KEBU7571-10 (en-us)
August 2018

Operation and Maintenance Manual

CB22B, CB24B, CB32B, CC24B Utility Compactors

419 1-UP (Machine)
2B2 1-UP (Machine)
420 1-UP (Machine)
2X4 1-UP (Machine)
421 1-UP (Machine)
HCB 1-UP (Machine)
422 1-UP (Machine)
3H2 1-UP (Machine)
466 1-UP (Machine)
LR2 1-UP (Machine)
467 1-UP (Machine)
J2T 1-UP (Machine)
468 1-UP (Machine)
C24 1-UP (Machine)
469 1-UP (Machine)
J32 1-UP (Machine)

Language: Original Instructions

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards, including human factors that can affect safety. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you verify that you are authorized to perform this work, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

A non-exhaustive list of operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the worksite. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that you are authorized to perform this work, and that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Cat dealers have the most current information available.

⚠ WARNING

When replacement parts are required for this product Caterpillar recommends using Cat replacement parts.

Failure to follow this warning may lead to premature failures, product damage, personal injury or death.

In the United States, the maintenance, replacement, or repair of the emission control devices and systems may be performed by any repair establishment or individual of the owner's choosing.

Table of Contents

Foreword

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

WARNING – This product can expose you to chemicals including ethylene glycol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to:

www.P65Warnings.ca.gov

Do not ingest this chemical. Wash hands after handling to avoid incidental ingestion.

WARNING – This product can expose you to chemicals including lead and lead compounds, which are known to the State of California to cause cancer, birth defects, or other reproductive harm. For more information go to:

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety information, operation instructions, transportation information, lubrication information, and maintenance information.

Some photographs or illustrations in this publication show details or attachments that can be different from your machine. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your machine which are not included in this publication. Read, study, and keep this manual with the machine.

Whenever a question arises regarding your machine, or this publication, please consult your Cat dealer for the latest available information.

Safety

The safety section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the machine.

Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance, and repair on this machine.

Operation

The operation section is a reference for the new operator and a refresher for the experienced operator. This section includes a discussion of gauges, switches, machine controls, attachment controls, transportation, and towing information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating, and stopping the machine.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and its capabilities.

Maintenance

The maintenance section is a guide to equipment care. The Maintenance Interval Schedule (MIS) lists the items to be maintained at a specific service interval. Items without specific intervals are listed under the "When Required" service interval. The Maintenance Interval Schedule lists the page number for the step-by-step instructions required to accomplish the scheduled maintenance. Use the Maintenance Interval Schedule as an index or "one safe source" for all maintenance procedures.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if the calendar intervals provide more convenient servicing schedules and approximate the indicated service hour meter reading. Perform the recommended service at the interval that occurs first.

Under severe, dusty, or wet operating conditions, more frequent lubrication than is specified in the maintenance intervals chart might be necessary.

Perform service on items at multiples of the original requirement. For example, at every 500 service hours or 3 months, also service those items listed under every 250 service hours or monthly and every 10 service hours or daily.

Certified Engine Maintenance

Proper maintenance and repair are essential to keep the engine and machine systems operating correctly. As the heavy-duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter, or to render inoperative, any emission-related device or element of design installed on or in an engine or machine that is in compliance with all applicable regulations of the intended country to which it has been shipped. Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system, and cooling system may be emission-related and should not be altered unless approved by Caterpillar.

Machine Capacity

Additional attachments or modifications may exceed machine design capacity which can adversely affect performance characteristics. Included would be stability and system certifications such as brakes, steering, and rollover protective structures (ROPS). Contact your Cat dealer for further information.

Product Identification Number

Effective First Quarter 2001 the Product Identification Number (PIN) has changed from 8 to 17 characters. To provide uniform equipment identification, construction equipment manufacturers are moving to comply with the latest version of the product identification numbering standard. Non-road machine PINs are defined by ISO 10261. The new PIN format will apply to all machines and generator sets. The PIN plates and frame marking will display the 17 character PIN. The new format will look like the following:

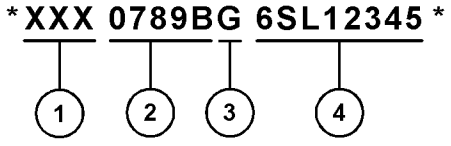

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

4. Machine Indicator Section (MIS) or Product Sequence Number (characters 10-17). These were previously referred to as the Serial Number.

Machines and generator sets produced before First Quarter 2001 will maintain their 8 character PIN format.

Components such as engines, transmissions, axles, and work tools will continue to use an 8 character Serial Number (S/N).

Safety Section

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Safety Messages

SMCS Code: 1000; 6700; 7000; 7405

There are several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Become familiarized with all safety messages.

Make sure that all of the safety messages are legible. Clean the safety messages or replace the safety messages if you cannot read the words. Replace the illustrations if the illustrations are not legible. When you clean the safety messages, use a cloth, water, and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety messages. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety message. Loose adhesive will allow the safety message to fall.

Replace any safety message that is damaged, or missing. If a safety message is attached to a part that is replaced, install a safety message on the replacement part. Any Caterpillar dealer can provide new safety messages.

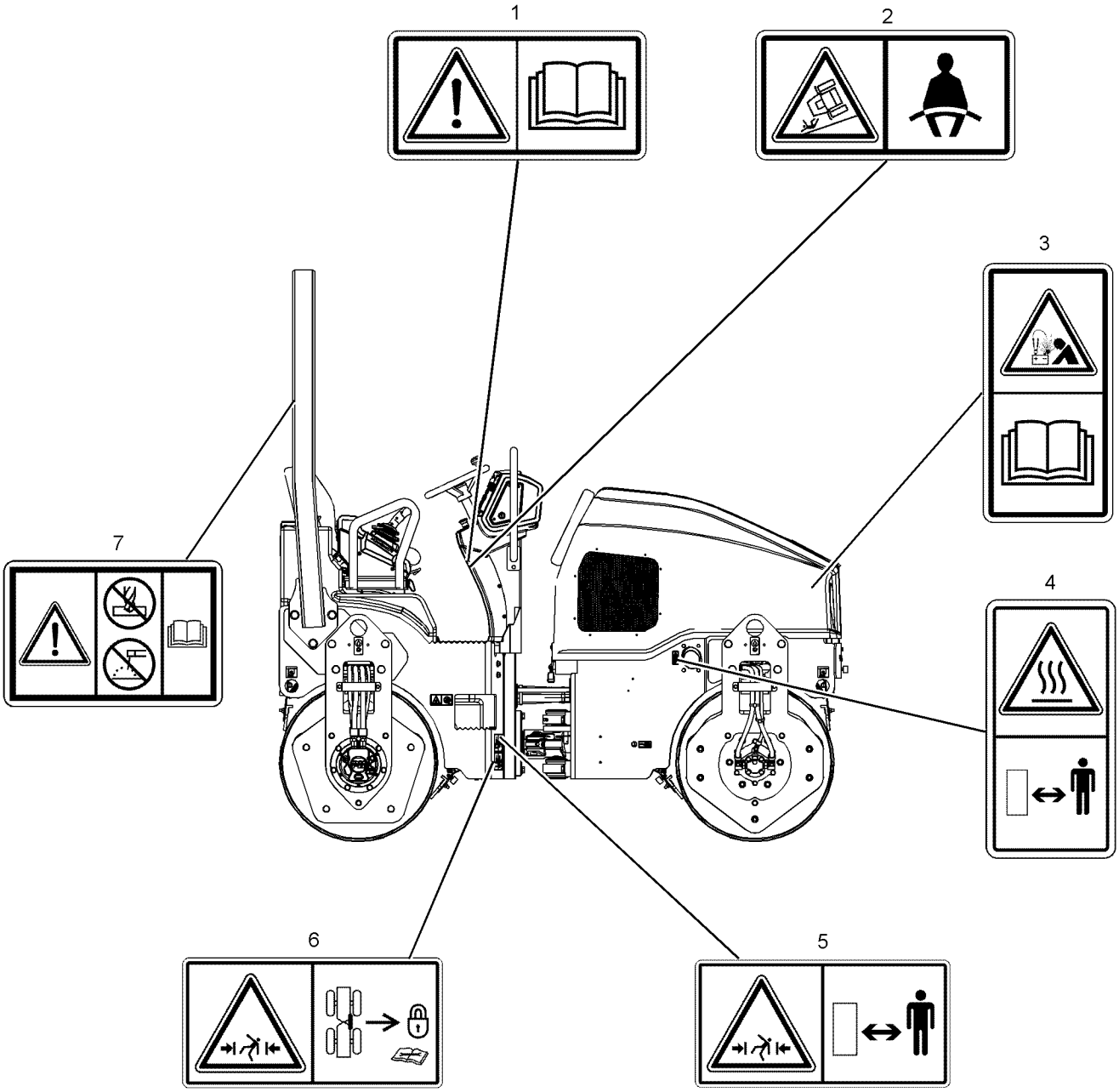

Illustration 2 g03160422

Do Not Operate (1)

This safety message is located below the steering wheel.

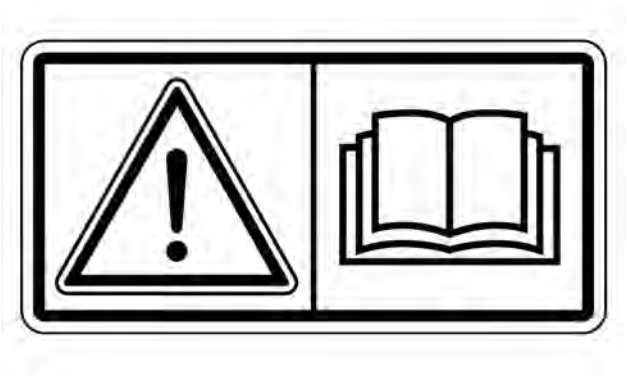

Illustration 3 g01370904

⚠ WARNING

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Cat dealer for replacement manuals. Proper care is your responsibility.

Seat Belt (2)

This safety message is located below the steering wheel.

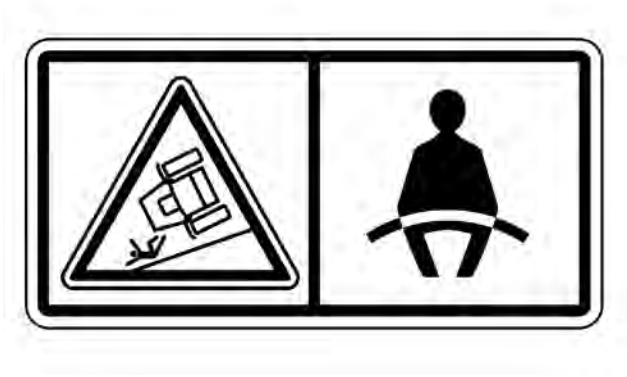

Illustration 4 g01370908

⚠ WARNING

For machines that are equipped with a ROPS, a seat belt should be worn at all times during machine operation to prevent serious injury or death in the event of an accident or machine overturn. Failure to wear a seat belt during machine operation may result in serious injury or death.

For machines that are NOT equipped with a ROPS, falling from a machine could cause serious injury or death. Seat belts should be worn when driving the machine on public roads.

Batteries (3)

This safety message is located in the engine compartment, near the battery.

Illustration 5 g01409730

⚠ WARNING

Explosion Hazard! Improper jumper cable connections can cause an explosion resulting in serious injury or death. Batteries may be located in separate compartments. Refer to the Operation and Maintenance Manual for the correct jump starting procedure.

Hot Surface (4)

This safety message is located near the exhaust outlet.

Illustration 6 g03446436

⚠ WARNING

Hot engine components can cause injury from burns. Before performing maintenance on the engine, allow the engine and the components to cool.

Crush Hazard (5)

This safety message is located on both sides of the machine near the articulation joint.

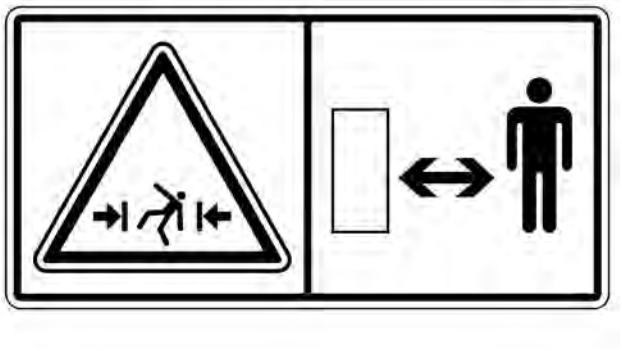

Illustration 7 g01371644

WARNING

Stay back a safe distance. No clearance for a person in this area when the machine turns. Severe injury or death from crushing could occur.

Crush Hazard (6)

This safety message is located on both sides of the machine near the articulation joint.

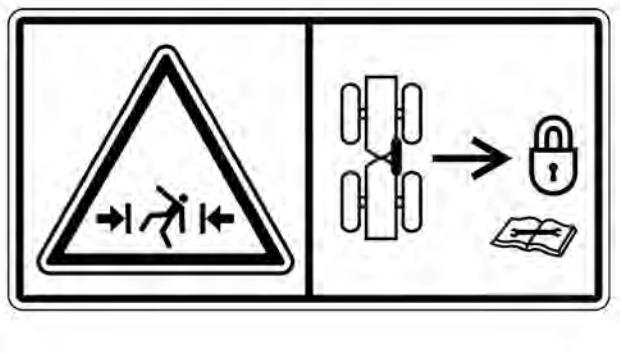

Illustration 8 g01371647

WARNING

Connect the steering frame lock between the front and the rear frames before lifting, transporting, or servicing the machine in the articulation area. Disconnect the steering frame lock and secure the steering frame lock before resuming operation. Severe injury or death could occur.

Do Not Weld or Drill (7)

This safety message is located on the post for the ROPS (Rollover Protective Structure).

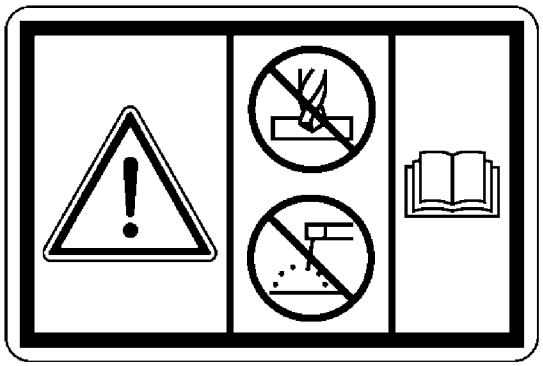

Illustration 9 g01226901

WARNING

Structural damage, an overturn, modification, alteration, or improper repair can impair this structure's protection capability thereby voiding this certification. Do not weld on or drill holes in the structure. Consult a Caterpillar dealer to determine this structure's limitations without voiding its certification.

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General Hazard Information

SMCS Code: 7000

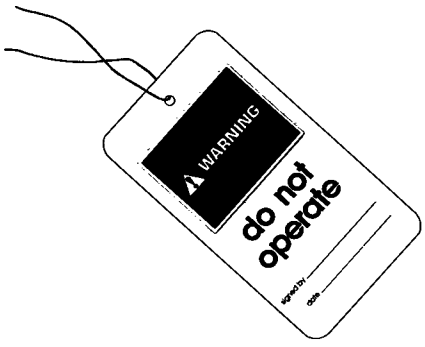

Illustration 10 g00104545

Typical example

Attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls. Attach the warning tag before you service the equipment or before you repair the equipment. Warning tag SEHS7332 is available from your Cat dealer.

⚠ WARNING

Operating the machine while distracted can result in the loss of machine control. Use extreme caution when using any device while operating the machine. Operating the machine while distracted can result in personal injury or death.

Know the width of your equipment in order to maintain proper clearance when you operate the equipment near fences or near boundary obstacles.

Be aware of high voltage power lines and power cables that are buried. If the machine comes in contact with these hazards, serious injury or death may occur from electrocution.

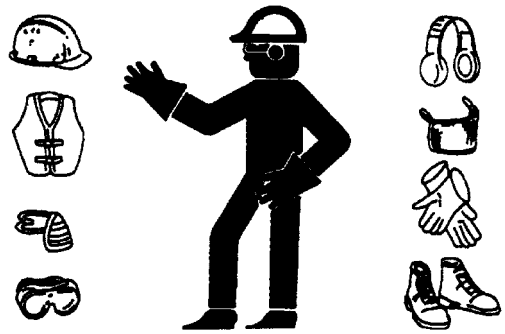

Illustration 11 g00702020

Wear a hard hat, protective glasses, and other protective equipment, as required.

Do not wear loose clothing or jewelry that can snag on controls or on other parts of the equipment.

Make sure that all protective guards and all covers are secured in place on the equipment.

Keep the equipment free from foreign material. Remove debris, oil, tools, and other items from the deck, from walkways, and from steps.

Secure all loose items such as lunch boxes, tools, and other items that are not a part of the equipment.

Know the appropriate work site hand signals and the personnel that are authorized to give the hand signals. Accept hand signals from one person only.

Do not smoke when you service an air conditioner. Also, do not smoke if refrigerant gas may be present. Inhaling the fumes that are released from a flame that contacts air conditioner refrigerant can cause bodily harm or death. Inhaling gas from air conditioner refrigerant through a lighted cigarette can cause bodily harm or death.

Never put maintenance fluids into glass containers. Drain all liquids into a suitable container.

Obey all local regulations for the disposal of liquids.

Use all cleaning solutions with care. Report all necessary repairs.

Do not allow unauthorized personnel on the equipment.

Unless you are instructed otherwise, perform maintenance with the equipment in the servicing position. Refer to Operation and Maintenance Manual for the procedure for placing the equipment in the servicing position.

When you perform maintenance above ground level, use appropriate devices such as ladders or man lift machines. If equipped, use the machine anchorage points and use approved fall arrest harnesses and lanyards.

Pressurized Air and Water

Pressurized air and/or water can cause debris and/or hot water to be blown out. The debris and/or hot water could result in personal injury.

When pressurized air and/or pressurized water is used for cleaning, wear protective clothing, protective shoes, and eye protection. Eye protection includes goggles or a protective face shield.

The maximum air pressure for cleaning purposes must be reduced to 205 kPa (30 psi) when the nozzle is deadheaded and the nozzle is used with an effective chip deflector and personal protective equipment. The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi).

Avoid direct spraying of water on electrical connectors, connections, and components. When using air for cleaning, allow the machine to cool to reduce the possibility of fine debris igniting when re-deposited on hot surfaces.

Trapped Pressure

Pressure can be trapped in a hydraulic system. Releasing trapped pressure can cause sudden machine movement or attachment movement. Use caution if you disconnect hydraulic lines or fittings. High-pressure oil that is released can cause a hose to whip. High-pressure oil that is released can cause oil to spray. Fluid penetration can cause serious injury and possible death.

Fluid Penetration

Pressure can be trapped in the hydraulic circuit long after the machine has been stopped. The pressure can cause hydraulic fluid or items such as pipe plugs to escape rapidly if the pressure is not relieved correctly.

Do not remove any hydraulic components or parts until pressure has been relieved or personal injury may occur. Do not disassemble any hydraulic components or parts until pressure has been relieved or personal injury may occur. Refer to the Service Manual for any procedures that are required to relieve the hydraulic pressure.

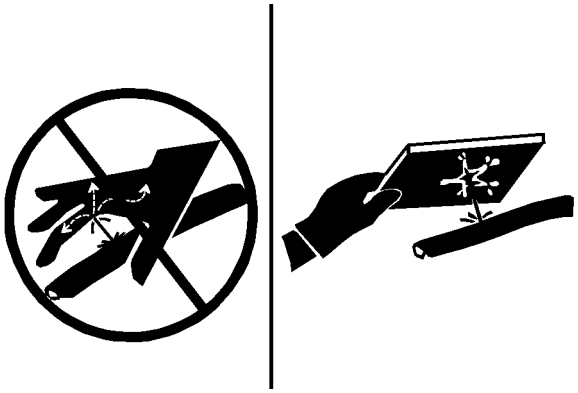

Illustration 12 g00687600

Always use a board or cardboard when you check for a leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Containing Fluid Spillage

Care must be taken in order to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the equipment. Prepare to collect the fluid with suitable containers before opening any compartment or disassembling any component that contains fluids.

Refer to Special Publication, NENG2500, “Cat dealer Service Tool Catalog” for the following items:

- Tools that are suitable for collecting fluids and equipment that is suitable for collecting fluids
- Tools that are suitable for containing fluids and equipment that is suitable for containing fluids

Obey all local regulations for the disposal of liquids.

Inhalation

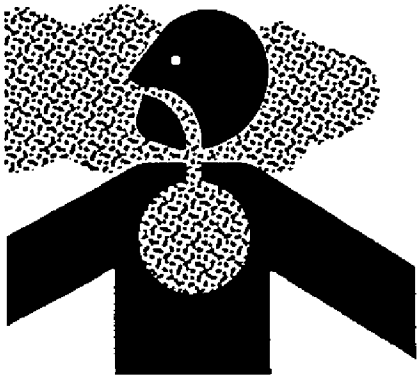

Illustration 13 g02159053

Exhaust

Use caution. Exhaust fumes can be hazardous to your health. If you operate the machine in an enclosed area, adequate ventilation is necessary.

Asbestos Information

Cat equipment and replacement parts that are shipped from Caterpillar are asbestos free. Caterpillar recommends the use of only genuine Cat replacement parts. Use the following guidelines when you handle any replacement parts that contain asbestos or when you handle asbestos debris.

Use caution. Avoid inhaling dust that might be generated when you handle components that contain asbestos fibers. Inhaling this dust can be hazardous to your health. The components that may contain asbestos fibers are brake pads, brake bands, lining material, clutch plates, and some gaskets. The asbestos that is used in these components is bound in a resin or sealed in some way. Normal handling is not hazardous unless airborne dust that contains asbestos is generated.

If dust that may contain asbestos is present, there are several guidelines that should be followed:

- Never use compressed air for cleaning.
- Avoid brushing materials that contain asbestos.
- Avoid grinding materials that contain asbestos.
- Use a wet method in order to clean up asbestos materials.
- A vacuum cleaner that is equipped with a high efficiency particulate air filter (HEPA) can also be used.

- Use exhaust ventilation on permanent machining jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place. In the United States, use Occupational Safety and Health Administration (OSHA) requirements. These OSHA requirements can be found in “29 CFR 1910.1001”. In Japan, use the requirements found in the “Ordinance on Prevention of Health Impairment due to Asbestos” in addition to the requirements of the Industrial Safety and Health Act.
- Obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

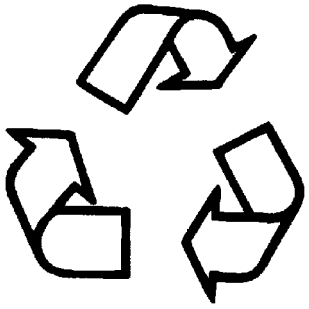

Illustration 14 g00706404

Improperly disposing of waste can threaten the environment. Potentially harmful fluids should be disposed of according to local regulations.

Always use leakproof containers when you drain fluids. Do not pour waste onto the ground, down a drain, or into any source of water.

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Crushing Prevention and Cutting Prevention

SMCS Code: 7000

Support the equipment properly before you perform any work or maintenance beneath that equipment. Do not depend on the hydraulic cylinders to hold up the equipment. Equipment can fall if a control is moved, or if a hydraulic line breaks.

Do not work beneath the cab of the machine unless the cab is properly supported.

Unless you are instructed otherwise, never attempt adjustments while the machine is moving or while the engine is running.

Never jump across the starter solenoid terminals in order to start the engine. Unexpected machine movement could result.

Whenever there are equipment control linkages the clearance in the linkage area will change with the movement of the equipment or the machine. Stay clear of areas that may have a sudden change in clearance with machine movement or equipment movement.

Stay clear of all rotating and moving parts.

If it is necessary to remove guards in order to perform maintenance, always install the guards after the maintenance is performed.

Keep objects away from moving fan blades. The fan blade will throw objects or cut objects.

Do not use a kinked wire cable or a frayed wire cable. Wear gloves when you handle wire cable.

When you strike a retainer pin with force, the retainer pin can fly out. The loose retainer pin can injure personnel. Make sure that the area is clear of people when you strike a retainer pin. To avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

Chips or other debris can fly off an object when you strike the object. Make sure that no one can be injured by flying debris before striking any object.

i04760300

Burn Prevention

SMCS Code: 7000

Do not touch any part of an operating engine. Allow the engine to cool before any maintenance is performed on the engine. Relieve all pressure in the air system, in the oil system, in the lubrication system, in the fuel system, or in the cooling system before any lines, fittings, or related items are disconnected.

Coolant

When the engine is at operating temperature, the engine coolant is hot. The coolant is also under pressure. The radiator and all lines to the heaters or to the engine contain hot coolant.

Any contact with hot coolant or with steam can cause severe burns. Allow cooling system components to cool before the cooling system is drained.

Check the coolant level only after the engine has been stopped.

Ensure that the filler cap is cool before removing the filler cap. The filler cap must be cool enough to touch with a bare hand. Remove the filler cap slowly in order to relieve pressure.

Cooling system conditioner contains alkali. Alkali can cause personal injury. Do not allow alkali to contact the skin, the eyes, or the mouth.

Oils

Hot oil and hot components can cause personal injury. Do not allow hot oil to contact the skin. Also, do not allow hot components to contact the skin.

Remove the hydraulic tank filler cap only after the engine has been stopped. The filler cap must be cool enough to touch with a bare hand. Follow the standard procedure in this manual in order to remove the hydraulic tank filler cap.

Batteries

The liquid in a battery is an electrolyte. Electrolyte is an acid that can cause personal injury. Do not allow electrolyte to contact the skin or the eyes.

Do not smoke while checking the battery electrolyte levels. Batteries give off flammable fumes which can explode.

Always wear protective glasses when you work with batteries. Wash hands after touching batteries. The use of gloves is recommended.

i06180998

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 15 g00704000

General

All fuels, most lubricants, and some coolant mixtures are flammable.

To minimize the risk of fire or explosion, Caterpillar recommends the following actions.

Always perform a Walk-Around Inspection, which may help you identify a fire hazard. Do not operate a machine when a fire hazard exists. Contact your Cat dealer for service.

Understand the use of the primary exit and alternative exit on the machine. Refer to Operation and Maintenance Manual, “Alternative Exit”.

Do not operate a machine with a fluid leak. Repair leaks and clean up fluids before resuming machine operation. Fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire. A fire may cause personal injury or death.

Remove flammable material such as leaves, twigs, papers, trash, and so on. These items may accumulate in the engine compartment or around other hot areas and hot parts on the machine.

Keep the access doors to major machine compartments closed and access doors in working condition in order to permit the use of fire suppression equipment, in case a fire should occur.

Clean all accumulations of flammable materials such as fuel, oil, and debris from the machine.

Do not operate the machine near any flame.

Keep shields in place. Exhaust shields (if equipped) protect hot exhaust components from oil spray or fuel spray in case of a break in a line, in a hose, or in a seal. Exhaust shields must be installed correctly.

Do not weld or flame cut on tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with a nonflammable solvent prior to welding or flame cutting. Ensure that the components are properly grounded in order to avoid unwanted arcs.

Dust that is generated from repairing nonmetallic hoods or fenders may be flammable and/or explosive. Repair such components in a well ventilated area away from open flames or sparks. Use suitable Personal Protection Equipment (PPE).

Inspect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and the hoses should have adequate support and secure clamps. Tighten all connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

Store fuels and lubricants in properly marked containers away from unauthorized personnel. Store oily rags and flammable materials in protective containers. Do not smoke in areas that are used for storing flammable materials.

Illustration 16 g03839130

Use caution when you are fueling a machine. Do not smoke while you are fueling a machine. Do not fuel a machine near open flames or sparks. Do not use cell phones or other electronic devices while you are refueling. Always stop the engine before fueling. Fill the fuel tank outdoors. Properly clean areas of spillage.

Avoid static electricity risk when fueling. Ultra low sulfur diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations with a higher sulfur content. Avoid death or serious injury from fire or explosion. Consult with your fuel or fuel system supplier to ensure that the delivery system is in compliance with fueling standards for proper grounding and bonding practices.

Never store flammable fluids in the operator compartment of the machine.

Battery and Battery Cables

Illustration 17 g03839133

Caterpillar recommends the following in order to minimize the risk of fire or an explosion related to the battery.

Do not operate a machine if battery cables or related parts show signs of wear or damage. Contact your Cat dealer for service.

Follow safe procedures for engine starting with jump-start cables. Improper jumper cable connections can cause an explosion that may result in injury. Refer to Operation and Maintenance Manual, “Engine Starting with Jump Start Cables” for specific instructions.

Do not charge a frozen battery. This may cause an explosion.

Gases from a battery can explode. Keep any open flames or sparks away from the top of a battery. Do not smoke in battery charging areas. Do not use cell phones or other electronic devices in battery charging areas.

Never check the battery charge by placing a metal object across the terminal posts. Use a voltmeter in order to check the battery charge.

Daily inspect battery cables that are in areas that are visible. Inspect cables, clips, straps, and other restraints for damage. Replace any damaged parts. Check for signs of the following, which can occur over time due to use and environmental factors:

- Fraying
- Abrasion
- Cracking
- Discoloration
- Cuts on the insulation of the cable
- Fouling
- Corroded terminals, damaged terminals, and loose terminals

Replace damaged battery cable(s) and replace any related parts. Eliminate any fouling, which may have caused insulation failure or related component damage or wear. Ensure that all components are reinstalled correctly.

An exposed wire on the battery cable may cause a short to ground if the exposed area comes into contact with a grounded surface. A battery cable short produces heat from the battery current, which may be a fire hazard.

An exposed wire on the ground cable between the battery and the disconnect switch may cause the disconnect switch to be bypassed if the exposed area comes into contact with a grounded surface. This may result in an unsafe condition for servicing the machine. Repair components or replace components before servicing the machine.

⚠ WARNING

Fire on a machine can result in personal injury or death. Exposed battery cables that come into contact with a grounded connection can result in fires. Replace cables and related parts that show signs of wear or damage. Contact your Cat dealer.

Wiring

Check electrical wires daily. If any of the following conditions exist, replace parts before you operate the machine.

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

Make sure that all clamps, guards, clips, and straps are reinstalled correctly. This will help to prevent vibration, rubbing against other parts, and excessive heat during machine operation.

Attaching electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided.

Consult your Cat dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install any lines that are bent or damaged. Use the appropriate backup wrenches in order to tighten all connections to the recommended torque.

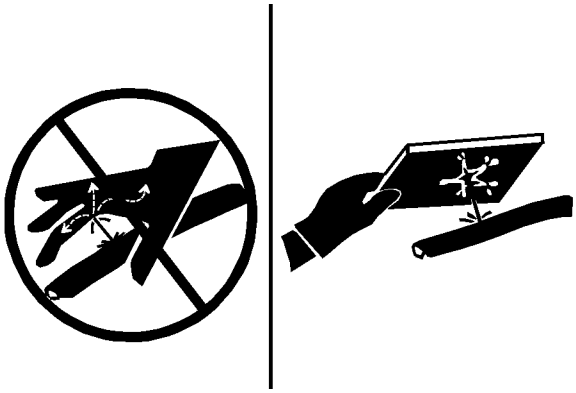

Illustration 18 g00687600

Check lines, tubes, and hoses carefully. Wear Personal Protection Equipment (PPE) in order to check for leaks. Always use a board or cardboard when you check for a leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Replace the affected parts if any of the following conditions are present:

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Wires are exposed.
- Outer coverings are swelling or ballooning.
- Flexible parts of the hoses are kinked.

- Outer covers have exposed embedded armoring.
- End fittings are displaced.

Make sure that all clamps, guards, and heat shields are installed correctly. During machine operation, this will help to prevent vibration, rubbing against other parts, excessive heat, and failure of lines, tubes, and hoses.

Do not operate a machine when a fire hazard exists. Repair any lines that are corroded, loose, or damaged. Leaks may provide fuel for fires. Consult your Cat dealer for repair or for replacement parts. Use genuine Cat parts or the equivalent, for capabilities of both the pressure limit and temperature limit.

Ether

Ether (if equipped) is commonly used in cold-weather applications. Ether is flammable and poisonous.

Only use approved Ether canisters for the Ether dispensing system fitted to your machine, do not spray Ether manually into an engine, follow the correct cold engine starting procedures. Refer to the section in the Operation and Maintenance Manual with the label “Engine Starting” .

Use ether in ventilated areas. Do not smoke while you are replacing an ether cylinder.

Do not store ether cylinders in living areas or in the operator compartment of a machine. Do not store ether cylinders in direct sunlight or in temperatures above 49° C (120.2° F). Keep ether cylinders away from open flames or sparks.

Dispose of used ether cylinders properly. Do not puncture an ether cylinder. Keep ether cylinders away from unauthorized personnel.

Fire Extinguisher

As an additional safety measure, keep a fire extinguisher on the machine.

Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Follow the recommendations on the instruction plate.

Consider installation of an aftermarket Fire Suppression System, if the application and working conditions warrant the installation.

i07041871

Fire Safety

SMCS Code: 7000

Note: Locate secondary exits and how to use the secondary exits before you operate the machine.

Note: Locate fire extinguishers and how to use a fire extinguisher before you operate the machine.

If you find that you are involved in a machine fire, your safety and that of others on site are the top priority. The following actions should only be performed if the actions do not present a danger or risk to you and any nearby people. Assess the risk of personal injury and move away to a safe distance as soon as you feel unsafe.

Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch, and timber.

Lower any implements and turn off the engine as soon as possible. If you leave the engine running, the engine will continue to feed a fire. The fire will be fed from any damaged hoses that are attached to the engine or pumps.

If possible, turn the battery disconnect switch to the OFF position. Disconnecting the battery will remove the ignition source in the event of an electrical short. Disconnecting the battery will eliminate a second ignition source if electrical wiring is damaged by the fire, resulting in a short circuit.

Notify emergency personnel of the fire and your location.

If your machine is equipped with a fire suppression system, follow the manufacturers procedure for activating the system.

Note: Fire suppression systems need to be regularly inspected by qualified personnel. You must be trained to operate the fire suppression system.

If you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire.

