M0082430-05 (en-us)
January 2023

Operation and Maintenance Manual

CB1.7 and CB1.8 Utility Compactors

HRB 1-UP (CB1.7)
SA7 1-UP (CB1.7)
ERX 1-UP (CB1.8)
MP9 1-UP (CB1.8)
643 1-UP (CB1.7)
644 1-UP (CB1.8)

Language: Original Instructions

Scan to find and purchase genuine Cat® parts and related service information.

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.

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.

NOTICE

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

Other parts may not meet certain original equipment specifications.

When replacement parts are installed, the machine owner/user should ensure that the machine remains in compliance with all applicable requirements.

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:

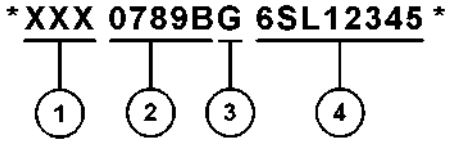

Illustration 1 g03891925

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 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.

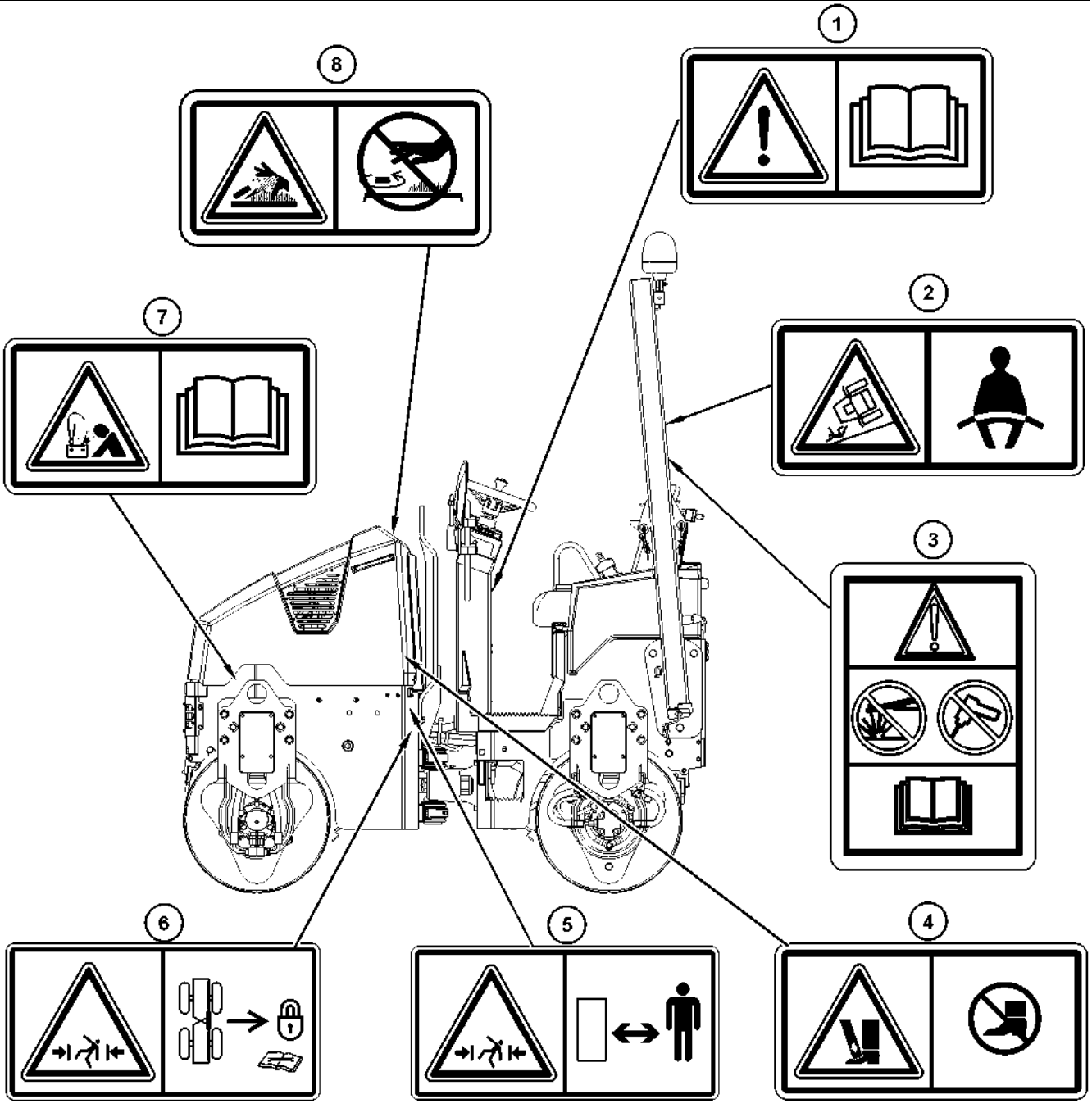

Illustration 2 g06251144

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 on the post for the ROPS.

Illustration 4 g01370908

WARNING

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.

Do Not Weld or Drill (3) (If Equipped)

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

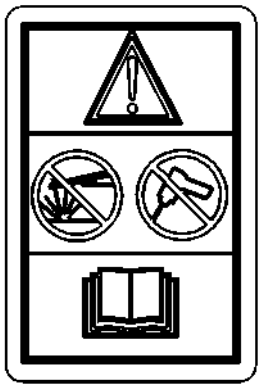

Illustration 5 g06251665

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.

Crush Hazard (4)

This safety message is on both sides of the machine at the rear of the hood.

Illustration 6 g01412530

WARNING

A crushing hazard exists between the front frame and rear frame when the machine is articulated. This can result in personal injury. Keep your feet inside the operator station.

Crush Hazard (5)

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

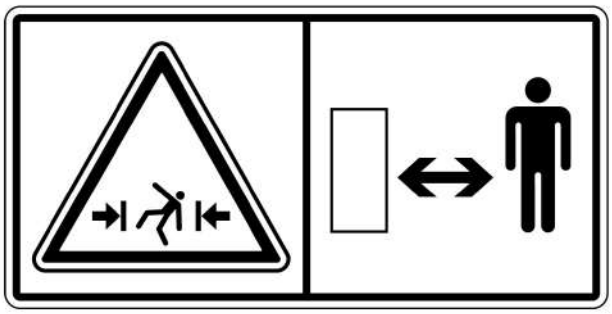

Illustration 7 g01371644

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 on both sides of the machine near the articulation joint.

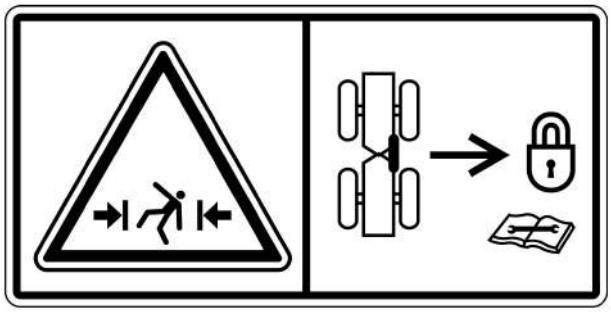

Illustration 8 g01371647

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.

Batteries (7)

This safety message is on the left side of the machine above the drum.

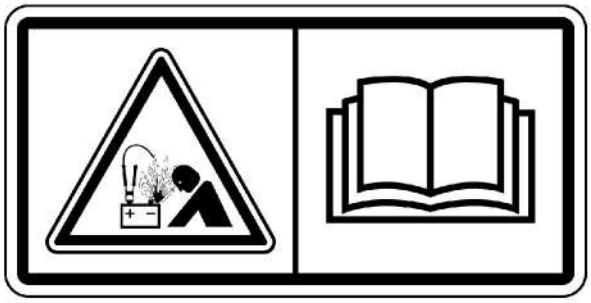

Illustration 9 g01370909

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.

Pressurized System (8)

This safety message is located in the engine compartment on top of the radiator.

Illustration 10 g01371640

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.

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Additional Messages

SMCS Code: 1000; 6700; 7000; 7405

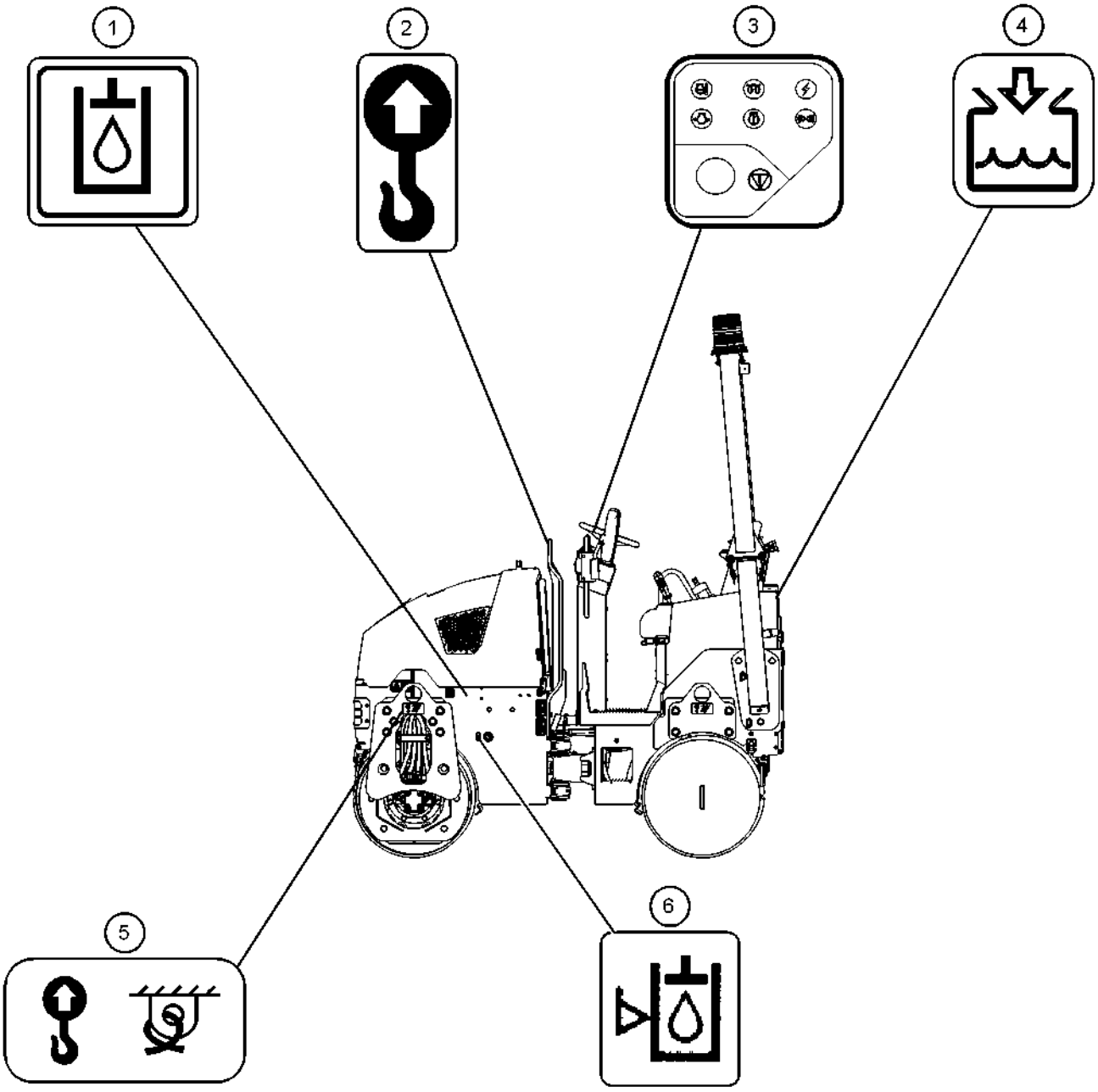

Illustration 11
g06252571

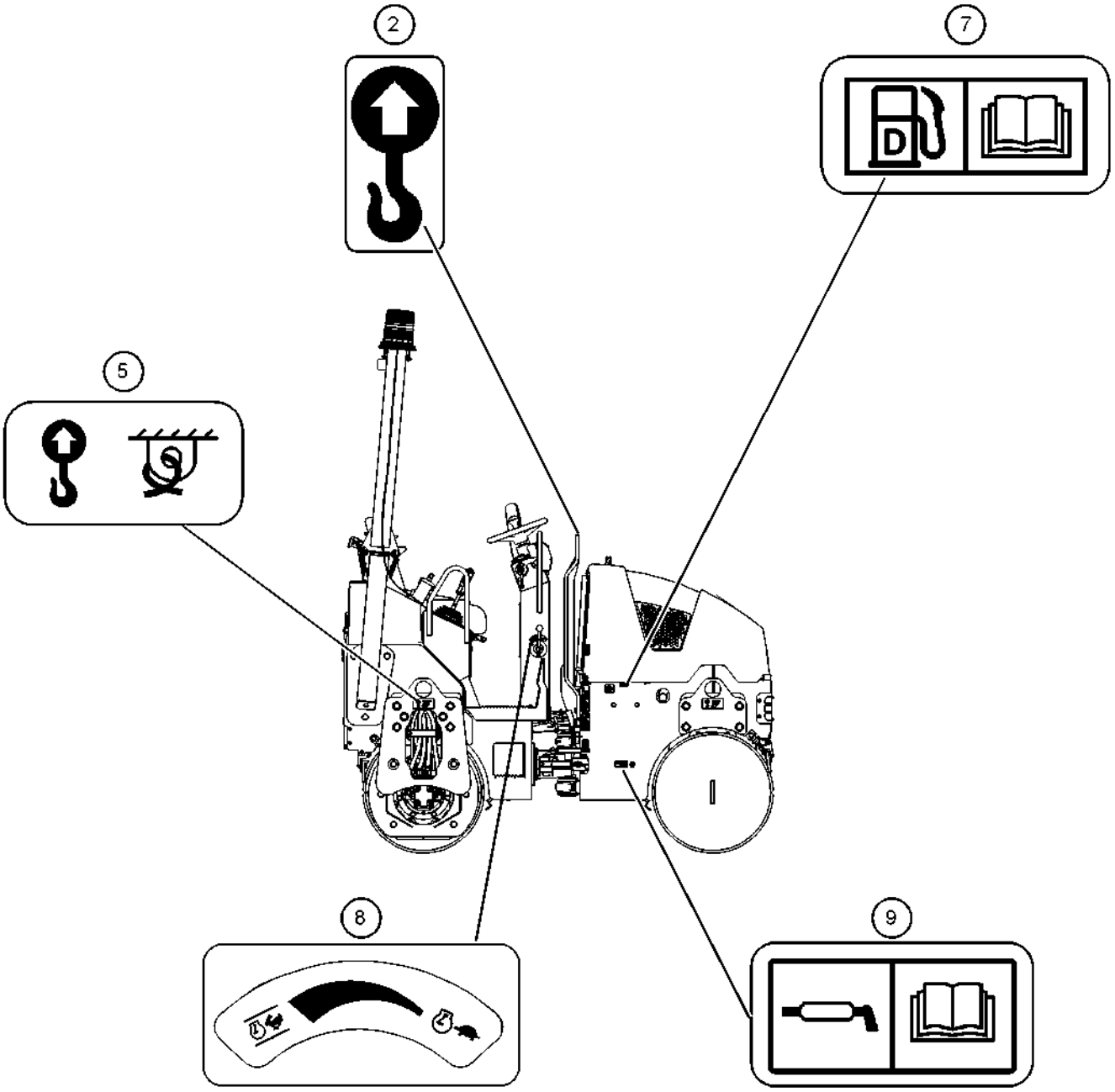

Illustration 12 g06252587

Oil (1)

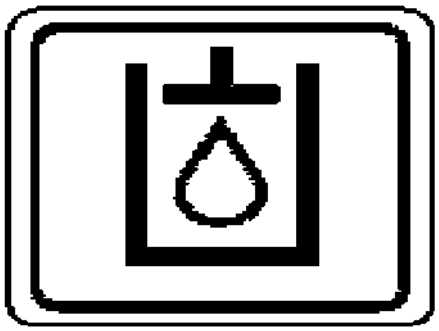

Illustration 13 g06252591

Oil

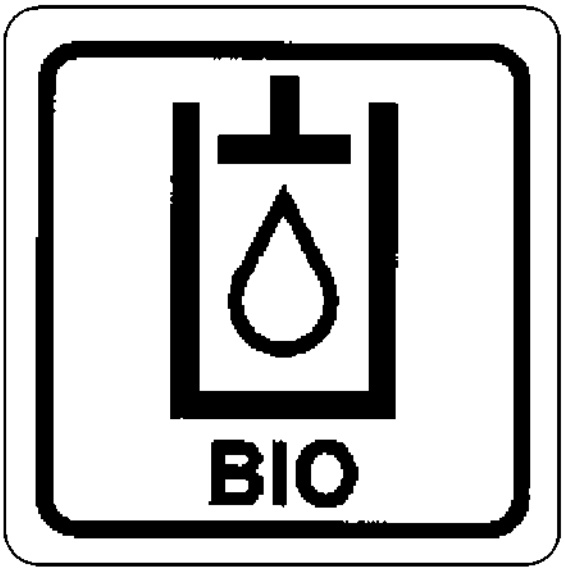

Illustration 14 g06252605

Bio Oil

Lifting Point (2)

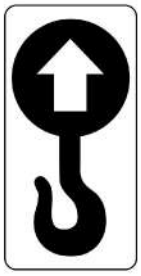

Illustration 15 g02926416

This message is located in the center of the machine on the lifting link.

Dash Panel (3)

Illustration 16 g06252608

Water Tank (4)

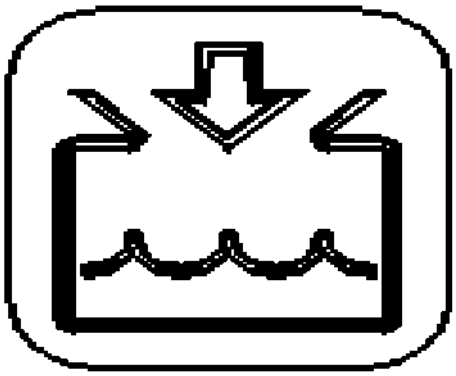

Illustration 17 g06252609

This message indicates the location of the water tank.

Tie Down Point / Lifting Point (5)

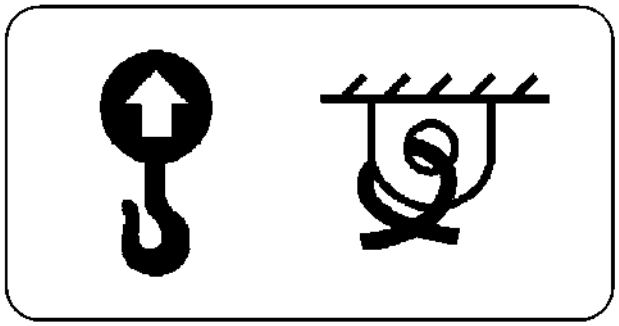

Illustration 18 g06252611

This message is located in four places, and indicates a tie-down point and a lifting point.

Hydraulic Oil (6)

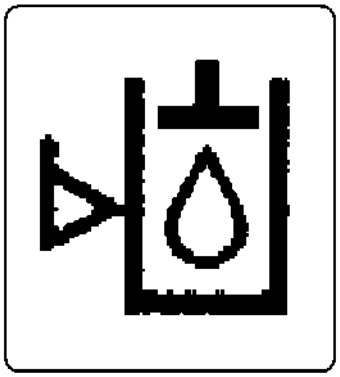

Illustration 19 g06252632

Fuel (7)

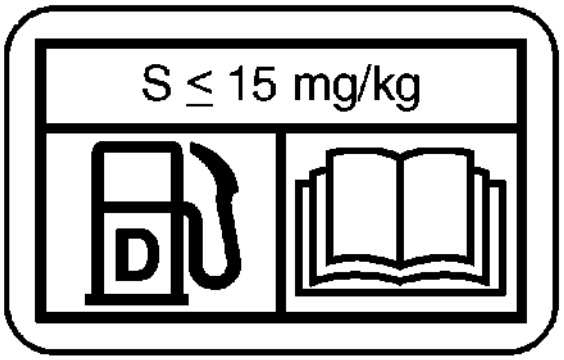

Illustration 20 g02052934

SA7 and MP9 use S ≤ mg/kg

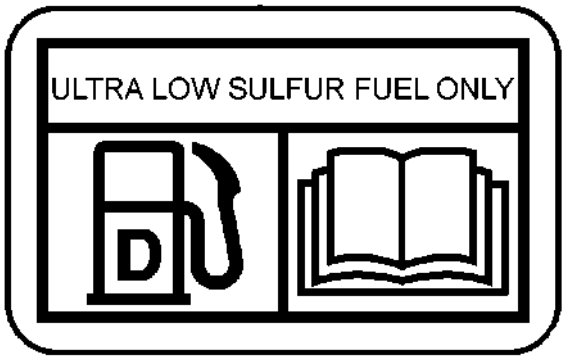

Illustration 21 g06252524

HRB and ERX use Ultra low sulfur fuel only

Throttle (8)

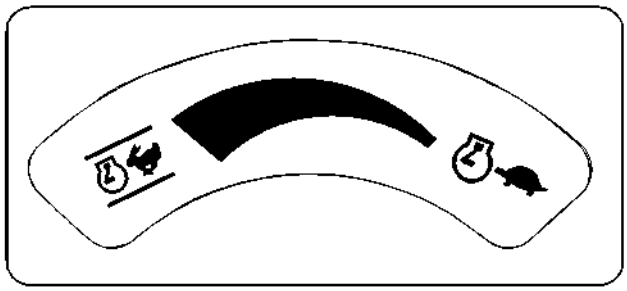

Illustration 22 g06252633

Grease (9)

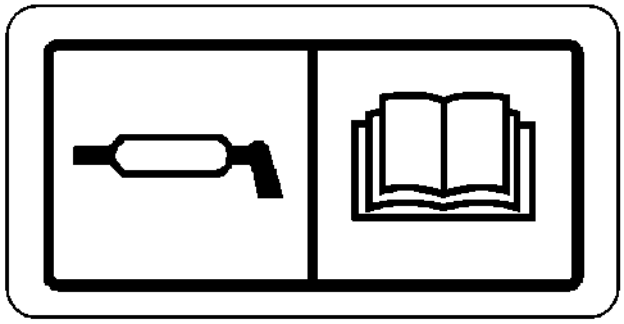

Illustration 23 g06252634

i08313103

General Hazard Information

SMCS Code: 7000

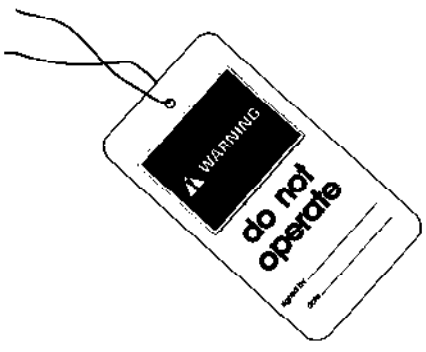

Illustration 24 g00104545

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 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.

