade failure can result.

6. Remove any dirt or debris from the fan, the fan hub, the oil cooler, the radiator guard and the fan guard.

Note: Dirt or debris on the cooling fan can cause an imbalance.

7. Tilt the radiator guard downward.

8. Close the engine access door.

i01968724

Refrigerant Dryer - Replace (If Equipped)

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.

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

Refer to Service Manual, SENR5664, “Air Conditioning and Heating R-134a For All Caterpillar Machines” for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

Note: The receiver-dryer must also be replaced when the air conditioning system is evacuated.

i02418592

Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect

SMCS Code: 7323-040; 7325-040

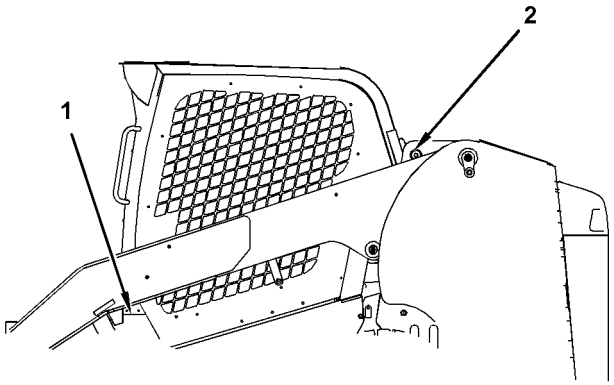


Illustration 190 g01280181

1. Inspect the ROPS for loose bolts. Tighten the bolts (1) to the following torque 125 ± 20 N·m (92 ± 15 lb ft). Check the hinge on the cab (2). Check the ROPS and the FOPS for damaged bolts or missing bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

2. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS emits a noise. Replace the ROPS mounting supports if the ROPS rattles. Refer to Operation and Maintenance Manual, “Cab Tilting” for a description of the mounting support.

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

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

Inspect the Flying Object Guard (if equipped) for damage.

Consult your Caterpillar dealer for repair of any cracks in the Flying Object Guard.

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.

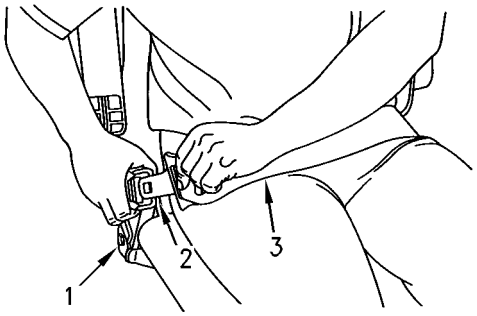


Illustration 191 g00932801

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.

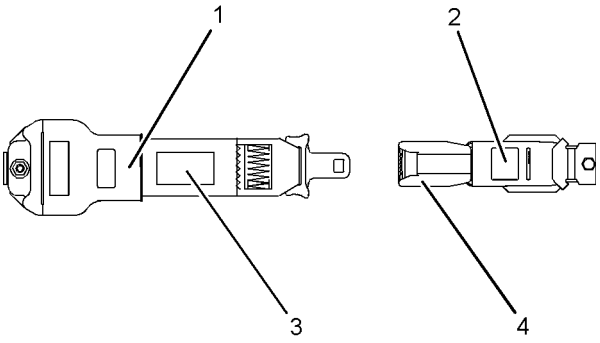


Illustration 192 g01152685

(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.

i02708298

Sprocket - Inspect

SMCS Code: 4164-040

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. It is important to clean the undercarriage of the machine daily in order to maximize component life. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.

