SEBU8795-15 (en-us)
August 2022

Operation and Maintenance Manual

623K Wheel Tractor-Scraper

WTB 1-UP (623K)

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:

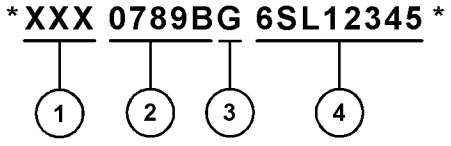


Illustration 1 g03891925

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

i09600182

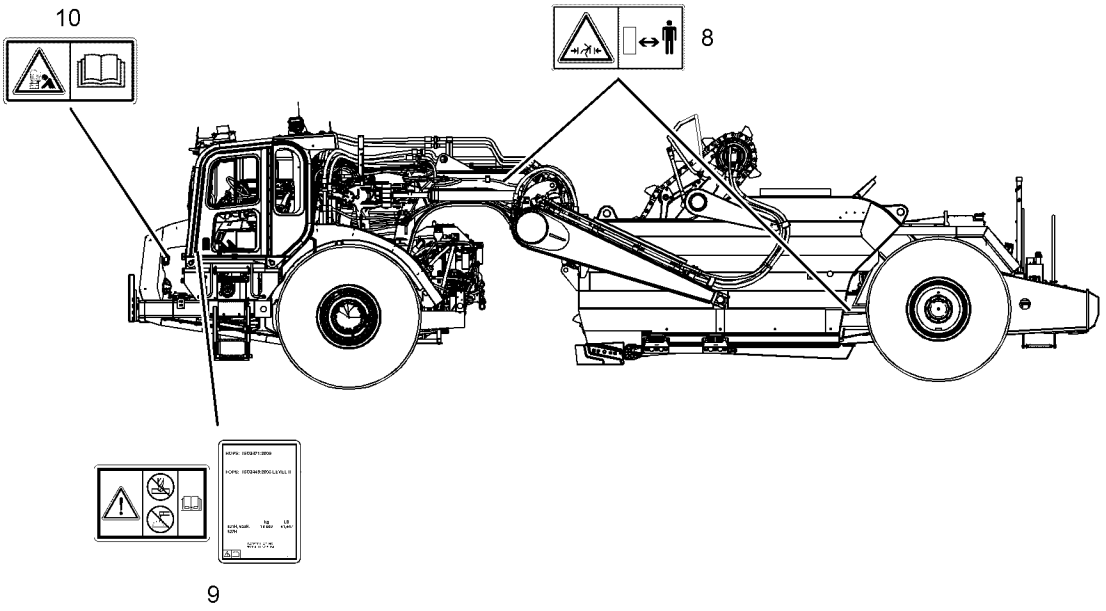
Safety Messages

SMCS Code: 7000; 7405

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

Make sure that all safety messages are legible. Clean the safety messages or replace the safety messages if you cannot read the words. Replace the safety messages 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 Cat dealer can provide new safety messages.


10
8
9

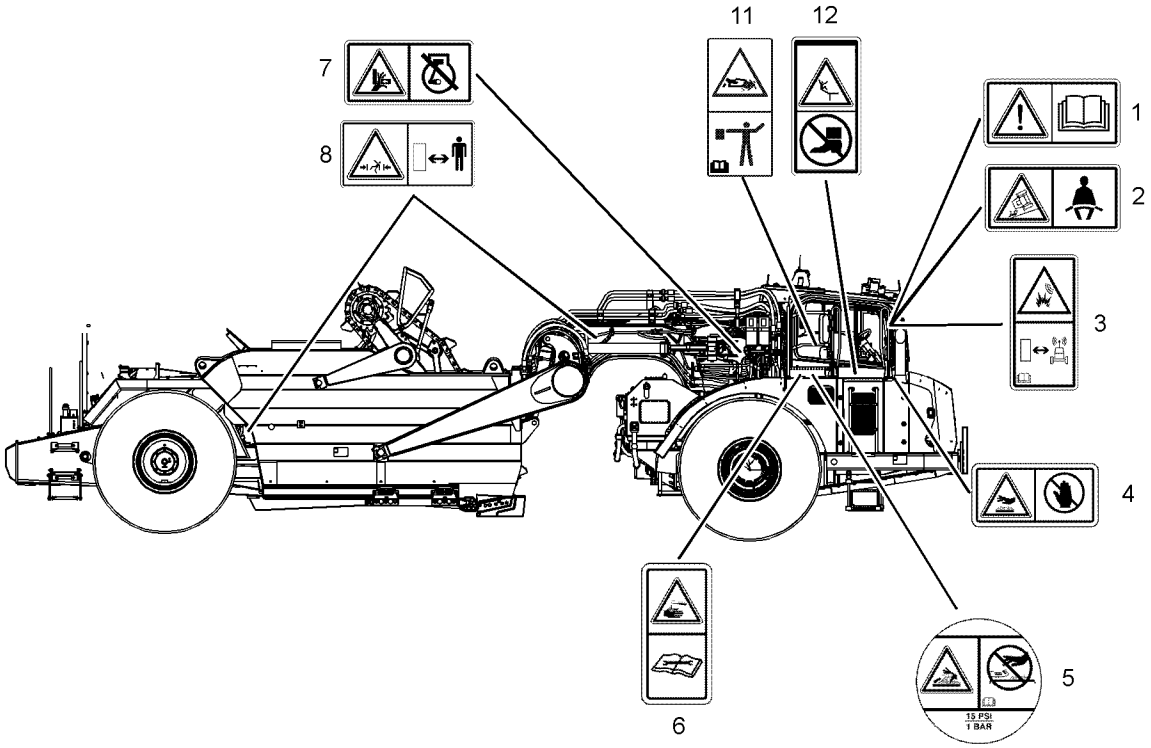

11
12
7
8
1
2
3
4
5
6
15 PSI
1 BAR

Illustration 2 g03431158

Do Not Operate (1)

This safety message is positioned on the right side of the ROPS. This safety message is also positioned in the engine compartment of the machine. This safety message is also positioned on the scraper engine on the left side.

Illustration 3 g01370904

⚠ WARNING

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

Seat Belt (2)

This safety message is positioned on the right side of the ROPS.

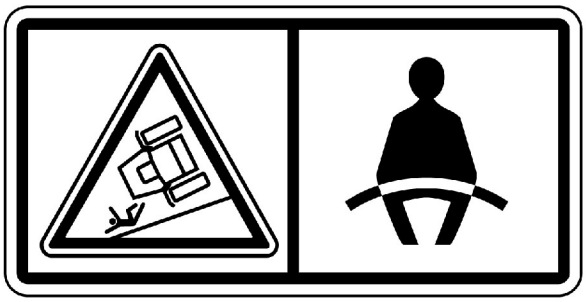


Illustration 4 g01370908

⚠ 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.

Product Link (3) (If Equipped)

This safety message is positioned in the cab.

Illustration 5 g01381177

WARNING

This machine is equipped with a Caterpillar Product Link communication device. When electric detonators are used, this communication device should be deactivated within 12 m (40 ft) of a blast site for satellite-based systems and within 3 m (10 ft) of a blast site for cellular based systems, or within the distance mandated under applicable legal requirements. Failure to do so could cause interference with blasting operations and result in serious injury or death.

In cases where the type of Product Link module cannot be identified, Caterpillar recommends that the device be disabled no less than 12 m (40 ft) from the blast perimeter.

Refer to Operation and Maintenance Manual, “Product Link” for more information.

Hot Surface (4)

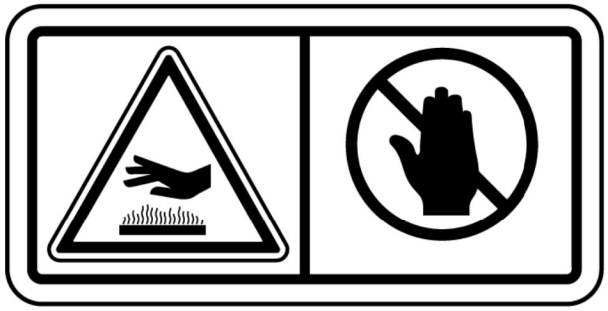


Illustration 6 g01372256

These safety messages are on the engine hood.

WARNING

Hot parts or hot components can cause burns or personal injury. Do not allow hot parts or components to contact your skin. Use protective clothing or protective equipment to protect your skin.

Engine Coolant (5)

This safety message is positioned on the top of the radiator tank.

Illustration 7 g01370913

WARNING

The coolant is hot and the coolant is under pressure. Do not touch the hot surfaces. Refer to the Operation and Maintenance Manual for the procedure to follow when you check the radiator.

Refer to Operation and Maintenance Manual, “Cooling System Coolant Level - Check” for more information.

Acid Burn Hazard (6)

This safety message is positioned on the engine.

Illustration 8 g01382725

⚠ WARNING

Sulfuric Acid Burn Hazard may cause serious personal injury.

The NOx Reduction System (NRS) may contain a small amount of sulfuric acid. The use of fuel with sulfur levels greater than 15 ppm may increase the amount of sulfuric acid formed. The sulfuric acid may spill from the NRS cooler during service of the engine. The sulfuric acid will burn the eyes, skin, and clothing on contact. Always wear eye shields, rubber gloves, and protective clothing when you may come in contact with fluids that may spill from the NRS cooler. If fluid contacts an eye, immediately flush with water and seek medical help.

Crushing Hazard (7)

This safety message is positioned on the right side of the hitch link.

Illustration 9 g01379133

⚠ WARNING

Hitch and steering movement can reduce clearances suddenly and cause personal injury...

Stop engine before servicing.

No Clearance (8)

This safety message is positioned on each side of the steering link.

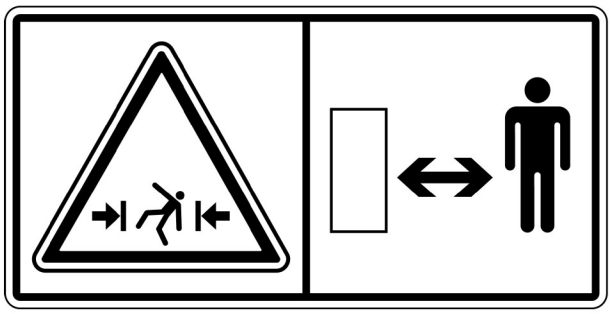


Illustration 10 g01371644

⚠ 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.

Do Not Weld On The ROPS/FOPS Structure (9)

This safety message is positioned outside of the cab to the left of the rear window.

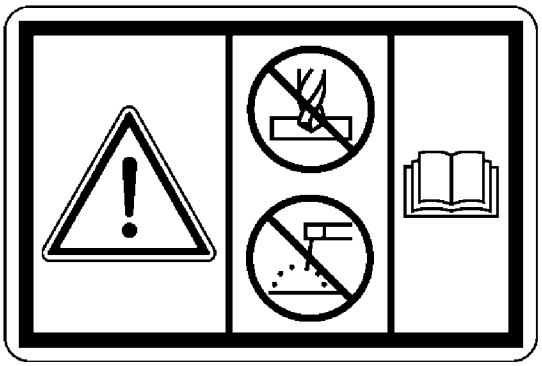


Illustration 11 g01226901

⚠ WARNING

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

Certification for Rollover Protective Structure (ROPS) and for Falling Object Protective Structure (FOPS)

The unaltered ROPS or the FOPS structure meets the following standards for the ROPS at the time of installation: ISO 3471-2008 and GB/T 17922-2014. Also, the FOPS canopy meets the following standards at the time of installation: ISO 3449-2005 LEVEL II and GB/T 17771-2010 LEVEL II.

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

Improper Connections For Jump-Start Cables (10)

This safety message is positioned inside the battery compartment.