If the fire grows out of control, be aware of the following risks:

- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.
- Remember that nearly all the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

i04978211

Fire Extinguisher Location

SMCS Code: 7000; 7419

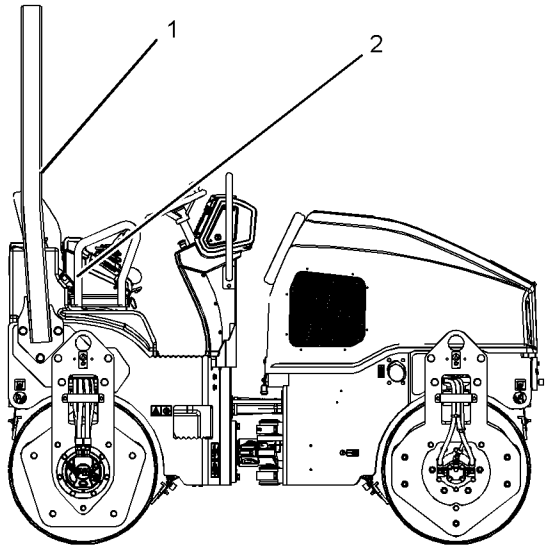

Illustration 19 g03160676

If your machine is equipped with a ROPS, mount the fire extinguisher on ROPS (1). If your machine is not equipped with a ROPS, install the fire extinguisher on rail (2) closest to the water tank.

Do not weld the ROPS in order to install the fire extinguisher. Also, do not drill holes in the ROPS in order to mount the fire extinguisher on the ROPS.

If the fire extinguisher is mounted on the ROPS, strap the mounting plate to a leg of the ROPS. If the weight of the fire extinguisher is more than 4.5 kg (10 lb), mount the fire extinguisher as low as possible on one leg. Do not mount the fire extinguisher on the upper one-third area of the leg.

i06164462

Tire Information

SMCS Code: 7000

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

Explosions of air inflated tires have resulted from heat-induced gas combustion inside the tires. Explosions can be caused by heat that is generated by welding, by heating rim components, by external fire, or by excessive use of brakes.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, the rim components, and the axle components from the machine. Stay out of the trajectory path. Both the force of the explosion and the flying debris can cause property damage, personal injury, or death.

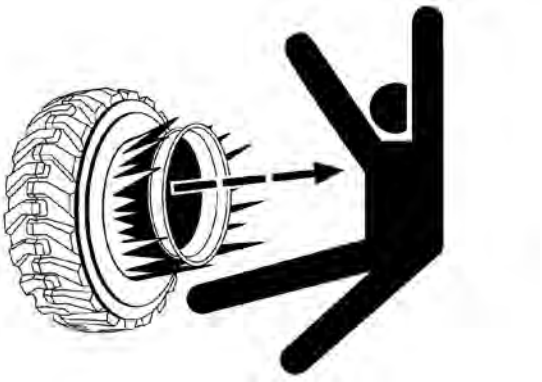

Illustration 20 g02166933

Typical example of tire is shown

Do not approach a hot or an apparently damaged tire.

Caterpillar recommends against using water or calcium as a ballast for the tires except in machines designed for this additional mass. For those applicable machines, the maintenance section will contain instructions on the correct tire inflation and filling procedures. Ballast, such as fluid in the tires, increases overall machine weight and may affect braking, steering, power train components, or the certification of the protective structure such as the ROPS. The use of tire/rim rust preventatives or other liquid additives is not required.

⚠ 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).

Dry nitrogen gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion because nitrogen does not aid combustion. Nitrogen helps to prevent oxidation of the rubber, deterioration of rubber, and corrosion of rim components.

To avoid overinflation, proper nitrogen inflation equipment and training in the usage of the equipment are necessary. A tire blowout or a rim failure can result from improper equipment or from misused equipment.

When you inflate a tire, stand behind the tread and use a self-attaching chuck.

Servicing tires and rims can be dangerous. Only trained personnel that use proper tools and proper procedures should perform this maintenance. If correct procedures are not used for servicing tires and rims, the assemblies could burst with explosive force. This explosive force can cause serious personal injury or death. Carefully obey the specific instructions from your tire dealer.

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

When lightning is striking in the vicinity of the machine, the operator should never attempt the following procedures:

- Mount the machine.
- Dismount the machine.

If you are in the operator's station during an electrical storm, stay in the operator's station. If you are on the ground during an electrical storm, stay away from the vicinity of the machine.

i00820587

Before Starting Engine

SMCS Code: 1000; 7000

Make sure that the steering frame lock link is stored in the UNLOCKED position. The steering frame lock link must be removed in order to steer the machine. Start the engine only from the operator compartment. Never short across the starter terminals or across the batteries. Shorting could damage the electrical system by bypassing the engine neutral start system.

Inspect the condition of the seat belt and of the mounting hardware. Replace any parts that are worn or damaged. Regardless of appearance, replace the seat belt after three years of use. Do not use a seat belt extension on a retractable seat belt.

Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Make sure that all machine lights are working properly. Before you start the engine and before you move the machine, make sure that no one is underneath the machine, around the machine, or on the machine. Make sure that the area is free of personnel.

i02676850

Engine Starting

SMCS Code: 1000; 7000

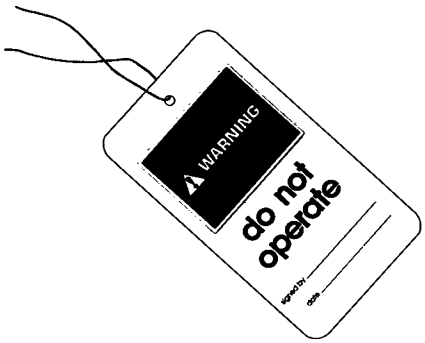

Illustration 21 g00104545

Do not start the engine or move any controls if there is a “Do Not Operate” or similar warning tag attached to the start switch or controls.

Before you start the engine, check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine. Briefly sound the forward horn before you start the engine.

Move the parking brake switch to the “ON” position.

Start the engine and operate the engine in a well ventilated area. In an enclosed area, vent the exhaust to the outside.

i01361940

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

Clear all obstacles that are in the path of the machine. Beware of hazards such as wires, ditches, etc.

Make sure that the machine horn, the backup alarm (if equipped) and all other warning devices are working properly.

Fasten the seat belt securely.

i04862936

Visibility Information

SMCS Code: 7000

Before you start the machine, perform a walk-around inspection in order to ensure that there are no hazards around the machine.

While the machine is in operation, constantly survey the area around the machine in order to identify potential hazards as hazards become visible around the machine.

Your machine may be equipped with visual aids. Some examples of visual aids are Closed Circuit Television (CCTV) and mirrors. Before operating the machine, ensure that the visual aids are in proper working condition and that the visual aids are clean. Adjust the visual aids using the procedures that are located in this Operation and Maintenance Manual. If equipped, the Work Area Vision System shall be adjusted according to Operation and Maintenance Manual, SEBU8157, “Work Area Vision System”. If equipped, the Cat Detect Object Detection shall be adjusted according to the Operation and Maintenance Manual, “Cat Detect Object Detection” for your machine.

It may not be possible to provide direct visibility on large machines to all areas around the machine. Appropriate job site organization is required in order to minimize hazards that are caused by restricted visibility. Job site organization is a collection of rules and procedures that coordinates machines and people that work together in the same area. Examples of job site organization include the following:

- Safety instructions
- Controlled patterns of machine movement and vehicle movement
- Workers that direct safe movement of traffic
- Restricted areas
- Operator training
- Warning symbols or warning signs on machines or on vehicles
- A system of communication
- Communication between workers and operators prior to approaching the machine

Modifications of the machine configuration by the user that result in a restriction of visibility shall be evaluated.

i07444897

Operation

SMCS Code: 7000

Machine Operating Temperature Range. The machine must function satisfactorily in the anticipated ambient temperature limits that are encountered during operation. The minimum limits of items that will affect the safe operation of the machine to be considered are 0-100% relative humidity for −24 °C (−11 °F) to 50 °C (122 °F) temperatures.

Limiting Conditions and Criteria. Limiting conditions are immediate issues with this machine that must be addressed prior to continuing operation.

The Safety Section of the Operation and Maintenance Manual describes limiting condition criteria for replacing items such as safety messages, seat belt and mounting hardware, lines, tubes, hoses, battery cables and related parts, electrical wires, and repairing any fluid leak.

The Maintenance Interval Schedule in the Operation and Maintenance Manual describes limiting condition criteria that require repair or replacement for items (if equipped) such as alarms, horns, braking system, steering system, and rollover protective structures.

The Monitoring System (if equipped) described in the Operation Section of the Operation and Maintenance Manual provides information on limiting condition criteria, including a warning level that requires immediate shutdown of the machine.

Machine Operation. For machines that are equipped with a ROPS, a seat belt should be worn at all times during machine operation to prevent serious injury or death in the event of an accident or machine overturn. Failure to wear a seat belt during machine operation may result in serious injury or death.

For machines that are NOT equipped with a ROPS, falling from a machine could cause serious injury or death. Seat belts should be worn when driving the machine on public roads.

Only operate the machine while you are in a seat. Only operate the controls while the engine is running.

While you operate the machine slowly in an open area, check for proper operation of all controls and all protective devices.

Make sure that no personnel will be endangered before you move the machine.

Do not allow riders on the machine unless the machine has the following equipment:

- additional seat
- additional seat belt

Never use the work tool as a work platform.

Note any needed repairs during machine operation. Report any needed repairs.

Carry attachments approximately 40 cm (15 inches) above ground level. Do not go close to the edge of a cliff, an excavation, or an overhang.

If the machine begins to sideslip downward on a grade, immediately remove the load and turn the machine downhill.

Avoid any conditions that can lead to tipping the machine. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip when you cross ditches, ridges, or other unexpected obstructions.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes.

Maintain control of the machine. Do not overload the machine beyond the machine capacity.

Never straddle a wire cable. Never allow other personnel to straddle a wire cable.

Know the maximum dimensions of your machine.

i06299648

Engine Stopping

SMCS Code: 1000; 7000

Do not stop the engine immediately after the machine has been operated under load. Stopping the engine immediately can cause overheating and accelerated wear of engine components.

After the machine is parked and the parking brake is engaged, allow the engine to run at low idle for 5 minutes before shutdown. Running the engine allows hot areas of the engine to cool gradually.

i04725627

Parking

SMCS Code: 7000

Park on a level surface. If you must park on a grade, chock the wheels.

Move the propel control lever to the NEUTRAL position.

Lower all attachments to the ground.

Engage the parking brake.

Stop the engine.

Turn the engine start switch to the OFF position and remove the engine start switch key.

Always turn the battery disconnect switch to the OFF position before leaving the machine.

If the machine will not be operated for a week or more, remove the battery disconnect switch key.

i03647047

Slope Operation

SMCS Code: 7000

Machines that are operating safely in various applications depend on these criteria: the machine model, configuration, machine maintenance, operating speed of the machine, conditions of the terrain, fluid levels and tire inflation pressures. The most important criteria are the skill and judgment of the operator.

A well trained operator that follows the instructions in the Operation and Maintenance Manual has the greatest impact on stability. Operator training provides a person with the following abilities: observation of working and environmental conditions, feel for the machine, identification of potential hazards and operating the machine safely by making appropriate decisions.

When you work on side hills and when you work on slopes, consider the following important points:

Speed of travel – At higher speeds, forces of inertia tend to make the machine less stable.

Roughness of terrain or surface – The machine may be less stable with uneven terrain.

Direction of travel – Avoid operating the machine across the slope. When possible, operate the machine up the slopes and operate the machine down the slopes. In order to achieve the best compaction performance and steering control on a slope, operate a vibratory soil compactor with the drum end of the machine downhill.

Compacting with drum beyond edge of surface – Machines with solid drums can tip suddenly as the center of balance of the machine moves beyond the edge of the compacted surface. Slow down and pay close attention when operating with the drum extended beyond the edge of the compacted surface. Minimize the amount of the drum that extends beyond the edge.

Over compacting – When the material is fully compacted, and the vibratory system is activated, the drum may bounce on the compacted surface. If the machine is on an incline, this can cause the machine to move down the slope with the force of gravity. Reduce the vibratory amplitude or shut off vibration if the drum is bouncing on the compacted surface.

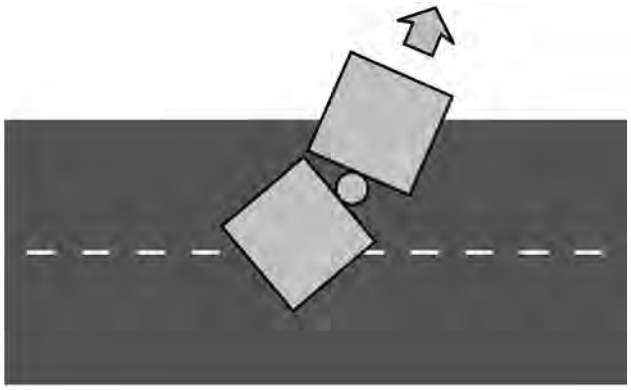

Illustration 22 g01956702

The appropriate method for driving off a compacted surface

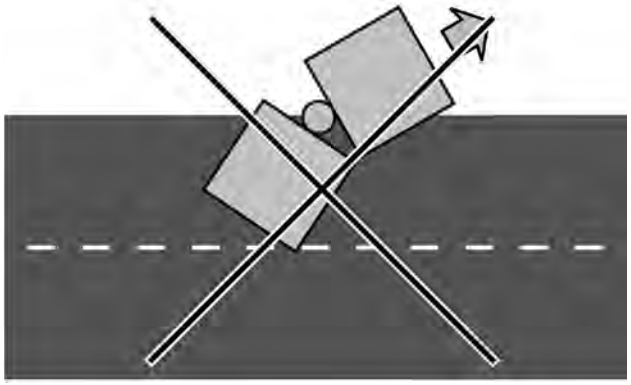

Illustration 23 g01957405

The improper method for driving off a compacted surface

Steering angle – The steering angle affects the lateral balance of an articulated machine. When the machine is driven off the compacted mat, always exit by turning the machine toward the edge. Refer to illustration 22 . Do not turn away from the edge when the machine is driven off the compacted mat. Refer to illustration 23 .

Mounted equipment – Balance of the machine may be impeded by the following components: equipment that is mounted on the machine, machine configuration, weights and counterweights.

Nature of surface – Ground that has been newly filled with earth may collapse from the weight of the machine. The vibratory action of a vibratory compactor can increase the tendency of material on the edge of an incline to collapse.

Surface material – Rocks and moisture of the surface material may drastically affect the machine's traction and machine's stability. Rocky surfaces may promote side slipping of the machine.

Operated equipment – Be aware of performance features of the equipment in operation and the effects on machine stability.

Operating techniques – Keep all attachments low to the ground for optimum stability.

Machine systems have limitations on slopes – Slopes can affect the proper function and operation of the various machine systems. These machine systems are needed for machine control.

Note: Safe operation on steep slopes may require special machine maintenance. Excellent skill of the operator and proper equipment for specific applications are also required. Consult the Operation and Maintenance Manual for the proper fluid level requirements and intended use for the machine.

i01329161

Equipment Lowering with Engine Stopped

SMCS Code: 7000-II; 7000

Before lowering any equipment with the engine stopped, clear the area around the equipment of all personnel. The procedure to use will vary with the type of equipment to be lowered. Keep in mind most systems use a high pressure fluid or air to raise or lower equipment. The procedure will cause high pressure air, hydraulic, or some other media to be released in order to lower the equipment. Wear appropriate personal protective equipment and follow the established procedure in the Operation and Maintenance Manual, “Equipment Lowering with Engine Stopped” in the Operation Section of the manual.

i07506719

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

The declared operator sound pressure level is 83 dB (A) when the procedure in “ISO 6396:2008” is used to measure the value. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment.

The declared exterior sound power level (L_{WA}) is 106 dB(A) when measured according to the test procedures and conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

The declared sound level values listed above include both measurement uncertainty and uncertainty due to production variation.

Sound Level Information for Machines in European Union Countries and in Countries that Adopt the “EU Directives”

The declared operator sound pressure level is 83 dB (A) when the procedure in “ISO 6396:2008” is used to measure the value. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment.

The declared exterior sound power level (L_{WA}) is 106 dB(A) when measured according to the test procedures and conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

The declared sound level values listed above include both measurement uncertainty and uncertainty due to production variation.

Sound Level Information for Machines in Eurasian Economic Union Countries

The declared operator sound pressure level is 83 dB (A) when the procedure in “ISO 6396:2008” is used to measure the value. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment.

The declared exterior sound power level (L_{WA}) is 106 dB(A) when measured according to the test procedures and conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

The declared sound level values listed above include both measurement uncertainty and uncertainty due to production variation.

“The European Union Physical Agents (Vibration) Directive 2002/44/EC”

Vibration Data for Vibratory Asphalt Compactor

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5 meter per second squared.

Information Concerning Whole Body Vibration Level

This section provides vibration data and a method for estimating the vibration level for vibratory asphalt compactors.

Note: Vibration levels are influenced by many different parameters. Many items are listed below.

- Operator training, behavior, mode, and stress
- Job site organization, preparation, environment, weather, and material
- Machine type, quality of the seat, quality of the suspension system, attachments, and condition of the equipment

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in Table 1 to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

Estimate the vibration levels for the three vibration directions. For typical operating conditions, use the average vibration levels as the estimated level. With an experienced operator and smooth terrain, subtract the Scenario Factors from the average vibration level to obtain the estimated vibration level. For aggressive operations and severe terrain, add the Scenario Factors to the average vibration level to obtain the estimated vibration level.

Note: All vibration levels are in meter per second squared.

Table 1

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."							
Machine Type	**Typical Operating Activity**	**Vibration Levels**			**Scenario Factors**		
		X axis	**Y axis**	**Z axis**	**X axis**	**Y axis**	**Z axis**
Vibratory Asphalt Compactor	vibration ON	0, 33	0, 40	0, 48	0, 11	0, 08	0, 14
	vibration OFF	0, 35	0, 43	0, 36	0, 13	0, 20	0, 19

Note: Refer to "ISO/TR 25398 Mechanical Vibration - Guideline for the assessment of exposure to whole body vibration of ride on operated earthmoving machines" for more information about vibration. This publication uses data that is measured by international institutes, organizations, and manufacturers. This document provides information about the whole body exposure of operators of earthmoving equipment. Refer to Operation and Maintenance Manual, SEBU8257, "The European Union Physical Agents (Vibration) Directive 2002/44/EC" for more information about machine vibration levels.

The Caterpillar suspension seat meets the criteria of "ISO 7096". This represents vertical vibration level under severe operating conditions.

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

Properly adjust machines. Properly maintain machines. Operate machines smoothly. Maintain the conditions of the terrain. The following guidelines can help reduce the whole body vibration level:

1. Use the right type and size of machine, equipment, and attachments.

2. Maintain machines according to the manufacturer's recommendations.

a. Tire pressures

b. Brake and steering systems

c. Controls, hydraulic system, and linkages

3. Keep the terrain in good condition.

a. Remove any large rocks or obstacles.

b. Fill any ditches and holes.

c. Provide machines and schedule time to maintain the conditions of the terrain.

4. Use a seat that meets "ISO 7096". Keep the seat maintained and adjusted.

a. Adjust the seat and suspension for the weight and the size of the operator.

b. Inspect and maintain the seat suspension and adjustment mechanisms.

5. Perform the following operations smoothly.

a. Steer

b. Brake

c. Accelerate.

d. Shift the gears.

6. Move the attachments smoothly.

7. Adjust the machine speed and the route to minimize the vibration level.

a. Drive around obstacles and rough terrain.

b. Slow down when it is necessary to go over rough terrain.

8. Minimize vibrations for a long work cycle or a long travel distance.

a. Use machines that are equipped with suspension systems.

b. Use the ride control system.

c. If no ride control system is available, reduce speed to prevent bounce.

d. Haul the machines between workplaces.

9. Less operator comfort may be caused by other risk factors. The following guidelines can be effective to provide better operator comfort:

a. Adjust the seat and adjust the controls to achieve good posture.

b. Adjust the mirrors to minimize twisted posture.

c. Provide breaks to reduce long periods of sitting.

d. Avoid jumping from the cab.

e. Minimize repeated handling of loads and lifting of loads.

f. Minimize any shocks and impacts during sports and leisure activities.

Sources

The vibration information and calculation procedure is based on “ISO/TR 25398 Mechanical Vibration - Guideline for the assessment of exposure to whole body vibration of ride on operated earthmoving machines”. Harmonized data is measured by international institutes, organizations, and manufacturers.

This literature provides information about assessing the whole body vibration exposure of operators of earthmoving equipment. The method is based on measured vibration emission under real working conditions for all machines.

You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

Refer to Operation and Maintenance Manual, SEBU8257, “The European Union Physical Agents (Vibration) Directive 2002/44/EC” for more information about vibration.

Consult your local Caterpillar dealer for more information about machine features that minimize vibration levels. Consult your local Caterpillar dealer about safe machine operation.

Use the following web site to find your local dealer:

Caterpillar, Inc.
www.cat.com

Product Information Section

General Information

i07430921

Specifications

SMCS Code: 7000

Intended Use

This roller is a self-propelled vibratory compactor. This roller consists of one or more metallic cylindrical bodies (drums) that are used for compaction. This roller may also consist of rubber tires that are used for compaction. This roller is used to compact materials such as crushed rock, earth, asphalt, or gravel through rolling and/or vibrating action of the roller.

Specified Useful Life or Expected Life

The specified useful life, defined as total years of operation, or expected life, defined as total machine hours, of this machine is dependent upon many factors including the machine owner's desire to rebuild the machine back to factory specifications. Consult your Cat dealer for assistance in calculating overall owning and operating costs required to determine the machine's specified useful life or expected life. The following items are required to obtain an economical specified useful life or expected life of this machine:

- Perform regular preventive maintenance procedures as described in the Operation and Maintenance Manual.
- Perform machine inspections as described in the Operation and Maintenance Manual and correct any problems discovered.
- Perform system testing as described in the Operation and Maintenance Manual and correct any problems discovered.
- Ensure that machine application conditions comply with Caterpillar's recommendations.
- Ensure that the operating weight does not exceed limits set by manufacturer.
- Ensure that all frame cracks are identified, inspected, and repaired to prevent further development.

Dimensions

Table 2

CB22B Vibratory Compactor	
Maximum Operating Weight	2731 kg (6021 lb)
Maximum Length of Machine	2575 mm (102 inch)
Width of the Machine	1112 mm (44 inch)
Height of the Machine with a ROPS	2700 mm (106 inch)
Width of Drum	1000 mm (40 inch)

Table 3

CB24B Vibratory Compactor	
Maximum Operating Weight	3201 kg (7277 lb)
Maximum Length of Machine	2575 mm (102 inch)
Width of the Machine	1312 mm (52 inch)
Height of the Machine with a ROPS	2700 mm (106 inch)
Width of Drum	1200 mm (47 inch)

Table 4

CB32B Vibratory Compactor	
Maximum Operating Weight	3385 kg (7463 lb)
Maximum Length of Machine	2575 mm (102 inch)
Width of the Machine	1412 mm (56 inch)
Height of the Machine with a ROPS	2700 mm (106 inch)
Width of Drum	1300 mm (51 inch)

Table 5

CC24B Vibratory Compactor	
Maximum Operating Weight	2618 kg (5772 lb)
Maximum Length of Machine	2575 mm (102 inch)
Width of the Machine	1312 mm (52 inch)
Height of the Machine with a ROPS	2700 mm (106 inch)
Width of Drum	1200 mm (47 inch)

Note: The following items are included in the operating machine weight: lubricants, coolant, half full fuel tank, full hydraulic tank, half full water tank and an 80 kg (176 lb) operator.

Identification Information

i07506785

Plate Locations and Film Locations

SMCS Code: 1000; 7000

The Product Information Number (PIN) will be used to identify a powered machine that is designed for an operator to ride.

Caterpillar products such as engines, transmissions, and major attachments that are not designed for an operator to ride are identified by Serial Numbers.

The certification plate (CE) is used to verify that the product conforms to all the requirements that were established by a country or a group of countries. The product is tested by a certified testing group to verify conformance.

For quick reference, record the identification numbers in the spaces that are provided below the illustration.

Product Identification Number (PIN)

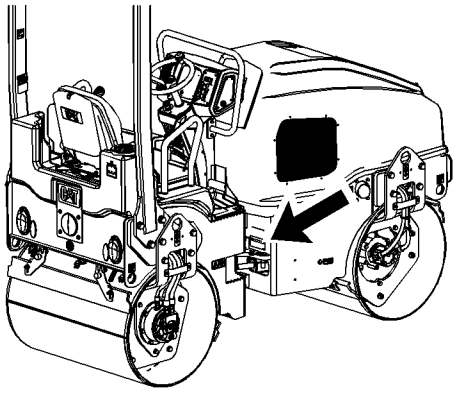

Illustration 24 g03162376

The Product Information Number (PIN) plate is at the rear of the machine on the left side. The plate may have the following information:

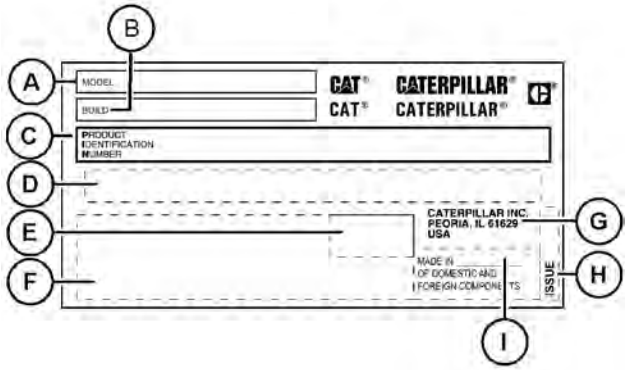

Illustration 25 g06201159

Manufacturer Name and Address _____

Model (A) _____

Build (B) _____

Product Identification Number (C) _____

Bar Code (D) _____

Month and Year of Manufacture Plate (If Required) (E) _____

CE Plate (If Required) (F) _____

Address of Manufacturer (G) _____

Issue (H) _____

Country of Origin Info Plate (If Required) (I) _____

Local regulation may require documentation of the month and/or year of manufacture in the Operation and Maintenance Manual. Enter on line (E) above if required.

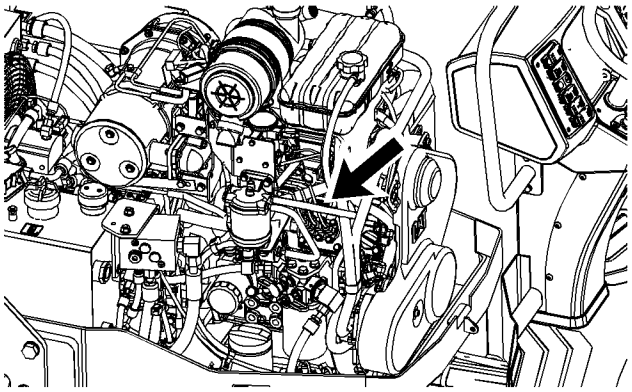

Illustration 26 g03162418

Engine Information and Serial Number Plate

Eurasian Economic Union

For machines compliant to the Eurasian Economic Union requirements, the EAC mark plate is positioned near the Product Identification Number (PIN) plate (see Product Information Section of the machine Operation and Maintenance Manual). The EAC mark plate is placed on machines certified to the Eurasian Economic Union requirements effective at the time of market entry.

Illustration 27 g06094564

The Month and Year of Manufacture are on the PIN plate.

Manufacturer Information

Manufacturer:

Caterpillar Paving Products Inc.,
9401 85th Avenue North
Brooklyn Park MN, 55445-2199

Entity authorized by the manufacturer at the territory of Eurasian Economic Union:

Caterpillar Eurasia LLC
75, Sadovnicheskaya Emb.
Moscow 115035, Russia

Certification

ROPS/FOPS Structure

This message is positioned on the ROPS on the left side of the machine above the door.

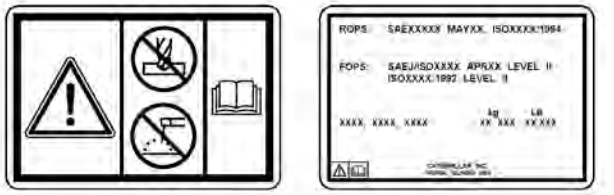

Illustration 28 g01212098

⚠ WARNING

Structural damage, an overturn, modification, alteration, or improper repair can impair this structure's protection capability thereby voiding this certification. Do not weld on or drill holes in the structure. This will void the certification. Consult your Cat dealer to determine this structure's limitations without voiding its certification.

This machine has been certified to the standards that are listed on the certification film. The maximum mass of the machine, which includes the operator and the attachments without a payload, should not exceed the mass on the certification film.

Refer to Operation and Maintenance Manual, “Guards (Operator Protection)” for more information.

European Union

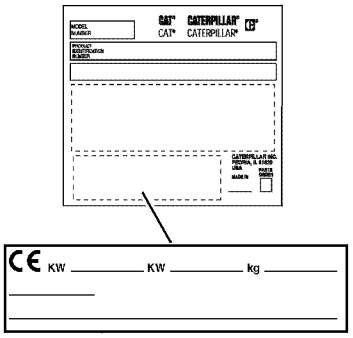

Illustration 29 g01880193

This plate is positioned on the bottom left side of the plate for the PIN.

Note: The CE plate is on machines that are certified to the European Union requirements that were effective at that time.

For machines compliant to 2006/42/EC, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

- Engine Power Primary Engine (kW)_____
- Engine Power for Additional Engine (If Equipped) _____
- Typical Machine Operating Weight for European Market (kg)_____
- Year of Construction_____
- Machine Type _____

Sound Certification

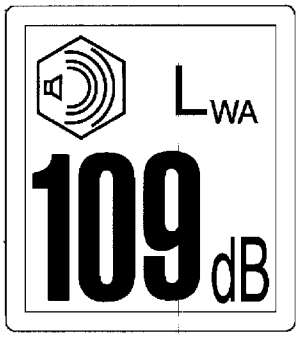

Illustration 30 g00933634

A typical example of this film is shown. Your machine may have a different value.

If equipped, the certification film is used to verify the environmental sound certification of the machine. The value that is listed on the film indicates the guaranteed sound power level. The guaranteed sound power level is measured at the time of manufacture. The guaranteed sound power level is measured according to the conditions that are specified in “2000/14/EC”.

i04019095

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Note: This information is pertinent in the United States, in Canada and in Europe.

Consult your Cat dealer for an Emission Control Warranty Statement.

This label is located on the engine.

Declaration of Conformity

SMCS Code: 1000; 7000

Table 6

An EC or EU Declaration of Conformity document was provided with the machine if it was manufactured to comply with specific requirements for the European Union. In order to determine the details of the applicable Directives, review the complete EC or EU Declaration of Conformity provided with the machine. The extract shown below from an EC or EU Declaration of Conformity for machines that are declared compliant to "2006/42/EC" applies only to those machines originally "CE" marked by the manufacturer listed and which have not since been modified.

EC or EU DECLARATION OF CONFORMITY

Manufacturer: CATERPILLAR PAVING PRODUCTS INC. 9401 85th Ave. North Brooklyn Park, MN 55445 USA

Person authorized to compile the Technical File and to communicate relevant part (s) of the Technical File to the Authorities of European Union Member States on request:

Standards & Regulations Manager,Caterpillar France S.A.S 40,
Avenue Leon-Blum, B.P. 55, 38041 Grenoble Cedex 9, France

I, the undersigned, _____, hereby certify that the construction equipment specified hereunder

Description:	Generic Denomination:	Paving Equipment
	Function:	Vibratory Soil Compactor
	Model/Type:	CB22B, CB24B, CC24B, CB32B
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfils all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2000/14/EC amended by 2005/88/EC, Note (1)		
2004/108/EC	N/A	
2014/30/EC	N/A	

Note (1) Annex -_____ Guaranteed Sound Power Level -_____dB (A)
Representative Equipment Type Sound Power Level - _____dB (A)
Engine Power per ____-____ kW Rated engine speed - _____ rpm
Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of July 2012, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Operation Section

Before Operation

i04027420

Mounting and Dismounting

SMCS Code: 7000

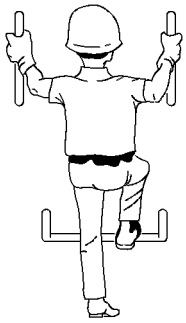

Illustration 31 g00037860

Use steps and handholds whenever you mount the machine. Use steps and handholds whenever you dismount the machine. Before you mount the machine, clean the step and the handholds. Inspect the step and handholds. Make all necessary repairs.

Face the machine whenever you mount the machine and whenever you dismount the machine. Maintain a three-point contact with the step and with handholds.

Note: Three-point contact can be two feet and one hand. Three-point contact can also be one foot and two hands.

Do not mount a moving machine. Do not dismount a moving machine. Never jump off the machine. Do not try to mount the machine when you carry tools or supplies. Do not try to dismount the machine when you are carrying tools or supplies. Use a hand line to pull equipment onto the platform. Do not use any controls as handholds when you enter the operator compartment or when you exit the operator compartment.

Machine Access System Specifications

The machine access system has been designed to meet the intent of the technical requirements in “ISO 2867 Earth-moving Machinery – Access Systems”. The access system provides for operator access to the operator station and to conduct the maintenance procedures described in Maintenance section.

i02704669

Daily Inspection

SMCS Code: 1000; 7000

For a maximum service life of the machine, complete a thorough walk-around inspection before you mount the machine and before you start the engine.

Inspect the area around the machine and under the machine. Look for loose bolts, trash buildup, oil, coolant leakage, broken parts, or worn parts.

Note: Watch closely for leaks. If you observe a leak, find the source of the leak and correct the leak. If you suspect a leak or you observe a leak, check the fluid levels more frequently.

Inspect the condition of the equipment and of the hydraulic components.

Check the condition of the tires. Adjust the inflation pressure, if necessary.

Check all of the oil levels, all of the coolant levels, and all of the fuel levels.

Remove any trash buildup and debris. Make all necessary repairs before you operate the machine.

Make sure that all covers and guards are securely attached.

Adjust the mirrors for the correct rear view of the machine.

Make sure that the engine air filter service indicator is not in the red zone.

Grease all of the fittings that need to be serviced on a daily basis.

Daily, perform the procedures that are applicable to your machine:

- Backup Alarm - Test
- Beacon and Lights - Inspect
- Cooling System Level - Check
- Drum Scrapers - Inspect/Adjust/Replace
- Engine Air Filter Service Indicator - Inspect

- Engine Oil Level - Check
- Hydraulic System Oil Level - Check
- Indicators and Gauges - Test
- Neutral Start Switch - Test
- Seat Belt - Inspect
- Water Spray System Filter - Clean

i04981611

Steering Frame Lock

SMCS Code: 7506

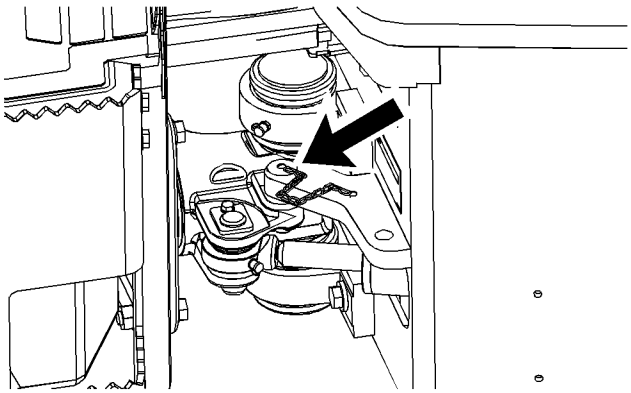

Illustration 32 g03162543

The steering frame lock is in the LOCKED position.