Remove the Sprocket

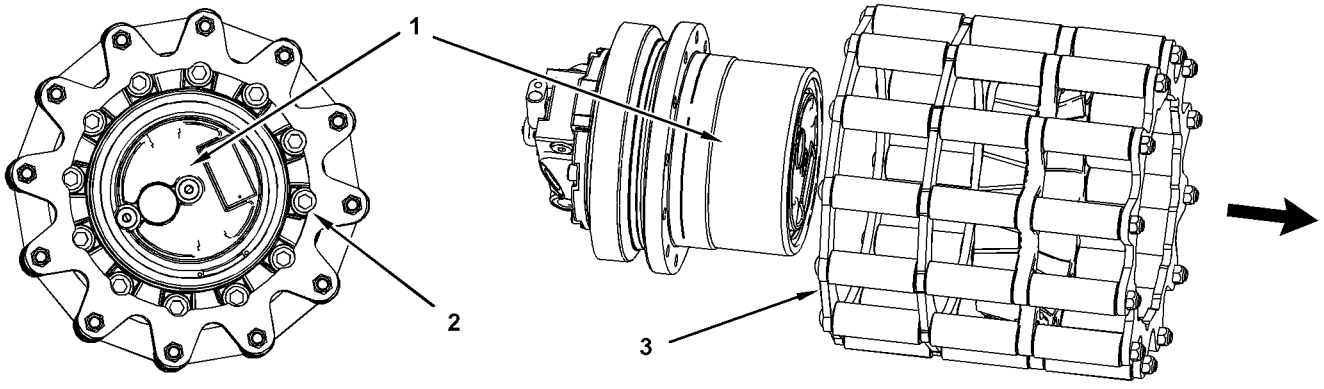


Illustration 193 g01284748

(1) Drive motor
(2) Bolts and washers
(3) Sprocket assembly

Note: In order to service the sprocket, the tracks must be loosened. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust” for the procedure.

1. Remove the 12 bolts (2) and the 12 washers that hold the sprocket assembly (3) to the drive motor (1).

2. Slide the sprocket assembly off the drive motor.

Sleeves and Rings

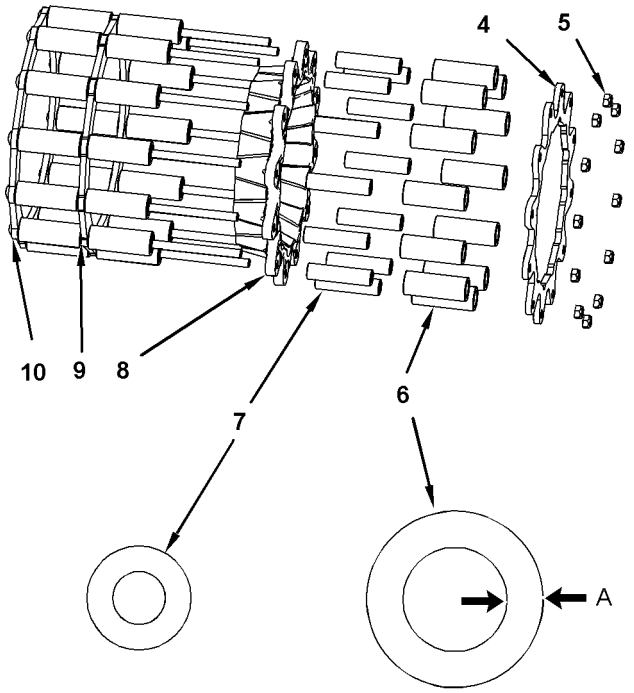


Illustration 194 g01282450

(4) Outer ring
(5) Washers and Locknuts
(6) Outer sleeve
(7) Inner sleeve
(8) Sprocket mounting ring
(9) Middle ring
(10) Inner ring

The sprocket is equipped with two types of sleeves.

- Inner Sleeves (7)
- Outer sleeves (6)

The outer sleeves (6) are free to rotate on the inner sleeves (7). The sleeves are held in position by the outer ring (4), the sprocket mounting ring (8), the middle ring (9), and inner ring (10).

Note: There are many parts in the sprocket assembly. Remove the sprocket completely from the machine in order to work on the sprocket. Use a clean, flat surface in order to disassemble the sprocket and assemble the sprocket.

1. Remove the 12 locknuts and washers that hold the outer ring (4) in place.
2. Remove the ring.
3. Remove the outer sleeves and the inner sleeves.
4. Measure thickness (A) for the outer sleeves. If the thickness of the outer sleeves measures less than 3 mm (0.12 inch), replace the sleeves. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.
5. When you replace the outer sleeves, rotate the inner sleeves for 180°. If the inner sleeves have already been rotated, replace the inner sleeves.
6. Repeat steps 2 through 5 for each set of sleeves.
7. Install the sleeves and the rings.
8. Install the new locknuts. **Do not reuse the locknuts.** Tighten the locknuts to a torque of 55 ± 5 N·m (40.6 ± 3.7 lb ft) in a star pattern. Turn the locknuts an additional 180° ± 5° in the star pattern.
9. Install the sprocket on the drive motor. Tighten the bolts to a torque of 270 ± 40 N·m (199 ± 30 lb ft).

Rings

The inner ring (10), the middle ring (9), the outer ring (4), and the sprocket mounting ring (8) will wear from the rotation of the outer sleeves. Measure the thickness of the inner ring, the middle ring, and outer ring. If the thickness of the rings measures less than 4.75 mm (0.19 inch), replace the ring. If the thickness of the sprocket mounting ring measures less than 8 mm (0.32 inch), replace the sprocket mounting ring.