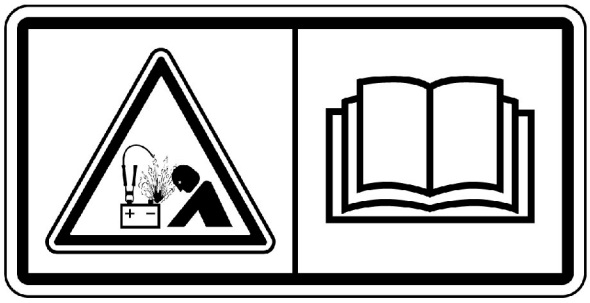


Illustration 12 g01370909

⚠ 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.

Refer to Operation and Maintenance Manual, “Engine Starting with Jump-Start Cables” for more information.

Crushing Hazard (11)

This safety message is located inside the cab near the transmission control.

Illustration 13 g01953898

⚠ WARNING

There is restricted visibility to the area directly behind the machine. Failure to make sure the area is clear could result in injury or death. Use a second person on the ground to make sure that the area is clear before you operate the machine in the REVERSE position. Refer to the Operation and Maintenance Manual, "Operation Information" for more information.

Refer to Operation and Maintenance Manual, "Restricted Visibility" for more information.

Do Not Step (12)

This safety message is on the front and the rear of the machine.

Illustration 14 g03466598

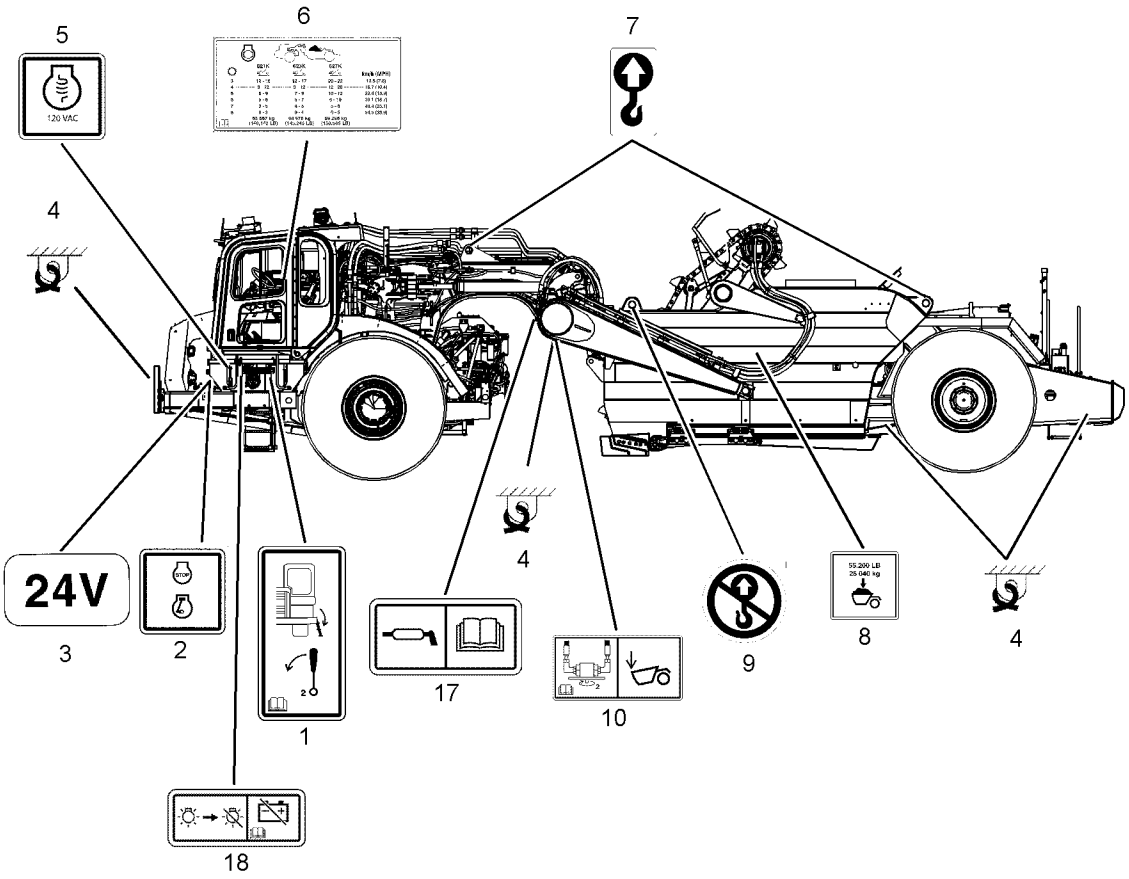
⚠ WARNING

Do not use this surface as a step or platform. This surface may not support additional weight or may be slippery. Serious injury or death could occur from a fall.

i08529398

Additional Messages

SMCS Code: 7000; 7405


5
120 VAC
6
7
4
24V
3
2
1
4
17
10
9
55,200 LB
25 040 kg
8
4
18

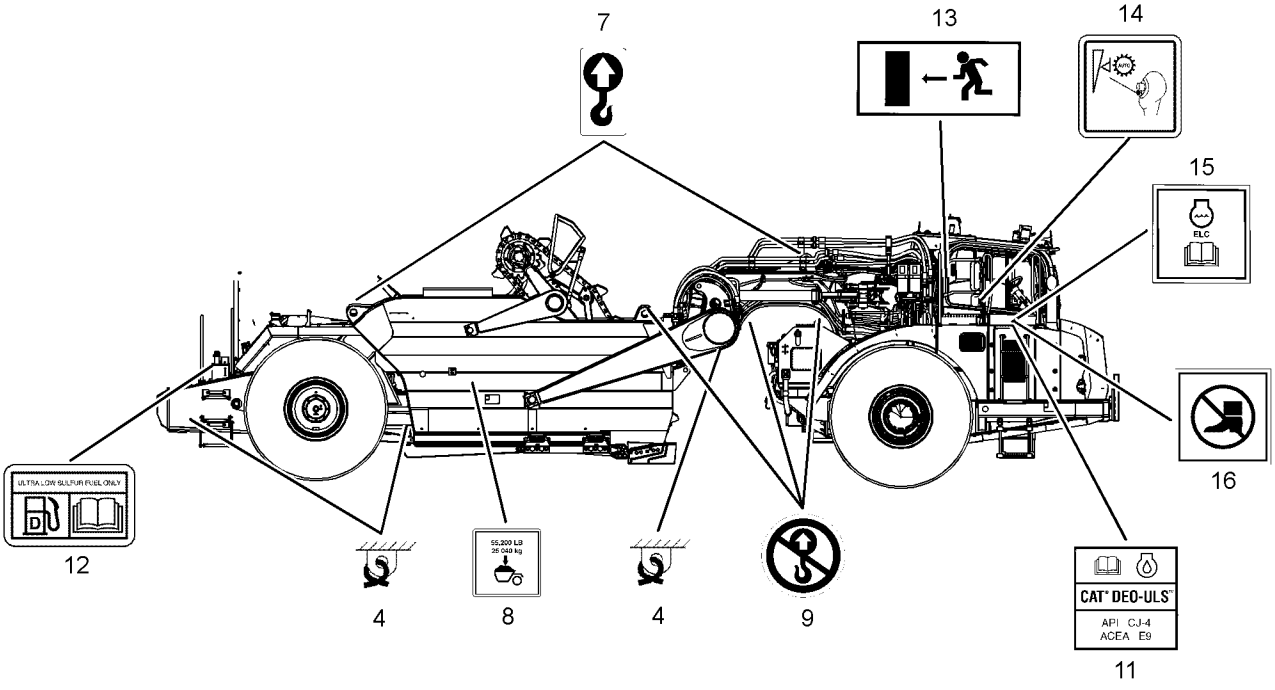

7
13
14
15
ELC
16
ULTRA LOW SULFUR FUEL ONLY
12
4
55,200 LB
25 040 kg
8
4
9
CAT® DEO-ULS™
API CJ-4
ACEA E9
11

Illustration 15 g03431878

Powered Step Manual Release (1)

This message is located inside the cab as well as on the exterior of the machine near the powered step.

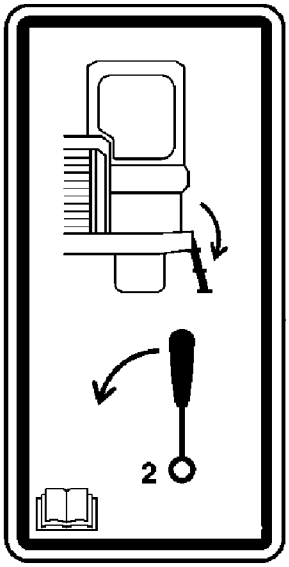


Illustration 16 g02594141

Engine Stop (2)

This message is on the front left of the tractor.

Illustration 17 g01631013

24 V (3)

This message is on the front left of the tractor.

Illustration 18 g01183244

Tie-Down (4)

This message is on the front on each side of the tractor and on the rear on each side of the scraper.

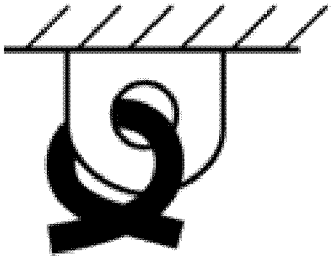


Illustration 19 g02176754

Water Jacket Heater (5)

This message is on the front of the machine on the left side.

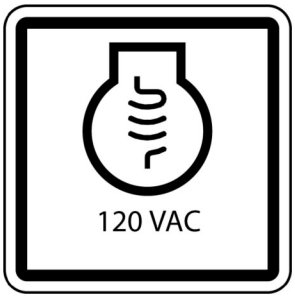


Illustration 20 g03466758

Retarding Guidelines (6)

This message is located inside the cab.

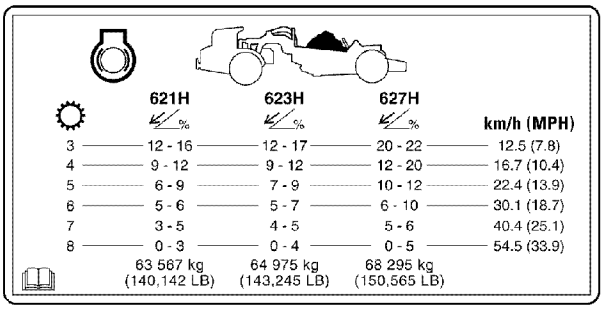


Illustration 21 g02592738

Lift (7)

This message is on each side of the hitch area of the tractor and on each side of the bowl of the scraper.

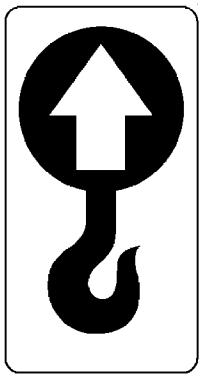


Illustration 22 g02176758

Capacity (8)

This message is on the left and right side of the bowl.

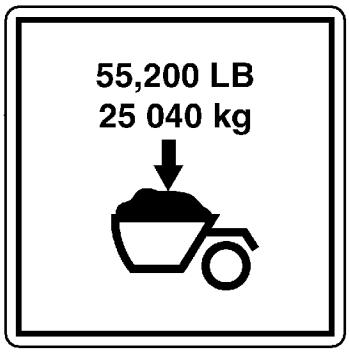


Illustration 23 g02186914

Do Not Lift (9)

This message is located in the center of the machine

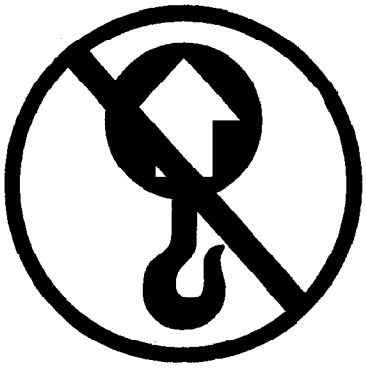


Illustration 24 g00935918

Manual Bowl Lower Valve (10)

This message is located in the middle of the cross-tube of the bowl.

