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MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt

CATERPILLAR®

CATERPILLAR®

SEBU8495-03
February 2012

Operation and Maintenance Manual

216B3, 226B3, 236B3, 242B3 and 252B3 Skid Steer Loaders, 247B3 and 257B3 Multi Terrain Loader and 259B3 Compact Track Loader

JXM1-Up (216B3)
MWD1-Up (226B3)
A9H1-Up (236B3)
SRS1-Up (242B3)
TNK1-Up (252B3)
TSL1-Up (247B3)
B7H1-Up (257B3)
YYZ1-Up (259B3)

Maintenance Section

Maintenance Access

i01961574

Access Doors and Covers

SMCS Code: 7273-572; 7273-573

Engine Access Door

Note: A pinch point exists between the top of the engine access door and the radiator guard. Keep hands away from this area when you close the engine access door.

The engine access door is located on the back of the machine.

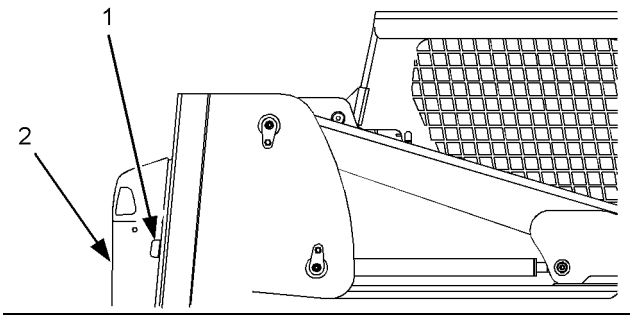

Illustration 119 g01019131

1. Pull the release lever (1) in order to open the engine access door (2).

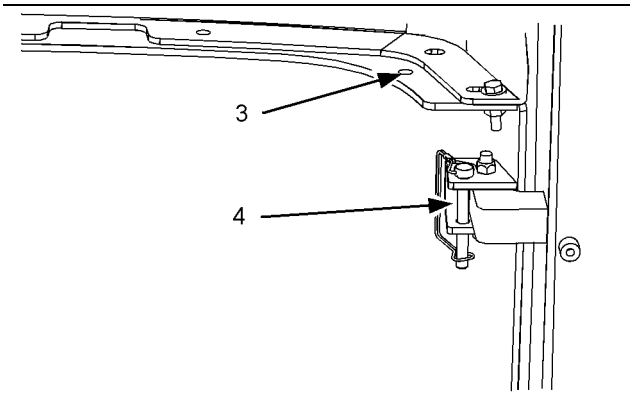

Illustration 120 g01019162

2. Move the retaining pin from the stored position (3) and put the retaining pin in the locked position (4). This will prevent the engine access door from closing inadvertently.
3. In order to close the engine access door, put the retaining pin in the stored position.
4. Close the engine access door.

i03879812

Cab Tilting

SMCS Code: 7301-506; 7301-509

WARNING

Do not go beneath cab unless cab is empty and support lever is engaged.

Failure to follow the instructions or heed the warnings could result in injury or death.

WARNING

Do not tilt the cab using an open door. The door must be closed and latched when lifting the cab. The door may become dislodged from its hinges and may cause serious personal injury or death.

Tilting the Cab Upward

1. Park the machine on level ground.

Note: Empty the water tank (if equipped) before you tilt the cab.

2. Lower the loader arms fully. If you tilt the cab upward with the loader lift arms in the RAISED position, you must engage the brace for the loader lift arms. See Operation and Maintenance Manual, “Loader Lift Arm Brace Operation” for the process for engaging the brace for the loader lift arms.
3. Turn the engine start switch key to the OFF position.
4. Place supports under the rear of the machine in order to support the machine while the cab is tilted.

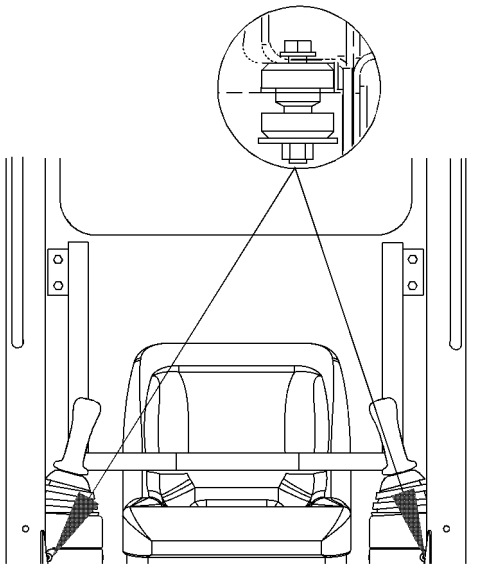

Illustration 121 g01025254

5. Remove the two front bolts for the ROPS.

6. Close the cab door and ensure that the door is latched.

7. Tilt the cab upward. Stand on the ground when you tilt the cab.

Note: More than one person may be needed to tilt the cab.

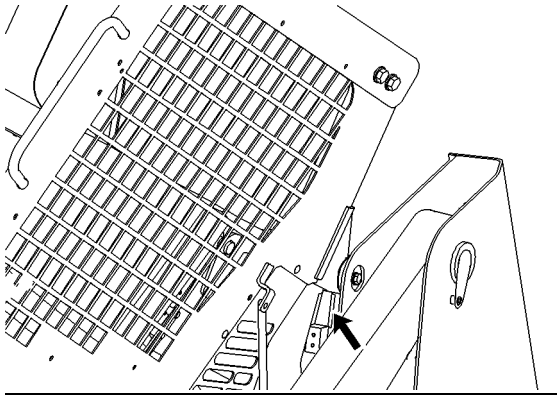

Illustration 122 g00954946

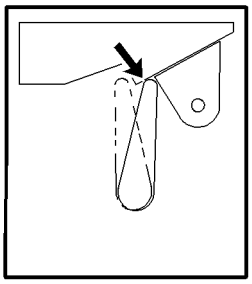

Illustration 123 g00952728

The cab support lever is in the ENGAGED position.

8. Make sure that the cab support lever is in the ENGAGED position.

Tilting the Cab Downward

Note: More than one person may be needed to tilt the cab.

1. Ensure that all persons are not under the cab. Remove all of the tools and unsecured items that are underneath the cab.

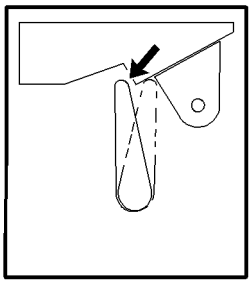

Illustration 124 g00952719

The cab support lever is shown in the DISENGAGED position.

2. Tilt the cab upward. Move the cab support lever to the DISENGAGED position.

3. Tilt the cab downward and install the bolts for the ROPS. Torque the bolts to 125 ± 20 N·m (92 ± 15 lb ft).

4. Remove the supports from the rear of the machine.

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Loader Lift Arm Brace Operation

SMCS Code: 6119-011-AB; 6119-012-AB

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: TSL1-Up

S/N: JXM1-Up

⚠ WARNING

Loader lift arm brace must be in place when working under raised lift arms.

Failure to follow the instructions or heed the warnings could result in injury or death.

Engage the Lift Arm Brace (Radial Lift)

1. Empty the work tool. Remove the work tool. Park the machine on level ground. Lower lift arms to the ground. Stop the engine and exit the machine.

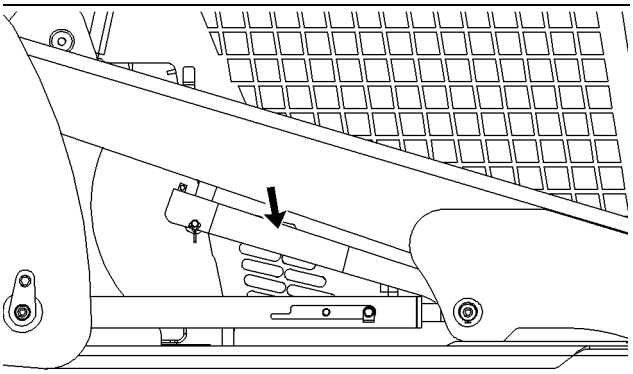

Illustration 125 g00930196

2. Remove the pin that holds the lift arm brace in the stored position.
3. Lower the lift arm brace to rest on the cylinder housing.
4. Mount the machine. Secure the seat belt and lower the armrest. Start the engine.
5. Raise the lift arms until the brace falls onto the cylinder rod. Slowly lower the lift arms until the brace stops movement.

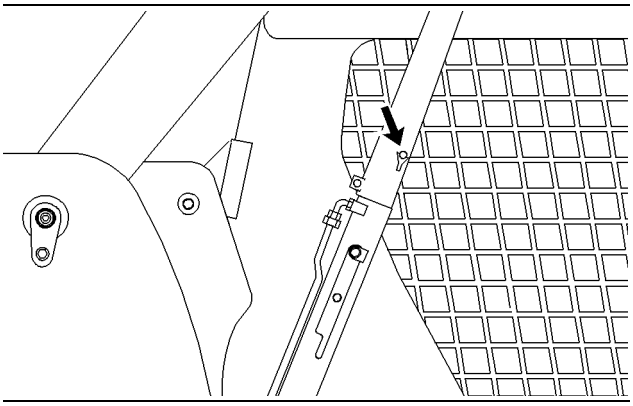

Illustration 126 g00952492

6. Stop the engine. Exit the machine. Secure the retaining pin through the brace below the cylinder rod.

Disengage the Lift Arm Brace (Radial Lift)

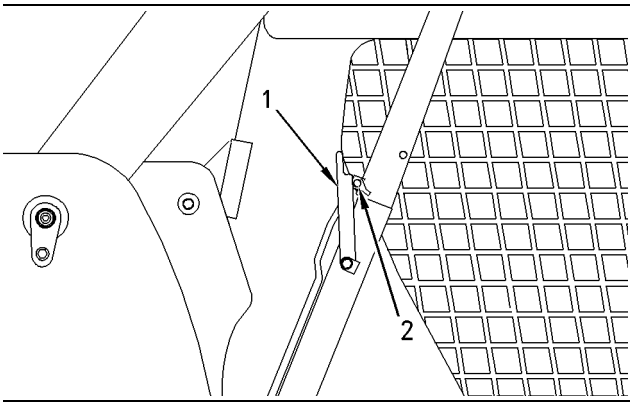

Illustration 127 g00952586

1. Remove the retaining pin from the brace and install the pin (2) in the holding block.
2. Detach and swing the pivot lever (1) clockwise onto the retaining pin.
3. Mount the machine. Secure the seat belt and lower the armrest. Start the engine.

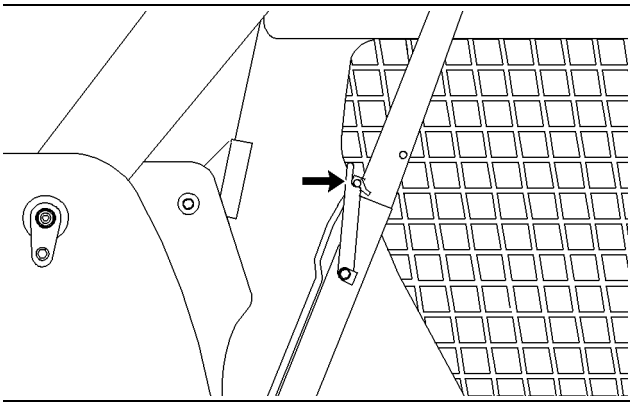

Illustration 128 g00952609

4. Slowly raise the loader lift arms until the lever engages the retaining pin.

5. Slowly lower the lift arms to the ground. Stop the engine. Exit the machine.

6. Raise and secure the brace to the lift arm with the retaining pin.

7. Install the pivot lever into the STORED position.

Engage the Lift Arm Brace (Extended Lift)

1. Empty the work tool. Remove the work tool. Park the machine on level ground. Raise the lift arms to maximum height.

2. Remain in the seat with the seat belt fastened until the brace is installed.

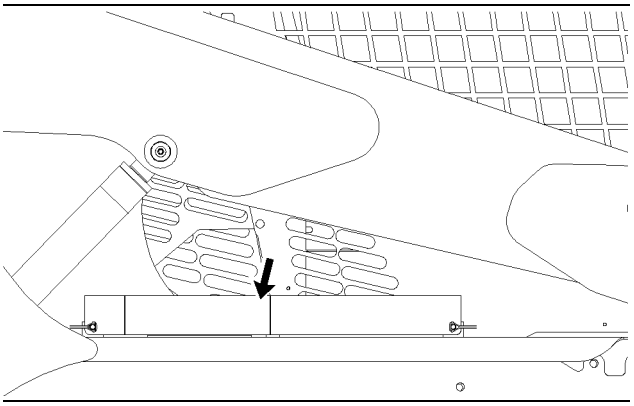

Illustration 129 g00930202

3. A second person must remove the brace from the storage position by removing the retaining pins.

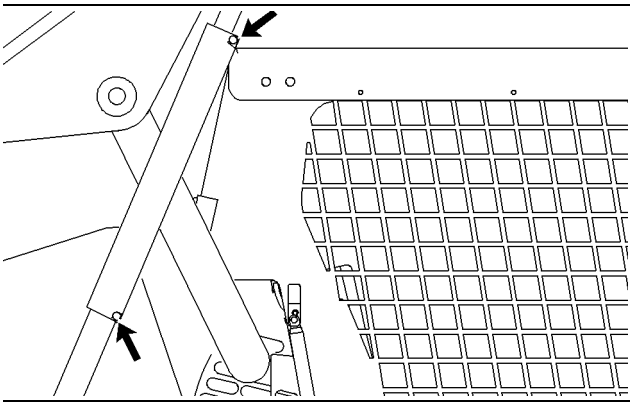

Illustration 130 g00952659

4. The second person should then install the brace over the rod of one of the lift cylinders.

5. Lower the loader arms slowly until the brace is held tightly between the rod and the cylinder.

6. Secure the two retaining pins through the brace below the rod.

Disengage the Lift Arm Brace (Extended Lift)

1. Mount the machine. Fasten the seat belt. Lower the armrest and remain in the seat until the brace is removed.

2. Slowly raise the lift arms until the brace is free.

3. A second person must remove the retaining pins and the brace from the rod.

4. Slowly lower the lift arms to the ground.

5. The second person should return the brace to the storage location. Attach the brace with the retaining pins.

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Loader Lift Arm Brace Operation

SMCS Code: 6119-011-AB; 6119-012-AB

S/N: B7H1-Up

S/N: SRS1-Up

S/N: YYZ1-Up

⚠ WARNING

Loader lift arm brace must be in place when working under raised lift arms.

Failure to follow the instructions or heed the warnings could result in injury or death.

Engage the Lift Arm Brace

1. Empty the work tool. Remove the work tool. Park the machine on level ground. Raise the lift arms to maximum height, then lower the lift arms 76.2 mm (3.0 inch).

2. Remain in the seat with the seat belt fastened until the brace is installed.

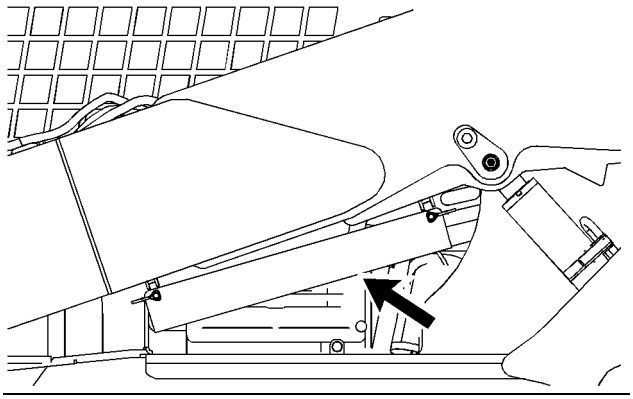

Illustration 131 g02151078

3. A second person must remove the brace from the storage position by removing the retaining pins.

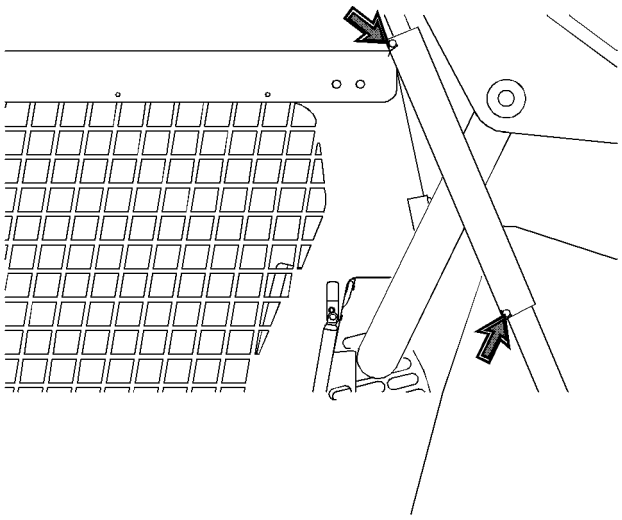

Illustration 132 g02151079

4. The second person should then install the brace over the rod of one of the lift cylinders.

5. Lower the loader arms slowly until the brace is held tightly between the rod and the cylinder.

6. Secure the two retaining pins through the brace below the rod.

Disengage the Lift Arm Brace

1. Mount the machine. Fasten the seat belt. Lower the armrest and remain in the seat until the brace is removed.

2. Slowly raise the lift arms until the brace is free.

3. A second person must remove the retaining pins and the brace from the rod.

4. Slowly lower the lift arms to the ground.

5. The second person should return the brace to the storage location. Attach the brace with the retaining pins.

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Radiator Tilting

SMCS Code: 1353-506; 1353-509

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

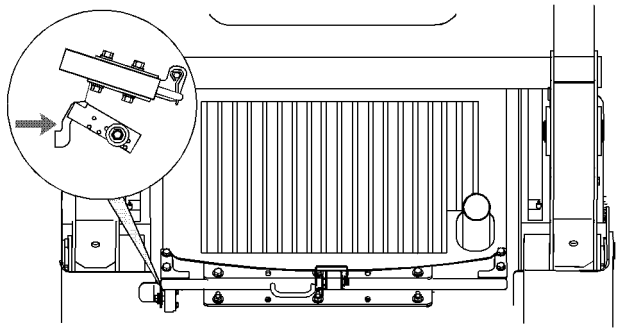


Illustration 133 g01019329

2. The release lever for the radiator latch is located on the left side or the right side of the radiator. Pull the release lever for the radiator latch. Tilt the radiator upward.

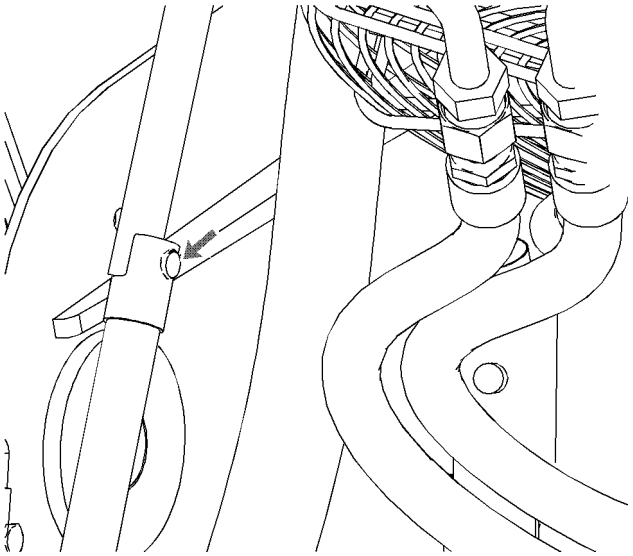


Illustration 134 g01028581

3. The strut lock is located on the right side or the left side of the engine compartment. Make sure that the strut lock is in the LOCKED position.

4. In order to tilt the radiator downward, push the strut lock to the left.

5. Tilt the radiator downward. Make sure that the radiator is in the LOCKED position.

6. Close the engine access door.

Tilting the Radiator Guard

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

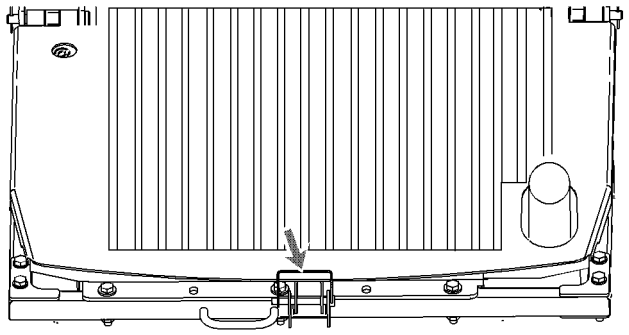


Illustration 135 g01019340

2. Remove the retaining pin from the radiator guard. Tilt the radiator guard upward.

3. In order to tilt the radiator guard downward, pull down on the radiator guard and install the retaining pin.

Lubricant Viscosities and Refill Capacities

i04777228

Lubricant Viscosities

SMCS Code: 7581

Selecting the Viscosity

Ambient temperature is the temperature of the air in the immediate vicinity of the machine. The temperature may differ due to the machine application from the generic ambient temperature for a geographic region. When selecting the proper oil viscosity for use, review **both** the regional ambient temperature and the potential ambient temperature for a given machine application. Generally, use the higher temperature as the criterion for the selection of the oil viscosity. Generally, use the highest oil viscosity that is allowed for the ambient temperature when you start the machine. Refer to the “Lubricant Viscosities for Ambient Temperatures” tables for guidance. In cold-weather applications, the preferred method is to use properly sized machine compartment heaters and a higher viscosity grade oil. Thermostatically controlled heaters that circulate the oil are preferred.

The proper oil viscosity grade is determined by the minimum ambient temperature (the air in the immediate vicinity of the machine). The ambient temperature is the temperature when the machine is started and while the machine is operated. In order to determine the proper oil viscosity grade, refer to the “Min” column in the table. This information reflects the coldest ambient temperature condition for starting a cold machine and for operating a cold machine. Refer to the “Max” column in the table in order to select the oil viscosity grade for operating the machine at the highest temperature that is anticipated. Unless specified otherwise in the “Lubricant Viscosities for Ambient Temperatures” tables, use the highest oil viscosity that is allowed for the ambient temperature when you start the machine.

Machines that are operated continuously should use oils that have the higher oil viscosity in the final drives and in the differentials. The oils that have the higher oil viscosity will maintain the highest possible oil film thickness. Refer to this Special Publication, General Information for Lubricants article, Lubricant Viscosities tables, and any associated footnotes. Consult your Cat dealer if additional information is needed.

Note: SAE 0W and SAE 5W oils, where allowed for use in non-hydraulic system compartments, are not recommended for use in machines that are operated continuously and/or are heavily loaded. Refer to the “Lubricant Viscosities for Ambient Temperatures” tables for guidance. The oils that have the higher oil viscosity will maintain the highest possible oil film thickness. Consult your Cat dealer if additional information is needed.

Note: Oil viscosity grade selection is also machine compartment specific. Some machine models and/or machine compartments do not allow the use of all available viscosity grades. For guidance on selecting oil viscosity, refer to the “Lubricant Viscosities for Ambient Temperatures” tables.

Note: Generally, use the highest oil viscosity that is available to meet the requirement for the temperature at start-up.

NOTICE
Proper oil viscosity **AND** oil type/specification are required to maximize machine compartment performance and life. Do **NOT** use only oil viscosity, or only oil type to determine the machine compartment oil selection. Using only the oil viscosity or only the oil type to determine a machine compartment oil selection can lead to reduced performance and compartment failure. Refer to the “Lubricant Viscosities for Ambient Temperatures” tables and to ALL of the associated footnotes.

NOTICE
Not following the recommendations found in the “Lubricant Viscosities for Ambient Temperatures” tables and associated footnotes can lead to reduced performance and compartment failure.

NOTICE
In colder ambient conditions a machine warm-up procedure and/or supplemental machine fluid compartment heat may be required. Machine specific warm-up procedures can typically be found in the Operation and Maintenance Manual for the machine. In addition, generic machine warm-up procedures can be found in this Special Publication, “Procedures for Machines that are Used in Cold Weather - (Generic)” topic. Some of the “Lubricant Viscosities for Ambient Temperatures” tables in this Special Publication include footnotes that address compartment warm-up.

General Information for Lubricants

The information provided in this “Lubricant Viscosities for Ambient Temperatures” article and Tables should be used with the information provided in the “Lubricant Specifications” section (Maintenance Section) of this Special Publication.

NOTICE
Cat does not warrant the quality or performance of non-Cat fluids and greases.

NOTICE
Not following the recommendations found in this Special Publication can lead to reduced performance and compartment failure.

NOTICE
Do NOT use only the oil viscosities when determining the recommended oil for an engine compartment. The oil type (performance requirements) MUST also be used.

Note: Some machine models and/or machine compartments do NOT allow the use of all available oil viscosity grades.

Note: Only use the oil type and the specification that is recommended for the various machine compartments.

Note: Some machine compartments allow the use of more than one oil type. For the best results, do not mix oil types.

Note: Different brand oils may use different additive packages to meet the various machine compartment performance specification recommendations. For the best results, do not mix oil brands.

Note: The availability of the various Cat oils will vary by region.

