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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt



Operation and Maintenance Manual

303 CR Mini Hydraulic Excavator

DMA1-Up (Machine)

i02853668

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

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

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

When Required

Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace	120
Battery - Recycle	120
Battery or Battery Cable - Inspect/Replace	121
Bucket Linkage - Inspect/Adjust	126
Bucket Tips - Inspect/Replace	128
Bucket Tips - Inspect/Replace	128
Bucket Tips - Inspect/Replace	131
Circuit Breakers - Reset	133
Cooling System Pressure Cap - Clean/Replace ..	138
Engine Air Filter Element - Clean/Replace	139
Fuel System - Prime	145
Fuel System Water Separator - Drain	146
Fuel Tank Water and Sediment - Drain	147
Fuses - Replace	148
Oil Filter - Inspect	153
Radiator Core - Clean	154
Track Adjustment - Adjust	156
Track Adjustment - Inspect	157
Window Washer Reservoir - Fill	158
Window Wiper - Inspect/Replace	159
Windows - Clean	159

Every 10 Service Hours or Daily for First 100 Hours

Blade Linkage - Lubricate	122
Boom and Stick Linkage - Lubricate	123
Bucket Linkage - Lubricate	127
Quick Coupler - Lubricate	153

Every 10 Service Hours or Daily

Cooling System Coolant Level - Check	135
Engine Air Filter Service Indicator - Inspect	140
Engine Oil Level - Check	140
Hydraulic System Oil Level - Check	151
Indicators and Gauges - Test	152
Seat Belt - Inspect	154
Track (Rubber) - Inspect/Replace	155
Travel Alarm - Test	158
Undercarriage - Check	158

Every 10 Service Hours or Daily for Machines Used in Severe Applications

Blade Linkage - Lubricate	122
Bucket Linkage - Lubricate	127
Quick Coupler - Lubricate	153

Every 50 Service Hours

Bucket Linkage - Lubricate	127
Quick Coupler - Lubricate	153

Initial 100 Service Hours

Engine Oil and Filter - Change	141
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Every 100 Service Hours

Swing Bearing - Lubricate	155
Swing Gear - Lubricate	155

Every 100 Service Hours or 2 Weeks for Machines Used in Severe Applications

Boom and Stick Linkage - Lubricate	123
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Initial 250 Service Hours

Engine Valve Lash - Check	143
Final Drive Oil - Change	143
Hydraulic System Oil Filter (Return) - Replace ..	151

Every 250 Service Hours

Belt - Inspect/Adjust/Replace	121
Cooling System Hoses - Inspect	137
Engine Oil Sample - Obtain	141
Engine Oil and Filter - Change	141
Final Drive Oil Level - Check	144

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

Cooling System Coolant Sample (Level 2) - Obtain	137
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Every 500 Service Hours

Blade Linkage - Lubricate	122
Boom and Stick Linkage - Lubricate	123
Boom, Stick, and Frame - Inspect	124

Cooling System Coolant Sample (Level 1) - Obtain	136
Engine Valve Lash - Check	143
Final Drive Oil Sample - Obtain	144
Fuel System Filter - Replace	145
Fuel Tank Cap and Strainer - Clean	147
Hydraulic System Oil Filter (Return) - Replace ...	151
Hydraulic System Oil Sample - Obtain	152

Every 1000 Service Hours

Battery - Clean	120
Battery Hold-Down - Tighten	120
Final Drive Oil - Change	143

Every 2000 Service Hours

Engine Air Filter Element - Clean/Replace	139
Hydraulic System Oil - Change	148

Every Year

Cooling System Coolant Sample (Level 2) - Obtain	137
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**Every 3 Years After Date of Installation or
Every 5 Years After Date of Manufacture**

Seat Belt - Replace	154
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Every 3000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add ..	135
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Every 6000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change	133
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i02788833

i01586674

Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace

SMCS Code: 1054-040-A/C; 1054-510-A/C

NOTICE

An air recirculation filter element plugged with dust will result in decreased performance and service life to the air conditioner or cab heater.

To prevent decreased performance, clean the filter element, as required.

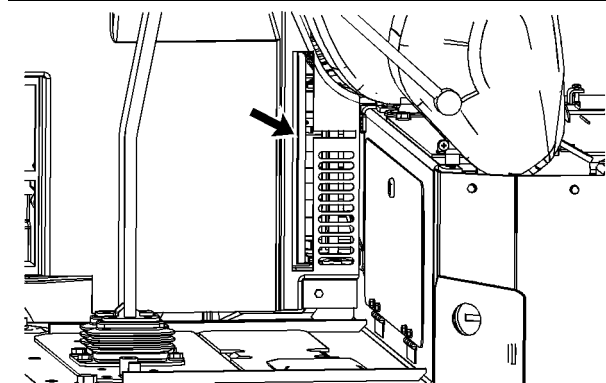


Illustration 156

g01213860

The filter element is located on the lower right side of the cab.

1. In order to remove the filter element, slide the filter element outward.
2. Inspect the filter element. If the filter element is dirty, clean the filter element with a mild solution of soap and warm water.

Note: Do not use organic solvents in order to clean the filter element.

3. The filter element may also be cleaned with a maximum of 200 kPa (30 psi) pressure air.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" before using pressure air to clean the filter element.

4. After you clean the filter element, inspect the filter element. If the filter element is damaged or badly contaminated, use a new filter element.
5. Make sure that the filter element is dry. Install the filter element into the filter housing. Make sure that the filter element is seated in the bottom of the filter housing before the system is operated.

Battery - Clean

SMCS Code: 1401-070

Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the terminal post with petroleum jelly.

i00993589

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i01586700

Battery Hold-Down - Tighten

SMCS Code: 7257

Tighten the hold-downs for the battery in order to prevent the batteries from moving during machine operation.

i01999587

i01709766

Battery or Battery Cable - Inspect/Replace

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

WARNING

Personal injury can result from battery fumes or explosion.

Batteries give off flammable fumes that can explode. Electrolyte is an acid and can cause personal injury if it contacts the skin or eyes.

Prevent sparks near the batteries. Sparks could cause vapors to explode. Do not allow jumper cable ends to contact each other or the engine. Improper jumper cable connections can cause an explosion.

Always wear protective glasses when working with batteries.

1. Turn the engine start switch key to the OFF position. Turn all of the switches to the OFF position. Remove the key.
2. Disconnect the negative battery cable at the battery.
3. Disconnect the positive battery cable at the battery.
4. Disconnect the battery cables from the machine if new cables are needed.
5. Make necessary repairs or replace the battery.
6. Connect the battery cables to the machine if the battery cables were removed.
7. Connect the positive battery cable of the battery.
8. Connect the negative battery cable of the battery.
9. Install the key into the engine start switch.

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510; 1397-025; 1397-040; 1397-510

NOTICE

The V-belt must be tensioned correctly. Failure to tension the belt properly could cause damage to the belt and/or to the air conditioner compressor.

Your engine can be equipped with a water pump, with a fan drive, and with an alternator. Your engine can also be equipped with accessory drive belts. For maximum engine performance and maximum utilization of your engine, inspect the belts for wear and for cracking. Check the belt tension. Adjust the belt tension in order to minimize belt slippage. Belt slippage will decrease the belt life. Belt slippage will also cause poor performance of the alternator and of any driven equipment.

If new belts are installed, recheck the belt adjustment after 30 minutes of operation. If two belts or more are required for an application, replace the belts in belt sets. If only one belt of a pair is replaced, the new belt will carry more load. This is due to the fact that the older belts are stretched. The additional load on the new belt could cause the new belt to break.

Water Pump Belt, Fan Drive Belt, and Alternator Belt

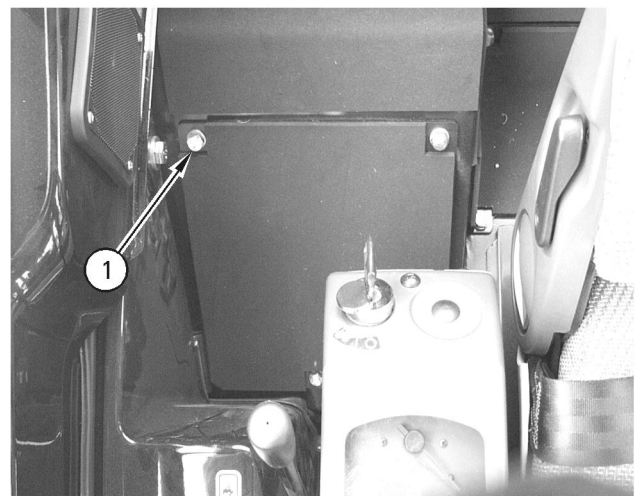


Illustration 157

g00880036

The access cover is located behind the right side of the operator seat.

1. Remove three bolts and washers (1) in order to gain access to the belt.

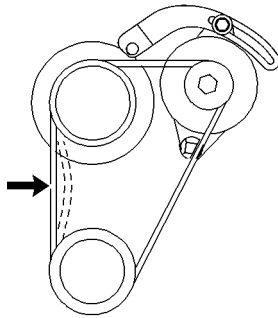


Illustration 158

g00823530

2. Apply approximately 98 N (22 lb) of force midway between the pulleys.
3. Measure the deflection of the belt. The belt should deflect 10 to 12 mm (7/16 to 1/2 inch).

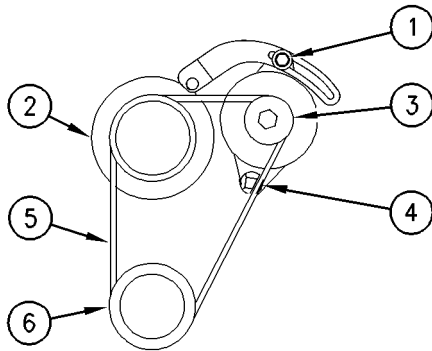


Illustration 159

g00823546

- (1) Adjusting bolt
(2) Water pump pulley
(3) Alternator pulley
(4) Alternator mounting bolt
(5) Belt
(6) Crankshaft pulley

4. If the deflection is not correct, loosen alternator mounting bolt (4) and adjusting bolt (1). Move the alternator forward and backward in order to adjust belt (5) to the specified tension.
5. When the adjustment is correct, tighten adjusting bolt (1) and mounting bolt (4) securely.
6. Check the deflection of the belt again.

Note: If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at the rated engine speed.

i02304927

Blade Linkage - Lubricate

SMCS Code: 6060-086-KL

Lower all the work tools and the blade to the ground.

Wipe all grease fittings before lubricating.

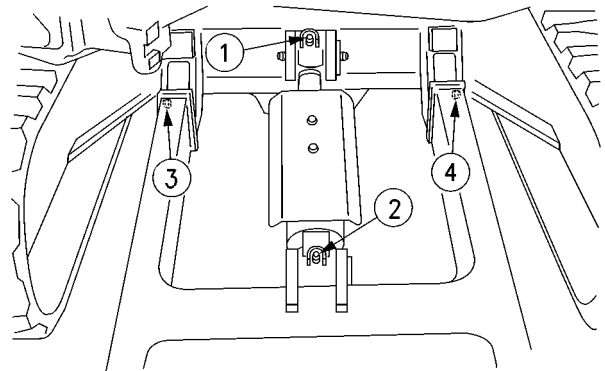


Illustration 160

g00823677

1. Apply lubricant to grease fitting (2) at the head end of the blade cylinder. Apply lubricant to grease fitting (1) at the rod end of the blade cylinder.
2. Apply lubricant to grease fittings (3) and (4) for the blade linkage.

Angle Blade (If Equipped)

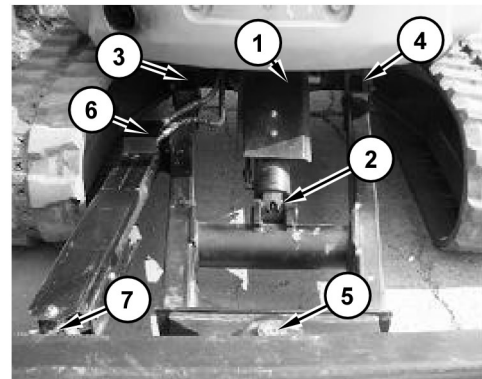


Illustration 161

g01154347

1. Apply lubricant to grease fitting (2) at the head end of the blade cylinder. Apply lubricant to grease fitting (1) at the rod end of the blade cylinder.
2. Apply lubricant to grease fittings (3) and (4) for the blade linkage. Apply lubricant to grease fittings (5) for the center pin of the angle blade.

3. Apply lubricant to grease fitting (6) at the head end of the cylinder of the angle blade. Apply lubricant to grease fitting (7) at the rod end of the cylinder of the angle blade.

i02181923

Boom and Stick Linkage - Lubricate

SMCS Code: 6501-086; 6502-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom and stick linkage. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on molybdenum grease.

Apply lubricant through all fittings after operation under water.

Wipe all fittings before you apply lubricant.