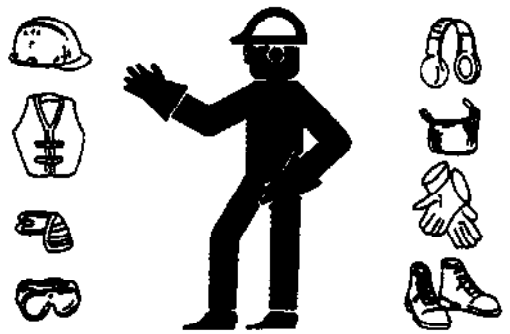

Illustration 25 g00702020

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.

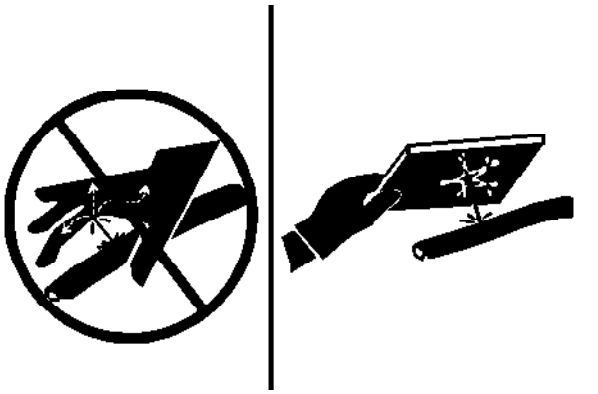

Illustration 26 g00687600

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

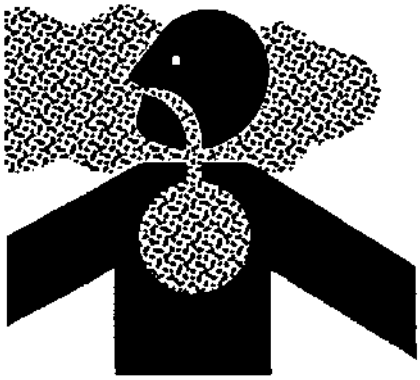

Illustration 27 g02159053

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.

Hexavalent Chromium Information

Cat equipment and replacement parts comply with applicable regulations and requirements where originally sold. Caterpillar recommends the use of only genuine Cat replacement parts.

Hexavalent chromium has occasionally been detected on exhaust and heat shield systems on Cat engines. Although lab testing is the only accurate way to know if hexavalent chromium is, in fact, present, the presence of a yellow deposit in areas of high heat (for example, exhaust system components or exhaust insulation) may be an indication of the presence of hexavalent chromium.

Use caution if you suspect the presence of hexavalent chromium. Avoid skin contact when handling items that you suspect may contain hexavalent chromium, and avoid inhalation of any dust in the suspect area. Inhalation of, or skin contact with, hexavalent chromium dust may be hazardous to your health.

If such yellow deposits are found on the engine, engine component parts, or associated equipment or packages, Caterpillar recommends following local health and safety regulations and guidelines, utilizing good hygiene, and adhering to safe work practices when handling the equipment or parts. Caterpillar also recommends the following:

- Wear appropriate personal protective equipment (PPE).
- Wash your hands and face with soap and water prior to eating, drinking, or smoking, and also during rest room breaks, to prevent ingestion of any yellow powder.
- Never use compressed air for cleaning areas suspected of containing hexavalent chromium.

- Avoid brushing, grinding, or cutting materials suspected of containing hexavalent chromium.
- Obey environmental regulations for the disposal of all materials that may contain or have come into contact with hexavalent chromium.
- Stay away from areas that might have hexavalent chromium particles in the air.

Dispose of Waste Properly

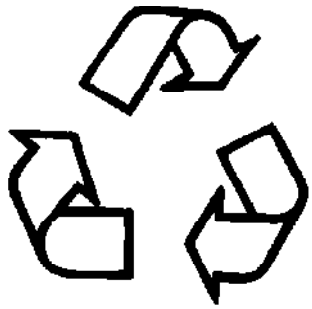

Illustration 28 g00706404

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.

i01359664

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.

i07746334

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 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 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.

i07746336

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 29 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 30 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 31 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.

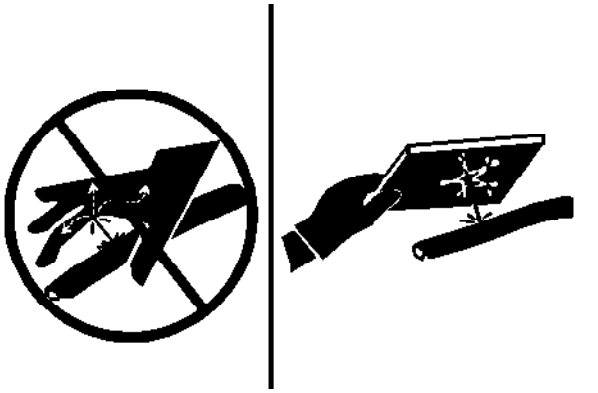

Illustration 32 g00687600

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.

i04891322

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 is 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. At all times you should 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, disconnect the battery disconnect switch. 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.

Use the on-board fire extinguisher and use the following procedure:

1. Pull the pin.

2. Aim the extinguisher or nozzle at the base of the fire.

3. Squeeze the handle and release the extinguishing agent.

4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

Remember, 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:

- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.
- Remember that nearly all of 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

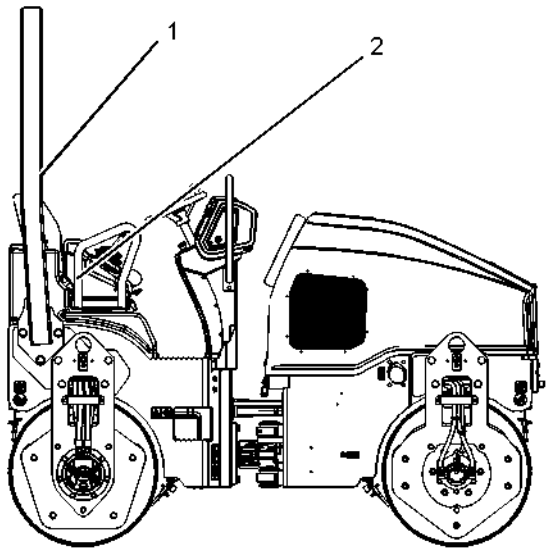

Illustration 33 g03160676

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.

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.

i02546320

High Pressure Fuel Lines

SMCS Code: 1000; 1252; 1274; 7000

⚠ WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

The high pressure fuel lines are the fuel lines that are between the high pressure fuel pump and the high pressure fuel manifold and the fuel lines that are between the fuel manifold and cylinder head. These fuel lines are different from fuel lines on other fuel systems.

This is because of the following differences:

- The high pressure fuel lines are constantly charged with high pressure.
- The internal pressures of the high pressure fuel lines are higher than other types of fuel system.
- The high pressure fuel lines are formed to shape and then strengthened by a special process.

Do not step on the high pressure fuel lines. Do not deflect the high pressure fuel lines. Do not bend or strike the high pressure fuel lines. Deformation or damage of the high pressure fuel lines may cause a point of weakness and potential failure.

Do not check the high pressure fuel lines with the engine or the starting motor in operation. After the engine has stopped allow 10 minutes to pass in order to allow the pressure to be purged before any service or repair is performed on the engine fuel lines.

Do not loosen the high pressure fuel lines in order to remove air from the fuel system. This procedure is not required.

Visually inspect the high pressure fuel lines before the engine is started. This inspection should be each day.

If you inspect the engine in operation, always use the proper inspection procedure in order to avoid a fluid penetration hazard. Refer to Operation and Maintenance Manual, “General hazard Information”.

- Inspect the high pressure fuel lines for damage, deformation, a nick, a cut, a crease, or a dent.

- Do not operate the engine with a fuel leak. If there is a leak do not tighten the connection in order to stop the leak. The connection must only be tightened to the recommended torque. Refer to Disassembly and Assembly for your engine.
- If the high pressure fuel lines are torqued correctly and the high pressure fuel lines are leaking the high pressure fuel lines must be replaced.
- Ensure that all clips on the high pressure fuel lines are in place. Do not operate the engine with clips that are damaged, missing or loose.
- Do not attach any other item to the high pressure fuel lines.
- Loosened high pressure fuel lines must be replaced. Also removed high pressure fuel lines must be replaced. Refer to Disassembly and Assembly for your engine.

i03636744

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. Briefly sound the horn before you start the engine. Make sure that the area is free of personnel.

i02676850

Engine Starting

SMCS Code: 1000; 7000

Illustration 34 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.

i01378973

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.

i08473852

Visibility Information

SMCS Code: 7000

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

While the machine is in operation, constantly survey the area around the machine 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. Shut down the machine until damaged or nonfunctional visual aid(s) are repaired (if applicable) or until appropriate job site organization is used to minimize hazards that are caused by any resulting restricted visibility. 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 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.

i08515690

Operation

SMCS Code: 7000

Sound the horn and allow adequate time for bystanders to clear the area before moving the machine into a restricted visibility area. Follow local practices for your machine application.

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of −17° C (0° F) to 49° C (120° F). Special configurations for different ambient temperatures may be available. Consult your Caterpillar dealer for additional information on special configurations of your machine.

Limiting Conditions and Criteria

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

The Operation and Maintenance Manual, “Safety Section” 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 Operation and Maintenance Manual, “Maintenance Interval Schedule” 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 Operation and Maintenance Manual, “Monitoring System” (if equipped) provides information on limiting condition criteria, including a Warning Category 3 that requires immediate shutdown of the engine.

Critical Failures

The following table provides summary information on several limiting conditions found in this Operation and Maintenance Manual. The table provides criteria and required action for the limiting conditions listed. Each System or Component in this table, together with the respective limiting condition, describes a potential critical failure that must be addressed. Not addressing limiting conditions with required actions may, along with other factors or circumstances, result in a risk of personal injury or death. If an accident occurs, notify emergency personnel and provide location and description of accident.

Table 1

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Line, tubes, and hoses	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.	Visible corrosion, loose, or damaged lines, tubes, or hoses. Visible fluid leaks.	Immediately repair any lines, tubes, or hoses that are corroded, loose, or damaged. Immediately repair any leaks as these may provide fuel for fires.
Electrical Wiring	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation	Visible damage to electrical wiring	Immediately replace damaged wiring
Battery cable(s)	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation of the cable, fouling, corroded terminals, damaged terminals, and loose terminals	Visible damage to battery cable(s)	Immediately replace damaged battery cables
Operator Protective Structure	Structures that are bent, cracked, or loose. Loose, missing, or damaged bolts.	Visible damage to structure. Loose, missing, or damaged bolts.	Do not operate machine with damaged structure or loose, missing, or damaged bolts. Contact your Cat ® dealer for inspection and repair or replacement options.
Seat Belt	Worn or damaged seat belt or mounting hardware	Visible wear or damage	Immediately replace parts that are worn or damaged.
Seat Belt	Age of seat belt	Three years after date of installation	Replace seat belt three years after date of installation
Safety Messages	Appearance of safety message	Damage to safety messages making them illegible	Replace the illustrations if illegible.
Audible Warning Device(s) (if equipped)	Sound level of audible warning	Reduced or no audible warning present	Immediately repair or replace audible warning devices not working properly.
Camera(s) (if equipped)	Dirt or debris on camera lens	Dirt or debris obstructing camera view	Clean camera before operating machine.
Cab Windows (if equipped)	Dirt, debris, or damaged windows	Dirt or debris obstructing operator visibility. Any damaged windows.	Clean windows before operating machine. Repair or replace damaged windows before operating machine.
Mirrors (if equipped)	Dirt, debris, or damaged mirror	Dirt or debris obstructing operator visibility. Any damaged mirrors.	Clean mirrors before operating machine. Repair or replace damaged mirrors before operating machine.
Braking System	Inadequate braking performance	System does not pass Braking System - Test(s) included in Maintenance Section or in the Testing and Adjusting Manual	Contact your Cat ® dealer to inspect and, if necessary, repair the brake system.
Cooling System	The coolant temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the coolant level and check the radiator for debris. Refer to Operation and Maintenance Manual, Cooling System Coolant Level - Check. Check the fan drive belts for the water pump. Refer to Operation and Maintenance Manual, Belts - Inspect/Adjust/ Replace. Make any necessary repairs.
Engine Oil System	A problem has been detected with the engine oil pressure.	Monitoring System displays Warning Category 3	If the warning stays on during low idle, stop the engine and check the engine oil level. Perform any necessary repairs as soon as possible.
Engine system	An engine fault has been detected by the engine ECM.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat ® dealer for service.
Fuel System	A problem has been detected with the fuel system.	Monitoring System displays Warning Category 3	Stop the engine. Determine the cause of the fault and perform any necessary repairs.
Hydraulic Oil System	The hydraulic oil temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

(continued)

(Table 1, contd)

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Steering System	A problem has been detected with the steering system. (If equipped with steering system monitoring.)	Monitoring System displays Warning Category 3	Move machine to a safe location and stop the engine immediately. Contact your Cat ® dealer to inspect and, if necessary, repair the steering system.
Overall Machine	Machine service is required.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat ® dealer for service.

Machine Operation

Only operate the machine while you are in a seat. The seat belt must be fastened while you operate the machine. 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.

Before you move the machine, make sure that no one will be endangered.

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

- additional seat
- additional seat belt
- Rollover Protective Structure (ROPS)

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

Carry work tools 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.

Always keep the Rollover Protective Structure (ROPS) installed during machine operation.

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.

i04891329

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 disconnect the battery disconnect before leaving the machine.

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.

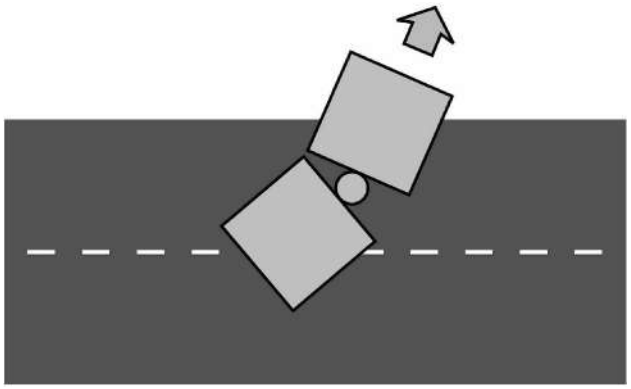

Illustration 35 g01956702

The appropriate method for driving off a compacted surface

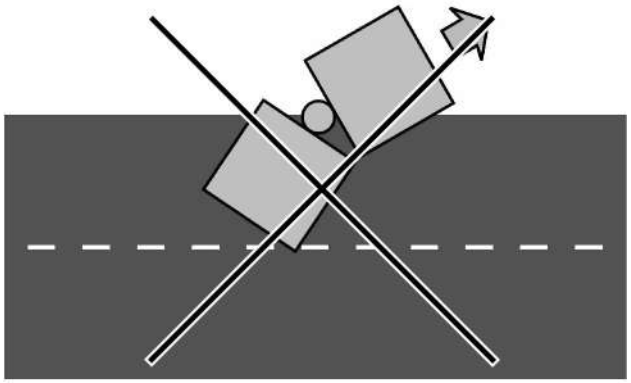

Illustration 36 g01957405

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 35 . Do not turn away from the edge when the machine is driven off the compacted mat. Refer to illustration 36 .

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.

i08488472

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

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

Table 2

Sound Level		Test Method
Operator Sound Pressure Level	93 dB(A)	"ISO 6396:2008" (1)
Exterior Sound Power Level	106 dB (A)	"ISO 6395:2008" (2)

(1) The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.
(2) 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 sound levels listed above include both measurement uncertainty and uncertainty due to production variation.

Sound Level Information for Machines Required by the Applicable Regional Regulations

- **European Union Countries**
- **United Kingdom**
- **Eurasian Economic Union Countries**
- **Ukraine**
- **Countries that Adopt the "EU Directives"**

The information below applies to only the machine configurations that contain regional product marking on or near the Product Identification Plate noted in the "Regional Product Marking" section of this manual.

Table 3

Declared Dynamic Operator Sound Pressure Level		
Region	**Sound Level**	**Test Method**
European Union	93 dB(A)	"ISO 6396:2008" (1)
United Kingdom	93 dB(A)	"ISO 6396:2008" (1)
Eurasian Economic Union	93 dB(A)	"ISO 6396:2008" (1)

(1) The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

Table 4

Declared Exterior Sound Power Level		
Region	**Sound Level**	**Test Method**
European Union	106 dB(A)	"ISO 6395:1988" (1)
United Kingdom	106 dB(A)	"ISO 6395:1988" (1)
Eurasian Economic Union	106 dB(A)	"ISO 6395:2008" (1)
Ukraine	106 dB(A)	"ISO 6395:1988" (1)

(1) 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 levels listed above include both measurement uncertainty and uncertainty due to production variation.

The machine sound power level meets the criteria that are specified in the applicable regional regulation. For example:

- "European Directive 2000/14 EC" amended by "2005/88/EC"
- "United Kingdom 2001 No. 1701" amended by "2005 No. 3525"
- "Ukraine Technical Regulation of the Noise Emission in the Environment by Equipment for Use Outdoors"

The criteria are specified on the certificate of the conformance and the accompanying labels.

Vibration Information Applicable to Regional Regulations

- "**European Union Directive: 2002/44/EC - Physical Agents (Vibration)** "

- “**United Kingdom: 2005 No. 1093 - The Control of Vibration at Work Regulation 2005** ”

Vibration Data for Vibratory Asphalt Compactors

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 m/s2.

Information Concerning Whole Body Vibration Level

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

The expected vibration levels can be estimated with the information in Table 5 to calculate the daily vibration exposure. A simple evaluation of the machine application can be used. 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.

Table 5

“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.

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

Vibration levels are influenced by many different parameters, such as: operator training, operator behavior, operator mode and stress, job site organization, job site preparation, job site environment, job site weather, job site material, machine type, quality of the seat, quality of the suspension system, attachments, and condition of the 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 manufacturers recommendations: tire pressures and brake and steering systems, controls, hydraulic system, and linkages.

3. Keep the terrain in good condition by performing the following items: remove any large rocks or obstacles, fill any ditches and holes and provide machines and schedule time to maintain the conditions of the terrain.

4. Keep the seat maintained and adjusted by doing the following: adjust the seat and suspension for the weight and the size of the operator and inspect and maintain the seat suspension and adjustment mechanisms.

5. Perform the following operations smoothly: steer, brake, accelerate, and shift the gears.

6. Move the attachments smoothly.

7. Adjust the machine speed and the route to minimize the vibration level by doing the following: drive around obstacles and rough terrain and slow down when necessary to go over rough terrain.

8. Minimize vibrations for a long work cycle or a long travel distance by doing the following: use machines that are equipped with suspension systems, if no ride control system is available, reduce speed to prevent bounce and 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: adjust the seat and adjust the controls to achieve good posture, adjust the mirrors to minimize twisted posture, provide breaks to reduce long periods of sitting, avoid jumping from the cab, minimize repeated handling of loads and lifting of loads and minimize any shocks and impacts during sports and leisure activities.

Consult your local Cat ® dealer for more information about machine features that minimize vibration levels. Consult your local Cat ® 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

i08504117

Specifications

SMCS Code: 7000

Intended Use

This roller is a self-propelled vibratory compactor. This roller consists of metallic cylindrical bodies (drums) 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.

Expected Life

The expected life, defined as total machine hours, of this machine is dependent upon many factors. The factors include the desire of the owner to rebuild the machine back to factory specifications. The expected life interval of this machine is 5,000 service hours The expected life interval corresponds to the service hours to engine overhaul or replacement. Service hours to engine overhaul or replacement may vary based on overall machine duty cycle. At the expected life interval, remove the machine from operation. Consult your Cat ® dealer for inspect, repair, rebuild, install remanufactured, install new components, or disposal options and to establish a new expected life interval. If a decision is made to remove this machine from service, refer to “Decommissioning and Disposal“ for more information.

The following items are required to obtain an economical 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 all service letters are addressed in the time intervals described in the letters.
- 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.

Application/Configuration Restrictions

- Use only in non-explosive gas environments.
- Use machine only with approved tools and guards in place.
- Not for use in underground applications.
- Towing trailers is prohibited.

Dimensions

Table 6

CB1.7 Vibratory Compactor	
Operating Weight (1)	1605 kg (3538.4 lb)
Maximum Length of Machine	2040 mm (80.3 inch)
Width of the machine	1012 mm (39.8 inch)
Height to the Top of the Beacon Light	2579 mm (101.5 inch)
Height with Folded ROPS	2400 mm (94.5 inch)
Width of Drum	900 mm (35.4 inch)

(1) Operating weight includes a half full fuel tank, a half full water tank, and an 80 kg (175 lb) operator.

Table 7

CB1.8 Vibratory Compactor	
Operating Weight (1)	1735 kg (3825 lb)
Maximum Length of Machine	2040 mm (80.3 inch)
Width of the machine	1112 mm (43.8 inch)
Height to the Top of the Beacon Light	2579 mm (101.5 inch)
Height with Folded ROPS	2400 mm (94.5 inch)
Width of Drum	1000 mm (39.4 inch)

(1) Operating weight includes a half full fuel tank, a half full water tank, and an 80 kg (175 lb) operator.

Identification Information

i08488493

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 are identified by Serial Numbers.