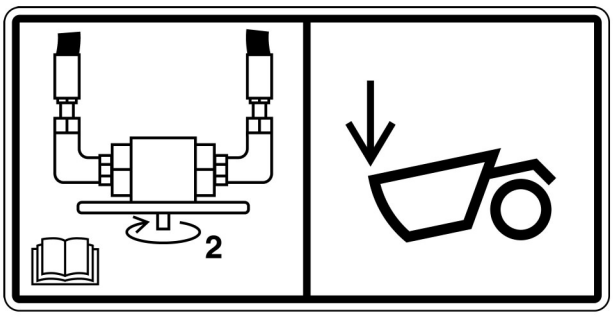


Illustration 25 g02722143

Required Engine Oil (11)

This message is on the engine.

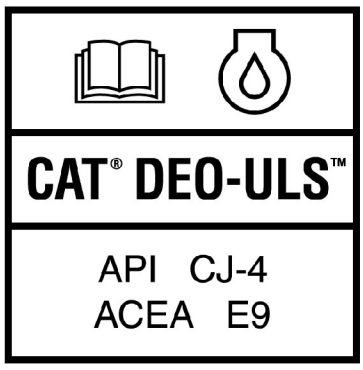


Illustration 26 g02176761

Ultra Low Sulfur Diesel (12)

This message is on the fuel cap, which is on the rear of the machine.

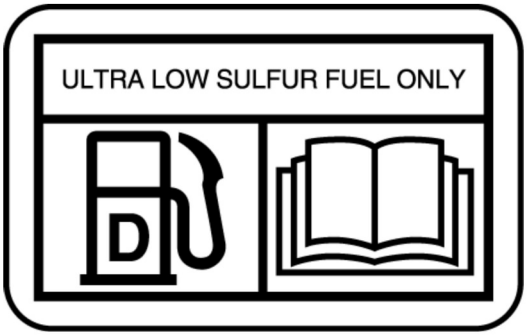


Illustration 27 g02157153

Alternate Exit (13)

This message is on the ROPS support assembly behind the operator and to the right of the operator.

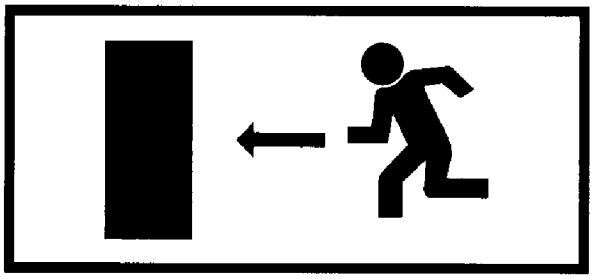


Illustration 28 g03515123

If the primary exit is blocked, use the hammer to break the window. Exit the machine through the window.

Transmission Top Gear Control (14)

This message is located in the cab near the transmission control.

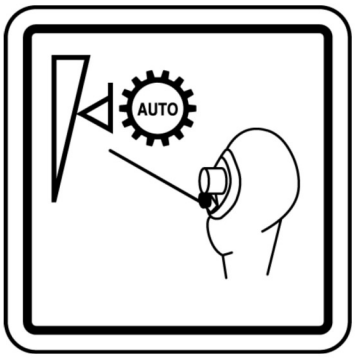


Illustration 29 g02537458

Cat Extended Life Coolant (ELC) (15)

This message is on the radiator tank on top of the engine compartment.

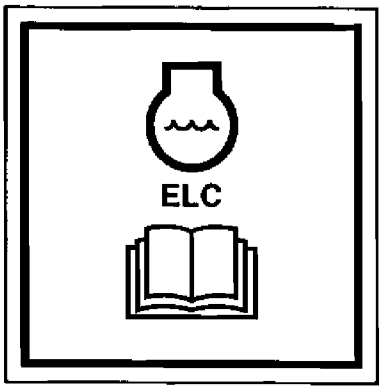


Illustration 30 g01132922

Refer to Operation and Maintenance Manual, “Cooling System Coolant (ELC) - Change” and Operation and Maintenance Manual, “Cooling System Coolant Extender (ELC) - Add” for more information.

No Step (16)

This message is on the top of the hood.

Illustration 31 g01206181

Do not use the hood as a step or platform.

Hitch Lubricate (17)

This message is located in the middle of the cross-tube near the grease points for the hitch.

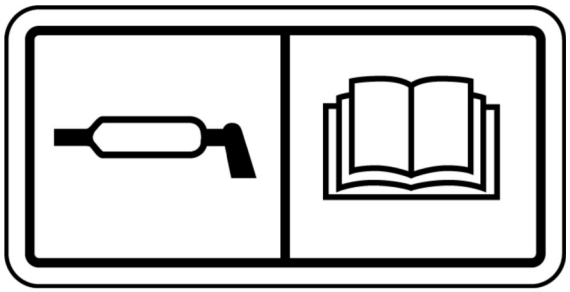


Illustration 32 g02387467

Battery Disconnect Delay (18)

Do not turn off the battery disconnect switch until the light has turned off. If the battery disconnect switch is turned off when the light is illuminated the DEF system will not purge and DEF could freeze and cause damage to the pump and the lines.

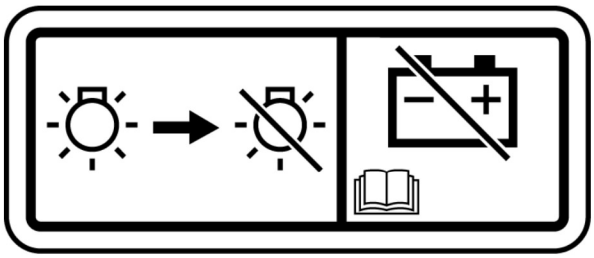


Illustration 33 g03408962

Air Conditioner (If Equipped)

These messages are positioned under the cab.

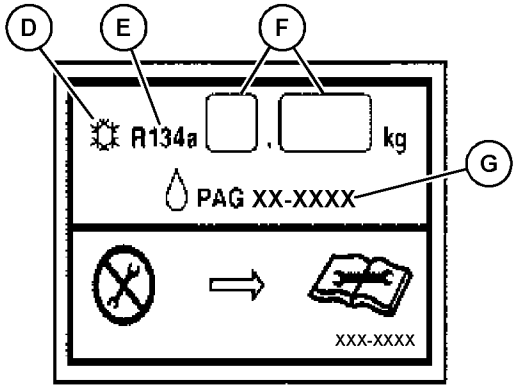


Illustration 34 g06540695

(D) Air conditioning symbol
(E) R134a (Refrigerant type common name)
(F) Refrigerant amount
(G) The lubricating oil type for this system is PAG (polyalkylene glycol)

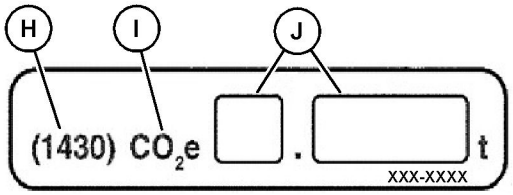


Illustration 35 g06540697

(H) (1430) - Global Warming Potential of R134a
(I) CO_2 equivalent
(J) System CO_2 equivalent amount

Illustration 36 g06540698

(K) If equipped, this film provides the required language translations of the text "Contains fluorinated greenhouse gases" for the greenhouse gas regulation.

These messages for the air conditioner system have the appropriate information for the following services: the air conditioner lubricant, the refrigerant charge, and the refrigerant capacity.

i08313103

General Hazard Information

SMCS Code: 7000

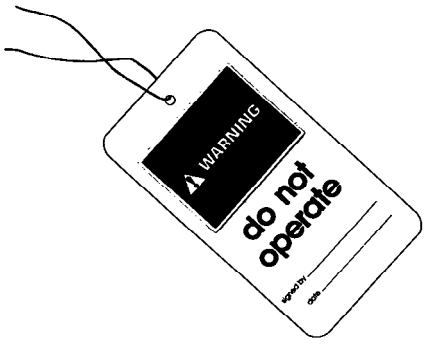


Illustration 37 g00104545

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.

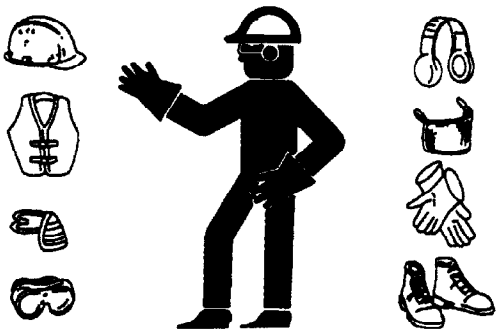


Illustration 38 g00702020

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.

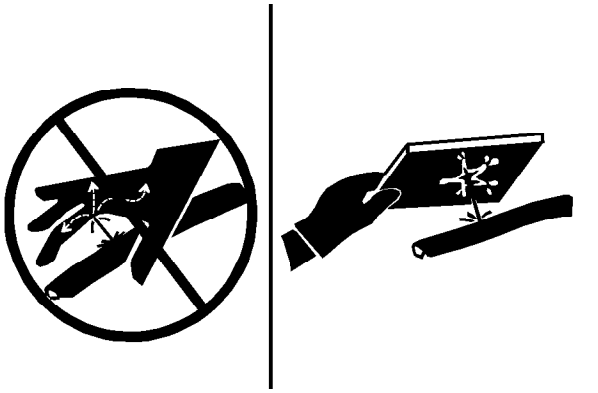


Illustration 39 g00687600

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

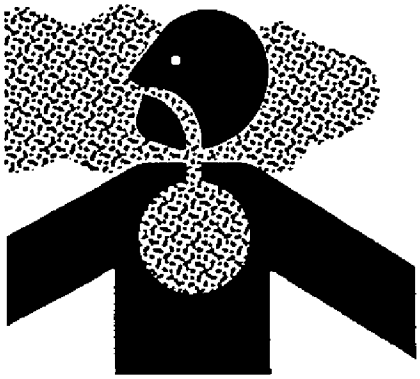


Illustration 40 g02159053

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

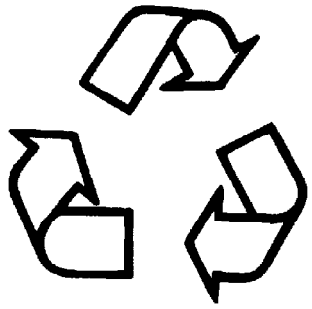


Illustration 41 g00706404

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.

i07399130

Burn Prevention

SMCS Code: 7000

Do not touch any part of an operating engine. Allow machine systems to cool before any maintenance is performed. 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.

Induction System

WARNING

Sulfuric Acid Burn Hazard may cause serious personal injury or death.

The exhaust gas cooler may contain a small amount of sulfuric acid. The use of fuel with sulfur levels greater than 15 ppm may increase the amount of sulfuric acid formed. The sulfuric acid may spill from the cooler during service of the engine. The sulfuric acid will burn the eyes, skin and clothing on contact. Always wear the appropriate personal protective equipment (PPE) that is noted on a material safety data sheet (MSDS) for sulfuric acid. Always follow the directions for first aid that are noted on a material safety data sheet (MSDS) for sulfuric acid.

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.

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 42 g00704000

Regeneration

The exhaust gas temperatures during regeneration will be elevated. Follow proper fire prevention instructions and use the disable regeneration function (if equipped) when appropriate.

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 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 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 43 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 44 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.

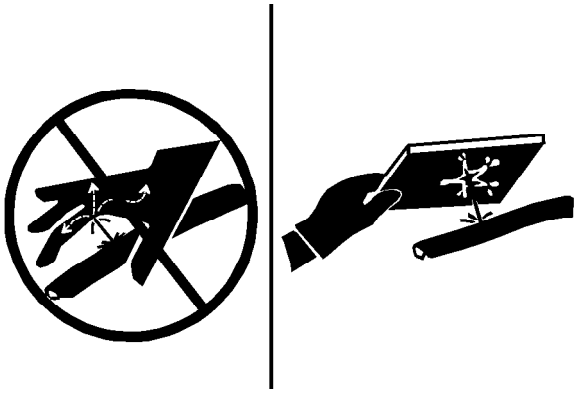


Illustration 45 g00687600

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” .