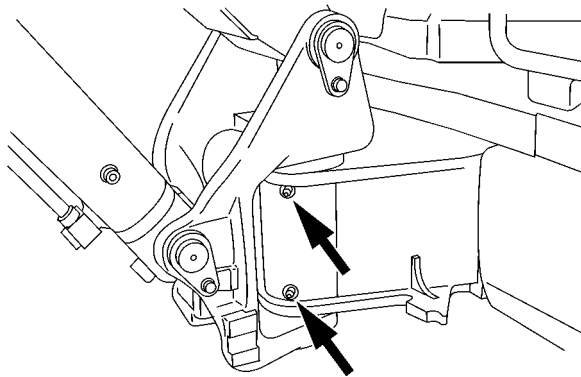


Illustration 162

g00823721

1. Apply lubricant through the fittings at the swing post.

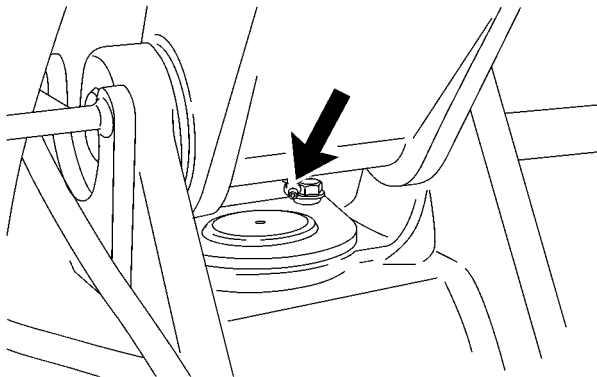


Illustration 163

g00844838

2. Apply lubricant through the fitting at the base of the boom.

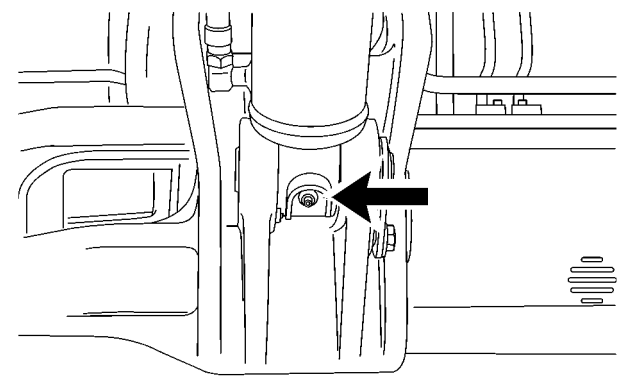


Illustration 164

g00844843

3. Apply lubricant through the fitting at the boom cylinder head end.

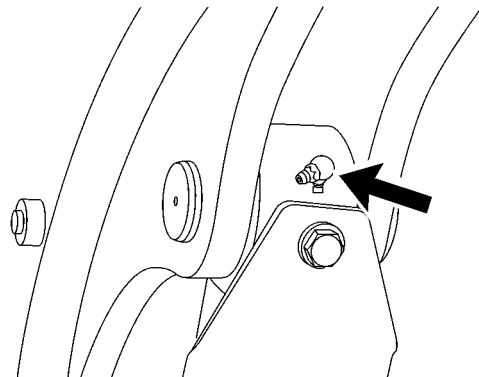


Illustration 165

g00844846

4. Apply lubricant through the fitting at the rod end of the boom cylinder.

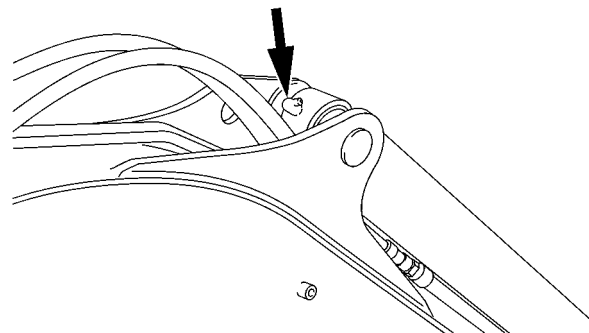


Illustration 166

g00823737

5. Apply lubricant through the fitting at the stick cylinder head.

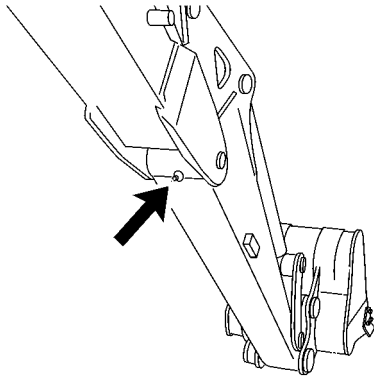


Illustration 167

g00844856

6. Apply lubricant through the fitting at the joint that is between the boom and the stick.

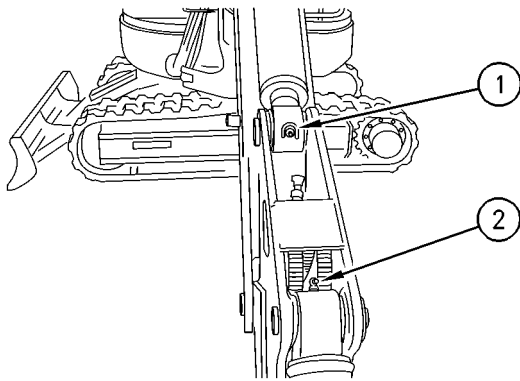


Illustration 168

g00844861

7. Apply lubricant through the following fittings:

- (1) The fitting at the stick cylinder rod end.
- (2) The fitting at bucket cylinder head end.

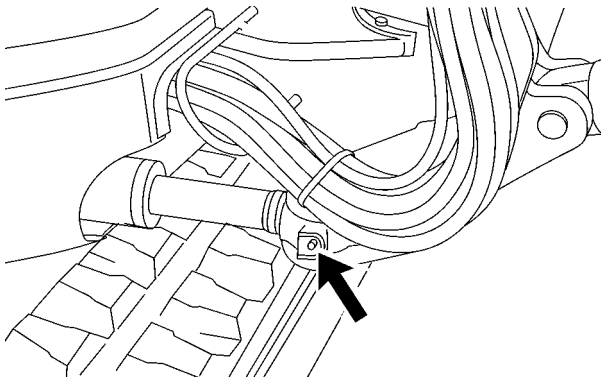


Illustration 169

g00844876

8. Apply lubricant through the fitting that is located at the swing cylinder rod end.

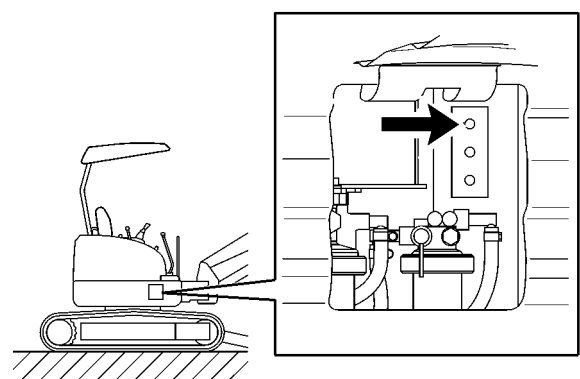


Illustration 170

g00844880

9. Apply lubricant through the fitting at the swing cylinder head end. The fitting is accessed through the filter element access cover on the right side of the machine.

i02860835

Boom, Stick, and Frame - Inspect

SMCS Code: 6501; 6502; 6506

All earthmoving equipment is prone to a high degree of wear. Regular inspections for structural damage are necessary.

The interval between these inspections depends on the factors that follow.

- The age of the machine
- The severity of the application
- The loads that have been carried on the machine
- The amount of routine servicing that has been carried out

If the machine has been involved in any kind of accident, the machine must be inspected thoroughly. Inspect the machine regardless of the date of the last inspection.

The machine must be clean before the machine is inspected.

Proper repair of frames and structures requires specific knowledge of the following subjects.

- Materials that have been used to manufacture the frame members
- Frame member construction

- Repair techniques that are recommended by the manufacturer.

Consult your Caterpillar dealer if repairs are necessary. Your Caterpillar dealer is qualified to carry out repairs on your behalf.

All repairs should be carried out by a Caterpillar dealer. If you carry out your own repairs, contact your Caterpillar dealer for advice about proper repair techniques.

Particular attention should be given to all welded structures. The following items should be thoroughly inspected for cracks and for defects:

- Boom
- Stick
- Blade
- Lifting points
- Upper frame
- Lower frame

NOTICE

The areas highlighted are of particular importance but other areas must not be neglected. The entire structure must be carefully examined.

Boom

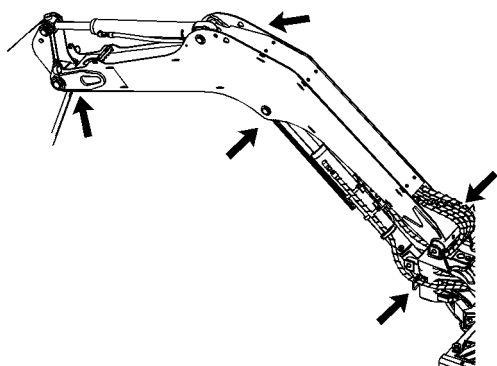


Illustration 171

g01425291

Check all welded joints and check the mounting points for the cylinder.

Stick

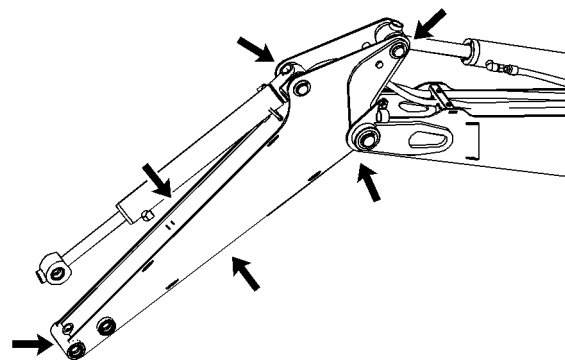


Illustration 172

g01425293

Check all welded joints and check the mounting points for the cylinder.

Blade

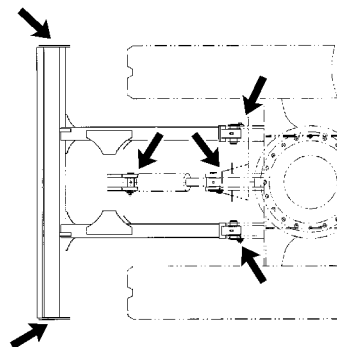


Illustration 173

g01425286

Check all welded joints and check the mounting points for the cylinder.

Lifting Points

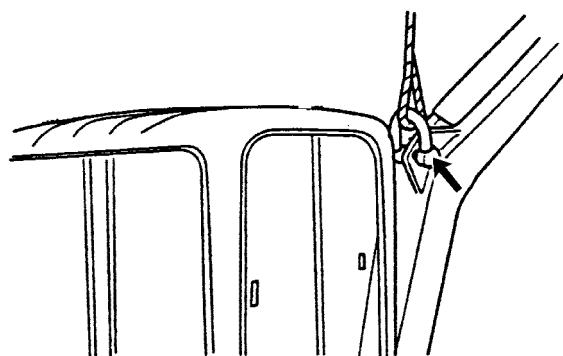


Illustration 174

g01425213

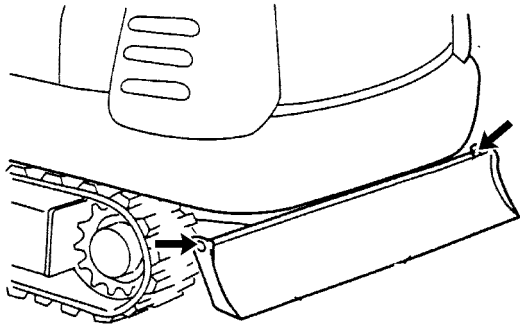


Illustration 175

g00309343

Check the approved lifting points carefully. Check the welds. Check that the plates are not excessively bent. Check that the lifting holes are not deformed.

Upper Frame

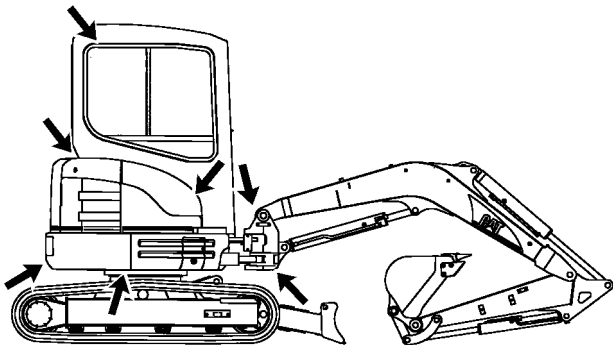


Illustration 176

g01425289

Check for damaged panels. Specifically look for any damage to the cab or damage to the canopy that might invalidate the certification. The cab or the canopy is a safety device that must be maintained in good condition. Check for loose hardware or missing hardware.

Lower Frame

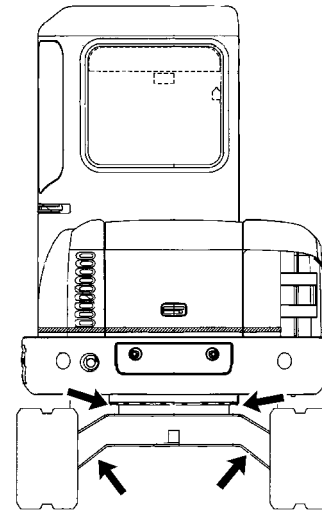


Illustration 177

g01425287

Check the weld joints in the lower structure. Check for loose hardware or missing hardware. Check the ring of bolts that secure the swing gear.

i01995001

Bucket Linkage - Inspect/Adjust

SMCS Code: 6513-025; 6513-040

WARNING

Unexpected machine movement can cause injury or death.

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

NOTICE

Improperly adjusted bucket clearance could cause galling on the contact surfaces of the bucket and stick, resulting in excessive noise and/or damaged O-ring seals.

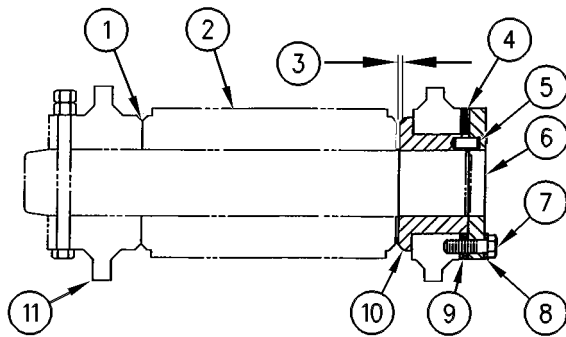


Illustration 178

g00101687

- (1) No gap
- (2) Stick boss
- (3) Bucket clearance
- (4) Shims
- (5) Pin
- (6) Plate
- (7) Bolts
- (8) Washers
- (9) Location
- (10) Flange
- (11) Bucket boss

The clearance of the bucket linkage on this machine can be adjusted by shimming. If the gap between the bucket and the stick becomes excessive, adjust bucket clearance (3) to 0.5 to 1 mm (.02 to .04 inch).

Two shims of different thickness are used at location (9). The thicknesses of the shims are 0.5 mm (0.02 inch) and 1.0 mm (0.04 inch).

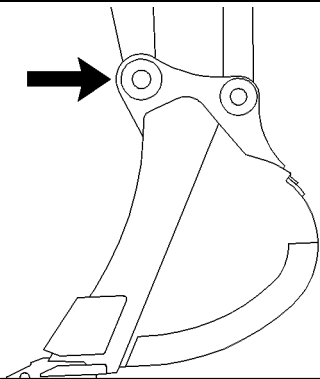


Illustration 179

g00428258

Area for linkage adjustment

1. Position the machine on a level surface and lower the bucket to the ground.
2. Slowly operate the swing control lever until stick boss (2) and bucket boss (11) are in full face contact at no gap (1). This will help to determine the total clearance of the connection point of the stick and the bucket.

3. Move the hydraulic lockout control to the LOCKED position. Stop the engine.

4. Measure bucket clearance (3), which is the existing total clearance.

5. Determine the number of shims that need to be removed from shims (4) by using the following calculation:

Subtract 0.5 mm (0.02 inch) or 1.0 mm (0.04 inch) from bucket clearance (3).

6. Remove the appropriate number of shims at location (9) in order to meet the above thickness. Make sure that you use a minimum of three 0.5 mm (.02 inch) shims. To remove the shims, remove bolts (7), washers (8), and plate (6).

7. After the correct number of shims have been removed and pin (5) is aligned with the pin hole, install plate (6), washers (8), and bolts (7). Tighten bolts (7) to a torque of $100 \pm 20 \text{ N}\cdot\text{m}$ ($70 \pm 15 \text{ lb}\cdot\text{ft}$).

8. After installation, make sure that bucket clearance (3) is still correct.

i02182155

Bucket Linkage - Lubricate

SMCS Code: 6513-086

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

Wipe all grease fittings before you apply lubricant.

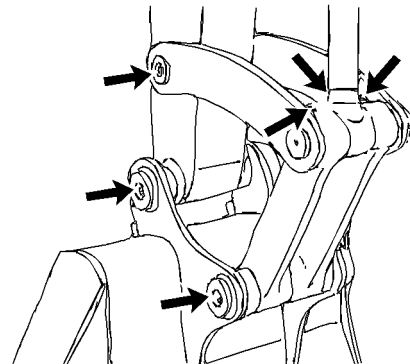


Illustration 180

g01104220

Note: Completely fill all cavities of the bucket control linkage with grease when you initially install a bucket.

1. Apply lubricant through the grease fittings.

Note: Service the above grease fittings after you operate the bucket under water.

i02869831

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 tips or side cutters.