Install the steering frame lock link in the LOCKED position before you lift the machine and before you transport the machine on another vehicle. Also install the steering frame lock link before you perform maintenance near the center of the machine.

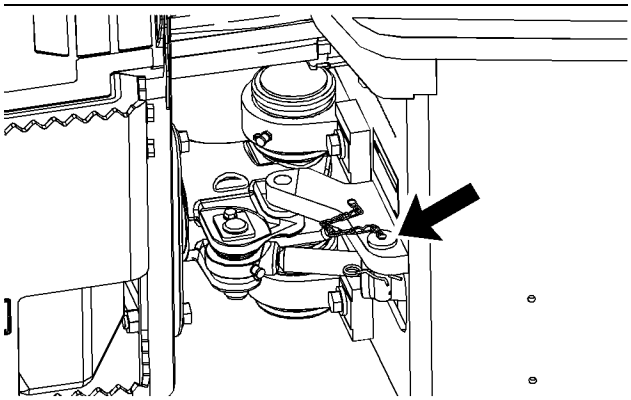

Illustration 33 g03162544

The steering frame lock is in the UNLOCKED position.

Install the steering frame lock in the UNLOCKED position before you operate the machine.

Machine Operation

i04982809

Seat

SMCS Code: 7312; 7324

Note: Adjust the seat for a new operator or at the beginning of each shift.

The operator should sit in the seat in order to determine the correct positioning. Adjust the seat so that the operator is allowed full travel of all the controls.

Lock the seat into position before you operate the machine. Locking the seat will prevent unexpected movement of the seat.

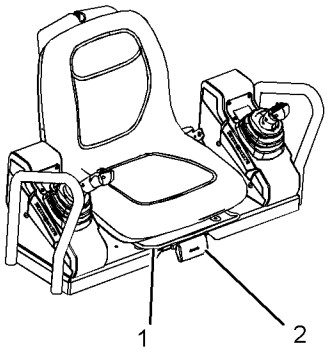

Illustration 34 g03163377

Standard seat

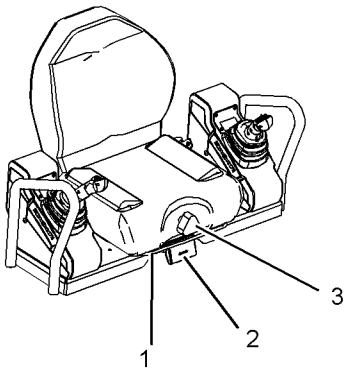

Illustration 35 g03163379

Optional seat (If Equipped)

Forward/Back Slide Adjustment (1) – Lift the bar at the front of the seat. Slide the seat until the desired position is attained. Release the bar in order to lock the seat into position.

Left/Right Slide Adjustment (2) – Lift the handle at the front of the seat. Slide the seat until the desired position is attained. Release the handle in order to lock the seat into position.

Weight Adjustment (3) (If Equipped) – Rotate the dial in order to increase or decrease the seat stiffness.

Operator Presence (If Equipped)

The operator presence system detects when the operator is present in the operator seat. If the operator presence system determines that the operator is not present, the machine will be stopped. In order to start the machine again the operator must be seated.

i04575638

Seat Belt

SMCS Code: 7327

Note: This machine was equipped with a seat belt when the machine was shipped from Caterpillar. At the time of installation, the seat belt and the instructions for installation of the seat belt meet the SAE J386 and ISO 6683 standards. Consult your Cat dealer for all replacement parts.

Always check the condition of the seat belt and the condition of the mounting hardware before you operate the machine.

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

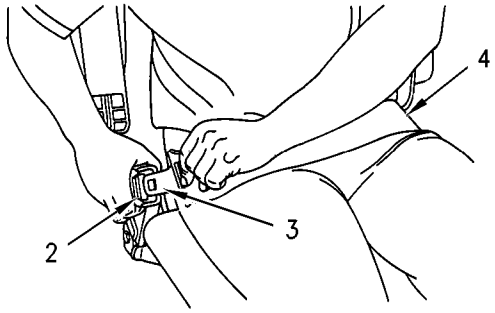

Illustration 36 g00867598

Pull seat belt (4) out of the retractor in a continuous motion.

Fasten seat belt catch (3) into buckle (2). Make sure that the seat belt is placed low across the lap of the operator.

The retractor will adjust the belt length and the retractor will lock in place. The comfort ride sleeve will allow the operator to have limited movement.

Releasing The Seat Belt

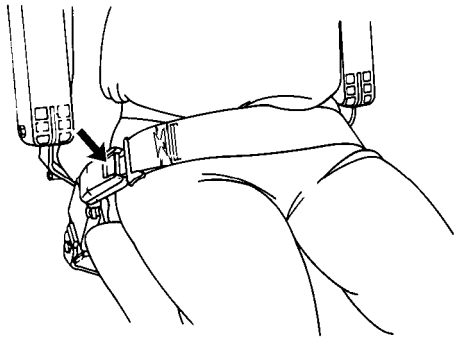

Illustration 37 g00039113

Push the release button on the buckle in order to release the seat belt. The seat belt will automatically retract into the retractor.

Extension of the Seat Belt

⚠ WARNING

When using retractable seat belts, do not use seat belt extensions, or personal injury or death can result.

The retractor system may or may not lock up depending on the length of the extension and the size of the person. If the retractor does not lock up, the seat belt will not retain the person.

Longer, non-retractable seat belts and extensions for the non-retractable seat belts are available.

Caterpillar requires only non-retractable seat belts to be used with a seat belt extension.

Consult your Cat dealer for longer seat belts and for information on extending the seat belts.

i07165580

Operator Controls

SMCS Code: 7000; 7300; 7301; 7451

Note: Your machine may not be equipped with all the controls that are discussed in this topic.

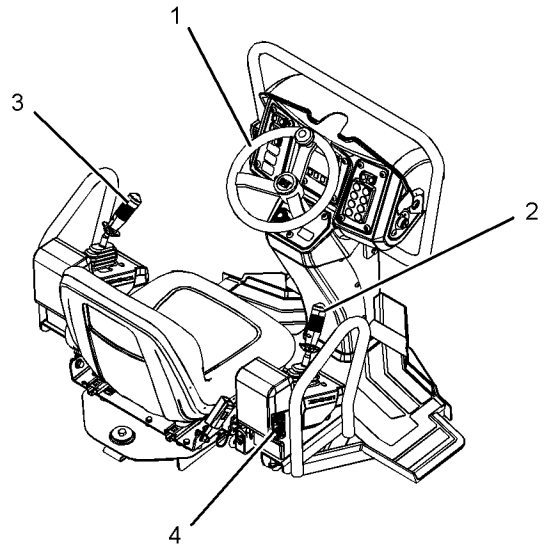

Illustration 38 g03177940

(1) Steering wheel
(2) Right propel control
(3) Left propel control
(4) 12V power receptacle

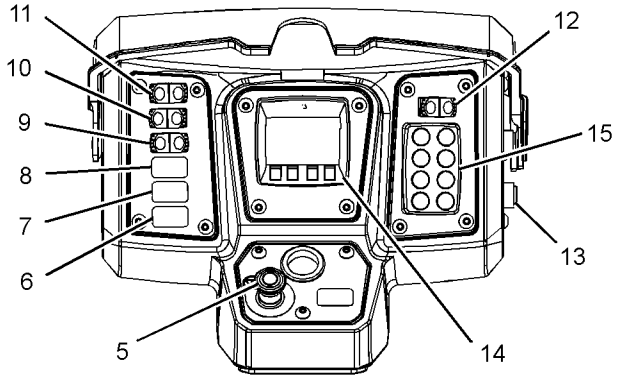

Illustration 39 g03177950

(5) Auxiliary shutdown knob
(6) Additive spray
(7) Regeneration
(8) Traction control
(9) Horn
(10) Turn signals
(11) Hazard lights
(12) Parking brake
(13) Engine start switch
(14) Monitoring system
(15) Keypad

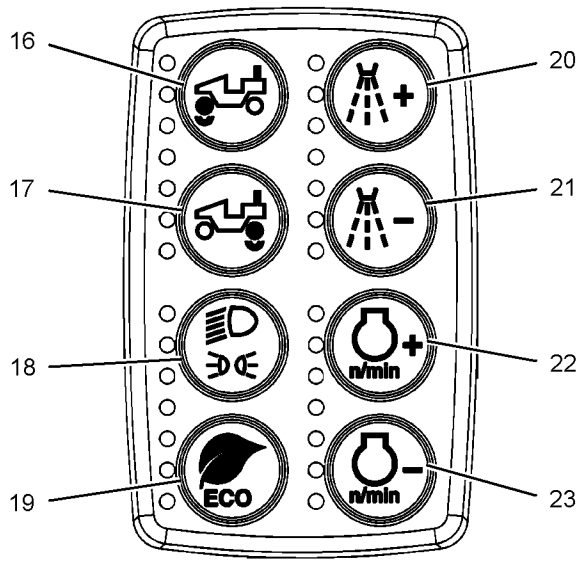

Illustration 40 g03177996

Keypad (13)

(16) Front drum vibratory mode
(17) Rear drum vibratory mode
(18) Lights
(19) ECO mode
(20) Water spray increase
(21) Water spray decrease
(22) Throttle control increase
(23) Throttle control decrease

Steering Wheel (1)

The steering wheel controls the directional steering of the machine. The machine will turn in the same direction as the steering wheel.

Note: The steering frame lock must be unlocked to steer the machine.

Right Propel Control (2)

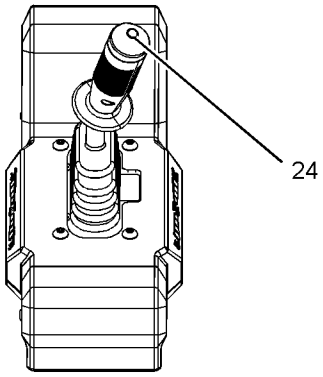

Illustration 41 g03178035

On/Off Switch for the Vibratory System (24) – To turn on the vibration system, press the switch. To stop the vibration system, press the switch again.

Note: The vibratory system will only turn on when propel control is out of neutral.

When the ECM is cycled, the propel control will default to the STOP position. This will happen regardless of the position of the propel control. If the machine is started with the propel lever out of the STOP position, the lever must be placed in the STOP position before the propel system will be active. When the control lever is in the STOP position, the STOP light should be illuminated. If the light is not illuminated, test the propel control for your machine.

Refer to Systems Operation, Testing and Adjusting, “Propel Adjust - Test and Adjust” to test the propel control.

FWD – Push the lever away from the operator to move the compactor forward. To cause the machine to move faster, push the lever farther.

STOP – Move the lever to the center STOP position to stop the machine.

REV – Pull the lever toward the operator to move the machine in reverse. To cause the machine to move faster, pull the lever farther.

Left Propel Control (3) (If Equipped)

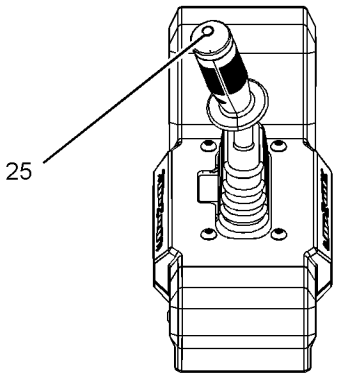

Illustration 42 g03178042

On/Off Switch for the Vibratory System (25) – To turn on the vibration system, press the switch. To stop the vibration system, press the switch again.

Note: The vibratory system will only turn on when propel control is out of neutral.

When the ECM is cycled, the propel control will default to the STOP position. This will happen regardless of the position of the propel control. If the machine is started with the propel lever out of the STOP position, the lever must be placed in the STOP position before the propel system will be active. When the control lever is in the STOP position, the STOP light should be illuminated. If the light is not illuminated, test the propel control for your machine.

Refer to Systems Operation, Testing and Adjusting, “Propel Adjust - Test and Adjust” to test the propel control.

Note: Full speed may not be achievable in forward or reverse when the left propel handle is used. The left propel handle is only intended for working speeds.

FWD – Push the lever away from the operator to move the compactor forward. To cause the machine to move faster, push the lever farther.

STOP – Move the lever to the center STOP position to stop the machine.

REV – Pull the lever toward the operator to move the machine in reverse. To cause the machine to move faster, pull the lever farther.

12V Power Receptacle (4)

12V Power Receptacle – This power receptacle can be used to power automotive electrical equipment or accessories. Remove the cap before use.

Auxiliary Shutdown Knob (5)

Auxiliary Shutdown Knob – To stop the engine, push the knob downward. To release the auxiliary shutdown knob, pull the knob upward.

Additive Spray (If Equipped) (6)

Additive Spray – Push down on the right side of the switch to turn on the additive spray system. Push down on the left side of the switch to turn off the additive spray system.

Regeneration (If Equipped) (7)

Note: The MIDDLE position of the regeneration switch is the default position for automatic regeneration.

Force Regeneration – The following conditions must be met to force regeneration:

- The machine must be stopped with the parking brake enabled
- The minimum coolant temperature must be reached
- The DPF soot load must be achieved

Note: These conditions do not apply to automatic regeneration, which may occur during regular machine operation.

Press the force regeneration side of the switch for 2 seconds to begin regeneration. The high exhaust temperature indicator will become active showing that the regeneration is active. The high exhaust temperature indicator will deactivate after regeneration is completed or the regeneration has been disabled. An indicator light on the switch will illuminate showing that the regeneration is active.

Disable Regeneration – Press the disable regeneration side of the switch for 2 seconds to disable regeneration. An indicator light on the switch will illuminate showing that the regeneration is being disabled.

Note: To re-enable the regeneration, cycle the engine start switch key or press and hold down the force regeneration switch for 2 seconds.

Note: If the engine start switch key is cycled while the regeneration system is disabled via the disable regeneration switch, press and hold the disable regeneration switch for 2 seconds to reinitiate the disable regeneration.

Refer to Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration” for more information.

Traction Control (If Equipped) (8)

Traction Control – Push down on the right side of the switch to turn on the traction control. Push down on the right side of the switch again to turn off the traction control.

The traction control switch controls the traction control system. If the front drum or the rear drum begins to slip, depress the traction control switch to limit the slipping of the drum. The traction control system is a hydraulic system which does not manage the engine power or idle.

Note: When you operate the traction control system, reduce the propel speed until the drum stops spinning. Excessive movement of the propel lever may cause the engine to lug when the traction control system is engaged.

The traction control will disengage if the travel speed becomes greater than 5 km/h (3 mph) or if the parking brake is engaged.

Horn (9)

Horn – Depress the horn button to sound the horn. Use the horn for alerting personnel or for Signaling personnel.

Turn Signals (10)

Turn Signals – Push down on the left side of the switch to activate the left turn signal. Push down on the right side of the switch to activate the right turn signal.

Hazard Lights (11)

Hazard Lights – Push down on the right side of the switch to turn on the hazard lights. Push down on the left side of the switch to turn off the hazard lights.

Parking Brake (12)

Parking Brake Apply – Push down on the right side of the switch to apply the parking brake.

Parking Brake Release – Push down on the left side of the switch to release the parking brake.

Note: If the propel control is not in the NEUTRAL position when the parking brake is released, the machine will not propel. The propel control must be returned to the NEUTRAL position to propel the machine.

Engine Start Switch (13)

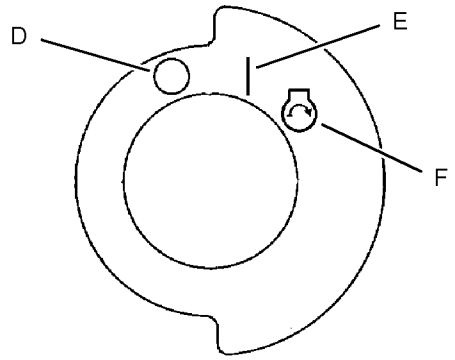

Illustration 43 g02448283

OFF – To disconnect the electrical power to the engine and to the machine, turn the switch in a counterclockwise direction to the OFF position (D). Turn the switch to the OFF position (D) before trying to restart the engine. Turn the switch to the OFF position (D) to stop the engine.

ON – To activate the cab circuits, turn the switch to the ON position (E). When the switch is released from the START position (F), the switch will return to the ON position (E).

START – Turn the engine start switch to the START position (F) to crank the engine. Release the key when the engine starts.

Note: If the engine does not start, return the switch to the OFF position before returning to the START position.

For more information, refer to the Operation and Maintenance Manual, “Engine Starting” section.

Monitoring System (14)

For information concerning the monitoring system refer to Operation and Maintenance Manual, “Monitoring System”.

Vibratory Mode (16) (17)

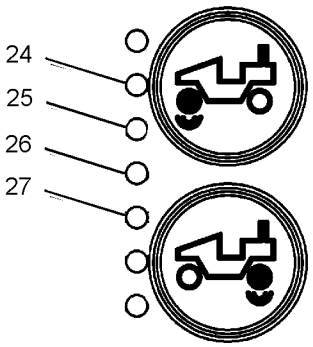

Illustration 44 g03574038

Vibratory mode indicator lights

Front Drum Vibratory Mode (16) – Push the button to activate the vibratory system for the front drum. When the vibratory system for the front drum is activated, indicator light (24) will be illuminated.

Rear Drum Vibratory Mode (17) – Push the button to activate the vibratory system for the rear drum. When the vibratory system for the rear drum is activated, indicator light (27) will be illuminated.

Dual Drum Vibratory Mode – If the front drum vibratory mode is activated, press button (17) once to activate dual drum vibratory mode. If the rear drum vibratory mode is activated, press button (16) once to activate dual drum vibratory mode. When dual drum vibratory mode is activated, indicator lights (25) and (26) will be illuminated.

The vibratory system can only be enabled when the throttle position is set to 1900 RPM, 2300 RPM, or 2700 RPM. The vibratory frequency is proportional to the engine speed. The higher the engine speed the higher the frequency of vibration.

Lights (18)

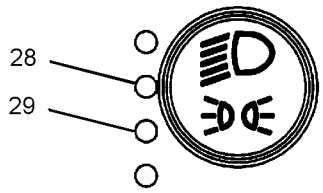

Illustration 45 g03574116

Lights indicator lights

Roading Lights – Push the button until indicator light (28) is illuminated to turn on the front roading lights.

Position Lights – Push the button until indicator light (29) is illuminated to turn on the position lights.

Off – Push the button until no indicator lights are illuminated to turn off the lights.

ECO Mode (19)

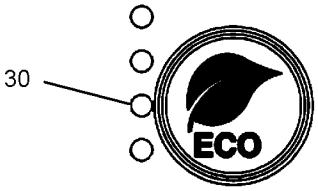

Illustration 46 g03574136

ECO mode indicator light

ECO mode – Push the button to select ECO mode. When ECO mode is selected, indicator light (30) will be illuminated. When ECO mode is selected, the machine will use the following RPM rules:

- Maximum engine speed is 2300 RPM.
- If the engine speed is greater than 2300 RPM when ECO mode is activated, the engine speed will be reduced to 2300 RPM.
- If the machine is equipped with an optional operator presence switch and the operator leaves the seat for more than 10 seconds, the engine speed will reduce to 1100 RPM.
- If the machine is in neutral for more than 60 seconds, the engine speed will reduce to 1100 RPM.
- The engine speed can be adjusted between 1100 RPM and 2300 RPM at any time by using the throttle control buttons.

Water Spray Increase (20)

Water Spray Increase – Push the button to increase the amount of water being sprayed. Each time the button is pressed the amount of water being sprayed increases. The indicator lights show the approximate level for the water spray system.

Note: Holding both the water spray increase button and water spray decrease button for 2 seconds will turn on the water spray system at 100%.

Water Spray Decrease (21)

Water Spray Decrease – Push the button to decrease the amount of water being sprayed. Each time the button is pressed the amount of water being sprayed decreases. The indicator lights show the approximate level for the water spray system.

Note: Holding both the water spray increase button and water spray decrease button for 2 seconds will turn on the water spray system at 100%.

Throttle Control (22) (23)

The following throttle positions are available:

- 1100 RPM
- 1400 RPM
- 1900 RPM
- 2300 RPM
- 2700 RPM
- 2800 RPM (Travel Mode)

Note: Vibration is not available when the machine is in travel mode or when the engine speed is below 1900 RPM.

Throttle Control Increase (22)

Throttle Control Increase – Push the button to increase the throttle. To continue to increase the throttle, push the button again until the desired throttle is achieved. Hold the button down to increase the throttle faster.

Throttle Control Decrease (23)

Throttle Control Decrease – Push the button to decrease the throttle. To continue to decrease the throttle, push the button again until the desired throttle is achieved. Hold the button down to decrease the throttle faster.

i05467129

Diesel Particulate Filter Regeneration

SMCS Code: 108F

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

Regeneration

Regeneration is to increase the exhaust temperature for a given time. The Caterpillar Regeneration System (CRS) is used to remove soot from the DPF, and warm up the Selective Catalyst Reduction (SCR) system. The DPF traps both soot and ash. The ash is removed through a manual cleaning process. Refer to Operation and Maintenance Manual, “Diesel Particulate Filter - Clean” for more information on the service of the DPF.

Regeneration Indicators

Regeneration Active – When illuminated, this indicator shows that the system is active. This indicator shows that elevated emission temperatures are possible. This indicator will turn off when regeneration is complete.

DPF – This indicator will illuminate in order to show that a regeneration is required. This indicator will illuminate when “Time to Regen” is less than a pre-determined amount of time.

Regeneration Disabled – This indicator will illuminate in order to show that a regeneration has been disabled.

Regeneration Switch

Force Regeneration – Press in the top switch for 2 seconds in order to begin regeneration.

Disable Regeneration – Press in the bottom switch for 2 seconds in order to disable regeneration.

Note: If equipped with a rocker style switch, the MIDDLE position of the regeneration switch is the default position for automatic regeneration.

Note: If the engine start switch key is cycled or the “Force Regeneration” switch is pressed for longer than 2 seconds the system will no longer be disabled. When the “Force Regeneration” switch is pressed and “Time to Regen” is less than 8 hours, regeneration will begin if the machine is at low idle and is parked.

Note: If the engine start switch key is cycled while the regeneration system is disabled via the “Disable Regeneration” switch, press and hold the “Disable Regeneration” switch for 2 seconds to reinitiate.

Modes of Regeneration

Automatic: The Electronic Control Module (ECM) uses multiple inputs from the engine and the machine to determine the best time to perform an automatic regeneration. Automatic regenerations can take place throughout the operating cycle of the engine. The regeneration active indicator will be illuminated when a regeneration is being performed. Interruptions of the regeneration are acceptable. If a regeneration is in progress and is stopped for any reason, it is permissible to press the “Disable Regeneration” switch.

Note: Automatic adjustments of engine speed may be noticed during regenerations. If a regeneration is taking place and the engine is taken to low idle, the engine speed may remain elevated in order to maintain the regeneration.

Note: If the machine returns to work while an automatic regeneration is active, the regeneration may be stopped. The ECM will continue to monitor inputs to determine the best time to restart the regeneration.

Manual: A manual regeneration is initiated by pressing the “Force Regeneration” switch. A manual regeneration will only be allowed if the “Time to Regen” is less than 8 hours. If the “Force Regeneration” switch is pressed before “Time to Regen” is less than 8 hours, then “Regen not Required” will be displayed. The machine must be stationary, the parking brake must be applied, and the engine must be at low idle in order to perform a manual regeneration.

Disabled: When the regeneration system is in disabled mode, automatic regenerations will not be performed. The DPF indicator will illuminate if a manual regeneration is required. The “Time to Regen” displayed on the performance screen will indicate the time until the next regeneration will be required. However, the DPF indicator may illuminate with time remaining on the display. When the DPF indicator illuminates, the operator must perform a manual regeneration.

Regeneration Triggers

A regeneration may be required for the following reasons:

Soot: The DPF will collect soot produced by the engine. An automatic regeneration will become active to reduce soot level.

Regeneration System Warning Indicators

Illustration 47 g02117258

The DPF Indicator will illuminate when a regeneration is required. A regeneration should be performed as soon as possible.

Note: In some situations, the DPF indicator may stay illuminated after a regeneration ends. The illuminated DPF indicator indicates that a complete regeneration has **not** been performed. A complete regeneration is when the soot has been depleted or all of the criteria for one of the other regeneration types have been met. If the DPF indicator stays illuminated, perform a regeneration without interruption. The DPF indicator will shut off when a regeneration is complete.

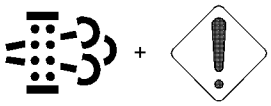

Illustration 48 g02117259

If the soot load is above a threshold or “Time to Regen” is 0 hours, then a regeneration is required. The DPF indicator and an action indicator will be illuminated. Engine power will be slightly derated. If the machine continues to operate without a regeneration, derate will eventually reach 100%. Stop the machine and apply the parking brake. With the engine at low idle, initiate a manual regeneration.

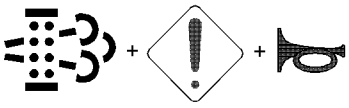

Illustration 49 g02117261

Once the amount of soot collected in the DPF has reached a threshold or “Time to Regen” has been at 0 hours for a pre-determined time, the DPF indicator and an action indicator will be illuminated and an audible alarm will sound.

10 minutes after the illumination of the DPF indicator, action indicator, and audible alarm, the engine will shut down. The engine can be restarted by cycling the engine start switch key. The engine will return to its previous derate state before shutdown.

Once the amount of soot collected reaches a threshold level or 6.4 hours of run time has passed since the action indictor was illuminated without a successful regeneration, the engine will have a 100% derate.

Once the amount of soot collected reaches a critical threshold level, the regeneration will be locked out. At this time, a regeneration can only be done through Cat Electronic Technician (ET), by an authorized Cat dealer. The engine may be restarted, but will only run for 30 seconds before shutting down again.

i05777265

Battery Disconnect Switch (If Equipped)

SMCS Code: 1411

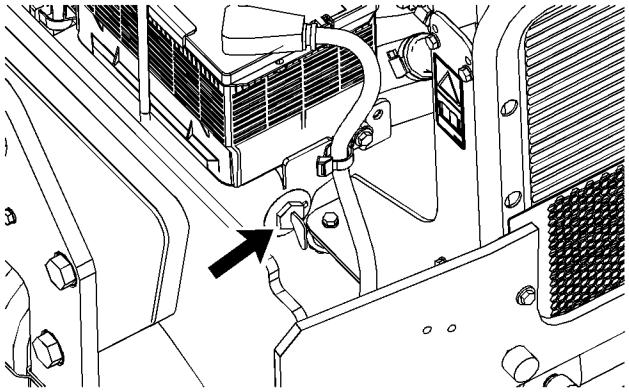

Illustration 50 g03450523

Battery Disconnect Switch – The battery disconnect switch is located on the front right side of the engine compartment.

OFF – In order to deactivate the electrical system, turn the switch to the OFF position.

ON – To activate the electrical system, insert the key and turn the switch in a clockwise direction. The switch must be in the ON position in order to start the engine.

The functions of the battery disconnect switch and the engine start switch are different. When the battery disconnect switch is turned to the OFF position, the entire electrical system is disabled. When the engine start switch is turned to the OFF position, the battery remains connected to the electrical system.

Remove the key when you exit the machine for an extended period of time. Also, remove the key when you service the electrical system.

NOTICE
Never move the battery disconnect switch to the OFF position while the engine is operating. Serious damage to the electrical system could result.

To ensure that no damage to the engine occurs, verify that the engine is fully operational before cranking the engine. Do not crank an engine that is not fully operational.

Perform the following procedure in order to check the battery disconnect switch for proper operation:

1. With the battery disconnect switch in the ON position, verify that electrical components in the operator compartment are functioning. Verify that the hour meter is displaying information. Verify that the engine will crank.
2. Turn the battery disconnect switch to the OFF position.
3. Verify that the following items are not functioning: electrical components in the operator compartment, hour meter and engine cranking. If any of the items continue to function with the battery disconnect switch in the OFF position, consult your Caterpillar dealer.

i06247028

Monitoring System

SMCS Code: 1900; 5258; 7400; 7402; 7450; 7451; 7490

Note: Your machine may not be equipped with all of the features that are discussed in this topic.

Indicator Lights

There are three indicator lights on each side of the monitoring system display. There is one green indicator, one amber indicator, and one red indicator. The indicators will illuminate when certain machine functions are activated, or when a fault occurs.

Right Side Green Indicator

The green indicator on the right side of the monitoring system display will be illuminated when the vibratory system is activated. When the vibratory activation control is set to manual mode, the light will be illuminated and the system will begin vibrating when the system is activated. When the vibratory activation control is set to automatic mode and the vibratory system is activated, the light will illuminate but the system will not begin vibrating until sufficient speed is reached.

Left Side Green Indicator

The green indicator on the left side of the monitoring system display will be illuminated when the water spray function is activated.

Right Side Amber and Red Indicators

The amber and red indicators on the right side of the monitoring system display are used to indicate the following machine faults:

Level 1 Machine Fault – The right side amber indicator will be illuminated. A level 1 machine fault is a warning and does not act on any system.

Level 2 Machine Fault – The right side amber indicator will flash. Systems may be derated or disabled during a level 2 machine fault.

Level 2+ Machine Fault – The right side amber indicator will flash and an audible alarm will sound continuously. Systems may be derated or disabled during a level 2+ machine fault.

Level 3 Machine Fault – The right side amber indicator will flash, the right side red indicator will be illuminated, and an audible alarm will sound in sync with the amber indicator. The propel and vibratory systems will be disabled during a level 3 machine fault.

Left Side Amber and Red Indicators

The amber and red indicators on the left side of the monitoring system display are used to indicate the following engine faults:

Level 1 Engine Fault – The left side amber indicator will be illuminated. A level 1 engine fault is a warning and does not act on any system.

Level 2 Engine Fault – The left side amber indicator will flash. Systems may be derated or disabled during a level 2 engine fault.

Level 3 Engine Fault – The left side amber indicator will flash, the left side red indicator will be illuminated, and an audible alarm will sound in sync with the amber indicator. Systems may be derated or disabled during a level 3 engine fault.

Display Navigation

In order to navigate through the monitoring system use the four soft keys that are located at the bottom of the screen. Soft key selection options are displayed above each key and are dependent on the current screen that is being viewed within the monitoring system. The soft key options are not displayed when the keys are not in use. Press any key in order to view the soft key options when the key options are not displayed. The selection options will be displayed for three seconds.

The following soft key options will be available depending on the situation:

Brightness/Contrast – Press this key in order to access brightness and contrast settings.

Navigate Up – Press this key in order to move up through the menu items.

Navigate Down – Press this key in order to move down through the menu items.

Exit/Back One Screen – Press this key in order to go back one screen.

Select/Next – Press this key in order to make a selection or to navigate to the next digit or screen element.

Quick Data – Press this key in order to monitor the selected signals in a scrollable single view display.

Brightness/Contrast

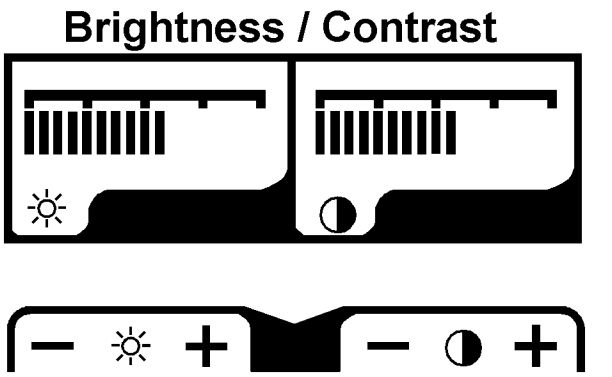

Illustration 51 g02616037

Press the Brightness/Contrast key in order to adjust the brightness and contrast levels. Use the plus and minus keys on the left in order to adjust the brightness. Use the plus and minus keys on the right in order to adjust the contrast. The Brightness/ Contrast screen will disappear after three seconds of inactivity.

Main Menu

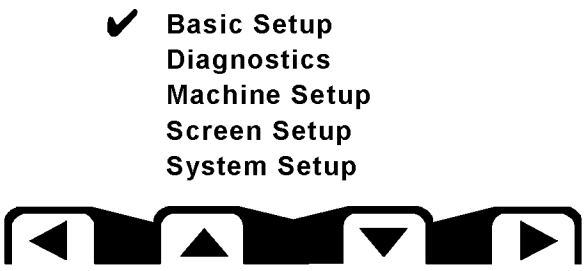

Illustration 52 g02795970

The Main Menu screen is the starting point for configuring the monitoring system.

The following options are available from the Main Menu:

- Basic Setup
- Diagnostics
- Machine Setup
- Screen Setup
- System Setup

Basic Setup

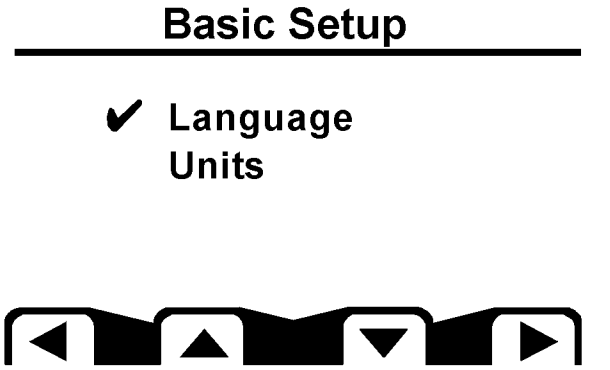

Illustration 53 g02795980

Use the Basic Setup screen to adjust the following settings:

- Language
- Units

Language

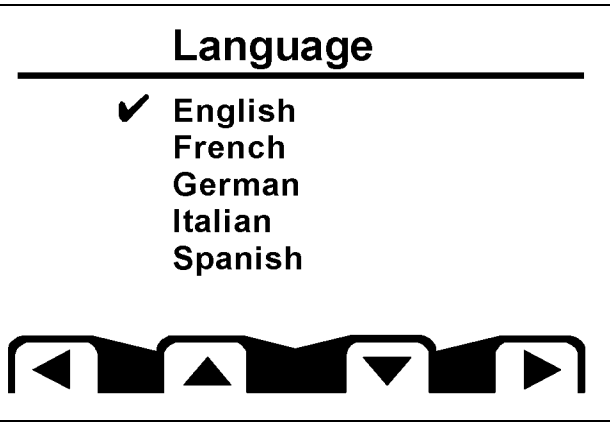

Illustration 54 g02795991

Use the Language screen to select the program language.