Note: SAE 10W viscosity grade oil used in most Cat machine compartments must have a minimum viscosity of 5.8 cSt at 100 °C (212 °F) (“ASTM D445”).

Note: The minimum acceptable viscosity for commercial alternative oils in most Cat machine hydraulic and hydrostatic transmission systems is 6.6 cSt at 100 °C (212 °F) (“ASTM D445”).

Cat GO (Gear Oil) is available in SAE 80W-90 and SAE 85W-140 viscosity grades.

Cat SYNTHETIC GO is an SAE 75W-140 viscosity grade oil.

Cat FDAO (Final Drive and Axle Oil) exceeds the FD-1 oil performance requirements.

Cat TDTO-TMS (Transmission Multi-Season Oil) is a synthetic blend that exceeds the TO-4M multigrade oil performance requirements.

Note: Cat oils are the **preferred** oils. ALL other oil types and specifications that are listed in the applicable section are acceptable oils.

When you are operating the machine in temperatures below −20°C (−4°F), refer to Special Publication, SEBU5898, “Cold Weather Recommendations”. This publication is available from your Cat dealer.

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold Weather TDTO is the first choice oil. Second choice oils for cold-weather transmission applications are commercial oils of full synthetic basestock that do not have viscosity index improvers and do meet the performance requirements of the Cat TO-4 specification. Typical lubricant viscosity grades are SAE 0W-20, SAE 0W-30, and SAE 5W-30. Commercial oils that contain a Cat TO-4 additive package and a lubricant viscosity grade of SAE 0W-20, SAE 0W-30, or SAE 5W-30 are a last choice.

The footnotes are a key part of the tables. Read ALL footnotes that pertain to the machine compartment in question.

Lubricant Viscosities for Ambient Temperatures

General Lubricants

Cat FDAO SYN Cat FDAO or commercial FD - 1 are the preferred oil types to maximize gear and bearing life. Do not use Cat FDAO, Cat FDAO SYN, or CatFD-1 in compartments containing clutches and/or brakes. Cat TDTO, Cat TDTO-TMS, or commercial TO-4 oil types must be used in any compartment containing friction material unless specified otherwise by Cat.

For the Final Drives in severe usage or in continuous operations, WARM-UP is required. Exercise the final drives for several minutes with the engine at a partial throttle in order to warm up the oil prior to production operation.

Engine Crankcase

Refer to the “General Information for Lubricants” article for important lubricant information.

Supplemental heat is recommended for cold-soaked starts below the minimum ambient temperature. The parasitic load and other factors will determine if supplemental heat is required for cold-soaked starts that are above the minimum temperature that is stated. Cold-soaked starts occur when the engine has not been operated for time. The oil becomes more viscous due to cooler ambient temperatures.

For oil recommendations for Tier 4 EPA certified engines, EU stage IIIB and IV type approved engines, and Japan Step IV approved engines refer to the “Engine Oil” section in this Special Publication.

Refer to the “Lubricant Information” section in this Special Publication for a list of all Cat engine oils.

Cat DEO-ULS SYN and Cat DEO SYN are SAE 5W-40 viscosity grade oils.

Cat Cold Weather DEO-ULS is an SAE 0W-30 viscosity grade oil.

Cat ECF refers to Engine Crankcase Fluid specifications. Refer to the “Maintenance” section in this Special Publication, “Lubricant Information” for details. Commercial alternative diesel engine oils must meet one or more of these Cat ECF specifications.

Table 26

Engine Crankcase						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Engine Crankcase	**Cat DEO-ULS Cold Weather**	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS Cat DEO	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS Cat DEO	SAE 15W-40	−9.5	50	15	122

Hydraulic System

Refer to the “Lubricant Information” section in the latest revision of the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for detailed information. This manual may be found on the Web at Safety.Cat.com.

The following are the preferred oils for use in most Cat machine hydraulic systems:

- Cat HYDO Advanced 10 SAE 10W
- Cat HYDO Advanced 30 SAE 30W
- Cat BIO HYDO Advanced

Cat HYDO Advanced fluids have a 50% increase in the standard oil drain interval for machine hydraulic systems (3000 hours versus 2000 hours) over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. Consult your Cat dealer for details. When switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are listed below.

- Cat MTO
- Cat DEO
- Cat DEO-ULS
- Cat TDTO
- Cat TDTO Cold Weather
- Cat TDTO-TMS

- Cat DEO-ULS Cold Weather

Table 27

Hydraulic System						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Hydraulic System	**Cat HYDO Advanced 10**[1] Cat TDTO	SAE 10W	−20	40	−4	104
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	0	50	32	122
	Cat BIO HYDO Advanced	“ISO 46” Multi-Grade	−30	45	−22	113
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	−20	40	−4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	−15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−15	50	5	122
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

(1) −20° C (−4° F) to 50° C (122° F) if equipped with the High Ambient Cooling Attachment

Drive Train Components

Refer to the “Lubricant Information” section in the latest revision of the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for detailed information. This manual may be found on the Web at Safety.Cat.com.

When you are operating the machine in temperatures below −20°C (−4°F), refer to Special Publication, SEBU5898, “Cold Weather Recommendations”. This publication is available from your Cat dealer.

Table 28

Drive Chain Case						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Drive Chain Case	**Cat DEO-ULS Cold Weather**	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS Cat DEO	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS Cat DEO	SAE 15W-40	−9.5	50	15	122

Table 29

Multi-terrain and Compact track Loaders						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Final Drive for Multiterrain Loaders and Compact Track Loaders	**Cat Synthetic GO**	SAE 75W-140	−30	45	−22	113

Special Lubricants

Grease

In order to use a non-Cat grease, the supplier must certify that the lubricant is compatible with Cat grease.

Each pin joint should be flushed with the new grease. Ensure that all old grease is removed. Failure to meet this requirement may lead to failure of a pin joint.

Table 30

Recommended Grease						
Compartment or System	**GreaseType**	**NLGI Grade**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
External Lubrication Points	**Cat Advanced 3Moly**	NLGI Grade 2	−20	40	−4	104
	Cat Ultra 5Moly	NLGI Grade 2	−30	50	−22	122
		NLGI Grade 1	−35	40	−31	104
		NLGI Grade 0	−40	35	−40	95
	Cat Arctic Platinum	NLGI Grade 0	−50	20	−58	68
	Cat Desert Gold	NLGI Grade 2	−20	60	−4	140
General Bearing Lubrication	**Cat Multipurpose Grease**	NLGI Grade 2	−30	40	−22	104

Diesel Fuel Recommendations

Diesel fuel must meet “Cat Specification for Distillate Fuel” and the latest versions of “ASTM D975” or “EN 590” in order to ensure optimum engine performance. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for the latest fuel information and for Cat fuel specification. This manual may be found on the Web at Safety.Cat.com.

The preferred fuels are distillate fuels. These fuels are commonly called diesel fuel, furnace oil, gas oil, or kerosene. These fuels must meet the “Caterpillar Specification for Distillate Diesel Fuel for Off-Highway Diesel Engines”. Diesel Fuels that meet the Cat specification will help provide maximum engine service life and performance.

Misfueling with fuels of high sulfur level can have the following negative effects:

- Reduce engine efficiency and durability
- Increase the wear
- Increase the corrosion
- Increase the deposits
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals)
- Increase overall operating costs
- Negatively impact engine emissions

Failures that result from the use of improper fuels are not Caterpillar factory defects. Therefore the cost of repairs would not be covered by a Caterpillar warranty.

Caterpillar does not require the use of ULSD in off road and machine applications that are not Tier 4/Stage IIIB certified engines. ULSD is not required in engines that are not equipped with after treatment devices.

Follow operating instructions and fuel tank inlet labels, if available, in order to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels and lubricants. This manual may be found on the Web at Safety.Cat.com.

Fuel Additives

Cat Diesel Fuel Conditioner and Cat Fuel System Cleaner are available for use when needed. These products are applicable to diesel and biodiesel fuels. Consult your Cat dealer for availability.

Biodiesel

Biodiesel is a fuel that can be made from various renewable resources that include vegetable oils, animal fat, and waste cooking oil. Soybean oil and rapeseed oil are the primary vegetable oil sources. In order to use any of these oils or fats as fuel, the oils or fats are chemically processed (esterified). The water and contaminants are removed.

U.S. distillate diesel fuel specification “ASTM D975-09a” includes up to B5 (5 percent) biodiesel. Currently, any diesel fuel in the U.S. may contain up to B5 biodiesel fuel.

European distillate diesel fuel specification “EN 590” includes up to B5 (5 percent) and in some regions up to B7 (7 percent) biodiesel. Any diesel fuel in Europe may contain up to B5 or in some regions up to B7 biodiesel fuel.

When biodiesel fuel is used, certain guidelines must be followed. Biodiesel fuel can influence the engine oil, aftertreatment devices, non-metallic, fuel system components, and others. Biodiesel fuel has limited storage life and has limited oxidation stability. Follow the guidelines and requirements for engines that are seasonally operated and for standby power generation engines.

In order to reduce the risks associated with the use of biodiesel, the final biodiesel blend and the biodiesel fuel used must meet specific blending requirements.

All the guidelines and requirements are provided in the latest revision of Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”. This manual may be found on the Web at Safety.Cat.com.

Coolant Information

The information provided in this “Coolant Recommendation” section should be used with the “Lubricants Information” provided in the latest revision of Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”. This manual may be found on the Web at Safety.Cat.com.

The following two types of coolants may be used in Cat diesel engines:

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/Coolant)

NOTICE
Never use water alone as a coolant. Water alone is corrosive at engine operating temperatures. In addition, water alone does not provide adequate protection against boiling or freezing.

i04040409

Capacities (Refill)

SMCS Code: 7560

Table 31

Approximate Refill Capacities Common for All B3 Series			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Hydraulic Tank	35.0	9.3	7.7

Table 32

Approximate Refill Capacities 216B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	10	2.6	2.2
Fuel Tank	58	15.4	12.8
Cooling System	9	2.4	2.0
Each Drive Chain Box	6	1.6	1.3

Table 33

Approximate Refill Capacities 226B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	10	2.6	2.2
Fuel Tank	58	15.4	12.8
Cooling System	10.5	2.8	2.3
Each Drive Chain Box	6	1.6	1.3

Table 34

Approximate Refill Capacities 242B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	9	2.6	2.2
Fuel Tank	58	15.4	12.8
Cooling System	12.5	2.8	2.3
Each Drive Chain Box	8	2.1	1.8

Table 35

Approximate Refill Capacities 236B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	9	2.4	2.0
Fuel Tank	90.0	23.8	19.8
Cooling System	12.5	3.3	2.7
Each Drive Chain Box	7.5	2.0	1.6

Table 36

Approximate Refill Capacities 252B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	9	2.4	2.0
Fuel Tank	90.0	23.8	19.8
Cooling System	12.5	3.3	2.7
Each Drive Chain Box	8	2.1	1.8

Table 37

Approximate Refill Capacities 247B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	10	2.6	2.2
Fuel Tank	62	16.4	13.6
Cooling System	10	2.6	2.2
Each Final Drive	1.0	0.26	0.22

Table 38

Approximate Refill Capacities 257B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	9	2.4	2.0
Cooling System	12.5	3.3	2.8
Each Final Drive	1.0	0.26	0.22
Fuel Tank	84	22.2	18.5

Table 39

Approximate Refill Capacities 259B3			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	9	2.4	2.0
Cooling System	12.5	3.3	2.8
Each Final Drive	1.0	0.26	0.22
Fuel Tank	89	23.5	19.6

Table 40

Track Roller Frame Approximate Refill Capacities 259B3	
Compartment or System	**Milliliters**
Track Roller	240 ± 12 ml
Idler - Single Flange	349 ± 15 ml
Idler - Dual Flange	354 ± 15 ml

i04311449

S·O·S Information

SMCS Code: 1000; 7000; 7542-008

S·O·S Services is a highly recommended process for Cat customers to use in order to minimize owning and operating cost. Customers provide oil samples, coolant samples, and other machine information. The dealer uses the data in order to provide the customer with recommendations for management of the equipment. In addition, S·O·S Services can help determine the cause of an existing product problem.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluid Recommendations” for detailed information concerning S·O·S Services.

Refer to the Operation and Maintenance Manual, “Maintenance Interval Schedule” for a specific sampling location and a service hour maintenance interval.

Consult your Cat dealer for complete information and assistance in establishing an S·O·S program for your equipment.

Maintenance Support

i04564699

Service Interval Chart

SMCS Code: 7000

Refer to the following service interval charts and service intervals for additional maintenance information.

216B3, 226B3, and 236B3

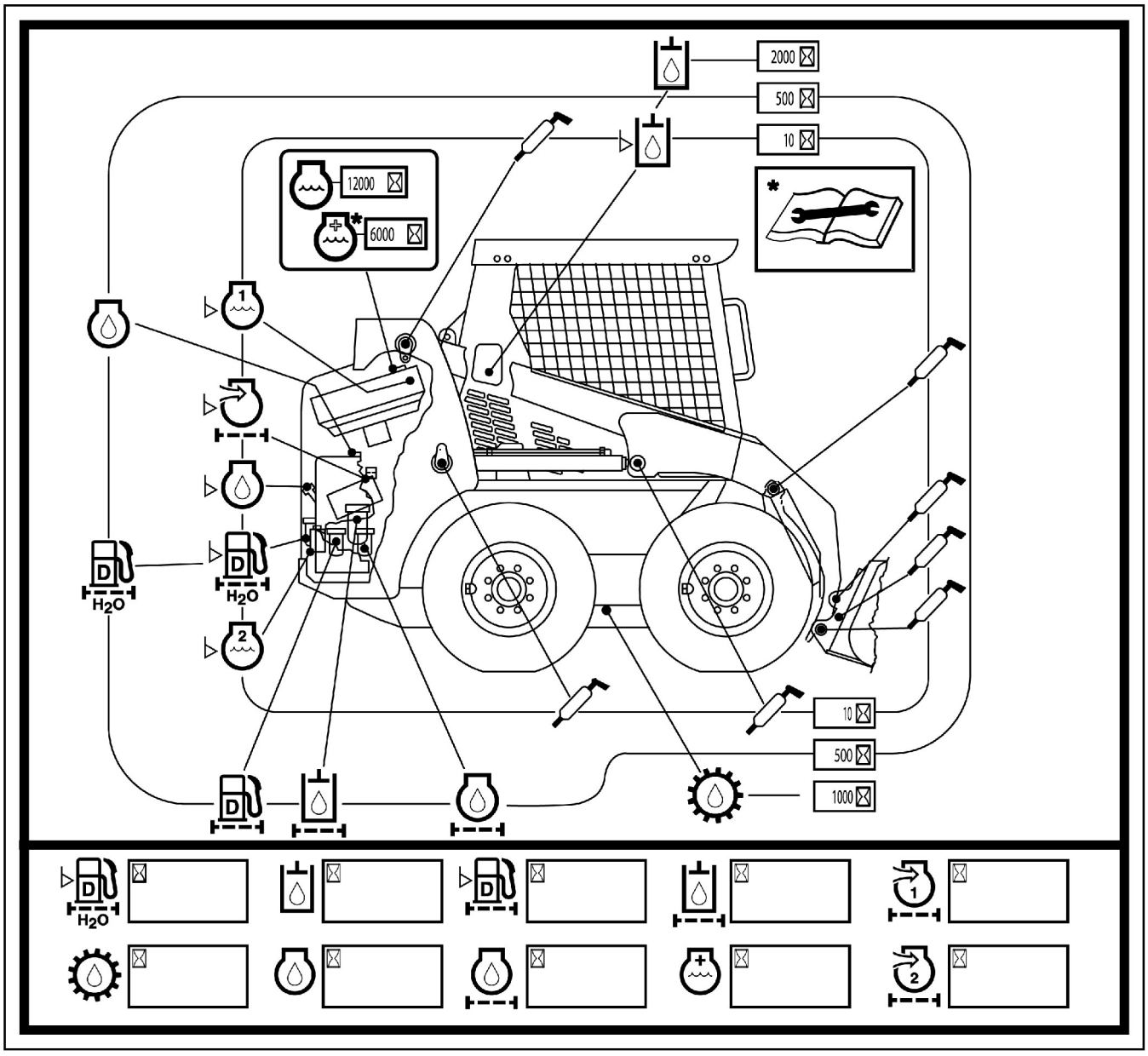


Illustration 136

g01386832

242B3, and 252B3

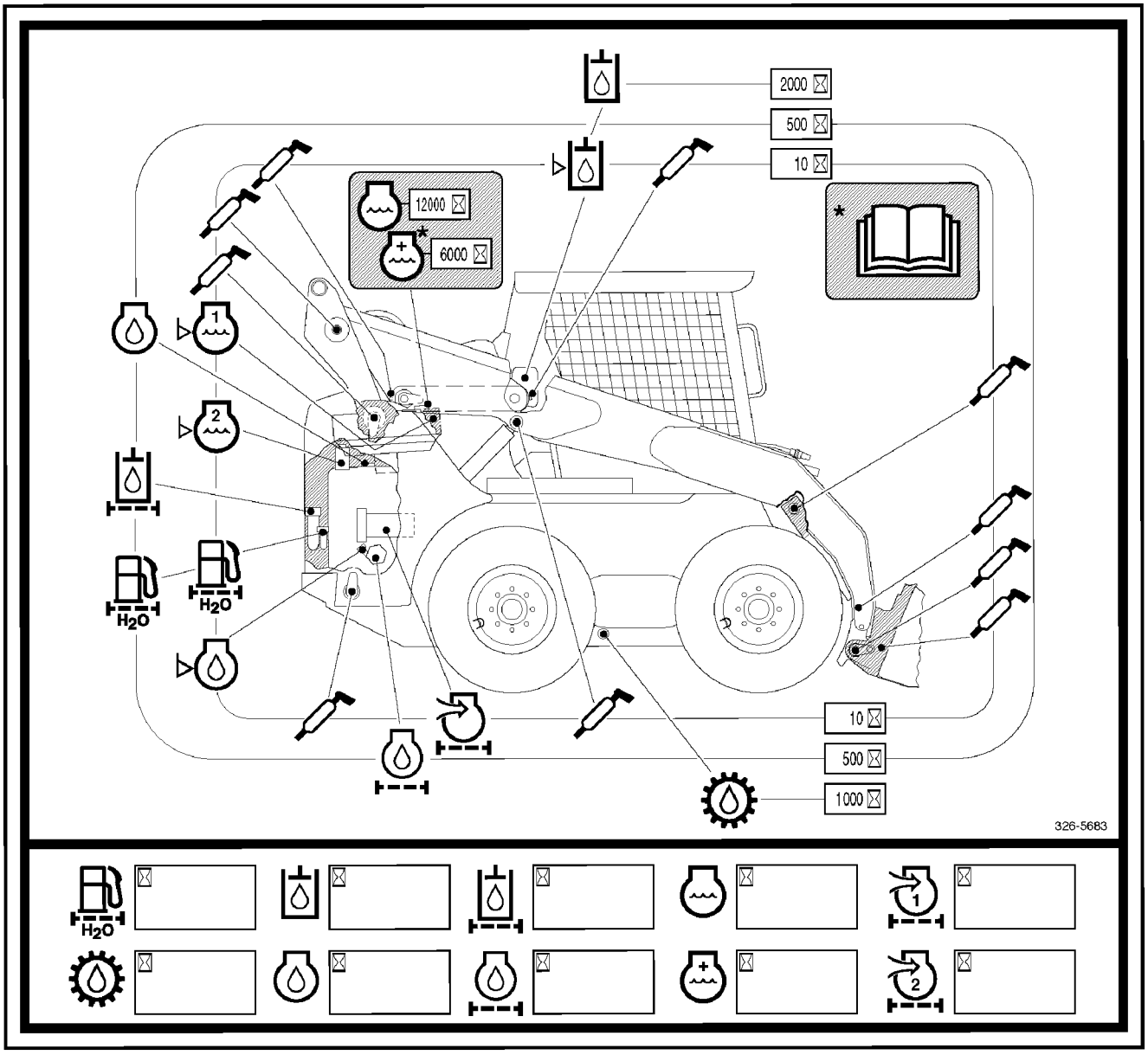


Illustration 137

g02125913

247B3

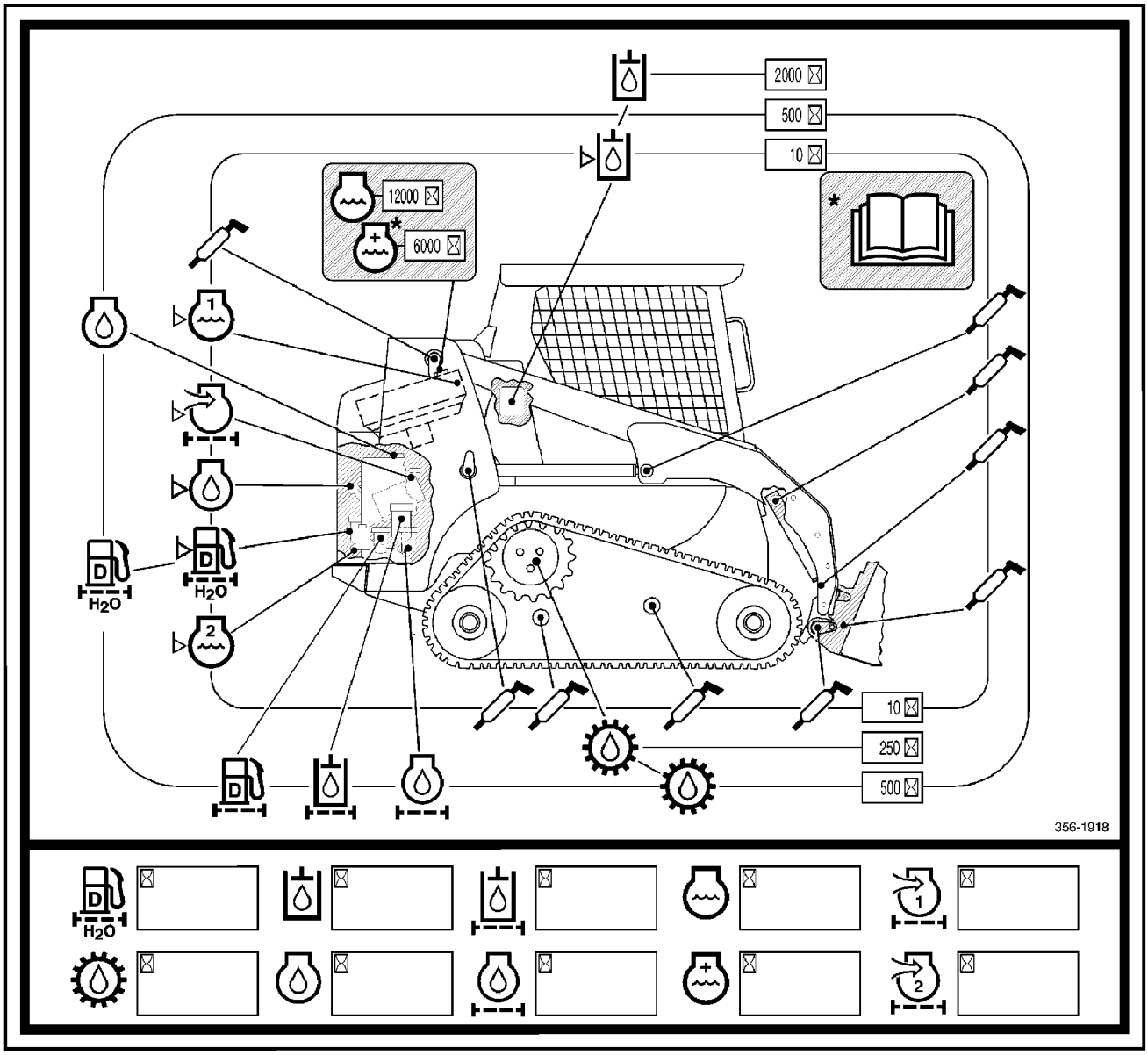


Illustration 138

g02125914

257B3, and 259B3

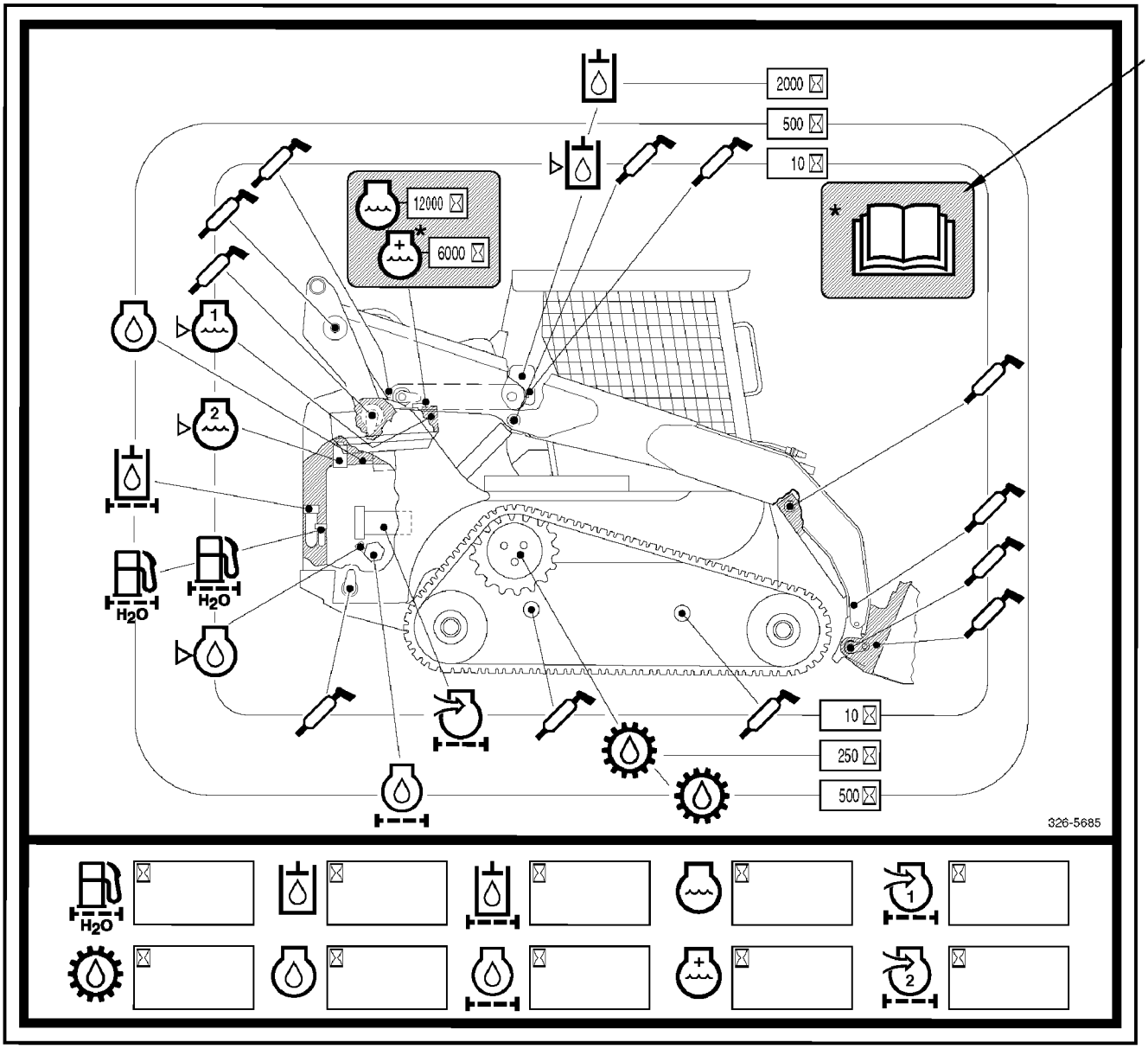


Illustration 139

g02125919

Service Intervals

Coolant additive – Add the extender to the extended life coolant after every 6000 service hours or every 3 years.