Bucket Tips

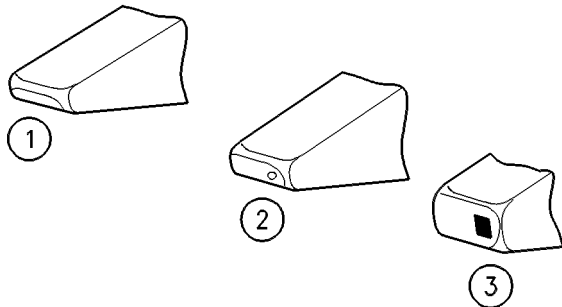


Illustration 181

g00101352

- (1) Usable
(2) Replace this bucket tip.
(3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

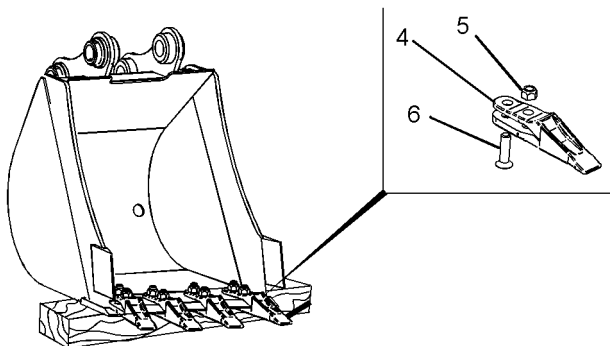


Illustration 182

g01429324

1. Block the bucket.

2. Remove mounting bolts (6) and nuts (5). Remove bucket tip (4).
3. Clean the mounting surfaces.
4. Install the new bucket tip onto the adapter.

i02798352

Bucket Tips - Inspect/Replace (J200 Tips)

SMCS Code: 6805-040; 6805-510

WARNING

Block the bucket before changing the bucket teeth.

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

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

Bucket Tips

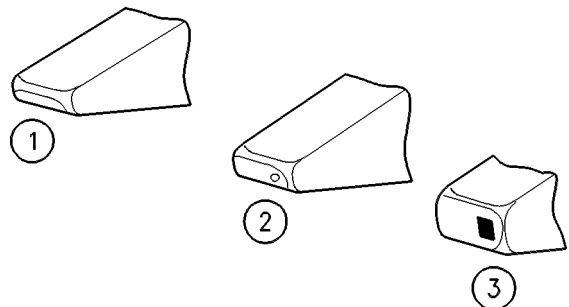


Illustration 183

g00101352

- (1) Usable
(2) Replace this bucket tip.
(3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.
 - Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
 - Use a Pin-Master. Follow Step 1.a through Step 1.c for the procedure.

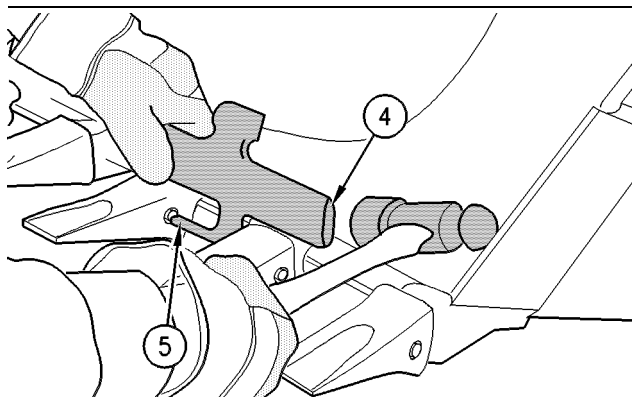


Illustration 184

g00590670

(4) Back of Pin-Master
(5) Extractor

- a. Place the Pin-Master on the bucket tip.
- b. Align extractor (5) with the pin.
- c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

Note: Discard the old pin and the retainer assembly. When you change tips, use a new pin and a new retainer assembly. Refer to the appropriate parts manual for your machine.

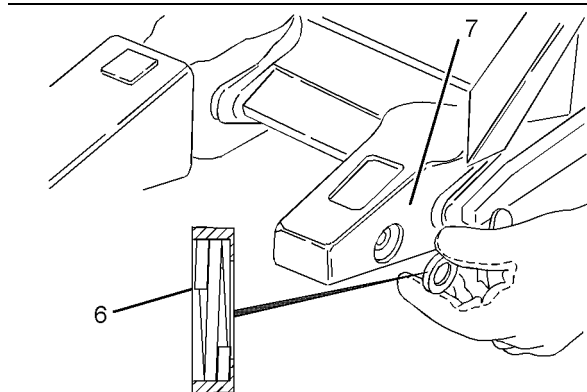


Illustration 185

g01194448

(6) Retainer assembly
(7) Adapter

2. Clean the adapter and the pin.
3. Fit retainer assembly (6) into the counterbore that is in the side of adapter (7). Make sure that the face of the retainer assembly with the marking "OUTSIDE" is visible.

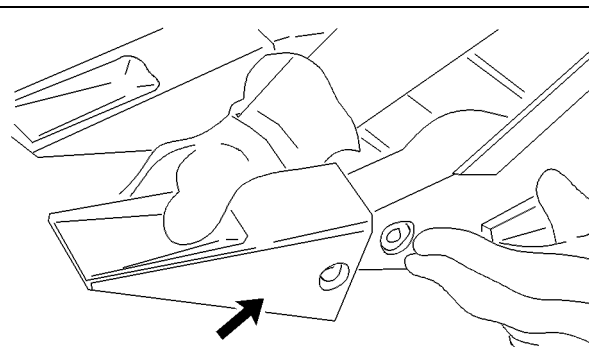


Illustration 186

g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tips can be rotated by 180 degrees in order to allow the tip to wear evenly. You may also move the tips from the outside teeth to the inside teeth. Check the tips often. If wear is present on the tips, rotate the tips. The outside teeth generate the most wear.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the same side of the retainer, drive the pin through the bucket tip, the retainer assembly, and the adapter.
- Use a Pin-Master. Follow Step 5.a through Step 5.e for the procedure.

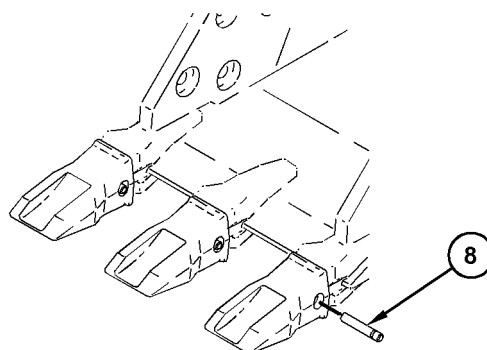


Illustration 187

g01209166

(8) Pin

- a. Insert pin (8) through the bucket tip.

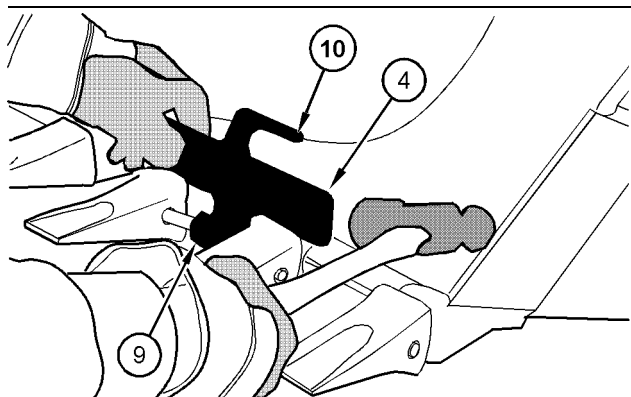


Illustration 188

g01209140

- (4) Back of Pin-Master
(9) Pin holder
(10) Pin setter

- b. Place the Pin-Master over the bucket tips so that the pin will fit into the counterbore of the pin holder (9).
- c. Strike the Pin-Master with a hammer at the back of the tool (4) in order to insert the pin.
- d. Slide pin holder (9) away from the pin and rotate the tool slightly in order to align pin setter (10) with the pin.

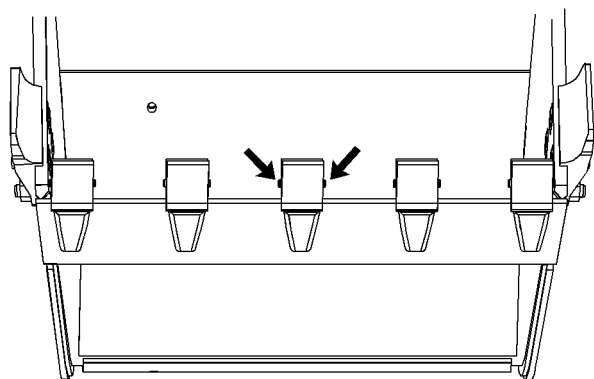


Illustration 189

g01209159

Final assembly of pin into bucket tip.

- e. Strike the end of the tool until the pin is fully inserted.

Side Cutters

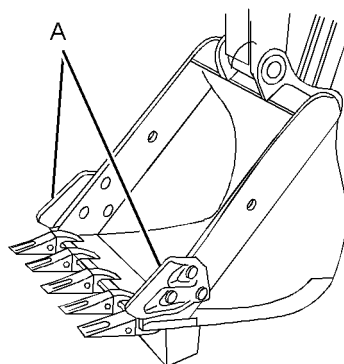


Illustration 190

g01092808

Bucket With Side Cutters

(A) Side cutters

1. Remove the mounting bolts and the side cutters.
2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

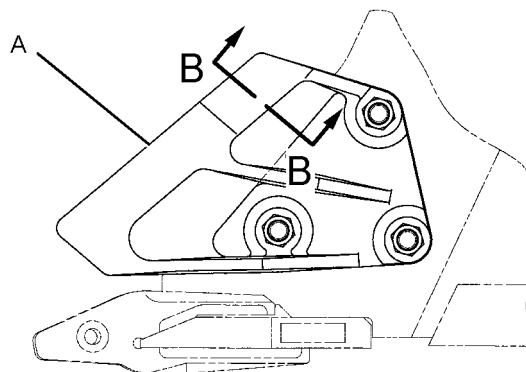


Illustration 191

g01092810

(A) Side cutter

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

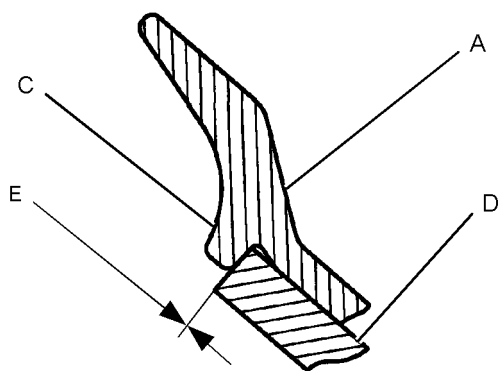


Illustration 192

g01092812

Section B-B From Illustration 191

- (A) Side cutter
(C) Shear ledge on a side cutter
(D) Side plate on a bucket
(E) 0.0 mm (0.0 inch)

5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.
6. Torque the mounting bolts to the correct specification.

i02869770

Bucket Tips - Inspect/Replace (Vertical Retention System for a Round Hole Tip)

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket tips or side cutters.

Bucket Tips

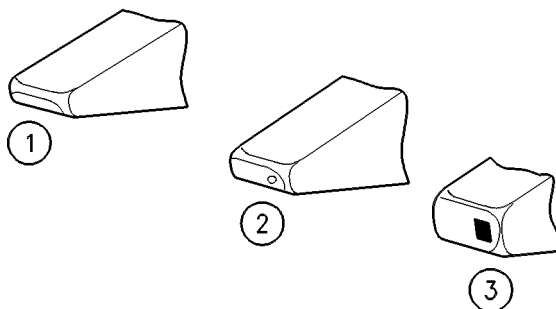


Illustration 193

g00101352

- (1) Usable
(2) Replace this bucket tip.
(3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

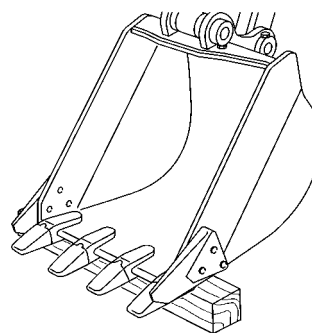


Illustration 194

g00823856

1. Block the bucket.

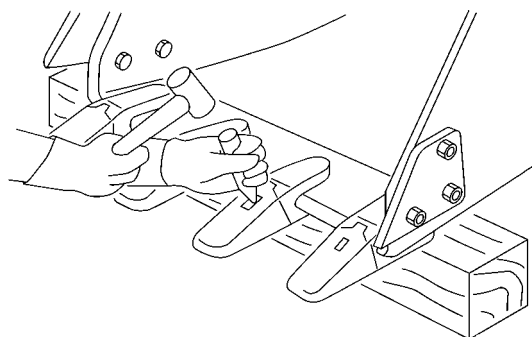


Illustration 195

g00823857

2. Remove the pin from the bucket tip. Use a hammer and a punch in order to drive the pin from the bucket tip.

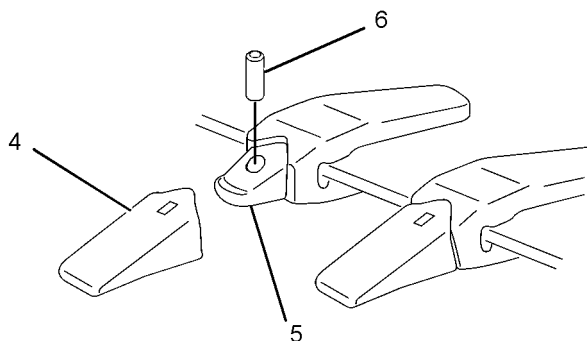


Illustration 196

g01198006

- (4) Tip
- (5) Adapter
- (6) Pin

3. Clean the adapter and the pin. When you replace tip (4), also replace pin (6).

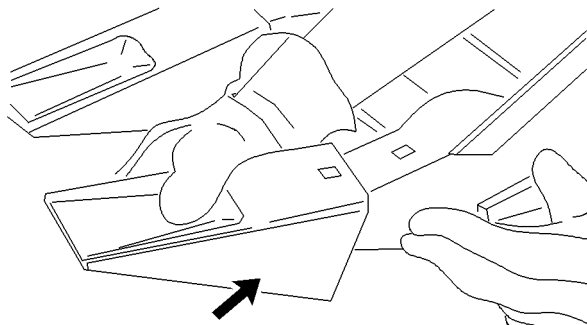


Illustration 197

g00823892

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

5. Drive pin (6) through tip (4).
6. After you drive pin (6), make sure that the pin fits snugly into the groove.

Side Cutters

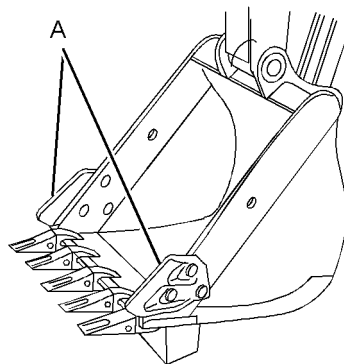


Illustration 198

g01092808

Bucket With Side Cutters

(A) Side cutters

1. Remove the mounting bolts and the side cutters.
2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

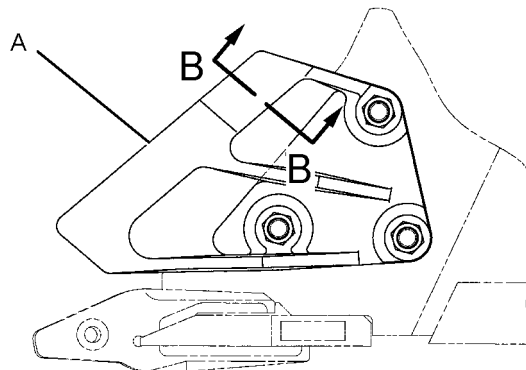


Illustration 199

g01092810

(A) Side cutter

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

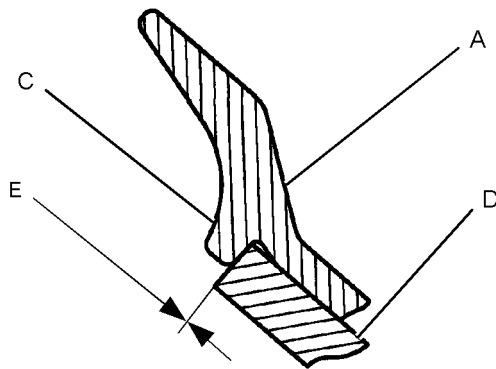


Illustration 200

g01092812

Section B-B From Illustration 199

- (A) Side cutter
(C) Shear ledge on a side cutter
(D) Side plate on a bucket
(E) 0.0 mm (0.0 inch)

5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.
6. Torque the mounting bolts to the correct specification.

i01650429

Circuit Breakers - Reset

SMCS Code: 1420-529

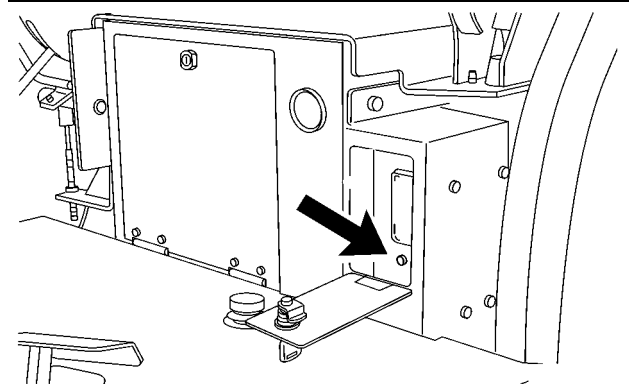


Illustration 201

g00852789

Circuit breaker for the alternator

The circuit breaker for the alternator is located inside the access cover on the left front side of the seat support. Open the access cover in order to inspect the circuit breaker or reset the circuit breaker.