⚠ WARNING

Manually spraying Ether into an engine with a Diesel Particulate Filter (DPF) may result in the accumulation of Ether in the DPF and an explosion. This in conjunction with other factors may result in an injury or death.

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

i08519598

Fire Extinguisher Location

SMCS Code: 7000

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instruction plate.

The fire extinguisher may be mounted on the lower side of the left fender of the tractor.

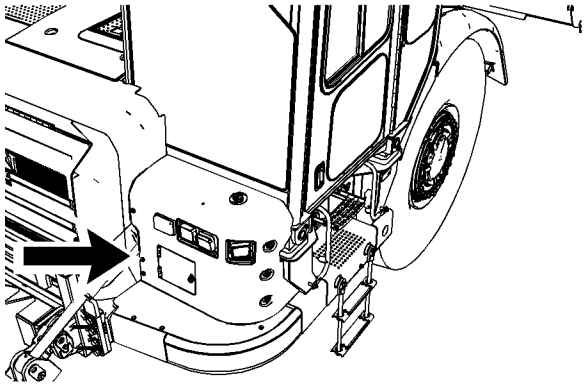


Illustration 46 g06696511

Do not block access to the following items:

- handrails
- ladders
- walkways
- front side door of engine hood

Do not weld a bracket on the Rollover Protective Structure (ROPS) to install the fire extinguisher. Also, do not drill holes in the ROPS to mount the fire extinguisher on the ROPS.

i06164462

Tire Information

SMCS Code: 7000

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

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

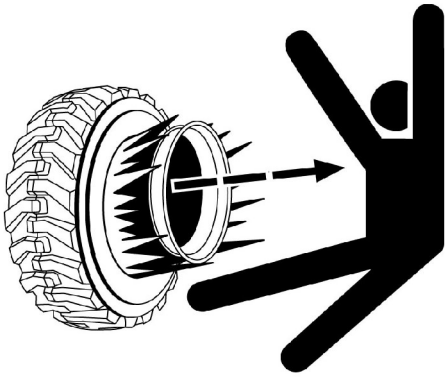


Illustration 47 g02166933

Typical example of tire is shown

Do not approach a hot or an apparently damaged tire.

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

⚠ WARNING

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

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

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

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

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

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

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

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

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

- Mount the machine.
- Dismount the machine.

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

i04788287

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operators compartment. Never short across the starter terminals or across the batteries. Shorting could bypass the engine neutral start system. Shorting could also damage the electrical system.

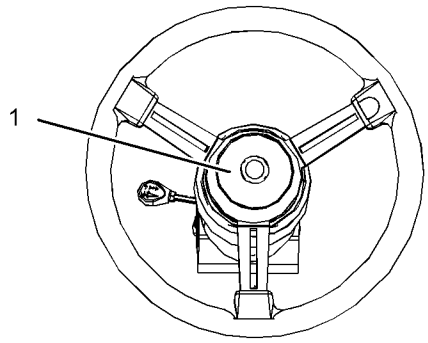


Illustration 48 g02110677

Depress the machine horn (1) in order to make sure that the machine horn works properly.

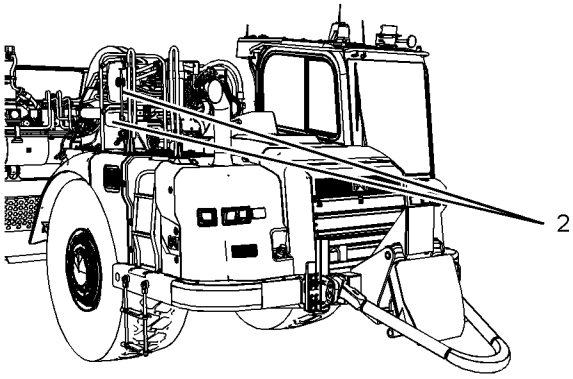


Illustration 49 g02901924

Adjust the mirrors (2) on your machine for the best operator vision. Adjust the mirrors before you operate the machine.

Inspect the condition of the seat belt and the condition of mounting hardware. Replace any damaged parts and any worn parts. Regardless of appearance, replace the seat belt after 3 years of use.

Adjust the seat in order to achieve full pedal travel when the operator's back is against the back of the seat.

Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Make sure that all lights are working properly.

Before you start the engine or before you move the machine, make sure that no one is on the machine, underneath the machine, or around the machine. Make sure that there are no personnel in the area.

i03565626

Engine Starting

SMCS Code: 1000; 7000

If a warning tag is attached to the engine start switch or to the machine controls, do not start the engine. Also, do not move any machine controls.

Move all hydraulic controls to the HOLD position or to the OFF position before you start the engine.

Move the transmission control (lever) to the NEUTRAL position.

Engage the parking brake control.

Diesel engine exhaust contains products of combustion which can be harmful to your health. Always start the engine in a well ventilated area. Always operate the engine in a well ventilated area. If you are in an enclosed area, vent the exhaust to the outside.

Briefly sound the horn before you start the engine.

i07935203

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

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

Make sure that all windows are clean. Secure the doors in the open position or in the shut position. Secure the windows in the open position or in the shut position.

Make sure that all exterior lights and signals are clean of debris.

For the best vision of the area that is close to the machine, adjust the rear view mirrors (if equipped).

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

Fasten the seat belt securely.

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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.

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Restricted Visibility

SMCS Code: 7000

The size and the configuration of this machine may result in areas that cannot be seen when the operator is seated. Illustration 50 provides an approximate visual indication of areas of significant restricted visibility. Illustration 50 indicates restricted visibility areas at ground level inside a radius of 24.00 m (80 ft) from the operator on a machine without the use of optional visual aids. This illustration does not provide areas of restricted visibility for distances outside a radius of 24.00 m (80 ft).

This machine may be equipped with optional visual aids that may provide visibility to some of the restricted visibility areas. Refer to this Operation and Maintenance Manual, “Mirror” for more information on additional visibility. If your machine is equipped with cameras, refer to this Operation and Maintenance Manual, “Camera” for more information on additional visibility. For areas that are not covered by the optional visual aids, the job site organization must be utilized to minimize hazards of this restricted visibility. For more information regarding job site organization refer to Operation and Maintenance Manual, “Visibility Information”.

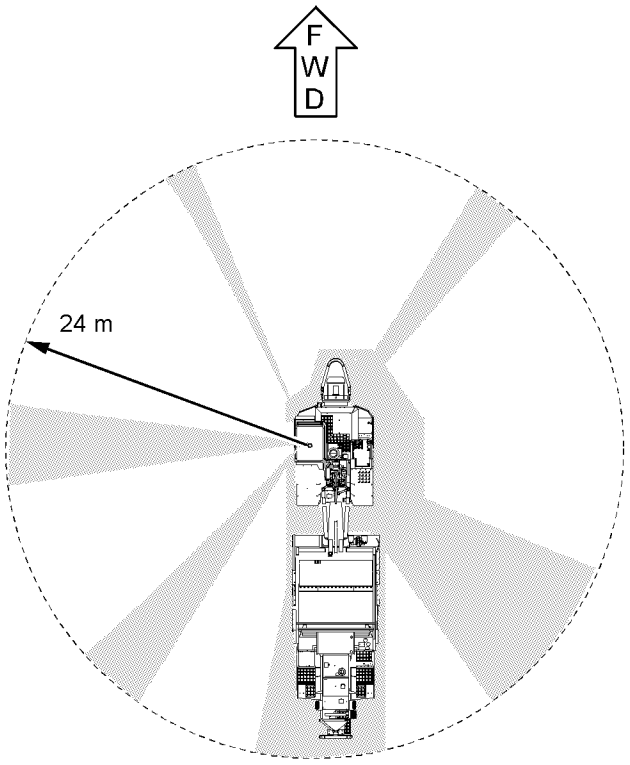

Illustration 50 g03569304
Top view of typical machine

Note: The shaded areas indicate the approximate location of areas with significant restricted visibility.

⚠ WARNING

There is restricted visibility to the area directly behind the machine. Failure to make sure the area is clear could result in injury or death. Use a second person on the ground to make sure that the area is clear before you operate the machine in the REVERSE position. Refer to the Operation and Maintenance Manual, "Operation Information" for more information.

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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. For more information refer to Operation and Maintenance Manual, "Restricted Visibility".

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of −40 °C (−40 °F) to 43 °C (110 °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, in conjunction 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
- Roll over Protective Structure (ROPS)

Never use the work tool for a work platform.

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

Do not operate the machine on ground conditions that could result in the seat suspension travel stops being contacted and do not operate the machine at travel speeds that could result in the seat suspension travel stops being contacted. Operating this machine in rough ground conditions or at travels speeds not suitable for the ground conditions may result in excessive seat vertical travel with impact of the suspension against the travel stops, which may cause injury. To minimize impact loading on the operator, properly adjust the seat controls for the operator weight and height. Refer to Operation and Maintenance Manual, “Seat” for more information.

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

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

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

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

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

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

Before you maneuver the machine, make sure that no personnel are between the machine and attachments.

Know the maximum dimensions of your machine.

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

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Engine Stopping

SMCS Code: 1000; 7000

Do not stop the engine immediately after the machine has been operated under load. Stopping the engine 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 for 5 minutes before shutdown. Running the engine allows hot areas of the engine to cool gradually.

Note: If the “Regen Active” indicator is illuminated, do not shut off the engine. Refer to Operation and Maintenance Manual, “Monitoring System” for more information on indicators.

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Parking

SMCS Code: 7000

Park the machine on a level surface. If you must park on a grade, chock the machines wheels with suitable chocks. Take the following into account:

- tire size
- machine weight
- ground conditions

Apply the service brake to stop the machine. Move the transmission control (lever) to the NEUTRAL position. Move the throttle control to the LOW IDLE position.

Engage the parking brake.

Note: Allow the machine to reach normal operating temperature before engaging or releasing the parking brake. The parking brake may take up to 10 seconds to engage or disengage during extreme cold ambient temperatures. If the parking brake does not engage within 2 seconds, the parking brake indicator will illuminate and flash. Once the parking brake engages, the parking brake indicator will stay illuminated but will not flash. If the parking brake does not engage within 6 seconds, a warning will be displayed on the digital display.

Note: If the machine is restarted with the parking brake switch disengaged, engage the parking brake switch for 2 seconds, then disengage the parking brake switch to disengage the parking brake.

Lower all equipment to the ground. Activate any control locks.

Allow the engine to run for 5 minutes before shutting down.

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

Do not turn the battery disconnect switch OFF until the “Wait to Disconnect Lamp” has turned off. If the battery disconnect switch is turned off before the lamp has shut off, the DEF system will not purge. DEF could freeze and damage the pump and lines.

If the machine will not be operated for a few days or more, turn the battery disconnect switch to the OFF position, and remove the battery disconnect switch key.

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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. Place the heaviest end of the machine uphill when you are working on an incline.

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.

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.

Slippage due to excessive loads – This may cause downhill tracks or downhill tires to dig into the ground, which will increase the angle of the machine.

Width of tracks or tires – Narrower tracks or narrower tires further increase the digging into the ground which causes the machine to be less stable.

Implements attached to the drawbar – This may decrease the weight on the uphill tracks. This may also decrease the weight on the uphill tires. The decreased weight will cause the machine to be less stable.

Height of the working load of the machine – When the working loads are in higher positions, the stability of the machine is reduced.

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

Operating techniques – Keep all attachments or pulled loads 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: Operators with lots of experience and proper equipment for specific applications are also required. Safe operation on steep slopes may also require special machine maintenance. Refer to Lubricant Viscosities and Refill Capacities in this manual for the proper fluid level requirements and intended machine use. Fluids must be at the correct levels to ensure that systems will operate properly on a slope.