Track

Tighten the track to the proper tension. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust” for the procedure.

i02565868

Sprocket Sleeve - Inspect

SMCS Code: 4164-040-ZV

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. It is important to clean the undercarriage of the machine daily in order to maximize component life. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.

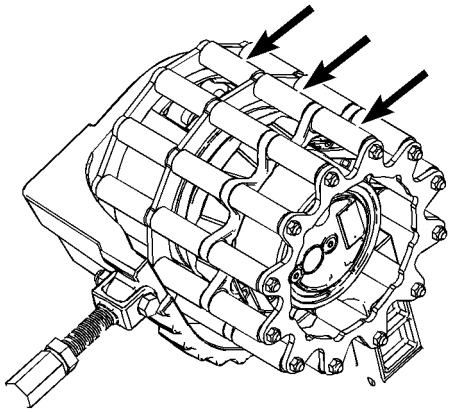


Illustration 195 g01285052

3 rows of outer sleeves

Check the 3 rows of outer sleeves in order to ensure that the sleeves rotate freely. If the sleeves do not rotate freely, refer to Operation and Maintenance Manual, “Sprocket - Inspect” for information about the inspection of the sprocket assembly.

i01878236

Tilt Cylinder Bearings and Bucket Linkage Bearings - Lubricate

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

Wipe all of the grease fittings before you apply lubricant.

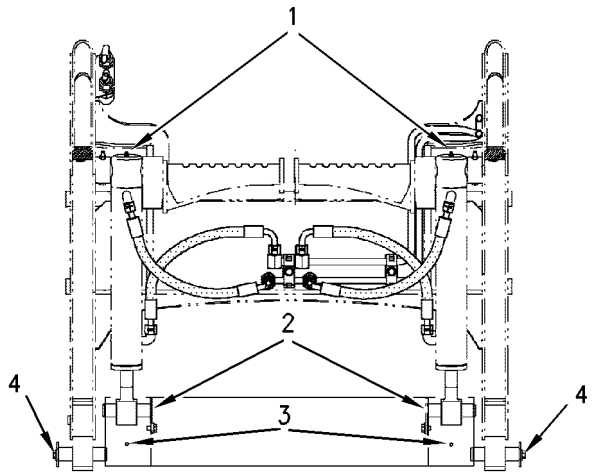


Illustration 196 g00955895

Note: Lubricate the fittings with the loader lift arms in the fully lowered position.

Apply lubricant to the grease fittings (1) for the upper bearings for the tilt cylinders.

Apply lubricant to the grease fittings (2) for the lower bearings for the tilt cylinders.

Apply lubricant to the grease fittings (3) for the coupler engagement pins.

Apply lubricant to the grease fitting (4) for the pivot pin of the quick coupler assembly.

There are a total of 8 grease fittings.

i02418763

Track (Rubber) - Inspect/Adjust

SMCS Code: 4197; 4198-025; 4198-040

Periodic adjustment of the track tension is necessary in order to avoid damage to the tracks. Maintaining the tracks at the proper tension will maximize the service life of the undercarriage components. The undercarriage components include the sleeves of the drive sprocket, the rings of the drive sprocket, the wheels, and the track.

NOTICE
Do not overtighten the tracks. Tracks that are too tight can cause premature failure of the tracks. Tracks that are too tight can cause power loss and bearing failures.

Tracks that are too loose increase the possibility of the track derailing or the drive lugs mis-feeding on the drive sprocket. In aggressive operating conditions, occasional mis-feeding is normal. If consistent mis-feeding is observed, ensure that the track tension is set to the recommended specification. If the track tension is set to the recommended specification and mis-feeding is still observed, then your application may require a tighter track tension. Increase the track tension until consistent mis-feeding is no longer observed.

The intervals for track tension vary depending on the following conditions: the machine application, the operator, the soil conditions, the climate, and the condition of the undercarriage components. Operators are responsible for basic visual inspections of the track tension on a daily basis.