The circuit breaker has a capacity of 60 Amperes.

In order to reset the circuit breaker, push the button. If the system is working properly the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.

i01631756

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

NOTICE

Do not change the coolant until you read and understand the cooling system information in Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

Failure to do so could result in damage to the cooling system components.

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: This machine was filled at the factory with Caterpillar Extended Life Coolant.

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

1. Open the engine hood.

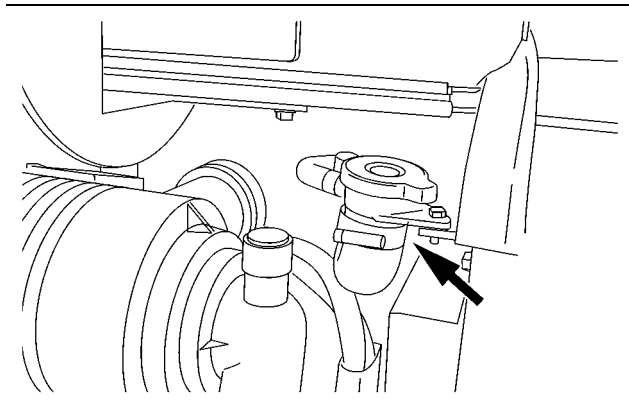


Illustration 202

g00845211

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

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

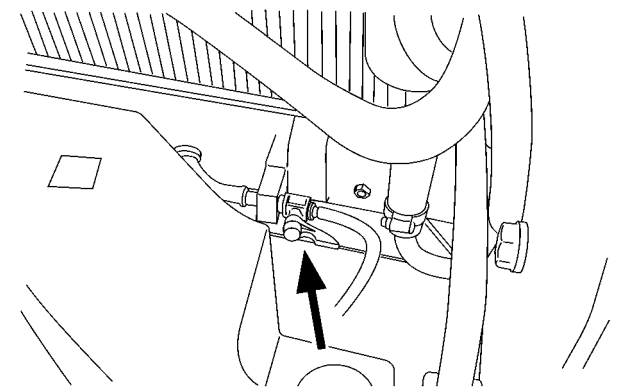


Illustration 203

g00845225

3. Open the drain valve that is under the radiator. Allow the coolant to drain into a suitable container.
4. Close the drain valve. Fill the system with a solution that consists of clean water and of cooling system cleaner.
5. Start the engine. Run the engine for approximately ten minutes in order to raise the coolant temperature.
6. Stop the engine. Open the drain valve and allow the cleaning solution to drain into a suitable container.
7. Flush the cooling system with water until the draining water is transparent.
8. Close the drain valve.

9. Add the Extended Life Coolant. Refer to the following topics:

- Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
- Operation and Maintenance Manual, "Refill Capacities"

10. Start the engine. Leave the cooling system pressure cap off. Run the engine in order to expel any air from the system.
11. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.
12. Install the cooling system pressure cap after the thermostat and the coolant level stabilizes.
13. Stop the engine.

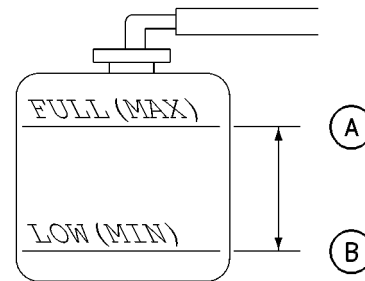


Illustration 204

g00824033

- (A) "FULL" level
(B) "LOW" level

14. Check the coolant level of the coolant reservoir. Maintain the coolant level between the "FULL" mark and the "LOW" mark.
15. If additional coolant is necessary, remove the reservoir cap and add the appropriate coolant solution.
16. Install the reservoir cap.
17. Close the engine hood.

Note: Drained fluids should always be disposed of according to local regulations.

i01278063

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

 WARNING

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

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

Table 33

RECOMMENDED AMOUNT OF EXTENDER BY COOLING SYSTEM CAPACITY	
Cooling System Capacity	Recommended Amount of Extender
4 to 8 L (1.1 to 2.1 US gal)	.2 L (0.19 qt)

For additional information on the addition of extender, see Operation and Maintenance Manual, SEBU6250, "Caterpillar Coolant Recommendations" or consult your Caterpillar dealer.

i02182933

Cooling System Coolant Level - Check

SMCS Code: 1350-040; 1350-535-FLV; 1395-535-FLV

 WARNING

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



Illustration 205 g00879749

The coolant reservoir is located under the access cover on the right rear of the machine.

1. Open the access cover and lock the access cover open.

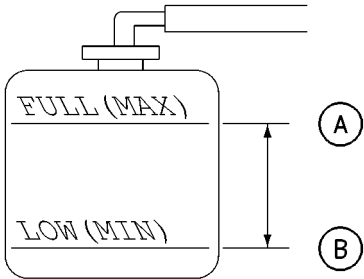


Illustration 206 g00824033

2. Maintain the coolant level between "FULL" mark (A) on the coolant reservoir and "LOW" mark (B) on the coolant reservoir.

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

3. If additional coolant is necessary, remove the filler cap for the coolant reservoir and add the appropriate coolant mixture. Install the filler cap.

i02182199

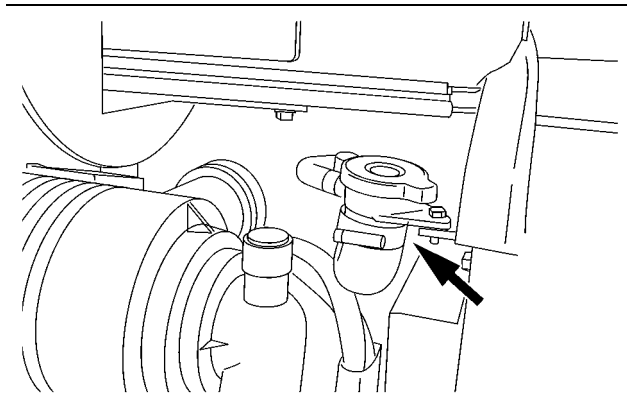


Illustration 207

g00845211

4. If the coolant reservoir is empty, open the engine hood in order to gain access to the radiator. Remove the cooling system pressure cap slowly in order to relieve pressure. Add coolant to the radiator.

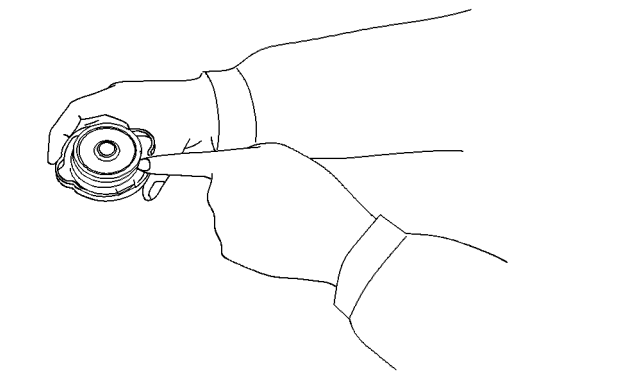


Illustration 208

g00102170

5. Inspect the condition of the cap gasket. If necessary, replace the cap.
6. Install the cooling system pressure cap.
7. Close the engine hood.

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1395-008; 1395-554; 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.

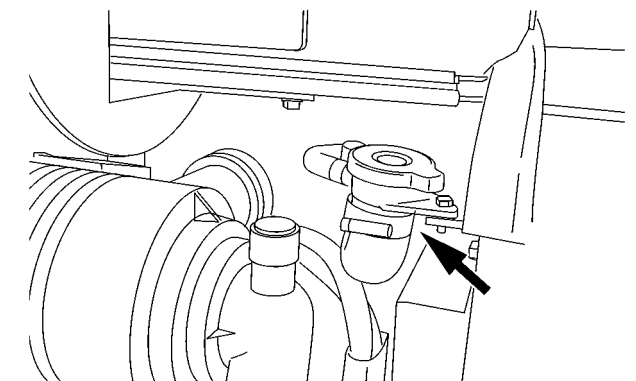


Illustration 209

g00845211

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

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples through the filler pipe of the radiator.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.

- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

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

i02049802

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1395-008; 1395-554; 7542

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

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.

Submit the sample for Level 2 analysis.

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

i01631766

Cooling System Hoses - Inspect

SMCS Code: 1380-040; 1380-510

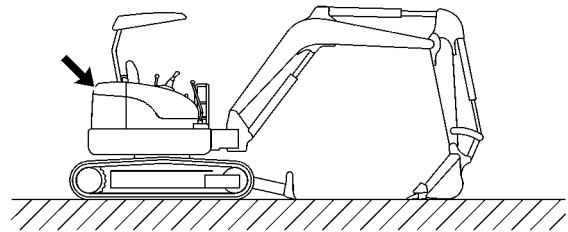


Illustration 210

g00824300

1. Open the engine hood.

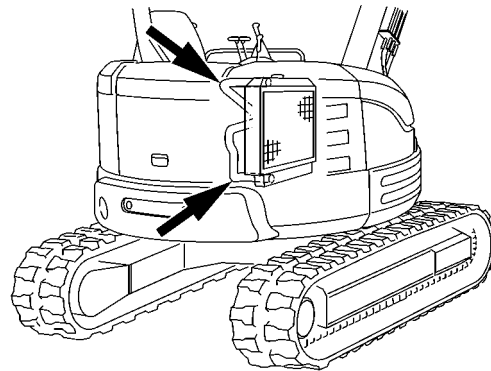


Illustration 211

g00824313

2. Inspect all hoses for leaks due to cracking, for softness next to the clamps, and for loose clamps.
3. Replace hoses that are cracked or soft and tighten any loose clamps.

Use Steps 3.a through 3.f to replace the hoses.

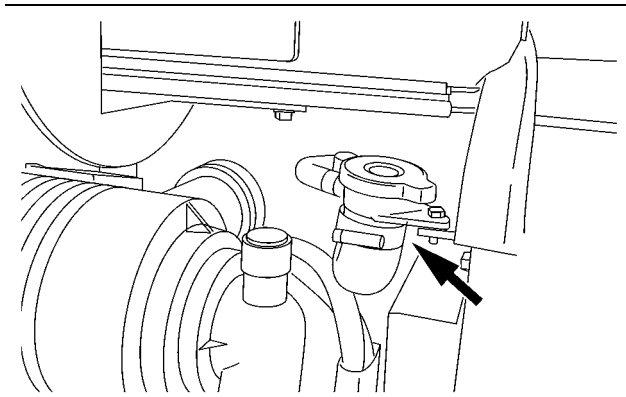


Illustration 212

g00845211

- a. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the pressure cap.

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

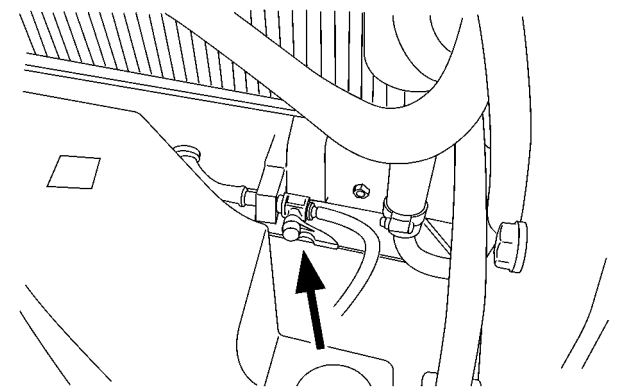


Illustration 213

g00845225

- b. Open the drain valve that is located on the bottom of the radiator. Drain the coolant from the cooling system to a level that is below the hose that is being replaced.

Note: Dispose of the drained fluids according to local regulations.

- c. Loosen the hose clamps and disconnect the damaged hose.
- d. Replace the damaged hose with a new hose.
- e. Replace the hose clamps and tighten the hose clamps.
- f. Add the appropriate coolant solution to the cooling system. Refer to the Operation and Maintenance Manual, "Cooling System Level - Check".

4. Close the engine hood.

i01631931

Cooling System Pressure Cap - Clean/Replace

SMCS Code: 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.

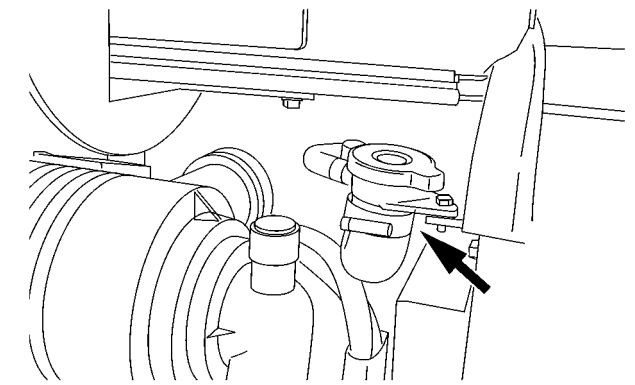


Illustration 214

g00845211

The cooling system pressure cap is located under the engine hood.

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

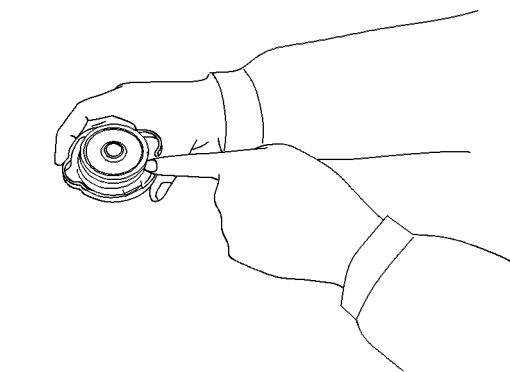


Illustration 215

g00102170

2. Inspect the cooling system pressure cap and the seal on the cooling system pressure cap for debris, for foreign material, or for damage.

3. Clean the cooling system pressure cap with a clean cloth. If necessary, replace the cooling system pressure cap.
4. Install the cooling system pressure cap.

i02183081

Engine Air Filter Element - Clean/Replace

SMCS Code: 1054-070; 1054-510

Cleaning the Air Filter Element

NOTICE

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

The air filter element can be cleaned by using the following methods.

- pressure air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean air 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).