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Equipment Lowering with Engine Stopped

SMCS Code: 7000

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

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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, in a noisy environment, with a cab that is not properly maintained, or when the doors and windows are open for extended periods of time.

Table 2

Sound Level		Test Method
Operator Sound Pressure Level	75 dB(A)	“ISO 6396:2008” (1)
Equivalent Sound Pressure Level (Leq)	78 dB(A)	“ANSI/SAE J1166 FEB 2009” (2)

(1) The measurement was conducted at 100 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained.

(2) This is a work cycle sound exposure level. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained.

The sound levels listed above include both measurement uncertainty and uncertainty due to production variation. Typical measurement uncertainty for this type of machinery is 2 dBA in accordance with “ISO 4871” .

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

Operator Sound Pressure Level		
Region	**Sound Level**	**Test Method**
European Union	75 dB(A)	“ISO 6396:2008” (1)
United Kingdom	75 dB(A)	“ISO 6396:2008” (1)
Eurasian Economic Union	75 dB(A)	“ISO 6396:2008” (1)

(1) The measurement was conducted at 100 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained.

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

Vibration Data for Wheel Scrapers

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is 2.6 m/s2.

Information Concerning Whole Body Vibration Level

This section provides vibration data and a method for estimating the vibration level for wheel scrapers.

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

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

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in Table 4 to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

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

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

Table 4

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."								
Machine Family	**Machine Type**	**Typical Operating Activity**	**Vibration Levels**			**Scenario Factors**		
			X axis	**Y axis**	**Z axis**	**X axis**	**Y axis**	**Z axis**
Scraper	Wheel Scraper	work cycle	1.05	1.18	1.12	0.34	0.40	0.42

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

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the 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

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Operator Station

SMCS Code: 7000

Any modifications to the inside of the operator station should not project into the operator space or into the space for the companion seat (if equipped). The addition of a radio, fire extinguisher, and other equipment must be installed so that the defined operator space and the space for the companion seat (if equipped) is maintained. Any item that is brought into the cab should not project into the defined operator space or the space for the companion seat (if equipped). A lunch box or other loose items must be secured. Objects must not pose an impact hazard in rough terrain or in the event of a rollover.

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Guards
(Operator Protection)

SMCS Code: 7000

There are different types of guards that are used to protect the operator. The machine and the machine application determine the type of guard that should be used.

A daily inspection of the guards is required in order to check for structures that are bent, cracked, or loose. Never operate a machine with a damaged structure.

The operator becomes exposed to a hazardous situation if the machine is used improperly or if poor operating techniques are used. This situation can occur even though a machine is equipped with an appropriate protective guard. Follow the established operating procedures that are recommended for your machine.

Rollover Protective Structure (ROPS), Falling Object Protective Structure (FOPS) or Tip Over Protection Structure (TOPS)

The ROPS/FOPS Structure (if equipped) on your machine is specifically designed, tested and certified for that machine. Any alteration or any modification to the ROPS/FOPS Structure could weaken the structure. This places the operator into an unprotected environment. Modifications or attachments that cause the machine to exceed the weight that is stamped on the certification plate also place the operator into an unprotected environment. Excessive weight may inhibit the brake performance, the steering performance and the ROPS. The protection that is offered by the ROPS/FOPS Structure will be impaired if the ROPS/FOPS Structure has structural damage. Damage to the structure can be caused by an overturn, a falling object, a collision, etc.

Do not mount items (fire extinguishers, first aid kits, work lights, etc) by welding brackets to the ROPS/FOPS Structure or by drilling holes in the ROPS/FOPS Structure. Welding brackets or drilling holes in the ROPS/FOPS Structures can weaken the structures. Consult your Cat dealer for mounting guidelines.

The Tip Over Protection Structure (TOPS) is another type of guard that is used on mini hydraulic excavators. This structure protects the operator in the event of a tipover. The same guidelines for the inspection, the maintenance and the modification of the ROPS/FOPS Structure are required for the Tip Over Protection Structure.

Other Guards (If Equipped)

Protection from flying objects and/or falling objects is required for special applications. Logging applications and demolition applications are two examples that require special protection.

A front guard needs to be installed when a work tool that creates flying objects is used. Mesh front guards that are approved by Caterpillar or polycarbonate front guards that are approved by Caterpillar are available for machines with a cab or an open canopy. On machines that are equipped with cabs, the windows should also be closed. Safety glasses are recommended when flying hazards exist for machines with cabs and machines with open canopies.

If the work material extends above the cab, top guards and front guards should be used. Typical examples of this type of application are listed below:

- Demolition applications
- Rock quarries
- Forestry products

Additional guards may be required for specific applications or work tools. The Operation and Maintenance Manual for your machine or your work tool will provide specific requirements for the guards. Refer to Operation Maintenance manual, "Demolition" for additional information. Consult your Cat dealer for additional information.

Product Information Section

General Information

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Rated Load

SMCS Code: 7000

The empty weight of the machine will depend on the configuration of the machine and the options of the machine. Approximate weights are listed below.

If the machine has a statutory marking as required in specific region, the weight on the statutory plate shall be based on the sum of the empty machine weight and a 75 kg (165 lb) operator.

Table 5

623K Wheel Tractor-Scraper	
Empty Weight(1)	39904 kg (87973 lb)
Rated Load	25038 kg (55200 lb)
Maximum Loaded Weight(1)	66071 kg (145661 lb)
Cubic Capacity	17.6 Cubic meters heaped 23 Cubic yards heaped

(1) This weight includes a standard machine, a 75 kg (165 lb) operator, and full fuel tanks.

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Specifications

SMCS Code: 1000; 7000

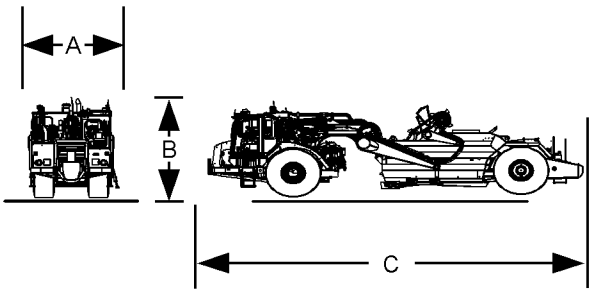

Illustration 51 g02166173

Approximate dimensions are shown. Dimensions will vary depending on the configuration and the options.

(A) 3.68 m (12 ft 1 in)
(B) 4.03 m (13 ft 3 in)
(C) 13.76 m (45 ft 2 in)

Table 6

623K Wheel Tractor-Scraper	
Engine	C13 Acert Diesel Engine T4F1–Up
Transmission	Eight speeds (forward) One speed (reverse) A4C1–Up

Intended Use

This Wheel Tractor-Scraper is an earthmoving machine as described in ISO 6165:2012 and is classified as a scraper. This machine is used to cut, load, transport, and discharge material through a forward motion.

Application/Configuration Restrictions

- Push-pull operation is only allowed between two machines. Using more than two machines will cause damage to components such as the hitch, hitch pins, and other push-pull components.
- Push-pull shall only be conducted with machine models from the same family. For example, a 623K and 623G is allowed, but not a 623K and 657G.
- Push-pull operation shall be conducted so that only one machine is being pushed at a time or only one machine is being pulled at a time.
- Push-pull operation shall be conducted when both machines are operating in a straight line, otherwise damage can occur to the machine.
- Auger machines and elevated scrapers shall not be push loaded.

The operator station is ROPS certified to a tractor only mass of 17084 kg (37663 lb) as tractor portion of tractor-scrapers per Table 1 of ISO 3471:2008. This excludes scraper weight and this weight excludes payload.

For the maximum approved operating weight refer to the loaded weight in Operation and Maintenance Manual, “Rated Load”.

Maximum side grade operation without machine articulation is 49% grade.

Note: The listed restriction assumes a machine operating perpendicular to a side grade, graded ground surface, nominal payload, homogeneous payload distribution in the bowl and operating on a dry, firm under footing. Refer to the Operation and Maintenance Manual, “Slope Operation” for more information.

Maximum side grade operation with machine articulation is 22% grade.

Note: The listed restriction assumes a machine operating at a slow ground speed on a graded ground surface, nominal payload, homogeneous payload distribution in the bowl and operating on a dry, firm under footing. Refer to the Operation and Maintenance Manual, “Slope Operation” for more information.

Service brake holding capability on a grade is 25% grade.

Note: The listed restriction assumes that the brake components are within working specifications, a graded ground surface, and a dry, firm under footing. Evaluate the condition of the machine and the environment and use appropriate judgment to maintain control of the machine.

Parking brake holding capability on a grade is 15% grade.

Note: The listed restriction is for a machine loaded with the rated payload and assumes that the brake components are within working specifications, a graded ground surface, a dry, firm under footing, and that the machine is oriented parallel to the grade with the tractor articulated no more than 20° left or right. Evaluate the condition of the machine and the environment and use appropriate judgment to maintain control of the machine.

While descending on a grade, do not exceed 2600 RPM with the tractor engine or damage to the engine may occur.

While descending on a grade, do not exceed 2600 RPM with the scraper engine or damage to the engine may occur.

Use only in nonexplosive gas environments.

Expected Life

The expected life, defined as total machine hours, of this machine is dependent upon many factors including the machine owner’s desire to rebuild the machine back to factory specifications. The expected life interval of this machine is 10000 service hours. The expected life interval corresponds to the service hours to engine overhaul. Service hours to engine overhaul may vary based on overall machine duty cycle. At the expected life interval, remove the machine from operation and 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 Operation and Maintenance Manual, “Decommissioning and Disposal”.

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 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.

Identification Information

i09598081

Plate Locations and Film Locations

SMCS Code: 1000; 6000; 7000

The Product Identification Number (PIN) will be used to identify a machine.

Caterpillar products such as engines, transmissions, and major attachments are identified by Serial Numbers (S/N).

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

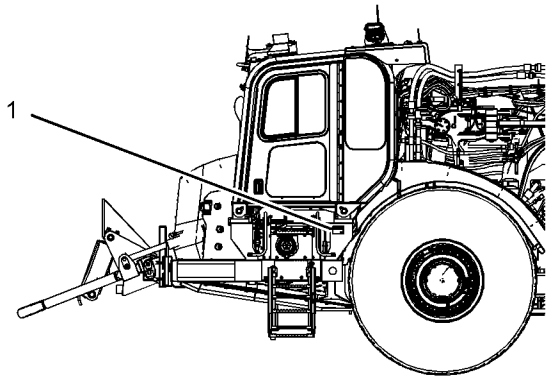

Illustration 52 g02161131

The Product Identification Number (PIN) for the machine is located on the left-hand side of the tractor. PIN plate (1) is below the operator compartment. Plate (1) will have the following information:

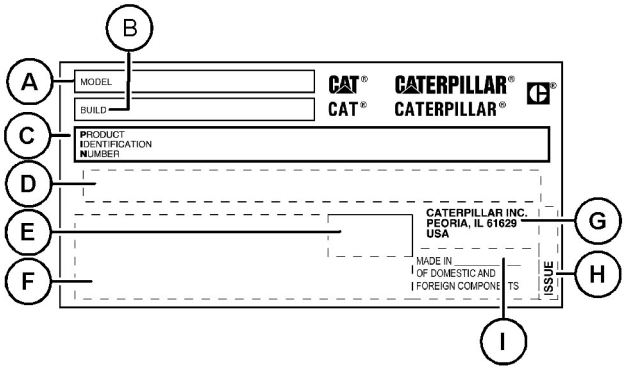

Illustration 53 g06201159

PIN plate

Model (A) _____

Build (B) _____

Product Identification Number (C) _____

Bar Code (D) _____

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

Regional Certification Plate (If Required) (F) _____

Address of Manufacturer (G) _____

Issue (H) _____

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

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

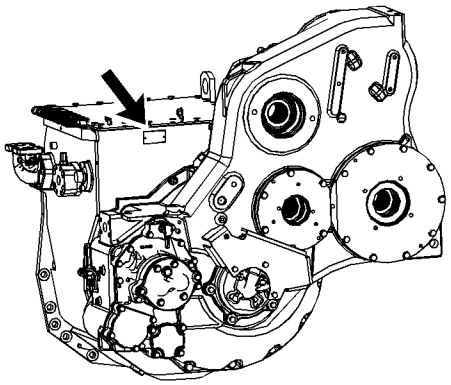

Illustration 54 g02125685

Serial number plate for the transmission for the tractor is located on the back side of the transmission.