Use the up, down, and select keys in order to choose from the following languages:

- English
- French
- German
- Italian

- Spanish
- Chinese
- Portuguese

Units

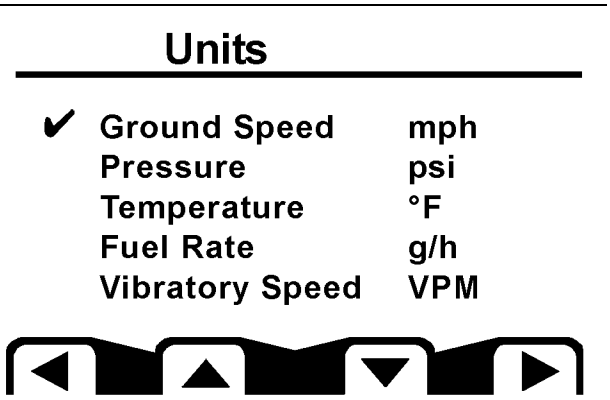

Illustration 55 g02795997

Use the Units screen in order to change the units displayed for the following options:

- Ground Speed
- Pressure
- Temperature
- Fuel Rate
- Vibratory Speed

Diagnostics

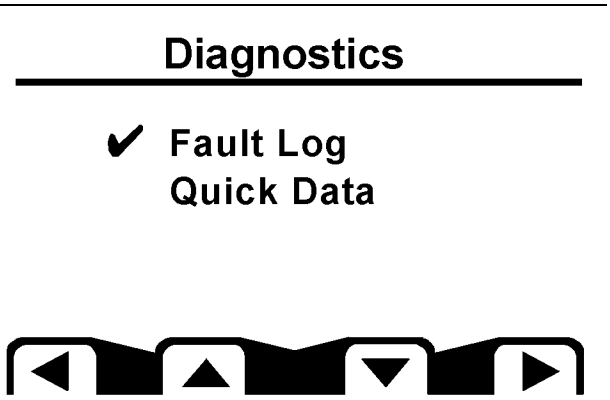

Illustration 56 g02796004

Use the Diagnostics screen to view fault logs and access quick data.

The following options are available from the Diagnostics screen:

- Fault Log
- Quick Data

Fault Log

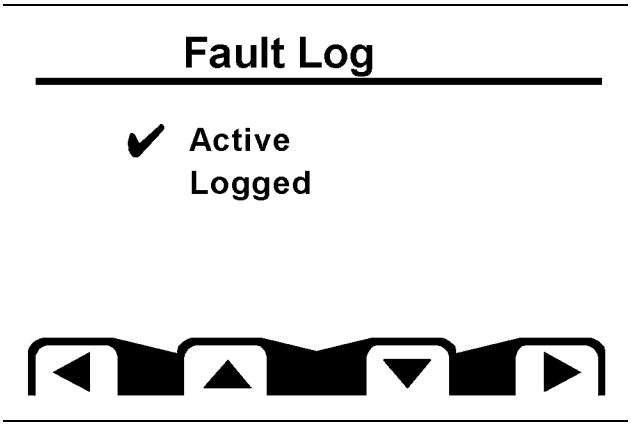

Illustration 57 g02796019

Fault information is saved and stored to the fault log. Select either Active or Logged in order to monitor fault activity.

Active

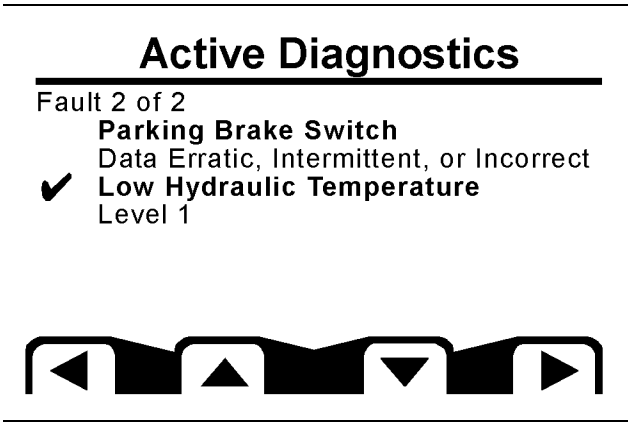

Illustration 58 g02796028

The active fault menu displays all the active faults. Use the up and down keys in order to scroll through the active faults.

Logged

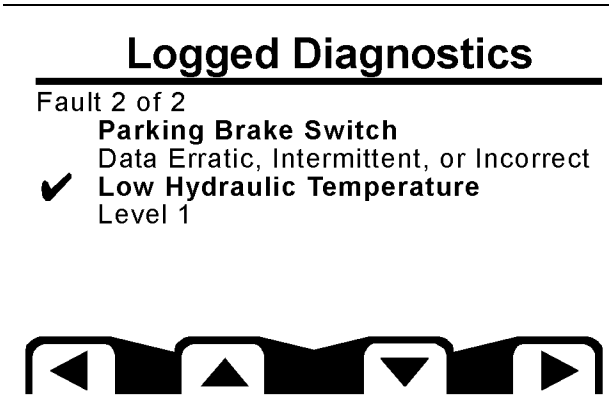

Illustration 59 g02796049

The logged fault menu displays all the previous faults. Use the up and down keys in order to scroll through the logged faults.

Quick Data

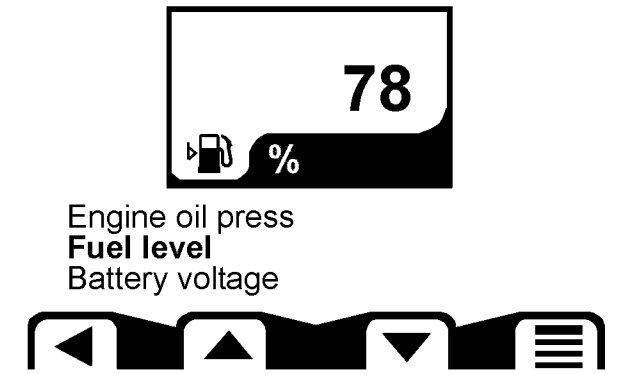

Illustration 60 g02796053

The Quick Data screen allows selected signals to be monitored in a scrollable single view display.

To select which signals are displayed, press the quick data soft key.

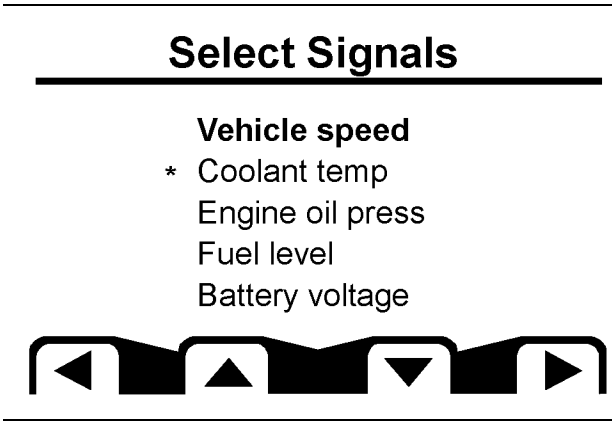

Illustration 61 g02796367

Scroll through the signal list using the up and down keys. Use the select key to select or deselect the signals that will be viewed on the Quick Data screen. The signals that are selected will show an asterisk to the left of the signal name.

Refer to “Signals” for a list of available signals for monitoring.

Machine Setup

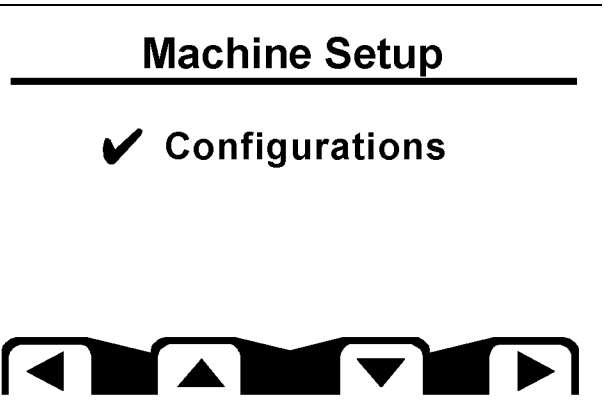

Illustration 62 g02796385

Use the Machine Setup menu to make changes to the configuration of the machine.

Screen Setup

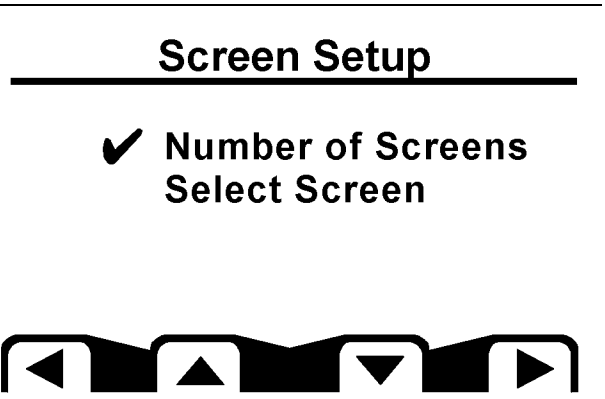

Illustration 63 g02796401

Use the Screen Setup menu to change how information is displayed on the screen. Use the Screen Setup menu to adjust the following screen settings:

- Number of Screens
- Select Screen

Number of Screens

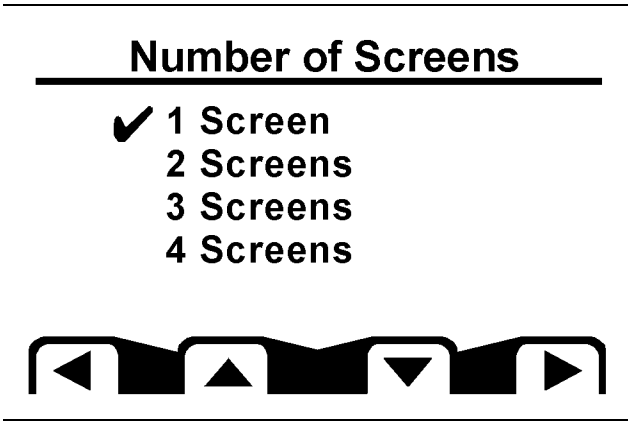

Illustration 64 g02796403

Use the Number of Screens menu to set the number of screens that can be displayed.

Select Screen

Use the Select Screen menu to customize the screen display. Use the following steps in order to customize the screen:

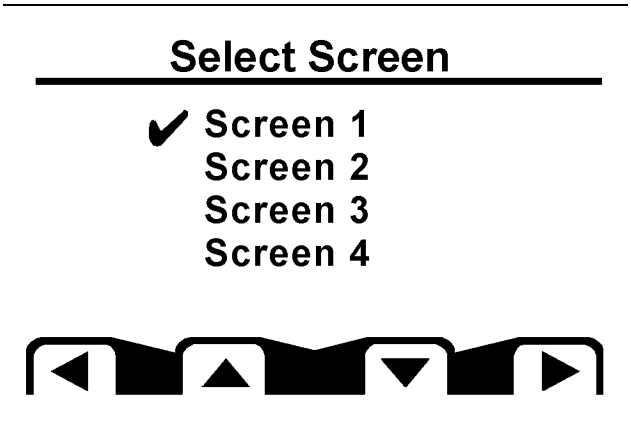

Illustration 65 g02796406

1. Use the up and down keys in order to select which screen to customize. Then press the select button in order to customize the screen that is selected.

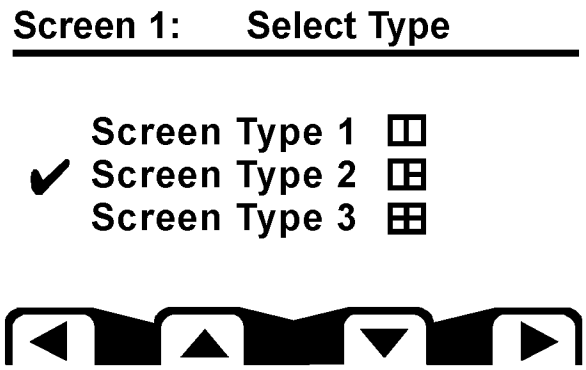

Illustration 66 g02796427

2. Use the up and down keys in order to select which screen type to use. Then press the select button in order to choose the selected screen type. The following screen types are available:

Type 1 – Screen type 1 is a two-up screen view with two signal capacity.

Type 2 – Screen type 2 is a three-up screen view with one large signal capacity and two small signal capacities.

Type 3 – Screen type 3 is a four-up display with four small signal capacities.

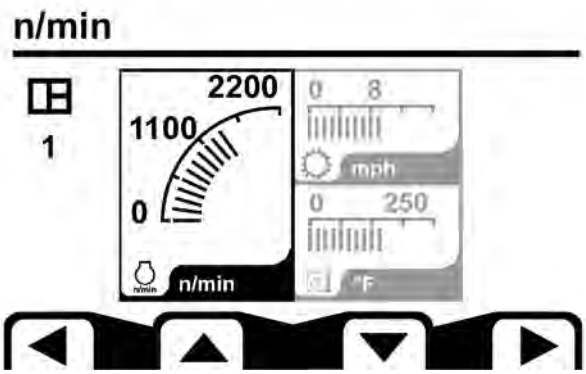

Illustration 67 g02802599

3. After the screen type is selected, select which signals to monitor. Use the up and down keys to cycle through the available signals.

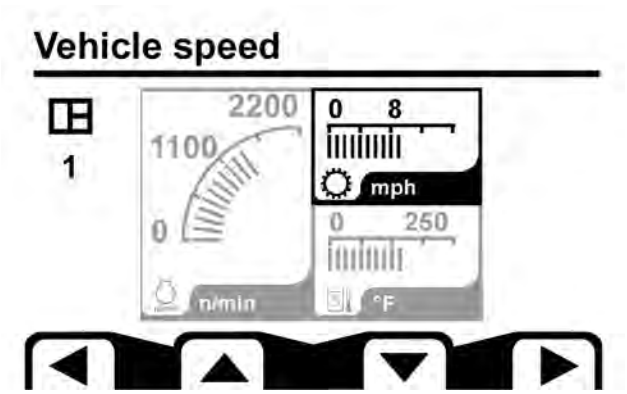

Illustration 68 g02802777

4. After a signal selection is made, press the next key in order to go to the next selection area. Use the up, down, and next keys to select the signals.

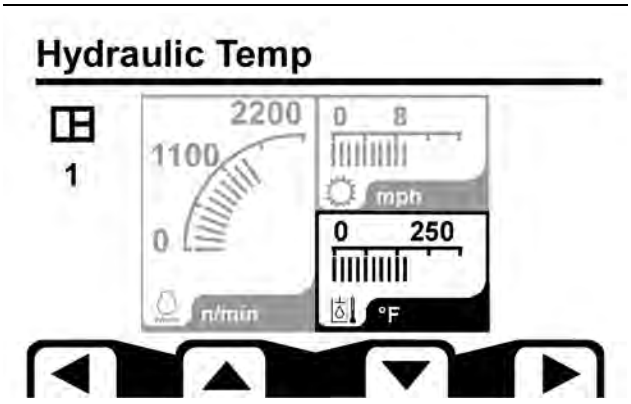

Illustration 69 g02802797

5. Using the next key will rotate through the selections in a clockwise rotation. After all signal selections have been made, press the exit key in order to return to the previous menu.

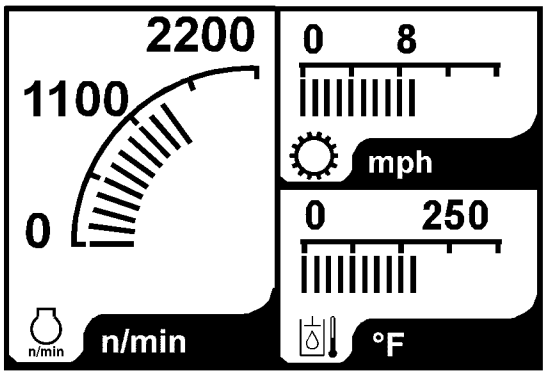

Illustration 70 g02802816

6. Navigate back for more screen selections, or press the exit key five times in order to display the current selections.

System Setup

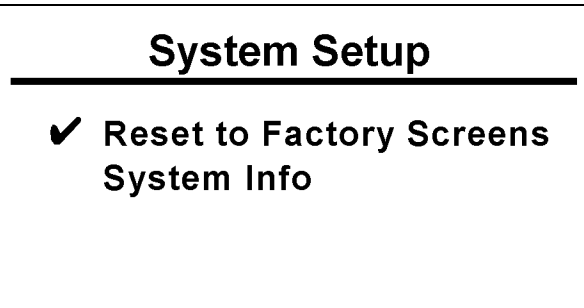

Illustration 71 g02796437

Use the System Setup menu to monitor and control applications systems. Use this menu to access the following setup menus:

- Reset to Factory Screens
- System Info

Reset Defaults

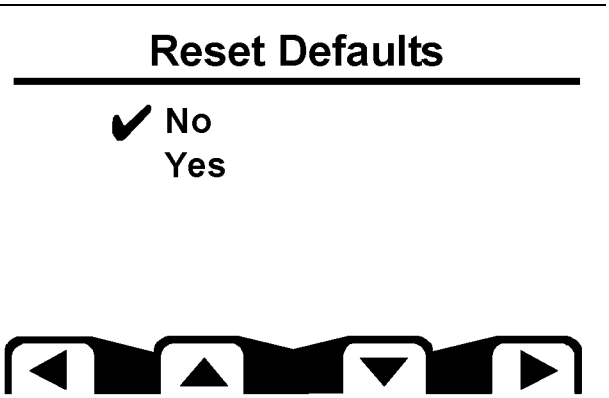

Illustration 72 g02796454

Use the Reset Defaults menu to reset all the monitoring system settings to the original factory default settings.

System Info

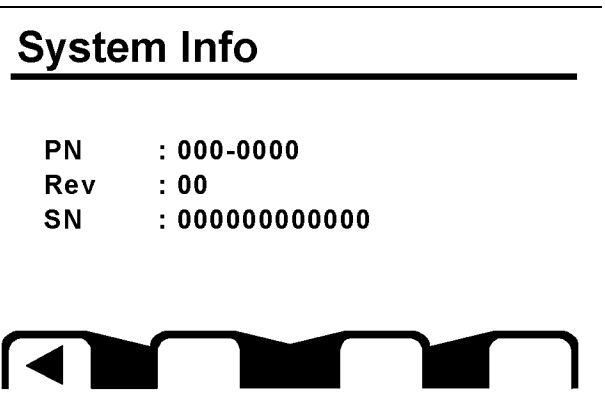

Illustration 73 g02796494

The System Info screen displays the part number, the software revision number, and the serial number. Only information is displayed in the System Info screen. No changes can be made.

Fault Pop-Up Alarms

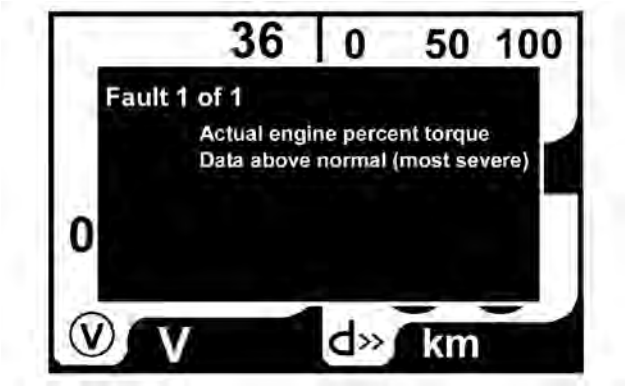

Illustration 74 g02625876

When a fault is detected on the network, a fault information pop-up window will be displayed listing the current fault information.

Warning lights will flash when a popup alarm occurs and will stay flashing until acknowledged. Warning lights will remain lit until the fault is no longer on the network.

Press the exit button in order to clear the pop-up alarm and return directly to the previous display information. Press the up key in order to go to the next fault. Press the down key in order to go to the previous fault. Press the select key in order to clear the pop-up and go directly to the current active fault information screen.

Faults that have been acknowledged and are no longer active will be shown in the Active Faults log in italics. Logged faults will be displayed in the Previous Faults log.

Signals

The following signals are available for monitoring:

Battery Voltage

Coolant Temp

Engine Oil Press

Engine Speed SW

Fuel Level

Hydraulic Temp

n/min

i06263982

Operation Information

SMCS Code: 1000; 7000

Operate the machine only when the operator is correctly seated in the operator compartment.

For machines that are equipped with a ROPS, a seat belt should be worn at all times during machine operation to prevent serious injury or death in the event of an accident or machine overturn. Failure to wear a seat belt during machine operation may result in serious injury or death.

For machines that are NOT equipped with a ROPS, falling from a machine could cause serious injury or death. Seat belts should be worn when driving the machine on public roads.

Operate the controls only when the engine is operating.

Inspect the machine for proper operation of controls.

Operate the machine slowly in an open area in order to inspect the protective devices.

The work area must be clear. The operator can then proceed to operate the machine.

Only the operator is allowed on the machine.

Report any needed repairs.

Maintain a safe distance from the edge of cliffs, overhangs, and slide areas.

i04984890

Backup Alarm

SMCS Code: 7406

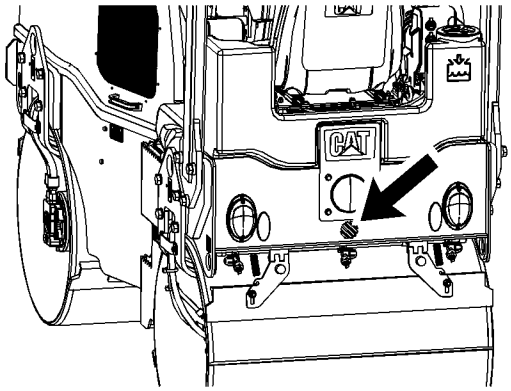

Illustration 75 g03164896

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

Backup Alarm – The backup alarm will sound when the propel lever is in the REVERSE position. The backup alarm alerts any personnel that the machine is backing up.

i04984969

Rollover Protective Structure (ROPS)
(Foldable)

SMCS Code: 7323

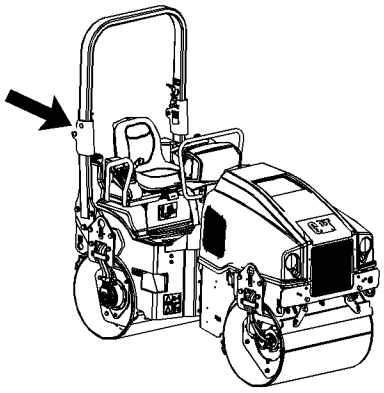

Illustration 76 g03165497

If the machine is equipped with a foldable rollover protective structure (ROPS), the ROPS must be in the raised position before you operate the machine. Before the machine is shipped, lower the ROPS in order to provide more clearance during transportation. The ROPS can be folded toward the rear of the machine.

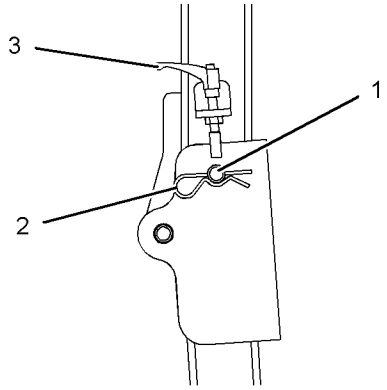

Illustration 77 g03165498

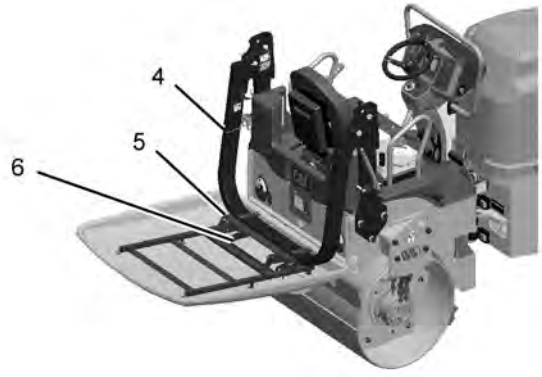

Illustration 78 g03485338

Raise

In order to raise the ROPS, perform the following steps for both folding joints on the ROPS:

1. If the machine is equipped with a canopy, perform steps 1a through 1d prior to raising the ROPS.

a. Remove the canopy pins from position (6).

b. Lower the canopy.

c. Insert the canopy pins into position (5).

d. Disconnect hold down cables (4).

2. Raise the ROPS to the full upright position. Use two people to raise the ROPS.

3. Install the locking pin (1).

4. Install cotter pin (2) through locking pin (1). The cotter pin will lock the locking pins in place.

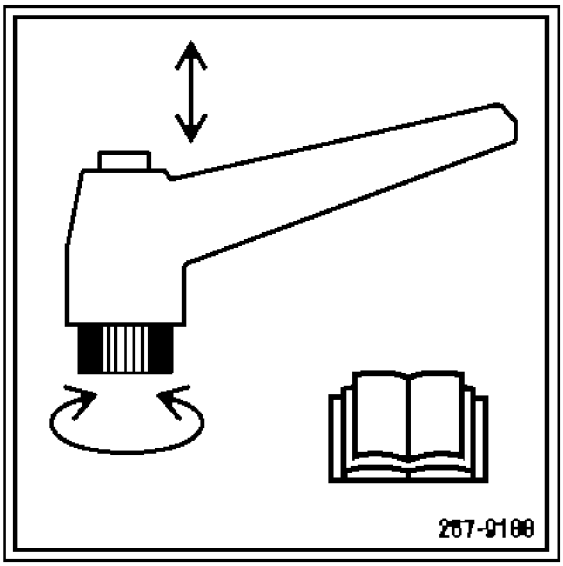

Illustration 79 g01114409

5. Tighten locking lever (3).

Note: In order to tighten the locking lever, perform the following procedure:

a. Turn the locking lever clockwise. Turn the locking lever by one-half turn.

b. Raise the locking lever.

c. Turn the locking lever counterclockwise by one-half turn.

d. Release the locking lever, and allow the locking lever to lower.

e. Repeat step 5a and step 5d until the locking lever is tight. Move the locking lever to the full counterclockwise position after the locking lever is tightened.

Lower

In order to lower the ROPS, perform the following steps for both folding joints on the ROPS:

1. Loosen locking lever (3).

Note: In order to loosen the locking lever, perform the following procedure:

a. Raise the locking lever.

b. Turn the locking lever clockwise by one-half turn.

c. Release the locking lever, and allow the locking lever to lower.

d. Turn the locking lever counterclockwise by one-half turn.

e. Repeat step 1a and 1d until the locking lever is loosened.

2. Remove the cotter pin and the locking pin in order to fold the ROPS toward the rear of the machine.

3. Lower the ROPS. Use two people to lower the ROPS.

4. If the machine is equipped with a canopy, perform steps 4a through 4d after lowering the ROPS.

a. Attach hold down cables (4).

b. Remove the canopy pins from position (5).

c. Raise the canopy.

d. Insert the pins into position (6).

5. In order to store locking pin (1), install locking pin (1) into the hole on the ROPS post.

6. Install cotter pin (2) through locking pin (1). The cotter pin will lock the locking pin in place.

i05031820

Additive Spray System
(If Equipped)

SMCS Code: 5615

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

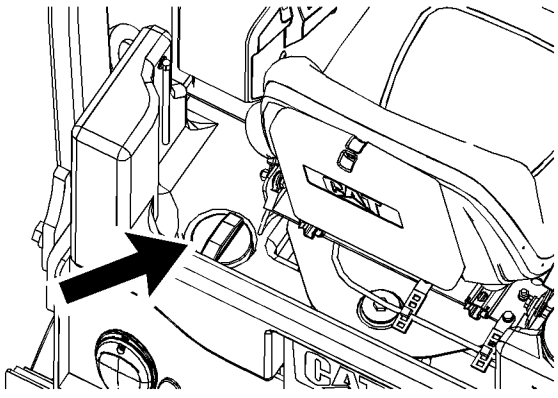

Illustration 80 g03202714

An optional tank for the additive spray system is located at the rear of the machine. The additive spray prevents asphalt from sticking to the tires.

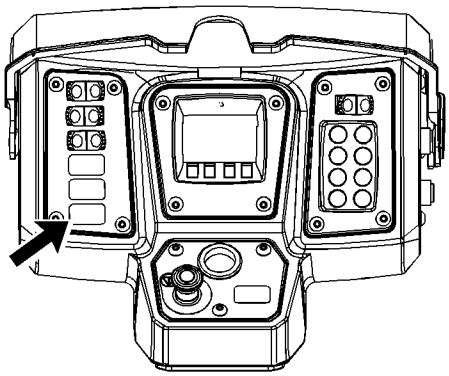

Illustration 81 g03448123

Use the additive spray switch in order to control the additive spray system.

Engine Starting

i05006869

Engine Starting

SMCS Code: 1000; 7000

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starter to cool for 2 minutes before cranking again.

Turbocharger damage can result, if the engine is not kept at low idle until the engine oil light/gauge verifies the oil pressure is sufficient.

The key must be in the RUN position with the engine on in order to maintain electrical functions, maintain hydraulic functions and prevent serious machine damage.

If the engine does not start, return the key to the OFF position before you return the key to START.

NOTICE
Do not use ether starting fluid in diesel engines equipped with inlet manifold heater.

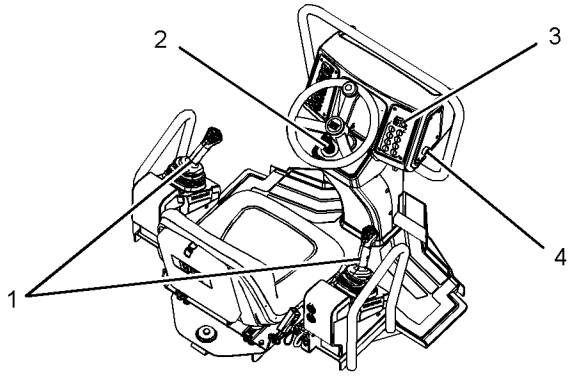

Illustration 82 g03179061

Use the following procedure in order to start the engine.

1. Lift auxiliary shutdown knob (2).

2. Push down on the right side of parking brake switch (3) in order to apply the parking brake.

3. Move the propel control levers (1) to the NEUTRAL position.

4. Turn key (4) clockwise to the ON position in order to activate the glow plugs. Wait until the monitoring system indicates the machine is ready to start.

Note: The glow plugs may not activate during higher ambient temperatures or higher engine temperatures.

5. Briefly sound the horn before you start the engine.

6. Turn key (4) clockwise to the START position. When the engine starts release the key.

i05458749

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE
Steering the machine completely to the steering stops while the hydraulic oil is below 0 °C (32 °F) can damage the steering system.

In temperatures below 0 °C (32 °F) work warm oil into the system by steering only a small amount at a time in each direction. Slowly increase the amount of each turn before steering completely to the steering stop.

1. Allow a cold engine to warm up at LOW IDLE for at least 5 minutes.

2. Cycle all controls in order to allow warm oil to circulate through all of the lines and the cylinders.

Observe the following recommendations during the warm-up period for the engine:

- In temperatures above 0°C (32°F), the warm-up period is 5 minutes.
- In temperatures below 0°C (32°F), the warm-up period is 15 minutes or longer.
- In temperatures below −18°C (0°F), more time is required if the hydraulic controls are sluggish.
- Do not use the machine if the filter indicator is ON.

Parking

i06248062

Stopping the Machine

SMCS Code: 7000

NOTICE
Park the machine on a level surface. If it is necessary to park on a grade, securely block the tires and the drum.

Do not apply the parking brake while the machine is moving unless an emergency exists.

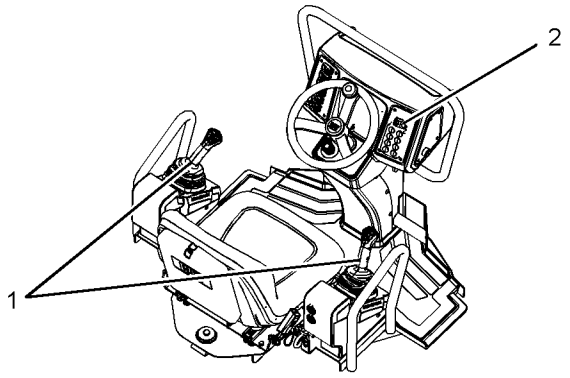

Illustration 83 g03179117

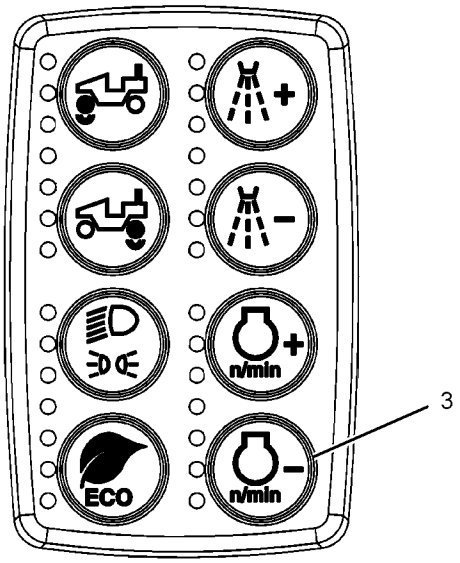

Illustration 84 g03179122

1. Move the propel control (1) to the NEUTRAL position.

2. Push the throttle control decrease button (3) until the low mode is selected.

3. Push down parking brake switch (2) in order to apply the parking brake.

Freezing Conditions

If freezing conditions are expected, the drums should be cleaned of mud and dirt. Park the machine on wood planks in order to prevent the drums from freezing to the ground.

Drain the water system and emulsion system (if equipped) in order to prevent damage.

i05006895

Stopping the Engine

SMCS Code: 1000; 7000

NOTICE
Stopping the engine immediately after it has been working under load, can result in overheating and accelerated wear of the engine components.

Follow the stopping procedure outlined below, in order to allow the engine to cool and prevent excessive temperatures in the turbocharger center housing, which could cause oil coking problems.