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

Product Identification Number (PIN)

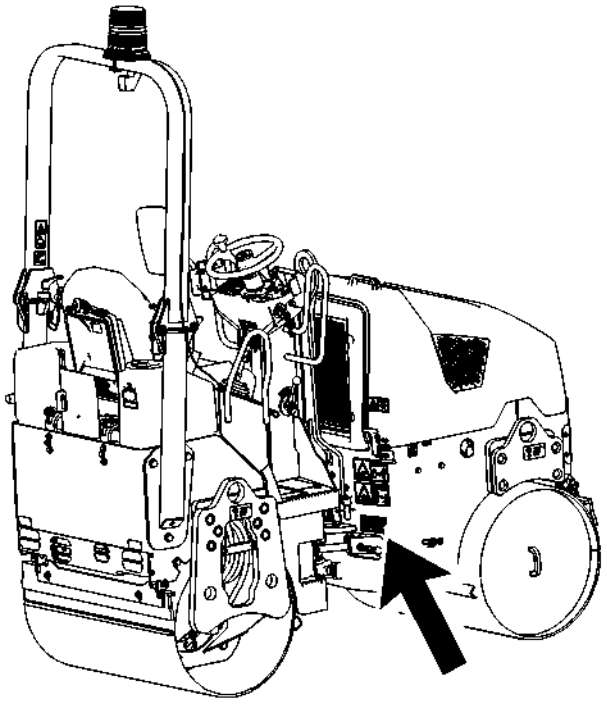

Illustration 37 g06253940

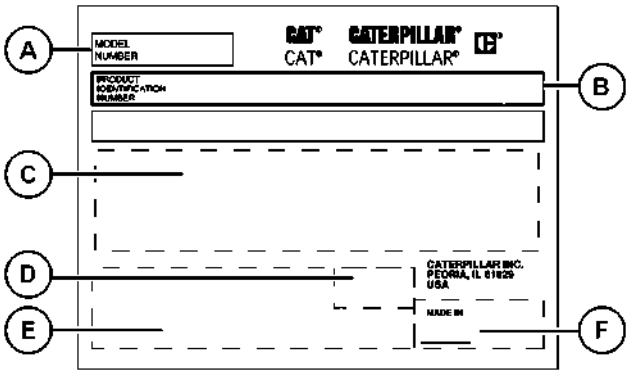

Illustration 38 g06686291

Model number (A)_____

Product Identification Number (B)_____

Service Information Plate (C)_____

Month and/or Year of Manufacture (If Required) (D)_____

Regional Certification Plate (If Required) (E)_____

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

Local regulation may require documentation of the Month and/or Year of manufacture in the Operations and Maintenance Manual. Comply with these regulations.

Regional Product Marking (If Equipped)

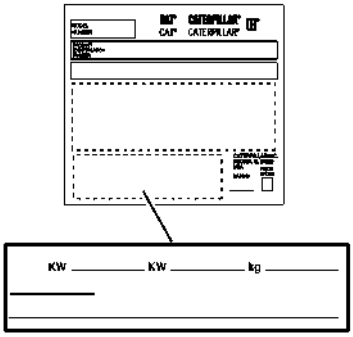

Illustration 39 g06650998

Regional marking plate

This plate is positioned on the bottom-left side of the PIN plate or near the PIN plate.

Note: The regional marking plate or plates are installed on machines that meet the applicable requirements that were effective at that time and may differ from the one shown above.

Regional product marking may include one or more of the following:

CE mark

UKCA mark

EAC mark

Gulf Standardization Organization (GSO) mark

Ukraine mark

The following information may be stamped onto the regional product marking 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 (kg)_____
- Month and/or Year of Manufacture_____
- Machine Type_____

Sound Certification

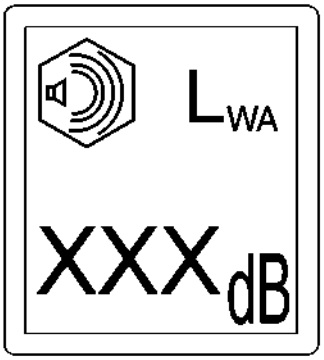

Illustration 40 g06675270

Sound certification film

A typical example of this film is shown.

A certification film is used to verify the environmental sound certification on machines that are certified to the regional requirements. A film installed on your machine will have a value. The value that is listed on the film indicates the guaranteed exterior sound power level (L_{wa}) at the time of manufacture for the conditions that are specified in the following sound test procedures:

- “ISO 6395:1988”
- “European Union 2000/14/EC” amended by “2005/88/EC”
- “United Kingdom 2001 No. 1701” amended by “2005 No. 3525”

Eurasian Economic Union

Manufacturer Information

Manufacturer:

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

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

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

i07011974

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
(European Union)

SMCS Code: 1000; 7000

Table 8

An EU Declaration of Conformity document was provided with the machine if it was manufactured to comply with specific requirements for the European Union. To determine the details of the applicable Directives, review the complete EU Declaration of Conformity provided with the machine. The extract shown below from an 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.

ORIGINAL 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 38000 Grenoble, France

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

Description:	Generic Denomination:	Paving Equipment
	Function:	Vibratory Roller
	Model/Type:	CB1.7 CB1.8
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills 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)		
2014/30/EU	N/A	

Note (1) Guaranteed Sound Power Level -_____dB (A) Annex VI
Representative Equipment Type Sound Power Level - _____dB (A)
[Engine Power per ISO 14396 -____ 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 June 2021, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Declaration of Conformity
(Great Britain)

SMCS Code: 1000; 7000

Table 9

A Declaration of Conformity document was provided with the machine if it was manufactured to comply with specific requirements for the Great Britain. In order to determine the details of the applicable legislation, review the complete Declaration of Conformity provided with the machine. The extract shown below from a Great Britain Declaration of Conformity for machines that are declared compliant to 2008 No. 1597 applies only to those machines originally “UKCA” marked by the manufacturer listed and which have not since been modified.

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 on request:

Standards & Regulations Manager,Caterpillar France S.A.S,
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Paving Equipment
	Function:	Vibratory Roller
	Model/Type:	CB1.7 CB1.8
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of these regulations and/or other enactments as listed below:

Legislation	Approved Body	Document No.
2008 No. 1597	N/A	
2016 No. 1091	N/A	
2001 No. 1701 amended by 2005 No. 3525, Note (1)	Note (2)	

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

Note (2) If applicable, information related to Approved Body.

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of June 2021, 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

i07012440

Before Operating Machine

SMCS Code: 7000

Preparing the Machine for First Use

Before the machine is used for the first time, the following actions must be performed:

- Remove all loose packaging materials from the machine.
- Check the machine and components for damage. If damage is found, do not operate the machine and consult your Cat dealer immediately.
- Take inventory of all items included with the machine, and verify that all loose components and fasteners are accounted for.
- Check all fluids. Refer to the Operation and Maintenance Manual maintenance section for fluid check procedures.
- Move the machine to the operating location.

i07786730

Mounting and Dismounting

SMCS Code: 7000

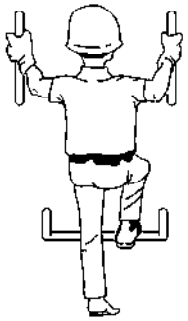

Illustration 41 g00037860

Typical example

Mount the machine and dismount the machine only at locations that have steps and/or handholds. Before you mount the machine, clean the steps and the handholds. Inspect the steps and handholds. Make all necessary repairs.

Face the machine whenever you get on or off the machine.

Maintain a three-point contact with the steps and with the 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 carry tools or supplies when you try to mount the machine or when you try to dismount the machine. 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 2867:2011 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.

Alternate Exit

Machines that are equipped with cabs have alternate exits. For additional information, see Operation and Maintenance Manual, “Alternate Exit”.

i07012496

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 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

i07012518

Steering Frame Lock

SMCS Code: 7506

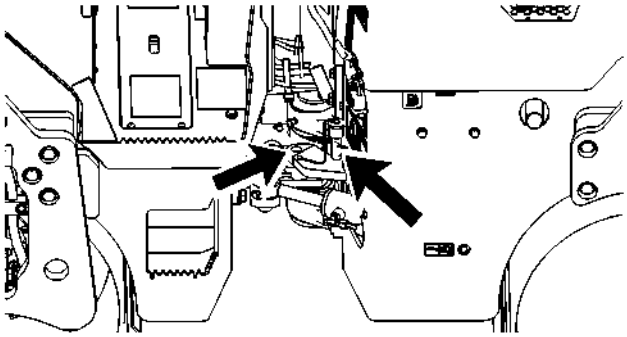

Illustration 42 g06252661

A lock pin, on the front frame near the articulation joint, is provided to secure the front and rear halves of the roller together. With the pin installed through the holes on the frame and the articulation hitch, the machine will be prevented from articulating. Secure the pin in place by using the attached locking pin.

Always disengage and stow the lock pin before operating the machine. The machine cannot be steered when the lock pin engaged.

Machine Operation

i07012519

Seat

SMCS Code: 7312; 7324

The machine is equipped with an operator presence system on the suspended seat only. Two seat switches, one on either side of center, both must open to signal no operator). When both switches open, the parking brake sets. Both switches must close and the propel handle returned to neutral for the machine to be able to propel again.

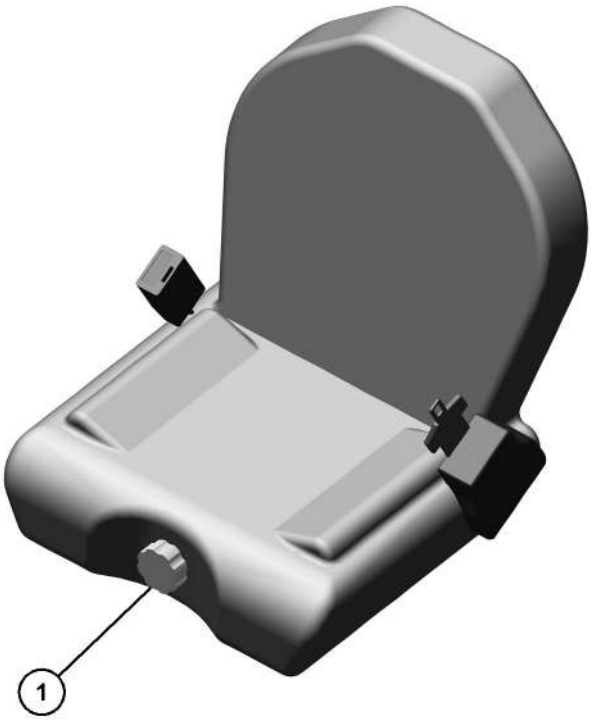

Illustration 43 g06252818

If the machine is supplied with an adjustable seat, the seat can be adjusted as follows:

Knob (1) – Use knob (1) to adjust the seat tension to the weight of the driver.

i07024100

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 Non-Retractable Seat Belts

Adjust both ends of the seat belt. The seat belt should be snug but comfortable.

Lengthening the Seat Belt

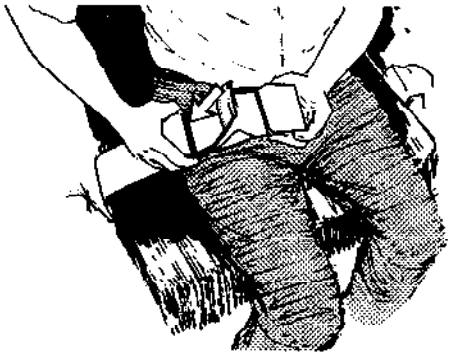

Illustration 44 g00100709

1. Unfasten the seat belt.

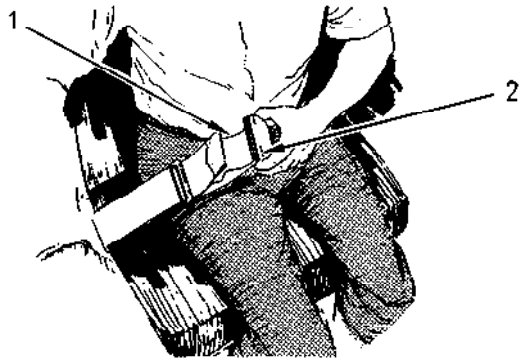

Illustration 45 g00932817

2. To remove the slack in outer loop (1), rotate buckle (2). This will free the lock bar. This permits the seat belt to move through the buckle.

3. Remove the slack from the outer belt loop by pulling on the buckle.

4. Loosen the other half of the seat belt in the same manner. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Shortening the Seat Belt

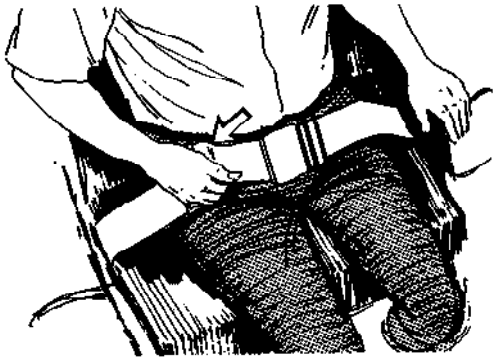

Illustration 46 g00100713

1. Fasten the seat belt. Pull out on the outer belt loop in order to tighten the seat belt.

2. Adjust the other half of the seat belt in the same manner.

3. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Fastening The Seat Belt

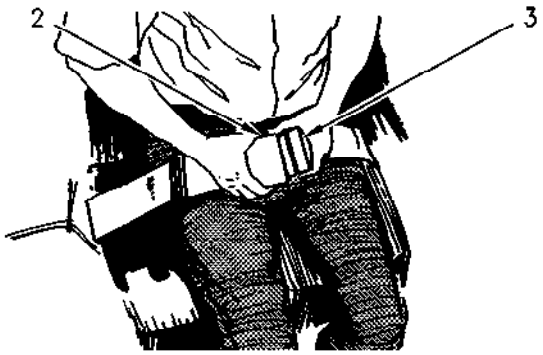

Illustration 47 g00932818

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

Releasing The Seat Belt

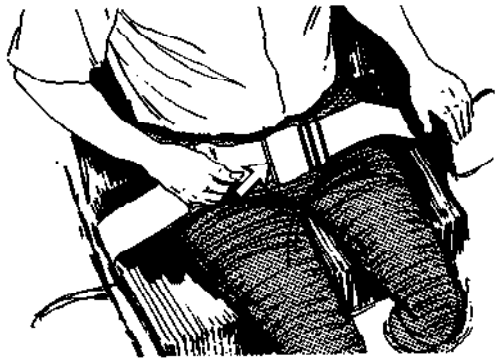

Illustration 48 g00100717

Pull up on the release lever. This will release the seat belt.

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

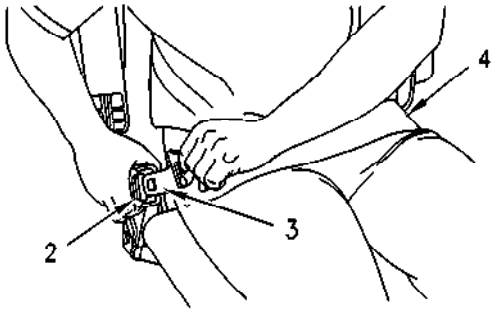

Illustration 49 g00867598

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

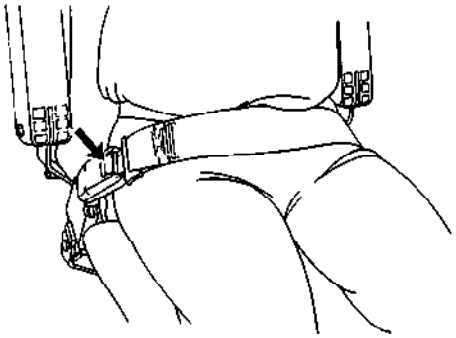

Illustration 50 g00039113

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.

i09648010

Operator Controls

SMCS Code: 7000; 7300; 7301; 7451

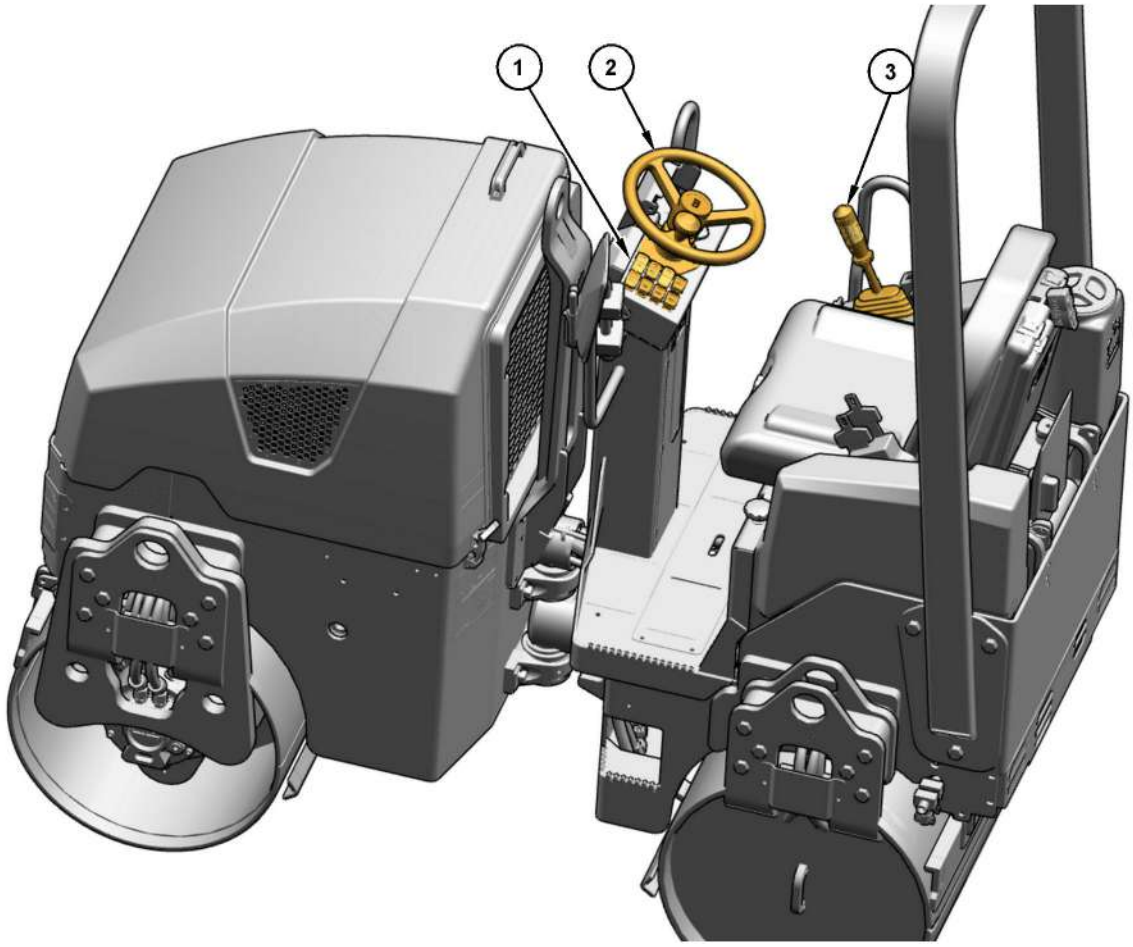

Illustration 51 g07529622

(1) Steering console (2) Steering wheel (3) Propel control lever

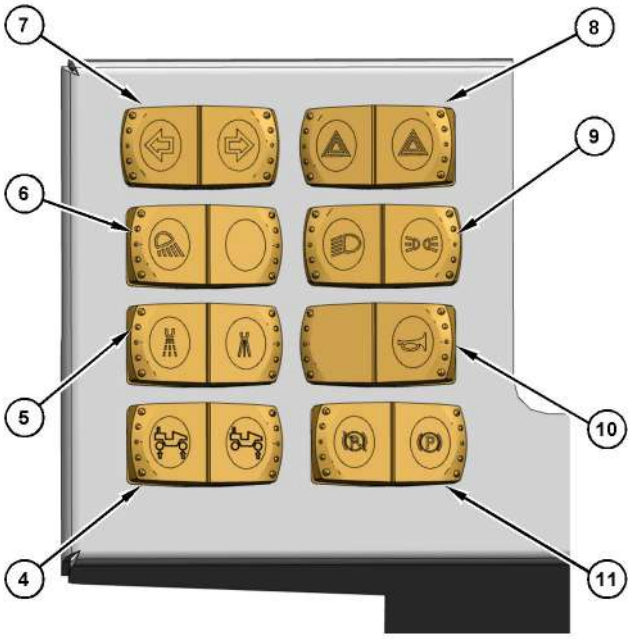

Illustration 52 g07529636

Close up view of the steering console (2)

(4) Switch and indicator for the vibratory system
(5) Switch and indicator for the water spray system
(6) Switch and indicator for the working lights (if equipped)
(7) Switch and indicator for the turn signal (if equipped)
(8) Switch and indicator for the hazard lights (if equipped)
(9) Switch for the lights (if equipped)
(10) Horn
(11) Switch and indicator for parking brake

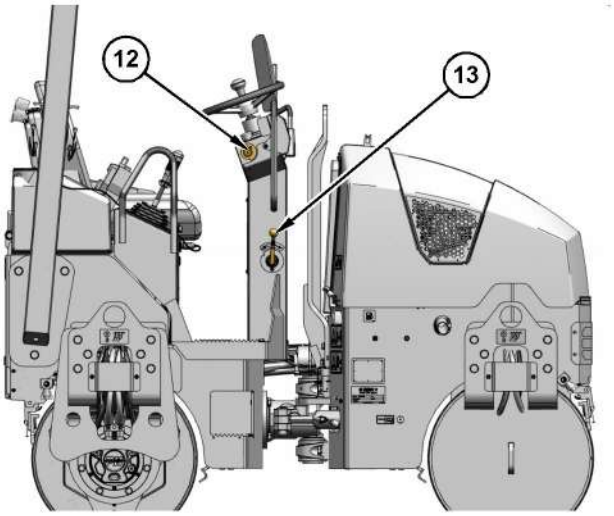

Illustration 53 g07532354

(12) Engine start switch
(13) Throttle control

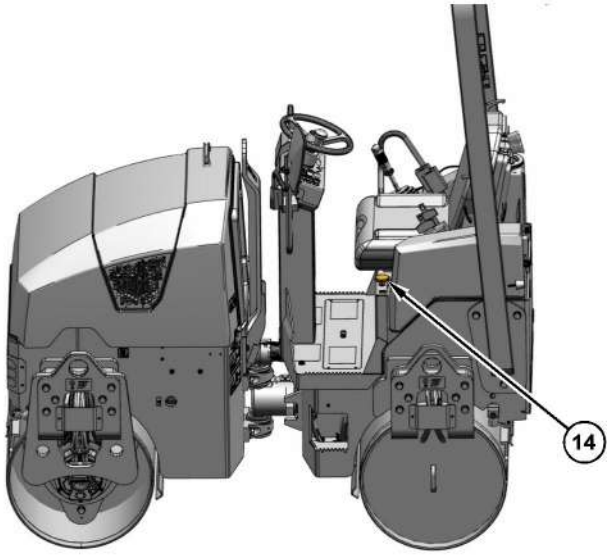

Illustration 54 g07532620

(14) Control knob for the water spray system

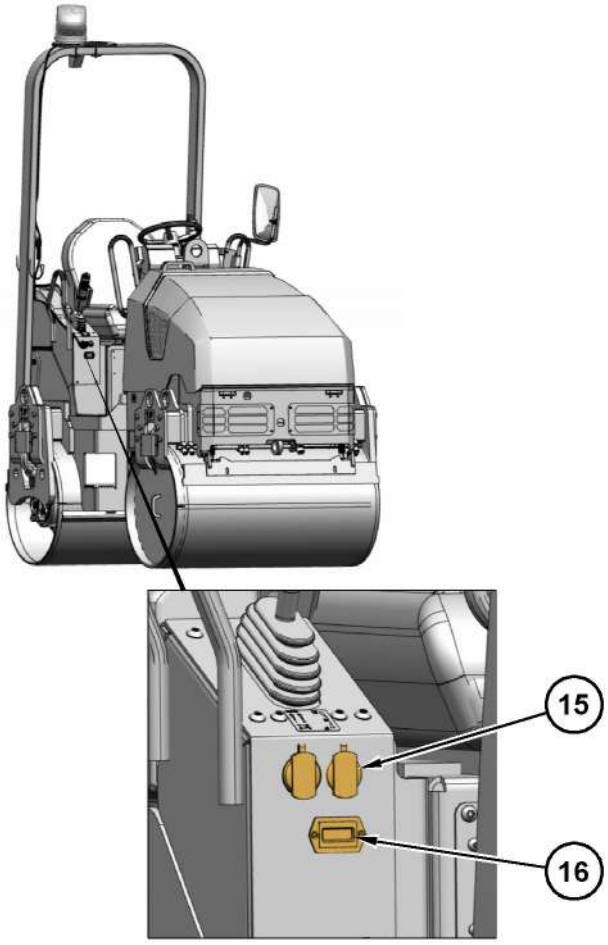

Illustration 55 g07532626

(15) Charge Ports or Beacon
(16) Hour Meter

Propel Control Lever (3)

FORWARD – To move the machine forward, slowly push the propel control lever away from the center NEUTRAL position.