Coolant level (radiator) – Check the coolant level in the radiator at the sight gauge after every 10 service hours or at the end of each day.

Coolant level (reservoir) – Check the coolant level in the coolant reservoir after every 10 service hours or at the end of each day.

Cooling system coolant – Change the ELC (Extended Life Coolant) after every 12,000 hours or every 6 years.

Drive Chain Oil – Check the drive chain case oil after every 500 service hours. Change the oil for the drive chain case after every 1,000 hours or every 6 months.

Final Drive Oil – Check the final drive oil after every 250 service hours. Change the final drive oil after the initial 250 service hours. Change the oil for the final drive after every 500 hours.

Engine air filter primary element – Clean the primary air filter element or replace the primary air filter element. The alert indicator for the air filter indicates when servicing is necessary.

Engine air filter secondary element – Replace the secondary air filter element with every third change of the primary air filter element. Replace the secondary air filter element, if necessary, before service hour requirement.

Engine oil level check – Check the engine oil level after every 10 service hours or at the end of each day.

Engine oil – Change the engine oil after every 500 service hours or every year.

Engine oil filter – Change the engine oil after every 500 service hours or every year.

Fuel System Water Separator – Drain the water separator after every 10 service hours or at the end of each day.

Fuel System Filter/Water Separator Element – Replace the filter after every 500 service hours or every 3 months.

Fuel System Filter – Replace the filter after every 500 service hours or every 6 months on C2.2 engines.

Grease zerk – Lubricate the designated locations after every 10 service hours or at the end of each day.

Hydraulic oil filter – Change the filter after every 500 service hours or every 3 months.

Hydraulic oil level check – Check the hydraulic oil level at the sight gauge after every 10 service hours or at the end of each day.

Hydraulic oil – Change the hydraulic oil after every 2000 service hours or every year.

i03636245

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

Do not weld on any protective structure. If it is necessary to repair a protective structure, contact your Caterpillar dealer.

Proper welding procedures are necessary in order to avoid damage to the electronic controls and to the bearings. When possible, remove the component that must be welded from the machine or the engine and then weld the component. If you must weld near an electronic control on the machine or the engine, temporarily remove the electronic control in order to prevent heat related damage. The following steps should be followed in order to weld on a machine or an engine with electronic controls.

1. Turn off the engine. Place the engine start switch in the OFF position.

2. If equipped, turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

NOTICE
Do NOT use electrical components (ECM or sensors) or electronic component grounding points for grounding the welder.

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure in order to reduce the possibility of damage to the following components:

   - Bearings of the drive train
   - Hydraulic components

- Electrical components
- Other components of the machine

4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.

5. Use standard welding procedures in order to weld the materials together.

i04776468

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 3 Months

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

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i03318742

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 in the engine compartment.

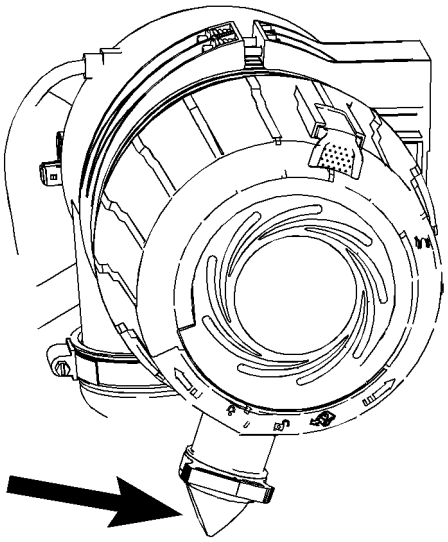


Illustration 140 g01433144

3. Check the air cleaner 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.

i03879882

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.

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).

i02772986

Axle Bearings - Lubricate

SMCS Code: 3282-086-BD

S/N: B7H1-Up

S/N: TSL1-Up

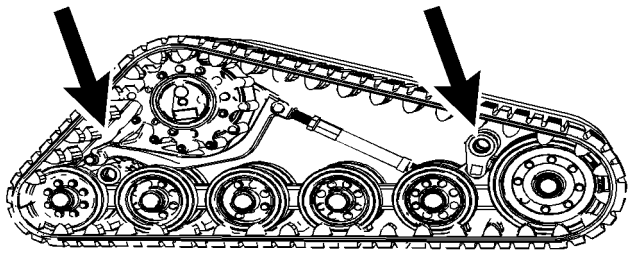


Illustration 141 g01387575

Apply lubricant to the grease fittings for the rear axle bearings and the front axle bearings.

Repeat the process for the opposite side of the machine.

i03898482

Axle Bearings - Lubricate

SMCS Code: 3282-086-BD

S/N: YYZ1-Up

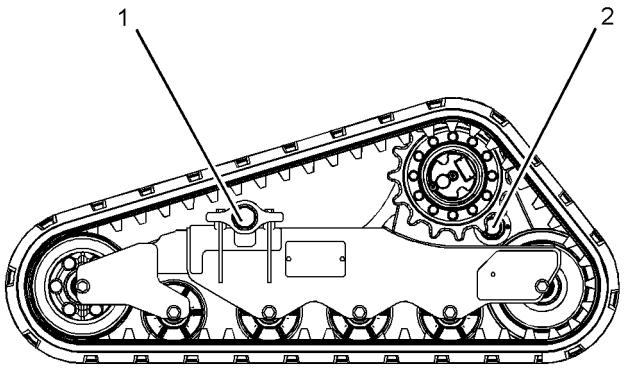


Illustration 142 g02142341

Apply lubricant to all grease fittings.

(1) Front pivot

(2) Rear pivot

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.

i04395699

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. Disconnect the negative battery cable from the starter.

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

3. Disconnect the negative battery cable at the battery.
4. Perform the necessary repairs. Replace the cable or the battery, as needed.
5. Connect the negative battery cable at the battery.
6. Connect the battery cable to the starter of the machine.
7. Install the engine start switch key.

Repeat the process for the positive battery cable.

Battery - Recycle

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

i01957641

Belts - Inspect/Adjust/Replace

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

S/N: MWD1-Up

S/N: TSL1-Up

S/N: JXM1-Up

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.

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”.

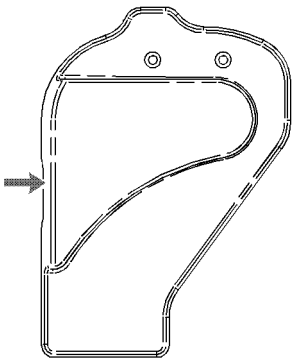


Illustration 143 g01017605

3. Remove the guard for the V-belt.

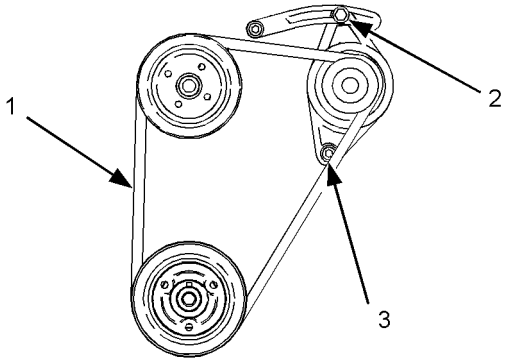


Illustration 144 g01017632

4. Inspect the condition of the belt (1) 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 41

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

5. Loosen the mounting bolt (2). Loosen the adjusting locknut (3).
6. Move the alternator until the correct tension is reached.
7. Tighten the adjusting locknut. Tighten the mounting bolt.
8. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 4 to step 7.
9. Install the guard for the V-belt.
10. Close the engine access door.

i02715751

Belts - Inspect/Adjust/Replace

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

S/N: A9H1-Up

S/N: B7H1-Up

S/N: TNK1-Up

S/N: SRS1-Up

S/N: YYZ1-Up

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”.

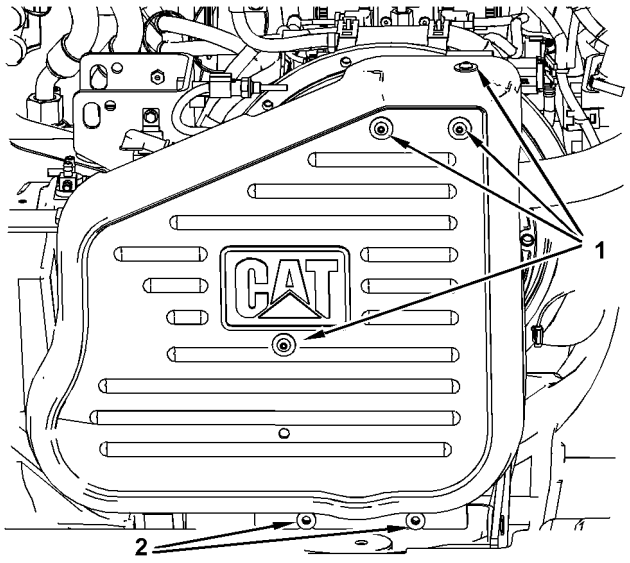


Illustration 145 g01209498

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.

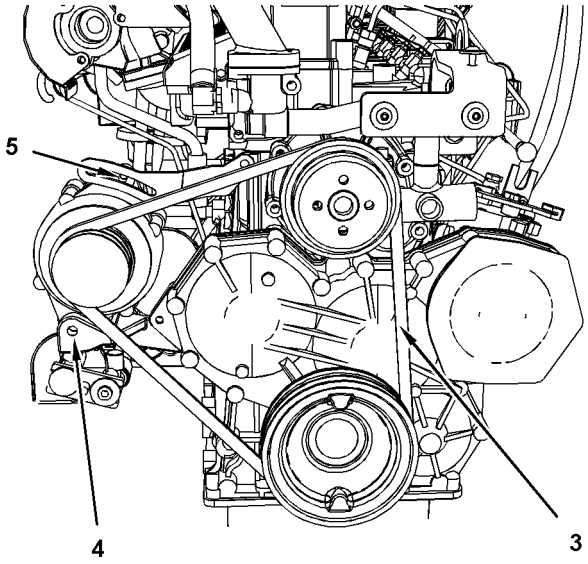


Illustration 146 g01209499

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 42

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.

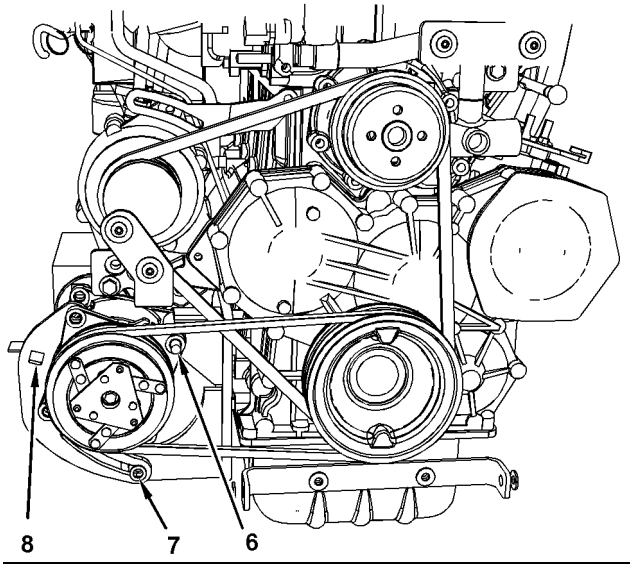


Illustration 147 g01279933

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).

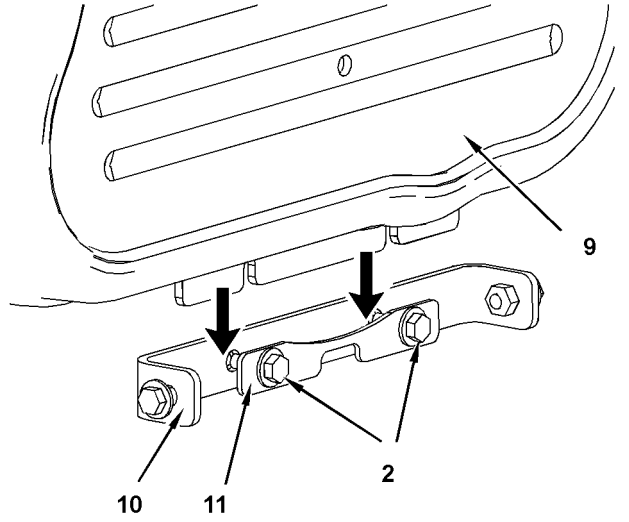


Illustration 148 g01364054

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).

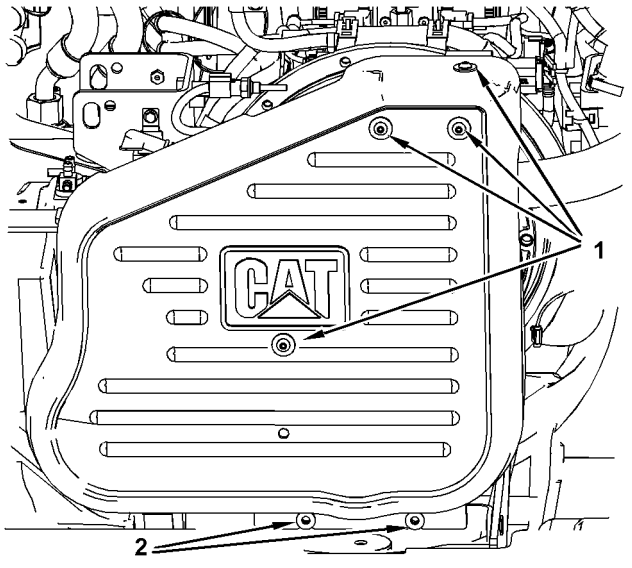


Illustration 149 g01209498

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.

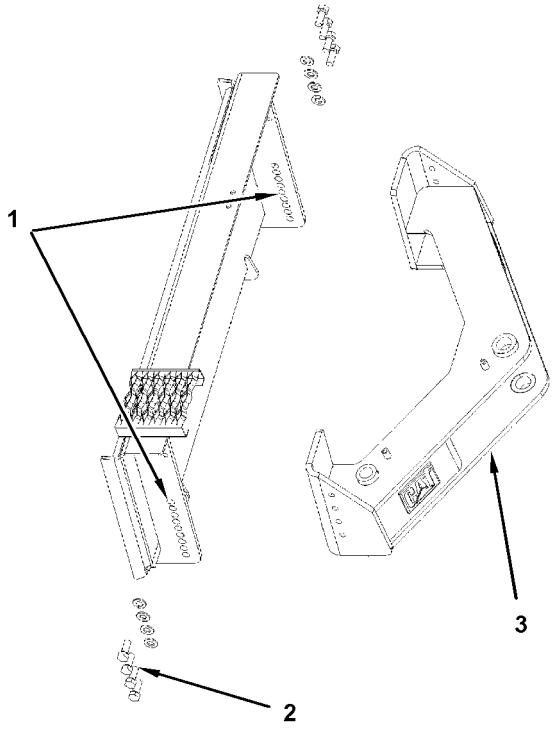
4. Close the engine access door.

i02549571

Blade Frame - Adjust

SMCS Code: 6060-025-BG

Height Adjustment



g01161532

Illustration 150

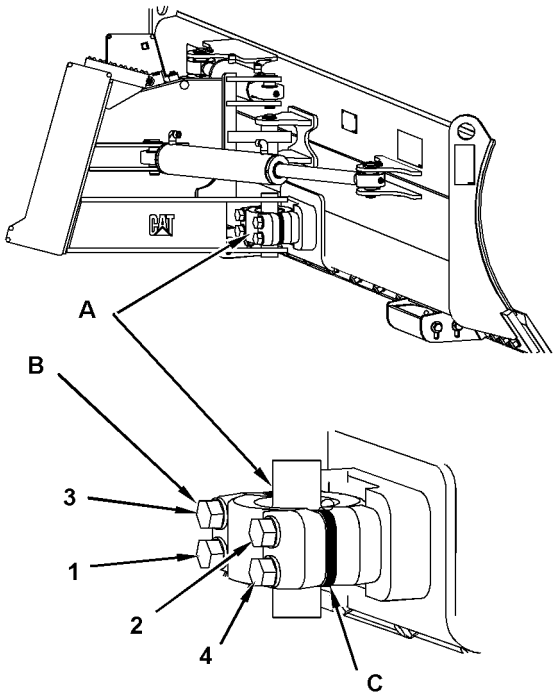
(1) Height Adjustment for the Frame
(2) Adjusting Bolts
(3) Frame

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.



g01173519

Illustration 151

(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 151.
- 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.

i03318544

Bogie and Idler - Inspect/Replace

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

S/N: B7H1-Up

S/N: TSL1-Up

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.

Table 43

Bogie Wheels and Idler Wheels Wear Limits		
	Minimum Width	Minimum Thickness
254 mm (10 inch)	48 mm (1.9 inch)	3 mm (0.12 inch)
358 mm (14 inch)	48 mm (1.9 inch)	3 mm (0.12 inch)

Loosen the Track

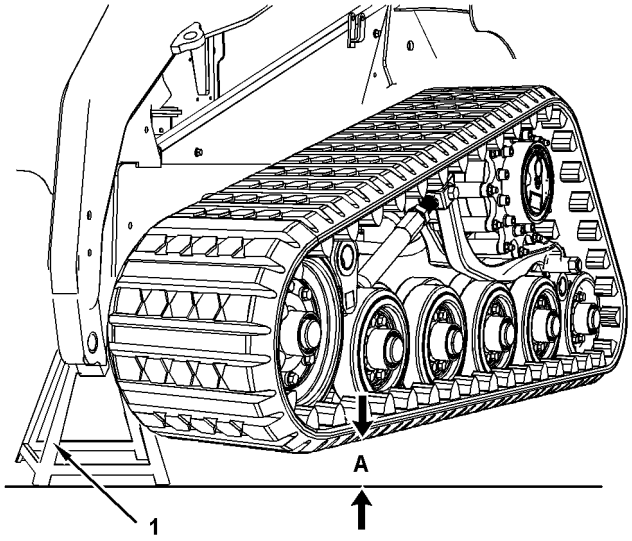


Illustration 152 g01393193

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 - Inspect/Adjust” for the procedure.

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

Idler wheels

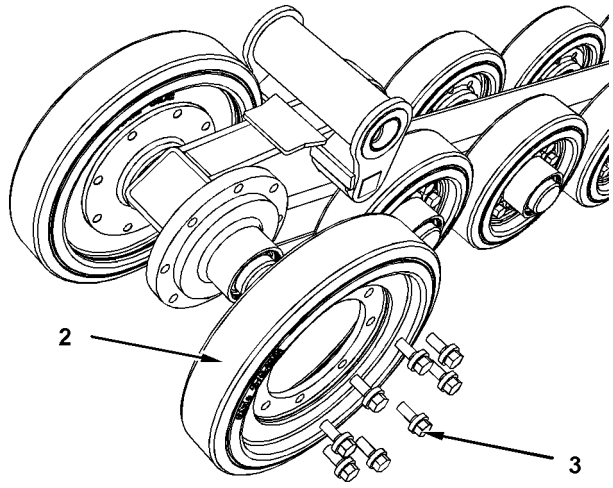


Illustration 153 g01393325

(2) Outer idler wheel
(3) Bolts and washers for the wheels

1. Remove the bolts (3) and the washers for the outer idler wheel (2).
2. Remove the outer idler wheel.
3. If necessary, remove the bolts and the washers for the inner idler wheel and remove the wheel.
4. Install the wheels. Tighten the bolts to a torque of 50 ± 5 N·m (37 ± 3.7 lb ft). Turn the bolts an additional 45 degrees ±5 degrees in the same star pattern.

Bogie wheels

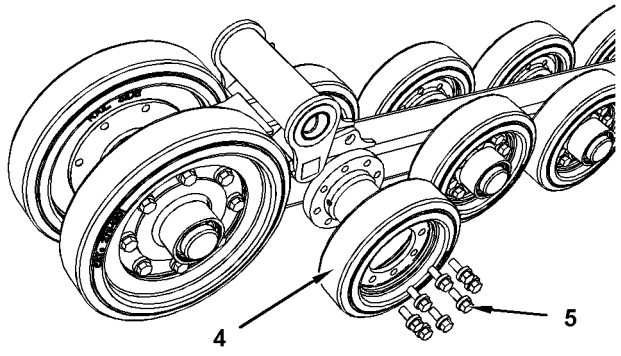


Illustration 154 g01393304

(4) Bogie Wheel
(5) Bolts and washers for the wheels

1. Remove the bolts (5) and the washers for the outer bogie wheel (4).

2. Remove the outer bogie wheel.

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

4. Install the wheels. Tighten the bolts to a torque of 150 ± 20 N·m (110 ± 15 lb ft).

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.

i01962545

Cab Air Filter - Clean/Replace (If Equipped)

SMCS Code: 7342-070; 7342-510

Fresh Air Filter

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

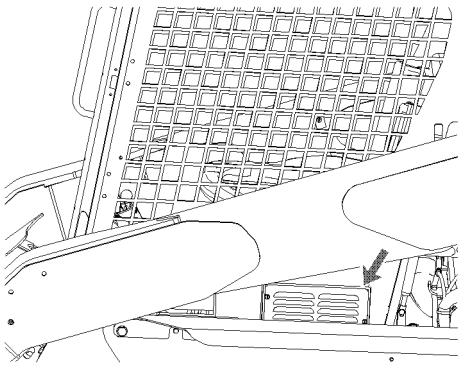


Illustration 155 g01019732

2. Remove the filter cover.

3. Remove the seal from the cover and inspect the seal. If the seal is damaged replace the seal.

4. Remove the air filter element from the cover and clean the filter element with low pressure air. Replace the element if the element is damaged.

5. Install the seal onto the filter cover and install the filter element.

6. Install the filter cover on the machine.

7. Remove the brace for the loader lift arms and return the brace to the stored position. Refer to Operation and Maintenance Manual, “Loader Lift Arm Brace Operation”.

Recirculation Filter

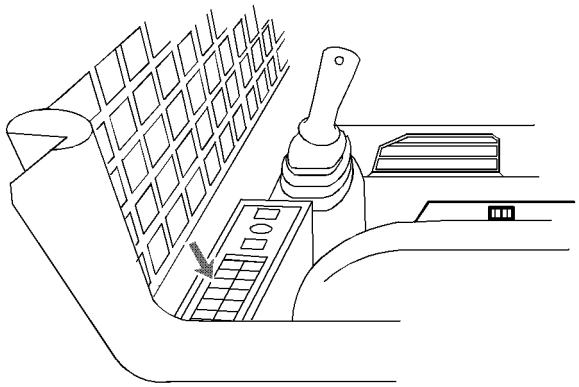


Illustration 156 g01024691

1. Remove the cover in order to access the air filter element.

2. Remove the air filter element and clean the element with soap and water. Replace the element if the element is damaged.