1. Before you stop the engine, allow the engine to run at low idle with no load for 5 minutes.

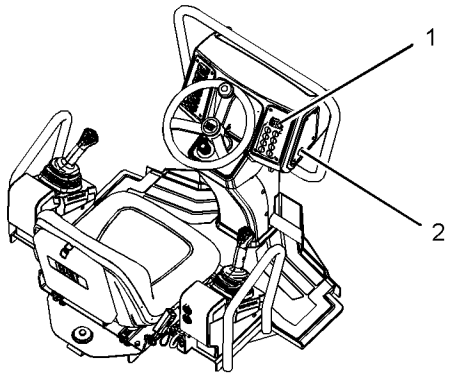

Illustration 85 g03179227

2. Push down parking brake switch (1) in order to apply the parking brake.

3. Be sure that all of the controls are in the OFF position.

4. Turn engine start switch (2) to the OFF position. Remove the key.

i02489691

Leaving the Machine

SMCS Code: 7000

1. Use the steps and the handholds in order to dismount the machine. Face the machine in order to dismount the machine.
2. Inspect the engine compartment for debris. Clean any debris from the engine compartment in order to avoid a fire. Clean any paper from the engine compartment in order to avoid a fire.
3. If the machine is being parked for an extended period of time, for example overnight, turn the battery disconnect switch to the OFF position.
4. Install all covers and locks in order to provide protection against vandalism.

i07445321

Machine Storage

SMCS Code: 7000

The Safety Section of this Operation and Maintenance Manual contains storage information for fuels, lubricants, and ether (if equipped).

The Operation Section of this Operation and Maintenance Manual contains information for short-term storage of this machine. This information includes engine shutdown, parking, and instructions for leaving the machine.

For detailed steps on long-term storage refer to Special Instruction, SEHS9031, “Storage Procedure for Caterpillar Products”. This Special Instruction provides information on a specified storage period of up to 1 year.

Transportation Information

i04986430

Shipping the Machine

SMCS Code: 7000; 7500

Investigate the travel route for overpass clearances. Make sure that there is adequate clearance for the machine that is being transported.

Remove ice, snow, or other slippery material from the loading dock and from the truck bed before you load the machine onto the transport machine. Removing ice, snow, or other slippery material will help to prevent the machine from slipping in transit.

NOTICE
Obey all state and local laws governing the mass, width and length of a load.

Observe all regulations governing wide loads.

When you move the machine to a colder climate, make sure that the cooling system has the proper antifreeze.

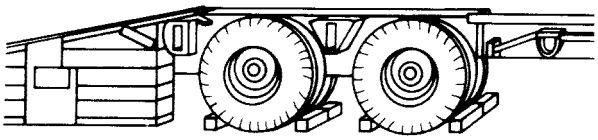

Illustration 86 g00303463

1. Before you load the machine, chock the trailer wheels or the rail car wheels, as shown.

2. Move the machine into position and engage the parking brake.

If the machine is equipped with an optional canopy, then the machine should be facing rearward when the machine is positioned on the trailer.

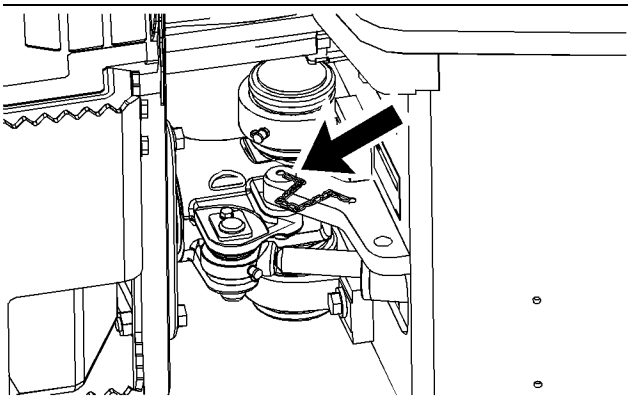

Illustration 87 g03162543

3. Stop the engine and install the steering frame lock into the LOCKED position. The pin will hold the front frame and the rear frame rigid.

Refer to the Operation and Maintenance Manual, “Steering Frame Lock” for further information.

4. Block the machine, and tie down the machine. Refer to the Operation and Maintenance Manual, “Lifting and Tying Down the Machine” for more information.

5. Lock the doors and the access covers. Attach any vandalism protection. Install the cover on the console. Cover the operator seat.

6. To protect the cooling systems, mix the solution of antifreeze and water. The solution should provide protection to the lowest expected outside temperature. Drain the excess coolant into a suitable container.

7. Perform a walk-around inspection and measure the fluid levels in the various compartments.

8. Travel at a moderate speed. Observe all speed limitations when you are roading the machine.

Consult your Caterpillar dealer for shipping instructions for your machine.

i02854698

Roading the Machine

SMCS Code: 7000; 7500

Note: Before roading the machine, consult your tire dealer for recommended tire pressures and speed limitations.

Inflate the tires to the correct pressure. Refer to the Operation and Maintenance Manual, “Tire Inflation Pressure Adjustment”.

The performance of the tires on the machine are specified by a rating of ton-kilometer per hour (ton-mile per hour). Consult your tire dealer for the specification of the tires on your machine. Observe the specified ton-kilometer per hour (ton-mile per hour) of the tires.

Perform a walk around inspection of the machine. Measure the fluid levels in the various compartments.

Check with the proper officials in order to obtain the required licenses.

Install any required flags, signals, or lights.

Travel at a moderate speed. Observe all speed limitations when you road the machine.

When you travel a long distance at full speed, stop the machine after 30 minutes.

In order to allow the tires to cool, stop the machine for 30 minutes.

In order to allow the components to cool, stop the machine for 30 minutes.

i04986654

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

⚠ WARNING

Improper lifting or tie-downs can allow load to shift and cause injury and damage.

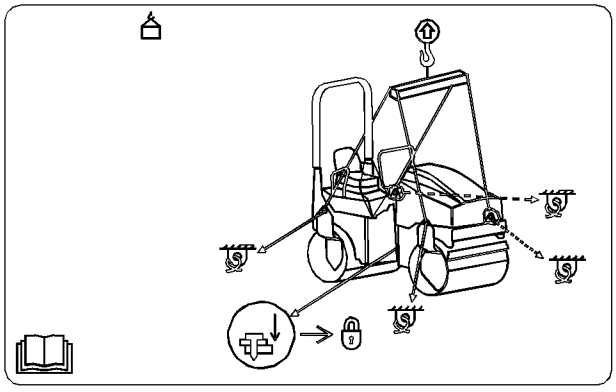

Illustration 88 g03166436

For the specifications of the machine, refer to Operation and Maintenance Manual, “Specifications”.

For specifications of any work tools, refer to the Operation and Maintenance Manual for the specific work tool.

Lifting Mass – The lifting mass indicates the maximum weight of the machine without any work tools.

Steering Frame Lock – The steering frame lock is used to secure the front frame and the rear frame from articulation.

Lock – Place all necessary locks in the locked position.

Lifting Point – In order to lift the machine, attach the lifting devices to the lifting points.

Tie Down Point – In order to tie down the machine, attach the tie-downs to the tie down points.

Lifting the Machine

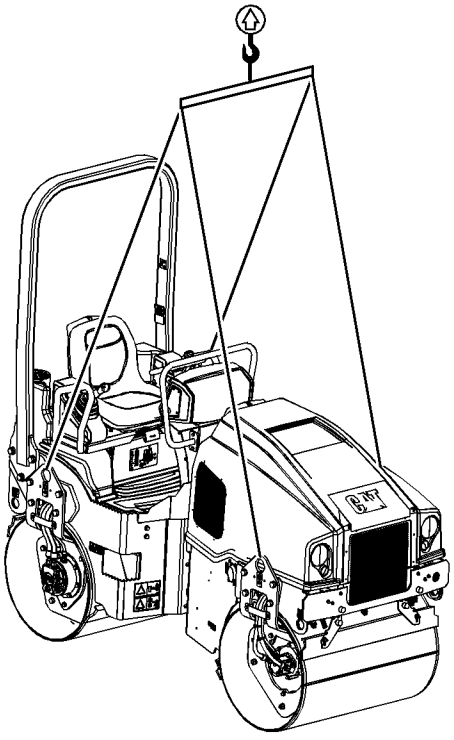

Illustration 89 g03166456

Use properly rated cables and properly rated slings in order to lift the machine.

Position the crane or the lifting device in order to lift the machine in a level position.

1. Move the machine into position.

2. Apply the parking brake.

3. Turn the engine start switch key to the OFF position. Remove the key.

4. Install the steering frame lock pin.

5. Attach lifting cables to the lifting eyes. The lifting eyes are identified on the machine by labels. There are two lifting eyes on each side of the machine and one optional lifting eye on top of the machine.

6. Lift the machine slowly in order to make sure that the machine stays level. Move the machine to the desired position.

Tying Down the Machine

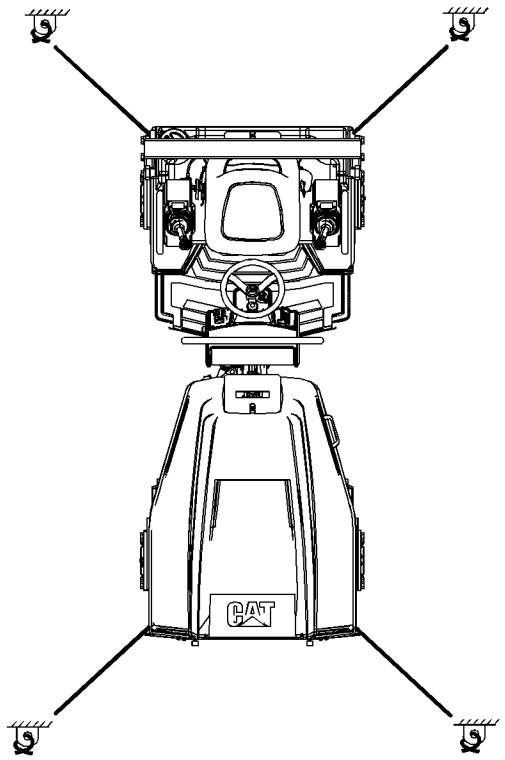

Illustration 90 g03166459

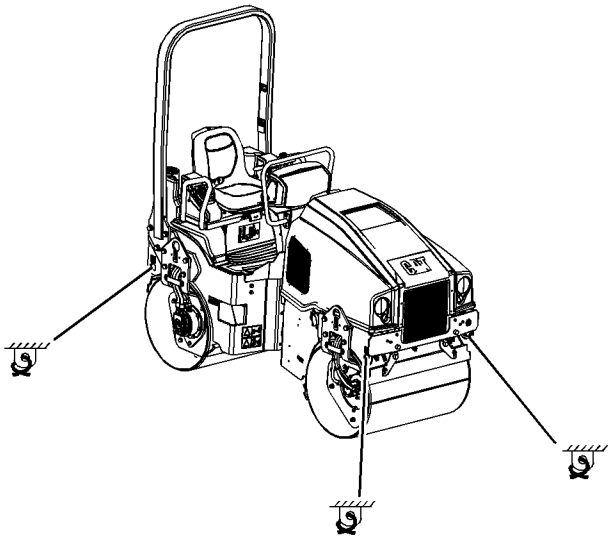

Illustration 91 g03166460

Do not tie down the machine over the operator platform. Tying down over the operator platform will reduce the life of the drum mounts and the isolation mounts for the platform.

Do not tie down the machine over the articulation hitch. Tying down over the articulation hitch will reduce the life of the articulation bearings, and could break the articulation hitch.

Use one chain per tie down point. Running a single chain through multiple tie down points can damage the scrapers, the spray bars, or other parts of the machine.

1. Move the machine into position.
2. Apply the parking brake.
3. Turn the engine start switch key to the OFF position. Remove the key.
4. Install the steering frame lock pin.
5. Place blocks under the front and the rear frames. The blocks will reduce the stress on the rubber isolation blocks.
6. Chock the front drum and the rear drum or tires.
7. Use the tie-down positions in order to secure the machine. The tie-down positions are identified on the machine by labels. There are two tie-down positions on each side of the machine.

Refer to Operation and Maintenance Manual, “Shipping the Machine” for shipping instructions.

Towing Information

i05006963

Towing the Machine

SMCS Code: 7000

⚠ WARNING

Improper hookup and towing is dangerous and could result in injury or death to yourself or others.

The towing connection must be rigid, or towing must be done by two machines of the same size as the towed machine. If two machines are used, connect a machine on each end of the towed machine.

If only one machine is used for towing, that machine must be larger than the towed machine.

Be sure that all necessary repairs and adjustments have been made before a machine that has been towed to a service area is put back into operation.

These towing instructions are for moving a disabled machine for a short distance at low speed. Move the machine at a speed of 2 km/h (1.2 mph) or less to a convenient location for repair. These instructions are only for emergencies. Always haul the machine if long distance moving is required.

Shielding must be provided on both machines. Shielding will protect the operator if the tow line or the tow bar breaks.

Do not allow an operator to be on the machine that is being towed unless the operator can control the steering and/or the braking.

Before towing, make sure that the tow line or the tow bar is in good condition. Make sure that the tow line or the tow bar has enough strength for the towing procedure that is involved. The strength of the towing line or of the tow bar should be at least 150 percent of the gross weight of the towing machine. This is true for a disabled machine that is stuck in the mud and for towing on a grade.

Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

Quick machine movement could overload the tow line or the tow bar. Overloading could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.

Normally, the towing machine should be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade that is involved and for the distance that is involved.

Sufficient control and sufficient braking must be provided when you are moving a disabled machine downhill. This may require a larger towing machine or additional machines that are connected to the rear. This will prevent the machine from rolling away out of control.

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. On inclines in poor condition or on surfaces in poor condition, maximum towing machine capacity is required.

Attach the towing device and the machine before you release the brakes.

Consult your Caterpillar dealer for towing a disabled machine.

Running Engine

If the engine is running, the machine can be towed for a short distance under certain conditions. The power train and the steering system must be operable.

The operator must steer the machine that is towed in the direction of the tow line.

Ensure that all instructions in this section are followed carefully. Ensure that all instructions in this section are followed exactly.

Stopped Engine

⚠ WARNING

Shutting off the engine will result in the loss of machine steering.

When the engine is stopped, additional steps may be required before the machine is towed. In order to avoid damaging the power train, the steering system, and the brakes, which may be inoperable, additional steps may be required.

1. Block the drum or block the tires securely in order to prevent the movement of the machine. Do not remove the blocking until the tow vehicle has been positioned and the tow lines are in place.

NOTICE
Release the parking brake to prevent excessive wear and damage to the braking system when towing.

The procedure for manual release of the parking brake is outlined in the Operation and Maintenance Manual, “Parking Brake Manual Release”.

2. Manually release the parking brake. Refer to the Operation and Maintenance Manual, “Parking Brake Manual Release” for more information.

3. Attach the tow line to the machine at the tow points.

4. Attach the tow line to the vehicle that is used to tow the disabled machine.

5. Remove blocks from the drum or from the tires.

6. Tow the disabled vehicle at a slow rate of speed to the desired location.

7. Once the machine is at the desired location, securely block the drum or block the tires. Blocking the drums or tires will prevent movement of the machine.

8. Engage the parking brake.

9. Detach the tow lines.

i05006919

Parking Brake Manual Release

SMCS Code: 4267; 4354

⚠ WARNING

Personal injury or death can result from a brake malfunction. Do not operate the machine if the brake was applied due to a malfunction of the brake system.

Correct any problem before attempting to operate the machine.

Manual Brake Release With Hand Pump for CC24B

To release the parking brake manually on the CC24B, perform the following procedure:

1. In order to prevent the machine from moving, block the drum and block the tires securely.

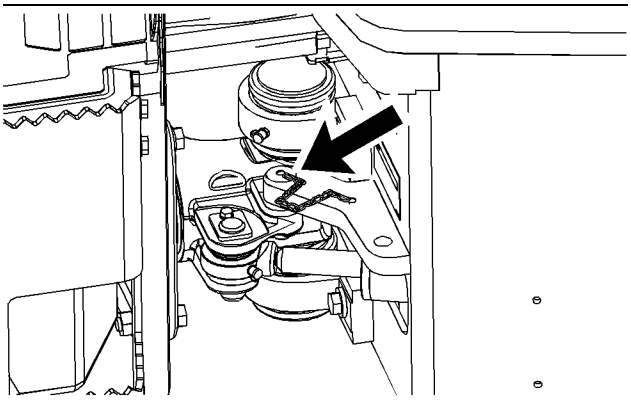

Illustration 92 g03162543

2. In order to hold the front frame and the rear frame rigid, install the steering frame lock into the LOCKED position.

Note: Refer to the Operation and Maintenance Manual, “Steering Frame Lock” for further information.

3. Open the engine compartment.

4. Ensure that the propel lever is in the neutral position. If the propel lever is not in the neutral position, the hand pump will not build pressure.

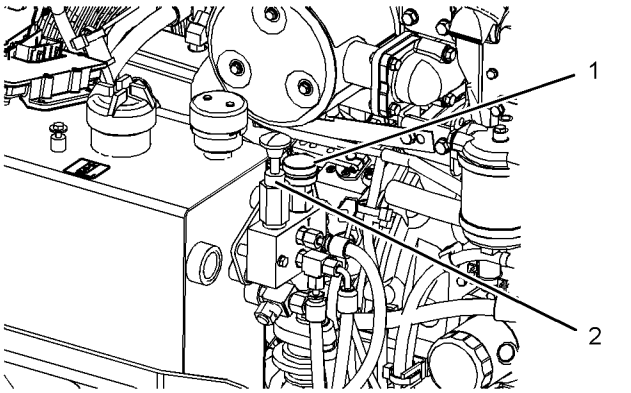

Illustration 93 g03179318

5. Close needle valve (1). The setscrew in the knob of the needle valve must be released in order to open the needle valve.

6. Pump the hand pump (2) until the pump (2) will no longer pump. Approximately five to seven full strokes of the pump will be required. The brakes are now released.

7. In order to engage the brakes, open needle valve (1).

Manual Brake Release for CB22B, CB24B, and CB32B

To release the parking brake manually on the CB22B, CB24B, and CB32B drum propel motors, perform the following procedure:

1. In order to prevent the machine from moving, block the drum and block the tires securely.

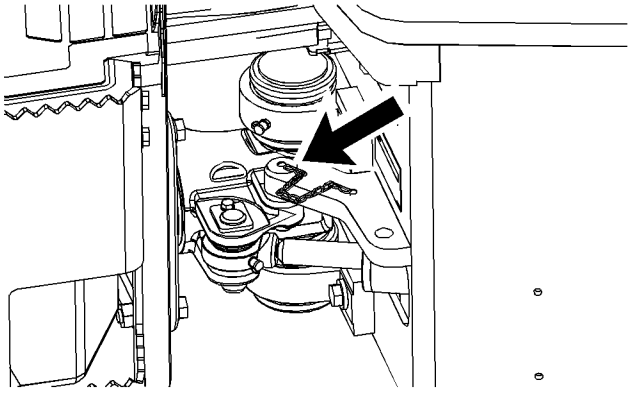

Illustration 94 g03162543

2. In order to hold the front frame and the rear frame rigid, install the steering frame lock into the LOCKED position.

Note: Refer to the Operation and Maintenance Manual, “Steering Frame Lock” for further information.

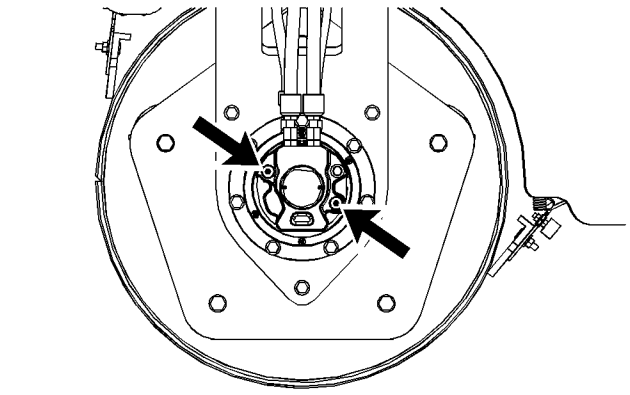

Illustration 95 g03179280

3. Remove the plugs in order to access the release screws for the front drum propel motor which is located on the left side of the drum.

4. Evenly tighten the two release screws in order to compress the brake springs by approximately two turns.

5. Repeat step 3 and step 4 in order to release the rear drum propel motor which is located on the right side of the rear drum.

Engine Starting (Alternate Methods)

i03650200

Engine Starting with Jump Start Cables

SMCS Code: 1000; 7000

⚠ WARNING

Failure to properly service the batteries may cause peronal injury.

Prevent sparks near the batteries. They could cause vapors to explode. Do not allow the jump start cable ends to contact each other or the machine.

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear eye protection when starting a machine with jump start cables.

Improper jump start procedures can cause an explosion resulting in personal injury.

Always connect the battery positive (+) to battery positive (+) and the battery negative (−) to battery negative (−).

Jump start only with an energy source with the same voltage as the stalled machine.

Turn off all lights and accessories on the stalled machine. Otherwise, they will operate when the energy source is connected.

NOTICE
When starting from another machine, make sure that the machines do not touch. This could prevent damage to engine bearings and electrical circuits.

Severely discharged maintenance free batteries do not fully recharge from the alternator after jump starting. The batteries must be charged to proper voltage with a battery charger. Many batteries thought to be unusable are still rechargeable.

This machine has a 12 volt starting system. Use only the same voltage for jump starting. Use of a welder or higher voltage damages the electrical system.

Refer to Special Instruction, Battery Test Procedure, SEHS7633, available from your Caterpillar dealer, for complete testing and charging information.

Use of Jump Start Cables

When the auxiliary start receptacles are not available, use the following procedure.

1. Make the initial determination of the machine's failure to crank. The procedure is applicable even if the machine does not have a diagnostic connector.
2. Move the propel control lever of the stalled machine into the NEUTRAL position. Engage the parking brake.
3. Turn the engine start switch on the stalled machine to the OFF position. Turn off all accessories.
4. Move the machine that is being used as a power source so that the jump start cables can reach the stalled machine. **DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.**
5. Stop the engine on the machine that is being used as a power source. If you are using an auxiliary power source, turn off the charging system.
6. Check the battery caps for correct placement and for correct tightness. Make these checks on both machines. Make sure that the batteries in the stalled machine are not frozen. Check the batteries for low electrolyte.
7. Connect the positive jump start cable to the positive battery terminal on the stalled machine.

   Do not allow positive cable clamps to contact any metal except for the positive remote jump start terminal.
8. Connect the positive jump start cable to the positive terminal of the boost source.
9. Connect one end of the negative jump start cable to the negative terminal of the electrical source.
10. Make the final connection. Connect the negative cable to the frame of the stalled machine. Make this connection away from the battery, the fuel, the hydraulic lines, or moving parts.
11. Start the engine on the machine that is being used as a power source. If you are using an auxiliary power source, energize the charging system on the auxiliary power source.
12. Wait for a minimum of two minutes while the batteries in the stalled machine partially charge.
13. Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, “Engine Starting”.

14. Immediately after you start the stalled engine, disconnect the jump start cable from the machine that is being used as a power source. Disconnect the negative battery cable first, and then disconnect the positive battery cable.

15. Disconnect the other end of the jump start cable from the stalled machine.

16. When the engine is running and the charging system is in operation, conclude the failure analysis on the starting charging system of the stalled machine, as required.

Maintenance Section

Maintenance Access

i04988331

Access Doors and Covers

SMCS Code: 7251; 7263; 7273-572; 7273; 7273-573

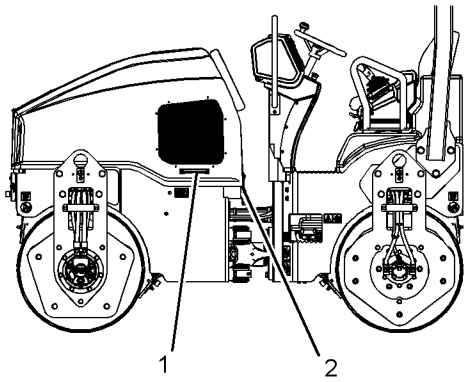

Illustration 96 g03167820

In order to open the hood, pull latch (2) away from the locking eye and lift on handle (1). Opening the hood will allow access to the engine and major compartments.

Tire Inflation Information

i05508467

Tire Inflation with Air

SMCS Code: 4203

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

⚠ 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.

Table 7

Tire Size	Minimum Pressure	Maximum Pressure
9.5/65-15	220 kPa (32 psi)	324 kPa (47 psi)

Note: The contact area for the tire varies 15 mm (0.6 inch) over the tire pressure range that is recommended.

i02610518

Tire Inflation Pressure Adjustment

SMCS Code: 4203

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

Always obtain the proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. The tire pressure in a warm shop area 18° to 21°C (65° to 70°F) will significantly change when you move the machine into freezing temperatures. If you inflate the tire to the correct pressure in a warm shop, the tire will be underinflated in freezing temperatures. Low pressure shortens the life of a tire.

Reference: When you operate the machine in freezing temperatures, refer to Special Publication, SEBU5898, “Cold Weather Recommendations for All Caterpillar Machines” in order to adjust tire inflation pressures.

Lubricant Viscosities and Refill Capacities

i05009749

Lubricant Viscosities
(Fluids Recommendations)

SMCS Code: 1000; 7000; 7581

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–Up

General Information for Lubricants

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 recommended.

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

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

Selecting the Viscosity

In order to select the proper oil for each machine compartment, refer to the “Lubricant Viscosity for Ambient Temperature” table. Use the oil type AND oil viscosity for the specific compartment at the proper ambient temperature.

The proper oil viscosity grade is determined by the minimum ambient temperature (the air in the immediate vicinity of the machine). Measure 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 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.

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 “General Information for Lubricants” article, “Lubricant Viscosities” tables, and any associated footnotes. Consult your Cat dealer if additional information is needed.

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

Engine Oil

Cat oils have been developed and tested in order to provide the full performance and life that has been designed and built into Cat engines.

Cat DEO-ULS multigrade and Cat DEO multigrade oils are formulated with the correct amounts of detergents, dispersants, and alkalinity in order to provide superior performance in Cat diesel engines where recommended for use.

Note: SAE 10W-30 is the preferred viscosity grade for the 3116, 3126, C7, C-9, and C9 diesel engines when the ambient temperature is between -18° C (0° F) and 40° C (104° F).

Note: C175 Series diesel engines require the use of **multigrade** SAE 40 oil. For example: SAE 0W-40, SAE 5W-40, SAE 10W-40, or SAE 15W-40. In ambient temperatures of −9.5° C (15° F) or above, SAE 15W-40 is the preferred oil viscosity grade

Table 8

Lubricant Viscosities for Ambient Temperatures						
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 SYN Cat DEO SYN	SAE 5W-40	−30	50	−22	122
	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

When fuels of sulfur level of 0.1 percent (1000 ppm) or higher are used, Cat DEO-ULS may be used if S·O·S oil analysis program is followed. Base the oil change interval on the oil analysis.

Hydraulic Systems

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 SYN
- Cat DEO SYN
- Cat DEO-ULS Cold Weather

Table 9

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Hydraulic System	**Cat HYDO Advanced 10** 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 SYN Cat DEO SYN	SAE 5W-40	−25	40	−13	104
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

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 10

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

Diesel Fuel Recommendations

Diesel fuel must meet “Caterpillar 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 Caterpillar 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.

Standard Factory Fill Fluids

Table 11

Standard Factory Fill Fluids[1]					
Compartment or System	Oil Viscosities	°C		°F	
		Min	Max	Min	Max
Engine Crankcase	SAE 15W-40	−9.5	50	15	122
Hydraulic Systems	Cat HYDO Advanced 10	-20	40	-4	104

(1) The machine is delivered from the factory with the designated fluids.

i06247993

Lubricant Viscosities
(Fluids Recommendations)

SMCS Code: 1000; 7000; 7581

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

General Information for Lubricants

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 recommended.

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

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

Selecting the Viscosity

In order to select the proper oil for each machine compartment, refer to the “Lubricant Viscosity for Ambient Temperature” table. Use the oil type AND oil viscosity for the specific compartment at the proper ambient temperature.

The proper oil viscosity grade is determined by the minimum ambient temperature (the air in the immediate vicinity of the machine). Measure 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 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.

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 “General Information for Lubricants” article, “Lubricant Viscosities” tables, and any associated footnotes. Consult your Cat dealer if additional information is needed.

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

Engine Oil

Cat oils have been developed and tested in order to provide the full performance and life that has been designed and built into Cat engines.

Cat DEO-ULS or oils that meet the Cat ECF-3 specification and the API CJ-4 are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification and the API CJ-4 and ACEA E9 oil categories have been developed with limited sulfated ash, phosphorus, and sulfur. These chemical limits are designed to maintain the expected aftertreatment devices life, performance, and service interval. If oils meeting the Cat ECF-3 specification and the API CJ-4 specifications are not available, oils meeting ACEA E9 may be used. ACEA E9 oils meet the chemical limits designed to maintain aftertreatment device life. ACEA E9 oils are validated using some but not all ECF-3 and API CJ-4 standard engine performance tests. Consult your oil supplier when considering use of an oil that is not Cat ECF-3 or API CJ-4 qualified.

Failure to meet the listed requirements will damage aftertreatment-equipped engines and can negatively impact the performance of the aftertreatment devices. The Diesel Particulate Filter (DPF) will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)
- Selective Catalytic Reduction (SCR)
- Lean NOx Traps (LNT)

Other systems may apply.

Table 12

Lubricant Viscosities for Ambient Temperatures						
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 SYN	SAE 5W-40	−30	50	−22	122
	Cat DEO-ULS	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS	SAE 15W-40	−9.5	50	15	122

Hydraulic Systems

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 SYN
- Cat DEO SYN
- Cat DEO-ULS Cold Weather

Table 13

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Hydraulic System	**Cat HYDO Advanced 10** 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

(continued)

(Table 13, contd)

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
	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 SYN Cat DEO SYN	SAE 5W-40	−25	40	−13	104
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

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 14

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

Diesel Fuel Recommendations

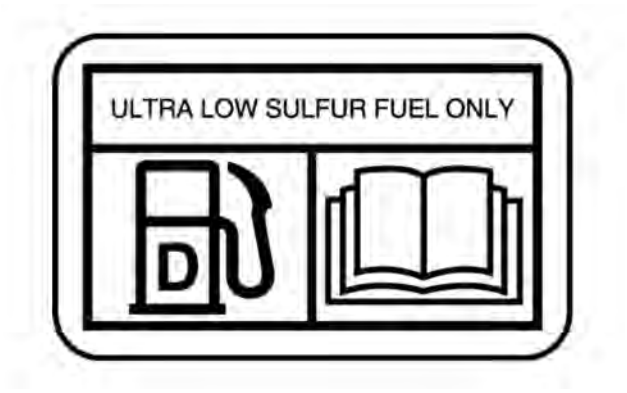

Illustration 97 g02157153
NACD Film

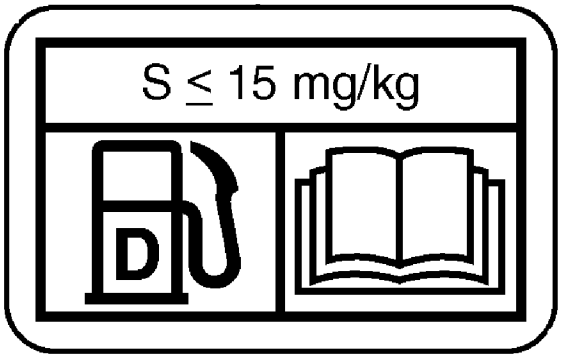

Illustration 98 g02052934
EAME Film

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.

NOTICE
Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤10ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

Misfueling with fuels of higher sulfur level will invalidate the warranty and have the following negative effects:

- **Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)**
- **Adversely impact the performance and life of aftertreatment devices (cause loss of performance)**
- **Reduce regeneration intervals of aftertreatment devices**
- 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.

Failures that result from the use of improper fuels are not Cat factory defects. Therefore the cost of repairs would not be covered by a Cat 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. For Tier 4/Stage IIIB/Stage IV certified engines always follow operating instructions. Fuel tank inlet labels are installed in order to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels, lubricants, and Tier 4 requirements. 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.

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (15 ppm sulfur or less, per “ASTM D975”). In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel (10 ppm sulfur or less, per “EN 590”). The final blend must have 15 ppm sulfur or less.

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.

Standard Factory Fill Fluids

Table 15

Standard Factory Fill Fluids(1)			
Compartment or System	**Oil Viscosities**	**°C**	**°F**

(continued)

(Table 15, contd)

		Min	Max	Min	Max
Engine Crankcase	SAE 10W-30	−18	40	0	104
Hydraulic Systems	Cat HYDO Advanced 10	-20	40	-4	104

(1) The machine is delivered from the factory with the designated fluids.

i05009693

Capacities (Refill)

SMCS Code: 1000; 6320; 7000; 7560

Table 16

REFILL CAPACITIES Approximate			
Compartment or System	**Liters**	**US Gallon**	**Imperial Gallon**
Fuel Tank	62.4	16.48	13.72
Engine Oil	6	1.59	1.32
Hydraulic Tank Oil	22	5.81	4.84
Water Spray Tank CB22B, CB24B, CB32B	235	62.08	51.69
Water Spray Tank CC24B	195	51.51	42.89
Additive Spray Tank CC24B	26	6.87	5.72
Coolant	10.5	2.77	2.31

i07445339

S·O·S Information

SMCS Code: 1348; 3080; 4070; 4250; 4300; 5050; 7542

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.

The effectiveness of S·O·S Services is dependent on timely submission of the sample to the laboratory at recommended intervals.

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

i06066971

System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 3000-553-PX; 4250-553-PX; 4300-553-PX; 5050-553-PX; 7540-553-PX

⚠ WARNING

Personal injury or death can result from sudden machine movement.

Sudden movement of the machine can cause injury to persons on or near the machine.

To prevent injury or death, make sure that the area around the machine is clear of personnel and obstructions before operating the machine.

Coolant System

⚠ 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.

To relieve the pressure from the coolant system, turn off the machine. Allow the cooling system pressure cap to cool. Remove the cooling system pressure cap slowly in order to relieve pressure.