NEUTRAL – Move the propel control lever to the NEUTRAL position to stop the machine.

REVERSE – To move the machine in reverse, slowly pull the propel control lever away from the center NEUTRAL position.

On/Off Switch for the Vibratory System

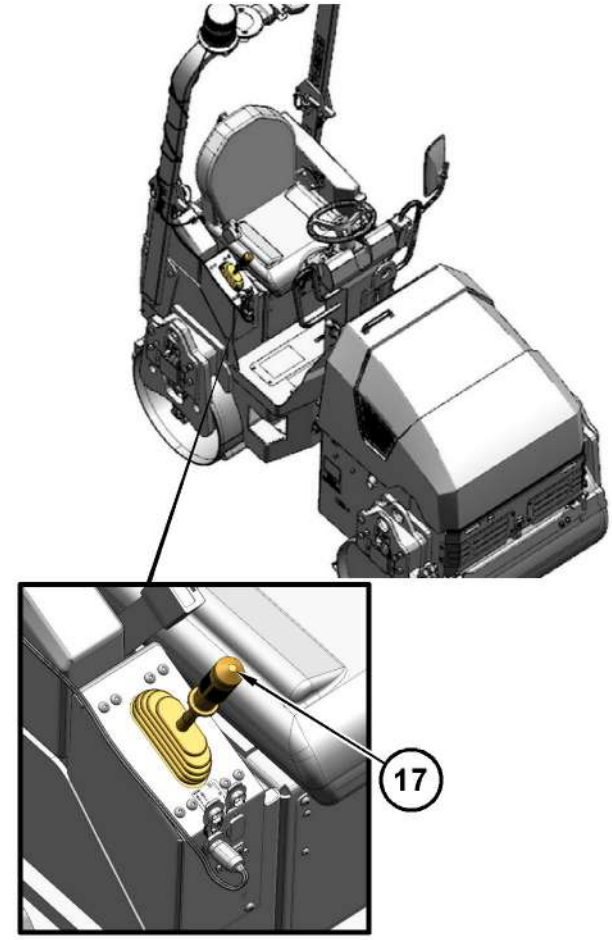

Illustration 56 g07532790

(17) Vibratory system on/off switch

The switch on the propel lever controls the operation of the vibration system

ON – To turn on the vibration system, press the switch.

OFF – To stop the vibration system, press the switch again. Vibration system will automatically turn off when the propel handle moves into neutral. It will start up automatically if the handle is moved out of neutral.

The switch on the propel lever controls the operation of the vibration system.

ON – To turn on the vibration system, press the switch.

OFF – To stop the vibration system, press the switch again. Vibration system will automatically turn off

when the propel handle moves into neutral. It will start up automatically if the handle is moved out of neutral.

Switch and Indicator for the Vibratory System (4)

Vibratory Control – Move the switch to the left to turn on the vibratory system for the front drum and the rear drum.

Vibratory Control – Move the switch to the right to turn on the vibratory system for the front drum only.

Switch and Indicator for the Water Spray System (5)

NOTICE
Always check the water level in the water tanks before you use the water spray system.

Contaminated water in the water tanks can cause performance problems and reliability problems in the water spray system.

NOTICE
Drain the water system completely when freezing conditions exist in order to avoid damage to the water system components.

Intermittent Spray – Move the switch to the left position to activate the intermittent water spray system. Intermittent spray interval is 10 seconds on, 10 seconds off. Water spay system turns off with the propel handle in neutral.

OFF – Move the switch to the center position to turn the water spray system OFF.

Continuous Spray – Move the switch to the right position to activate the continuous water spray system. Water spay system stays active with the propel handle in neutral.

Switch and Indicator for the Working Lights (6) (If Equipped)

Working Light – Move the switch for the working light to the left to activate the working light. Move the switch for the working light to the right to turn off the working light.

Switch and Indicator for the Turn Signal (7) (If Equipped)

Turn Signal – Move the switch for the turn signal to the left to activate the left turn signal lights. Move the switch for the turn signal to the right to activate the right turn signal lights.

Switch and Indicator for the Hazard Lights (8) (If Equipped)

Hazard Light – Move the switch for the hazard light to the left to activate the hazard light. Move the switch for the hazard light to the right to turn off the hazard light.

Switch for the Lights (9) (If Equipped)

Position Lights – set the switch in the center position to turn on the position lights.

Headlights – Push the switch to the left side to turn on the headlights. Push the switch to the right side to turn off the head and position lights.

Horn (10)

Horn – Push the switch to the right to activate the horn.

Parking Brake (11)

NOTICE

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

The use of the parking brake as a service brake in regular operation causes severe damage to the parking brake system.

Parking Brake – To apply the parking brake, push the right side of the switch. Push the left side of the switch to release the parking brake.

Note: The propel control lever must be returned to the NEUTRAL position to allow the machine to move after releasing the parking brake.

Engine Start Switch (12)

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

ON – To activate the machine circuits, turn the switch to the ON position. When the switch is released from the START position, the switch will return to the ON position. Turning the switch to the ON position also functions as the preheat position for the glow plugs.

START – Turn the engine start switch to the START position 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 “Engine Starting“ section.

Throttle Control (13)

LOW – To decrease the engine speed to low speed, move the throttle control downward to the LOW position.

HIGH – To increase the engine speed to high speed, move the throttle control upward to the HIGH position.

Control Knob for the Water Spray System (14)

Pressurized Water Spray System – Before using the pressurized water spray system, turn the control knob counterclockwise to open the valve and allow water into the water spray system. Turn the control knob clockwise to close the valve and turn off the water spray system. Closing the valve prevents water leakage during a storage period.

12V Power Port (15)

12V Power Port – The power receptacle can be used for powering automotive electrical equipment or accessories. Remove the cap before use. There are two power ports, both are connected to key switch.

Service Hour Meter (16)

Service Hour Meter – This gauge indicates the total operating hours of the engine. To determine the service hour maintenance intervals, use service hour meter (16).

Fuel Level Gauge (18)

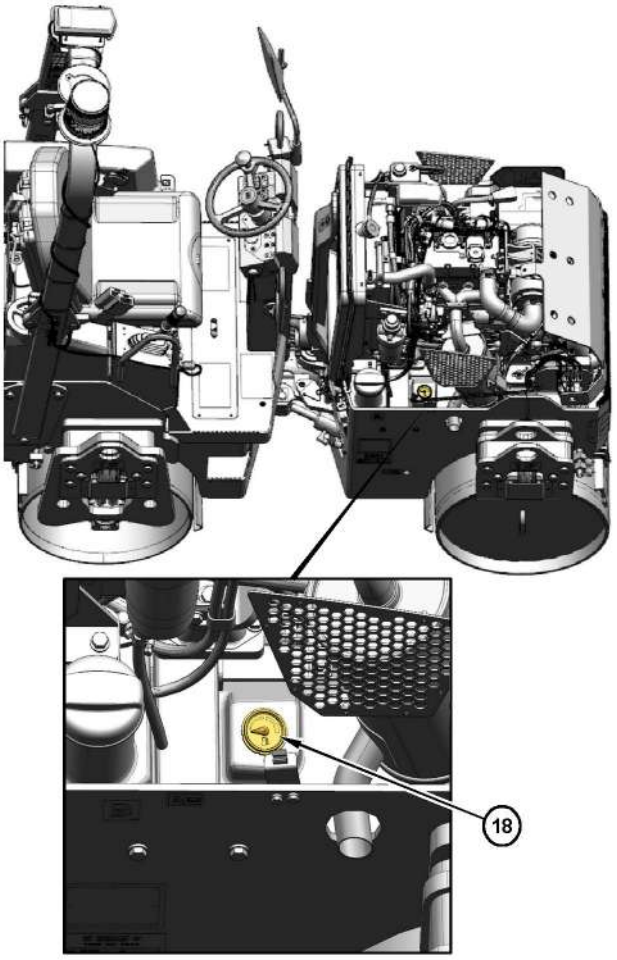

Illustration 57 g07533061

Fuel Level Gauge – Fuel level gauge (18) is located in the engine compartment on the right side of the machine. Fuel level gauge (18) indicates the amount of diesel fuel in the fuel tank.

i07423935

Battery Disconnect Switch
(If Equipped)

SMCS Code: 1411

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

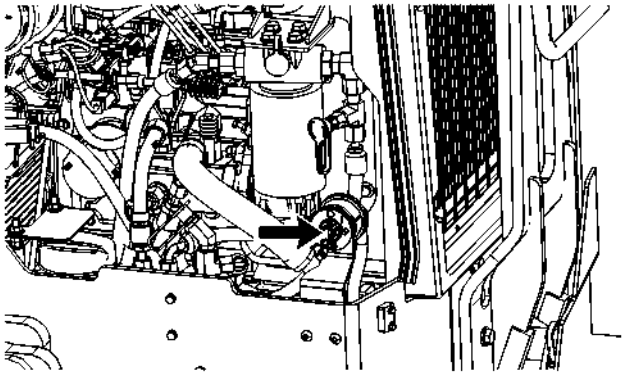

Illustration 58 g06318386

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

OFF – 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 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.

i09648072

Monitoring System

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

The monitoring system informs the status of the machine systems, problems, or an impending problem.

Indicators

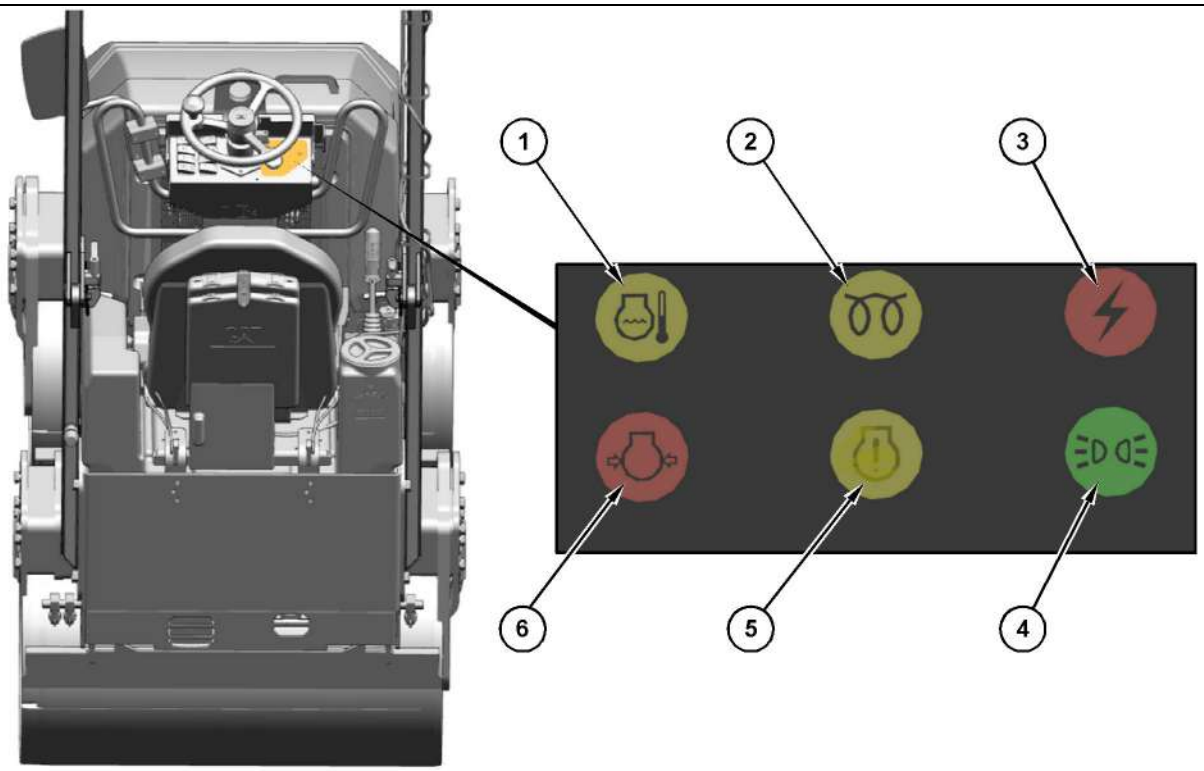

Illustration 59 g07529702

View of operator console on the right side of the steering wheel from the operator seat

Engine coolant temperature (1) – The indicator will illuminate when the temperature of the engine coolant is too hot. Stop the machine and investigate the problem. Do not operate the machine until all the repairs have been made.

Engine preheater (2) – The indicator will illuminate when the engine start switch is turned to the PREHEAT position. When the indicator turns off, turn the engine start switch to the START position to start the engine.

Charging system (3) – The indicator will illuminate when the alternator is malfunctioning. If the indicator illuminates, move the machine to a safe area and stop the machine. Investigate the problem. Do not operate the machine until all the repairs have been made.

Working lights indicator (4) – The indicator will illuminate when the roading lights are on.

Engine fault indicator (5) – Indicates a potential problem with the engine

Engine oil pressure indicator (6) – The indicator will illuminate when the engine oil pressure is too low. If the indicator illuminates, stop the engine and investigate the problem. Do not operate the machine until all the repairs have been made.

i09603786

Product Link

SMCS Code: 7606

Note: Your machine may be equipped with the Cat ® Product Link™ system.

The Cat Product Link communication device utilizes cellular and/or satellite technology to communicate equipment information. This information is communicated to Caterpillar, Cat dealers, and Caterpillar customers. The Cat Product Link communication device uses Global Positioning System (GPS) satellite receivers.

The capability of two-way communication between the equipment and a remote user is available with the Cat Product Link communication device. The remote user can be a dealer or a customer.

Data Broadcasts

Data concerning this machine, the condition of the machine, and the operation of the machine is being transmitted by Cat Product Link to Caterpillar and/or Cat dealers. The data is used to serve the customer better and to improve upon Cat products and services. The information transmitted may include: machine serial number, machine location, and operational data, including but not limited to: fault codes, emissions data, fuel usage, service meter hours, software, and hardware version numbers and installed attachments.

Caterpillar and/or Cat dealers may use this information for various purposes. Refer to the following list for possible uses:

- Providing services to the customer and/or the machine
- Checking or maintaining Cat Product Link equipment
- Monitoring the health of the machine or performance
- Helping maintain the machine and/or improve the efficiency of the machine
- Evaluating or improving Cat products and services
- Complying with legal requirements and valid court orders
- Performing market research
- Offering the customer new products and services

Caterpillar may share some or all the collected information with Caterpillar affiliated companies, dealers, and authorized representatives. Caterpillar will not sell or rent collected information to any other third party and will exercise reasonable efforts to keep the information secure. Caterpillar recognizes and respects customer privacy. For more information, please contact your local Cat dealer.

Operation in a Blast Site for Product Link Radios

⚠ WARNING

This equipment is equipped with a Cat® Product Link communication device. When electric detonators are being used for blasting operations, radio frequency devices can cause interference with electric detonators for blasting operations which can result in serious injury or death. The Product Link communication device should be deactivated within the distance mandated under all applicable national or local regulatory requirements. In the absence of any regulatory requirements Caterpillar recommends the end user perform their own risk assessment to determine safe operating distance.

Refer to your products Operation and Maintenance Manual Supplement, “Regulatory Compliance Information” for more information.

For information regarding the methods to disable the Cat Product Link communication device, please refer to your specific Cat Product Link manual listed below:

- Operation and Maintenance Manual, SEBU8142, “ Product Link - PL121, PL321, PL522, and PL523”
- Operation and Maintenance Manual, SEBU8832, “ Product Link PLE702, PLE602, PLE601, PL641, PL631, PL542, PL240, PL241, PL243, PL141, PL131, PL161, PL083 and PL042 Systems”

Note: If no radio disable switch is installed and the equipment will be operating near a blast zone, a Product Link radio disable switch may be installed on the equipment. The switch will allow the Cat Product Link communication device to be shut off by the operator from the equipment control panel. For more details and installation procedures, refer to the following:

- Special Instruction, REHS7339, “Installation Procedure for Product Link PLE640 Systems”
- Special Instruction, REHS8850, “Installation Procedure for the Elite Product Link PLE601, PLE641, and PLE631 Systems”

- Special Instruction, SEHS0377, “Installation Procedure for the Product Link PL131, PL141, and PL161 Systems”
- Special Instruction, REHS9111, “Installation Procedure for the Pro Product Link PL641 and PL631 Systems”
- Special Instruction, M0098124, “Installation Procedure for Pro Product Link PL243 Cellular Radio Systems”
- Special Instruction, M0109130, “Installation Procedure for the Elite Product Link PLE602, PLE602p, PLE702, PLE643, PLE643p, and PL743 Systems”
- Special Instruction, M0111437, “Installation Procedure for the Elite Product Link PLE602, PLE602p, PLE702, PLE683, PLE683p, and PL783 Systems”

i07423437

Backup Alarm

SMCS Code: 7406

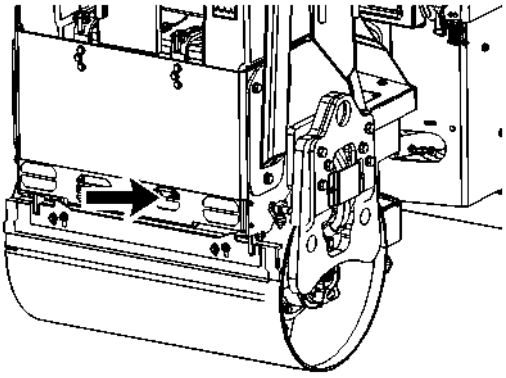

Illustration 60 g06318064

The backup alarm is 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.

i07013100

Rollover Protective Structure (ROPS)
(Foldable)

SMCS Code: 7323

Illustration 61 g02866428

The machine may be 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 front of the machine.

Raise

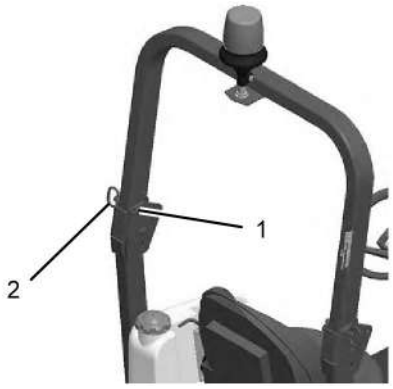

Illustration 62 g02866431

In order to raise the ROPS, perform the following steps:

1. Support the upper mass ROPS using a crane and suitable rigging.
2. Remove the safety pin (1) and pull out the locking pin (2). Do so on both sides.

3. Lift the ROPS into the upright position.

4. Insert the locking pins and secure the locking pins with the safety pins.

Lower

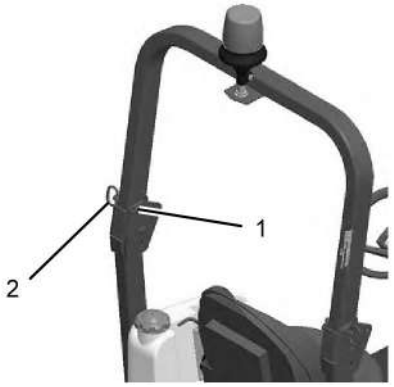

Illustration 63 g02866431

In order to lower the ROPS, perform the following steps:

1. Support the upper mass ROPS using a crane and suitable rigging.

2. Remove the safety pin (1) and pull out the locking pin (2). Do so on both sides.

3. Gently lower the upper mass.

Note: When lowering the ROPS, do not allow the upper frame to fall into the lower position. Allowing the upper mass to slam will weaken the ROPS system and ultimately compromise the integrity and protection.

4. Insert the pins in the ROPS in the lower hole setting through the upper mass to secure the ROPS for transport.

Engine Starting

i07013104

Engine Starting

SMCS Code: 1000; 7000

WARNING

To prevent personal injury, be sure all personnel are clear of the machine. Sound the horn for several seconds before starting the engine.