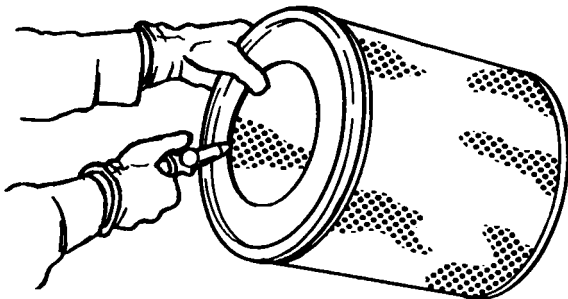


Illustration 216

g00281692

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

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

Vacuum Cleaning

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

Replace the air filter element after the air filter element has been cleaned six times. Also replace the air filter element if the air filter element has been in service for 2000 hours.

Replacing the Air Filter Element

The air filter element should be replaced immediately if the element is damaged.

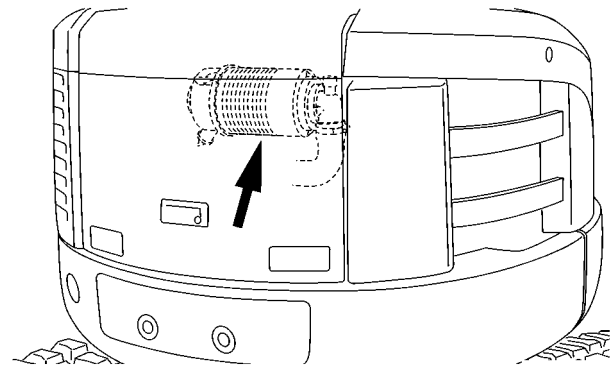


Illustration 217

g00845637

The air filter is located under the engine access door.

1. Open the engine access door.

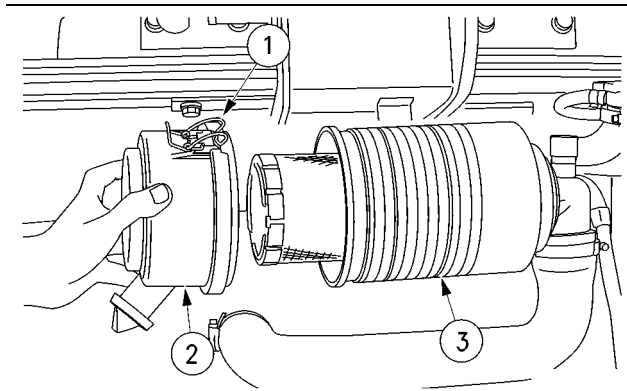


Illustration 218

g00845647

- (1) Clamp
- (2) Cover
- (3) Air cleaner housing

2. Remove clamp (1) and remove cover (2) from air cleaner housing (3).

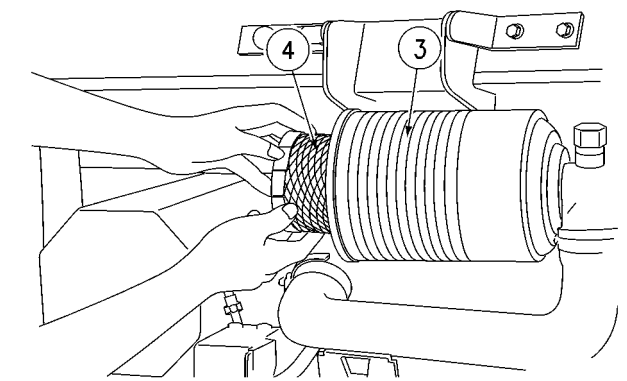


Illustration 219

g00845650

- (4) Air filter element

3. Remove air filter element (4) from air cleaner housing (3).

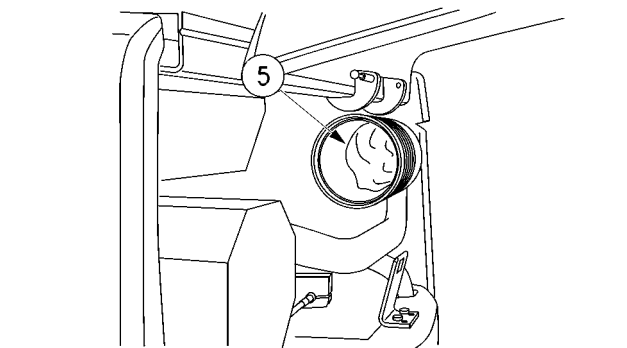


Illustration 220

g00845656

- (5) Air inlet port

4. Cover air inlet port (5) in order to prevent dirt from getting inside the engine.

5. Inspect air filter element (4). If the pleats, the gaskets or the seals are damaged, discard the air filter element. Replace the damaged air filter element with a new air filter element.
6. Wipe dust from the interior of air cleaner housing (3). Remove the cover from air inlet port (5).
7. Put the clean air filter element into air cleaner housing (3) and push the air filter element into position.
8. Install cover (2) and clamp the access cover.
9. Close the engine access door.

i01632010

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040-DJ

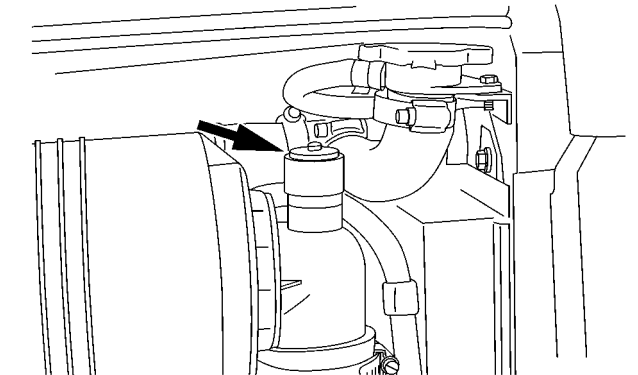


Illustration 221

g00845346

Check Air Filter indicator while the engine is running at high idle. Service the air cleaner if the restricted Air Filter indicator on the monitor panel comes on. Stop the engine before you service the air cleaner.

i01632740

Engine Oil Level - Check

SMCS Code: 1000-535

NOTICE

Do not overfill the crankcase. Engine damage can result.

1. Open the engine access door and lock the door open.

i02182208

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 1000; 1348-008;
1348-554-SM; 7542-008; 7542-554-OC, SM

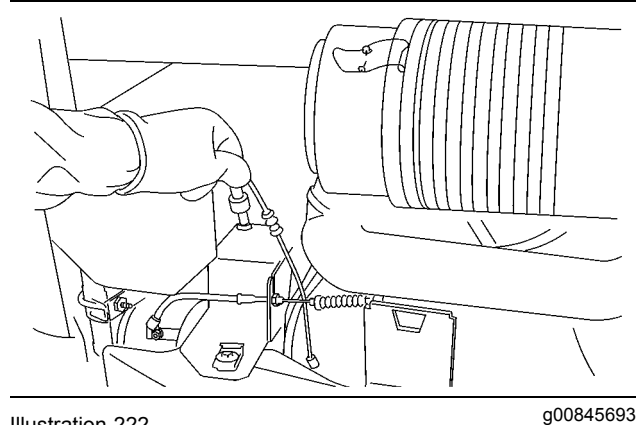


Illustration 222

g00845693

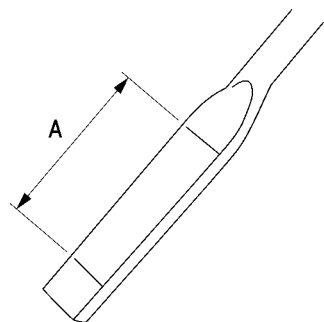


Illustration 223

g00824454

2. While the engine is stopped, maintain the oil level in area (A) on the dipstick.

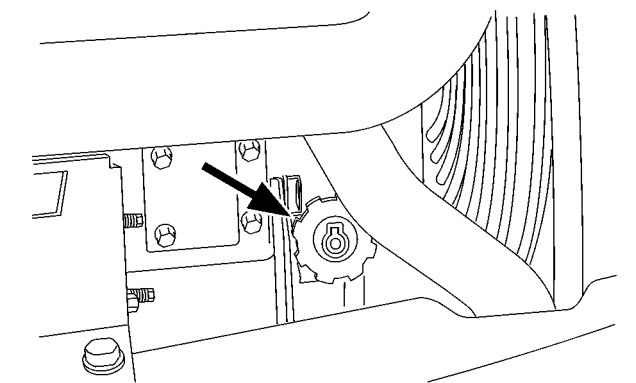


Illustration 224

g00845717

3. If necessary, remove the oil filler cap and add oil. Allow the oil to drain into the crankcase before you check the oil level.
4. Clean the oil filler cap and install the oil filler cap.
5. Close the engine access door.

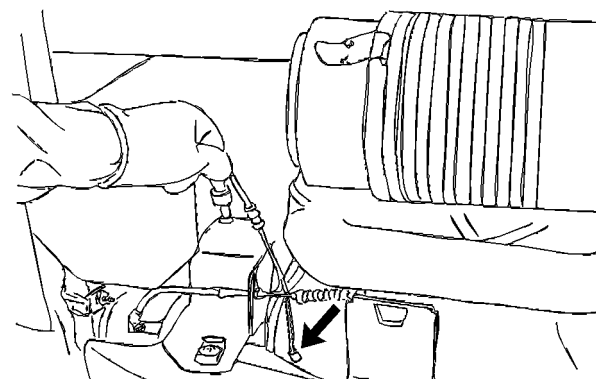


Illustration 225

g01104147

Obtain the oil sample of the engine oil through the opening for the dipstick.

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

i01633083

Engine Oil and Filter - Change

SMCS Code: 1318-510

Note: If the sulfur content in the fuel is greater than 1.5% by weight, use an oil that has a TBN of 30 and reduce the oil change interval by one-half.

Drain the crankcase while the oil is warm.

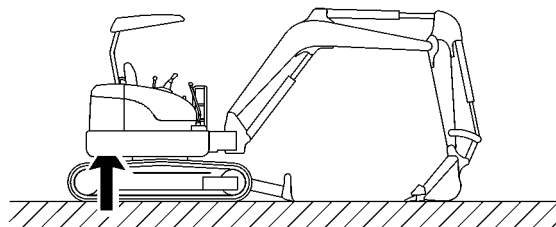


Illustration 226

g00824782

1. Open the crankcase access cover that is under the rear of the machine. Remove the bolts that secure the access cover.

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

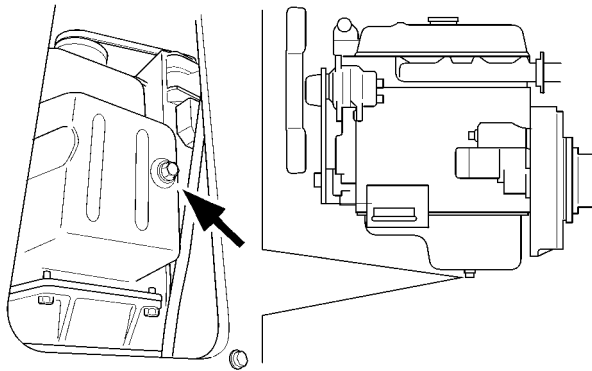


Illustration 227

g00824756

2. Remove the crankcase drain plug. Allow the oil to drain into a suitable container.

Note: Discard any drained fluids according to local regulations.

3. Clean the drain plug and install the drain plug.
4. Install the crankcase access cover.
5. Open the engine hood.

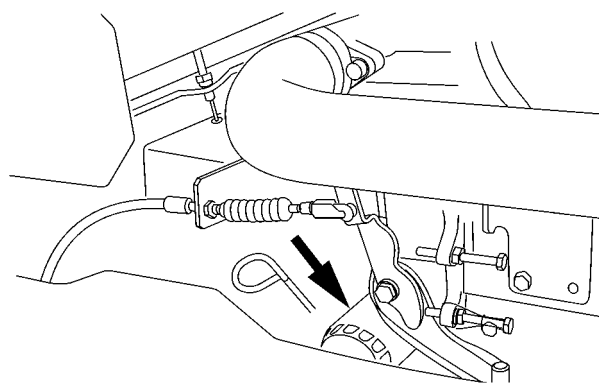


Illustration 228

g00845868

6. Remove the filter element with a filter wrench. Discard the used oil filter properly.
7. Clean the filter housing base. Make sure that all of the former filter gasket is removed.

Note: This oil filter is a cartridge type filter. This type of filter cannot be reused.

Note: Always discard used filters according to local regulations.

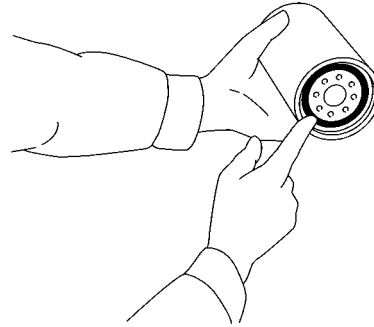


Illustration 229

g00824766

8. Apply a thin coat of clean engine oil to the gasket of the new filter.
9. Install the new filter element by hand. When the gasket contacts the filter base, tighten the filter for an additional three quarters of a turn.

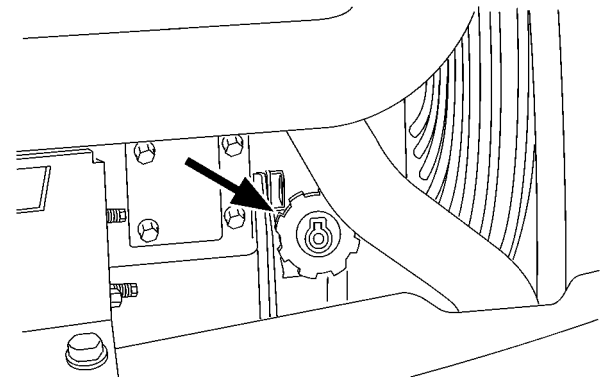


Illustration 230

g00845875

10. Remove the oil filler cap.
11. Fill the crankcase with new oil. Refer to Operation and Maintenance Manual, "Capacities (Refill)" and Operation and Maintenance Manual, "Lubricant Viscosities".
12. Clean the oil filler cap and install the oil filler cap.
13. Start the engine and operate the engine at low idle for several minutes. While the engine is running, check the filter base for oil leaks.
14. Stop the engine. Wait for thirty minutes in order to allow the oil to drain back into the crankcase.
15. Remove the dipstick and wipe off the oil.
16. Reinsert the dipstick.