Hydraulic System

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered, oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

1. Shut off the engine.
2. Slowly loosen the filler cap in order to release the pressure in the hydraulic tank.
3. Tighten the filler cap.
4. The pressure in the hydraulic system has been released. Lines and components can be removed.

i07382254

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 Cat 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.

i07107967

Maintenance Interval Schedule

SMCS Code: 1000; 7000

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

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 may be extended substantially. 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 50 Service Hours

Every 50 Service Hours or 2 Weeks

Every 100 Service Hours or 2 Weeks

Every 250 Service Hours

Every 250 Service Hours or 3 Months

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

Every 500 Service Hours

Every 500 Service Hours or 3 Months

Every 500 Service Hours or 1 Year

Every 1000 Service Hours or 1 Year

Every Year

Every 3000 Service Hours

Every 3000 Service Hours or 18 Months

Every 3000 Service Hours or 2 Years

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

Every 5000 Service Hours

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i07107966

Maintenance Interval Schedule

SMCS Code: 1000; 7000

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–Up

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 may be extended substantially. 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 50 Service Hours

Every 50 Service Hours or 2 Weeks

Every 100 Service Hours or 2 Weeks

Every 250 Service Hours

Every 250 Service Hours or 3 Months

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

Every 500 Service Hours

Every 500 Service Hours or 3 Months

Every 500 Service Hours or 1 Year

Every 1000 Service Hours or 1 Year

Every Year

Every 3000 Service Hours

Every 3000 Service Hours or 18 Months

Every 3000 Service Hours or 2 Years

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

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i06250509

Additive Spray System - Drain

SMCS Code: 5615-543

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

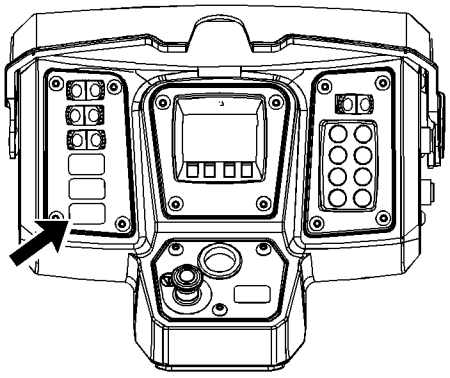

Illustration 99 g03448123

Additive spray control

1. Turn on the additive spray system.

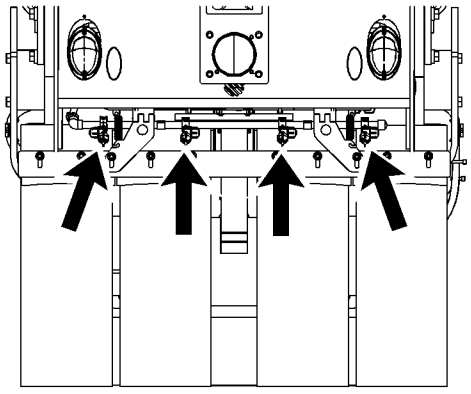

Illustration 100 g03202922

2. Allow the tank to drain through the spray nozzles.

3. Place a suitable container under the spray nozzle. Loosen the locking collar on one of the spray nozzles and allow the liquid within the spray bar to drain. Tighten the locking collar and ensure that the nozzle is pointed toward the drum. Repeat for each nozzle.

4. Turn off the additive spray system.

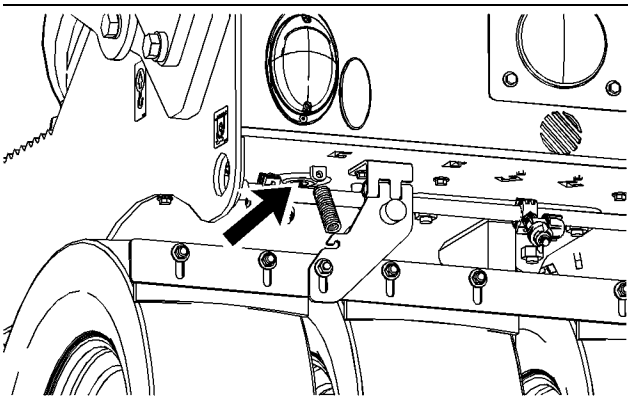

Illustration 101 g03202957

5. In order to remove any remaining additive, place a suitable container under the additive tank drain plug and remove the drain plug.

6. Allow the additive to drain, then reinstall the additive tank drain plug.

Note: The additive spray system must be primed after the system is refilled. Refer to Operation and Maintenance Manual, “Additive Spray System - Prime” for information on priming the additive spray system.

i06283666

Additive Spray System - Prime

SMCS Code: 5615-548

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

Perform the following steps in order to prime the additive spray system:

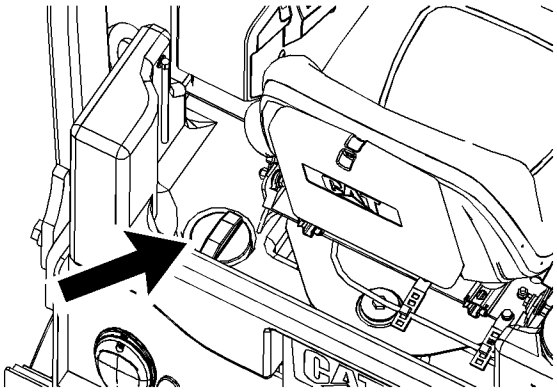

Illustration 102 g03202714

1. Remove the lid from the additive spray system tank.

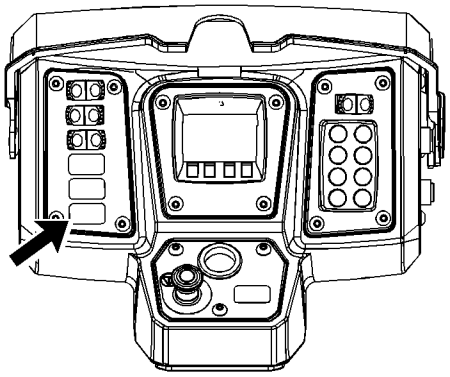

Illustration 103 g03448123

2. Turn the additive spray system ON. Run the additive spray system until the system begins to spray.

3. Turn the additive spray system OFF.

4. Install the lid on the additive spray system tank.

i04988529

Articulating and Oscillating Bearings - Lubricate

SMCS Code: 7051-086-BD; 7057-086-BD; 7113-086-BD

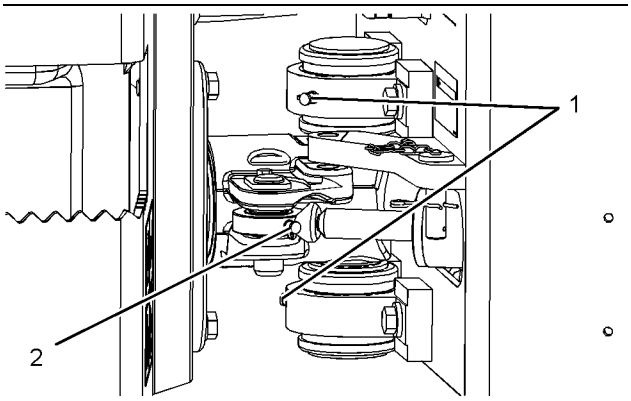

Illustration 104 g03168023

(1) Articulating Bearings
(2) Oscillation Bearing

The hitch is located in the center pivot area.

Lubricate the Articulation Bearings

1. Clean all caps before servicing.

2. Clean all fittings before servicing.

3. Lubricate the fittings for the articulation bearings (1) with ten strokes from a hand grease pump (16 to 20 cubic centimeters per fitting).

Note: Excess grease can cause seal damage.

4. Install all caps after servicing.

Lubricate the Oscillating Bearing

1. Clean the cap before servicing.

2. Clean the fitting before servicing.

3. Lubricate the fitting for the oscillation bearing (2) until grease comes out of the casting.

4. Install the cap after servicing.

i04988795

Backup Alarm - Test

SMCS Code: 7406-081

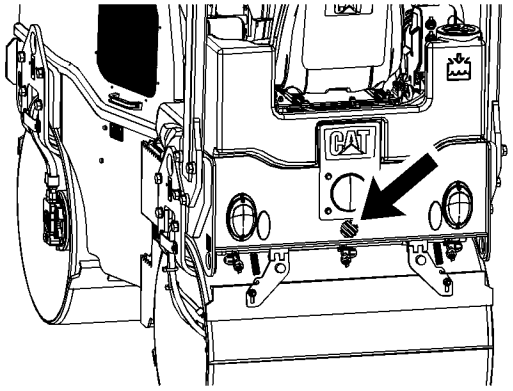

Illustration 105 g03164896

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

1. Engage the parking brake.

2. Start the engine.

3. Move the propel control lever to the REVERSE position. The backup alarm should sound immediately. The backup alarm will continue to sound until the propel control lever is moved to the NEUTRAL position or to the FORWARD position.

4. If the backup alarm does not sound, make the necessary repairs before operating the machine. Consult your Caterpillar dealer.

i05397290

Battery - Clean/Check

SMCS Code: 1401-535; 1401-070; 1402-535; 1402-070

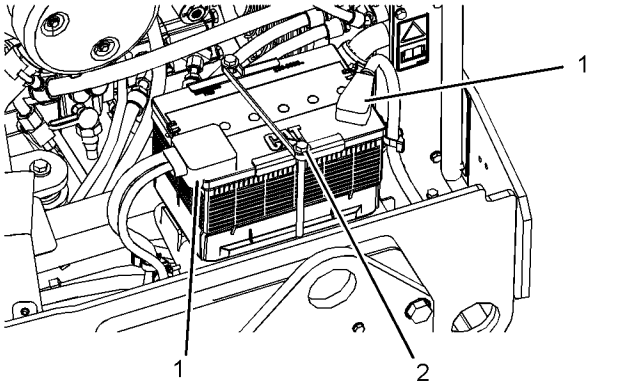

Illustration 106 g03411123

Note: The batteries that are supplied with the machines are maintenance free batteries. You do not need to check the level of the electrolyte in the maintenance free batteries.

Tighten the battery retainer (2) on the battery. Tighten the battery retainer at every 1000 hours.

Check the following items at every 1000 hours. If necessary, check the following items more often.

- Clean the top of the batteries with a clean cloth.
- Clean the battery terminals (1). As needed, coat the battery terminals with petroleum jelly.
- Check the battery cables. Tighten any loose connections.

i06543763

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i02870183

Battery or Battery Cable - Inspect/Replace

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

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

2. Open the engine compartment. Refer to Operation and Maintenance Manual, “Access Doors and Covers”. The battery is located on the front right side of the engine compartment.

3. Disconnect the negative battery cable at the battery.

4. Disconnect the positive battery cable from the battery.

5. Remove the cable from the engine starter.

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

7. Reverse the above steps in order to reconnect the battery.

8. Close the engine compartment.

i04988873

Belts - Inspect/Adjust/Replace

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

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

Your engine is equipped with one belt that operates the alternator and the water pump, and another belt that operates the air pump. For maximum engine performance and maximum utilization of your engine, inspect the belts for wear and for cracking. Check the tension of the belts. Adjust the tension of the belts in order to minimize belt slippage. Belt slippage will decrease the belt life. Belt slippage will also cause poor performance.

Alternator Belt and Water Pump Belt

1. Park the machine and stop the engine.

2. Open the engine compartment.

3. Remove the fan guard in order to gain access to the belt.

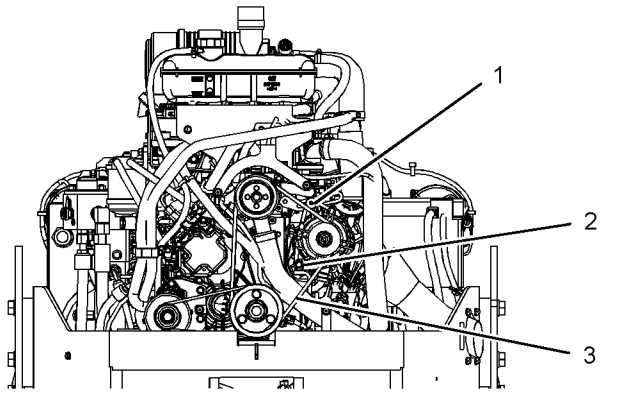

Illustration 107 g03170619

4. To check the belt tension, apply 110 N (25 lb) of force midway between the pulleys. Correctly adjusted belts will deflect 13 to 19 mm (1/2 to 3/4 inch).

5. In order to adjust belt (3), loosen mounting bolts (1) and (2).

6. To achieve the correct adjustment, move the alternator inward or move the alternator outward, as required.

7. Tighten mounting bolts (1) and (2).

Note: The alternator shaft nut must be tightened to a torque of 50 ± 5 N·m (37 ± 4 lb ft).

8. If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at the rated speed. Adjust the belt tension again if the tension has changed.

9. Install the fan guard.

10. Close the engine compartment.

Air Pump Belt

1. Park the machine and stop the engine.

2. Open the engine compartment.

3. Remove the fan guard in order to gain access to the belt.

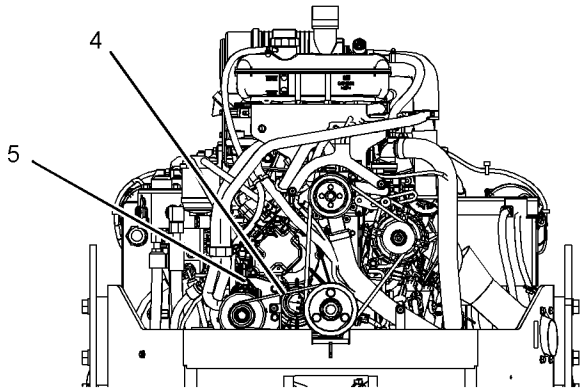

Illustration 108 g03170656

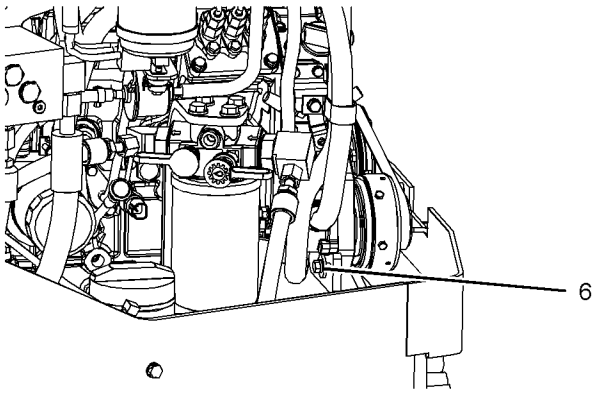

Illustration 109 g03170660

4. To check the belt tension, apply 110 N (25 lb) of force midway between the pulleys. Correctly adjusted belts will deflect 13 to 19 mm (1/2 to 3/4 inch).

5. In order to adjust belt (4), loosen mounting bolts (5) and (6).

6. To achieve the correct adjustment, move the air pump inward or move the air pump outward, as required.

7. Tighten mounting bolts (5) and (6).

8. If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at the rated speed. Adjust the belt tension again if the tension has changed.

9. Install the fan guard.

10. Close the engine compartment.

i06656448

Belts - Inspect/Adjust/Replace

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

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–Up

Your engine is equipped with one belt that operates the alternator and the water pump. For maximum engine performance and maximum utilization of your engine, inspect the belt for wear and for cracking. Check the tension of the belts. Adjust the tension of the belt in order to minimize belt slippage. Belt slippage will decrease the belt life. Belt slippage will also cause poor performance.

Alternator Belt and Water Pump Belt

1. Park the machine and stop the engine.

2. Open the engine compartment.

3. Remove the fan guard in order to gain access to the belt.

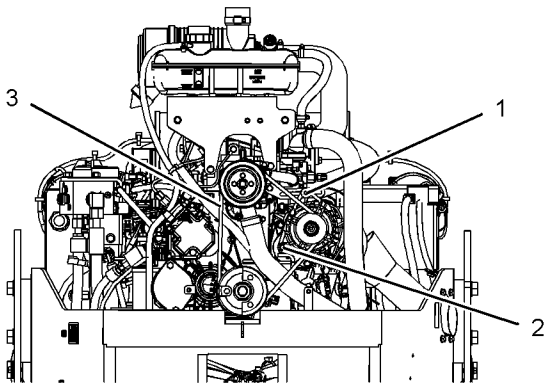

Illustration 110 g03179920

4. To check the belt tension, apply 110 N (25 lb) of force midway between the pulleys. Correctly adjusted belts will deflect 13 to 19 mm (1/2 to 3/4 inch).

5. In order to adjust belt (3), loosen mounting bolts (1) and (2).

6. To achieve the correct adjustment, move the alternator inward or move the alternator outward, as required.

7. Tighten mounting bolts (1) and (2).

Note: The alternator shaft nut must be tightened to a torque of 50 ± 5 N·m (37 ± 4 lb ft).

8. If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at the rated speed. Adjust the belt tension again if the tension has changed.

9. Install the fan guard.

10. Close the engine compartment.

i04991551

Braking System - Test

SMCS Code: 4250-081; 4267-081

Note: If the machine configuration changes, the parking brakes must be tested.

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

Put the steering frame lock in the UNLOCKED position.

Fasten the seat belt before checking the parking brake.

The following tests are used to determine if the parking brake is functional on a specified grade or a specified slope. These tests are not intended to measure the maximum brake holding effort. Read all of the steps before you perform the following procedure.

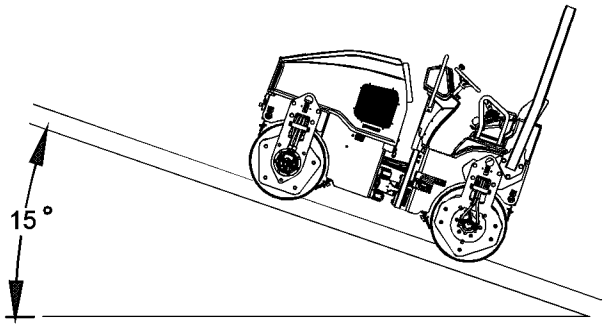

Illustration 111 g03170759

Position the machine on the incline of the slope, but near the base of the slope in order to check the parking brake. The test position should be 26 percent or a 15 degree slope.

1. Start the engine. Refer to the Operation and Maintenance Manual, “Engine Starting” for information on starting the engine.

2. Move the machine into the test position.

3. Place the throttle control into the LOW IDLE position.

4. Engage the parking brake.

The machine should not move under the following conditions.

- The engine is at low idle.
- The parking brake is applied.
- The machine is positioned on the specified slope.

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move, release the parking brake and use the propel lever in order to move the machine to a level surface.

5. Park the machine on a level surface.

6. Stop the engine.

NOTICE
If the machine moved during the brake test, consult your Caterpillar dealer.

The dealer must inspect the brake system and make any necessary repairs before the machine is returned to operation.

i06249609

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044-NL

⚠ WARNING

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

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

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

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

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

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

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

Dispose of all fluids according to local regulations and mandates.

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

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

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

Drain the coolant whenever the coolant is dirty. Drain the coolant when foam is observed.

1. Stop the engine. Allow the cooling system to cool completely.
2. Open the engine compartment. Refer to the Operation and Maintenance Manual, “Access Doors and Covers”.

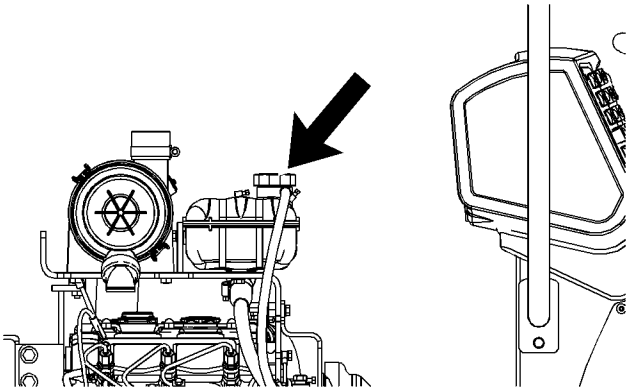

Illustration 112 g03170797

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

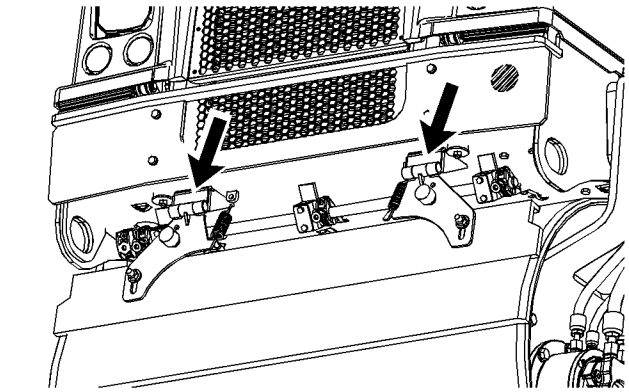

Illustration 113 g03871287

4. Remove the four bolts that hold the scraper brackets to the frame. Remove the scraper assembly.

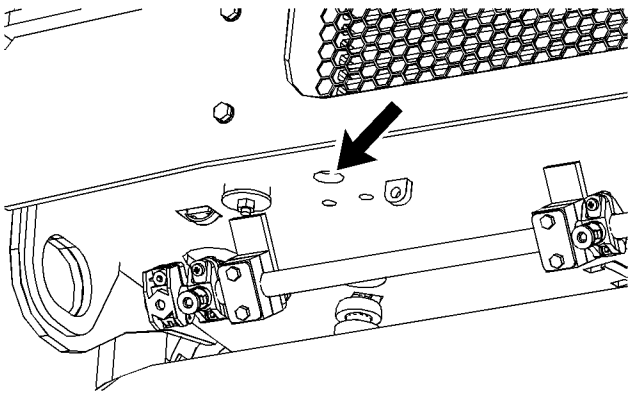

Illustration 114 g03871288

5. The radiator drain plug can be accessed through the hole located under the scraper bracket. Remove the radiator drain plug. Allow the coolant to drain into a suitable container.

6. Install the radiator drain plug.

7. Install the scraper assembly.

8. Fill the cooling system with clean water and with a 6 to 10% concentration of cooling system cleaner.

9. Install the cooling system pressure cap.

10. Close the engine compartment.

11. Start the engine. Run the engine for 90 minutes.

12. Stop the engine. Allow the cooling system to completely cool.

13. Open the engine compartment.

14. Remove the cooling system pressure cap.

15. Open the radiator drain valve. Drain the cleaning solution.

16. Flush the cooling system with water until the draining water is transparent.

17. Close the radiator drain valve.

18. Add the recommended amount of extender to the coolant system. Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the proper amount.

Note: If you are using Caterpillar Long Life Coolant that contains some additive, do not add any supplemental coolant additive at this time. Also, do not change the coolant conditioner element if you are using Caterpillar Long Life Coolant that contains some additive.

19. Start the engine and run the engine. Leave the cap off until the thermostat opens and the coolant level stabilizes.

20. Maintain the coolant level between the indicated lines on the shunt tank.

21. Inspect the gasket on the cooling system pressure cap. Replace the cooling system pressure cap if the gasket is damaged.

22. Install the cooling system pressure cap.

23. Close the engine compartment.

i05397384

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

⚠ WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

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

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

Dispose of all fluids according to local regulations and mandates.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system. For additional information about the addition of Extender, see the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

Use a 8T-5296 Coolant Test Kit to check the concentration of the coolant.

NOTICE
Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant, shortens coolant service life, and may cause premature wear to components.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

1. Stop the engine. Allow the cooling system to completely cool.

2. Open the engine compartment.

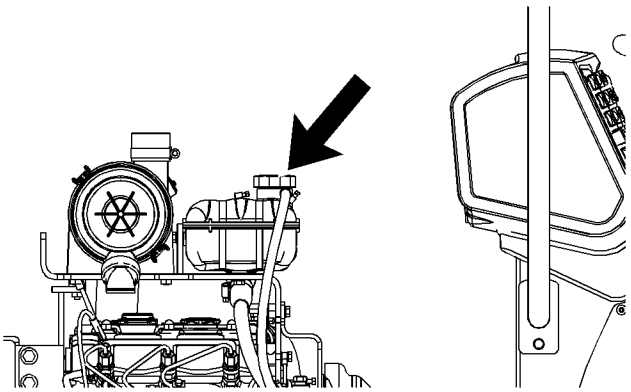

Illustration 115 g03170797

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

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

5. Add the recommended amount of extender to the coolant system. Refer to the Special Publication, SEBU6250, “Extended Life Coolant (ELC)” for the proper amount.

6. Maintain the coolant level between the indicated lines on the shunt tank.

7. Inspect the gasket on the cooling system pressure cap. Replace the cooling system pressure cap if the gasket is damaged.

8. Install the cooling system pressure cap.

9. Close the engine compartment.

For additional information on the addition of extender, see Special Publication, SEBU6250, “Coolant Recommendations” or consult your Caterpillar dealer.

i04991632

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

⚠ WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

Note: In order to access the areas required to perform this procedure, a portable access system (ladder, stair assembly, man lift, or other portable access system) that is suitable and compliant to local regulations may be necessary.

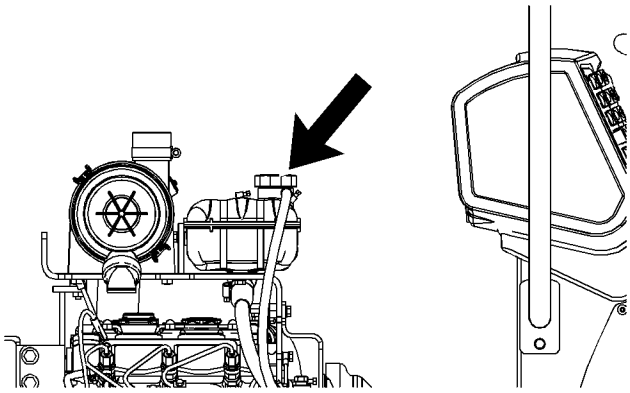

Illustration 116 g03170797

1. Slowly loosen the filler cap on the shunt tank in order to release any pressure in the system. Slowly remove the filler cap on the shunt tank.

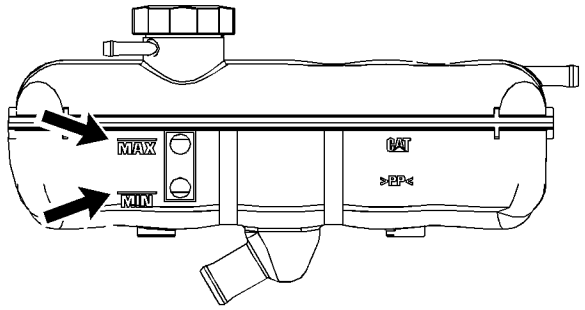

Illustration 117 g03170799

2. Maintain the coolant level between the indicated lines. If coolant must be added daily, check the cooling system for leaks. Repair the leaks as the leaks are found.

3. Inspect the gasket. Inspect the filler cap on the shunt tank. Clean the filler cap on the shunt tank with a clean cloth. Replace the cap if the gasket or the cap are damaged.

4. Install the filler cap on the shunt tank.

i05009959

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-554; 1395-008; 7542-008; 7542

Note: It is not necessary to obtain a Coolant Sample (Level 1) if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

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

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

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.

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

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

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. The recommended sampling interval for Level 1 Coolant Analysis is every 250 service hours. In order to receive the full effect of S·O·S analysis, a consistent trend of data must be established. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from the drain for a system.

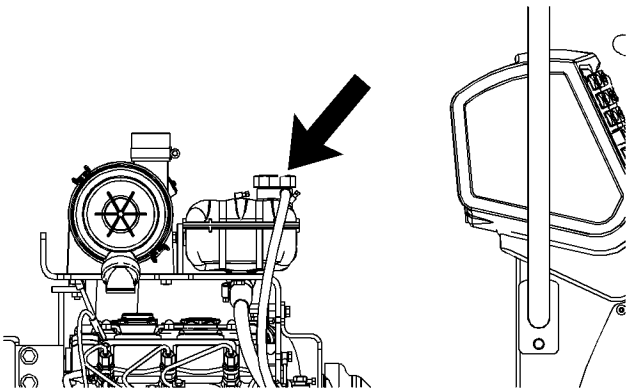

Illustration 118 g03170797

⚠ WARNING

Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure.

1. The machine must be operated in order to circulate the coolant. Collect the sample after a normal workday. Collect the samples from one to two hours after the engine has been shut off.
2. Start the engine momentarily in order to circulate the coolant again.
3. Shut off the engine.
4. Carefully remove the cooling system pressure cap.
5. Use a vacuum pump and draw the sample. Do not allow dirt or other contaminants to enter the sampling bottle. Fill the sampling bottle three-fourths from the top. Do not fill the bottle completely.
6. Place the sampling bottle with the completed label into the mailing tube.
7. Install the cooling system pressure cap.

i07349178

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 1395-554; 7542-008; 7542

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

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

Submit the sample for Level 2 analysis.

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

i05397395

Cooling System Pressure Cap - Clean/Replace

SMCS Code: 1382-510; 1382-070

⚠ WARNING

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

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

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

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

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

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

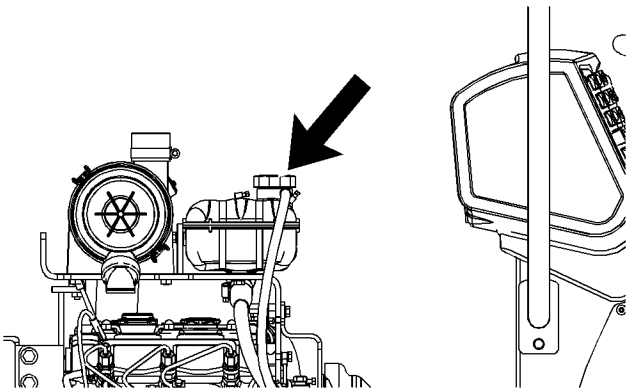

Illustration 119 g03170797

2. Remove the cooling system pressure cap slowly in order to relieve pressure.
3. Inspect the cooling system pressure cap for foreign material, for deposits, and for damage. Clean the cooling system pressure cap with a clean cloth. If the cooling system pressure cap is damaged, replace the cooling system pressure cap.
4. Install the cooling system pressure cap.
5. Close the engine compartment.

i05397415

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

⚠ WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

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

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

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

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

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

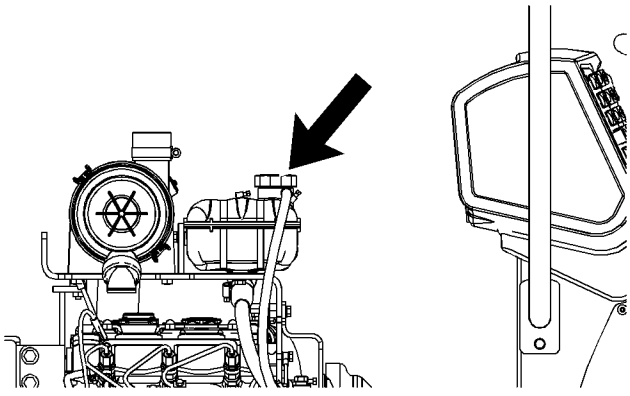

Illustration 120 g03170797

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

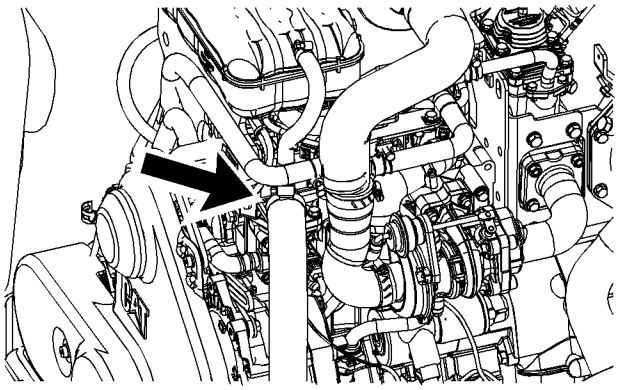

Illustration 121 g03411188

3. Remove the housing for the water temperature regulator.

4. Remove the gasket and remove the water temperature regulator.

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

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

5. Install a new water temperature regulator and install a new gasket.

6. Install the housing for the water temperature regulator.

7. Add the cooling system coolant. Maintain the coolant level between the indicated lines on the shunt tank.

8. Inspect cooling system pressure cap and the gasket for damage. Replace the pressure cap if the pressure cap or the gasket are damaged.

9. Install the cooling system pressure cap.

10. Close the engine compartment.

i05406820

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–Up

⚠ WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

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

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

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

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

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

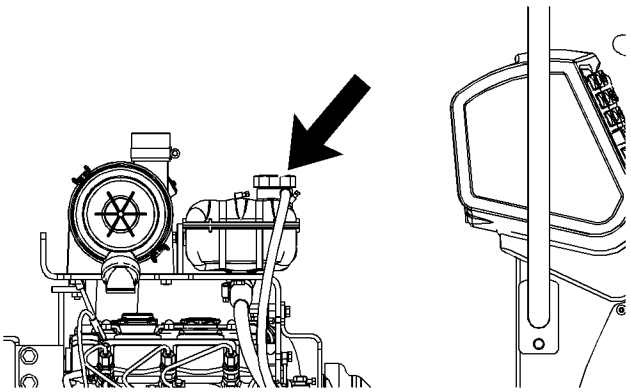

Illustration 122 g03170797

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

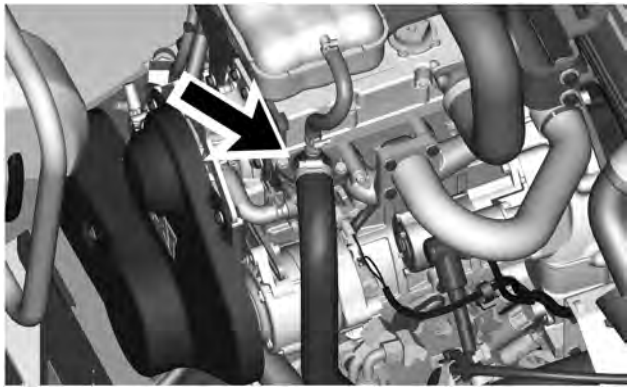

Illustration 123 g03414682

3. Remove the housing for the water temperature regulator.

4. Remove the gasket and remove the water temperature regulator.

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

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

5. Install a new water temperature regulator and install a new gasket.

6. Install the housing for the water temperature regulator.

7. Add the cooling system coolant. Maintain the level of the coolant to 1 cm from the bottom of the fill pipe.

8. Inspect cooling system pressure cap and the gasket for damage. Replace the pressure cap if the pressure cap or the gasket are damaged.

9. Install the cooling system pressure cap.

10. Close the engine compartment.

i07400083

Diesel Particulate Filter - Clean (Emission Related Component)

SMCS Code: 108F-070; 1091-070

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

Consult your Cat dealer when the DPF needs to be cleaned.

The approved Caterpillar DPF maintenance procedure requires that one of the following actions be taken when the DPF needs to be cleaned:

- The DPF from your machine can be replaced with a new DPF
- The DPF from your machine can be replaced with a remanufactured DPF
- The DPF from your machine can be cleaned by your local authorized Cat dealer, or a Caterpillar approved DPF cleaning machine, and reinstalled

Note: To maintain emissions documentation, the DPF that is removed from the machine when the DPF is cleaned must be reinstalled on the same machine.