WARNING

Do not use ether. This machine is equipped with glow plugs. Using ether can create explosions or fires that can cause personal injury or death. Read and follow the engine starting procedure in the Operation and Maintenance Manual.

NOTICE
Do not crank the engine for more than 15 seconds. Allow the starter to cool for two minutes before cranking again.

The key must be in run position with the engine running to maintain electrical and hydraulic functions and prevent machine damage.

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

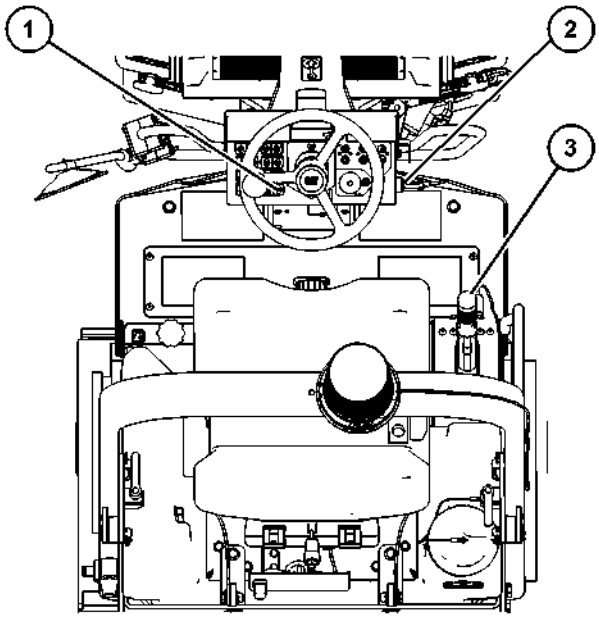

Illustration 64 g06253452

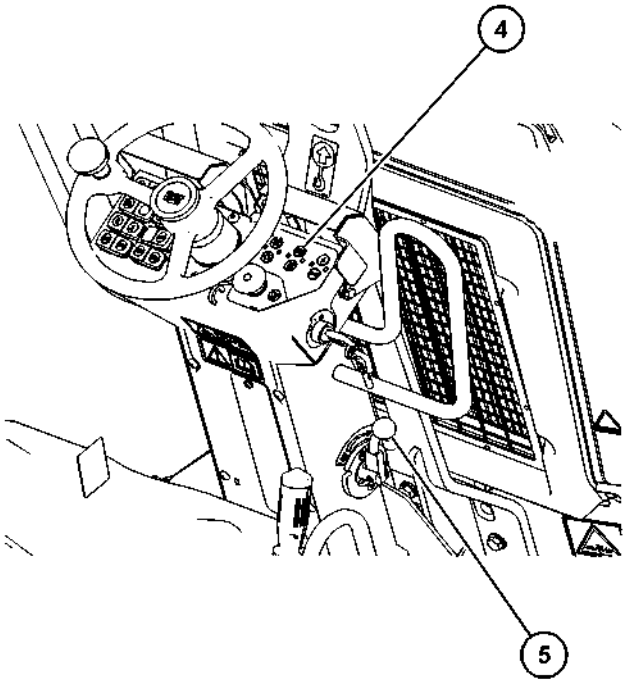

Illustration 65 g06253718

1. Sit in the operator seat, and fasten the seat belt.

2. Move propel control lever (3) to the NEUTRAL position.

3. Press parking brake switch (1) to set the parking brake.

4. Turn engine start switch (2) to the ON position. The glow plug indicator (4) will illuminate signifying the glow plugs are on. The length of time that the glow plugs is fixed at 10 seconds regardless of ambient temperature. Do not start the engine until the glow plug indicator light goes out.

5. Turn the engine start switch (2) to the start position. Do not crank for more than 30 seconds. If multiple crank attempts are needed, allow 2 minutes for starter to cool down before cranking again.

6. Allow the engine to warm up for a few minutes before operating the roller.

7. Disengage the parking brake by pushing the right side of the parking brake switch.

8. Lift the throttle handle (5) on the right side of the console until it latches to bring the engine to high throttle.

i07013110

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

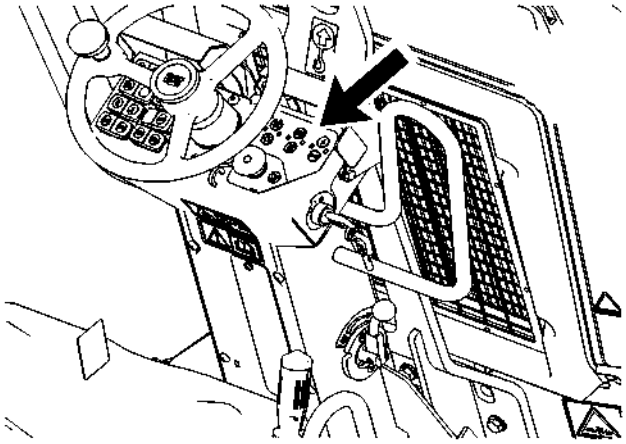

Illustration 66 g06254167

NOTICE
Keep the engine speed low until the engine oil indicator light goes out.

If the light does not go out within ten seconds, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

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

2. Look at the gauges and the indicator lights frequently during operation.

If the alternator indicator lamp remains illuminated after going to high idle, inspect the machine for the cause of the trouble. If the gauges do not respond properly, inspect the machine for the trouble. Before you move the machine, repair all problems.

3. Cycle all controls to allow warm oil to circulate through all the lines and the cylinders.

Observe the following recommendations during the warmup period for the engine:

- In temperatures above 0°C (32°F), the warmup period is 15 minutes.
- In temperatures below 0°C (32°F), the warmup period is 30 minutes or a longer period.

- In temperatures below −18°C (0°F), more time is required if the hydraulic controls are sluggish.

Parking

i07013170

Stopping the Machine

SMCS Code: 7000

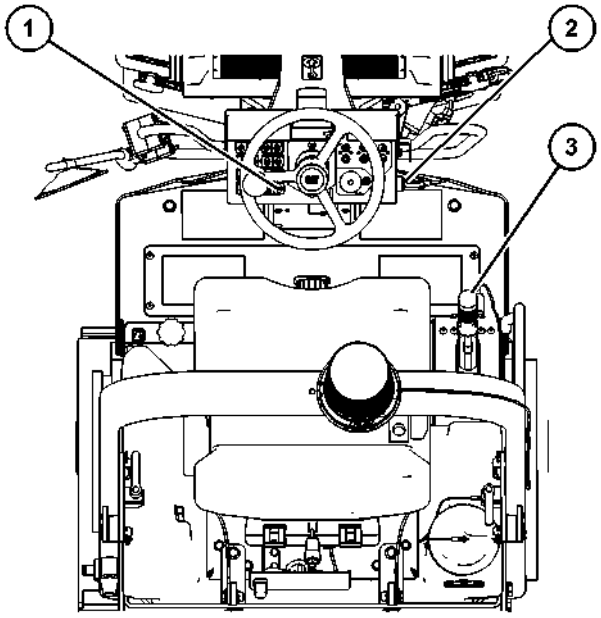

Illustration 67 g06253452

1. Turn off the vibratory system and water spray system.

2. Place propel control lever (3) in the NEUTRAL position.

3. Push left side of the parking brake switch(1) to set the parking brake.

4. Shut off key (2).

Stopping the Machine in the Event of a Breakdown

If a breakdown or accident occurs while the machine is operating, use the following procedure:

1. Turn off the vibratory system and water spray system.

2. Place propel control lever (3) in the NEUTRAL position.

3. Push left side of the parking brake switch(1) to set the parking brake.

4. Allow the engine and exhaust system to cool before accessing the machine.

5. Consult your Cat dealer to diagnose and repair the machine.

i07013181

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.

1. Before stopping the engine, allow the engine to run at low idle with no load for five minutes. This procedure allows the hot areas of the engine to cool gradually and the procedure will extend the life of the engine.

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

3. Be sure that all of the controls are in the OFF position. Be sure that all of the controls are in the proper position for parking the machine.

i07013186

Leaving the Machine

SMCS Code: 7000

1. Use the steps and the handholds to dismount the machine. Face the machine to dismount the machine.

2. If the machine is being parked for an extended period, disconnect the battery disconnect switch (if equipped).

3. Close all access covers and doors.

Vandalism Guards

Parts of the machine which may be subject to theft or vandalism when the vehicle is parked unattended can be padlocked to prevent unauthorized access or use.

Lockable parts include:

- Engine cover
- Vandal cover

- Engine hood

To lock the engine cover, close the cover and attach a padlock to the fastener.

To lock the vandal cover, rotate the cover until a padlock can be inserted between the cover and the locking tab.

Note: This machine is furnished with padlocks

i07735116

Machine Storage and Specified Storage Period

SMCS Code: 7000

Machine Storage

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, including 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”.

Specified Storage Period

The specified storage period of this machine is 1 year.

After the specified storage period has expired, consult your Cat dealer for inspect, repair, rebuild, install remanufactured, or install new components, and disposal options, and to establish a new specified storage period.

If a decision is made to remove the machine from service, refer to Decommissioning and Disposal for further information.

Transportation Information

i07013190

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 laws that govern the characteristics of a load (height, weight, width, and length). Observe all regulations that govern wide loads.

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

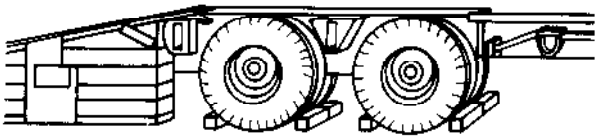

Illustration 68 g00303463

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.

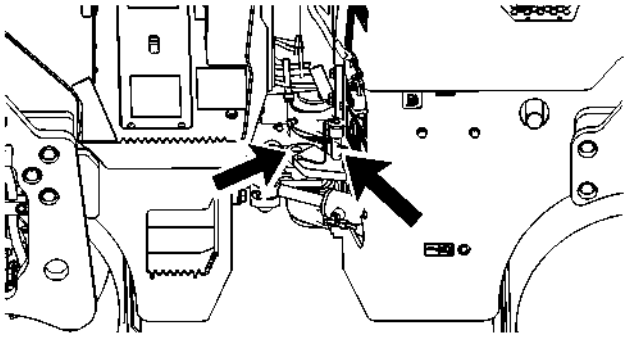

Illustration 69 g06252661

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. If your machine is equipped with a foldable rollover protective structure (ROPS), lower the ROPS. Refer to the Operation and Maintenance Manual, “Rollover Protective Structure (ROPS)” for further information on the ROPS.

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

7. 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.

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

9. 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.

i07013191

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.

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 the Machine

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

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

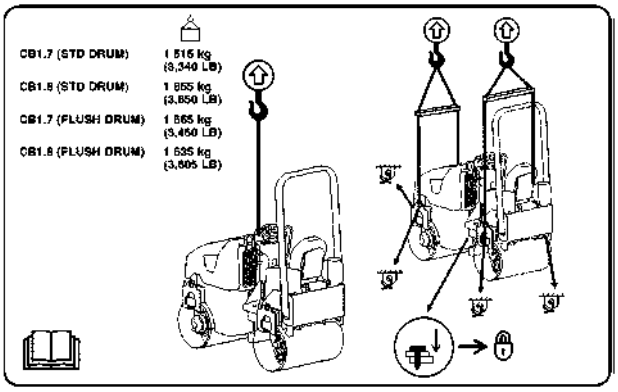

Illustration 70 g06253723

A spreader bar must be used when lifting the machine unless equipped with a single lift point.

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.

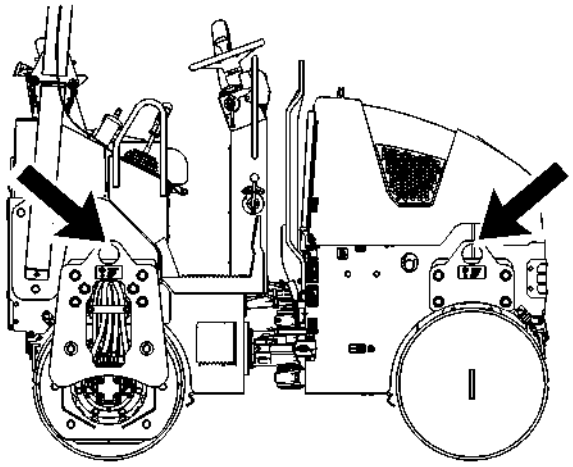

Illustration 71 g06253729

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

Tying Down the Machine

Do not tie down the machine over the operator platform. Tying down the machine 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 the machine over the articulation hitch will reduce the life of the articulation bearings.

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.

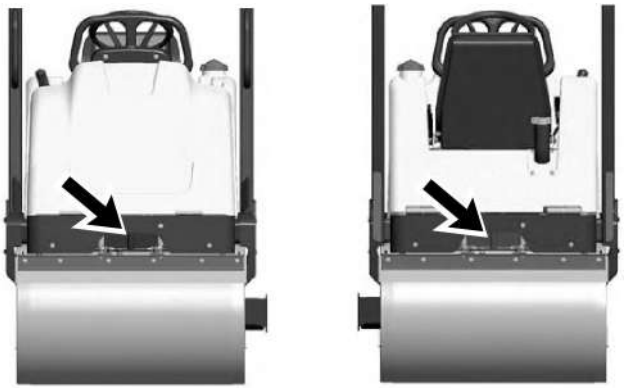

Illustration 72 g02871297

7. Use the tie-down positions to secure the machine. The tie-down positions are identified on the machine by labels. There are two tie-down positions on the front of the machine and two tie-down positions on the rear of the machine.

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

Towing Information

i07013199

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. This 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. This 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 more 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, more steps may be required before the machine is towed. To avoid damaging the power train, the steering system, and the brakes, which may be inoperable, more steps may be required.

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

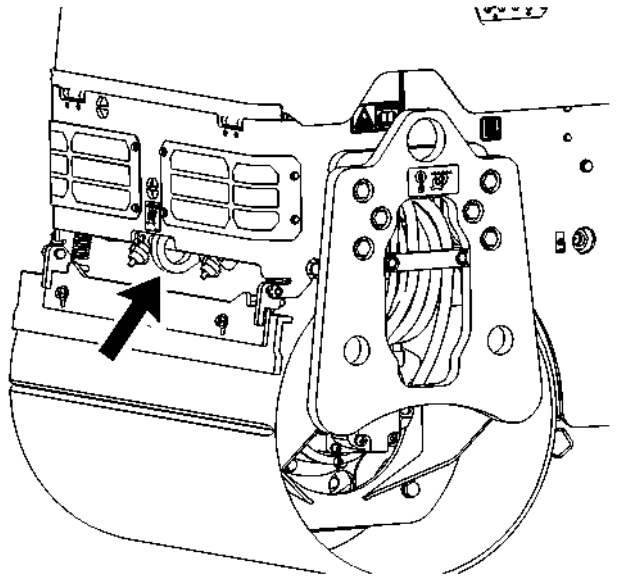

Illustration 73 g06253745

3. Attach the tow line to the machine at the tow point located in the front of the machine.

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

5. Remove blocks from the drum.

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. This will prevent movement of the machine.

8. Activate the brakes by turning out the brake release screws.

9. Engage the parking brake.

10. Detach the tow lines.

i07013209

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.

There are two drive motors on the machine, one on each drum. Each drive motor includes a parking brake that is spring activated and hydraulically released.

NOTICE
To avoid damaging the internal mechanism, do not use power tools to release or reactivate the brakes.

Perform the following procedure on both drums to release the brakes manually:

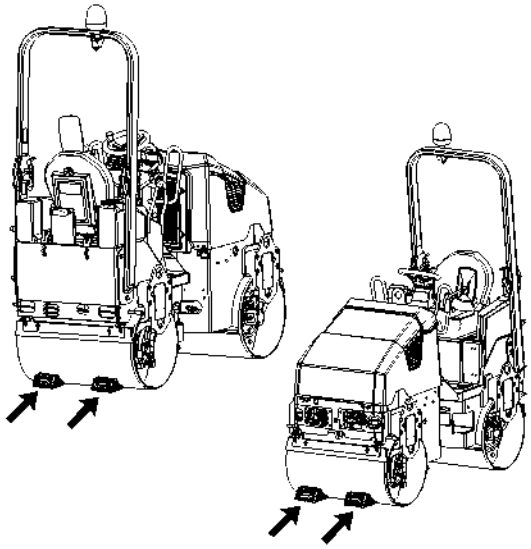

Illustration 74 g01351219

1. To prevent the machine from moving, block the drums securely.

Illustration 75 g01351074

2. 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.

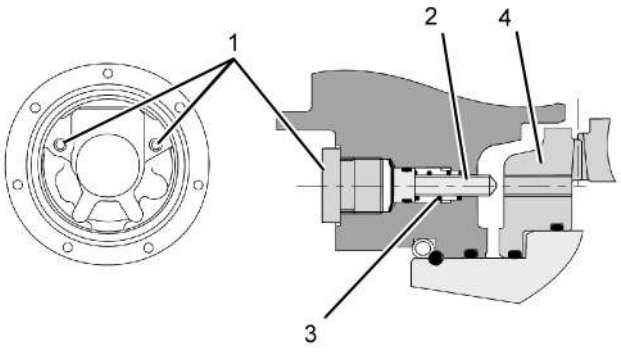

Illustration 76 g02871417

3. To access the release screws (2), use an 8mm allen wrench to remove plugs (1). There are two release screws on each drum.

4. Using a 6mm allen wrench, press and turn in each release screw until the threads catch in brake plate (4). Tighten each release screw alternately until spring (3) on each is fully compressed. You will feel a substantial difference in the amount of torque required to turn the screw once the spring is fully compressed.

5. Continue to tighten the two release screws to compress the brake plate springs. Alternate between the two screws, turning each approximately 45 degrees at a time, until the drums are no longer held by the brake plate. The brake plate should release after turning each screw approximately two turns.

Note: The maximum torque for the release screws is 33 N·m (24.3 lb ft). Overtightening the release screws can destroy the internal mechanism.

6. Manually turn the drum to test if the brake is released.

7. Replace the plugs. Tighten the plugs to a maximum torque of 60 ± 6 N·m (44.2 ± 4.4 lb ft).

To reactivate the brakes, perform the following procedure on both drums:

1. To access the release screws (2), use an 8mm allen wrench to remove plugs (1). There are two release screws on each drum.

2. Alternating between the two release screws (2), loosen the screws until the brake plate is disengaged.

3. Replace the plugs. Tighten the plugs to a maximum torque of 60 ± 6 N·m (44.2 ± 4.4 lb ft).

Engine Starting (Alternate Methods)

i07013210

Engine Starting with Jump Start Cables

SMCS Code: 1000; 7000

WARNING

Failure to properly service the batteries may cause personal 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

1. Make the initial determination of the 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 battery positive terminal on the stalled machine.

   Do not allow positive cable clamps to contact any metal except for the battery positive 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

i07014394

Access Doors and Covers

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

Engine Hood

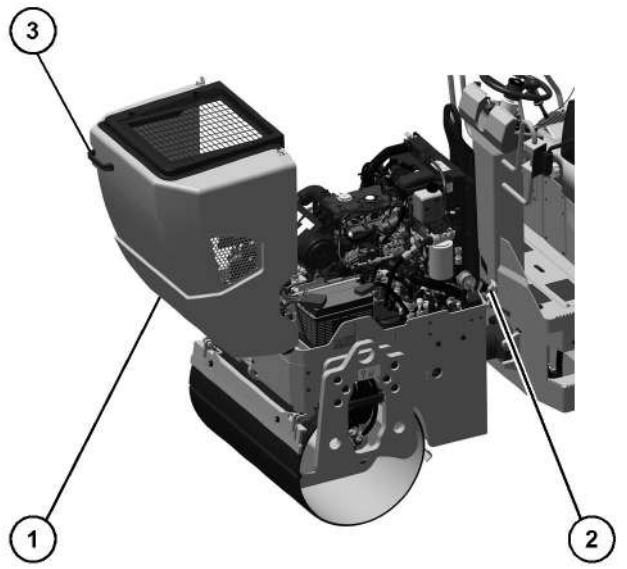

Illustration 77 g06253788

To raise the engine hood (1), release the two hood latches (2). Then use handle (3) to raise the hood.

Lubricant Viscosities and Refill Capacities

i07014704

Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 1000; 7000; 7581

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

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. 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 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 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 10

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 11

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

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 12

Recommended Grease						
Compartment or System	**GreaseType**	**NLGI Grade**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
External Lubrication Points	**Cat Advanced 3 Moly**	NLGI Grade 2	−20	40	−4	104
	Cat Ultra 5 Moly	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” 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.

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

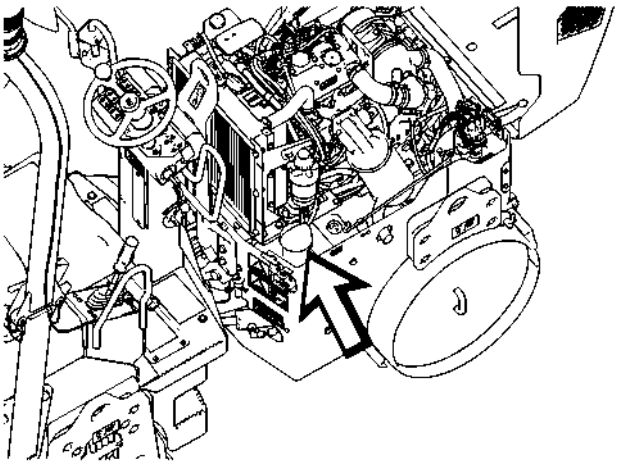

Illustration 78 g06265223
Fuel Cap Location

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. 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. B5 is the recommended maximum for these machines.

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.

To reduce the risks associated with the use of biodiesel, the final biodiesel blend, and the biodiesel fuel used must meet specific blending requirements. B5 is the recommended maximum for these machines.

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.

i07014705

Capacities (Refill)

SMCS Code: 1000; 6320; 7000; 7560

Table 13

Refill Capacities Approximate			
Compartment or System	**Liters**	**US Gallon**	**Imperial Gallon**
Fuel Tank	30	7.9	6.6
Engine Oil	4.4	1.16	0.97
Coolant	3.9	1.03	0.97
Water Tank	145	39.6	33.1
Hydraulic Tank Oil	34	7.4	6.2

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; 1250-553-PX; 1300-553-PX; 1300; 1350; 1350-553-PX; 3000-553-PX; 4250-553-PX; 4300-553-PX; 5050; 5050-553-PX; 5070; 5612; 5612-553-PX; 5615-553-PX; 6700-553-PX; 7000; 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.