Transmission serial number _____

Transmission arrangement number _____

Torque converter serial number _____

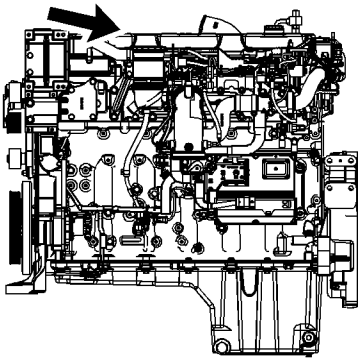

Illustration 55 g02722443

Serial number plate for the engine can be found on top of the engine.

Engine model number_____

Engine serial number_____

Engine arrangement number_____

Regional Product Marking (If Equipped)

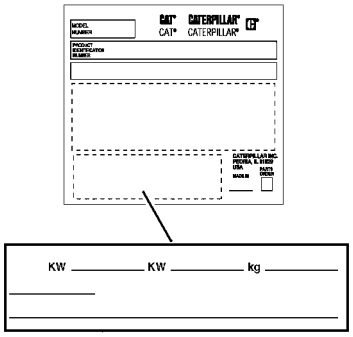

Illustration 56 g06650998

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_____

Eurasian Economic Union

Manufacturer Information

Manufacturer:

Caterpillar Inc.,
100 N.E. Adams Street
Peoria, Illinois 61629, USA

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

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

Sound Certification

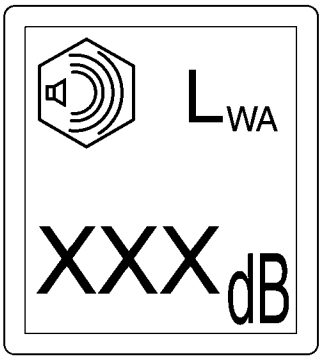

Illustration 57 g06675270

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”

Certification

ROPS/FOPS Structure

This message is positioned on the ROPS.

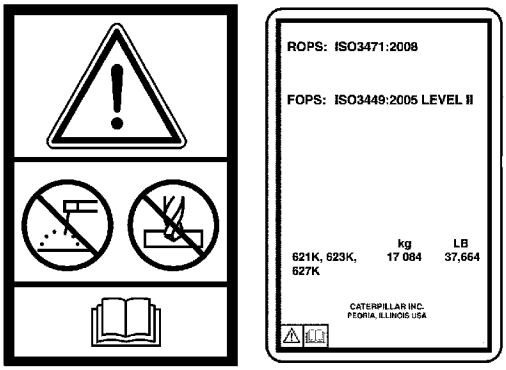

Illustration 58 g03511079

⚠ 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.

Certification for Rollover Protective Structure (ROPS) and for Falling Object Protective Structure (FOPS)

The unaltered ROPS or the FOPS structure meets the following standards for the ROPS at the time of installation: ISO 3471-2008 and GB/T 17922-2014. Also, the FOPS canopy meets the following standards at the time of installation: ISO 3449-2005 LEVEL II and GB/T 17771-2010 LEVEL II.

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

Product Link

If equipped, this message is used to verify the certification of the Product Link as an RF transmitter. The following specifications are provided to aid in ensuring compliance with all local regulations:

Table 7

Operating frequency range	148 to 150 MHz
Transmitter power	5-10 w

This message is located on the control group for the Product Link. The control group is located on the top of the cab.

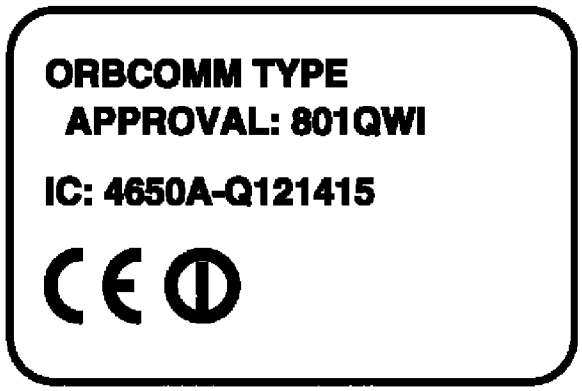

Illustration 59 g01261742

⚠ WARNING

This machine is equipped with a Caterpillar Product Link communication device. When electric detonators are used, this communication device should be deactivated within 12 m (40 ft) of a blast site for satellite-based systems and within 3 m (10 ft) of a blast site for cellular based systems, or within the distance mandated under applicable legal requirements. Failure to do so could cause interference with blasting operations and result in serious injury or death.

In cases where the type of Product Link module cannot be identified, Caterpillar recommends that the device be disabled no less than 12 m (40 ft) from the blast perimeter.

If the machine is required to work within 12 m (40 ft) of a blast site, power to the Product Link module must be disconnected.

Consult your Cat dealer with any questions that concern the operation of the Product Link in a specific country.

i08756279

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Consult your Cat dealer for an Emission Control Warranty Statement.

The emission certification film is located on the engine or inside the engine enclosure.

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. In order 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 Inc., 100 N.E. Adams Street, Peoria, Illinois 61629, 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 SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth - moving Equipment
	Function:	Scraper
	Model/Type:	623K
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC		
2014/30/EU		

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of May 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 Inc., 100 N.E. Adams Street, Peoria, Illinois 61629, 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 SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth - moving Equipment
	Function:	Scraper
	Model/Type:	623K
	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		
2016 No. 1091		

Designated standards taken into consideration (for 2008 No. 1597 and 2016 No. 1091 Regulation or enactments only) :

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of May 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

i04021647

Mounting and Dismounting

SMCS Code: 7000

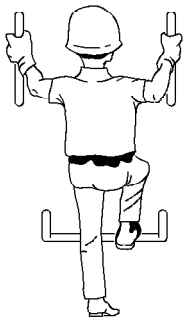

Illustration 60 g00037860
Typical example

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 the machine and whenever you get 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 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”.

i03867781

Daily Inspection

SMCS Code: 1000; 7000

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

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 cooling system pressure cap is cool enough to touch with your bare hand.

Remove the cooling system pressure cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

NOTICE
Accumulated grease and oil on a machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours or each time any significant quantity of oil is spilled on a machine.

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

Look around the machine and under the machine. Look for trash buildup, dirt buildup, loose bolts, oil leaks, coolant leaks, broken parts, cracked parts or worn parts.

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

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

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

Check the oil levels, the coolant level, and the fuel level.

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.

The operator should be seated against the seat backrest. Adjust the seat so that the operator is allowed full travel of the pedals.

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

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

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

- Operation and Maintenance Manual, “Backup Alarm - Test”
- Operation and Maintenance Manual, “Brakes, Indicators and Gauges - Test”
- Operation and Maintenance Manual, “Cooling System Coolant Level - Check”
- Operation and Maintenance Manual, “Differential and Final Drive Oil Level - Check”
- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Fuel System Water Separator - Drain”
- Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”
- Operation and Maintenance Manual, “Hydraulic Oil Cooler - Clean”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Push Plate - Lubricate”
- Operation and Maintenance Manual, “Radiator Core - Clean”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Tire Inflation - Check”
- Operation and Maintenance Manual, “Transmission Oil Level - Check”

Machine Operation

i06842826

Step (Powered) Operation
(If Equipped)

SMCS Code: 7254

WARNING

Crush hazard! Stay back a safe distance from the powered step when the powered step is being raised or lowered. Failure to stay back may result in injury or death.

NOTICE
Make sure that the area is free of obstacles before raising or lowering the powered step.

Machine travel with the powered step lowered could result in contact with the ground or an obstacle resulting in damage to the powered step.

WARNING

Do not ride on the powered step while the machine is moving. Riding the powered step while the machine is moving could result in injury or death.

NOTICE
To avoid damage to the powered step during machine operation, keep the powered step in the raised position.

The powered step is a set of electric controlled retractable steps that can be lowered close to the ground for mounting and dismounting the machine.

Step (Powered) Controls

The powered step can be raised or lowered under normal conditions in one of two places on the machine. One set of control buttons is located inside the cab, on the headliner. The other set of buttons is located above the front bumper of the machine behind a hinged cover.

Note: The battery disconnect switch must be in the ON position to operate the powered step buttons.

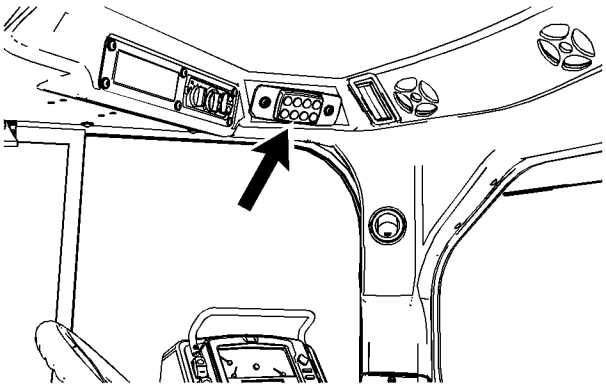

Illustration 61 g06138323
Cab keypad location

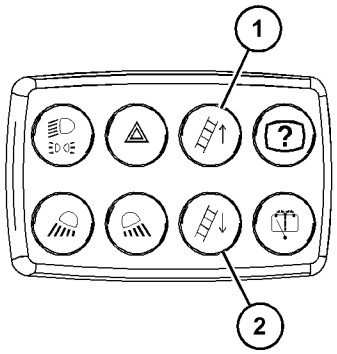

Illustration 62 g06138324
Cab keypad

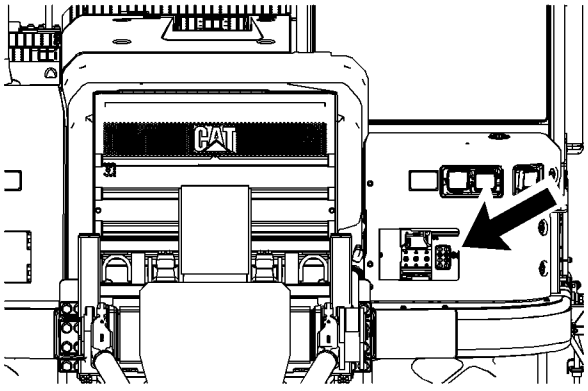

Illustration 63 g02523217
Exterior keypad location

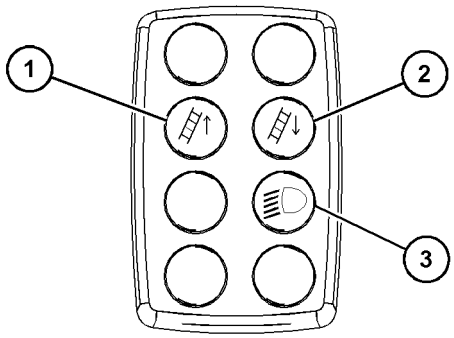

Illustration 64 g06138330
Exterior keypad

Note: The Step (Up) and Step (Down) buttons must be pressed once to enable the operation of the powered step. The Step (Up) and Step (Down) buttons can then be pressed again to raise or lower the step.

Powered Step (Up) (1)

Access Step (Up) – Press and hold button (1) to raise the step. Pressing button (1) will activate button (3) and will illuminate the access step light.

Powered Step (Down) (2)

Access Step (Down) – Press and hold button (2) to move the step down. Pressing button (2) will activate button (3) and will illuminate the access step light.