Inspect

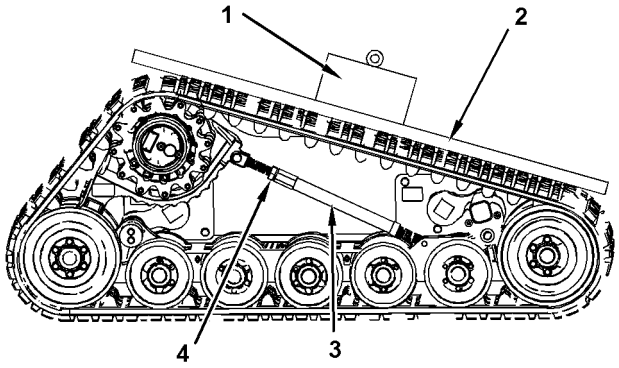


Illustration 197 g01283123

(1) Weight
(2) Straight edge
(3) Adjuster
(4) Jam nut

Place approximately 45 kg (100 lb) (1) between the drive sprocket and the front idler wheel. Place a straight edge (2) across the drive sprocket and idlers. Measure the track sag between the bottom of the straight edge and the top of the track. **The track sag should be set at 12 mm (0.5 inch).** If the track needs adjustment proceed with the following steps.

Track Adjustment

1. Loosen the jam nut (4). A 48 mm (1.875 inch) wrench is recommended.

2. Turn the adjuster (3) in order to raise or lower the drive sprocket. A 44 mm (1.75 inch) wrench is recommended.

3. Tighten the jam nut to the following torque 270 ± 40 N·m (199 ± 30 lb ft).

4. Recheck the track tension.

Detension the track

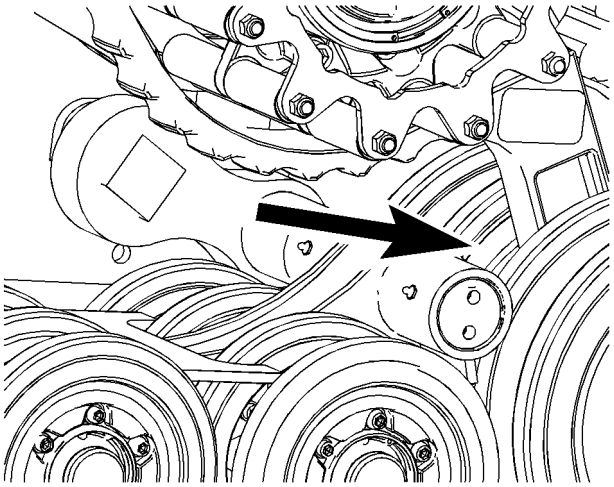


Illustration 198 g01286098

Clean the area under the sprocket.

Note: Many operations for maintenance of the undercarriage require the track to be loosened.

1. Remove any debris from the area under the sprocket before you loosen the track. Trapped material in this area may prevent the drive sprocket from lowering fully.

2. Loosen the jam nut (4). A 48 mm (1.875 inch) wrench is recommended.

3. Turn the adjuster (3) in order to lower the drive sprocket. A 44 mm (1.75 inch) wrench is recommended.

4. Lower the drive sprocket completely in order to provide the necessary clearance for maintenance or for removal of the track.

i02418767

Track (Rubber) - Remove/Replace

SMCS Code: 4197; 4198-011; 4198-510

Removing the Track

1. Position the machine on firm, level ground.

2. Remove any work tool that is attached to the quick coupler.

3. Raise the loader arms and install the brace for the loader lift arm. Refer to Operation and Maintenance Manual, “Loader Lift Arm Brace Operation”.

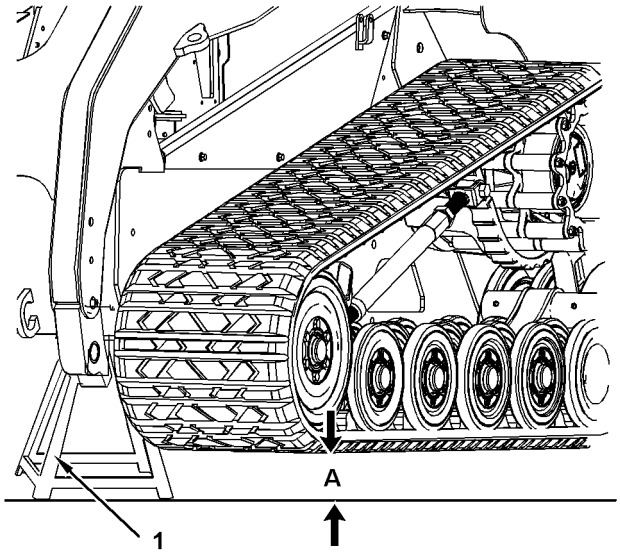


Illustration 199 g01286300

4. Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands (1) in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inch) (A) off the ground.