Engine Oil System

To relieve the pressure from the engine oil system, turn off the engine.

Fuel System

To relieve the pressure from the fuel system, turn off the engine.

High Pressure Fuel Lines

WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

The high-pressure fuel lines are the fuel lines that are between the high-pressure fuel pump and the high-pressure fuel manifold and the fuel lines that are between the fuel manifold and cylinder head. These fuel lines are different from fuel lines on other fuel systems because of the following differences:

- The high-pressure fuel lines are constantly charged with high pressure.
- The internal pressures of the high-pressure fuel lines are higher than other types of fuel system.

Before any service or repair is performed on the engine fuel lines, perform the following tasks:

1. Turn off the engine.

2. Wait for 10 minutes.

Note: Fuel pressure can be monitored by Caterpillar Electronic Technician (ET).

Do not loosen the high-pressure fuel lines in order to purge trapped air from the fuel system.

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. Apply the parking brake.

3. Slowly loosen the filler cap in order to release the pressure in the hydraulic tank.

4. Tighten the filler cap.

5. The pressure in the hydraulic system has been released. Lines and components can be removed.

i07014715

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

2. Disconnect the battery disconnect.

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.

i07419617

Prepare the Machine for Maintenance

SMCS Code: 1000; 7000

1. Move the machine to a dry, level, solid surface that is free of any debris.

Note: The surface must be solid enough to support the weight of the machine and any tooling that is used to support the machine.

2. Put the machine in park. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

3. Ensure that the pressure is released from any closed system that will be opened during the maintenance procedure. Refer to Operation and Maintenance Manual, “System Pressure Release” for more information.

Maintenance with the Engine Running

For maintenance that requires the engine to be running, perform the following:

1. Run the engine at an idle.

Maintenance without the Engine Running

For maintenance that does not require the engine to be running, perform the following:

1. Move the engine start switch to the OFF position. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

Maintenance with Electrical System Disabled

For maintenance that requires the electrical system to be disabled, perform the following:

1. Move the engine start switch to the OFF position. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

2. Move the battery disconnect switch to the OFF position. Refer to Operation and Maintenance Manual, “Battery Disconnect Switch” for the proper procedure.

i09644714

Maintenance Interval Schedule

SMCS Code: 1000; 7000

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

The user is responsible for the performance of maintenance. 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.

Products that operate in severe operating conditions or that experience abnormally high fuel consumption, may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

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

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

When Required

Every 10 Service Hours or Daily

Every 100 Service Hours

Every 250 Service Hours

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

Every 500 Service Hours

Every 1000 Service Hours

Every 2000 Service Hours

Every 3000 Service Hours

Every 3 Years

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i07014729

Articulating and Oscillating Bearings - Lubricate

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

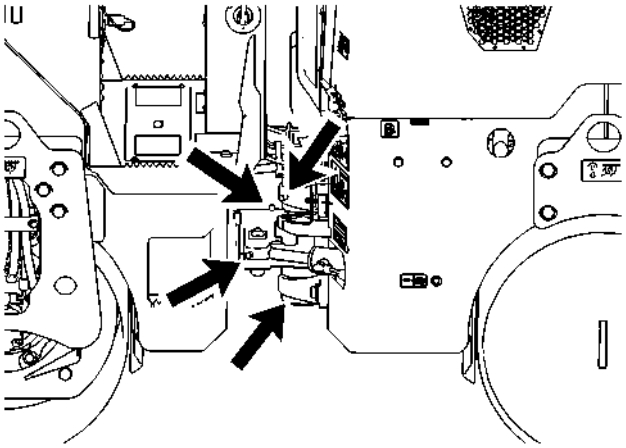

Illustration 79 g06265515

The hitch is located in the center pivot area. There are four grease fittings for the articulation and oscillations bearings.

1. Clean all fittings before servicing.
2. Lubricate the fittings with ten strokes from a hand grease pump (16 to 20 cc per fitting).

Note: Excess grease can cause seal damage.

i07014906

Backup Alarm - Test

SMCS Code: 7406-081

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.

i07014927

Battery - Clean/Check

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

1. Clean the top of the batteries with a clean cloth.
2. Clean the battery terminals. Coat the battery terminals with petroleum jelly, if necessary.
3. Check the battery cables. Tighten any loose connections.

i07014948

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

i07016143

Battery or Battery Cable - Inspect/Replace

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

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 left 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.

i07425969

Belts - Inspect/Adjust/Replace

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

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

If a new belt is installed, recheck the belt adjustment after 30 minutes of operation.

Alternator Belt and Water Pump Belt

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

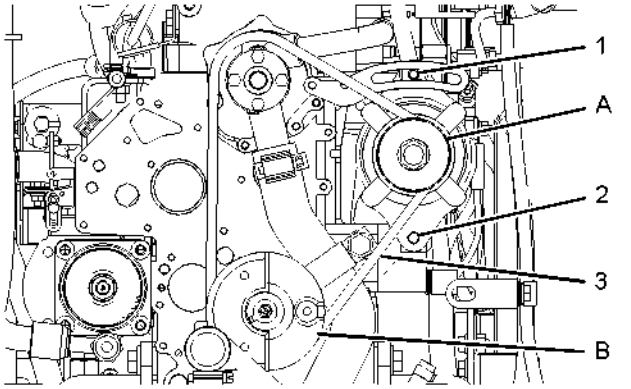

Illustration 80 g01351297

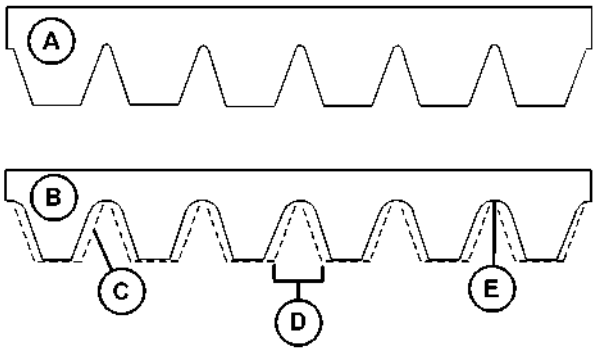

Illustration 81 g06114636

(A) New belt
(B) Worn belt

2. Inspect the condition of the serpentine belt. Over time the belt ribs will lose material (C). The space between the ribs will increase (D). The loss of material will cause the pulley sheave to contact the belt valley. This will lead to belt slippage and accelerated wear (E). Replace the belt if the belt is worn or frayed.

3. To check the belt tension, apply 110 N (25 lb) of force midway between pulley (A) and pulley (B). Correctly adjusted belts will deflect 6 to 10 mm (8/32 to 12/32 inch).

4. To adjust alternator belt (3), loosen mounting bolts (1) and (2).

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

6. 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).

7. If new belts are installed, check the belt adjustment again after 30 minutes of engine operation at the rated speed.

8. Close the engine compartment.

i07016145

Braking System - Test

SMCS Code: 4250-081; 4267-081

Note: If the machine configuration changes, the parking brakes need to 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 the steps before you perform the following procedure.

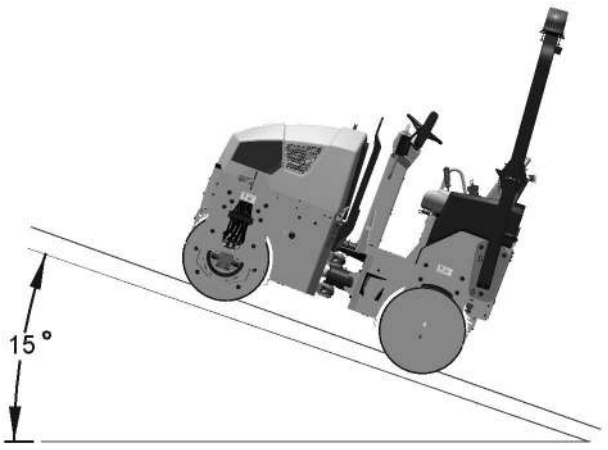

Illustration 82 g06265995

Position the machine on the incline of the slope, but near the base of the slope 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.

i07016154

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”.

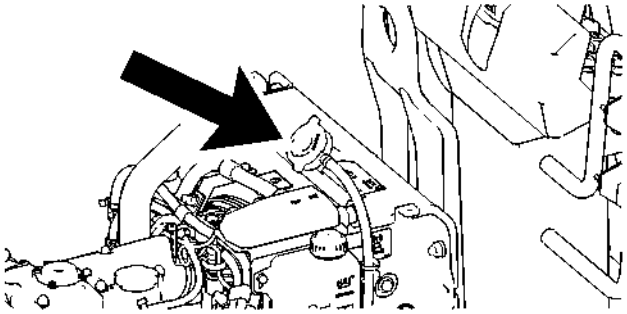

Illustration 83 g06266022

3. Slowly loosen the cooling system pressure cap to relieve system pressure. Remove the cooling system pressure cap.
4. Open the drain valve that is at the bottom right corner of the radiator, facing the engine. Allow the coolant to drain into a suitable container by using the drain hose at the right rear corner of the front frame.
5. Close the drain valve. Fill the cooling system with clean water and with a 6 to 10% concentration of cooling system cleaner.
6. Install the cooling system pressure cap.
7. Close the engine compartment.
8. Start the engine. Run the engine for 90 minutes.
9. Stop the engine. Allow the cooling system to completely cool.

10. Open the engine compartment.

11. Remove the cooling system pressure cap.

12. Open the drain valve and drain the cleaning solution.

13. While the engine is stopped, flush the cooling system with water until the draining water is transparent.

14. Close the drain valve.

15. 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 currently. Also, do not change the coolant conditioner element if you are using Caterpillar Long Life Coolant that contains some additive.

16. Start the engine and run the engine. Leave off the cap until the thermostat opens and the coolant level stabilizes.

17. Maintain the coolant level to 1 cm of the bottom of the fill pipe.

18. Inspect the gasket on the cooling system pressure cap. Replace the cooling system pressure cap if the gasket is damaged.

19. Install the cooling system pressure cap.

20. Drain and refill coolant recovery tank to proper level per markings on the tank.

21. Close the engine compartment.

i07016158

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.

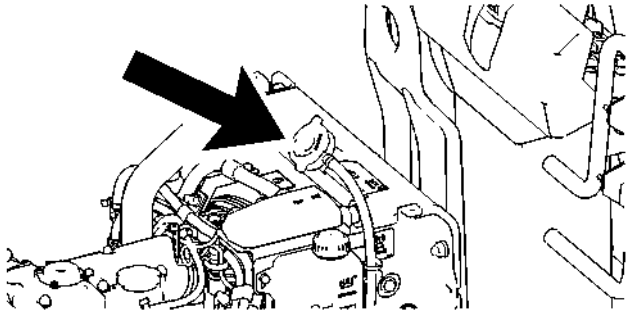

Illustration 84 g06266022

3. Slowly loosen the cooling system pressure cap to relieve system pressure. Remove the cooling system pressure cap.
4. If necessary, drain enough coolant from the radiator 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 to 1 cm of the bottom of the fill pipe.
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.

i07016162

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.

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

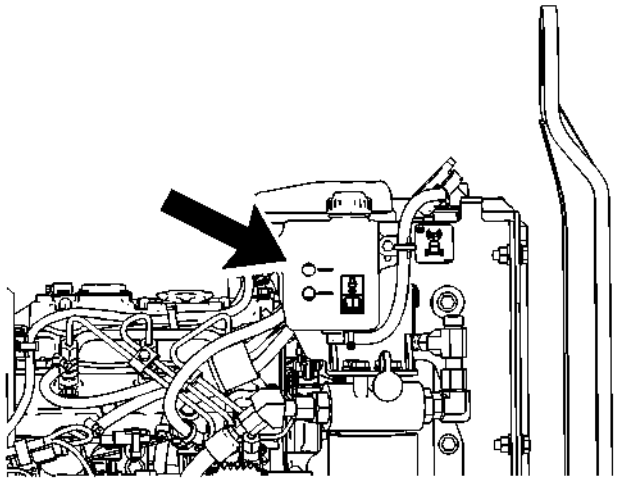

Illustration 85 g06254220

2. Maintain the coolant level to the markings on the side of the coolant overflow tank.
3. Inspect the overflow canister cap and the radiator cap seal for damage. Clean the cap with a clean cloth or replace the cap.

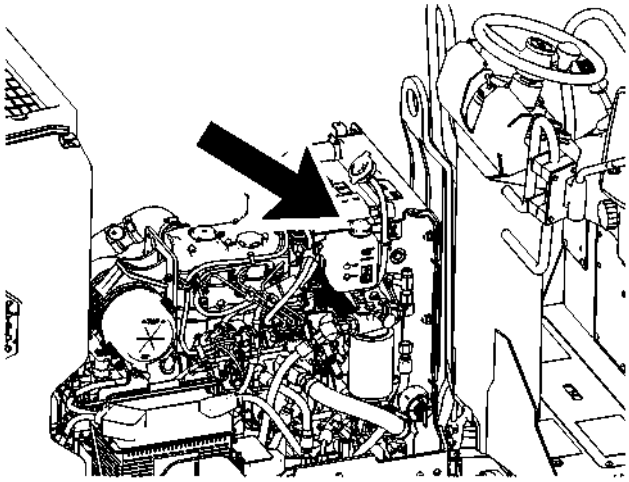

Illustration 86 g06254184

4. Install the cap.

5. Close the engine compartment.

i07016168

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. This includes the following types of coolants.

- 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. To receive the full effect of S·O·S analysis, you must establish a consistent trend of data. 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 to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

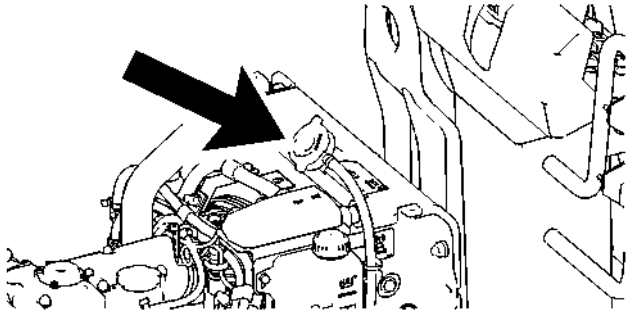

Illustration 87 g06266022

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 needs to be operated 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 to circulate the coolant again.
3. Shut off the engine.
4. Carefully remove the radiator 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 radiator cap.

i07016172

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-554; 1395-008; 7542; 7542-008

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

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Submit the sample for Level 2 analysis.

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

i07016173

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”.

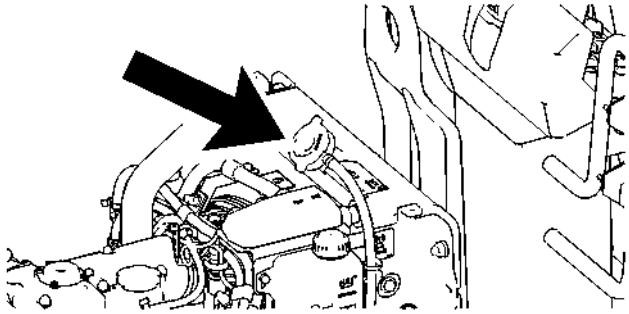

Illustration 88 g06266022

2. Remove the cooling system pressure cap slowly 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.

i02686343

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

⚠ 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”.

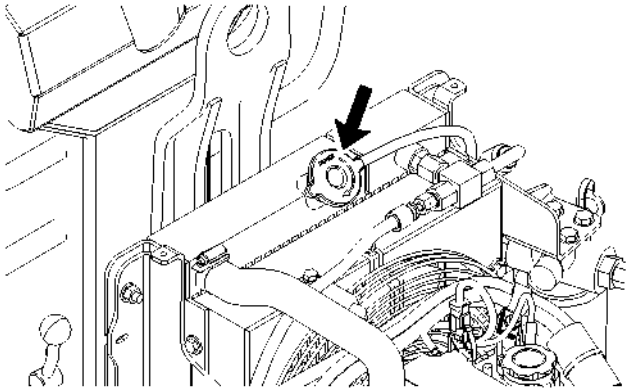

Illustration 89 g01349492

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

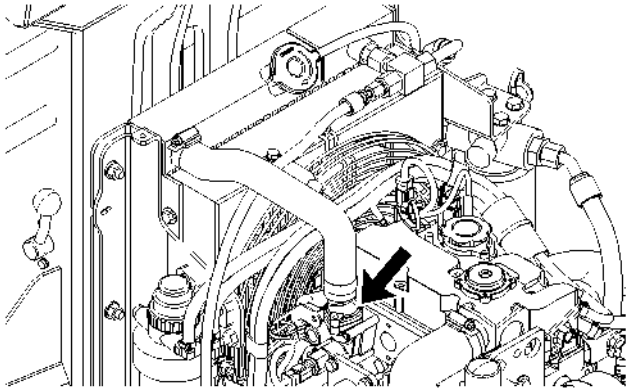

Illustration 90 g01349541

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
Since Caterpillar engines incorporate a shunt design cooling system, it is mandatory to always operate the engine with a water temperature regulator.

Depending on load, failure to operate with a water temperature regulator could result in either an overheating or an overcooling condition.

NOTICE
If the water temperature regulator is installed incorrectly, it will cause the engine to overheat.

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.

i07023880

Drum Scrapers - Inspect/ Adjust/Replace

SMCS Code: 6607-040; 6607-510; 6607-025

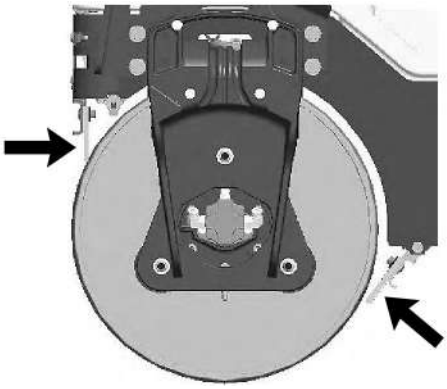

Illustration 91 g02874256

Inspect Scrapers

1. Remove dirt and debris from scrapers.

2. The drum scraper should be adjusted in order to touch the width of the drum.

Replace Scrapers

1. Loosen the bolts and remove the damaged scraper.

2. Install the new scraper and tighten the bolts. The recommended torque for the bolts is 34 N·m (25 lb ft).

3. The drum scraper should be adjusted in order to touch the width of the drum.

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”.

i07016179

Engine Air Filter Primary Element - Clean/Replace

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

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

Service the air cleaner filter element when the air filter service indicator has triggered and shows red in the indicator window. Refer to Operation and Maintenance Manual, “Operator Controls”.

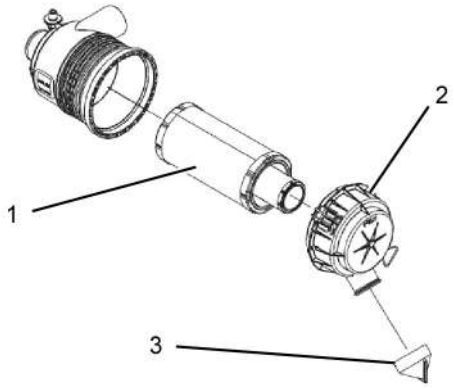

Illustration 92 g02874496

1. Remove cover (2) for the air filter housing by unlatching the 2 clips holding the cover onto the filter housing.

2. Remove primary filter element (1) from the air filter housing.

3. Clean the inside the air filter housing.

4. Clean dust cap (3).

5. Install a clean primary air filter element. Install the cover for the air filter housing with the dust cap pointing down.

6. Close the hood.

After cleaning the primary filter element, if the air filter indicator triggers after starting the engine or the exhaust smoke is still black, install a new primary filter element. If the air filter indicator remains activated, 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 the primary air filter element. Do not clean the primary air filter with pressurized air 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).

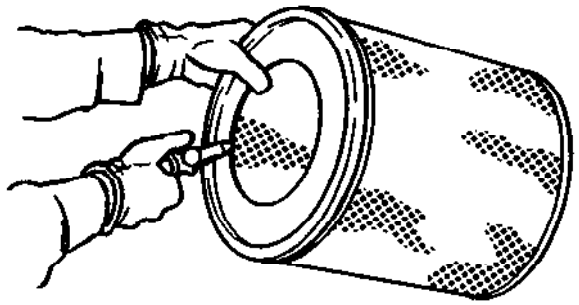

Illustration 93 g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) 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 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

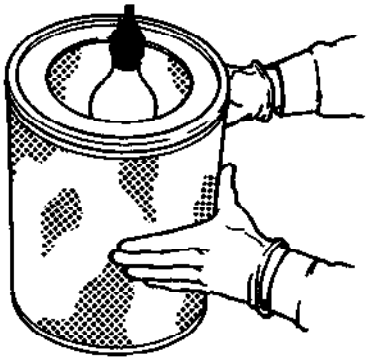

Illustration 94 g00281693

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 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.

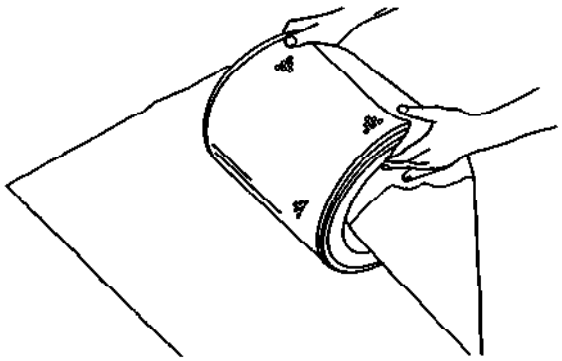

Illustration 95 g00281694

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

i07016181

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 engine access door.
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.