Note: A specific ash service regeneration must be performed before removing a DPF that will be cleaned. All three scenarios listed above require a reset of the ash monitoring system in the engine ECM.

i04991849

Drum Scrapers - Inspect/ Adjust/Replace

SMCS Code: 6607-040; 6607-025; 6607-510

Inspect Scrapers

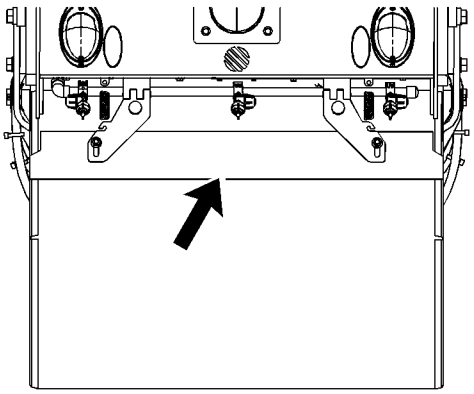

Illustration 124 g03170978

1. Remove dirt and debris from scrapers.

2. Inspect the scrapers for wear or damage.

3. Move the scraper down using the adjustment slots that are provided on the support for the scraper in order to maintain the original angle of the scraper. If no adjustment remains in the slot, replace the scraper.

Adjust Scrapers

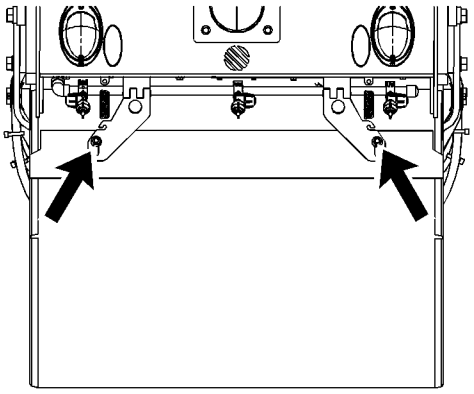

Illustration 125 g03171121

1. Adjust the scraper so that the drum scraper touches the width of the drum.

2. Loosen the bolts in order to adjust the scraper. When the scraper is in the desired position, tighten the bolts.

Replace Scrapers

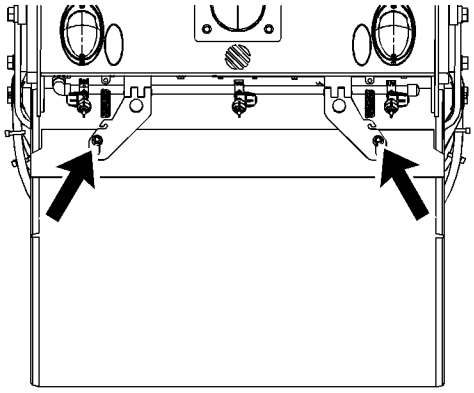

Illustration 126 g03171121

1. Loosen the bolts and remove the damaged scraper.

2. Install the new scraper and tighten the bolts.

3. Adjust the scraper in order to touch the drum.

4. Install the drum scraper so that the bolts are at the top of the adjustment slots in the support for the scraper.

i06250385

Eccentric Weight Bearings - Inspect

SMCS Code: 6606-040-BD

The eccentric weight bearings should be inspected periodically as part of a preventive maintenance schedule. Consult your Cat dealer for information concerning the inspection of the eccentric weight bearings.

For additional information, refer to Disassembly and Assembly, “Eccentric Weight - Remove and Install”.

i01953476

Engine Air Filter Primary Element - Clean/Replace

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

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

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

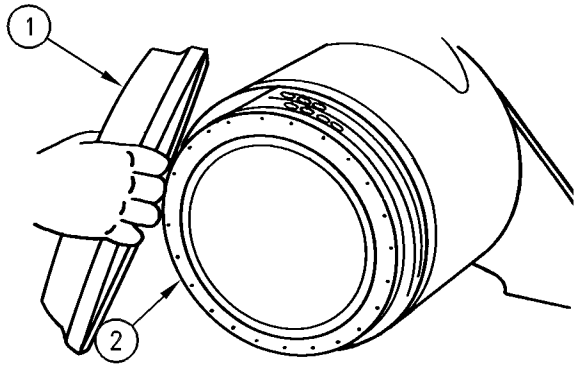

Illustration 127 g00102316

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

2. Remove primary filter element (2) from the air filter housing.

3. Clean the inside of the air filter housing.

4. If the machine is equipped with a vacuator valve, clean the vacuator valve on the cover for the air filter housing.

5. Install a clean primary air filter element. Install the cover for the air filter housing.

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

6. Reset the engine air filter service indicator.

7. Close the access door.

If the yellow piston in the indicator moves into the red zone after starting the engine or the exhaust smoke is still black after installation of a clean primary filter element, install a new primary filter element. If the piston remains in the red zone replace the secondary element.

Cleaning Primary Air Filter Elements

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

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

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

Do not wash the filter element.

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

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

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

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

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

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

- Pressurized air
- Vacuum cleaning

Pressurized Air

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

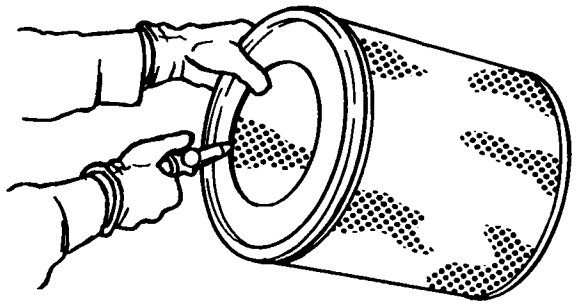

Illustration 128 g00281692

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

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

Vacuum Cleaning

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

Inspecting the Primary Air Filter Elements

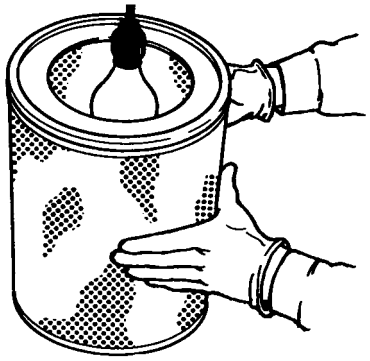

Illustration 129 g00281693

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

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

Storing Primary Air Filter Elements

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

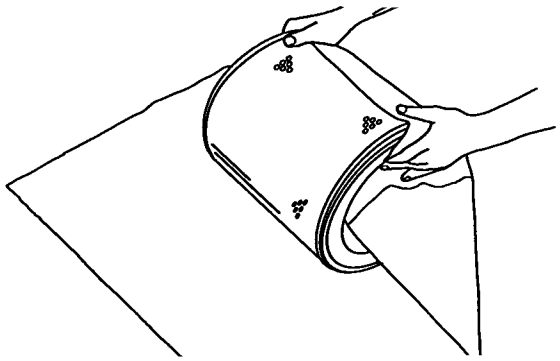

Illustration 130 g00281694

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

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

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i01822684

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 replaced, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the exhaust smoke is still black.

1. Open the access door on the front left side of the machine.
2. See Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”. Remove the air cleaner cover from the air cleaner housing. Remove the primary filter element from the air cleaner housing.

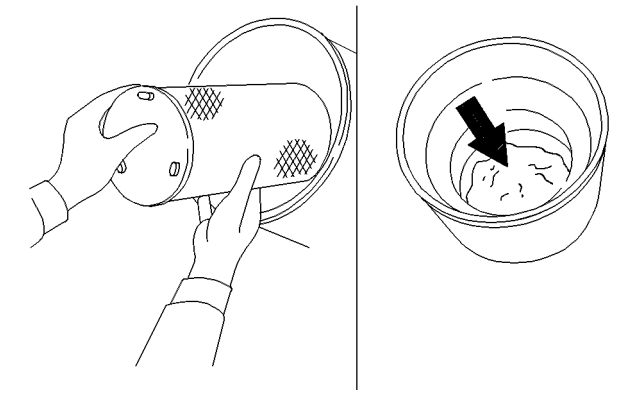

Illustration 131 g00101451

3. Remove the secondary filter element.
4. Cover the air inlet opening. Clean the inside of the air cleaner housing.
5. Remove the cover from the air inlet opening.
6. Install the new secondary filter element.
7. Install the primary filter element.
8. Install the air cleaner cover and close the latches securely.
9. Close the access door.

i04992269

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040

1. Open the engine compartment. Refer to the Operation and Maintenance Manual, “Access Doors and Covers”.
2. Start the engine.
3. Run the engine at high idle.

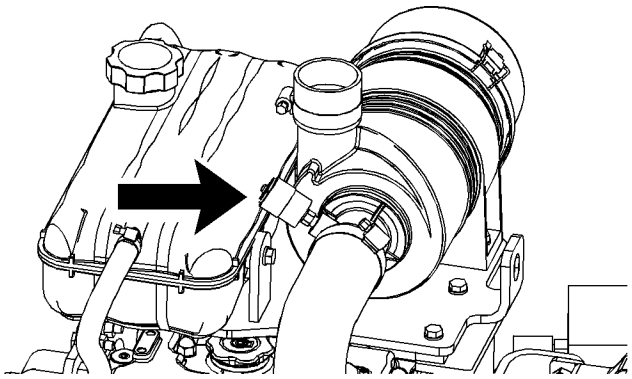

Illustration 132 g03171236

4. If the yellow piston in the engine air filter service indicator enters the red zone, service the air cleaner.
5. Stop the engine.

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

6. Close the engine compartment.

i05400970

Engine Mounts - Inspect

SMCS Code: 1152-040

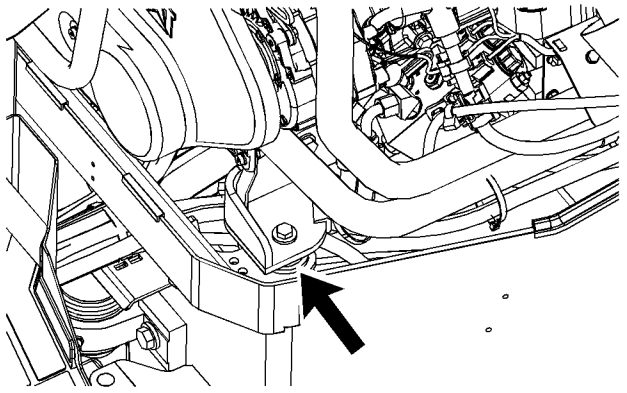

Illustration 133 g03412457

Open the engine compartment.

There are four engine mounts. There are two engine mounts on each side of the machine.

Engine vibration can be caused by improper mounting of the engine. Engine vibration can be caused by loose engine mounts or deteriorated engine mounts.

Inspect the engine mounts for deterioration.

Replace any engine mount that is deteriorated.

Inspect the engine mounts for correct bolt torque.

Tighten the mounts if the mounts are loose.

Close the engine compartment.

i04996529

Engine Oil Level - Check

SMCS Code: 1348-535-FLV

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

Stop the engine in order to check the oil level. DO NOT check the oil level when the engine is running.

Park the machine on a level surface.

1. Open the engine compartment.

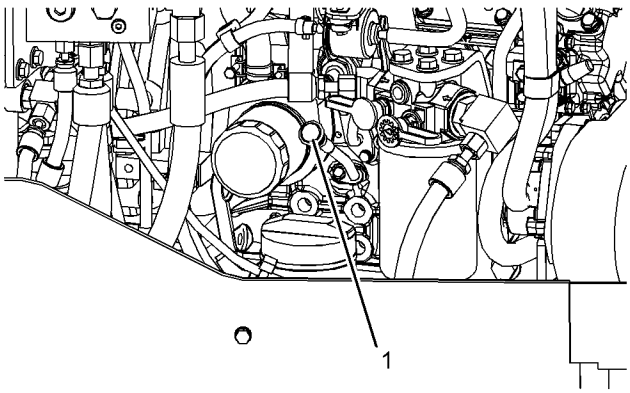

Illustration 134 g03175117

2. Remove oil level gauge (1). Wipe the oil level gauge with a clean cloth. Insert the oil level gauge. Remove the oil level gauge and note the oil level. Insert the oil level gauge.

Note: Refer to the Operation and Maintenance Manual, “Lubricant Viscosities and Capacities (Refill)” for the correct amount of oil that is used when the oil is changed. The correct amount of oil determines the correct level of the oil in the FULL range on the oil level gauge.

NOTICE
Do not overfill the crankcase. The oil level must not reach the top of the **FULL** range mark or above the **FULL** range mark.

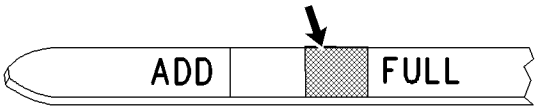

Illustration 135 g00857506

3. Maintain the oil level on the oil level gauge between the FULL RANGE mark and the ADD OIL mark . Add oil if the oil level is too low.

Note: Operating your engine with the oil level above the FULL mark in the FULL Range could cause the crankshaft to dip into the oil. If the crankshaft dipping into the oil, the result can be excessively high operating temperatures. The high operating temperatures could result in reduced lubricating characteristics of the oil. Reduced lubricating characteristics can cause bearing damage and loss of engine power.

Add The Engine Oil

1. Open the engine compartment.

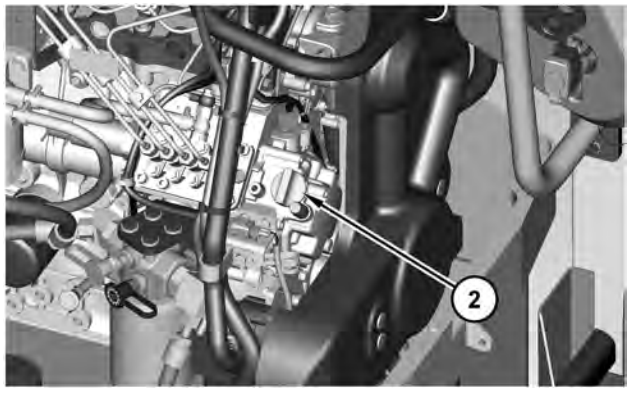

Illustration 136 g03175119

2. Remove oil filler plug (2).

3. Add the oil.

4. Clean the oil filler plug. Install the oil filler plug.

5. Close the engine compartment.

i01175145

Engine Oil Sample - Obtain

SMCS Code: 1000-008

⚠ WARNING

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

Obtain the Sample and the Analysis

In addition to a good preventive maintenance program, Caterpillar recommends using S·O·S oil analysis at regular scheduled intervals in order to monitor the condition of the engine and the maintenance requirements of the engine.

Each oil sample should be taken when the oil is warm and when the oil is well mixed. The sample should be taken at this time in order to ensure that the sample is representative of the oil in the crankcase.

Obtain the S·O·S Sample

Use the following method in order to obtain an S·O·S sample:

- Use a 1U-5718 Vacuum Pump or use an equivalent pump that is inserted into the sump.

To avoid contamination of the oil samples, the tools and the supplies that are used for obtaining oil samples must be clean.

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

If you fill the engine too fast with oil, the oil may saturate the engine breather. If the breather is saturated with oil, oil will blow out of the breather hose until the breather is free of oil. Add the engine oil at a rate of 2 L/min (0.5283 US gpm). This will help prevent saturating the breather with oil.

i04998071

Engine Oil and Filter - Change

SMCS Code: 1318-510

Run the engine in order to warm up the oil. Stop the engine before you drain the oil. When the oil is warm, the waste particles are suspended in the oil. The waste particles will be removed when the oil is drained.

As the oil cools, the waste particles settle to the bottom of the oil pan. The waste particles will not be removed if the oil is too cool.

The waste particles can recirculate through the engine lubrication system if the recommended procedure is not followed.

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

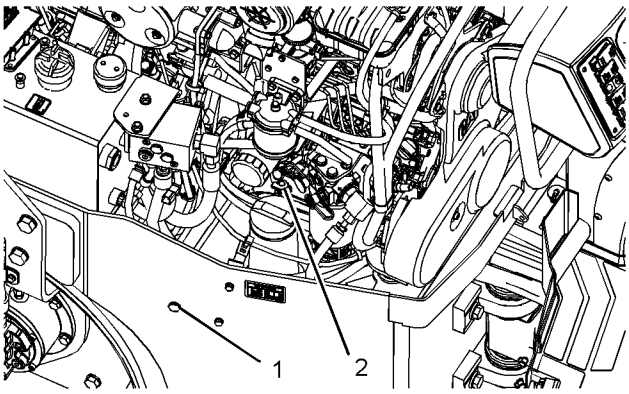

Illustration 137 g03175177

2. Remove plug (1). Place a drain hose on drain valve (2), and route the hose through the hole for plug (1). Place a suitable container under the drain hose. Open drain valve (2). Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

3. Allow the oil to drain.

4. Close drain valve (2).

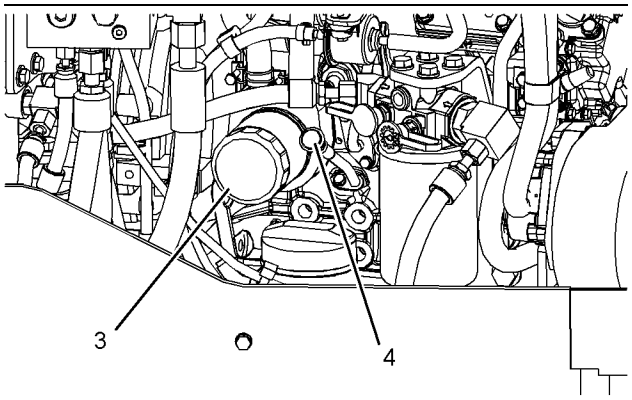

Illustration 138 g03175196

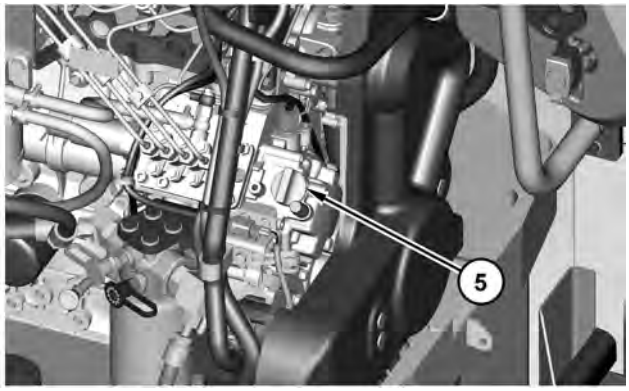

Illustration 139 g03175197

5. Remove filter element (3).

Note: Discard the used filter element according to local regulations.

6. Clean the filter housing base. All of the old filter seal must be removed from the filter housing base.

7. Apply a thin coat of engine oil to the seal of the new filter element.

8. Install the new filter by hand. When the gasket contacts the filter base, tighten the filter element for an additional 3/4 turn. This will tighten the filter sufficiently.

Every new oil filter has rotation index marks that are spaced at 90 degree increments. Use the rotation index marks as a guide for tightening the oil filter.

9. Remove oil filler cap (5). Fill the crankcase with new oil. See Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)” for further information. Clean the oil filler cap and install the oil filler cap.

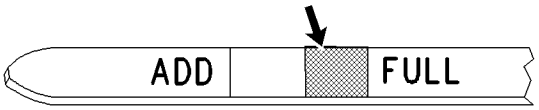

Illustration 140 g00857506

10. Before you start the engine, check the oil level on engine oil level gauge (4). The oil level must be within the FULL RANGE on the oil level gauge.

11. Start the engine. Run the engine for two minutes. Inspect the machine for leaks. Stop the machine.

12. Wait for ten minutes in order to allow the oil to drain back into the crankcase. Check the oil level. Maintain the oil level within the FULL RANGE on the oil level gauge.

13. Close the engine compartment.

i01633611

Engine Valve Lash - Check

SMCS Code: 1105-535

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

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

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

i05400990

Engine Water Pump - Inspect

SMCS Code: 1361-040

A water pump that has failed might cause severe engine overheating. Severe engine overheating could result in the following problems:

- Cracks in the cylinder head
- Piston seizure
- Other potential engine damage

Open the engine compartment.

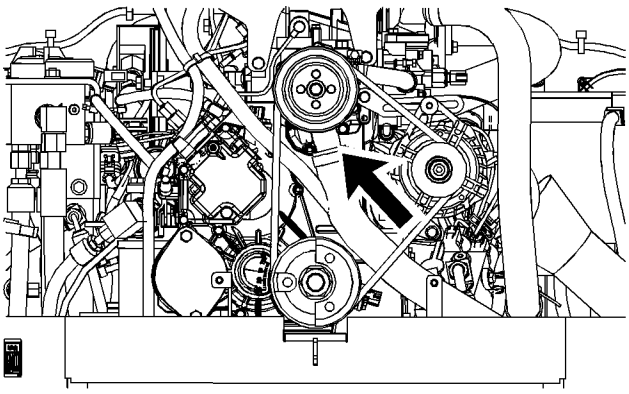

Illustration 141 g03412467

Water pump (1) is located on the engine block at the front of the engine.

Visually inspect the water pump for leaks. If leaks are found, all the seals must be replaced. If there is an excessive leakage of coolant, replace the water pump.

i03997106

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070

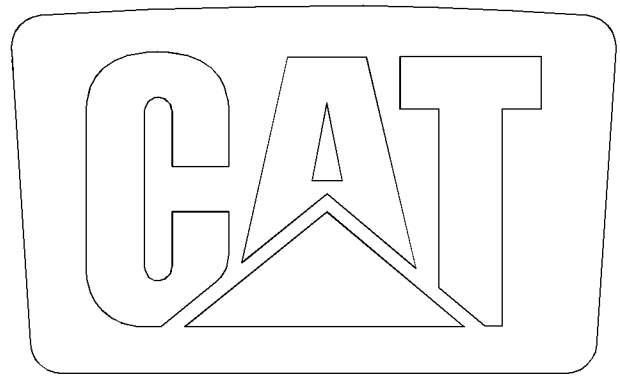

Illustration 142 g02174985

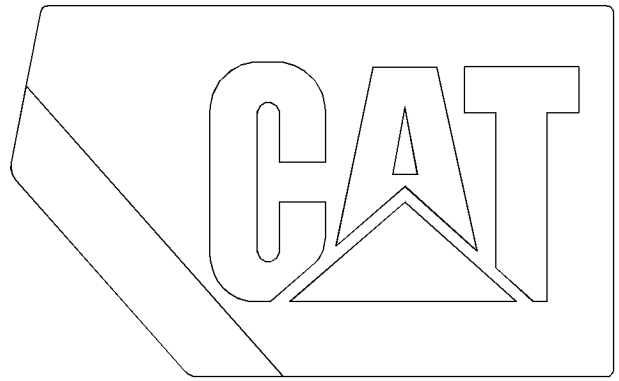

Illustration 143 g02175297

Typical example of the Product Identification Films.

Cleaning of the Films

Make sure that all of the product identification films are legible. Make sure that the recommended procedures are used in order to clean the product identification films. Ensure that all the product identification films are not damaged or missing. Clean the product identification films or replace the films.

Hand Washing

Use a wet solution with no abrasive material that contains no solvents and no alcohol. Use a wet solution with a “pH” value between 3 and 11. Use a soft brush, a rag, or a sponge in order to clean the product identification films. Avoid wearing down the surface of the product identification films with unnecessary scrubbing. Ensure that the surface of the product identification films is flushed with clean water and allow the product identification films to air dry.

Power Washing

Power washing or washing with pressure may be used in order to clean product identification films. However, aggressive washing can damage the product identification films.

Excessive pressure during power washing can damage the product identification films by forcing water underneath the product identification films. Water lessens the adhesion of the product identification film to the product, allowing the product identification film to lift or curl. These problems are magnified by wind. These problems are critical for the perforated film on windows.

To avoid lifting of the edge or other damage to the product identification films, follow these important steps:

- Use a spray nozzle with a wide spray pattern.
- A maximum pressure of 83 bar (1200 psi)
- A maximum water temperature of 50° C (120° F)
- Hold the nozzle perpendicular to the product identification film at a minimum distance of 305 mm (12 inch).
- Do not direct a stream of water at a sharp angle to the edge of the product identification film.

i04372845

Fuel System - Prime

SMCS Code: 1250-548

1. The fuel transfer pump is electrically controlled when the key is on. Turning the key to the on position will automatically prime the system after the filters have been changed.

Note: The transfer pump will continue to pump for 60 seconds after the key is placed in the on position and the engine is not started.

2. Start the engine. If the engine will not start, further priming is necessary. If the engine starts but the engine continues to misfire, further priming is necessary.

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

Note: If the engine cannot be primed or the fuel pressure is low, check the in-tank fuel inlet tube screen.

i06250413

Fuel System Filter (In-Line) - Replace

SMCS Code: 1261-510

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

Dispose of all fluids according to local regulations and mandates.

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

- Fuel pressure is low.
- Engine performance is poor.

1. Open the engine hood.

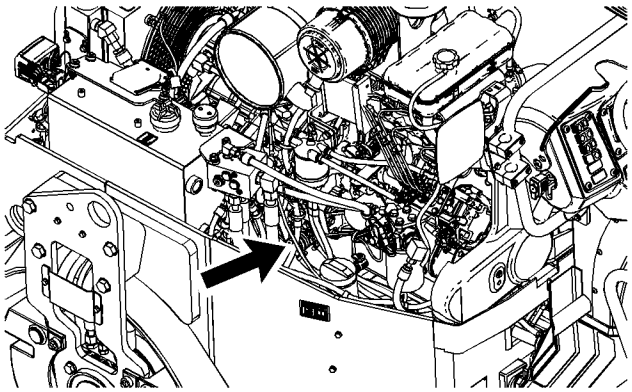

Illustration 144 g03871759

2. The in-line filter is located on the left side of the machine, in front of the fuel tank.

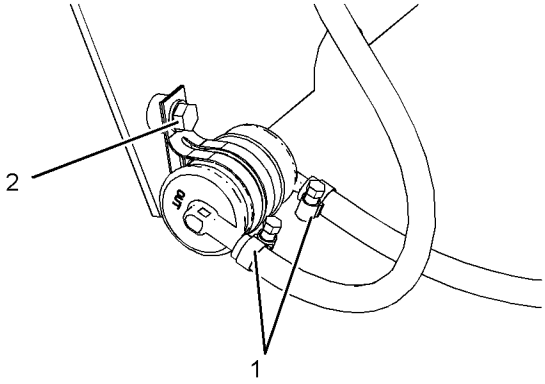

Illustration 145 g03871763

3. Loosen clamps (1).

4. Remove mounting bolt (2).

5. Remove the fuel filter and discard the fuel filter. Allow the fuel to drain into a suitable container.

6. Install a new in-line filter.

7. Install mounting bolt (2).

8. Tighten clamps (1).

9. Prime the fuel system. Refer to the Operation and Maintenance Manual, “Fuel System - Prime” section for the correct procedure.

10. Start the engine.

11. Check for leaks.

12. Close the engine hood.

i05406695

Fuel System Water Separator - Drain

SMCS Code: 1263-543; 1263

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–Up

1. Open the engine compartment.

2. The water separator is located in the engine compartment on the left side of the machine.

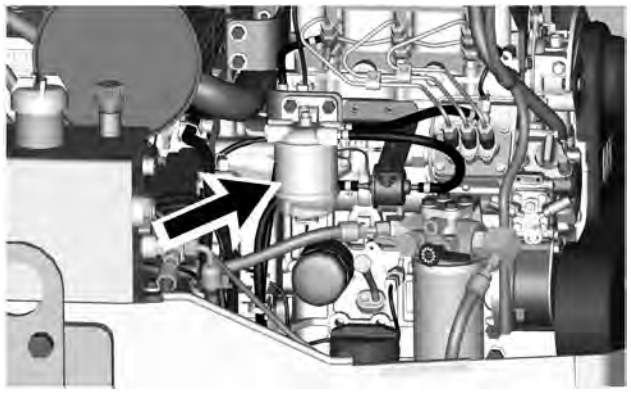

Illustration 146 g03414612

3. Loosen the drain valve on the water separator bowl. Allow the water and sediment to drain into a suitable container.

4. Tighten the drain valve.

5. If the engine fails to start, change the fuel filter. If there is a power loss, change the fuel filter.

6. Tighten the drain valve and close the engine compartment.

i05407109

Fuel System Water Separator - Drain

SMCS Code: 1263-543; 1263

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–Up

1. Open the engine compartment.

2. The water separator is located in the engine compartment on the left side of the machine.

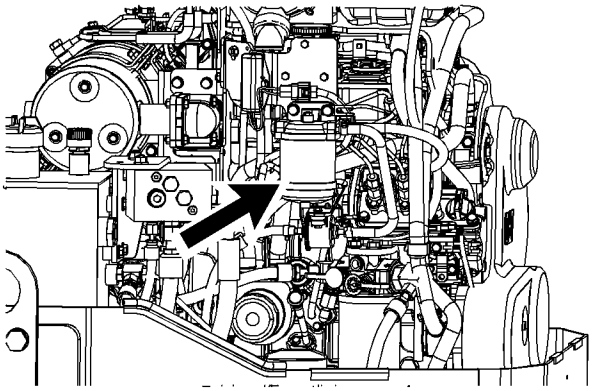

Illustration 147 g03414873

3. Loosen the drain valve on the water separator bowl. Allow the water and sediment to drain into a suitable container.

4. Tighten the drain valve.

5. If the engine fails to start, change the fuel filter. If there is a power loss, change the fuel filter.

6. Tighten the drain valve and close the engine compartment.

i05407083

Fuel System Primary Filter (Water Separator) Element - Replace

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

S/N: 4201–Up

S/N: 4211–Up

S/N: 2B21–Up

S/N: 3H21–Up

S/N: 4221–Up

S/N: 2X41–Up

S/N: 4191–Up

S/N: HCB1–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, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

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

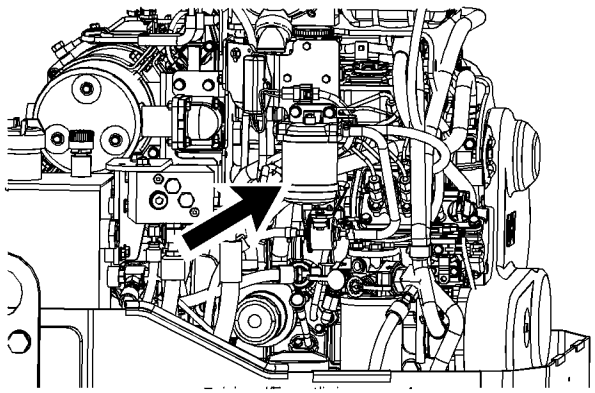

Illustration 148 g03414873

1. Open the engine compartment. The water separator is located in the engine compartment on the left side of the machine.

2. Place a suitable container under the water separator in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside of the water separator and the fuel filter.

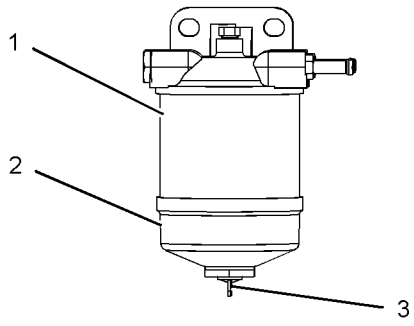

Illustration 149 g03414620

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

4. 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.

5. Remove clear bowl (2) from filter (1).

6. Use a Caterpillar strap wrench in order to remove the filter. Discard the old seals and the canister in a safe place.

7. Clean the clear bowl.

8. Install a new filter. Tighten the filter according to the instructions that are printed on the filter.

9. Install the clear bowl on the filter.

10. Dispose of the fuel in a safe place.

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

12. Close the engine access door.

i06256163

Fuel System Primary Filter (Water Separator) Element - Replace

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

S/N: J321–Up

S/N: LR21–Up

S/N: C241–Up

S/N: 4661–Up

S/N: 4671–Up

S/N: 4681–Up

S/N: 4691–Up

S/N: J2T1–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, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

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

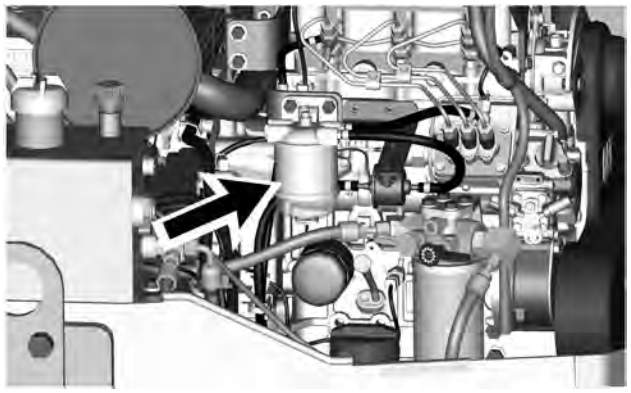

Illustration 150 g03414612

1. Open the engine compartment. The water separator is located in the engine compartment on the left side of the machine.

2. Place a suitable container under the water separator in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside of the water separator and the fuel filter.

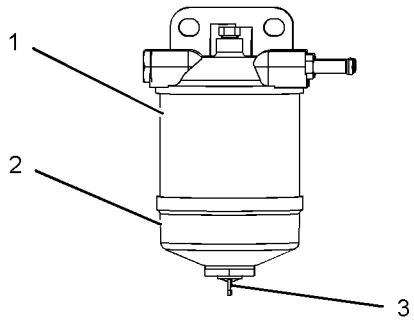

Illustration 151 g03414620

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

4. 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.

5. Remove clear bowl (2) from filter (1).

6. Use a Caterpillar strap wrench in order to remove the filter. Discard the old seals and the canister in a safe place.

7. Clean the clear bowl.

8. Install a new filter. Tighten the filter according to the instructions that are printed on the filter.

9. Install the clear bowl on the filter.

10. Dispose of the fuel in a safe place.

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

12. Close the engine access door.

i05508497

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

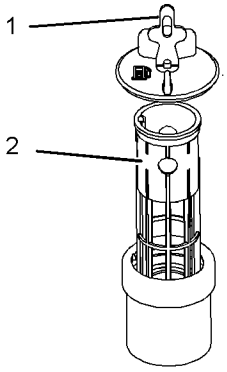

Illustration 152 g02609604

1. Remove fuel tank cap (1).

2. Remove strainer (2) from the filler opening.

3. Wash the strainer in a clean, nonflammable solvent.

4. Install the strainer into the filler opening.

5. Install the fuel tank cap.

i04998176

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

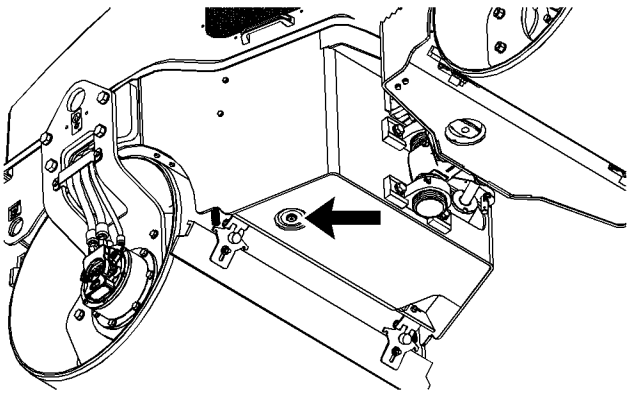

Illustration 153 g03175417

1. The drain plug is located under the left side of the machine.

2. Remove the drain plug. Allow the water and sediment to drain into a suitable container.

3. Install the drain plug.

Note: Dispose of all fluids according to local regulations.

i05402744

Fuses - Replace

SMCS Code: 1417-510

Fuse – The fuses protect the electrical system from damage that is caused by overloaded circuits. Change the fuse if the element separates. If the element of the new fuse separates, check the circuit. Repair the problem before you operate the machine.