5. Detension the track. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust”.

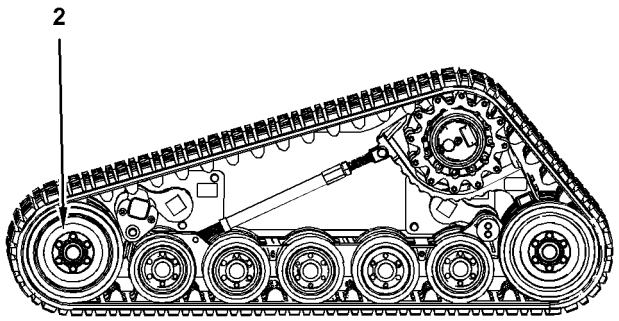


Illustration 200 g01286297

(2) Front idler wheel

6. Remove the front outboard idler wheel and the front inboard idler wheel. Remove the mud scraper plate. Refer to Operation and Maintenance Manual, “Bogie and Idler - Inspect/Replace” for the procedure to remove the idler wheels and the mud scraper plate.

7. Lubricate the remaining front idler wheels and the inside of the track in order to ease the removal of the track.

8. Grasp the track on top of the front idlers. Pull the track forward and pull the track away from the frame. Slide the drive lugs past the inside front idler wheels.

9. Lift the track off the drive sprocket and pull the track away from the rear idler wheels.

Installing the Track

1. Slide the track onto the drive sprocket.

2. Position the rear of the track so that the drive lugs are aligned between the rear idler wheels.

3. Pull all of the slack forward and make sure that the drive lugs are properly meshed with the drive sprocket. This will provide the maximum amount of slack to aid with installation across the front idlers.

4. Lubricate the idler wheels and the inside of the track in order to ease the installation of the track.

5. Pull the track over the front idler wheels.

6. Install the front inboard idler wheel and the front outboard idler wheel. Install the mud scraper plate. Refer to Operation and Maintenance Manual, “Bogie and Idler - Inspect/Replace” for the procedure to install the idler wheels and the mud scraper plate.

7. Tension the track. Refer to Operation and Maintenance Manual, “Track (Rubber) - Inspect/Adjust”.

i02418610

Window Washer Reservoir - Fill (If Equipped)

SMCS Code: 7306-544-KE

NOTICE
When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

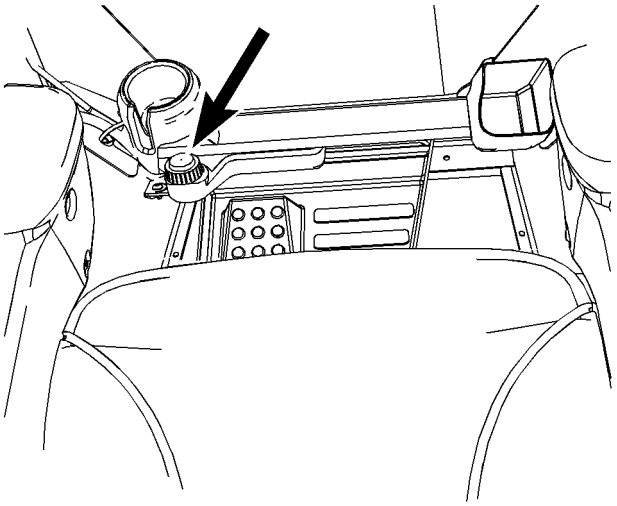


Illustration 201 g01209248

The reservoir for the window washer solvent is located inside the cab by the left footrest.

Fill the reservoir with window washer solvent. Window washer solvent with isopropyl alcohol is recommended.

i02810705

Window Wiper - Inspect/Replace (If Equipped)

SMCS Code: 7305-040; 7305-510

Inspect the condition of the front window wiper blade. Replace the window wiper blade if the window wiper blade is worn or damaged. If the window wiper blade streaks the window, replace the window wiper blade.

i02418633

Windows - Clean

SMCS Code: 7310-070

Rear Window and Glass Front Door

Use commercially available window cleaning solutions in order to clean the windows.

Apply the cleaning solution liberally. Wipe the surface.

Dry the surface in order to prevent spots.

Side Windows

Use commercially available window cleaning solutions in order to clean the windows.

The side windows of the cab can be removed for cleaning. Refer to the following procedure in order to remove the side windows.