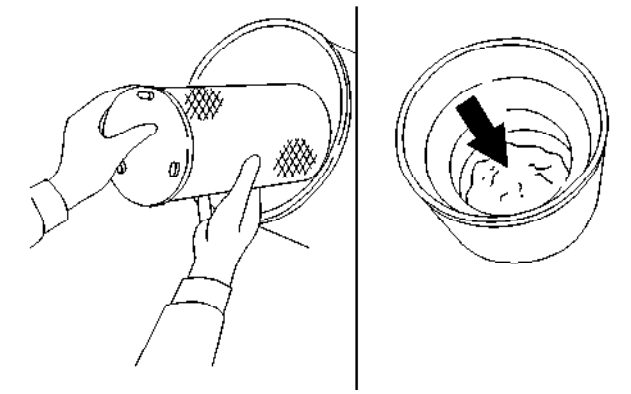

Illustration 96 g00101451

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 engine access door.

i07423460

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.

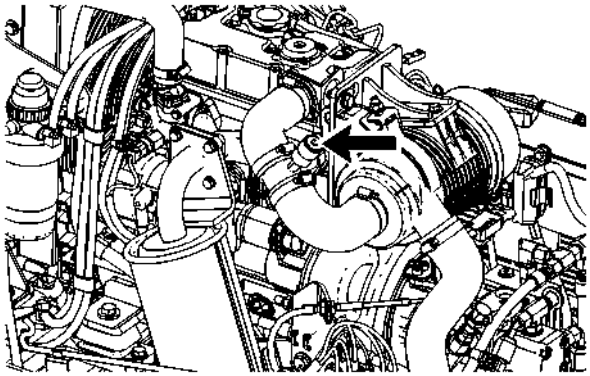

Illustration 97 g06318093

4. If the piston in the engine air filter service indicator turns red, 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.

i02166542

Engine Crankcase Breather - Clean/Replace

SMCS Code: 1317-510; 1317-070

NOTICE
Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

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.

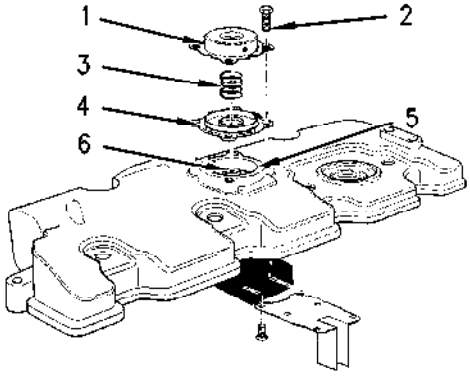

Illustration 98 g00827682

Typical example

(1) Breather cover
(2) Bolts for breather cover
(3) Spring
(4) Diaphragm and plate
(5) Cavity
(6) Vent hole

1. Loosen bolts (2) and remove breather cover (1) from the valve mechanism cover.

2. Remove spring (3). Remove the diaphragm and plate (4).

3. Clean vent hole (6). Clean cavity (5) for the breather assembly in the valve mechanism cover.

NOTICE
Make sure that the components of the breather assembly are installed correctly. Engine damage may occur if the breather assembly is not working properly.

4. Install a new diaphragm and plate (4) for the breather assembly. Install a new spring (3). Install breather assembly into cavity (5) of the valve mechanism cover.

5. Install breather cover (1) and four bolts (2). Tighten the bolts.

i07016190

Engine Mounts - Inspect

SMCS Code: 1152-040

Open the engine compartment.

There are four engine mounts. There are two engine mounts on the right side of the engine and there are two engine mounts on the left side of the engine.

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.

i07016192

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 to check the oil level. DO NOT check the oil level when the engine is running.

1. Park the machine on a level surface, and stop the engine.

2. Allow the oil to drain back to the sump for a minimum of 10 minutes.

3. Open the engine compartment.

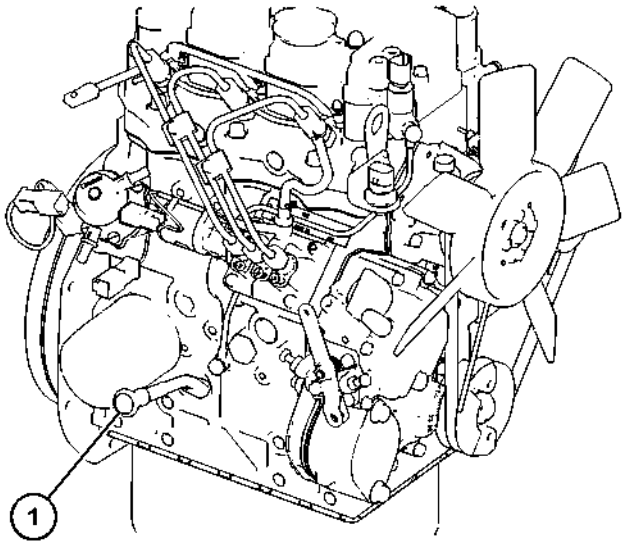

Illustration 99 g06266319

4. Remove engine oil level gauge (1). Wipe the engine oil level gauge with a clean cloth. Insert the engine oil level gauge. Remove the engine oil level gauge and note the oil level. Insert the engine oil level gauge.

Note: Refer to the Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “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 on the engine 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.

5. Maintain the oil level on the engine oil level gauge between the “MIN” mark and the “MAX” mark. Add oil if the oil level is too low. If the oil level is correct, close the engine compartment.

Note: Operating your engine with the oil level above the “MAX” mark on the oil level gauge could cause the crankshaft to dip into the oil. This could result in excessively high operating temperatures. The high operating temperatures could result in reduced lubricating characteristics of the oil. This could cause bearing damage and loss of engine power.

Add The Engine Oil

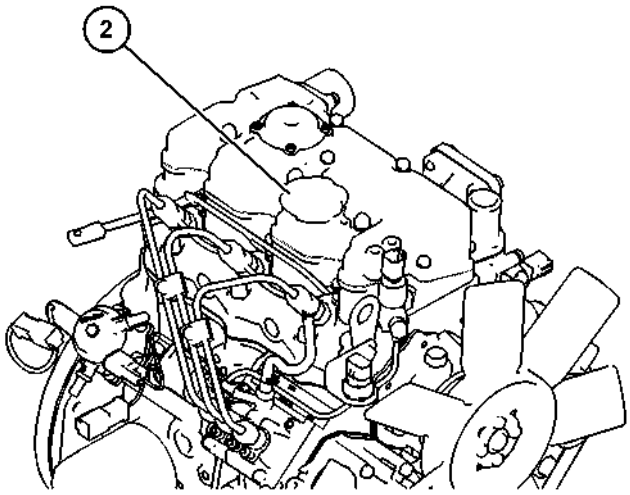

Illustration 100 g06266302

1. Open the engine compartment.

2. Remove oil filler cap (2).

3. Add the oil.

4. Clean oil filler cap (2). Install oil filler cap (2).

5. Close the engine compartment.

i07016302

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.

i07016308

Engine Oil and Filter - Change

SMCS Code: 1318-510

Run the engine 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 hood. Refer to the Operation and Maintenance Manual, “Access Doors and Covers”.

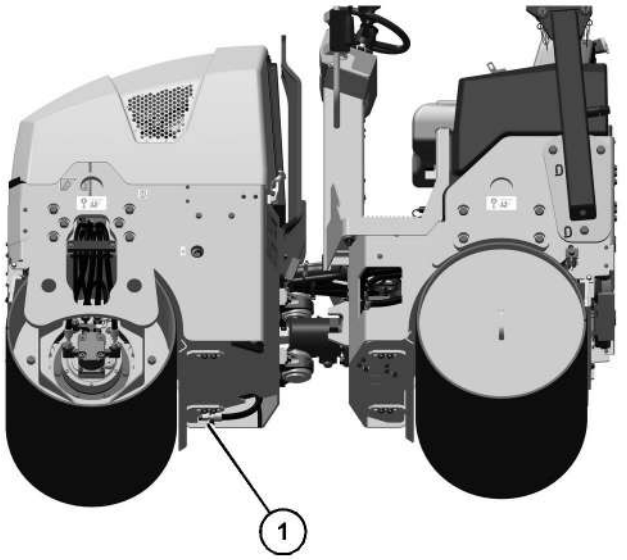

Illustration 101 g06266359

2. Place a suitable container under the drain plug (1). The drain plug is located below the front frame. Remove the drain plug. 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. Reinstall the drain plug.

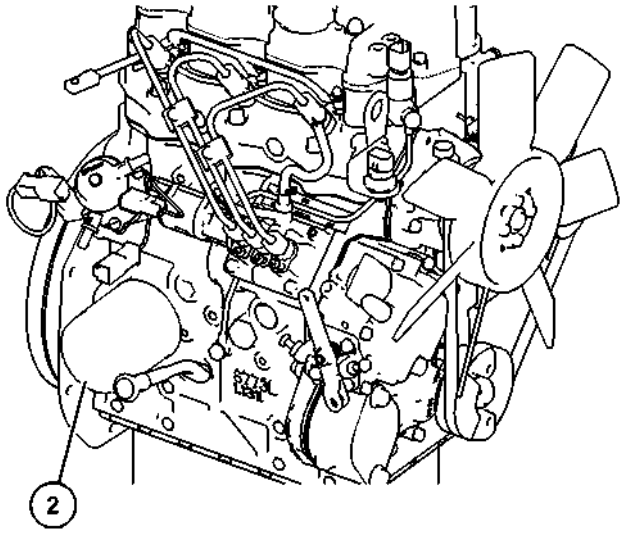

Illustration 102 g06266361

5. Remove filter element (2).

Note: Discard the used filter element according to local regulations.

6. Clean the filter housing base. All 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 extra 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.

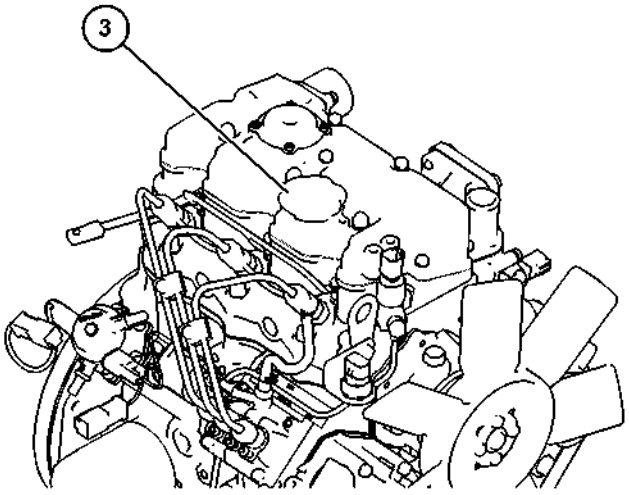

Illustration 103 g06266366

9. Remove oil filler cap (3). 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.

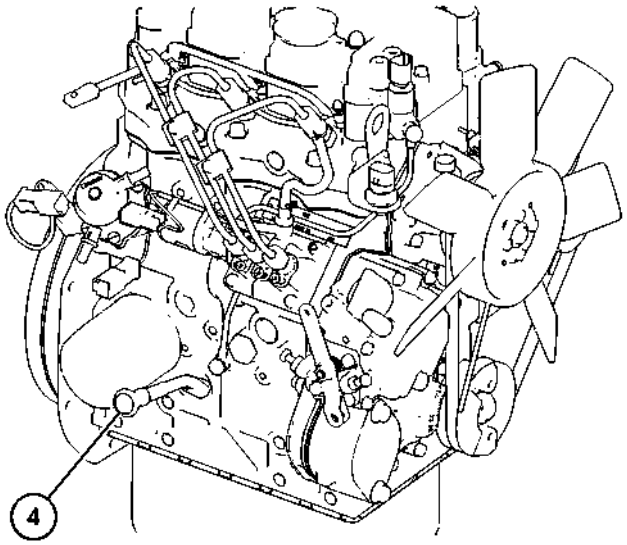

Illustration 104 g06266369

10. Before you start the engine, check the oil level on engine oil level gauge (4). The oil level must be between the “MAX” and “MIN” marks.

11. Start the engine. Run the engine for 2 minutes. Inspect the machine for leaks. Stop the machine.

12. Wait for 10 minutes to allow the oil to drain back into the crankcase. Check the oil level. Maintain the oil level between the “MAX” and “MIN” marks on the engine oil level gauge.

13. Close the engine hood.

i07016309

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.

For additional information refer to the engine manual for the machine.

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.

i02712308

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.

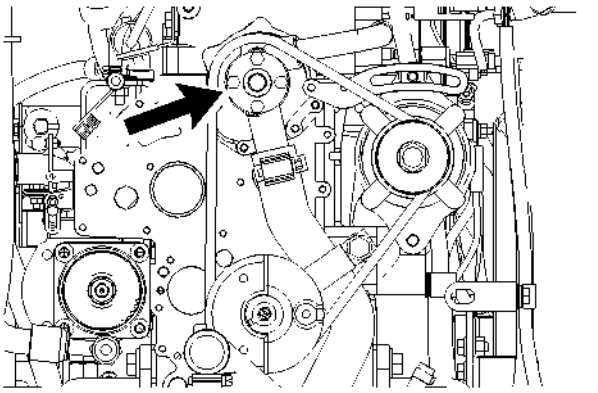

Illustration 105 g01361901

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.

i08192490

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070

Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

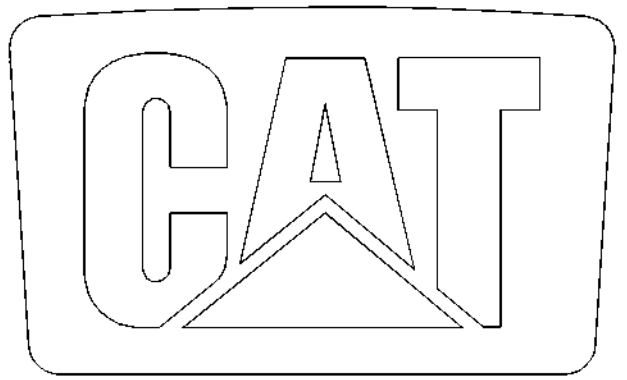

Illustration 106 g02174985

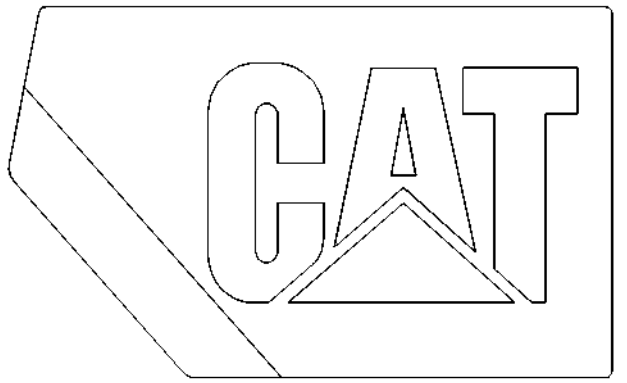

Illustration 107 g02175297

Illustration 108 g06394021

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.

i07016311

Fuel Injector - Test/Change

SMCS Code: 1254-510; 1254-081

This maintenance is recommended by Caterpillar as part of a lubrication and preventive maintenance schedule in order to help provide maximum engine life.

For additional information refer to the engine manual for the machine.

NOTICE
Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar dealer for the complete fuel injector test and change procedures.

i07016347

Fuel System - Prime

SMCS Code: 1250-548

If the fuel tank has been run dry or drained for service, manually priming the fuel system may be necessary. Use the following procedure to manually prime the fuel system.

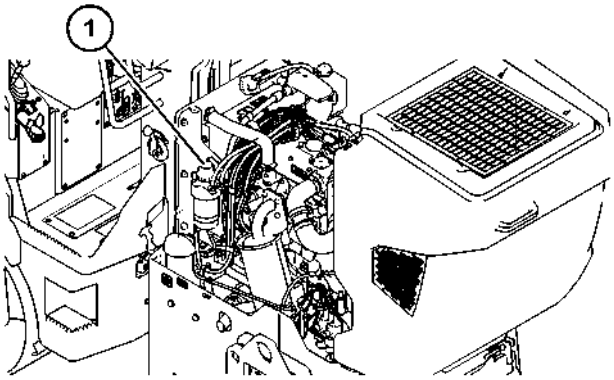

Illustration 109 g06266606

1. Manually prime the fuel system by repeatedly pressing the black priming button (1) on top of the fuel filter head.

2. Continue until you feel a marked resistance increase when pressing the priming button.

i07249924

Fuel System Primary Filter (Water Separator) Element - Replace

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

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

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

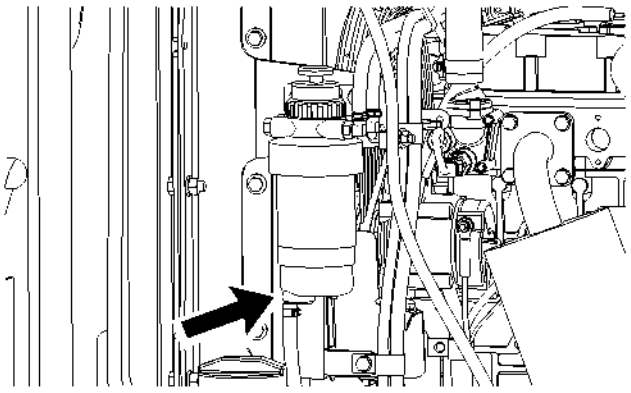

Illustration 110 g01351263

2. The water separator is located in the engine compartment on the right side of the machine.

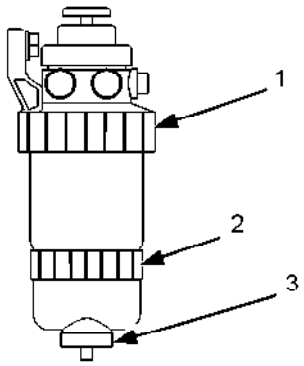

Illustration 111 g01017292

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

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

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

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

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

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

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.

i02690598

Fuel Tank Cap and Strainer - Clean

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

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

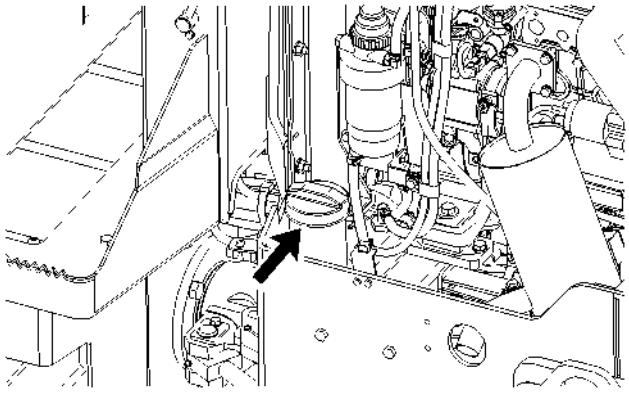

Illustration 112 g01350424

2. Remove fuel tank cap.

3. Remove the filler screen.

4. Wash the filler screen in clean, nonflammable solvent. Dry the filler screen with pressure air.

5. Inspect the cap and the filler screen. Replace the cap if the cap is damaged. Replace the filler screen if the filler screen is damaged.

6. Install the filler screen.

7. Apply a thin film of fuel to the gasket of the fuel tank cap.

8. Install fuel tank cap.

9. Close the engine compartment.

i02690758

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

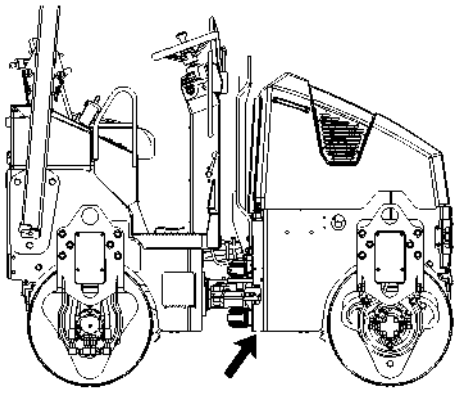

Illustration 113 g01350149

1. The drain plug is located under the right front side of the front frame.

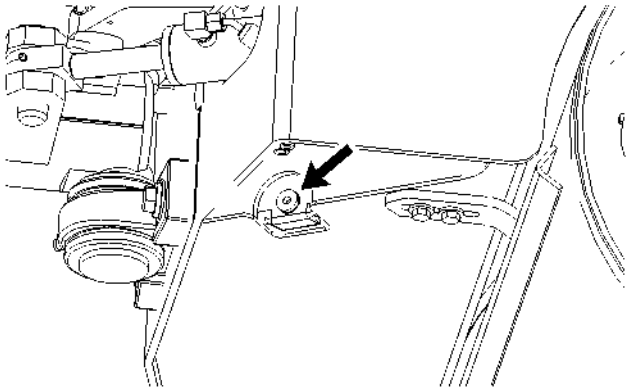

Illustration 114 g01350440

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.

i07423458

Fuses - Replace

SMCS Code: 1417-510

The compartment for the fuses and relays is below the operator controls. There are two screws that hold the cover on the compartment.

To access the compartment for the fuses and relays, remove the two screws. Remove the cover.

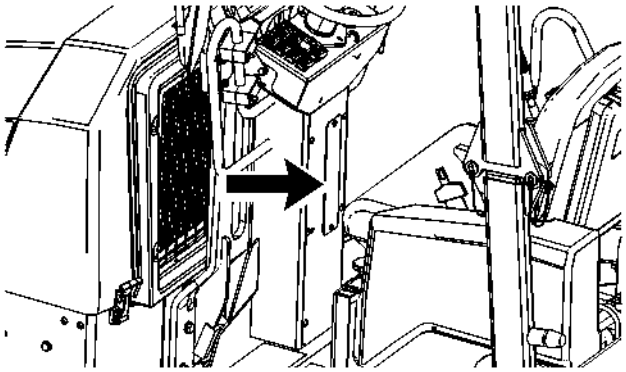

Illustration 115 g06318115

Fuses

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.