Powered Step Light (3)

Access Step Light – Press button (3) to turn on the access step light. Press button (3) again to turn off the access step light. Button (3) also illuminates the tractor work lights.

Raising the Step

Raise – To raise the powered step with a button, perform the following steps:

1. Ensure that there is adequate clearance, 2 m (6 ft 6 inch), on the left side of the machine from any stationary or mobile obstacles where the step is to be lowered.
2. Press and hold the powered step (up) button to raise the step. Release the button to stop the step from moving.
3. Always place the step in the fully raised position before moving the machine. Visually check the step to confirm that the step is fully raised. If the step is not fully raised, the step may be damaged during machine operation.

Note: If the parking brake is released and the engine start switch is in the ON position and the powered step is not fully raised, the following will occur: an audible alarm will sound, an indicator will illuminate on the dash, and a message will appear on the display.

Note: If the machine is moved at speeds greater than 4.8 km/h (3.0 mph) for more than 10 seconds with the step lowered, the step will attempt to raise automatically while the machine is in motion.

Lowering the Step

Lower – To lower the powered step with a button, perform the following steps:

1. Ensure that there is adequate clearance, 2 m (6 ft 6 inch), on the left side of the machine from any stationary or mobile obstacles where the step is to be lowered.
2. Press and hold the powered step down) button to lower the step. Release the button to stop the step from moving.

3. Always place the step in the fully lowered position before mounting or dismounting the machine.

Manual Step Lowering

Step Lower from Ground Level

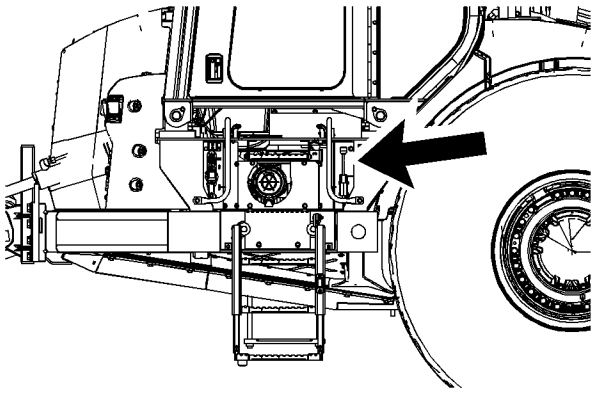

Illustration 65 g02523144

1. Ensure that there is adequate clearance, 2 m (6 ft 6 inch), on the left side of the machine from any stationary or mobile obstacles where the step is to be lowered.

2. When lowering the step from the ground, hold the step with your left hand and pull the manual control lever with your right hand until the step is released. Pull the step towards you and slowly lower the step to the ground with your left hand.

Step Lower from Cab

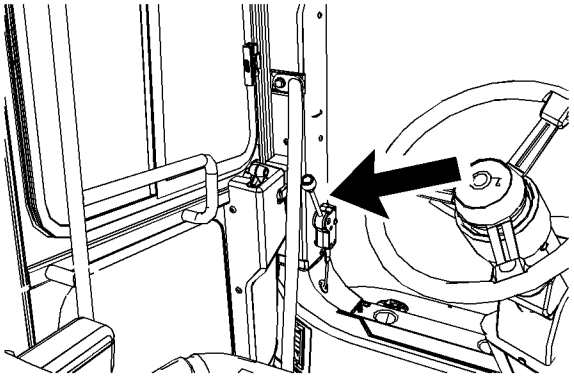

Illustration 66 g02523142

1. Open the cab door.

2. Pull the manual control level in the cab and with your foot push the step from the stored position using the tab on the step.

3. Release the manual control lever.

i04935476

Alternate Exit

SMCS Code: 7308; 7310

The front right hand sliding window can be used as an alternate exit.

i08109013

Seat

SMCS Code: 7312

Note: Adjust the seat height when prompted by the message on the cab display monitor.

The seat control monitors the resting position of the seat with the operator present. The seat control will prompt the operator with a message on the main cab display to change the seat height. This ride zone allows the seat suspension to work best in both directions.

The operator should be seated against the seat backrest. Adjust the seat fore/aft so that the operator is allowed full travel of the pedals.

If the seat is not centered when the machine is started a warning will be displayed on the monitoring system. Center the seat before operating the machine. If the seat is not centered before operation, an event will be logged.

Caterpillar Advanced Ride Management (ARM) Seat (Type II)

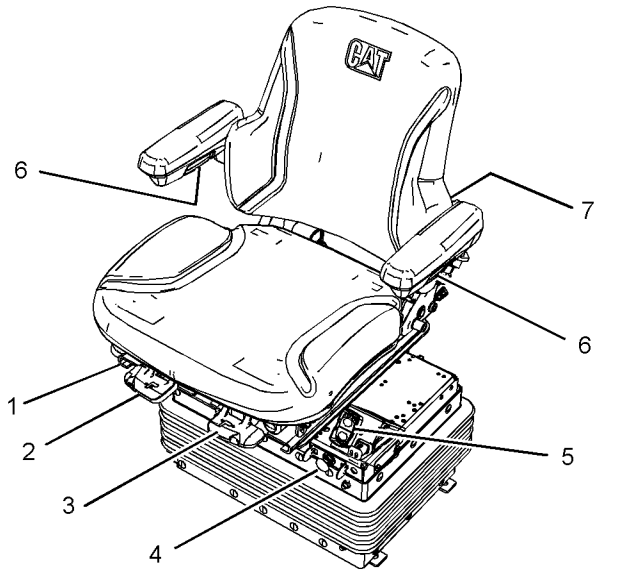

Illustration 67 g03573596

Swivel lever (1) – The seat is equipped to rotate 30° in 10° increments. Pull up on lever (1) for seat rotation. Rotate the seat right or rotate the seat left until the desired position is attained. Release the lever to lock the seat into position.

Seat recline lever (2) – Pull up on lever (2). Move the back of the seat forward or move the back of the seat backward until the desired position is attained. Release the lever to lock the back of the seat into position.

Fore/Aft lever (3) – Pull up on lever (3). Move the seat forward or move the seat backward until the desired position is attained. Release the lever to lock the seat into the desired position.

If the seat is loose on the suspension, tighten the set screws. Refer to the topic that covers the seat in your machine in Systems Operation, Testing and Adjusting, Disassembly and Assembly, RENR2165 for the correct procedure.

Seat height and weight control knob (4) – Use this control knob to adjust the seat height when prompted by the cab display that the seat is out of the ride zone position. Pull out on knob (4) to move the seat downward. Push in on the knob to move the seat upward. Release the knob to lock the seat in the desired position.

Damping Switch (5) – The damping switch is a three position switch which allows you to select your preferred damping level. Push the switch to the HIGH(+) position to increase damping for the seat suspension, the seat suspension will move less freely. Push the switch to the LOW(-) position to decrease the rate of damping for the seat suspension, the seat suspension will move more freely. When the switch is placed in the mid position, the rate of damping for the seat suspension will be between the HIGH(+) and LOW(-) positions. Regardless of the switch position, the damping rate will adjust to reduce the likelihood of hard contact with the seat end of travel.

Seat armrest knobs (6) – Adjustment knobs are used to adjust the angle of the armrests when the armrests are in the operating position. The knobs are on the bottom side of the armrests. Rotate the knob clockwise to raise the angle of the armrest. Rotate the knob counterclockwise to lower the angle of the armrest.

Lumbar support knob (7) – Rotate knob clockwise to increase back support. Rotate the knob counterclockwise to decrease back support.

i08109014

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.

If the seat belt is not latched when the machine is started a warning will be displayed on the monitoring system. Latch the set belt before operating the machine. If the seat belt is not latched before operation, an event will be logged.

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

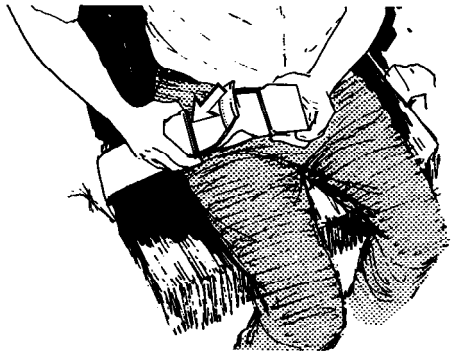

Illustration 68 g00100709

1. Unfasten the seat belt.

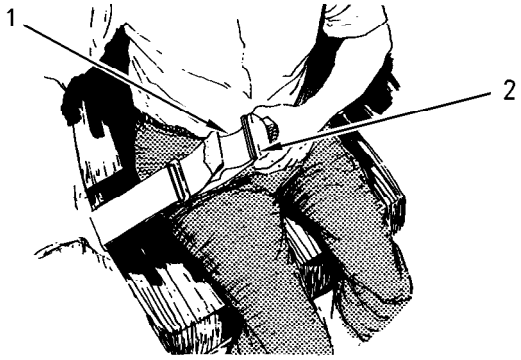

Illustration 69 g00932817

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 70 g00100713

1. Fasten the seat belt. Pull out on the outer belt loop 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

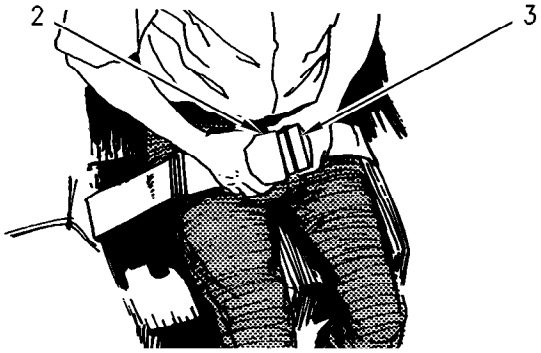

Illustration 71 g00932818

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 72 g00100717

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

i04788294

Mirror

SMCS Code: 7319

WARNING

Adjust all mirrors as specified in the Operation and Maintenance Manual. Failure to heed this warning can lead to personal injury or death.

WARNING

Slips and falls can result in personal injury. Use the machines access systems when adjusting the mirrors. If the mirrors cannot be reached using the machine access systems follow the instructions found within the Operation and Maintenance Manual, “Mirror” in order to access the mirrors.

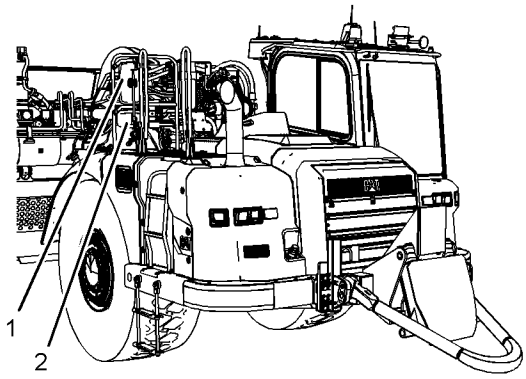

Illustration 73 g02901968

(1) Right Side Top Rear View Mirror
(2) Right Side Bottom Rear View Mirror

Mirrors provide additional visibility around your machine. Make sure that the mirrors are in proper working condition and that the mirrors are clean. Adjust all mirrors at the beginning of each work period and adjust the mirrors when you change operators.

Modified Machines or machines that have additional equipment or attachments may influence your visibility.

Mirror Adjustment

- Park the machine on a level surface.
- Stop the engine.

Note: You may need to use hand tools in order to adjust certain types of mirrors.