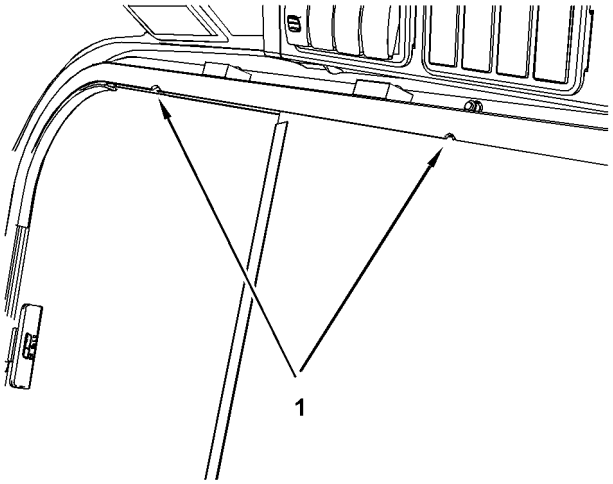


Illustration 202 g01209231

1. Release the latch. Slide the front window rearward between the circular marks (1) in the top of the window frame. Push the window upward in the track. Pull outward on the bottom of the window in order to remove the window.
2. Release the latch. Slide the rear window forward between the circular marks (1) in the top of the window frame. Push the window upward in the track. Pull outward on the bottom of the window in order to remove the window.
3. Pull straight up on the bottom window in order to remove the window from the track. Pull inward in order to remove the window.
4. Reverse the process in order to install the windows. Install the lower window first. Then install the rear window in the outer track. Install the front window in the inner track next.

Polycarbonate Front Door and Polycarbonate Top Window

Note: Do not wipe the window dry. Do not use paper towels. This may scratch the finish of the polycarbonate windows over time.

For cleaning your polycarbonate top window or polycarbonate front door, use a soft cloth, a sponge, or a chamois. Use any of the following cleaners:

- soap and water
- isopropyl alcohol
- kerosene
- denatured alcohol
- commercially available window cleaning solutions

Apply the cleaning solution liberally. Wipe the surface.

i02729220

Work Tool - Lubricate

SMCS Code: 6700-086

Multipurpose Bucket

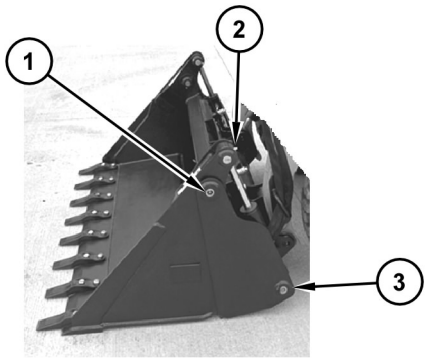


Illustration 203 g01280216

Apply lubricant to the grease fitting (1) for the pivot pin of the apron.

Apply lubricant to the grease fitting (2) for the rod end of the multipurpose bucket cylinder.

Apply lubricant to the grease fitting (3) for the head end of the multipurpose bucket cylinder.

Repeat for the other side of the bucket.

There are six grease fittings.

Utility Grapple Bucket and Utility Grapple Fork

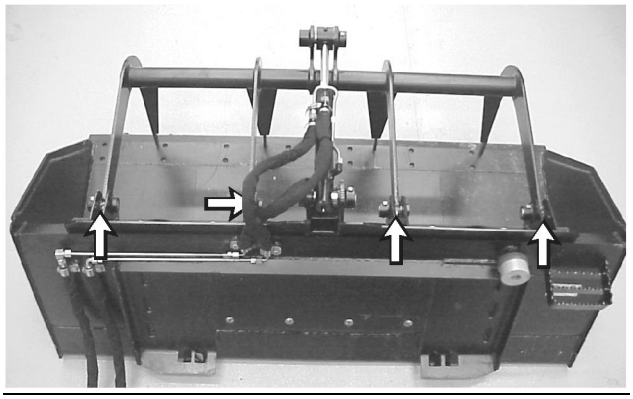


Illustration 204 g00647980

Apply lubricant to the four grease fittings for the grapples.

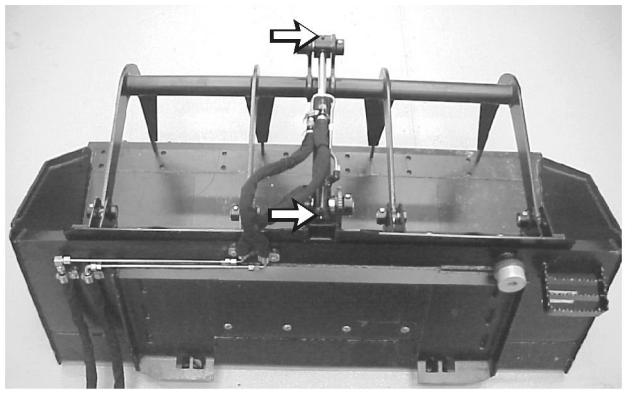


Illustration 205 g00647988

Apply lubricant to the two fittings for the grapple cylinder.

There are six grease fittings.