17. Remove the dipstick and check the oil level on the dipstick.

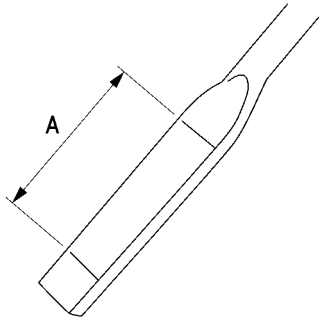


Illustration 231

g00824779

18. Maintain the oil within area (A) on the dipstick.

19. Close the engine access door.

i02860521

Engine Valve Lash - Check

SMCS Code: 1102-082; 1102-535; 1102; 1105-025; 1105-535; 1121-535; 1209-082; 1209-535; 1209; 7527

WARNING

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

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

NOTICE

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

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

Refer to Service Manual, RENR5578, "Mitsubishi Diesel Engines SL-Series, S3L, S3L2, S4L, S4L2" in order to perform the complete procedure for the valve lash adjustment.

i01633148

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

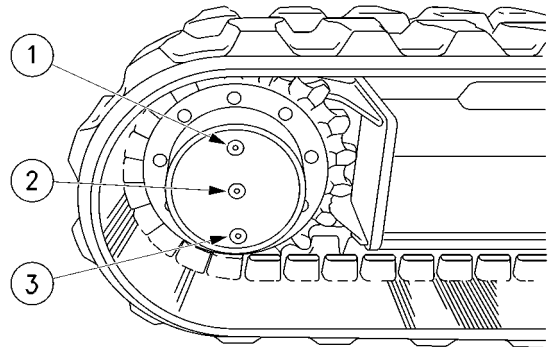


Illustration 232

g00845941

- (1) Oil filler plug
(2) Oil level plug
(3) Oil drain plug

1. Position one final drive so that the three plugs are aligned vertically.

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

2. Remove oil filler plug (1), level plug (2) and drain plug (3). Allow the oil to drain into a suitable container.
3. Clean the plugs and inspect the plugs. Replace a worn plug or a damaged plug.
4. Apply pipe sealant to oil filler plug (1), level plug (2) and drain plug (3).
5. Install drain plug (3).
6. Add oil through the opening of filler plug (1).
7. Fill the final drive to the bottom of the opening for level plug (2). Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".
8. Install level plug (2) and filler plug (1).
9. Perform Step 1 to Step 8 on the other final drive. Do not use the same container for the oil from the final drives. The oil samples from the final drives must be separate.
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 level plug (2).
15. 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.

i01633360

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

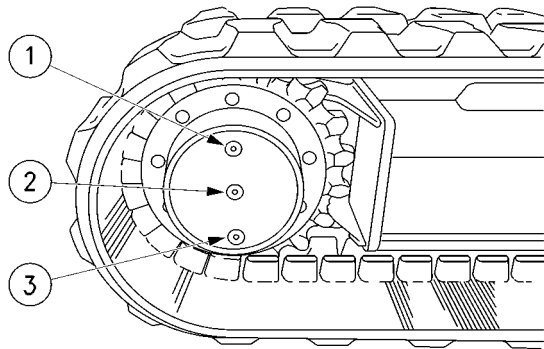


Illustration 233

g00845941

- (1) Oil filler plug
(2) Oil level plug
(3) Oil drain plug

1. Position one final drive so that the three plugs are aligned vertically.

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

2. Remove oil level plug (2).
 3. Check the oil level. The oil should be near the bottom of the opening of oil level plug (2).
 4. Add oil through the opening of oil filler 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 oil level plug (2) and oil filler plug (1).
 6. Apply pipe sealant to oil level plug (2) and oil filler plug (1).

7. Install oil level plug (2).
8. Install oil filler plug (1).
9. Repeat the procedure for the other final drive.

i02182193

Final Drive Oil Sample - Obtain

SMCS Code: 4011-008; 4050-008; 4050-SM; 7542-008

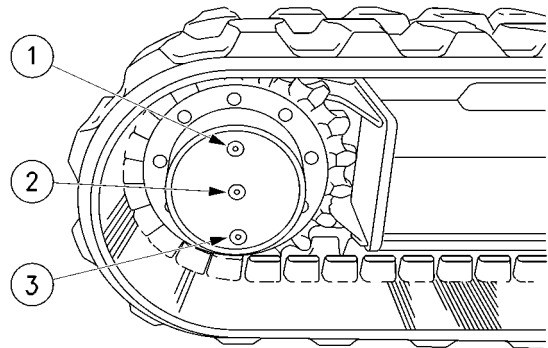


Illustration 234

g00845941

- (1) Oil filler plug
(2) Oil level plug
(3) Oil drain plug

Remove oil level plug (2) for the final drive. Obtain a sample of the final drive oil by pulling a sample through the opening for oil level plug (2).

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

i01728476

Fuel System - Prime

SMCS Code: 1250-548

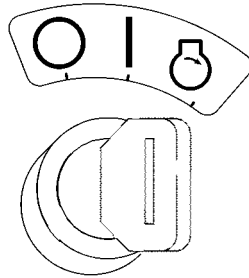


Illustration 235

g00817949

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

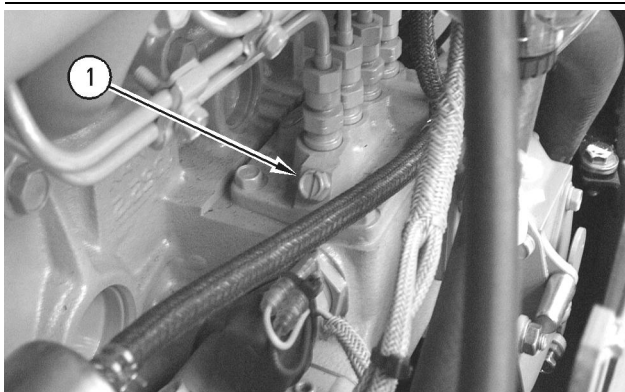


Illustration 236

g00887679

(1) Air vent screw

2. Loosen air vent screw (1) in order to purge the air in the fuel injector pump.
3. Once purging from air vent screw (1) is complete, tighten air vent screw (1).

Note: Air in the fuel injector lines and injectors will be expelled automatically when the engine is cranked.

4. Start the engine.

Further priming of the engine is necessary if the following problems occur:

- The engine will not start.
- The engine starts but the engine continues to misfire.
- The engine starts but the engine continues to emit smoke.

Note: If the engine starts but the engine runs rough, continue to run the engine at low idle until the engine runs smoothly.

i01684866

Fuel System Filter - Replace

SMCS Code: 1261-510

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

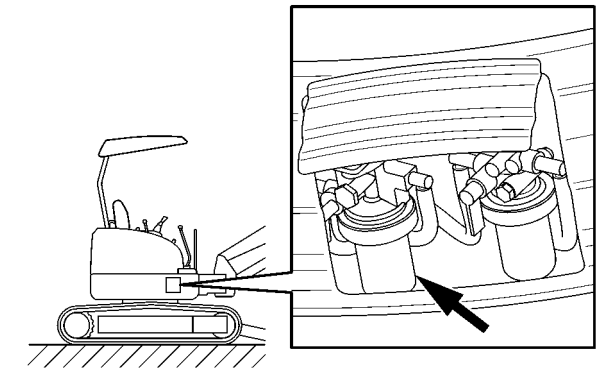


Illustration 237

g00868854

The fuel filter is located on the right side of the machine inside the filter element access cover.

1. Open the filter element access cover.

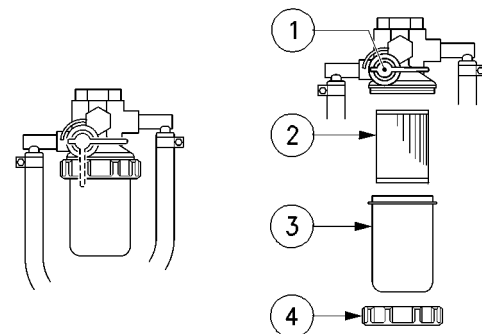


Illustration 238

g00868856

- (1) Fuel cock
- (2) Element
- (3) Case
- (4) Ring nut

2. Close fuel cock (1).
3. Remove ring nut (4).
4. Remove element (2) from case (3). Replace element (2) with a new element.

Note: This type of element cannot be reused.

Note: Always discard used elements according to local regulations.

5. Check for water in case (3). If water is found, clean case (3).
6. Reinstall case (3) and ring nut (4).
7. Open fuel cock (1).

i01685213

Fuel System Water Separator - Drain

SMCS Code: 1263

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

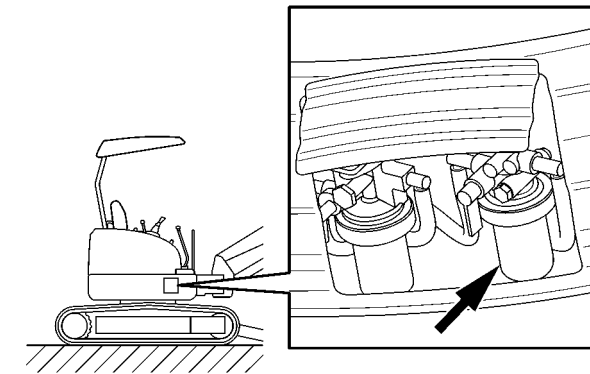


Illustration 239

g00869068

The fuel system water separator is located on the right side of the machine inside the filter element access cover.

Drain the water and the sediment if the level ring is positioned near the "reference line" on the case.

1. Open the filter element access cover.

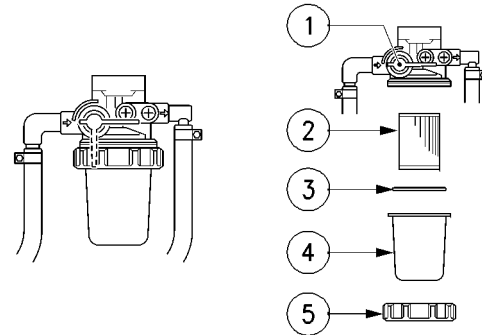


Illustration 240

g00869069

- (1) Fuel cock
- (2) Element
- (3) Level ring
- (4) Case
- (5) Ring nut

2. Close fuel cock (1).
 3. Remove ring nut (5) and case (4).
 4. Allow water and sediment to drain into a suitable container.
 5. Remove element (2) and level ring (3) from case (4). Replace element (2) with a new element.
- Note:** Always discard used elements according to local regulations.
6. Reinstall level ring (3).
 7. Reinstall case (4) and ring nut (5).
 8. Open fuel cock (1).

i01633615

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-STR

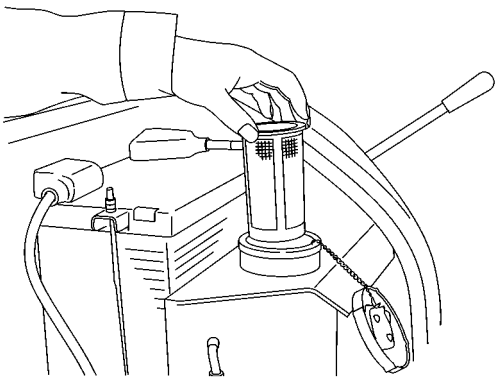


Illustration 241

g00846099

1. Remove the fuel cap and the fuel fill screen.

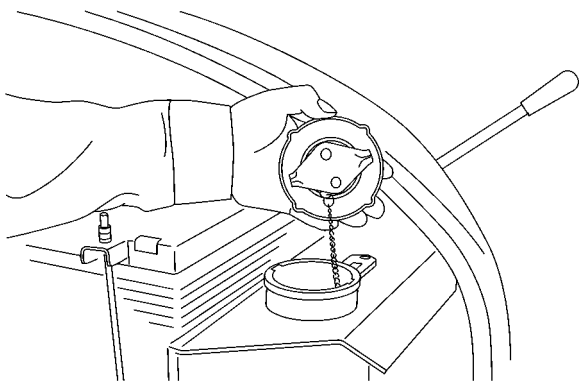


Illustration 242

g00846117

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

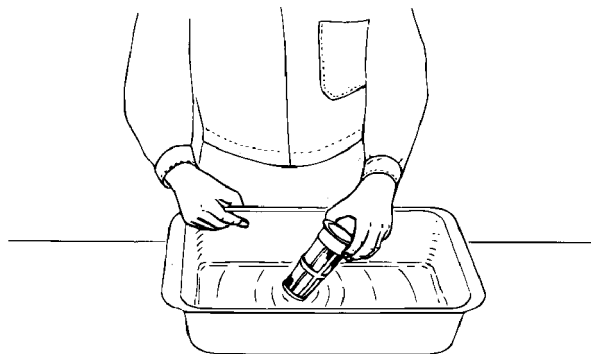


Illustration 243

g00104239

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

4. Install the fuel fill screen.
5. Put a light coating of fuel oil on the cap gasket.
6. Install the fuel cap.

i01633568

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

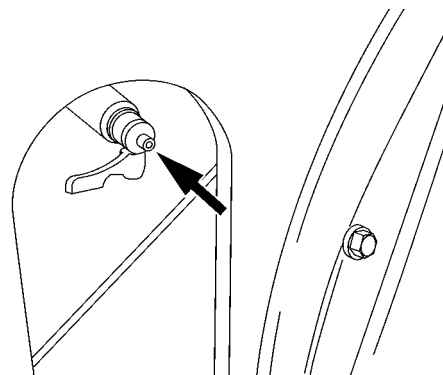


Illustration 244

g00846073

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

1. Open the drain valve that is located under the fuel tank. Allow the water and the sediment to drain into a suitable container.

Note: Discard the drained fluids according to local regulations.

2. Close the drain valve.

Fill the Fuel Tank

You can now add fuel to the fuel tank, if necessary. Remove the fuel tank cap and pump fuel through the opening.

Make sure that you securely tighten the fuel tank cap after the refueling is complete.

i01633841

Fuses - Replace

SMCS Code: 1417-510

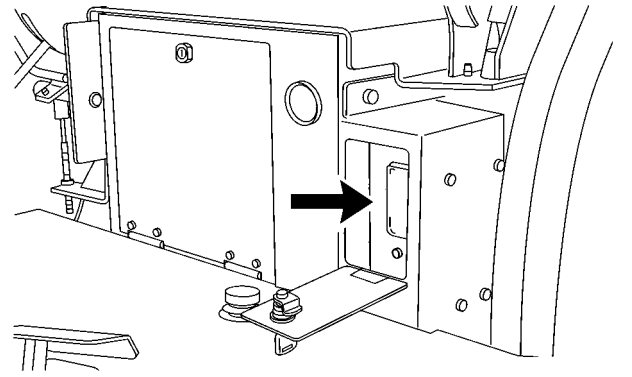


Illustration 245

g00846309

The fuse panel is located inside the access cover on the left front side of the seat support. Open the access cover for fuse access.



Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit and/or repair the circuit.

NOTICE

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

NOTICE

If it is necessary to replace fuses frequently, an electrical problem may exist.

Contact your Caterpillar dealer.

To replace a fuse, use a puller that is stored in the fuse panel. The following spare fuses are contained in the fuse panel:

- 10 Amperes
- 20 Amperes
- 30 Amperes

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

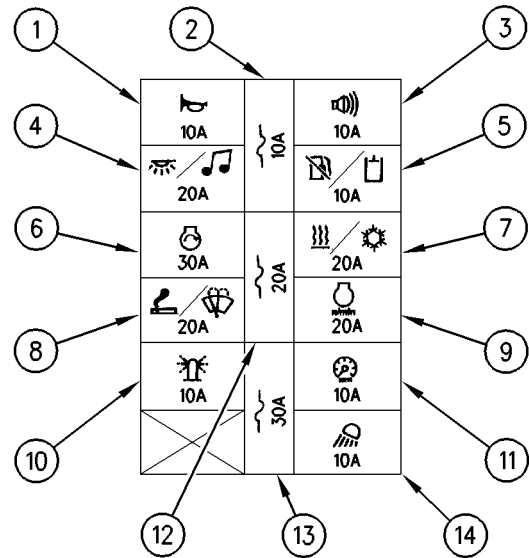


Illustration 246

g00825420

(1) **Horn** – 10 Amp

(2) **Spare** – 10 Amp

(3) **Travel Alarm** – 10 Amp

(4) **Dome Light and Radio** – 20 Amp

(5) **Hydraulic System and Fuel Shutoff** – 10 Amp

(6) **Engine Start** – 30 Amp

(7) **Heater and Air Conditioner** – 20 Amp

(8) **Windshield Washer and Lighter** – 20 Amp

(9) **Engine Speed** – 20 Amp

(10) **Beacon** – 10 Amp

(11) **Panel Dimmer** – 10 Amp

(12) **Spare** – 20 Amp

(13) **Spare** – 30 Amp

(14) **Work Lights** – 10 Amp

i01635713

Hydraulic System Oil - Change

SMCS Code: 5056-044

1. Park the machine on level ground.

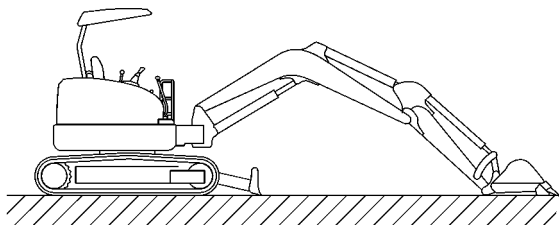


Illustration 247

g00825578

2. Extend the stick and the bucket fully. Lower the boom so that the bucket is rested on the ground. Lower the blade to the ground.