3. Install the element and replace the cover.

i03879985

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”.

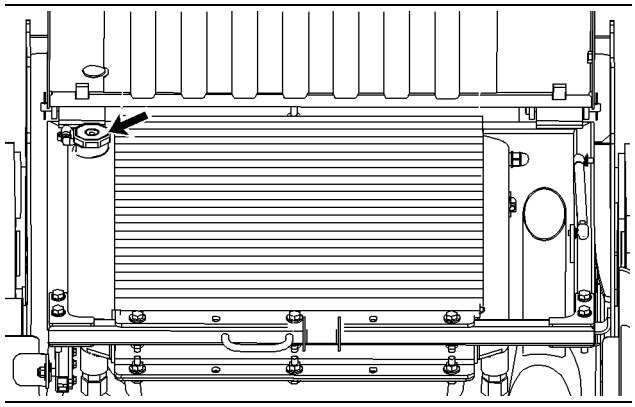


Illustration 157 g00956151

Typical Example

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

Note: The radiator cap is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The radiator cap is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

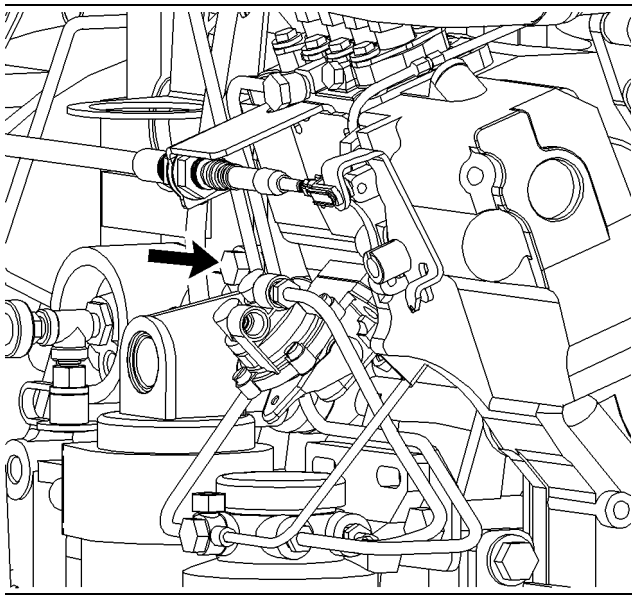


Illustration 158 g00954319

Drain Valve for the C2.2 engine

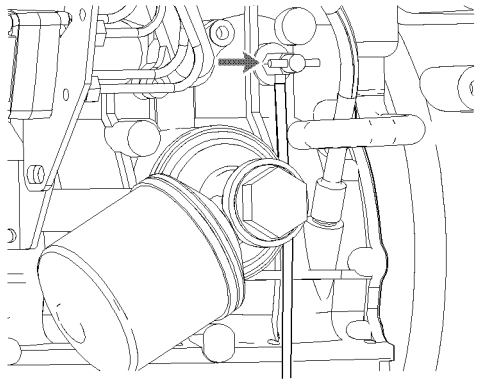


Illustration 159 g01018862

Drain Valve for the C3.4 engine

4. Remove the drain plug or open the drain valve (if equipped) and allow the coolant to drain into a suitable container.

5. Install the drain plug or close the drain valve (if equipped).

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

7. Add the coolant solution. 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.

8. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.

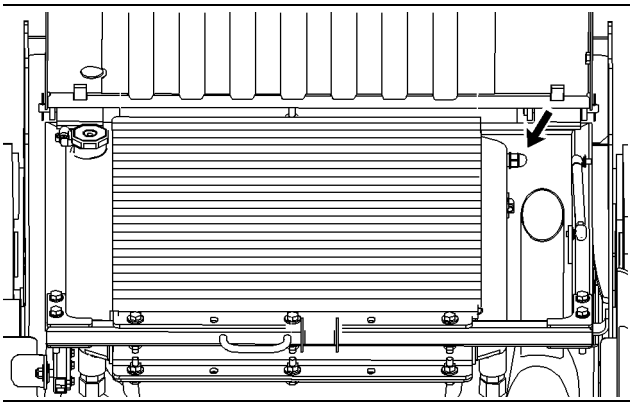


Illustration 160 g00956179

Typical Example

9. Maintain the coolant level in the sight gauge.

Note: The sight gauge is located on the right side of the engine compartment on machines that are equipped with the C2.2 engine. The sight gauge is located on the left side of the engine compartment on machines that are equipped with the C3.4 engine.

10. 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.

11. Pull the radiator guard downward.

12. Close the engine access door.

i03879996

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

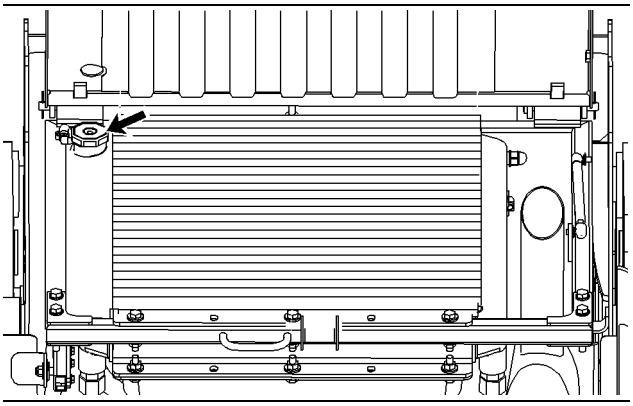
⚠ WARNING

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”.



g00956151

Illustration 161

Typical Example

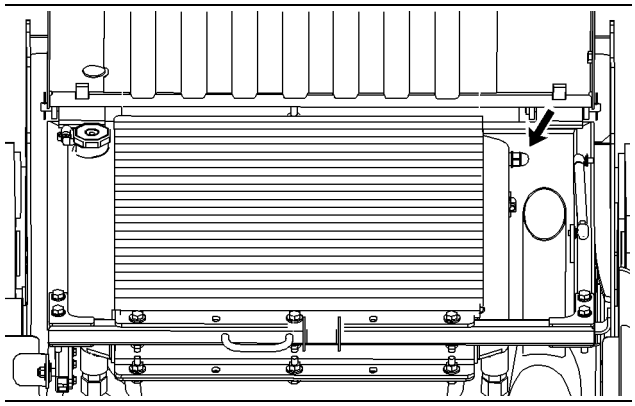
Note: The radiator cap is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The radiator cap is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

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

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.



g00956179

Illustration 162

Typical Example

Note: The sight gauge for the coolant level is located on the right side of the engine compartment on machines that are equipped with the C2.2 engine. The sight gauge for the coolant level is located on the left side of the engine compartment on machines that are equipped with the C3.4 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. Tilt the radiator guard downward.

9. Close the engine access door.

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

i03880003

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.

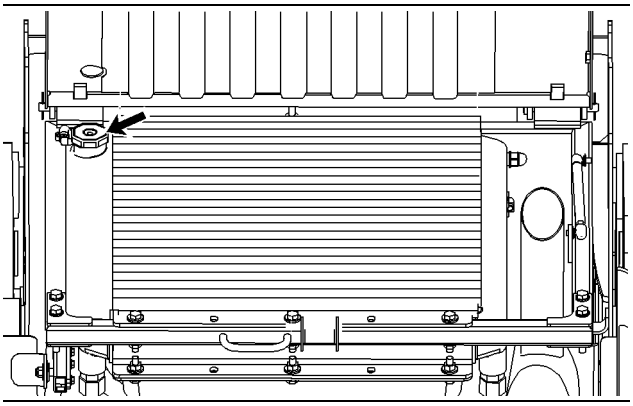


Illustration 163 g00956151

Typical Example

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.

Note: The radiator cap is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The radiator cap is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

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.

i03880006

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.

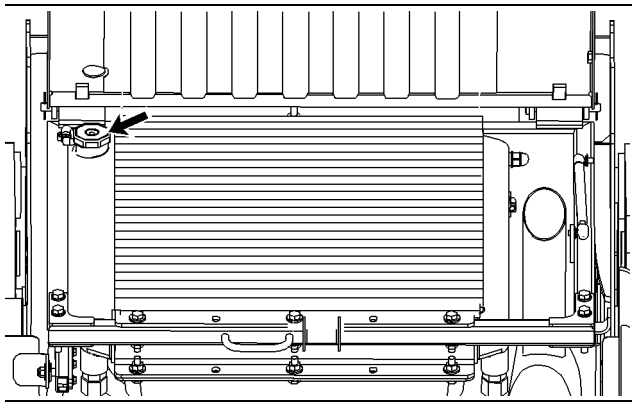


Illustration 164 g00956151

Typical Example

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.

Note: The radiator cap is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The radiator cap is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

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.

i03880033

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. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

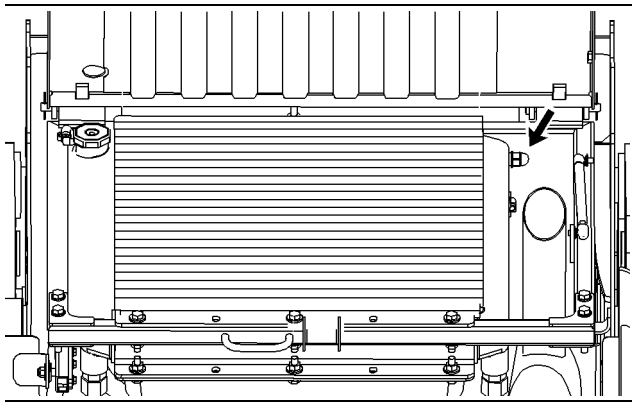


Illustration 165 g00956179

Note: The sight gauge for the coolant level is located on the right side of the engine compartment on machines that are equipped with the C2.2 engine. The sight gauge for the coolant level is located on the left side of the engine compartment on machines that are equipped with the C3.4 engine.

3. Maintain the coolant to the top of the sight gauge with the radiator in the LOWERED position.

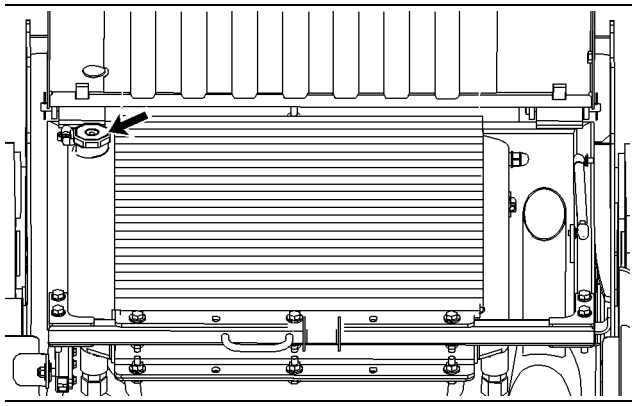


Illustration 166 g00956151

Note: The radiator cap is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The radiator cap is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

4. If you need to add coolant to the radiator, remove the radiator cap slowly in order to relieve system pressure.

Note: Inspect the cooling system hoses for any leaks, cracks, or signs of deterioration. Replace any damaged hoses.

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

6. Tilt the radiator guard downward.

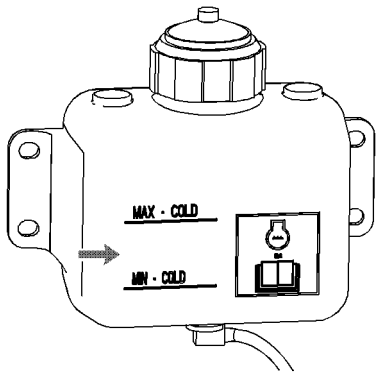


Illustration 167 g01018341

7. The coolant reservoir is located on either the left side of the engine compartment or on the engine access door. Maintain the coolant level in the coolant reservoir between the “MIN” and “MAX” lines.

8. 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.

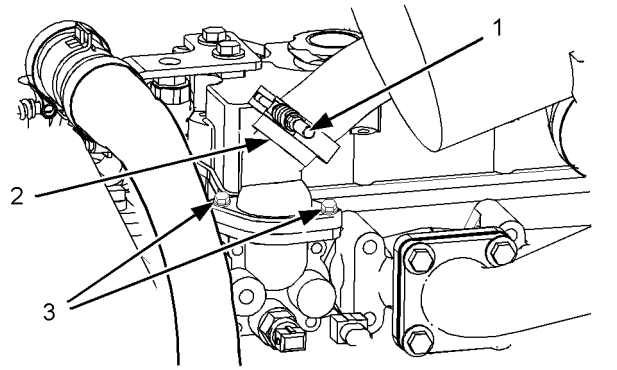


Illustration 168 g01018412

C2.2

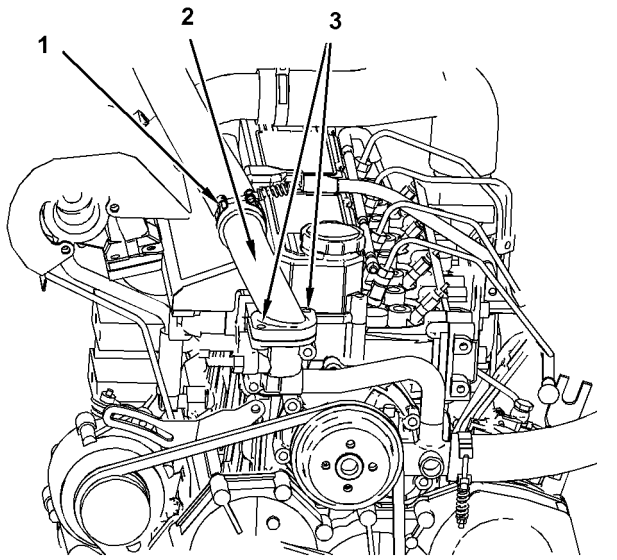


Illustration 169 g01210045

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.

i01990833

Drive Chain Case Oil - Change

SMCS Code: 3261-543-OC; 3261-544-OC

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: JXM1-Up

S/N: SRS1-Up

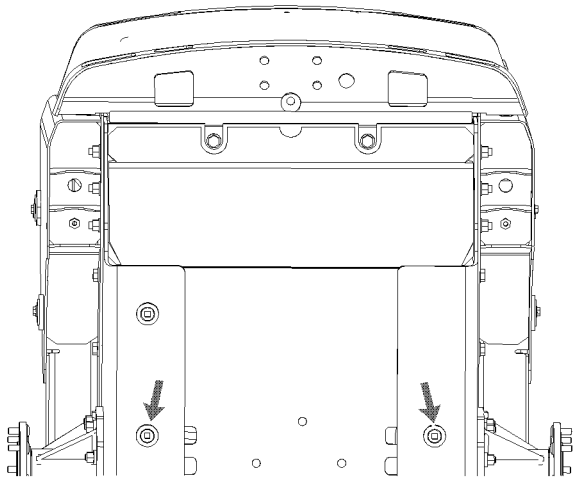


Illustration 170 g01025459

The plugs for the drive chain cases as the plugs are viewed from the underside of the machine.

1. Remove the drain plug for the left drive chain case and the right drive chain case. Allow the oil to drain into a suitable container.

2. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the drain plugs. Install the drain plugs.

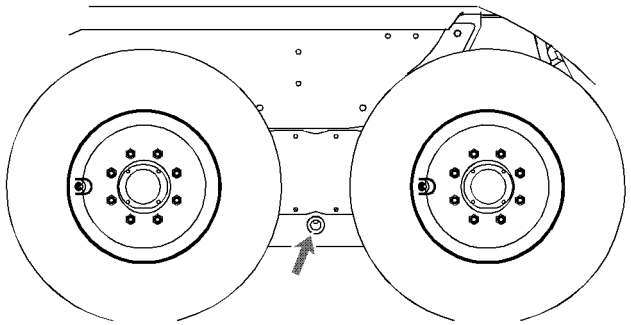


Illustration 171 g01025470

3. Remove the filler plug for the right side drive chain case. Fill the drive chain case with oil to the bottom of the threads on the fill port. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Refill Capacities”.

4. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the filler plug. Install the filler plug.

5. Repeat the process for the left side drive chain case.

Drive Chain Case Breathers

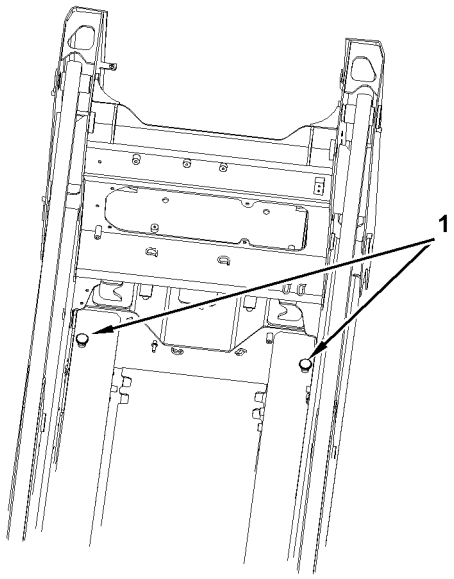


Illustration 172 g01031152

The breathers for the drive chain cases are located underneath the cab (1). Refer to Operation and Maintenance Manual, “Cab Tilting”.

Remove the breathers and inspect the breathers when the oil in the drive chain cases is changed. In order to clean the breathers, use solvent and low pressure air. If the breather is badly plugged, replace the breather.

i02799544

Drive Chain Case Oil - Check

SMCS Code: 3261-535

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: JXM1-Up

S/N: SRS1-Up

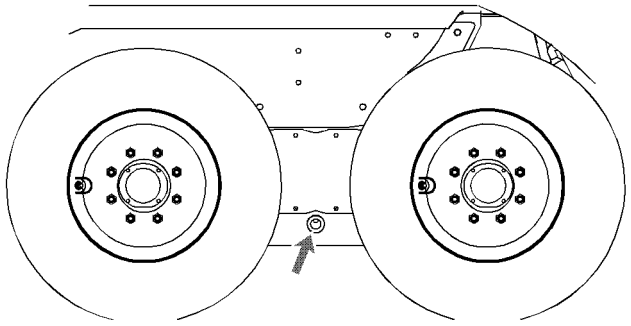


Illustration 173 g01025470

1. Remove the filler plug for the right side drive chain case. The oil level should be at the bottom of the threads on the fill port. If necessary, refer to Operation and Maintenance Manual, “Drive Chain Case Oil - Change” for the proper procedure to add oil.

2. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the filler plug. Install the filler plug.

3. Repeat the process for the left side drive chain case.

i03886391

Drive Chain Tension - Check/Adjust

SMCS Code: 3261-025; 3261-535

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: JXM1-Up

S/N: SRS1-Up

Note: Steel tracks that go over the tires should only be used with pneumatic tires. When you use steel tracks that go over tires or any drive train device except tires, the interval for checking the drive chains should be reduced to every 100 Service Hours. The use of rubber tracks that go over the tires is not recommended.

Note: There are four drive chains on the skid steer loader that must be checked and adjusted.

1. Park the machine on level ground and stable ground.

2. Chock the rear tires.

3. Use an appropriate floor jack to lift the front of the machine so that the front tires are off of the ground. Block up the front of the machine with two 1U-9758 Jack Stands.

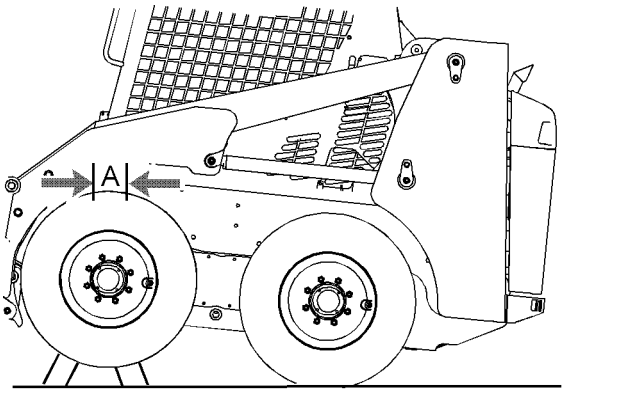


Illustration 174 g01025514

4. Rotate the wheel forward and backward. Measure the total free play (A).

Note: If the total free play does not exceed 15 mm (0.6 inch) the chain tension does not need further inspection. If the total free play exceeds 15 mm (0.6 inch), you should continue with the inspection.

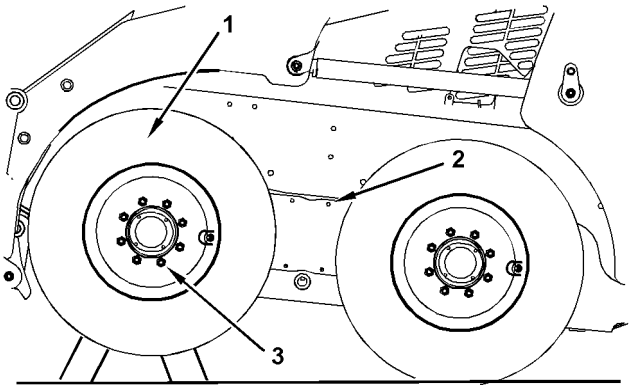


Illustration 175 g01025547

5. Remove the eight wheel nuts (3). Use an appropriate nylon lifting strap and a hoist in order to remove the tire and rim (1). The approximate weight of the standard tire and rim is 51 kg (113 lb).

6. Remove bolts and the cover (2) for the drive chain case.

Note: Remove the sealant from the cover and from the machine.

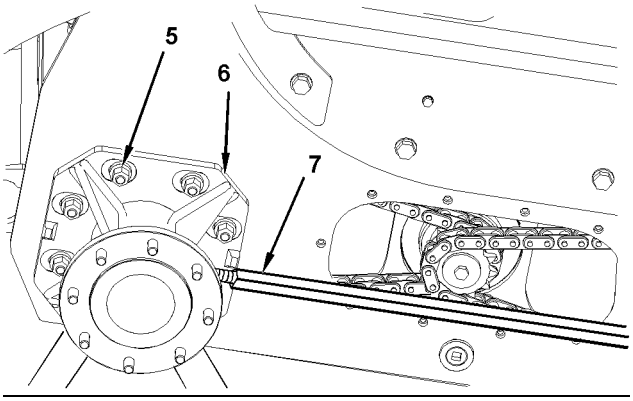


Illustration 176 g01025571

7. Loosen the eight bolts (5) for the axle housing. Place 159-3337 Chain Tension Adjuster (7) between the axle housings (6).

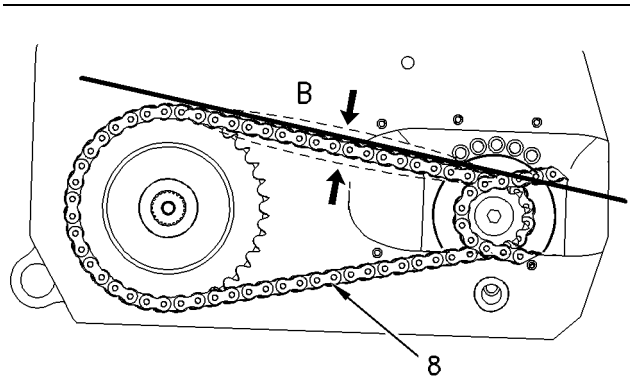


Illustration 177 g00867842

8. Rotate the axle in order to ensure that the chain (8) is taut below the sprockets. Place a straight edge across the top of the sprockets. Measure the total amount of movement in the chain (B). Set the chain tension so that there is a total of 15 mm (0.6 inch) movement in the chain. This is equal to 7.5 mm (0.3 inch) of movement above the straight edge and 7.5 mm (0.3 inch) of movement below the straight edge.

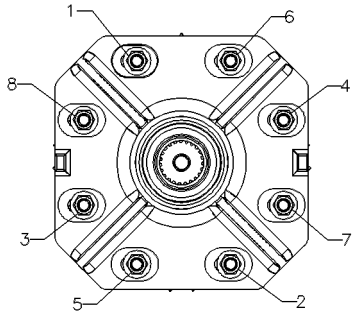


Illustration 178 g00554036

9. Tighten the bolts for the axle housing in the order that is shown above to 160 ± 15 N·m (118 ± 11 lb ft). Turn the nuts an additional 60 ±5° in the same star pattern.

10. Remove the chain tension adjuster.

11. Install the bolts and the cover for the drive chain case.

Note: Use 8T-9022 Silicone Gasket in order to seal the cover to the machine.

12. Use an appropriate nylon lifting strap and a hoist in order to position the tire and rim to the axle. The approximate weight of the tire and rim is 51 kg (113 lb). Refer to Operation and Maintenance Manual, “Wheel Nuts - Tighten” for the procedure to tighten the wheel nuts.

13. Lower the front of the machine to the ground. Repeat the procedure on the opposite side of the machine if it is necessary.

14. Repeat the adjustment procedure on the rear drive chains if it is necessary.

i03880059

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”.

The air filter housing is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The air filter housing is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

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.