Industrial Grapple Bucket and Industrial Grapple Fork

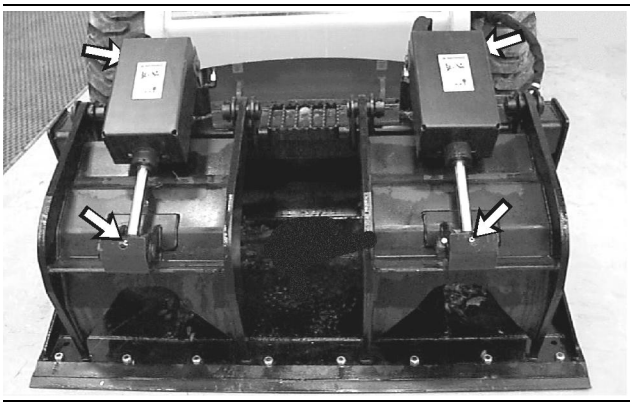


Illustration 206 g00645995

Apply lubricant to the four grease fittings for the fork cylinders.

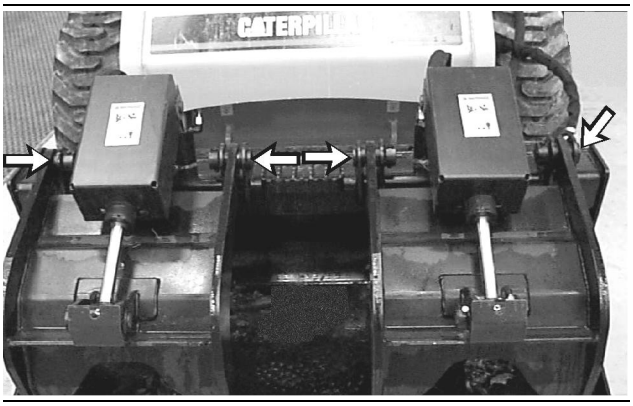


Illustration 207 g00646004

Apply lubricant to the four grease fittings for the two forks.

There are eight grease fittings.

Grapple Rake

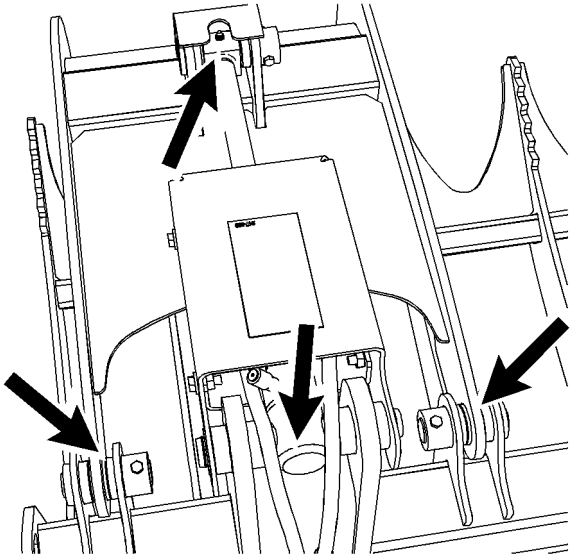


Illustration 208 g01368386

Apply lubricant to the four grease fittings for the grapple cylinders.

Apply lubricant to the four grease fittings for the two grapples.

There are eight grease fittings.

Angle Blade

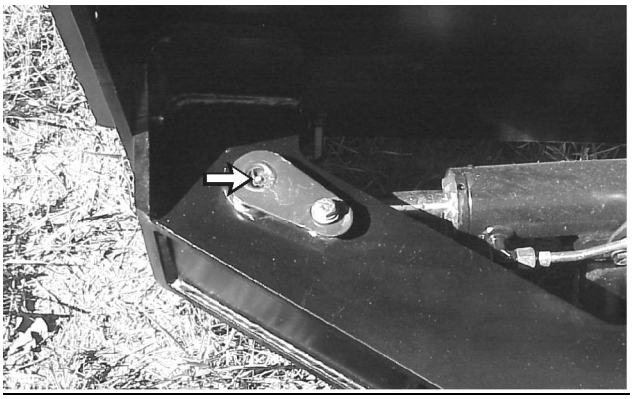


Illustration 209 g00648033

Apply lubricant to the grease fitting on the rod end of the angle cylinder.