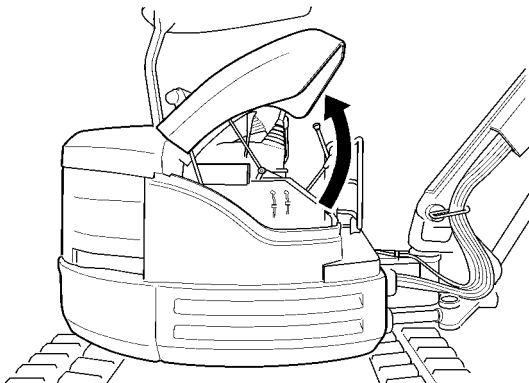


Illustration 248

g00846708

3. The hydraulic tank is located under the access cover on the right side of the machine. Open the access cover for the hydraulic tank. Clean the area around the hydraulic oil filler cap in order to prevent dirt from entering the hydraulic tank.

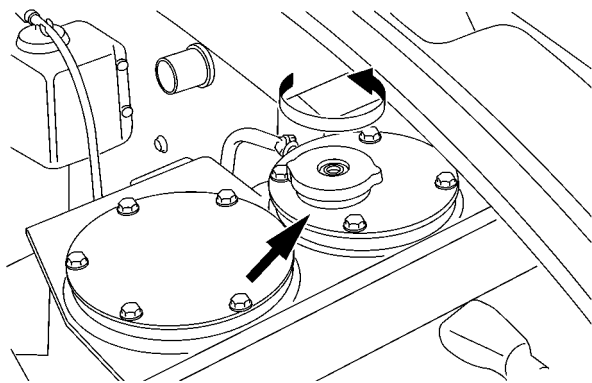


Illustration 249

g00846715

4. Relieve the internal pressure from the hydraulic tank by loosening the hydraulic oil filler cap. After the pressure is relieved, remove the hydraulic oil filler cap.

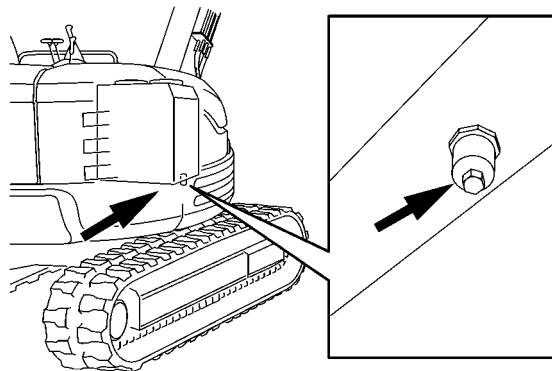


Illustration 250

g00825581

The hydraulic oil drain plug is located on the bottom of the hydraulic oil tank.

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

5. Remove the hydraulic oil drain plug. Allow the oil to drain into a suitable container.
6. Clean the drain plug and the O-ring. Inspect the drain plug and the O-ring. Replace the drain plug or replace the O-ring if the drain plug or the O-ring is damaged or worn. Reinstall the plug.

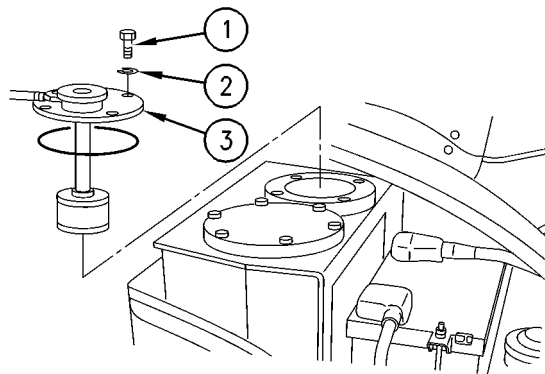


Illustration 251

g00846733

7. Remove bolt (1), washer (2), and left cover (3).

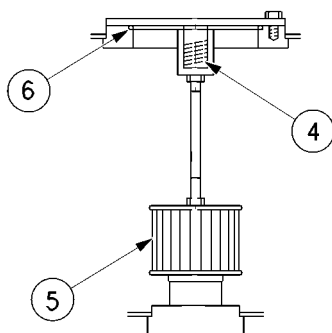


Illustration 252

g00825618

8. Remove spring (4) and screen (5).

Note: Do not allow spring (4) to fall into the hydraulic tank.

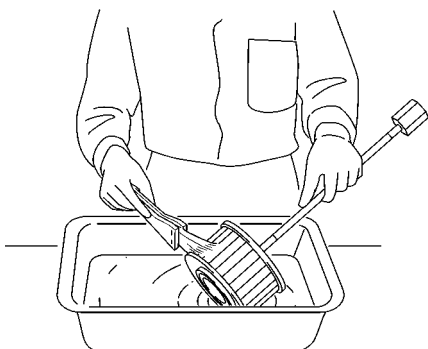


Illustration 253

g00825626

9. Clean screen (5) and inspect screen (5). Replace the screen if the screen is damaged or badly contaminated.
10. Inspect O-ring seal (6). Replace the O-ring seal if it is necessary.
11. Install the screen by reversing steps 7 and 8.

Note: Make sure that the O-ring seal and the spring are properly positioned during installation.

12. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Capacities (Refill)".

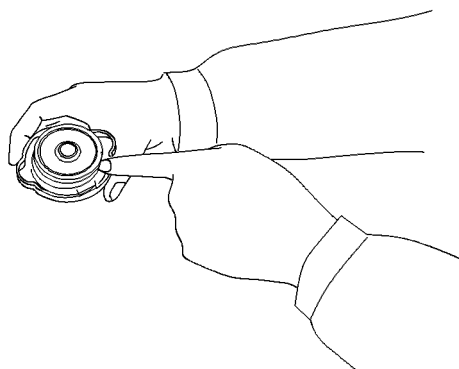


Illustration 254

g00101462

13. Inspect the pressure cap. Clean the pressure cap. Replace the pressure cap if damage is evident.
14. Install the pressure cap.
15. Start the engine and run the engine for a few minutes. Slowly operate the control levers in order to cause the hydraulic oil to flow through the circuits.

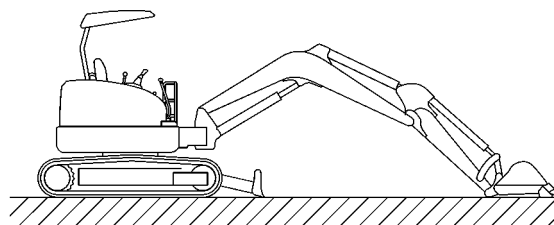


Illustration 255

g00825578

16. Extend the stick and the bucket fully. Lower the boom so that the bucket is rested on the ground. Lower the blade to the ground.

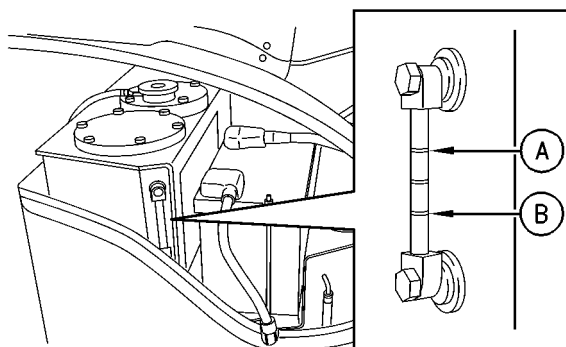


Illustration 256

g00846755

17. Maintain the hydraulic oil level between mark (A) and mark (B) of the sight gauge.
18. Close the right access door.

i01636092

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

NOTICE

Hot oil can cause personal injury. Remove the hydraulic oil filler cap only when the engine is stopped. Allow time for the hydraulic system to cool. Remove hydraulic oil filler cap slowly in order to relieve pressure.

The hydraulic oil tank is located under the access cover on the right side of the machine.

1. Open the right access cover.
2. Clean the area thoroughly in order to prevent dirt from entering the hydraulic oil tank.
3. Slowly loosen the hydraulic oil filler cap in order to relieve the pressure in the hydraulic oil tank.

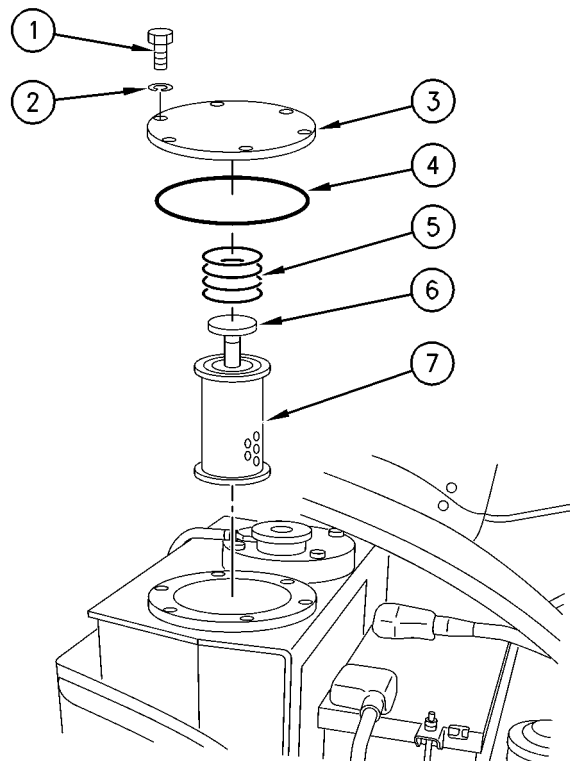


Illustration 257

g00846912

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

4. Remove bolt (1), washer (2), and right cover (3).
5. Remove spring (5), valve (6), and element (7) from the case.
6. Inspect O-ring (4). Replace the O-ring if the O-ring is worn or damaged.
7. Reverse steps 4 and 5 in order to install the new element.
8. Tighten the hydraulic oil filler cap.
9. Close the right access cover.

i01636660

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

Note: Check the hydraulic system oil level with the machine on a level surface.

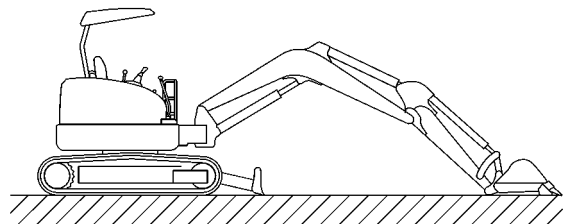


Illustration 258

g00825529

1. Extend the stick and the bucket fully. Lower the boom so that the bucket is rested on the ground. Lower the blade to the ground.

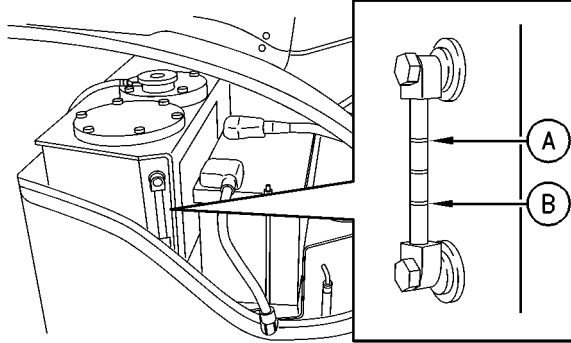


Illustration 259

g00847296

2. The sight gauge is located on the side of the hydraulic tank.
3. Maintain the hydraulic system oil level between top mark (A) and bottom mark (B) on the sight gauge.
4. If additional hydraulic oil is needed, the hydraulic oil filler cap is located under the access door on the right side of the machine.

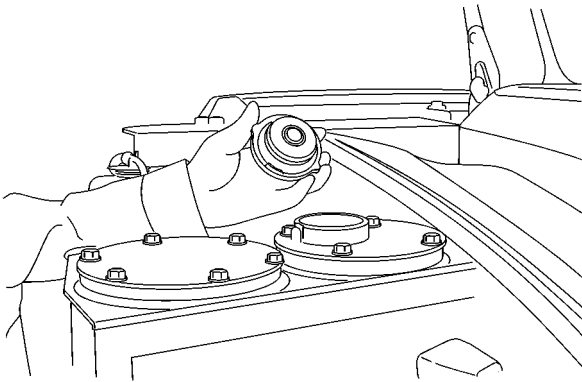


Illustration 260

g00847298

NOTICE

Never remove the hydraulic tank filler cap from the hydraulic tank if the oil is hot. Hot oil can cause burns.

Air can enter the system. Air in the system can cause pump damage.

5. Remove the hydraulic tank filler cap slowly in order to relieve any pressure. Add hydraulic oil, if necessary.
6. Inspect the gasket on the hydraulic tank filler cap. If the gasket is damaged replace the hydraulic tank filler cap.
7. Install the hydraulic tank filler cap.

i02182230

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-008; 5095-SM; 7542-008; 7542

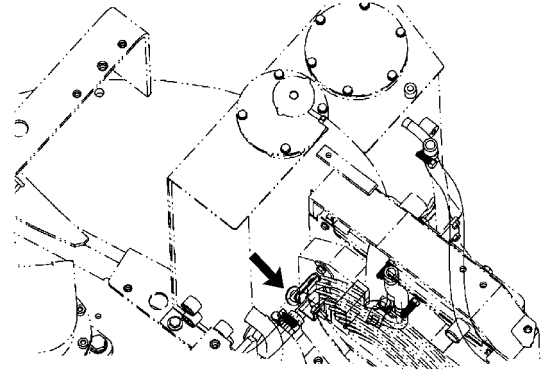


Illustration 261

g01104159

Obtain a sample of the hydraulic oil from the hydraulic oil sampling valve. The hydraulic oil sampling valve is located on the bottom of the hydraulic oil tank. Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the hydraulic oil.

i01710484

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

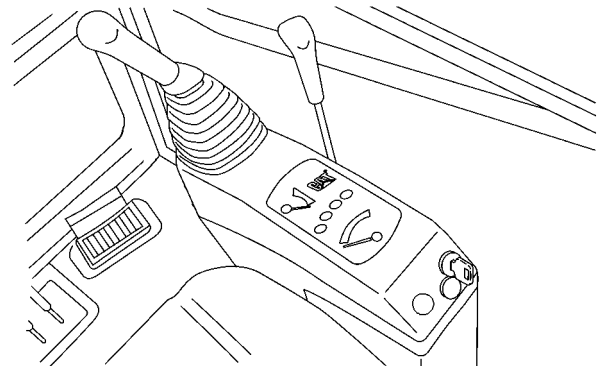


Illustration 262

g00880299

1. Check the cab for the following problems.
 - Broken lenses on the gauges
 - Broken indicator lights

- Broken switches
 - Other broken components
2. Turn the engine start switch key to the ON position..
 3. Verify that all of the indicators on the instrument panel are illuminated for approximately 2.5 seconds. The alarm should also sound.
 4. Start the engine.
 5. Look for inoperative gauges.
 6. Turn on all machine lights. Check for proper operation.
 7. Turn off all machine lights.
 8. Stop the engine.
 9. Make any repairs that are required before operating the machine.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris

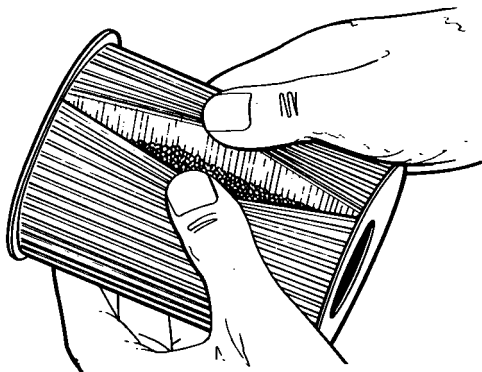


Illustration 263

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.

i02306981

Quick Coupler - Lubricate (If Equipped)

SMCS Code: 6129-086

1. Lower all work tools to the ground.
2. Wipe off the fitting before you lubricate the fitting.



Illustration 264

g00509006

3. Apply grease to the fitting for the quick coupler.

i01637493

Radiator Core - Clean

SMCS Code: 1353-070

1. Open the engine access cover.

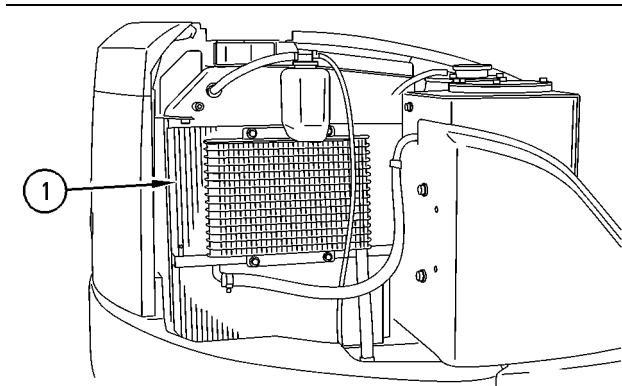


Illustration 265

g00847373

2. Inspect radiator core (1) for dust or debris.
3. You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator fins. However, the use of compressed air is preferred.
4. Close the engine access cover.