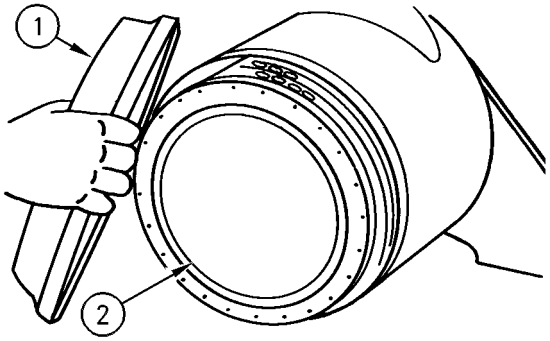


Illustration 179 g00101864

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

3. Remove the primary filter element (2).

4. 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.

5. 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.

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

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

8. Install the cover for the filter housing.

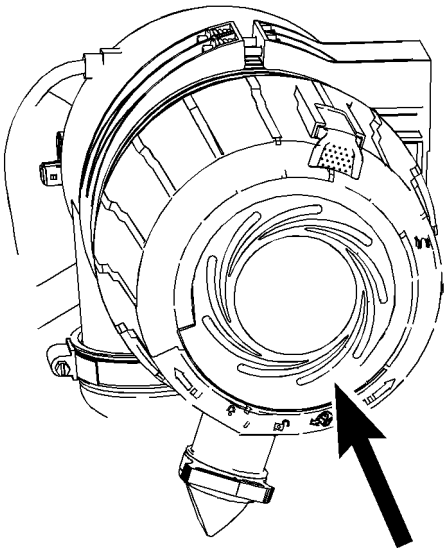


Illustration 180 g01433098

9. Rotate the cover clockwise and latch the cover.

10. Close the engine access door.

11. 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.

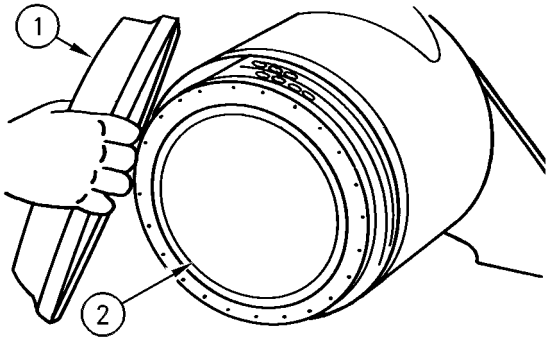


Illustration 181 g00101864

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

3. Remove the primary filter element (2).

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

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

6. Install the cover for the filter housing.

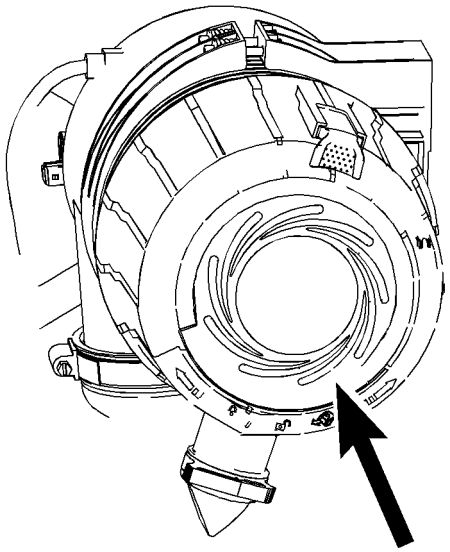


Illustration 182 g01433098

7. Rotate the cover clockwise and latch the cover.

8. Reset the air filter service indicator. Refer to Operation and Maintenance Manual, “Engine Air Filter Service Indicator - Inspect”.

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”.

i02879321

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.

The air filter housing is located on the left side of the engine compartment on machines that are equipped with the C2.2 engine. The air filter housing is located on the right side of the engine compartment on machines that are equipped with the C3.4 engine.

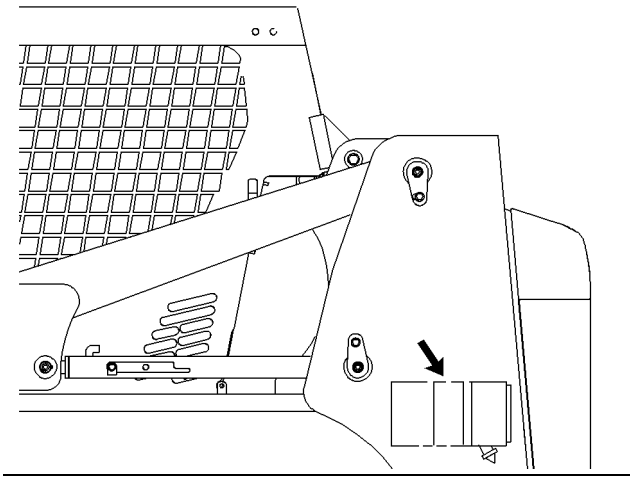


Illustration 183 g00891467

1. Open the engine access door.

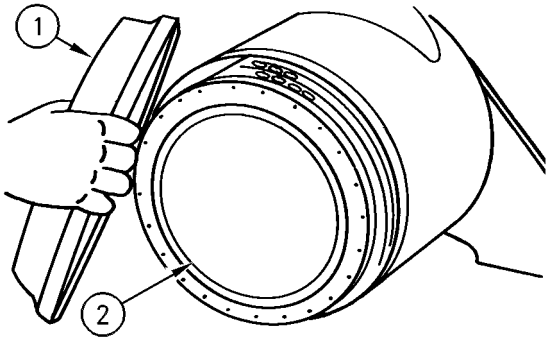


Illustration 184 g00101864

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

3. Remove the primary filter element (2).

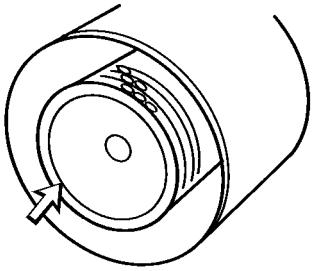


Illustration 185 g00038606

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

5. Remove the secondary filter element.

6. Cover the air inlet opening.

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

8. Uncover the air inlet opening.

9. Install a new secondary element.

10. Install the primary element.

11. Install the cover for the filter housing.

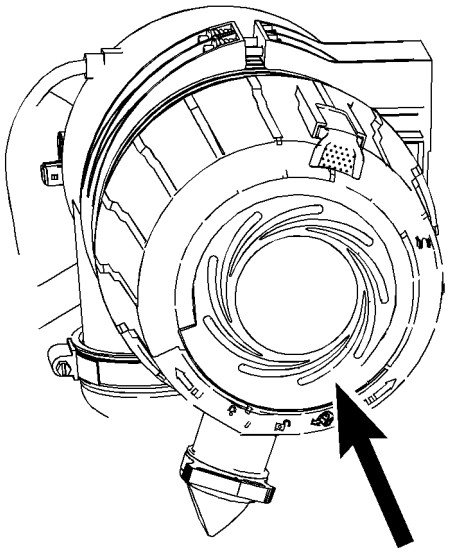


Illustration 186 g01433098

12. Rotate the cover clockwise and latch the cover.

13. Close the engine access door.

i03886451

Engine Compartment - Inspect/Clean

SMCS Code: 1000-040-CPA; 1000-070-CPA

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”.

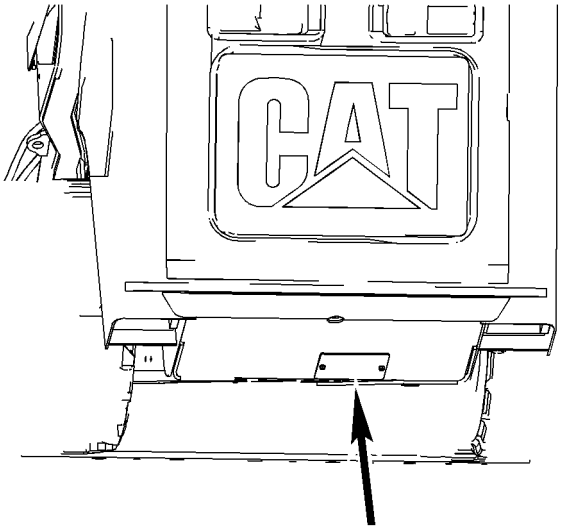


Illustration 187 g01264593

2. Remove any debris or dirt from the engine compartment. If equipped, 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. Close the engine access door.

Air Conditioning Condenser

The air conditioning condenser is located at the back of the engine compartment. Cleaning the air conditioning condenser will maintain optimum performance of the air conditioning system.

Use low pressure water in order to clean the condenser.

i03880064

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

S/N: MWD1-Up

S/N: TSL1-Up

S/N: JXM1-Up

Note: Ensure that the area around the vent hole on the breather cover is clean and that the vent hole is not restricted. Ensure that the components of the breather assembly are seated in the correct positions. Otherwise, engine damage could result.

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”.

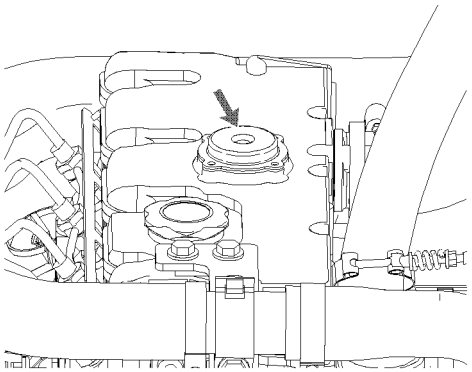


Illustration 188 g01018945

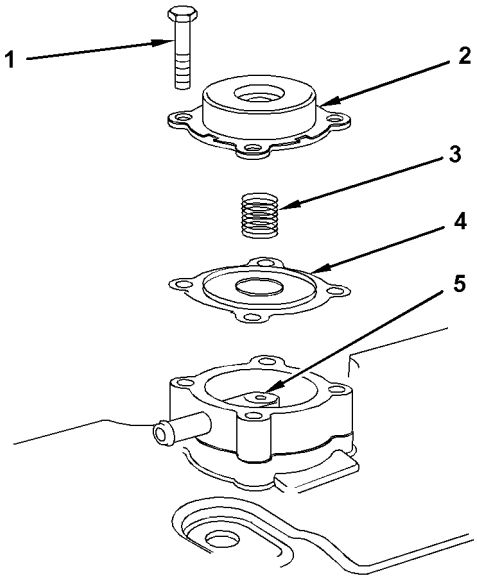


Illustration 189 g01044243

3. The breather is located on top of the valve cover. Remove the screws (1). Remove the breather cover (2).

4. Remove the diaphragm assembly (4). Remove the spring (3). The diaphragm assembly consists of the diaphragm and the locating ring.

5. Clean the cavity for the breather (5).

6. Remove the gauze that is located below the cavity for the breather.

7. Clean the following items with a clean diesel fuel:

   - Breather
   - Breather cover
   - Diaphragm assembly
   - Location ring assembly
   - Spring
   - Gauze

8. Allow the parts to dry. Pressure air may be used to dry the parts.

9. Install the gauze and install the components of the breather. Install the breather cover.

10. Tilt the radiator downward.

11. Close the engine access door.

i03880105

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.

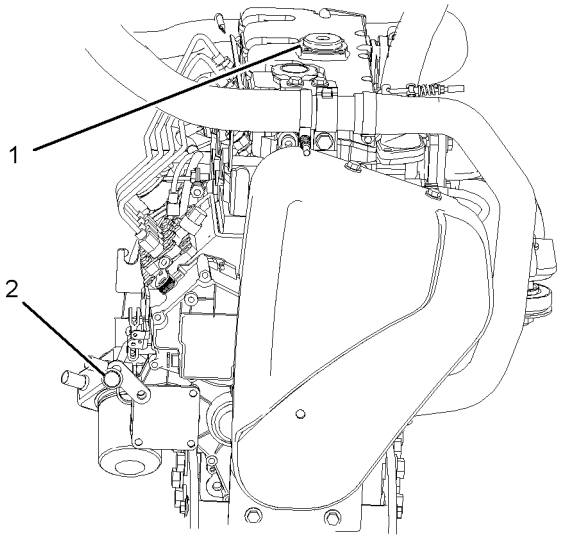
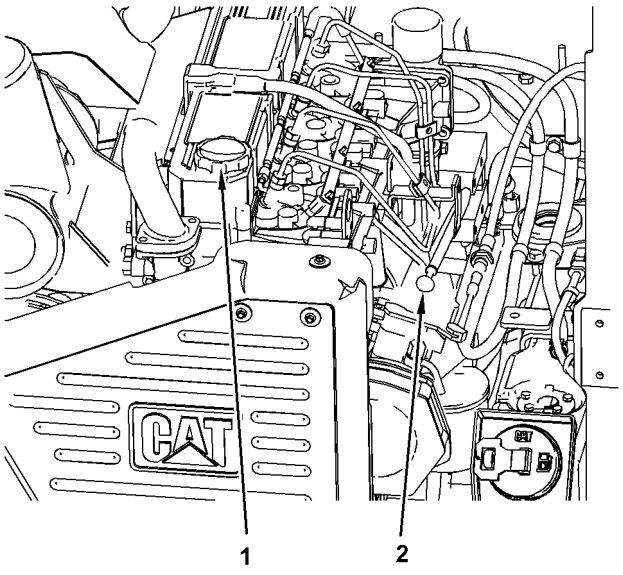


Illustration 190 g02126142

C2.2



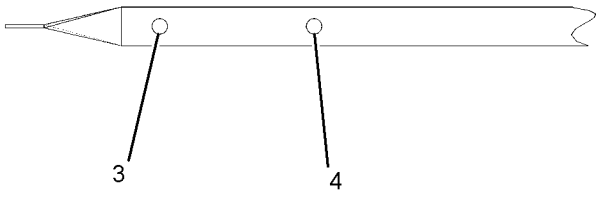
g01209758

Illustration 191

C3.4

(1) Oil Filler Cap
(2) Oil Level Gauge

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



g02126152

Illustration 192

(3) Add
(4) Full mark

3. Maintain the level of the oil between the “ADD” (3) mark and the “FULL” (4) mark on the oil level gauge (2).

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.

i03880121

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

S/N: MWD1-Up

S/N: TSL1-Up

S/N: JXM1-Up

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

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”.

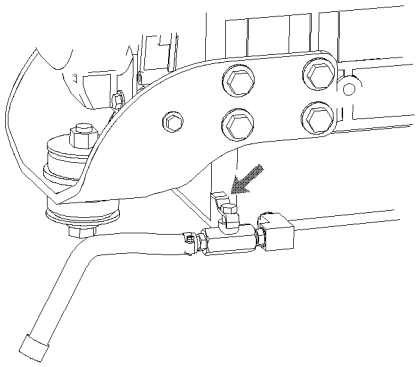


Illustration 193 g01022394

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

3. Pull the drain hose for the crankcase through the opening in the rear of the machine and remove the plug in the end of the drain hose. Open the crankcase drain valve and drain the oil into a suitable container. Close the crankcase drain valve. Install the plug in the drain hose.

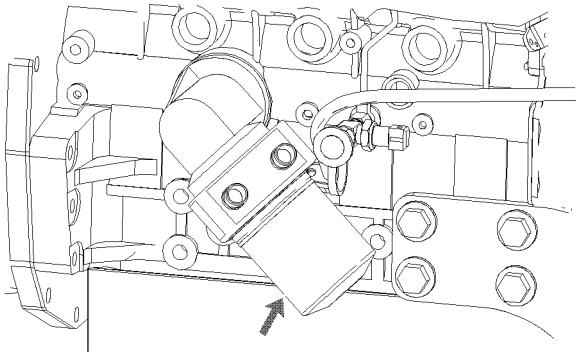


Illustration 194 g01022354

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.

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.

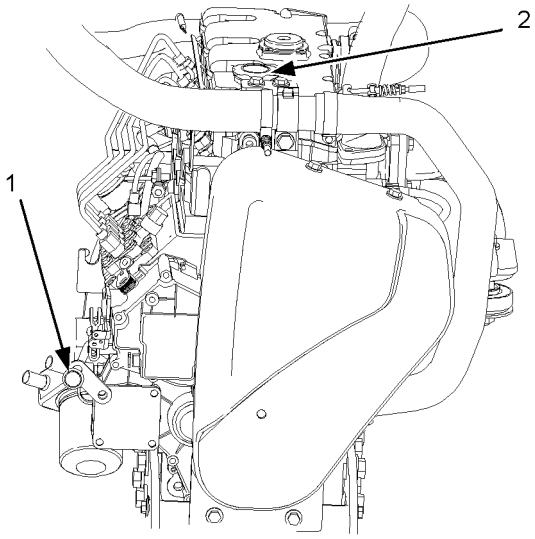


Illustration 195 g01018561

8. Remove the oil filler cap(2). Fill the crankcase with new oil. See Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Refill Capacities”. Clean the oil filler plug and install the oil filler plug.

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

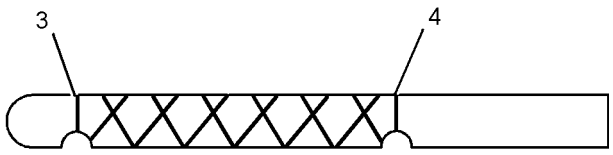


Illustration 196 g02126167

10. Stop the engine and allow the oil to drain back into the oil pan. Fill the crankcase to the “FULL” mark (4) on the oil level gauge (1). **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.

i03900344

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

S/N: A9H1-Up

S/N: B7H1-Up

S/N: TNK1-Up

S/N: SRS1-Up

S/N: YYZ1-Up

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

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

Dispose of all fluids according to local regulations and mandates.

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.

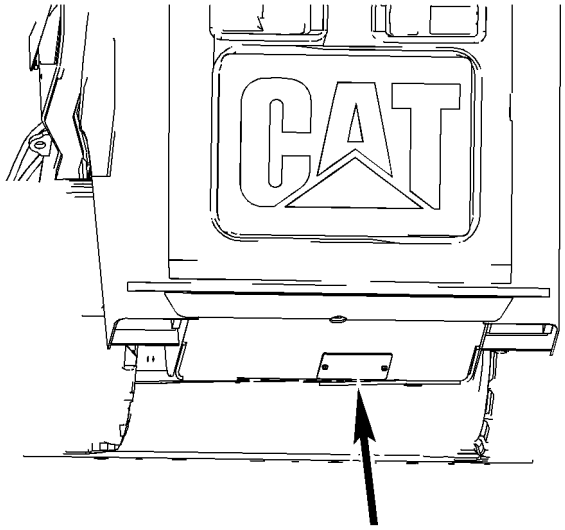


Illustration 197 g01264593

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.

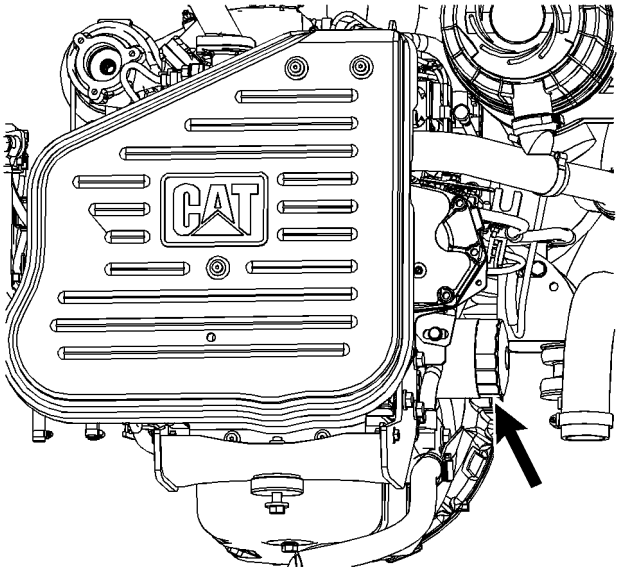


Illustration 198 g02143271

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.

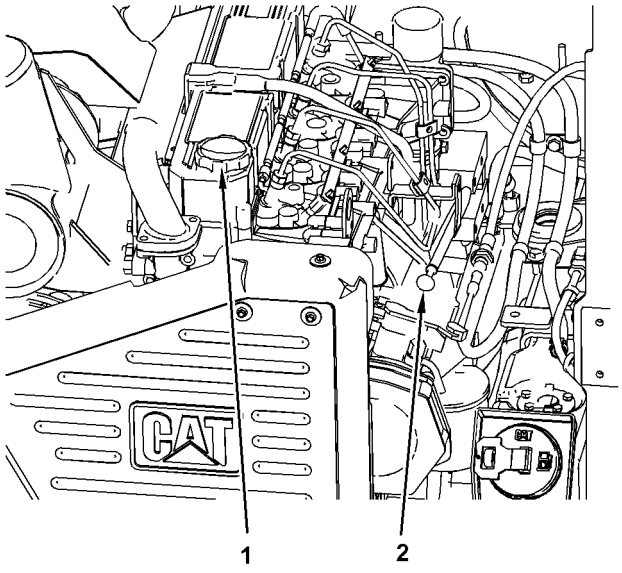


Illustration 199 g01209758

(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.

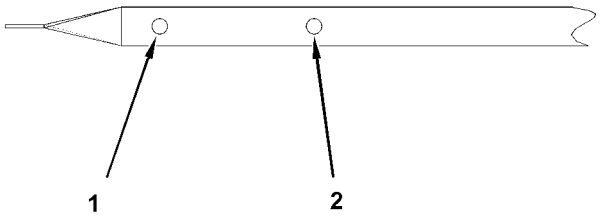


Illustration 200 g01277108

(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.

13. Install the access panel.

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.

i03880157

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.

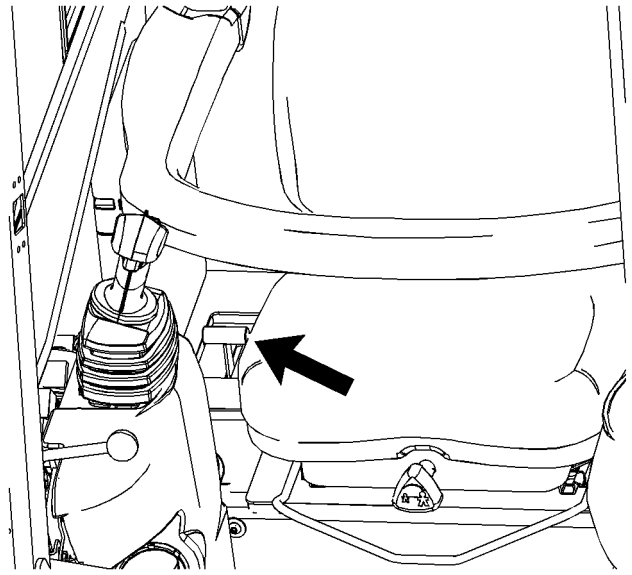


Illustration 201 g02141938

2. Push reward on the handle in order to fully actuate the valve.

3. Pull forward on the handle in order to return the handle to the original position. Ensure that the handle is fully seated.

i03880188

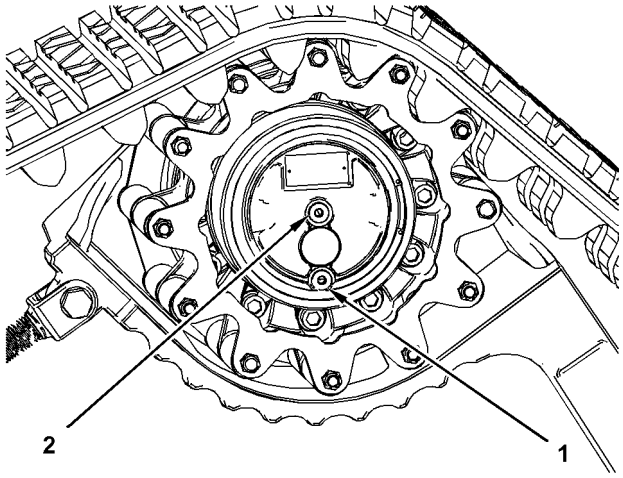
Final Drive Oil - Change

SMCS Code: 4011-044-OC; 4050-044; 4050-044-OC; 4050-044-FLV; 4050-535-FLV; 4050; 4070-044; 7527

S/N: B7H1-Up

S/N: TSL1-Up

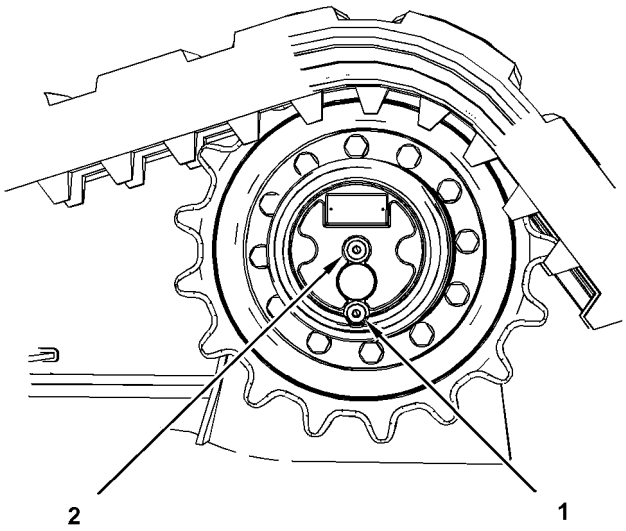
S/N: YYZ1-Up



g01291697

Illustration 202

Multi Terrain Loader



g01451295

Illustration 203

Compact Track Loader

(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 of 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 check plug (2). Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

8. Install the two 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 fill/drain plug (2).

i03880192

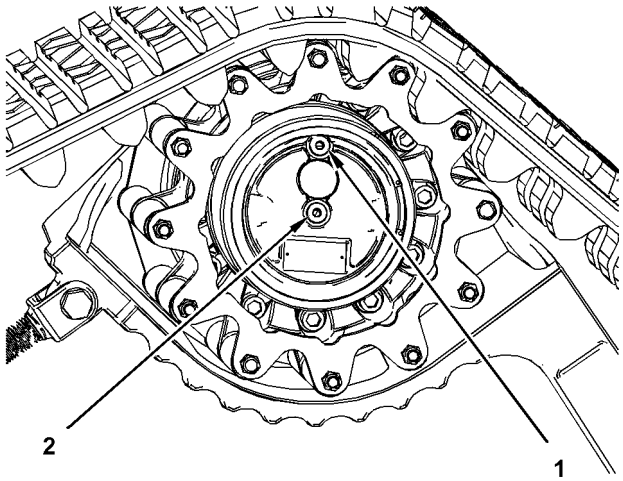
Final Drive Oil Level - Check

SMCS Code: 4011-535-FLV; 4050-535-FLV; 4050; 4070-535-FLV; 7524; 7527

S/N: B7H1-Up

S/N: TSL1-Up

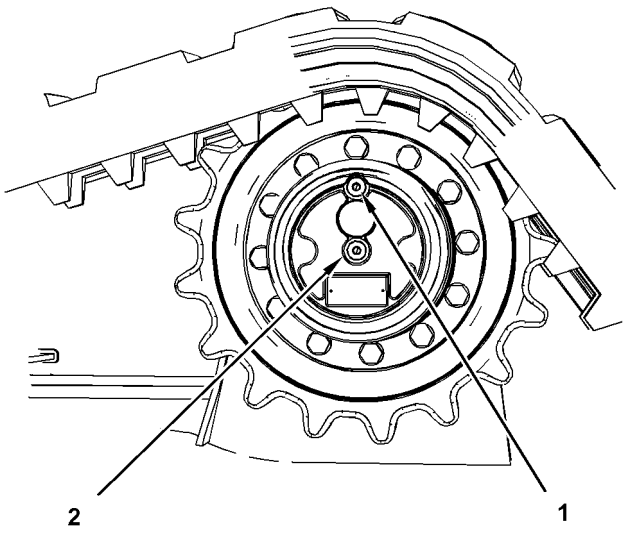
S/N: YYZ1-Up



g01457026

Illustration 204

Multi Terrain Loader



g01457009

Illustration 205

Compact Track Loader

(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.

i02868096

Fuel System Filter (In-Line) - Replace

SMCS Code: 1261-510

S/N: MWD1-Up

S/N: TSL1-Up

S/N: JXM1-Up

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

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

Dispose of all fluids according to local regulations and mandates.