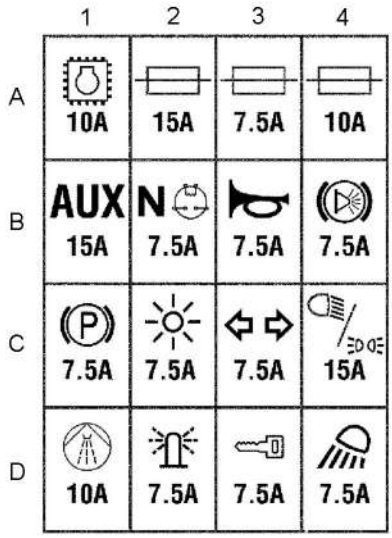

Illustration 116 g06318119

Engine ECM (A1) – 10 Amp

Spare (A2) – 15 Amp

Spare (A3) – 7.5 Amp

Spare (A4) – 10 Amp

Aux (B1) – 15 Amp

Neutral (B2) – 7.5 Amp

Horn (B3) – 7.5 Amp

B4 – 7.5 Amp

Parking Brake (C1) – 7.5 Amp

C2 – 7.5 Amp

Turn Signals (C3) – 7.5 Amp

Headlights/Position Lights (C4) – 15 Amp

Water Spray System (D1) – 10 Amp

Beacon (D2) – 7.5 Amp

Keyswitch (D3) – 7.5 Amp

Working Lights (D4) – 7.5 Amp

Relays

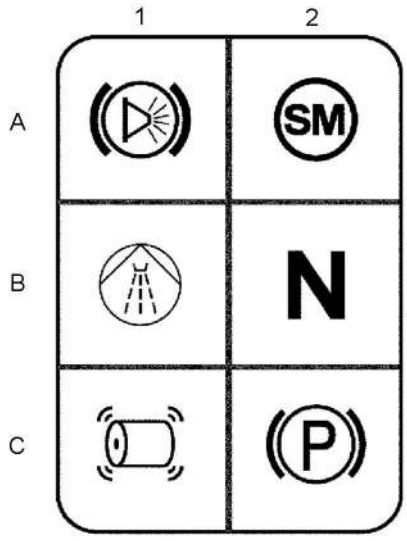

Illustration 117 g06318137

(A1) – Relay

(A2) – Relay

Water Spray System (B1) – Relay

Neutral (B2) – Relay

Vibratory System (C1) – Relay

Parking Brake (C2) – Relay

i07016362

Hydraulic System - Purge

SMCS Code: 5050-542; 5050

Use the following procedure to purge the air from the hydraulic system:

1. Fill the hydraulic system with clean hydraulic oil until the oil is visible within the middle of the sight gauge.
2. Disconnect the wire located on the fuel solenoid.
3. Crank the engine for 5 to 10 seconds. Cranking the engine will allow the oil to fill the inlet lines.
4. Reconnect the fuel solenoid wire.
5. Place the propel control lever in the NEUTRAL position. Start the engine and run the machine at idle for 3 to 4 minutes.
6. With the engine still running at idle, move the machine slowly back and forth from forward to reverse for a short time. Moving the machine back and forth will the purge air that is trapped in drive circuit.
7. Switch the engine to high idle for 15 to 20 seconds. Return to low idle for 1 minute. Repeat 2 to 3 times to purge the remaining air from the hydraulic lines.
8. Check the hydraulic oil level and add oil as required.

Note: If the drive pump chatters or operation is noisy, turn off the machine. Then check for air leaks in the inlet line of the charge pump.

i07016365

Hydraulic System Oil - Change

SMCS Code: 5050-044; 5095-044

⚠ 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. Set all controls in neutral, stop the engine, and allow the engine and fluids to cool.

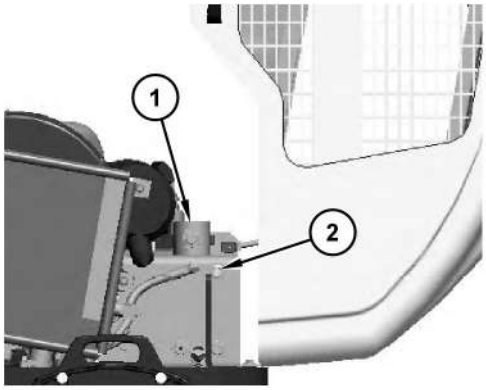

Illustration 118 g02879681

2. Remove filler cap (1) from top of the hydraulic tank.

3. Remove the drain plug on the drain hose and allow the hydraulic fluid to drain.

4. Unscrew the return line filter and replace the filter cartridge.

5. Install the drain plug on the drain hose.

6. Fill the hydraulic tank through the filler port with clean hydraulic fluid. Maintain the oil level within the middle of sight gauge (2).

7. Purge the air from the hydraulic system. Refer to Operation and Maintenance Manual, “Hydraulic System - Purge” for the correct purging procedure.

i07016372

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. Unscrew the return line filter and replace the filter cartridge.

2. Maintain the oil level within the middle of sight gauge.

i07016373

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”.

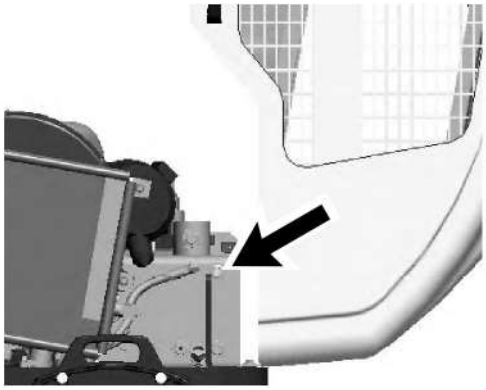

Illustration 119 g02877616

2. Observe the level of the hydraulic oil in the sight gauge when the oil is warm. Maintain the oil level within the middle of 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.

i07022184

Hydraulic System Oil Sample - Obtain

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

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

Caterpillar recommends that you use S·O·S oil analysis at regularly scheduled intervals in order to monitor the condition of the machine and the maintenance requirements of the machine.

Each oil sample should be taken when the oil is warm and when the oil is well mixed.

Obtain the S·O·S Sample

Use one of the following methods in order to obtain an S·O·S sample:

- Use the oil sampling valve.
- Use a 1U-5718 Vacuum Pump or use an equivalent pump that is inserted into the sump.

Caterpillar recommends using the sampling valve (if equipped) in order to obtain oil samples. The quality and the consistency of the samples is better when the sampling valve is used. If the machine is not equipped with a sampling valve, the use of a 1U-5718 Vacuum Pump is preferred.

To avoid contamination of the oil samples, the tools and the supplies that are used for obtaining oil samples must be clean.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” and Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining an oil sample. Consult your Caterpillar dealer for complete information and assistance in establishing an S·O·S program for your Machine.

i02713501

Hydraulic Tank Breather - Clean

SMCS Code: 5056-070-BRE

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

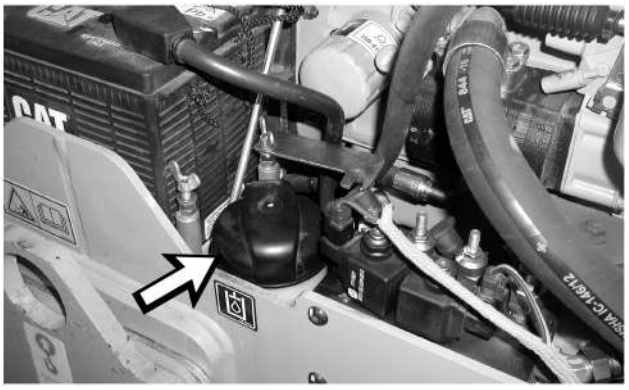

Illustration 120 g01350526

The vent is located on the hydraulic tank cap. Remove the hydraulic tank cap.

Clean the vent in clean, nonflammable solvent.

Dry the vent with compressed air.

Install the vent.

Close the engine compartment.

i02072906

Hydraulic Tank Strainer - Clean

SMCS Code: 5056-070-STR

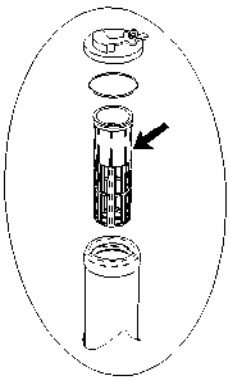

Illustration 121 g01059072

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.

i07423941

Indicators and Gauges - Test

SMCS Code: 7450-081

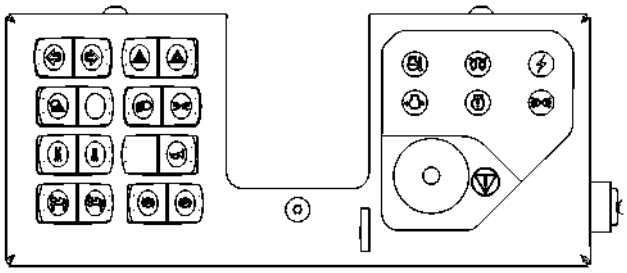

Illustration 122 g06318407

Front dash

1. Look for broken lenses on the gauges, broken indicator lights, broken switches, and other broken components in the operator station.

2. Start the engine.

3. Look for inoperative gauges.

4. Turn on all machine lights (if equipped). Check for proper operation.

5. Stop the engine.

Note: When the engine is stopped and the engine start switch key is turned to the ON position, all of the indicator lights should illuminate. If the indicator lights do not illuminate, replace the lights.

6. Make any repairs that are required before operating the machine.

i02690955

Isolation Mounts - Inspect

SMCS Code: 5654-040

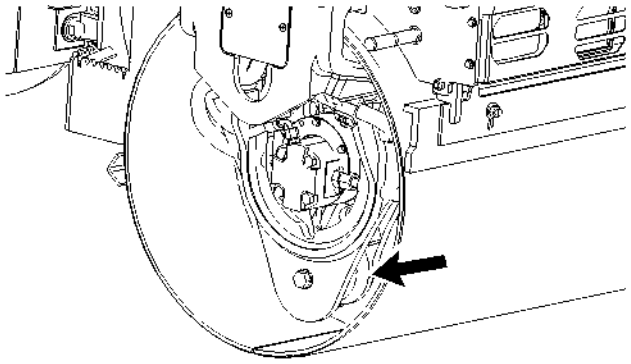

Illustration 123 g01350549

There are three isolation mounts on each side of both drums.

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.

i02711927

Neutral Start Switch - Test (If Equipped)

SMCS Code: 1424-025; 1424-535; 1424-081

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.

Illustration 124 g01361661

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. 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.

4. If the engine starts in either of the two tests 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. Contact your Caterpillar dealer for instructions on adjusting the neutral start switch.

i07022202

Oil Filter - Inspect

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

Inspect a Used Filter for Debris

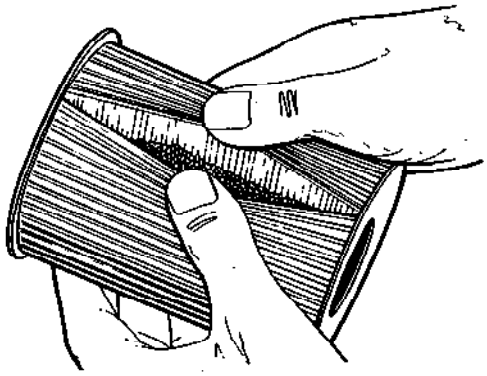

Illustration 125 g00100013

The element is shown with debris.

Use a 4C-5084 Filter Cutter or a 175-7546 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, or rod 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.

i07022209

Radiator Core - Clean

SMCS Code: 1353-070-KO

Open the engine compartment.

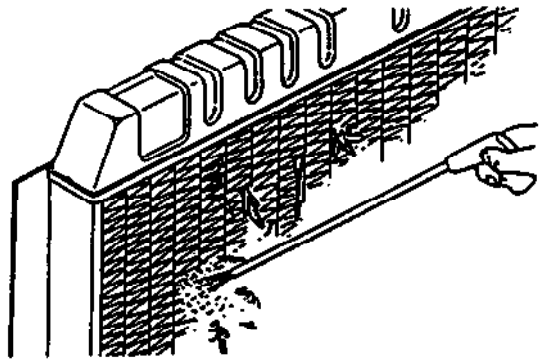

Illustration 126 g00101939

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.

Note: High-pressure water can bend the oil cooler and the radiator fins.

See Special Publication, SEBD0518, “Know Your Cooling System” for more information about cleaning radiator fins.

Close the engine compartment.

i07022242

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040

Illustration 127 g02866428

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.

Inspect the locking pins for wear or damage.

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.

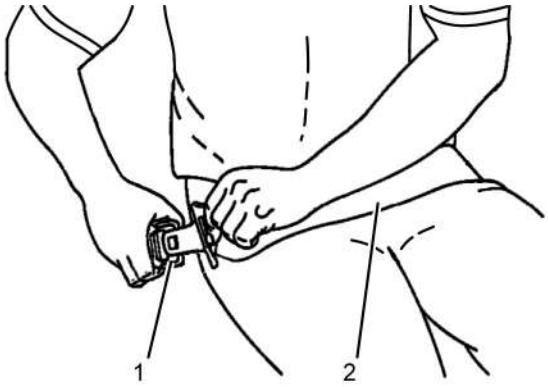

Illustration 128 g02620101
Typical example

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).

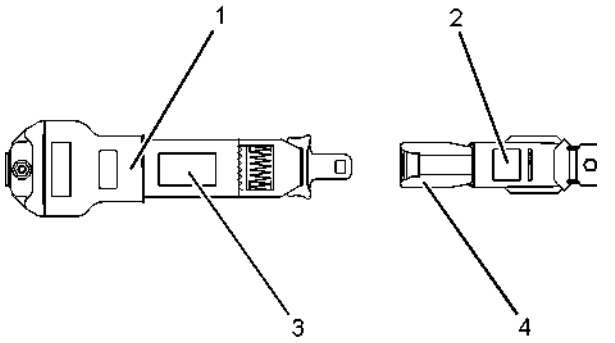

Illustration 129 g01152685

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.

i07022339

Steering Cylinder Ends - Lubricate

SMCS Code: 4303-086-BD

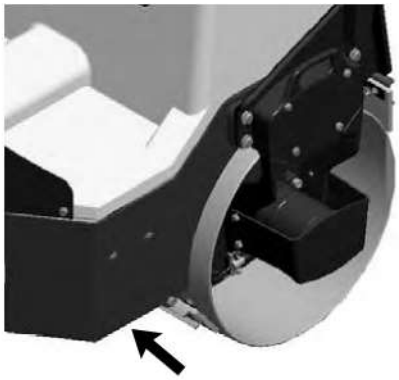

Illustration 130 g02880016

The steering cylinder is located under the operator platform. There is one grease fitting near the base end of the cylinder, and one grease fitting near the rod end of the cylinder.

i01978079

Throttle Control - Lubricate

SMCS Code: 1265-086

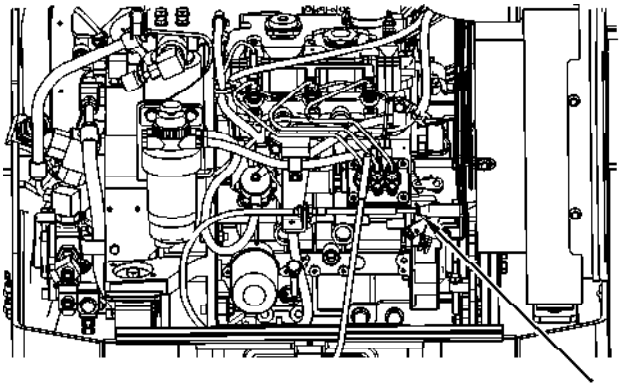

Illustration 131 g01035231

1. Open the engine compartment. Refer to the Operation and Maintenance Manual, “Access Doors and Covers”.
2. Clean the throttle control linkage with a clean rag.
3. Lubricate the throttle control linkage with engine oil.
4. Close the engine compartment.

i07022369

Water Spray Nozzles - Clean

SMCS Code: 6609-070

Clogged or dirty spray bars can prevent water from spraying onto the drums. If water spray is noticeably reduced or absent even though there is water in the tank, then clean the spray bars.

There are two spray bars on the machine, one for the front drum and one for the rear drum. Use the following procedure to clean the nozzles on both spray bars.

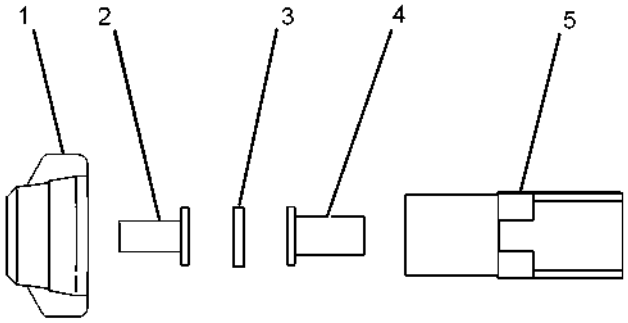

Illustration 132 g01439090

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.

i02857493

Water Spray System - Drain (Pressurized Water Spray System)

SMCS Code: 5612-543

The water system must be drained prior to frost or freezing conditions.

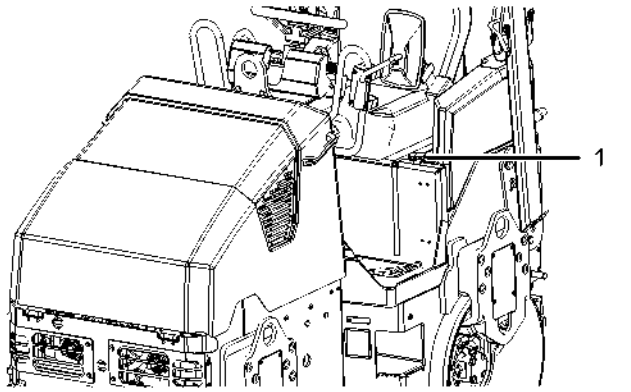

Illustration 133 g01350609

1. Open the water spray system by turning handle (1) that is located on the left side of the operator's platform.

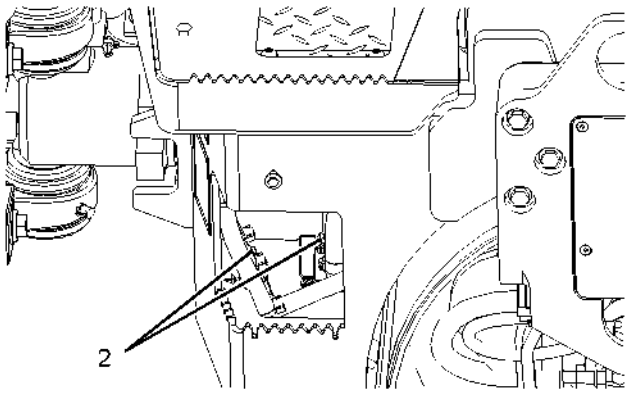

Illustration 134 g01423613

2. Open the two drain valves (2) in order to drain the water lines and the water tank.

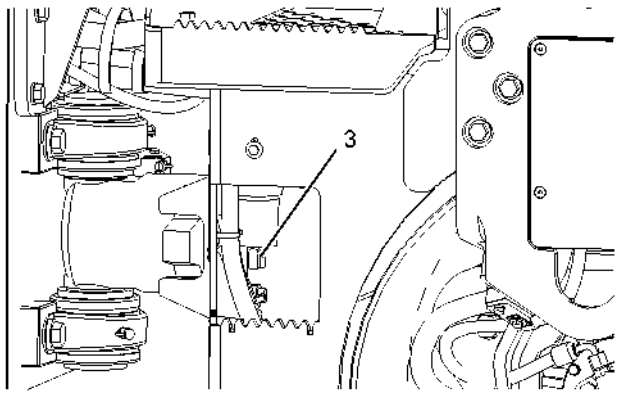

Illustration 135 g01423617

3. Open the filter drain valve (3) that is located on the bottom of the filter housing.

4. When the spraying system is completely drained turn on the water spray system on continuous spray for 10 seconds. For information on turning on the water spray system refer to Operation and Maintenance Manual, “Operator Controls”.

5. Close the two drain valves (2) and close the filter drain valve (3) when the spraying system is completely drained.

6. Loosen the locking collar on the spray nozzle and allow the water to drain from the nozzle. Tighten the locking collar and ensure that the nozzle is pointed toward the drum. Repeat for each nozzle.

i07022374

Water Spray System Filter - Clean

SMCS Code: 5612-070-FI

The water filter is located on the right side of the machine beneath the operator platform. Use the following procedure to clean the water filter.

1. Drain the water tank.

2. Raise the operator platform. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

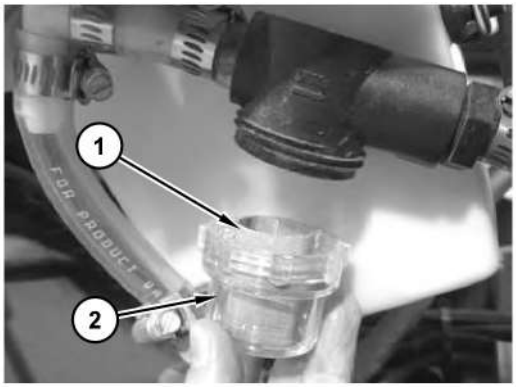

Illustration 136 g02875296

3. Unscrew cup (2) and remove strainer (1).

4. Empty the cup.

5. Rinse the cup and strainer thoroughly with clean water in order to remove sediment and dirt.

6. Install the strainer in the cup. Make sure that the strainer is properly seated inside the base of the cup.

7. Install the cup.

i02691260

Water Tank Strainer - Clean and Inspect

SMCS Code: 5613-571-STR

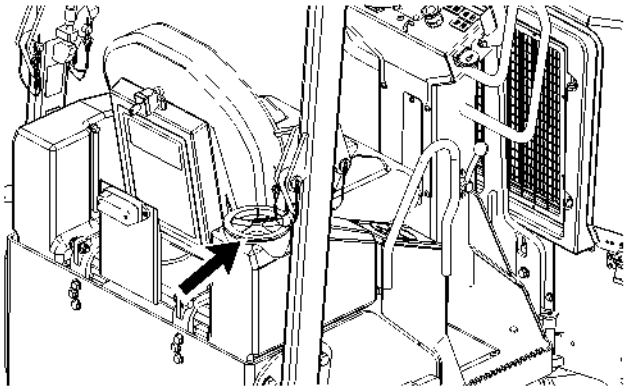

Illustration 137 g01350749

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.

Warranty Section

Warranty Information

i08769122

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 L 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.

4. New China non-road 4 mobile diesel engines operated and serviced in China, 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 manufacture, sale, and import with applicable emission standards in the promulgated by Enforcement Rule of the Clean Air Conservation Act Ministry of Ecology and Environment (MEE).

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.

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 the Emission Control Warranty statement available at the Cat Warranty website. 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 warranty publication.

Reference Information Section

Reference Materials

i08292374

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

i08292382

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.

Improperly disposing of waste can threaten the environment. Obey all local regulations for the decommissioning and disposal of materials.

Utilize appropriate personal protective equipment when decommissioning and disposing product.

Consult the nearest Cat dealer for additional information. Including information for component remanufacturing and recycling options.

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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:	_____	_____	_____