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.

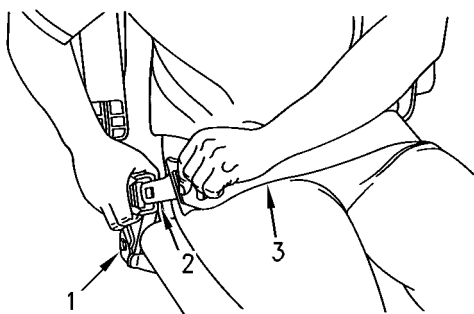


Illustration 266

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.

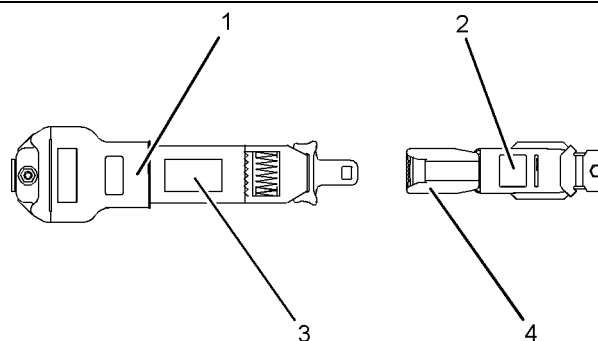


Illustration 267

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.

i01637513

Swing Bearing - Lubricate

SMCS Code: 7063-086

1. Lower all work tools to the ground.

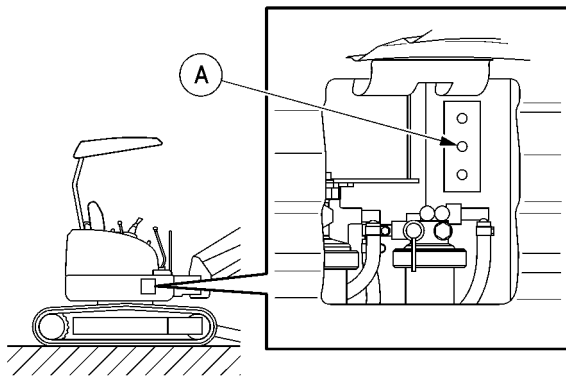


Illustration 268

g00847399

The grease fitting for the swing bearing is located on the right side of the machine.

2. Wipe the grease fitting before you lubricate the grease fitting.
3. Apply lubricant through fitting (A) until the old lubricant is pushed out from the seal surface.

i01637553

Swing Gear - Lubricate

SMCS Code: 7063-086

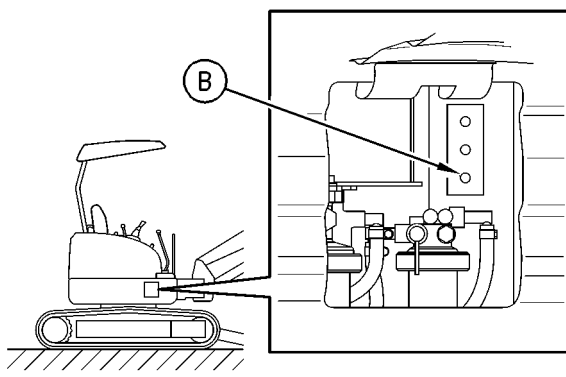


Illustration 269

g00847450

The grease fitting for the swing gear is located on the right side of the machine.

1. Lower all work tools to the ground.

2. Wipe the grease fitting before you lubricate the grease fitting.
3. Apply lubricant through fitting (A).
4. Rotate the upper structure for 90°.
5. Apply lubricant through fitting (A).
6. Repeat Step 3 and Step 4 until the upper structure has rotated 360°.

i02183254

Track (Rubber) - Inspect/Replace (If Equipped)

SMCS Code: 4198-040; 4198-510

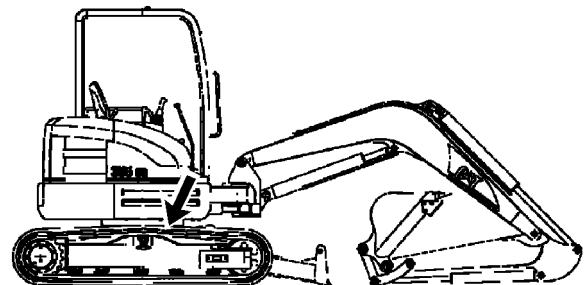


Illustration 270

g01104638

Check the rubber tracks for the following conditions:

- Steel cords that are cut
- Iron cores that are fractured
- Rubber flaking off to the point of showing steel cords or iron cores
- Loss of traction or grousers are worn down to approximately 5 mm (0.2 inch) in height.

If any of the above conditions or a combination of the above conditions are observed, replace the belt.

i01637735

Track Adjustment - Adjust

SMCS Code: 4170-025

WARNING

Personal injury or death can result from grease under pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve one turn only.

If track does not loosen, close the relief valve and contact your Caterpillar dealer.

Tightening the Tracks

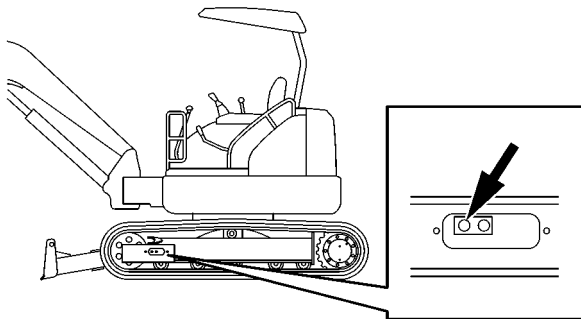


Illustration 271

g00847600

1. Remove the cover plate for the track adjustment valve.

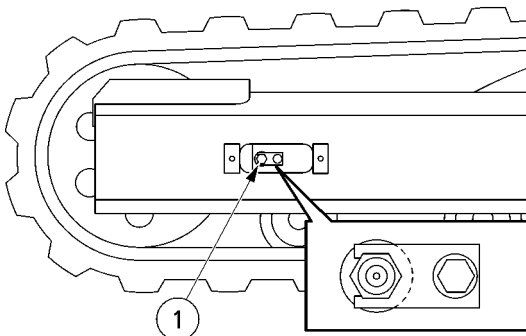


Illustration 272

g00847604

2. Wipe fitting (1) before you add grease.
3. Add grease through fitting (1) until the correct tension is reached.
4. Operate the track back and forth in order to equalize the pressure.
5. Check the amount of sag. Adjust the track, as needed.
6. Replace the cover plate for the track adjustment valve.
7. Repeat the same procedure for the other track.

Loosening the Track

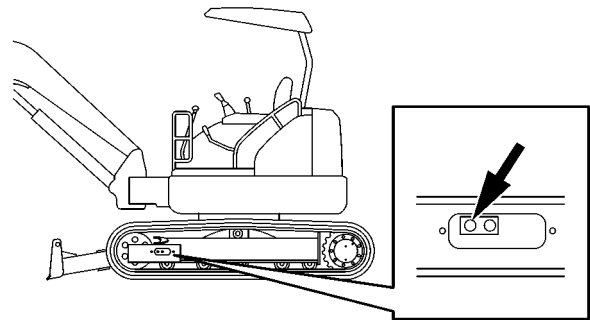


Illustration 273

g00847600

1. Remove the cover plate for the track adjustment valve.

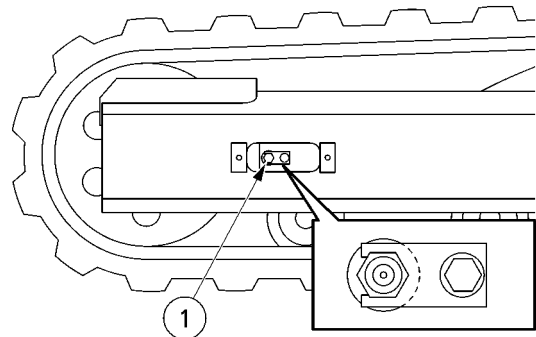


Illustration 274

g00847604

2. Loosen fitting (1) carefully until the track begins to loosen. One turn should be the maximum.
3. Tighten fitting (1) to 34 N·m (25 lb ft) when the desired track tension is reached.
4. Operate the track back and forth in order to equalize pressure.

5. Check the amount of sag in the track. Adjust the track, as needed.
6. Replace the cover plate for the track adjustment valve.
7. Repeat the same procedure for the other track.

i01592560

Track Adjustment - Inspect

SMCS Code: 4170-040

Measuring Rubber Track Tension

1. Park the machine on a level surface.



Illustration 275

g00696958

2. Position the upper frame over the tracks at a 90° angle.
3. Lower the bucket to the ground with the stick in a vertical position.
4. Chock the track that is not being lifted off the ground.
5. Apply boom down pressure until the track that is on the same side as the bucket has cleared the ground.
6. Chock the lower frame of the machine in this position.
7. Clean the track rollers and the area around the skid plate.

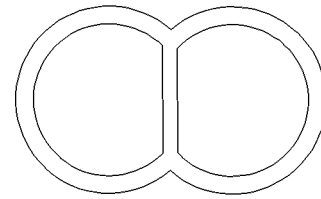


Illustration 276

g00484245

8. For a machine that is equipped with the rubber tracks, locate the “omega” mark on the inside flat of the track.
9. Locate the “omega” mark under the center track roller.

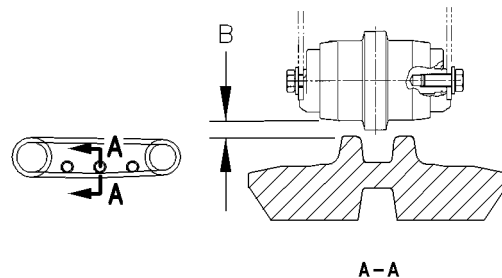


Illustration 277

g00522663

The distance (B) should be 10 to 15 mm (0.4 to 0.6 inch).

10. Measure the sag in the track. The sag is measured from the bottom of the roller to the surface on the top of the track. A properly adjusted track will have 10 to 15 mm (0.4 to 0.6 inch) of sag.

Measuring Steel Track Tension

Follow the same procedures for measuring rubber track tension. There is not a “omega” mark on the steel tracks. You do not need to align the steel tracks. The proper amount of sag for steel tracks is 25 to 35 mm (1.0 to 1.4 inch).

i01607731

Travel Alarm - Test (If Equipped)

SMCS Code: 7429-081

The travel alarm will sound when the machine is moved forward or backward. You must move the machine in order to test the travel alarm.

1. Start the engine. Move the hydraulic control console to the LOWERED position.
2. Raise the work tool. Make sure that there is adequate overhead clearance.

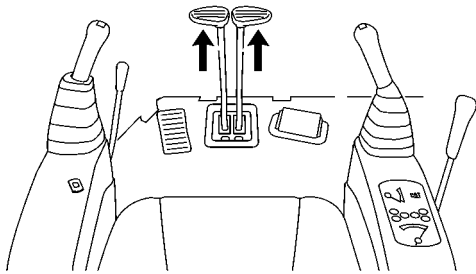


Illustration 278

g00832965

3. Use the travel levers to move the machine forward. The travel alarm should sound.
4. Release the travel levers in order to stop the machine.
5. Use the travel levers to move the machine backward. The travel alarm should sound.
6. Release the travel levers in order to stop the machine. Lower the work tool to the ground. Deactivate the hydraulic controls by placing the hydraulic control console in the RAISED position. Stop the engine.

i01722112

Undercarriage - Check

SMCS Code: 4150-535

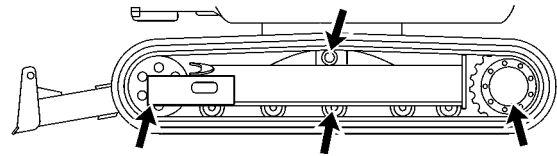


Illustration 279

g00885424

1. Check the carrier rollers, the track rollers, and the idler wheels for possible leakage.
2. Check the surface of the track, the carrier rollers, the track rollers, the idler wheels, the track shoes, and the drive sprockets. Look for signs of wear and loose mounting bolts.
3. Listen for any abnormal noises while you are moving slowly in an open area.
4. If abnormal wear exists or abnormal noises or leaks are found, consult your Caterpillar dealer.

i01637979

Window Washer Reservoir - Fill

SMCS Code: 7306-544-KE

NOTICE

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

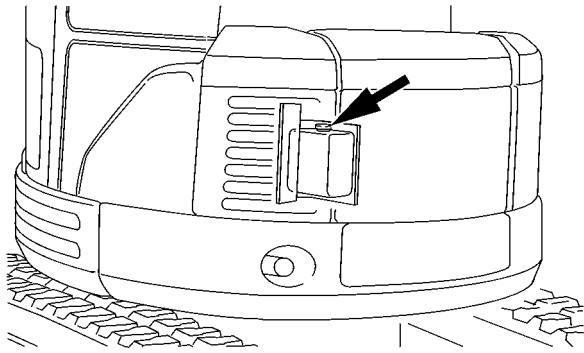


Illustration 280

g00847636

The washer fluid bottle is located in the engine compartment.

1. Open the engine access door.
2. Remove the filler cap.
3. Fill the washer fluid bottle with washer fluid through the filler opening.
4. Replace the filler cap.
5. Close the engine access door.

i01223970

Window Wiper - Inspect/Replace

SMCS Code: 7305-040; 7305-510

Inspect the wiper blade on the front window. Replace the wiper blade if the wiper blade is worn or damaged. Replace the wiper blade if the front window is streaked after use.

i01592019

Windows - Clean

SMCS Code: 7310-070; 7340-070

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

Note: When you are cleaning the window above the front window, you should use a soft cloth that is not abrasive. This window can be easily scratched.

WARNING

Wash polycarbonate windows with a mild soap and water. Never use a cleaning solvent on polycarbonate windows.

Cleaning Methods

Aircraft Windshield Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, or isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.