NOTICE
Replace fuses with the same type and size. Improper use of fuses could result in electrical damage. Frequent replacement of fuses may indicate another type of electrical problem. Contact your Caterpillar dealer.

The compartment for the fuses is located on the right side of the machine. There are four screws that hold the cover on the compartment.

In order to access the compartment for the fuses, remove the four screws. Remove the cover.

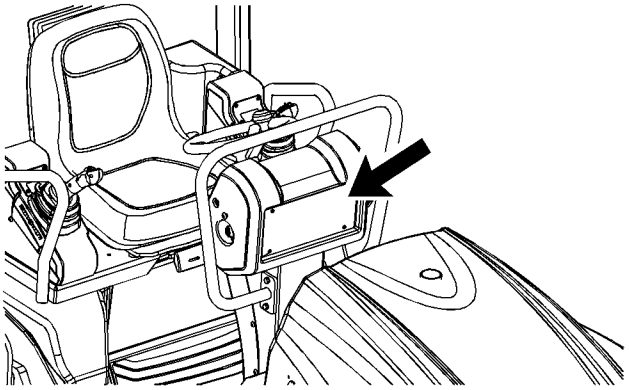

Illustration 154 g03413665

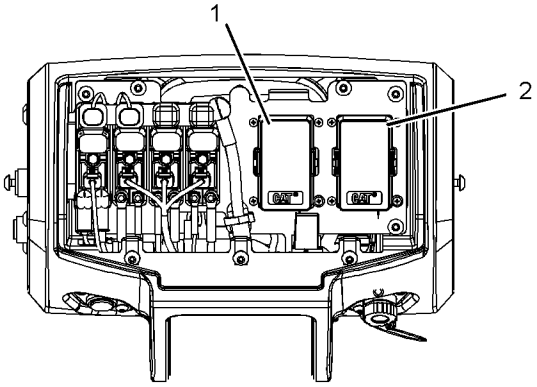

Illustration 155 g03413666

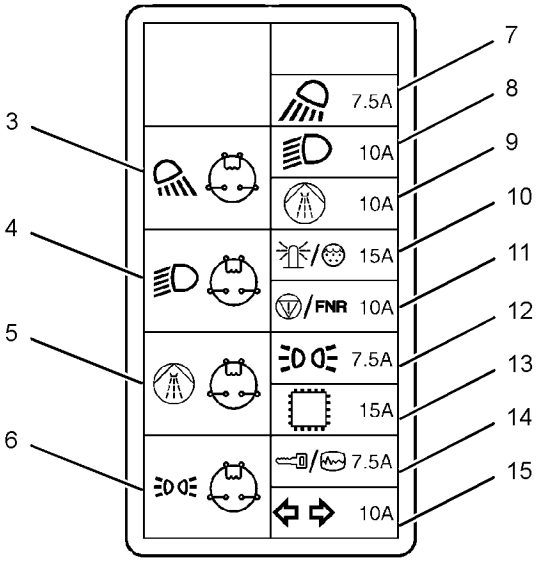

Illustration 156 g03485556

Fuse panel (1)

(3) Work Lights – Relay

(4) Headlights – Relay

(5) Water Pump – Relay

(6) Clearance Lights – Relay

(7) Work Lights – Relay

(8) Headlights – 7.5 amp

(9) Water Pump – 10 amp

(10) Beacon Light / Emulsion System – 15 amp

(11) Emergency Stop / Propel Lever – 10 amp

(12) Clearance Lights – 7.5 amp

(13) ECM – 15 amp

(14) Keyswitch / Monitoring System – 7.5 amp

(15) Turn Signals – 10 amp

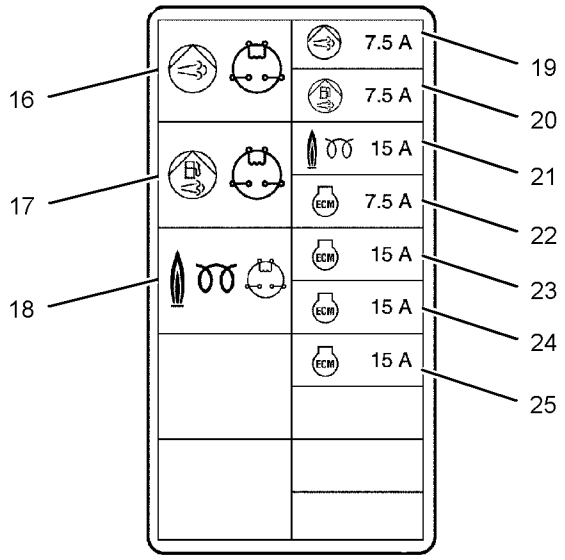

Illustration 157 g03485557

Fuse panel (2) (If Equipped)

(16) Engine Emissions System – Relay

(17) Engine Emissions Fuel System – Relay

(18) DPF Regeneration – Relay

(19) Engine Emissions System – 7.5 amp

(20) Engine Emissions Fuel System – 7.5 amp

(21) DPF Regeneration – 15 amp

(22) Engine ECM – 7.5 amp

(23) Engine ECM – 15 amp

(24) Engine ECM – 15 amp

(25) Engine ECM – 15 amp

i05402735

Hydraulic System Oil - Change

SMCS Code: 5050-044; 5095-044

Cat HYDO Advanced 10 Oil Change Interval

The standard Cat HYDO Advanced 10 oil change interval is every 3000 service hours or 18 months.

A 6000 service hour or 3 year maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Procedure to Change the Hydraulic Oil

NOTICE
Take extreme care to insure the cleanliness of the hydraulic oil. Keep the hydraulic oil clean in order to extend the component life and assure the maximum performance.

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

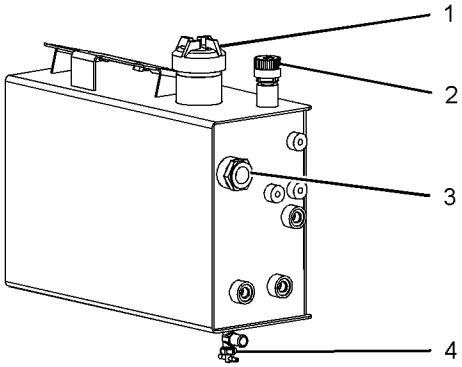

Illustration 158 g03413644

2. Remove hydraulic tank filler cap (1).

3. Remove the screen from the filler tube of the hydraulic tank.

4. Wash hydraulic tank filler cap (1) in clean, nonflammable solvent. Wash the screen in clean, nonflammable solvent.

5. Check the vent for the hydraulic tank (2). Clean the vent for the hydraulic tank with clean, nonflammable solvent.

Note: The drain for the hydraulic tank oil (4) is located on the bottom of the hydraulic tank.

6. Open the drain for the hydraulic tank (4) in order to drain the oil. Drain the oil in a suitable container.

7. Remove the suction strainer inside the hydraulic tank. Install a new suction strainer in the hydraulic tank.

8. Close the drain for the hydraulic tank (4).

9. Install the screen in the hydraulic tank.

10. Refill the hydraulic tank with clean, filtered hydraulic oil. Refer to the Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities”.

11. Park the machine on level ground. Check the hydraulic oil level. The oil level should be visible in the sight gauge (3).

Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

12. Install hydraulic tank filler cap (1).

13. Close the engine compartment.

i04998291

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

⚠ WARNING

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

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE
Take extreme care to insure the cleanliness of the hydraulic oil. Keep the hydraulic oil clean in order to extend the component life and assure the maximum performance.

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

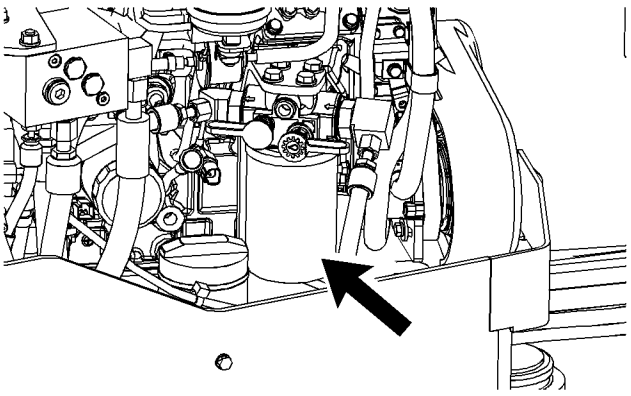

Illustration 159 g03175477

2. Clean the hydraulic oil filter location.

3. Remove the filter with a strap type wrench.

4. Clean the filter housing base. Remove any existing gasket material.

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

6. Use your hand to install the new filter. When the seal contacts the base, tighten the filter element for an additional three quarters of a turn.

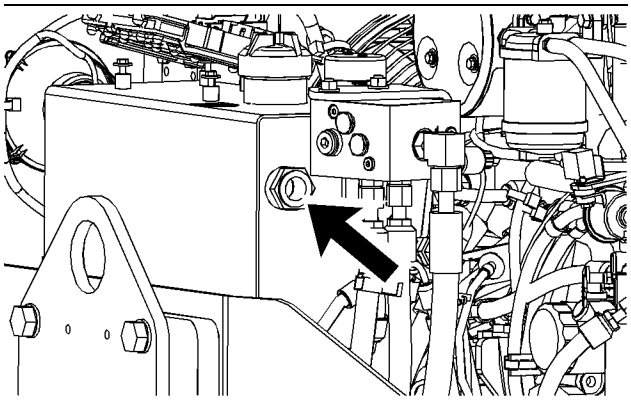

Illustration 160 g03175499

7. With the machine on level ground, check the hydraulic oil level in the sight gauge. The oil level should be visible in the sight gauge. Refer to the Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

8. Add required oil.

9. Close the engine compartment.

i04998333

Hydraulic System Oil Level - Check

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

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

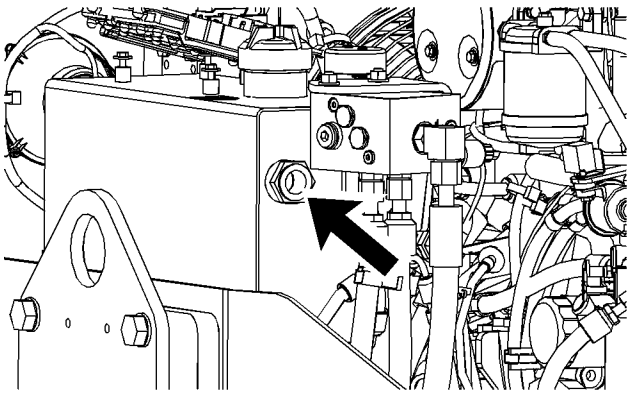

Illustration 161 g03175499

2. Observe the level of the hydraulic oil in the sight gauge when the oil is warm. Maintain the oil level to the mark on the sight gauge.

3. If necessary, add oil.

Refer to the Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities”.

4. Close the engine compartment.

i04998369

Hydraulic System Oil Sample - Obtain

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

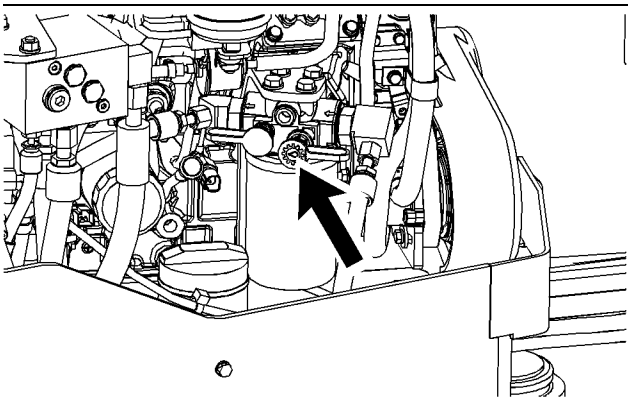

Illustration 162 g03175616

Use the sampling valve for the hydraulic oil in order to obtain the oil sample. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for further information on obtaining an oil sample.

i05402664

Hydraulic Tank Breather - Replace

SMCS Code: 5050-510-BRE; 5056-510-BRE; 5118-510

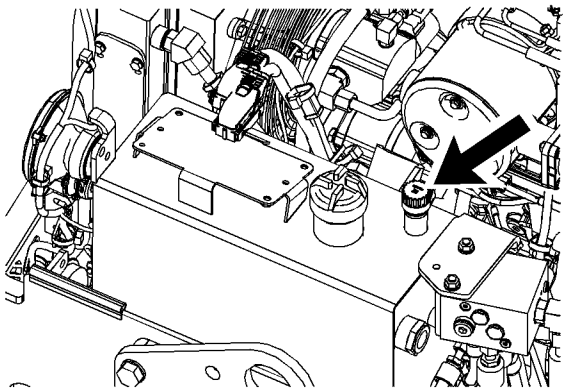

Illustration 163 g03413633

1. Open the engine compartment.

2. Remove the breather.

3. Replace the breather.

4. Close the engine compartment.

i02072906

Hydraulic Tank Strainer - Clean

SMCS Code: 5056-070-STR

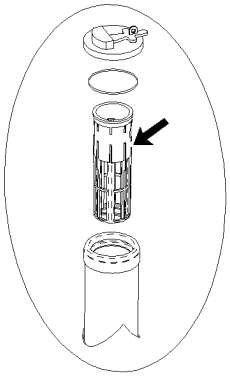

Illustration 164 g01059072

1. Remove the filler cap for the hydraulic tank.

2. Pull the strainer for the hydraulic tank out of the filler tube.

3. Clean the strainer in clean, nonflammable solvent. Dry the strainer with compressed air.

4. Install the strainer and the filler cap.

i04998410

Isolation Mounts - Inspect

SMCS Code: 5654-040

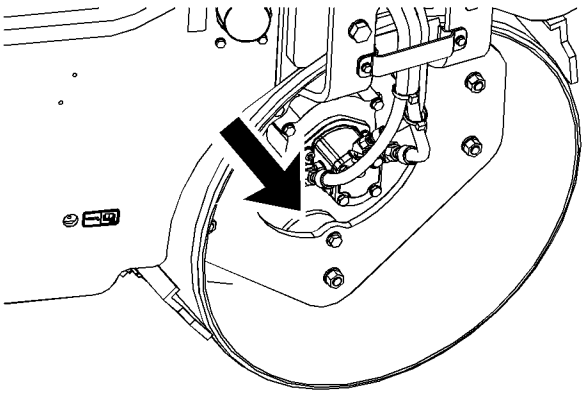

Illustration 165 g03175657

Inspect the isolation mounts for damage, cracking, or splitting. If an isolation mount is damaged, replace the mount. If two or more of the isolation mounts are damaged, replace all of the isolation mounts. Refer to the Disassembly and Assembly Manual for your machine for further information on removing and installing the isolation mounts.

i03003308

Neutral Start Switch - Test

SMCS Code: 1424-025; 1424-081; 1424-535

⚠ WARNING

The machine may lurch forward if the neutral start switch is out of adjustment. Be sure the area is clear of all personnel and equipment before performing this test.

1. Depress the parking brake knob in order to engage the parking brake.

2. Move the propel lever to the FORWARD position. Hold the engine start switch in the START position. Slowly move the propel lever toward the NEUTRAL position.

3. If the engine starts before you move the propel lever to the NEUTRAL position, the neutral start switch requires adjustment. Do not operate the machine until the repairs have been made. Refer to the service manual for your machine for the procedure on neutral start switch adjustment.
4. Move the propel lever to the REVERSE position. Hold the engine start switch in the START position. Slowly move the propel lever toward the NEUTRAL position.
5. If the engine starts before you move the propel lever to the NEUTRAL position, the neutral start switch requires adjustment. Do not operate the machine until the repairs have been made. Refer to the service manual for your machine for the procedure on neutral start switch adjustment.

i02106227

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

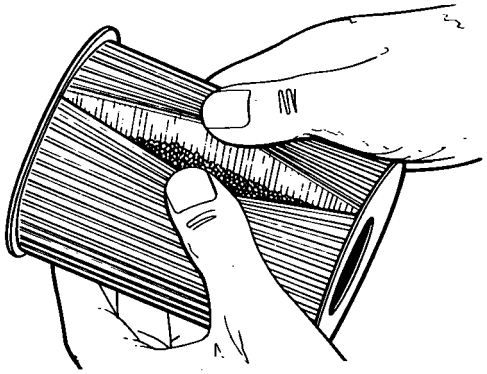

Illustration 166 g00100013

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.

i05465770

Operator Presence Switch - Test

SMCS Code: 1439-081; 1616-081

Perform the following procedure in order to test the operator presence switch:

1. Move the machine to an open area with no obstacles or people nearby.
2. Fasten the seat belt.
3. Start the engine and move the engine speed switch to LOW.
4. Move the propel control lever slightly forward until the machine just begins to move.
5. Slowly shift your weight off the seat.
6. If the operator presence switch is functioning correctly, the machine will stop moving when your weight is off the seat.
7. If the machine does not stop and there is no weight on the seat, consult your Cat dealer for repair of the operator presence switch system. Do not operate the machine until the operator presence switch system is repaired.

i02450488

Radiator Core - Clean

SMCS Code: 1353-070-KO

Open the engine compartment.

The radiator core is located at the front of the engine compartment. The radiator core is used to cool both the engine coolant and the hydraulic oil.

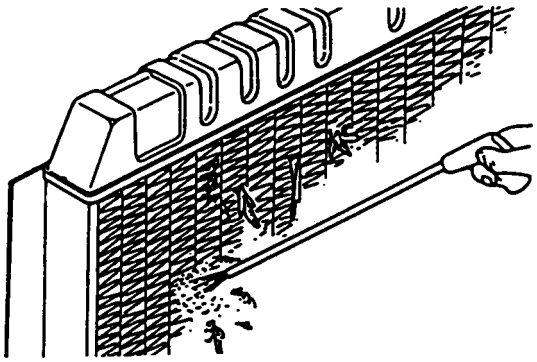

Illustration 167 g00101939

Inspect the radiator core for debris. If necessary, clean the radiator.

Compressed air is preferred, but high pressure water or steam can be used to remove dust and general debris from a radiator. Clean the radiator according to the condition of the radiator.

See Special Publication, SEBD0518, “Know Your Cooling System” for more information about cleaning radiator fins.

Close the engine compartment.

i05401018

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040

Illustration 168 g03412486

Standard ROPS

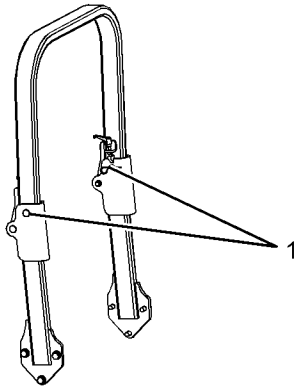

Illustration 169 g03412487

Foldable ROPS

Inspect the rollover protective structure (ROPS) for cracks. Inspect the ROPS for any loose bolts or damaged bolts. Replace the damaged bolts with original equipment parts only.

Note: If your machine is equipped with a foldable ROPS, inspect locking pins (1) for wear or damage.

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

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

Consult your Caterpillar dealer for the repair of the ROPS.

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 170 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).

i06891605

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).

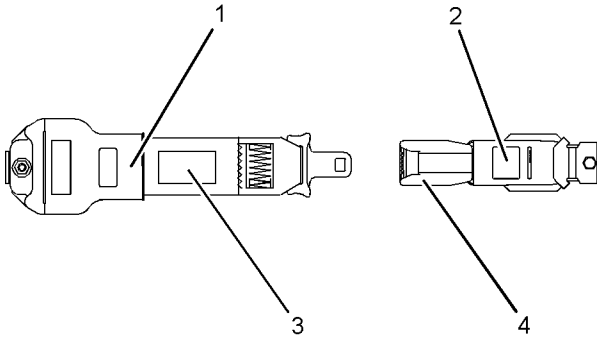

Illustration 171 g01152685

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.

i04998832

Steering Cylinder Ends - Lubricate

SMCS Code: 4303-086-BD

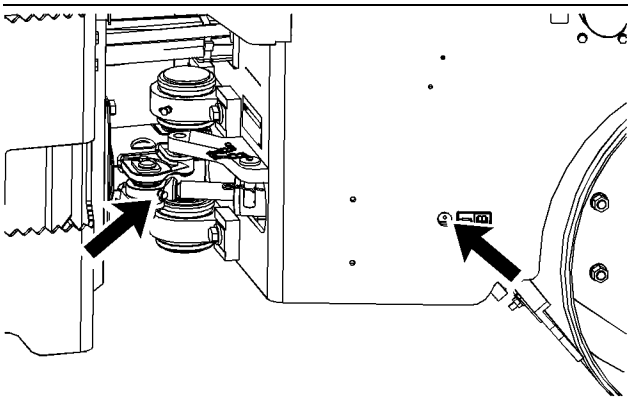

Illustration 172 g03175900

The steering cylinder is located in the pivot area, on the right side of the machine. Lubricate the fitting at each end of the steering cylinder.

Note: Wipe all of the fittings before you lubricate the fittings.

i05006984

Tire Inflation - Check

SMCS Code: 4203-535-PX

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

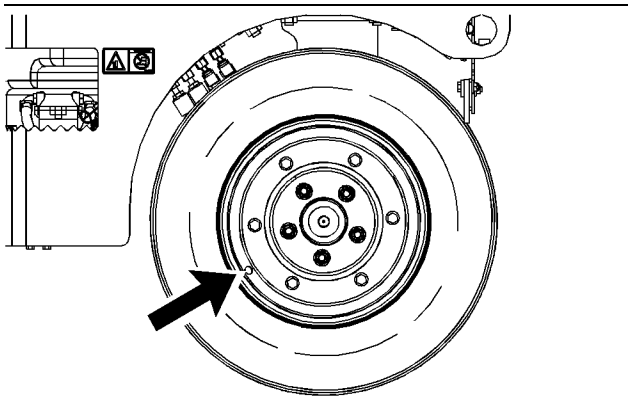

Illustration 173 g03179559

If necessary, inflate the tires.

For normal operating conditions, inflate the tires to the proper pressure:

Table 17

Tire Size	Minimum Pressure	Maximum Pressure
9.5/65-15	220 kPa (32 psi)	324 kPa (47 psi)

The tire inflation pressure is based on the weight of a machine that is ready to work and the machine is without attachments. The pressure is based on the rated payload, and in average operating conditions. Pressures for each application may vary. Consult your Caterpillar dealer for more information about proper tire inflation pressures.

i05017350

Tire Scraper - Inspect/Adjust/Replace

SMCS Code: 6607-040; 6607-510; 6607-025

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

Inspect Scrapers

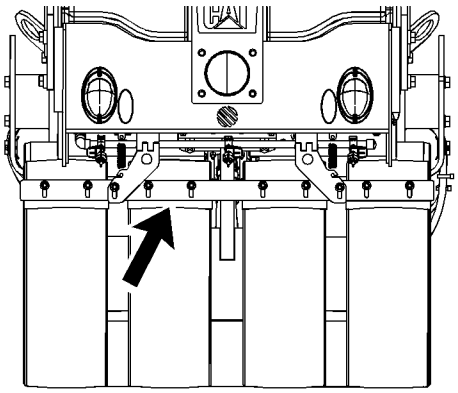

Illustration 174 g03170979

1. Remove dirt and debris from scrapers.
2. Inspect the scrapers for wear or damage.
3. Move the scraper down using the adjustment slots that are provided on the support for the scraper in order to maintain the original angle of the scraper. If no adjustment remains in the slot, replace the scraper.

Adjust Scrapers

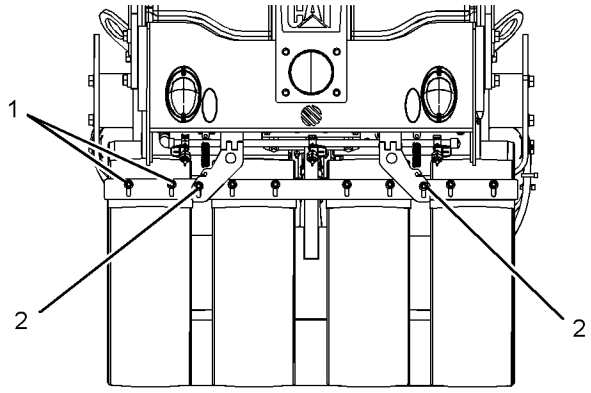

Illustration 175 g03171136

The tire scrapers should be adjusted slightly above the surface of the tire. The scraper should not touch the tire.

1. Adjust the scraper so that the tire scraper is slightly above the tire. Leave a 5 mm (0.2 inch) gap between the tire and the scraper.

2. Loosen bolts (1) in order to adjust the scraper. When the scraper is in the desired position, tighten bolts (1). The scrapers should be perpendicular to the surfaces of the tires. Use abutment bolts (2), if necessary.

Replace Scrapers

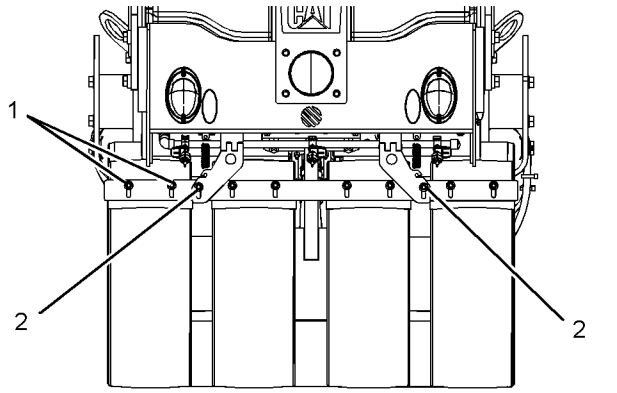

Illustration 176 g03171136

1. Loosen bolts (1) and remove the damaged scraper.

2. Install the new scraper and tighten bolts (1).

3. Leave a 5 mm (0.2 inch) gap between the tire and the scraper.

4. The scrapers should be perpendicular to the surfaces of the tires. Use abutment bolts (2), if necessary.

i06250440

Water and Additive Spray Nozzles - Clean

SMCS Code: 1743-070; 5612-070; 5615-070

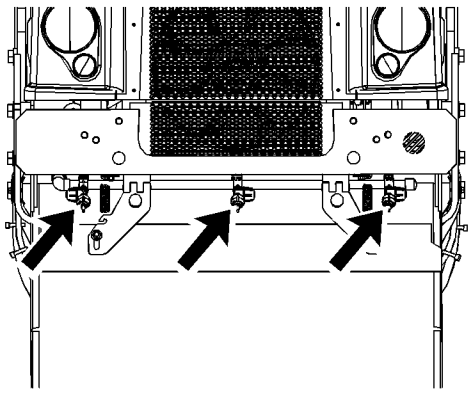

Illustration 177 g03176016

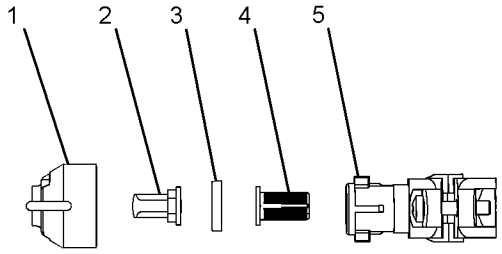

Illustration 178 g03176018

1. Remove cap (1).

2. Remove spray nozzle (2).

3. Remove rubber washer (3).

4. Remove screen (4).

5. Wash nozzle (2) and screen (4) in a clean, nonflammable solvent.

6. Install screen (4) into nozzle body (6).

7. Install rubber washer (3).

8. Install nozzle (2).

9. Install cap (1).

Note: Rotation of the nozzle may be required in order to establish a correct spray pattern.

i04999527

Water Spray System - Drain

SMCS Code: 5612-543

The water system must be drained prior to frost or freezing conditions.

1. Remove the filler cap for the water tank.

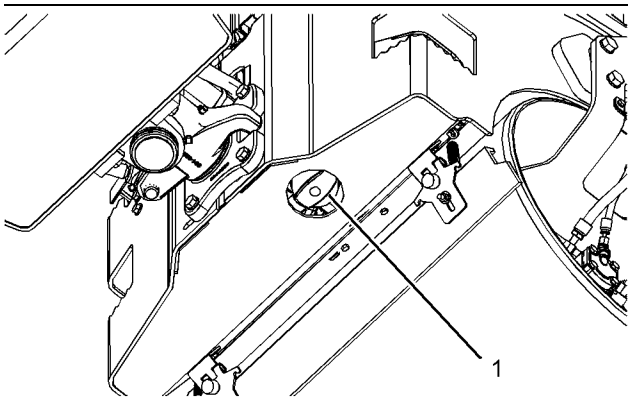

Illustration 179 g03182057

2. Remove the water tank filter cap on the water tank in order to drain the water tank.

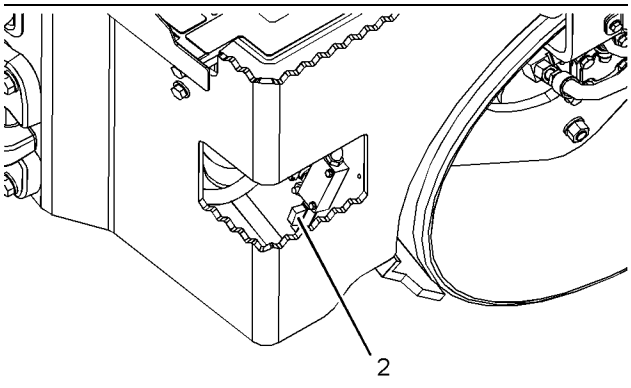

Illustration 180 g03182116

3. Open drain valve (2) in order to drain the water from the water pump.

4. Allow the water in the tank, lines, and the filter to drain.

5. When the tank is empty, turn on the water pump for 30 seconds in order to drain the water pump.

6. Remove the plastic caps that are located at the ends of the front and rear spray bars in order to drain the water from the spray bars.

7. Reinstall the caps on the ends of the spray bars.

8. Close valve (2).

9. Reinstall the water tank filter cap.

10. Reinstall the filler cap for the water tank.

i05009614

Water Spray System Filter - Clean

SMCS Code: 5612-070-FI

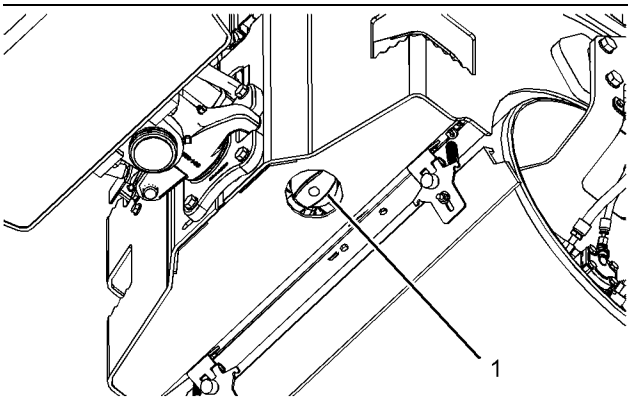

Illustration 181 g03182057

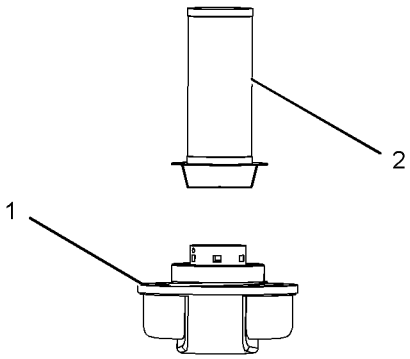

Illustration 182 g03182217

1. Remove filter cap (1). Remove screen (2).

2. Clean filter cap (1) with water or compressed air.

3. Clean screen (2) with water or compressed air.

4. Install filter (2).

5. Install filter cap (1).

i05007000

Water Tank Strainer - Clean and Inspect

SMCS Code: 5613-571-STR

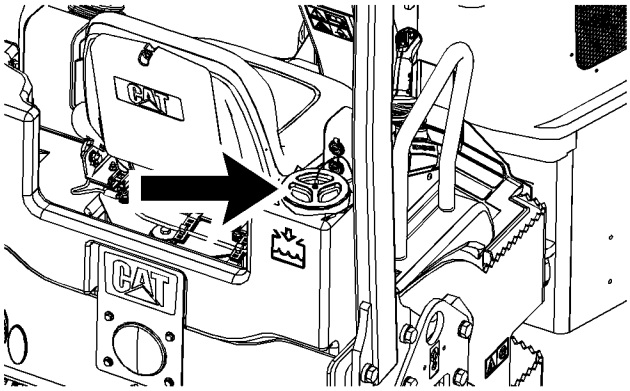

Illustration 183 g03179738

1. Remove the filler cap.

2. Remove the strainer.

3. Clean the filler cap with clean water or compressed air.

4. Clean the strainer with clean water or compressed air.

5. Install the strainer.

6. Fill the tank with clean water.

7. Install the filler cap.

i05006994

Wheel Nuts - Tighten

SMCS Code: 4201-527-NT; 4210-527

S/N: 4211–Up

S/N: C241–Up

S/N: 4681–Up

S/N: HCB1–Up

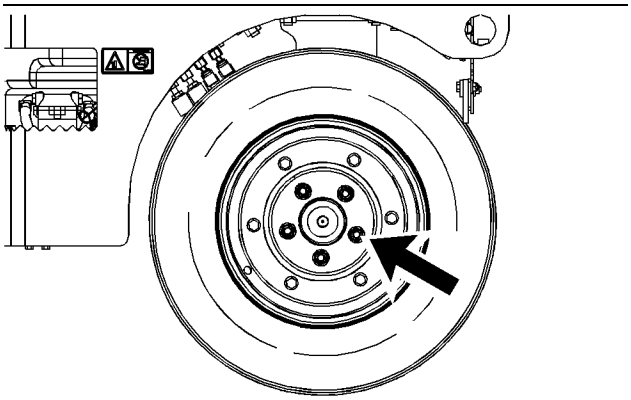

Illustration 184 g03179657

Tighten wheel nuts to 195 ± 15 N·m (144 ± 11 lb ft).

Warranty Section

Warranty Information

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).

b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i07422648

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting publications.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

publications.cat.com

i03989612

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations. Consult the nearest Cat dealer for additional information.

Index

Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____