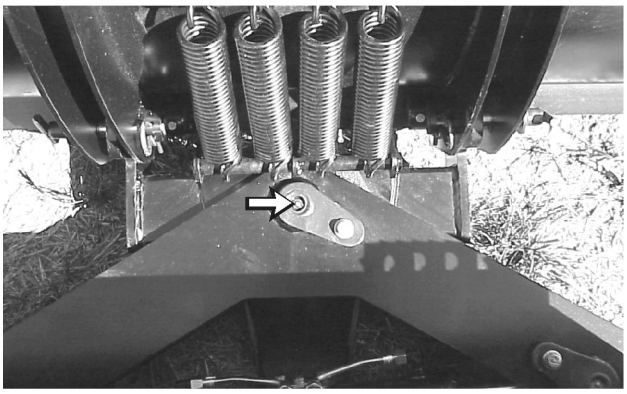


Illustration 210 g00648037

Apply lubricant to the grease fitting on the horizontal pivot point of the blade.

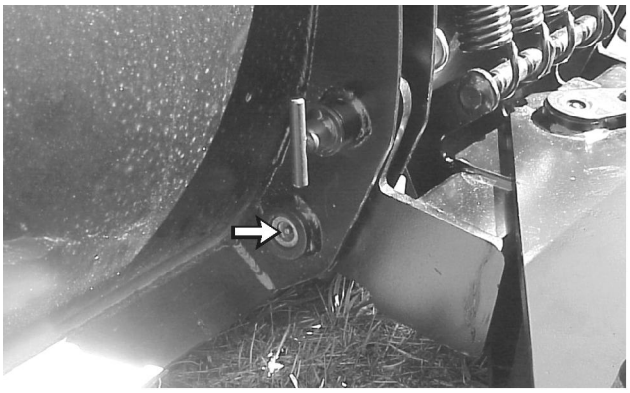


Illustration 211 g00648038

Apply lubricant to the grease fitting on the vertical pivot point of the blade. Repeat for opposite side of the blade.

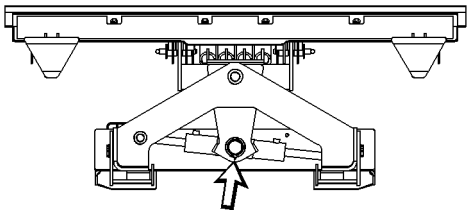


Illustration 212 g00677570

This is a bottom view of the angle blade.

Apply lubricant to the grease fitting on the pivot point of the cylinder.

There are five grease fittings.

Dozer Blade

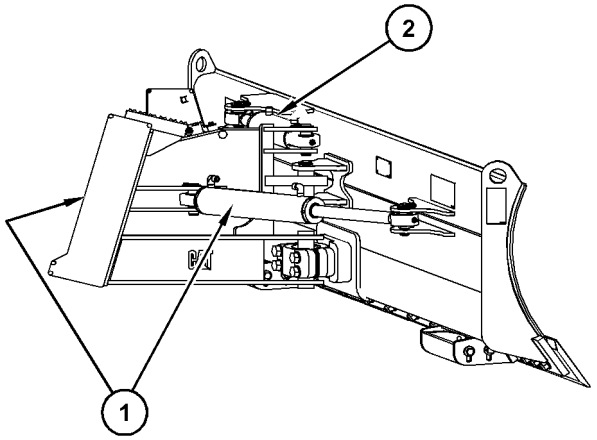


Illustration 213 g01073259

Apply lubricant to the grease fitting on both ends of the right hand angle cylinder (1). Repeat for opposite side of the blade.

Apply lubricant to the grease fitting on the pivot points on each end of the tilt cylinder (2).

There are six grease fittings.

i01809997

Work Tool Mounting Bracket - Inspect

SMCS Code: 6700-040-BK

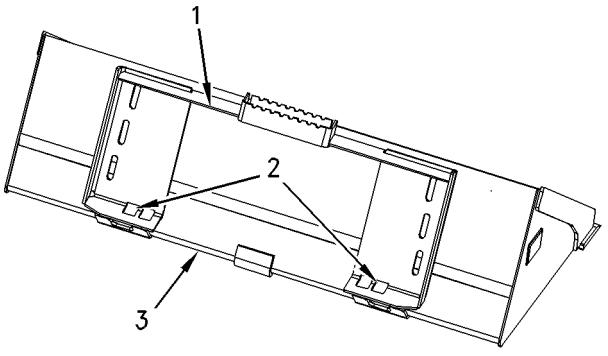


Illustration 214 g00925058

Inspect upper angled plate (1) and ensure that the plate is not bent or otherwise damaged. Inspect holes (2) for wear and for damage. Inspect lower angled plate (3) and ensure that the plate is not bent or otherwise damaged. If any wear is suspected or any damage is suspected, consult your Caterpillar dealer before you use the work tool.