Note: Replace the fuel filter before the scheduled interval if any of the following occur:

- The filter screen is more than half obstructed.
- Engine performance is poor.

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

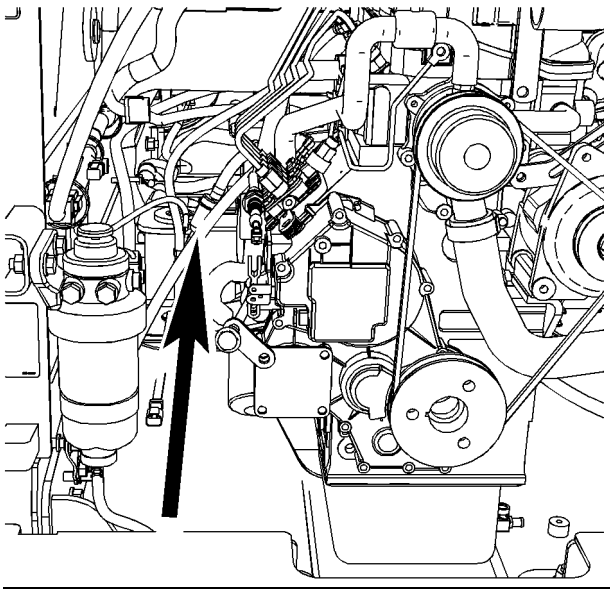


Illustration 206 g01428665

2. Loosen hose clamps.
3. Remove the fuel filter and discard the fuel filter.
4. Replace the fuel filter. Ensure that the arrow on the filter points upward.
5. Tighten hose clamps.
6. Start the engine.
7. Check for leaks.
8. Close the engine access door.

i03880387

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”.

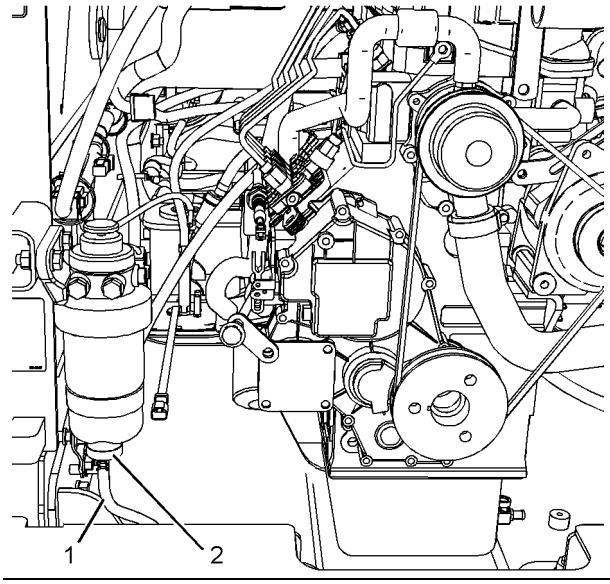


Illustration 207 g02126392

C2.2

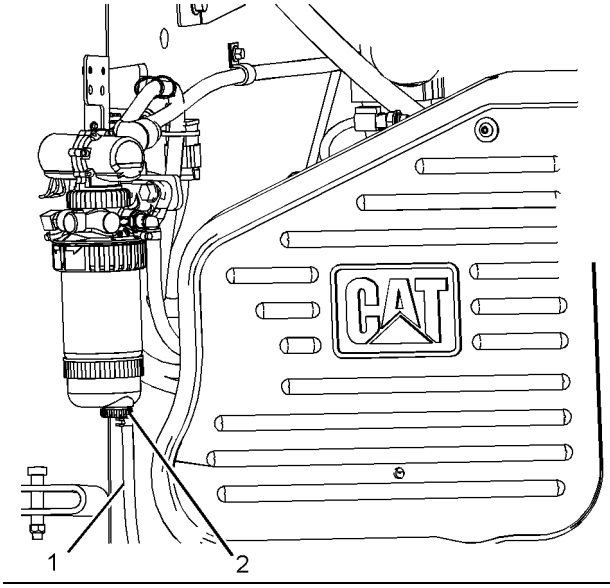


Illustration 208 g02126394

C3.4

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

2. Insert drain hose (1) into a suitable container. Loosen drain valve (2) on the bottom of the water separator.

3. Tighten drain valve (2) 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.

i03880390

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”.

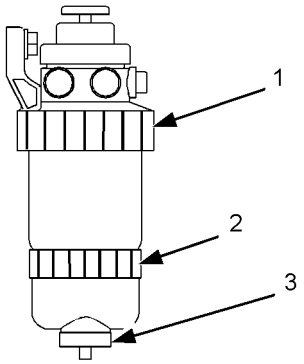


Illustration 209 g01017292

C2.2

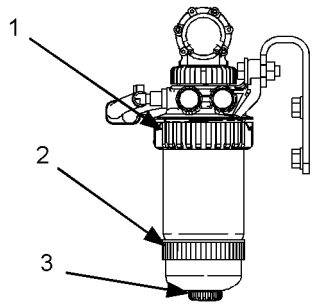


Illustration 210 g01017293

C3.4

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.

i03880392

Fuel System Priming Pump - Operate

SMCS Code: 1258-548

C2.2 Engine

The fuel priming pump is located on top of the fuel filter/water separator.

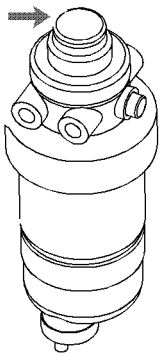


Illustration 211 g01019689

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

2. Push down on the top of the fuel priming pump plunger and release the fuel priming pump plunger in order to operate the fuel priming pump. Operate the fuel priming pump plunger in order to fill the new filter element with fuel. Continue to pump until increased resistance is felt. This resistance will indicate that the filter element is full of fuel.

3. 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. If the engine fails to start or if the engine continues to misfire or smoke repeat the priming procedure.

4. Close the engine access door.

C3.4 Engine

Machines that are equipped with the C3.4 engine are equipped with a fuel transfer pump that is electric.

1. Momentarily turn the engine start switch to the START position and then return the engine start switch to the ON position.

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

2. Leave the engine start switch in the ON position for thirty seconds.

3. 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. If the engine fails to start or if the engine continues to misfire or smoke, repeat the priming procedure.

i01819309

Fuel Tank Cap - Clean

SMCS Code: 1273-070-Z2

1. Remove the fuel cap.

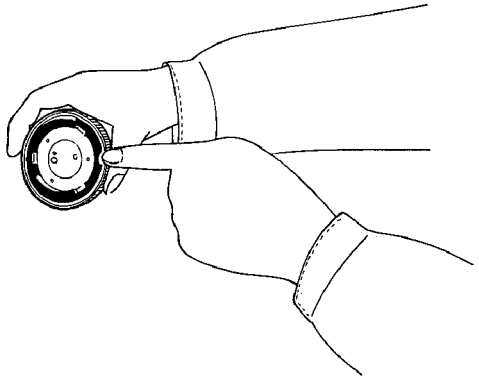


Illustration 212 g00104238

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.

i01971189

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

Dispose of all fluids according to local regulations and mandates.

Note: 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 relieve the tank pressure.

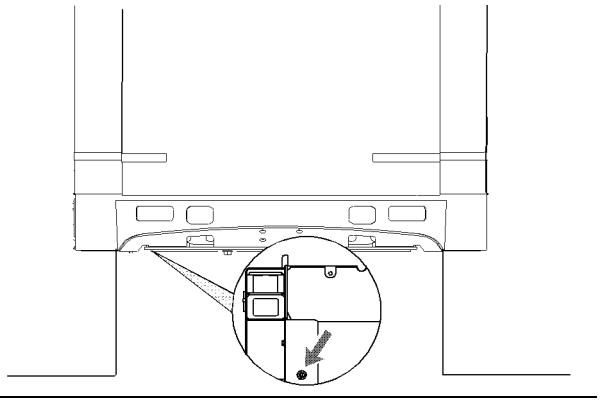


Illustration 213 g01023153

2. The fuel tank drain plug is located underneath the machine at the left rear corner. Loosen 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.

i03898484

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

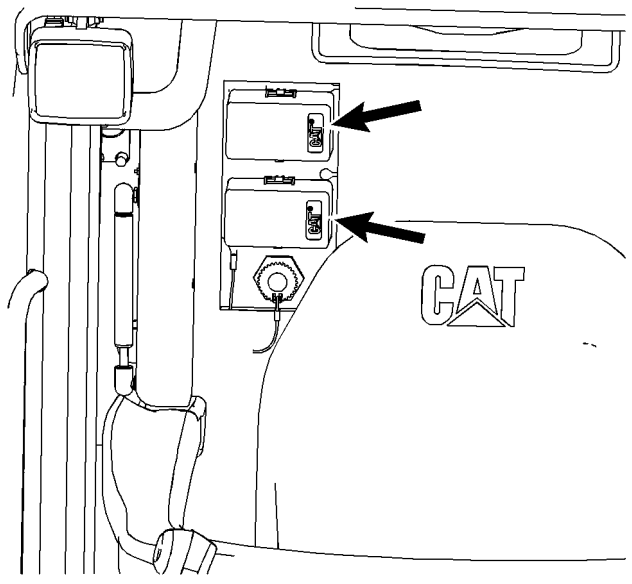


Illustration 214 g02142168

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

Remove the cover in order to access the fuse panel.

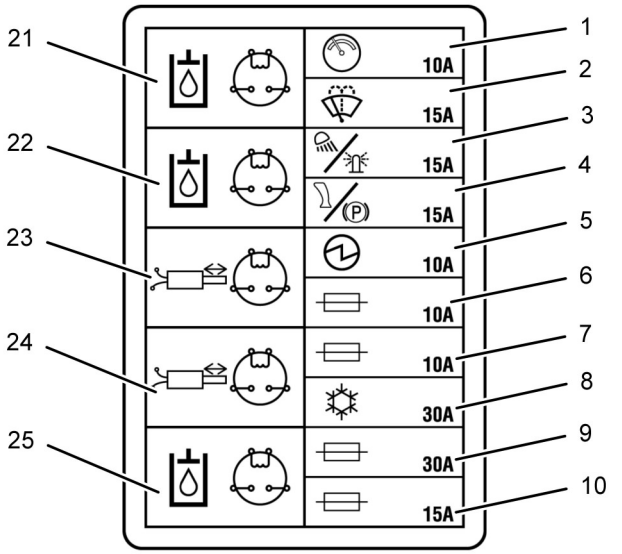


Illustration 215 g02142844

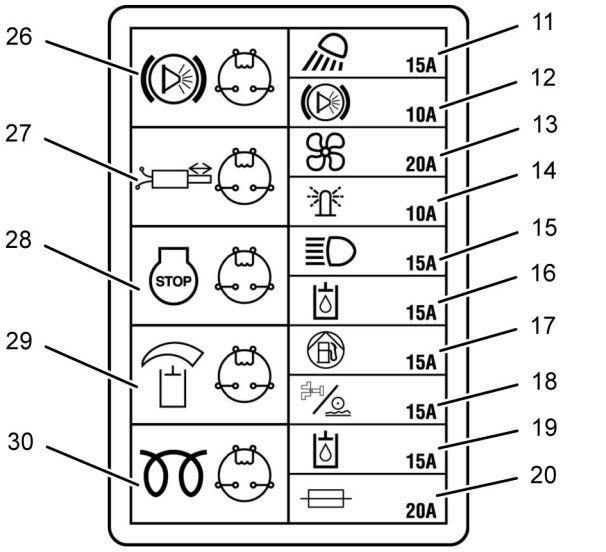


Illustration 216 g02142845

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

1 – Gauge

2 – Wiper

3 – Rear Work Lights and Beacon

4 – Right Joystick and Parking Brake Solenoid

5 – 12 volt power socket

6 – Spare

7 – Spare

8 – Air Conditioner Condenser Fans

9 – Spare

10 – Spare

11 – Front Work Lights

12 – Stop Lamp and Back-Up Alarm

13 – HVAC Blower Fan

14 – Beacon

15 – Headlights

16 – Work Tool Auxiliary Electrical Control (Pin H)

17 – Fuel Pump

18 – Hydraulic Quick Coupler and Self Level

19 – Work Tool Auxiliary Electrical Control Left Hand C1/C2 and right Hand Trigger (Pins B,C, & D)

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 – Secondary Auxiliary Electrical Control

28 – Fuel Shutoff

29 – Hydraulic Flow Control

30 – Glow Plugs

Main Fuse

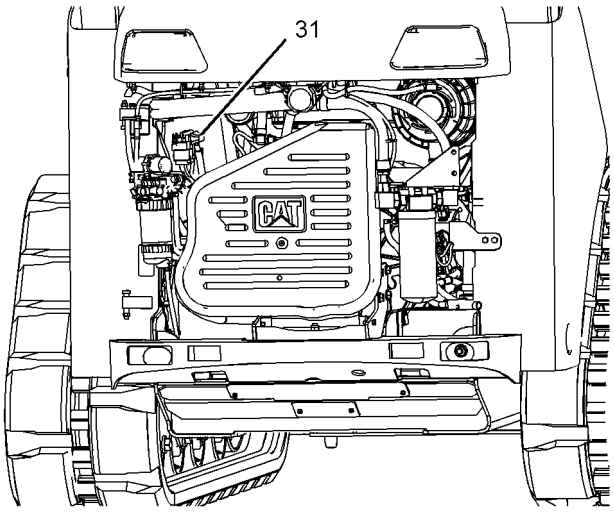


Illustration 217 g02142334

The main fuse (31) is located on the left side of the machine in the rear next to the engine. 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 left side of the machine.

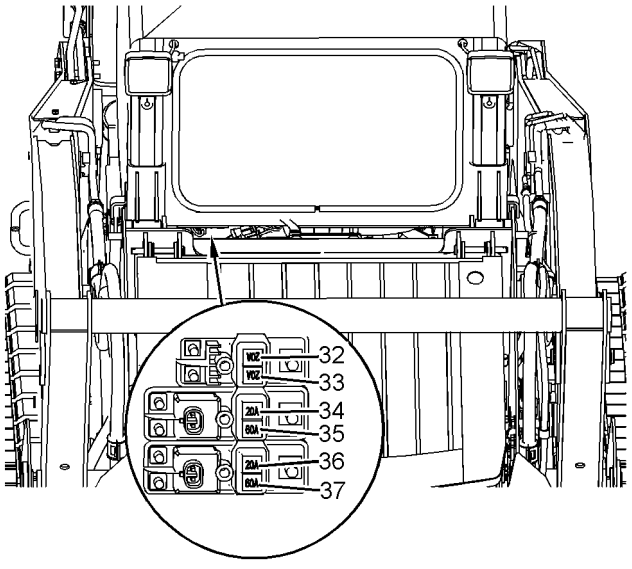


Illustration 218 g02142313

This panel has six 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.

32 – Ignition switch “20 A”

33 – ECM “20 A”

34 – Horn “20 A”

35 – Main power relay 1 “60 A”

36 – Miscellaneous cab accessories “20 A”

37 – Main power relay 2 “60 A”

i02127331

Headlights - Adjust

SMCS Code: 1429-025

Illustration 219 g00714442

Roading Lights

Perform the following procedure in order to align the headlights:

1. Verify that the tires are inflated properly.
2. Position the machine in the following manner when you adjust the headlights:
   a. Park the machine in a dark area.
   b. Park the machine on level ground.

c. Face the machine toward a wall with 10 m (32.8 ft) between the wall and the face of the headlights.

3. Place a second person or 75 kg (165 lb) in the operator's seat.

4. Turn on the headlights.

5. Cover one headlight.

6. Loosen the other headlight clamp.

7. Move the headlight so that the headlight is pointing straight ahead. Measure the height from the ground to the center of the headlight.

8. Twist the headlight so that the upper edge of the light that is shown on the wall is two-thirds of the height from the ground to the center of the headlight. Ensure that the line of the light that is shown on the wall is horizontal.

9. Tighten the headlight clamp.

10. Repeat the process for the other headlight.

i03880891

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.

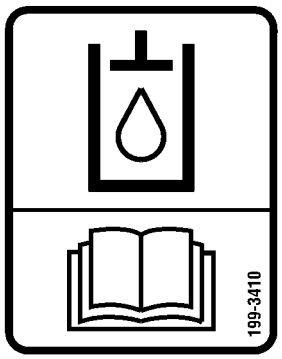


Illustration 220 g00956818

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.

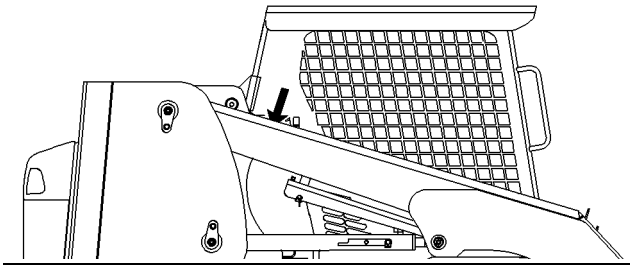


Illustration 221 g00926534

1. Remove the hydraulic tank filler cap.

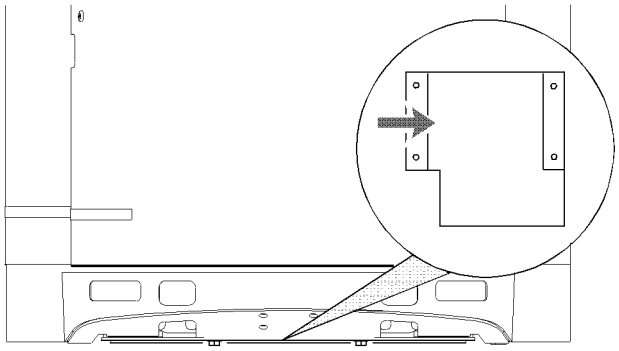


Illustration 222 g01021146

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

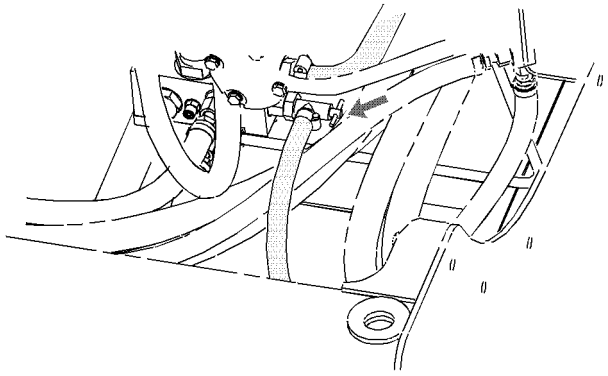


Illustration 223 g01030411

3. Remove the plug from the end of the drain hose. Pull the drain hose through the access panel in the belly guard. Open the drain valve and drain the oil into a suitable container.

4. Close the drain valve and pull the drain hose back into the machine. Install the drain plug into the drain hose.

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.

   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.

i03880895

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”.

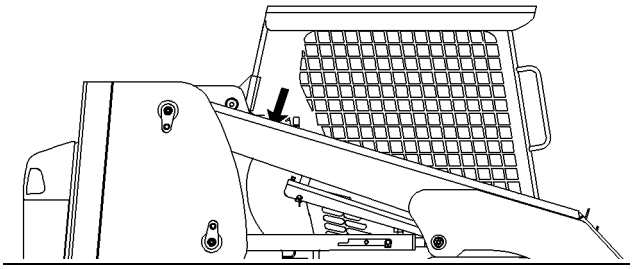


Illustration 224 g00926534

2. Remove the hydraulic tank filler cap.

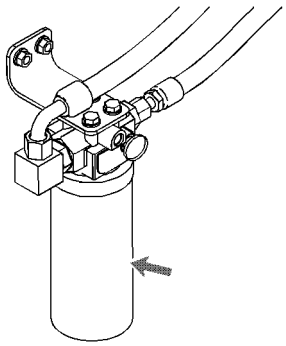


Illustration 225 g01017252

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 new filter 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.

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.

i01957050

Hydraulic System Oil Level - Check

SMCS Code: 5095-535-FLV

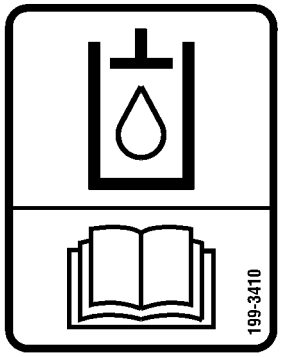


Illustration 226 g00956818

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

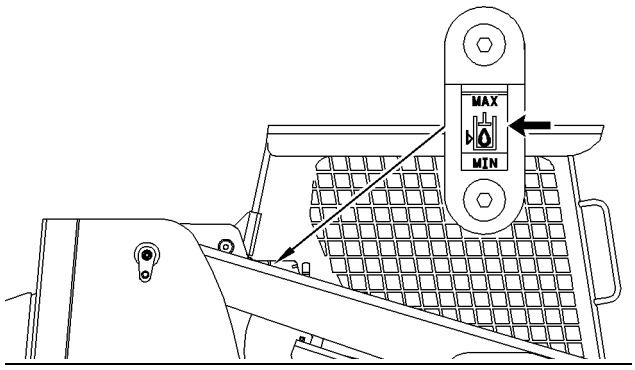


Illustration 227 g00926177

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. Maintain the oil level to the middle of 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.

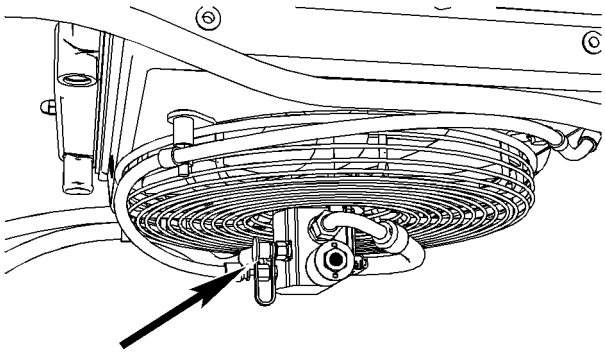


Illustration 228 g01280271

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

i01957078

Lift Arm and Cylinder Linkage - Lubricate

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

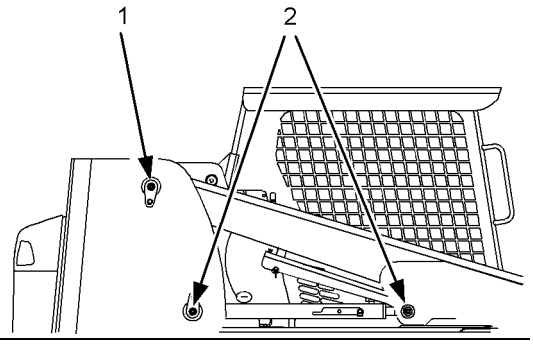


Illustration 229 g01017352

Radial Lift

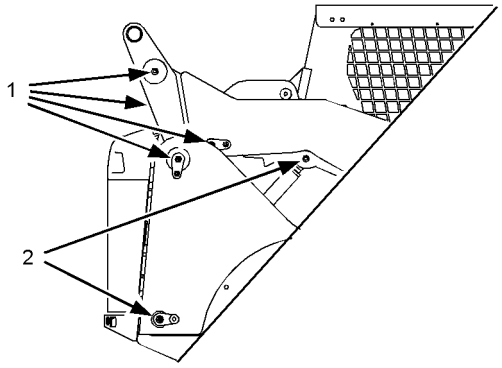


Illustration 230 g01017361

Extended Reach

Apply lubricant to the grease fittings (1) for the lift arm linkage.

Apply lubricant to the grease fittings (2) for the lift cylinder bearings.

Repeat the process for the opposite side of the machine.

i01963869

Lower Machine Frame - Clean

SMCS Code: 7050-070

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

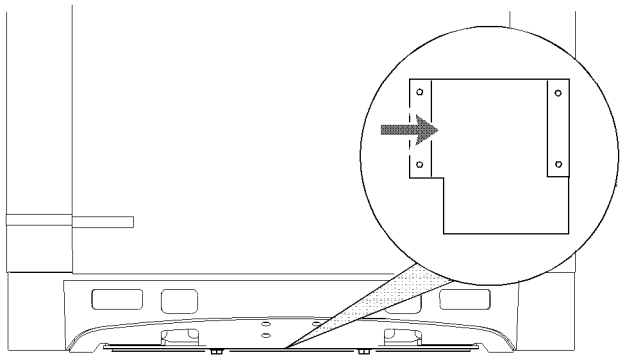


Illustration 231 g01020241

2. Remove the access panel in the frame that is located underneath the machine.

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

4. Reinstall the access panel and tilt the cab downward.

i02106227

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

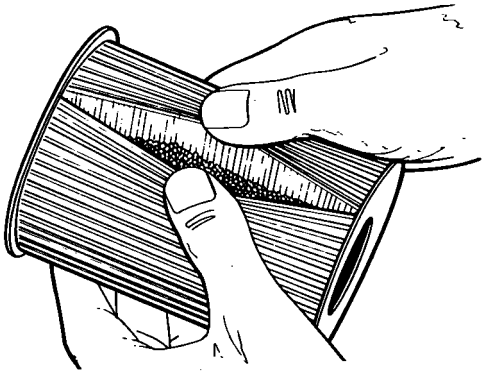


Illustration 232 g00100013

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.

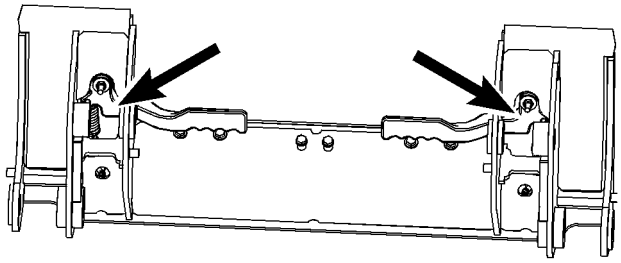


Illustration 233 g01322438

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.

i03886849

Radiator Core - Clean

SMCS Code: 1353-070-KO

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

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.

i02798931

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

SMCS Code: 7323-040; 7325-040

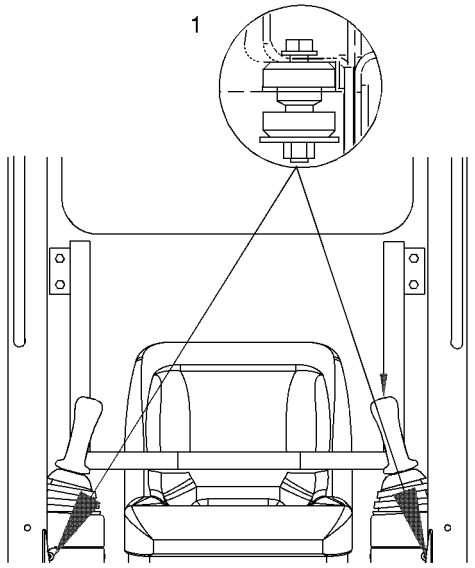


Illustration 234 g01022156

(1) Front ROPS retaining bolt (one bolt per side)

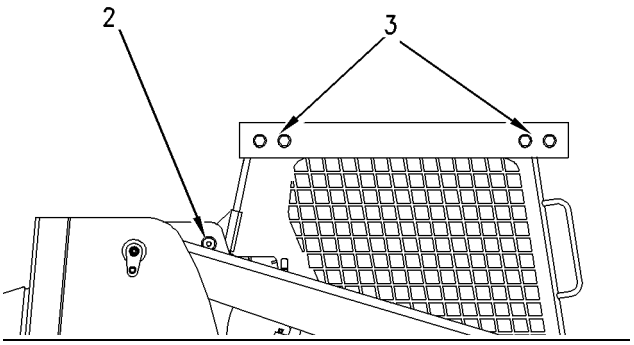


Illustration 235 g00925477

(2) Rear ROPS retaining bolt (one bolt per side)
(3) Retaining bolts for the FOPS 2

Note: There is a total of four retaining bolts for the ROPS. There is a total of eight retaining bolts for the FOPS 2.

1. Inspect the ROPS and the FOPS for loose bolts. Tighten the bolts (1) to the following torque 125 ± 10 N·m (92 ± 7 lb ft). Tighten the bolts (2) to the following torque 55 ± 5 N·m (41 ± 4 lb ft). Tighten the bolts (3) to the following torque 240 ± 40 N·m (177 ± 30 lb ft). 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.

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.

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect 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.

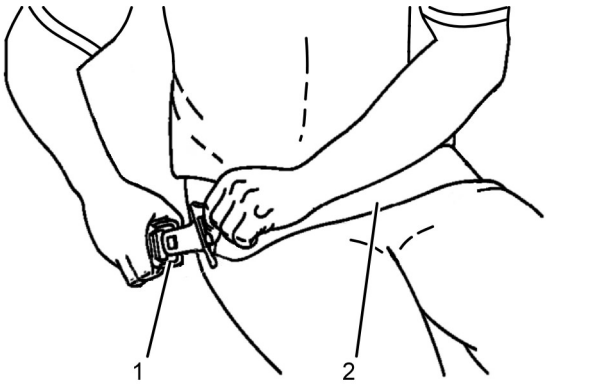


Illustration 236 g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

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

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i04421974

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

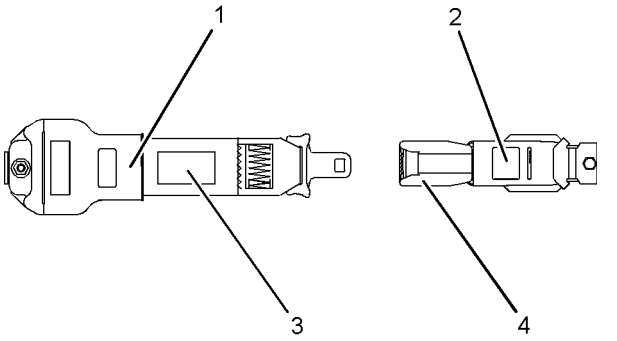


Illustration 237 g01152685

Typical Example

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

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

Determine age of new seat belt before installing on seat. A manufacture label is on belt webbing and imprinted on belt buckle. Do not exceed install by date on label.

Complete seat belt system should be installed with new mounting hardware.

Date of installation labels should be marked and affixed to the seat belt retractor and buckle.

Note: Date of installation labels should be permanently marked by punch (retractable belt) or stamp (non-retractable belt).

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

i04776649

Sprocket - Inspect

SMCS Code: 4164-040

S/N: B7H1-Up

S/N: TSL1-Up

S/N: YYZ1-Up

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. Clean the undercarriage of the machine daily in order to maximize component life.

Sprocket Inspection for 247B3 and 257B3

Note: 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

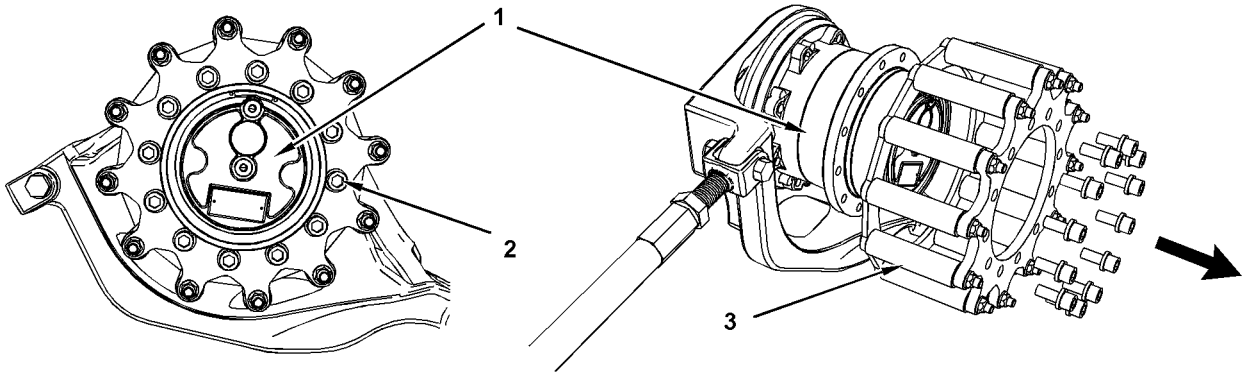


Illustration 238 g01394413

(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 and the 12 washers that hold the sprocket assembly to the drive motor.
2. Slide the sprocket assembly off the drive motor.

Sleeves and Rings

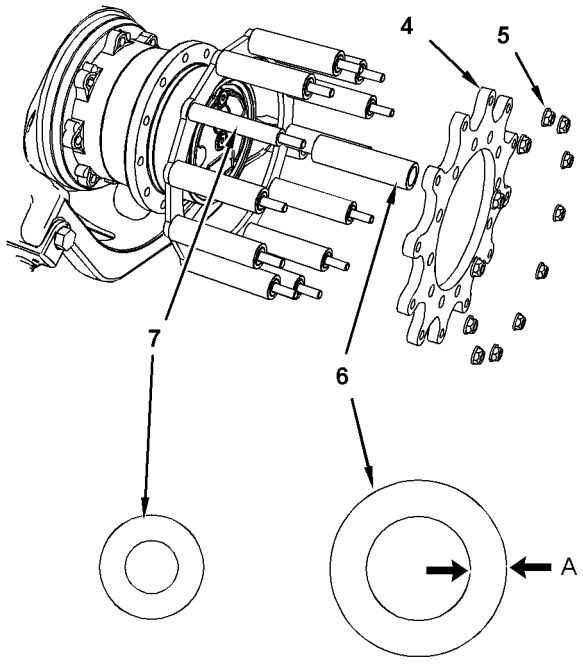


Illustration 239 g01394415

(4) Sprocket mounting ring
(5) Washers and Locknuts
(6) Outer sleeve
(7) Inner sleeve

The sprocket is equipped with two types of sleeves.

- Inner Sleeves (6)
- Outer sleeves (5)

The outer sleeves are free to rotate on the inner sleeves . The sleeves are held in position by the sprocket mounting ring.

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 sprocket mounting ring 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. The sprocket mounting rings of the drive sprocket will wear from the rotation of the outer sleeves. Measure the thickness of the inner rings and outer rings. If the thickness of the inner ring or outer ring measures less than 4.75 mm (0.19 inch), replace the ring.
8. Install the sleeves and the rings.
9. Install the new locknuts. **Do not reuse the locknuts.** Tighten the locknuts to a torque of 70 ± 5 N·m (51.6 ± 3.7 lb ft) in a star pattern. Turn the nuts an additional 120 degrees ±5 degrees in the same star pattern.
10. Install the sprocket on the drive motor. Tighten the bolts to a torque of 270 ± 40 N·m (199 ± 30 lb ft).

Track

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

Sprocket Inspection for 259B3

Inspect

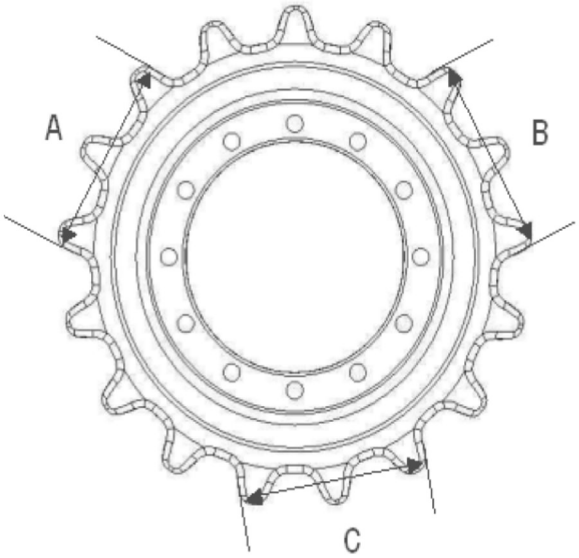


Illustration 240 g02789983

1. Measure the sprocket teeth in three places as shown in illustration 240.
2. Calculate the average of the 3 measurements to determine the 50% wear limit.
3. If the average of 3 measurements is less than 178 mm (7 inch), relocate the sprocket to the opposite side of the machine. Follow the steps in the “Relocate” section. If the average of 3 measurements is less than 165 mm (6.5 inch), then replace the sprocket. Follow the steps in the “Replace” section.

Relocate

1. Remove the track on both sides of the machine.
2. Remove the sprocket on the left side of the machine. Move the sprocket to the right side.
3. Remove the sprocket on the right side of the machine. Move the sprocket to the left side.
4. Install the sprockets. Tighten the bolts to the proper torque.
5. Install the track on both sides of the machine.

Replace

1. Remove the track on both sides of the machine.

2. Remove the sprocket on the left side of the machine. Install the new sprocket.

3. Tighten the bolts to the proper torque.

4. Remove the sprocket on the right side of the machine. Install the new sprocket.

5. Tighten the bolts to the proper torque.

6. Install the track on both sides of the machine.

i01992415

Sprocket Bearings - Lubricate

SMCS Code: 4164-086-BD; 7551-086-JK

S/N: B7H1-Up

S/N: TSL1-Up

NOTICE
The service interval for the lubrication of the sprocket bearings should be reduced to every 500 service hours if the machine is operated in wet and muddy conditions.

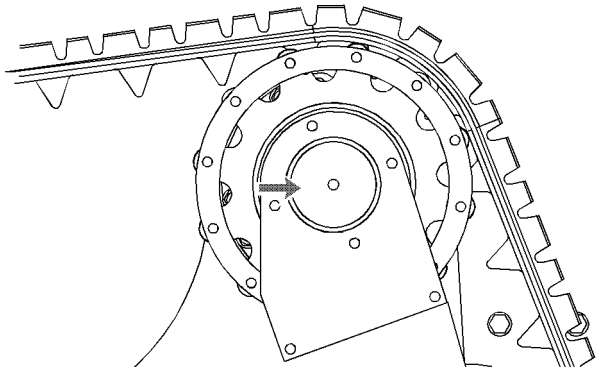


Illustration 241 g01025225
typical example

1. Use a mallet in order to pound the housing plug inward until the plug falls out of the housing. If the plug was damaged during removal, replace the plug.

2. Wipe the old grease out of the housing.

3. Pull out the bearing seal. Replace the seal if the seal is damaged.

4. Pack the bearing with clean grease and push the seal into position. Place clean grease on the outside of the seal in order to protect the seal.

5. If the old housing plug is reinstalled, reverse the housing plug and pound the plug into the housing.

i02125302

Sprocket Retaining Nuts - Check

SMCS Code: 4164-535-NT

S/N: B7H1-Up

S/N: TSL1-Up

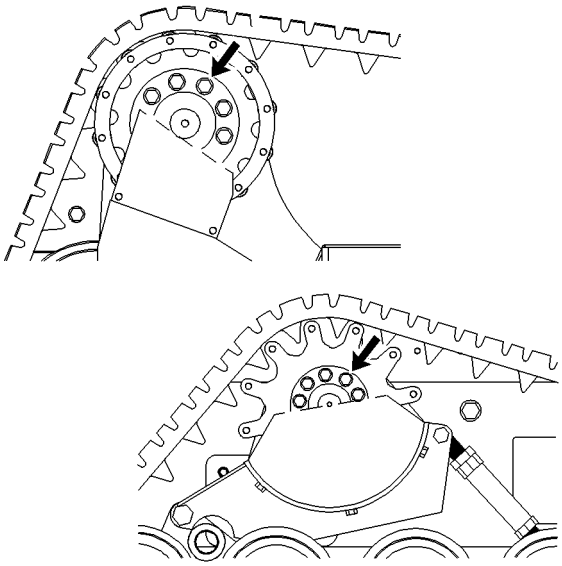


Illustration 242 g00953040

Check the torque on the nuts for new sprockets or for sprockets that have been reinstalled after every ten service hours until the specified torque is maintained.

Check the nuts on both sprockets. Use a star pattern when you tighten the nuts.

Tighten the nuts for the 247 and 257 to the following torque 175 ± 30 N·m (129 ± 22 lb ft).

Tighten the nuts for the 267, 277 and 287 to the following torque 270 ± 40 N·m (199 ± 30 lb ft).

i02790866

Sprocket Sleeve - Inspect

SMCS Code: 4164-040-ZV

S/N: B7H1-Up

S/N: TSL1-Up

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.

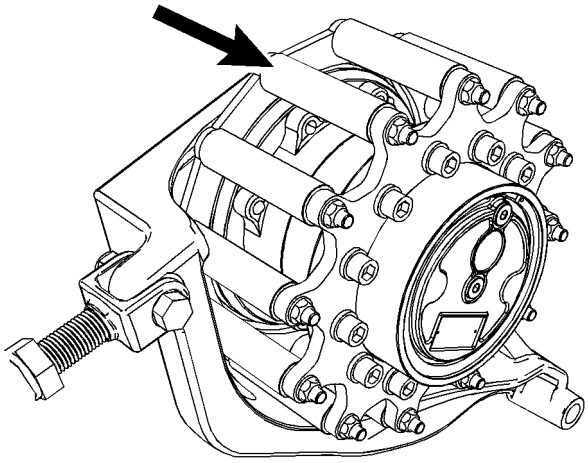


Illustration 243 g01394383

Check the 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.

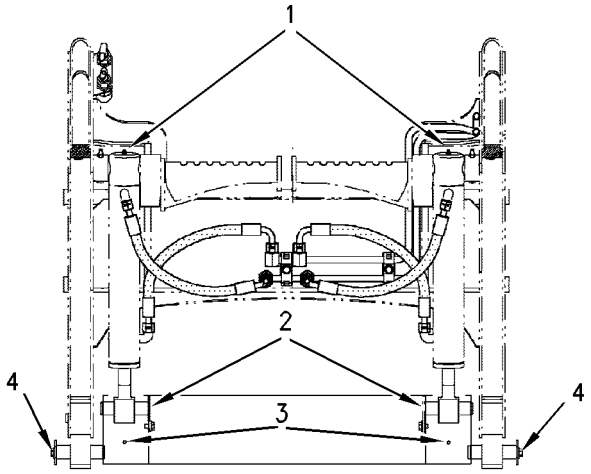


Illustration 244 g00955895

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.

i02124717

Tire Inflation - Check

SMCS Code: 4203-535-AI

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: JXM1-Up

S/N: SRS1-Up

Measure the tire pressure on each tire. Consult your Caterpillar dealer for the correct load rating and for the correct operating pressures. These correct load ratings and correct operating pressures can also be obtained from your tire dealer.

Inflate the tires, if necessary.

Tire Inflation with Air

⚠ WARNING

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire.

Proper inflation equipment, and training in using the equipment, are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

Before inflating tire, install on the machine or put tire in restraining device.

NOTICE
Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Tire Inflation with Nitrogen

Caterpillar recommends the use of dry nitrogen gas for tire inflation and for tire pressure adjustments. This includes all machines with rubber tires. Nitrogen is an inert gas that will not aid combustion inside the tire.

⚠ WARNING

Proper nitrogen inflation equipment, and training in using the equipment, are necessary to avoid over inflation. A tire blowout or rim failure can result from improper or misused equipment and personal injury or death can occur.

A tire blowout and/or rim failure can occur if the inflation equipment is not used correctly, due to the fact that a fully charged nitrogen cylinder's pressure is approximately 15000 kPa (2200 psi).

There are other benefits to using nitrogen in addition to reducing the risk of an explosion. The use of nitrogen for tire inflation lessens the slow oxidation of the rubber. Use of nitrogen also slows gradual tire deterioration. This is especially important for tires that are expected to have a long service life of at least four years. Nitrogen reduces the corrosion of rim components. Nitrogen also reduces problems that result from disassembly.

⚠ WARNING

A tire blowout or a rim failure can cause personal injury.

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire, to prevent personal injury.

NOTICE
Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Use 6V-4040 Inflation Group or an equivalent inflation group to inflate tires with a nitrogen gas cylinder.

Reference: For tire inflation instructions, refer to Special Instruction, SMHS7867, “Nitrogen Tire Inflation Group”.

For nitrogen inflation, use the same tire pressures that are used for air inflation. Consult your tire dealer for operating pressures.

i02970641

Track (Rubber) - Inspect/Adjust

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

S/N: B7H1-Up

S/N: TSL1-Up

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.

Track Adjustment

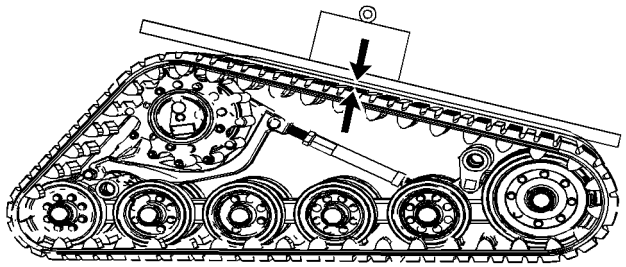


Illustration 245 g01393224

1. Place approximately 45 kg (100 lb) between the drive sprocket and the idlers. Place a straight edge 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.

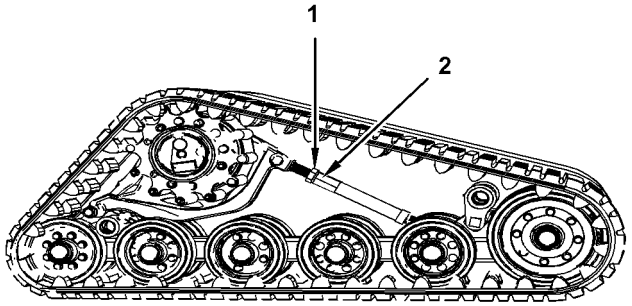


Illustration 246 g01393226

2. Loosen the jam nut (1).

3. Turn the adjuster (2) in order to raise or lower the drive sprocket.

4. Inspect the hoses. Ensure that the hoses are not kinked. If the hoses are kinked, loosen the clamp and move the hoses so that the hoses are not kinked.

Note: In order to detension the track for removal, fully lower the drive sprocket.

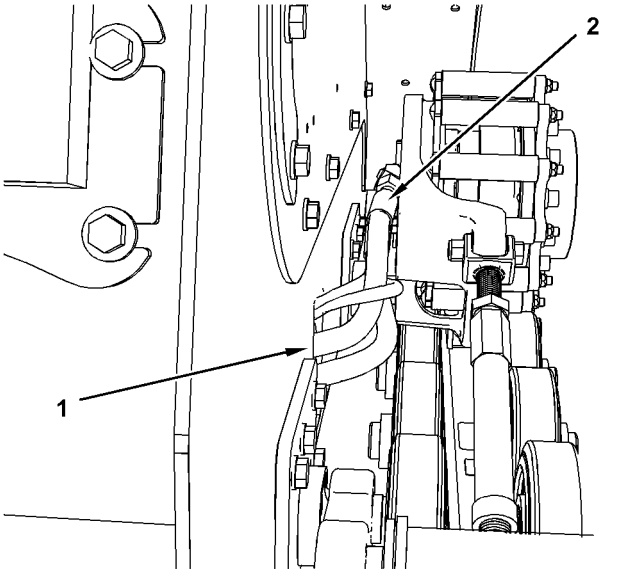


Illustration 247 g01497493

Note that the rubber track is removed for clarity.

(1) Hoses at the frame
(2) Fittings on final drive

Note: The hoses should not be under tension. The fittings at the drive motor may leak if there is tension on the hoses.

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

6. Recheck the track tension.

7. Check the hoses. Ensure that there is no tension in the hoses. Ensure that the hoses are not kinked. Tighten the hose clamps at the frame.

Note: Too much slack in the hoses may allow the hoses to contact other components. Not enough slack may strain hose connections at the drive motor.

i03880897

Track (Rubber) - Remove/Replace (MTL)

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

S/N: B7H1-Up

S/N: TSL1-Up

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”.

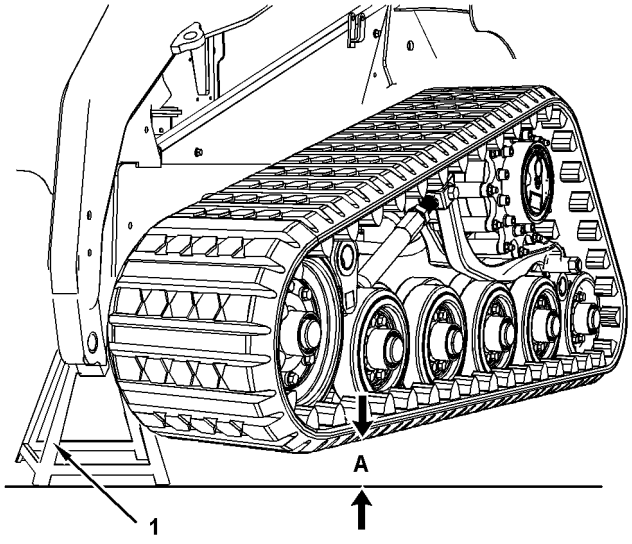


Illustration 248 g01393193

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”.

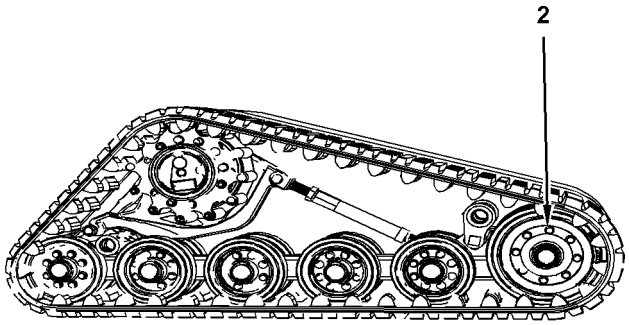


Illustration 249 g01393194

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

7. If necessary, lubricate the remaining front idler wheel and the inside of the track in order to ease the removal of the track.

8. Grasp the track on top of the front idler. 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 idler.

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 wheel.

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

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

i03880903

Track (Rubber) - Remove/Replace (CTL)

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

S/N: YYZ1-Up

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”.

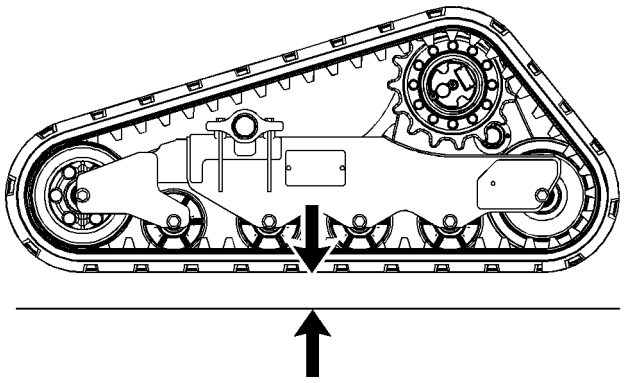


Illustration 250 g02142365

4. Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands 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 - Inspect/Adjust”.

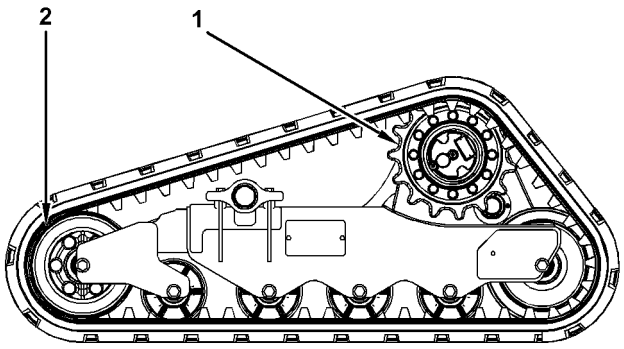


Illustration 251 g02142368

(1) Final Drive Sprocket
(2) Front idler wheel

Note: The approximate weight of the track is 247 kg (545 lb).

6. Use a suitable lifting device. Lift the track at middle position between the front idler and the final drive sprocket until the front idler collapses fully.

Note: It is helpful to support the bottom of the track in order to maximize the slack between the front idler and the drive sprocket.

7. Keep the track supported with a hoist. Lift the track over the flange of the front idler so that the inner track guides clear flanges.

8. Lift the track over the sprocket with a suitable lifting device. The inner guides need to clear the sprocket teeth.

9. Lift the track over the rear idler. The inner track guides need to clear the rear idler.

Installing the Track

Note: The approximate weight of the track is 247 kg (545 lb).

1. Use a suitable lifting device. Slide the track onto the rear idler so that the inner track guides straddle the rear idler. If your machine is equipped with an idler with dual flanges, the inner track guides must seat between the flanges.

2. Pull the track forward in order to ensure that the track guides are fully seated on the rear idler.

3. Lift the track over the final drive sprocket so that the inner track guides straddle the sprocket teeth. The sprocket teeth should seat in the openings in the middle of the track.

4. Pull all of the slack forward. This will provide the maximum amount of slack to aid with installation across the front idlers.

Note: It is helpful to support the bottom of the track in order to maximize the slack. This will help with installation.

5. Position the track so that the inner track guides seat between the flanges on the front idler.

6. Tension the track. Refer to Operation and Maintenance Manual, “Track - Inspect/Adjust” for the procedure.

i03898486

Track - Inspect/Adjust (CTL)

SMCS Code: 4170-025; 4170-040

S/N: YYZ1-Up

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 final drive sprocket, idlers, rollers, 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

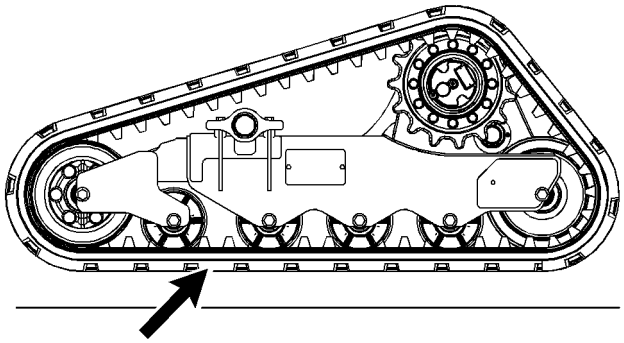


Illustration 252 g02142344

Support the machine so that the track is a minimum of 51 mm (2 inches) above the ground.

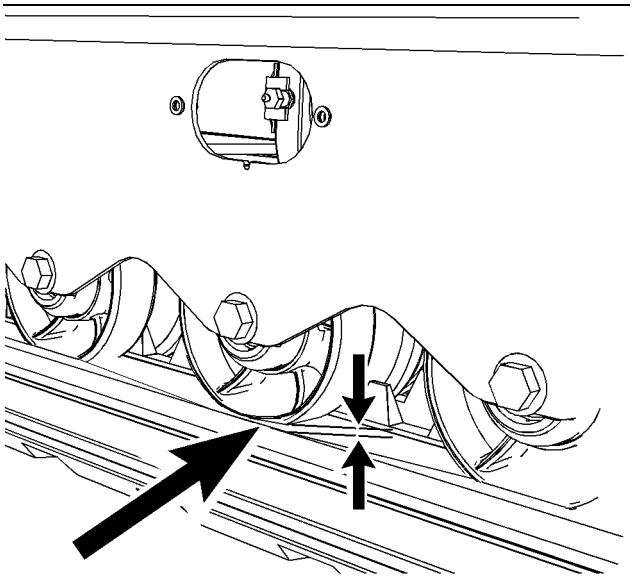


Illustration 253 g02142348

Measure the track sag at the third roller from the front. Measure the distance from the bottom surface of the flange on the roller to the inside top surface of the track. The minimum track sag should be 15 mm (0.59 inch). The maximum track sag should be 25 mm (0.98 inch).

Track Adjustment

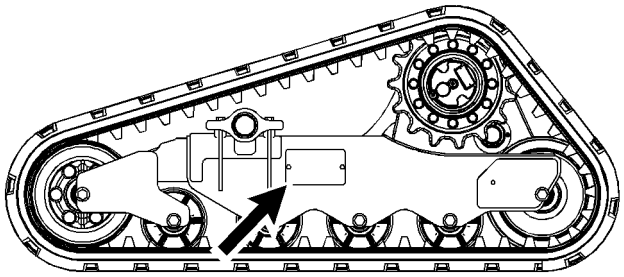


Illustration 254 g02142349

1. In order to adjust the track, remove the access panel on the side of the undercarriage.

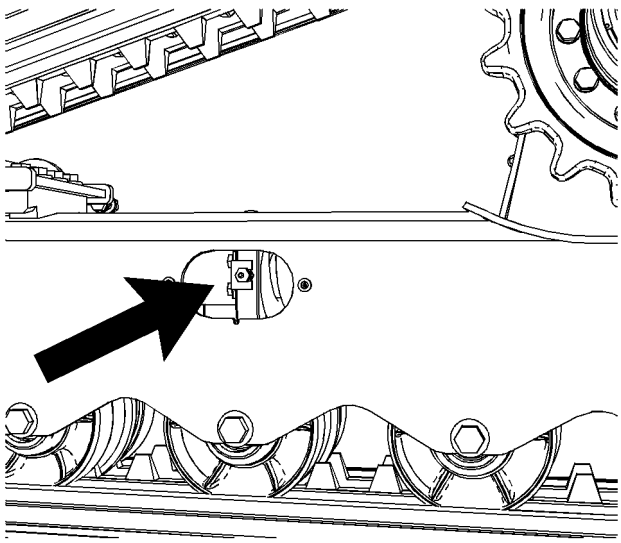


Illustration 255 g02142351

2. Pressurized grease in a cylinder is used in order to provide tension on the track. Use a grease gun in order to apply grease to the grease fitting on the cylinder. This will tighten the track.
3. Recheck the track tension.
4. Replace the access panel when the 15 mm (0.59 inch) sag is achieved.

Detension the track

⚠ 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.

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

1. In order to detension the track, remove the access panel on the side of the undercarriage.
2. Loosen the grease fitting with a suitable device. Loosen the grease fitting carefully until the track begins to loosen.

Note: Catch the grease in a suitable container. Dispose of the grease in accordance with all applicable regulations.

Note: One turn should be the maximum.

3. Tighten the grease fitting to a torque of 74 ± 14 N·m (55 ± 10 lb ft) when the desired track tension is reached.
4. Replace the access panel.

i03880910

Track Roller and Idler - Inspect/Replace

SMCS Code: 4159-040; 4159-510; 4180-040; 4180-510

S/N: YYZ1-Up

Inspect

Clean the undercarriage before inspecting the idlers and the rollers.

Inspect the idlers and the rollers for damage and wear.

The idlers and the rollers should be replaced when the damage to the wheels adversely affects machine performance.

Note: The idlers and the rollers contain oil. The idlers and the rollers are sealed for life. Periodically, inspect the idlers and the rollers for leaks or for excessive end play. Contact your Caterpillar dealer if either leaks or excessive end play is found.

i01203574

Wheel Nuts - Tighten

SMCS Code: 4210-527

S/N: MWD1-Up

S/N: A9H1-Up

S/N: TNK1-Up

S/N: JXM1-Up

S/N: SRS1-Up

Check the torque on new wheels or reinstalled wheels after every one service hour until the specified torque is maintained. After the specified torque is maintained, check the torque on the nuts after every ten service hours or every day.

Check the nuts on all four wheels. Use a star pattern when you are tightening the nuts.

The torque specifications are given in the following table.

Table 44

Tightening Torque for Wheels	
Airboss and Solid Tires	163 ± 7 N·m (120 ± 5 lb ft)
Pneumatic Tires	149 ± 7 N·m (110 ± 5 lb ft)

i03880912

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.

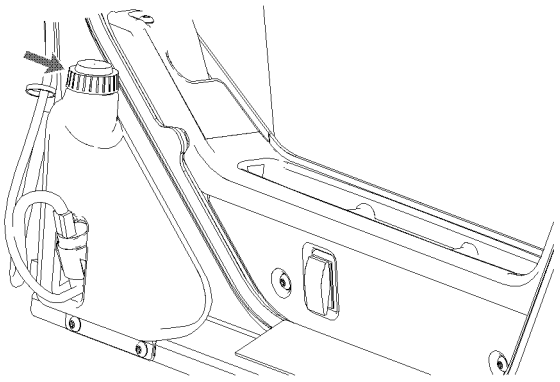


Illustration 256 g01027404

The reservoir for the window washer solvent is located inside the cab on the left side.

Fill the reservoir with window washer solvent.

Note: 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.

i03881935

Work Tool Guard and Reflector - Inspect/Replace

SMCS Code: 6700

Ensure that all safety reflectors are clean. Ensure that all safety reflectors are not damaged. When you clean the safety reflectors, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety reflectors. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety reflectors. Loose adhesive will allow the safety reflectors to fall.

Replace any safety reflector or replace any guards that are damaged, or missing. If a safety reflector is attached to a part that is replaced, install a safety reflector on the replacement part. Any Caterpillar dealer can provide new safety reflectors.

i03880915

Windows - Clean

SMCS Code: 7310-070

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.

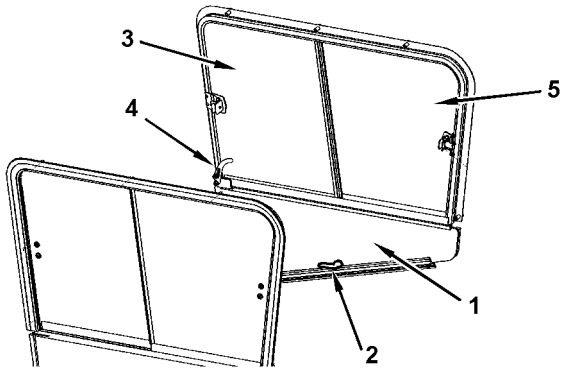


Illustration 257 g01026875

1. Release the latch (2) in order to remove the window (1). Pull downward on the window in order to remove the window. Pull outward on the window in order to remove the window.

2. Release the latch (4) in order to remove the window (3). Pivot the channel for the window downward. Pull the window outward in order to remove the window.

3. Slide the window (5) forward. Pull the window outward in order to remove the window.

Polycarbonate Front Door

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 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.

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Work Tool - Lubricate

SMCS Code: 6700-086

Multipurpose Bucket

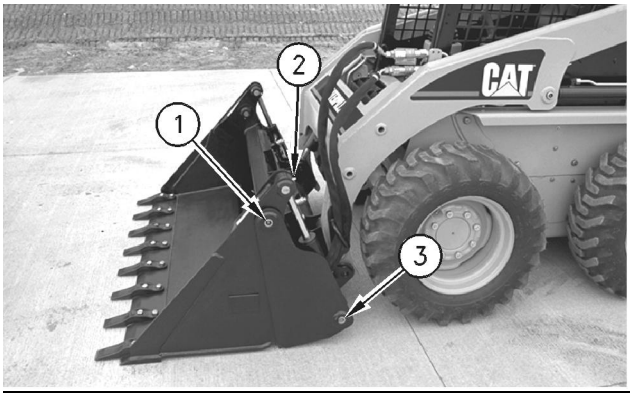

Illustration 258 g00534457

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 Tools

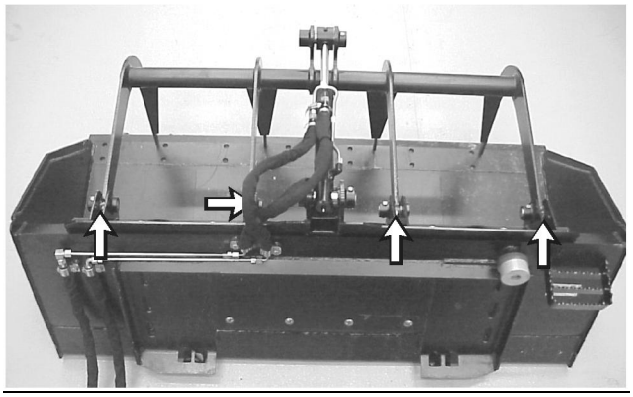

Illustration 259 g00647980

Apply lubricant to the four grease fittings for the grapples.

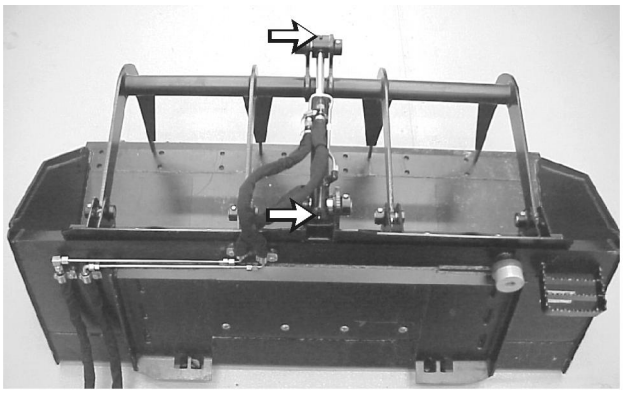

Illustration 260 g00647988

Apply lubricant to the two fittings for the grapple cylinder.

There are six grease fittings.

Industrial Grapple Tools

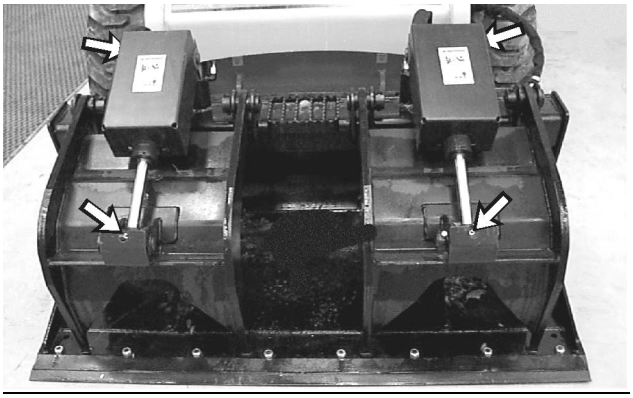

Illustration 261 g00645995

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

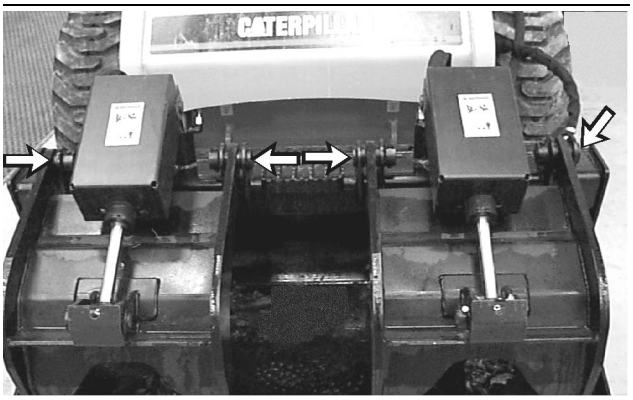

Illustration 262 g00646004

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

There are eight grease fittings.

Grapple Rake

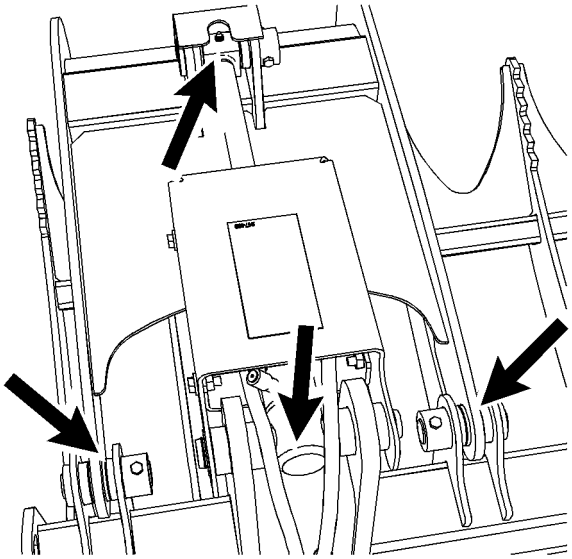

Illustration 263 g01368386

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

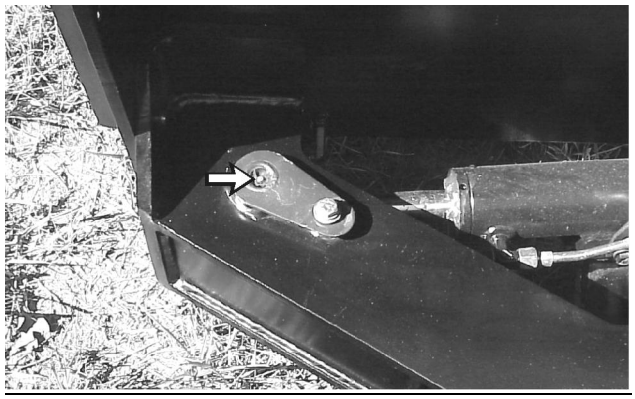

Illustration 264 g00648033

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

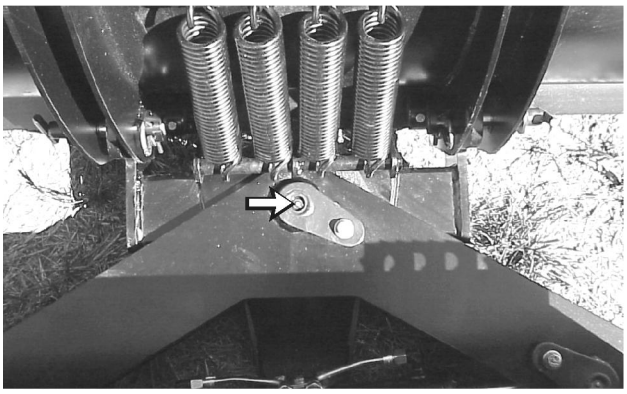

Illustration 265 g00648037

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

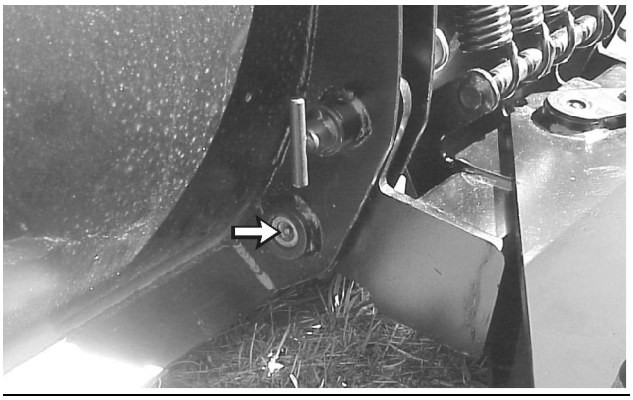

Illustration 266 g00648038

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

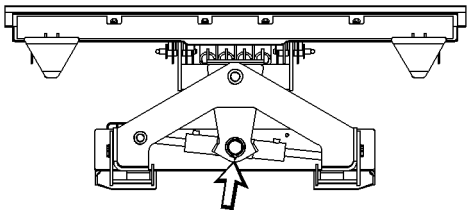

Illustration 267 g00677570

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

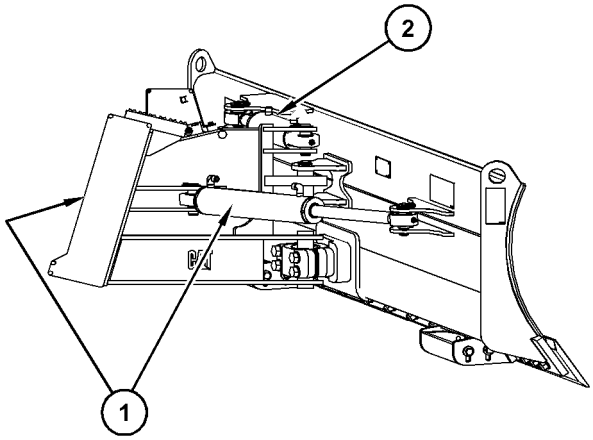

Illustration 268 g01073259

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.

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Work Tool Mounting Bracket - Inspect

SMCS Code: 6700-040-BK

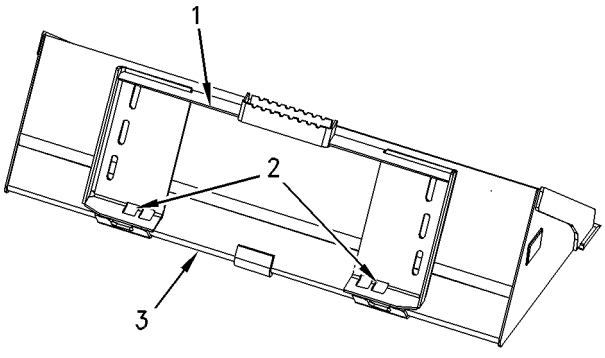

Illustration 269 g00925058

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.