Right Side Top Rear View Mirror

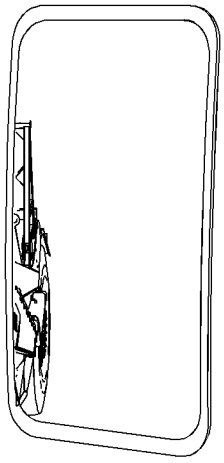

Illustration 74 g02513876

Adjust the right side rear view mirror (1) so 0.5 m (1.5 ft) from the outer edge of the cross-tube of the scraper bowl can be seen. Refer to illustration 74 . Also adjust the right side top rear view mirror in order to see the following areas from the operator seat:

- a portion of the scraper bowl draft tube
- a portion of the overflow guard (if equipped)
- an object on the ground 1 m (3.3 ft) from outside of the rear tires at the axle centerline

Right Side Bottom Rear View Mirror

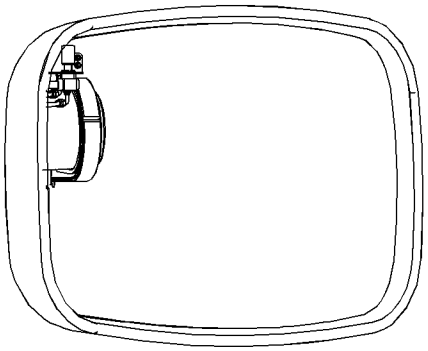

Illustration 75 g02218213

Adjust the right side bottom rear view mirror (2) so 0.5 m (1.5 ft) from the outer edge of the cross-tube of the scraper bowl can be seen. Refer to illustration 74 . Also adjust the right side bottom rear view mirror in order to see the following areas from the operator seat:

- a portion of the scraper bowl draft tube
- an object on the ground 1 m (3.3 ft) from outside of the rear tires at the axle centerline

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Operator Controls

SMCS Code: 7300; 7301; 7451

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

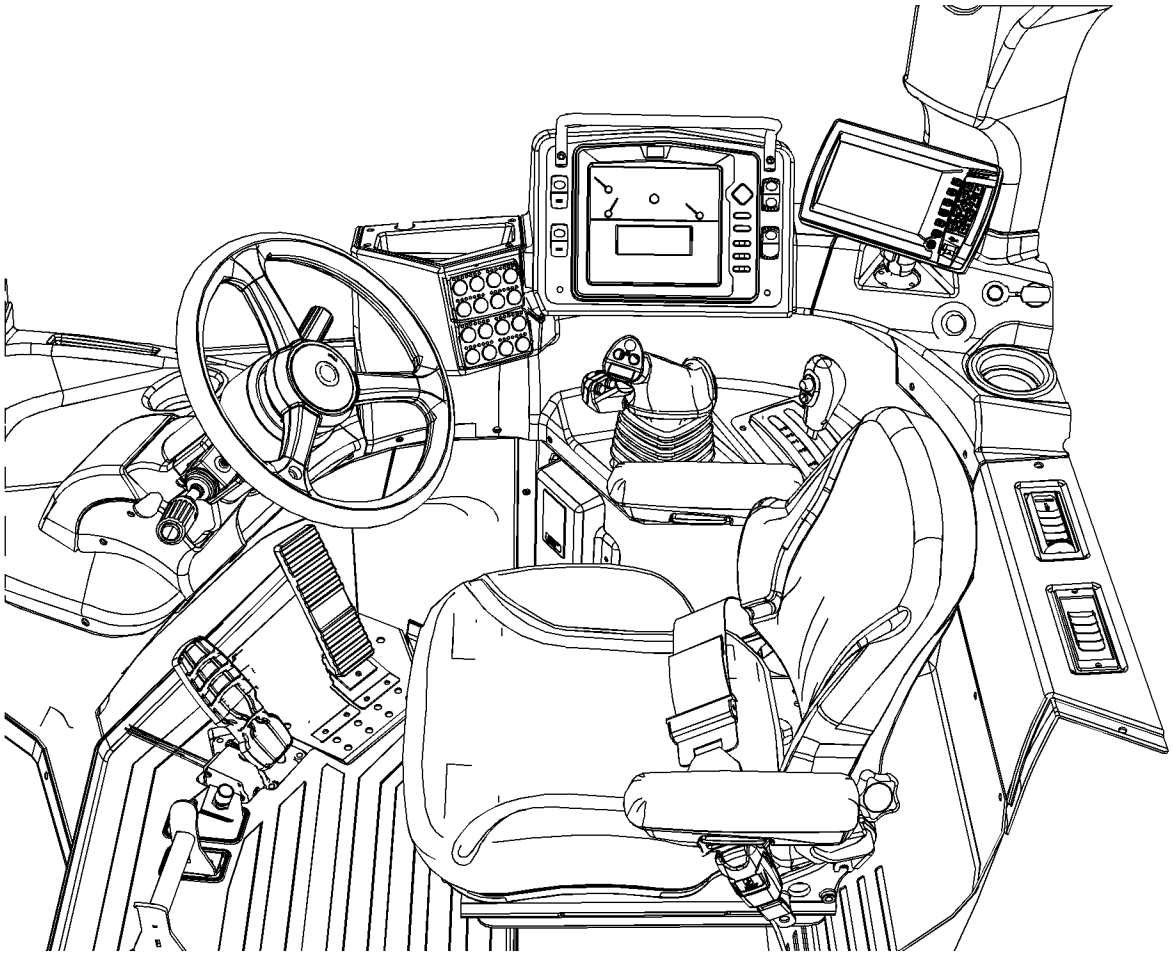


Illustration 76 g03430528

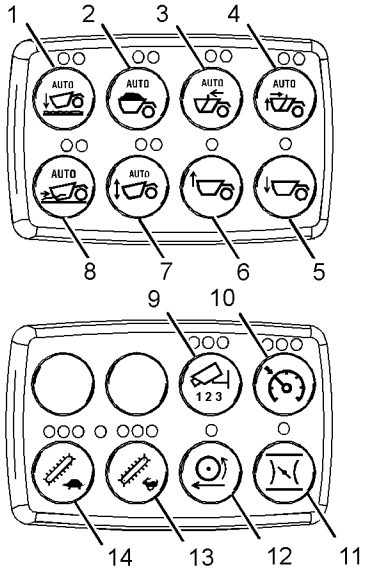


Illustration 77 g03080406

Cab Keypad (If Equipped)

(1) Ready to Dig (Auto) (If Equipped)
(2) Ready to Haul (Auto) (If Equipped)
(3) Ready Bowl Unload (Auto) (If Equipped)
(4) Ready to Return (Auto) (If Equipped)
(5) Cat Grade Control Decrement (If Equipped)
(6) Cat Grade Control Increment (If Equipped)
(7) Cat Grade Control (If Equipped)
(8) Load Assist (If Equipped)
(9) Camera (WAVS)
(10) Ground Speed Control
(11) Throttle Lock
(12) Tire Spin reduction
(13) Elevator Speed Increase
(14) Elevator Speed Decrease

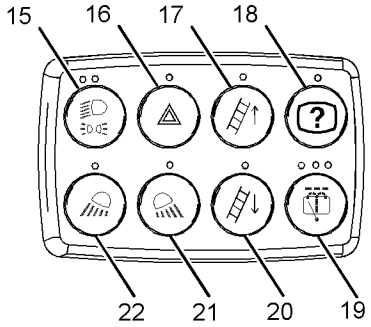


Illustration 78 g03083439

(15) Headlight/Marker Light
(16) Warning Hazard Light
(17) Powered Step (Up) (If Equipped)
(18) Information
(19) Rear Window Washer
(20) Powered Step (Down) (If Equipped)
(21) Rear Worklight
(22) Front Worklight

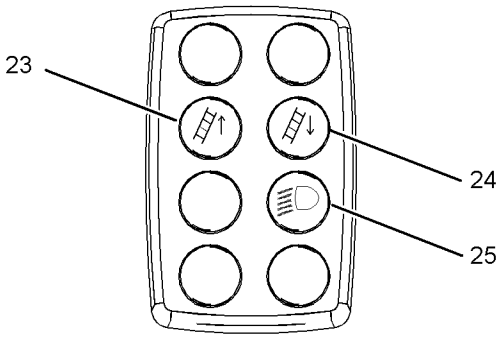


Illustration 79 g03080412

Cab Exterior Keypad (If Equipped)

(23) Powered Step (Up) (If Equipped)
(24) Powered Step (Down) (If Equipped)
(25) Powered Step Light (If Equipped)

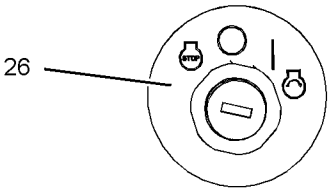


Illustration 80 g03084498

(26) Engine Start

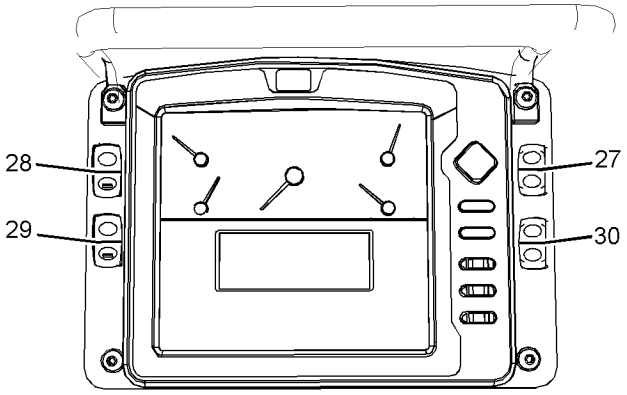


Illustration 81 g03084536

(27) Forced Regeneration Switch
(28) Implement Lockout Switch
(29) Parking Brake
(30) Secondary Steering Switch

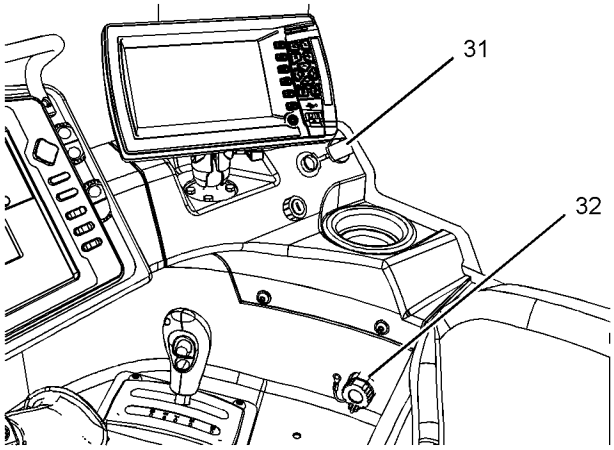


Illustration 82 g03430552

(31) 12 V Power Receptacle
(32) Cat Electronic Technician Port

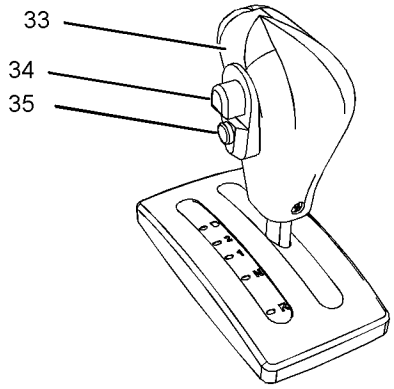


Illustration 83 g03084660

(33) Transmission Control
(34) Transmission Control Lock
(35) Top Gear Control

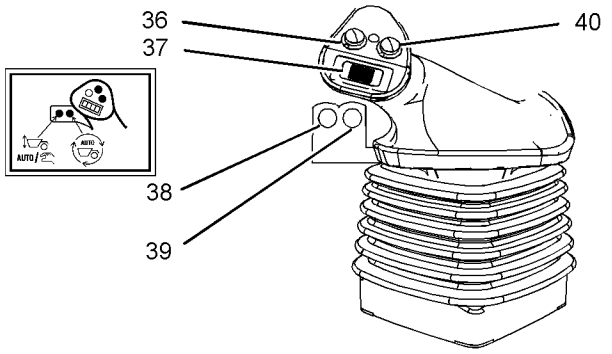


Illustration 84 g03084662

(36) Transmission Hold Control Button
(37) Elevator Control
(38) Auto/Manual Button (If Equipped)
(39) Mode Select Button (If Equipped)
(40) Cushion Hitch Control Button

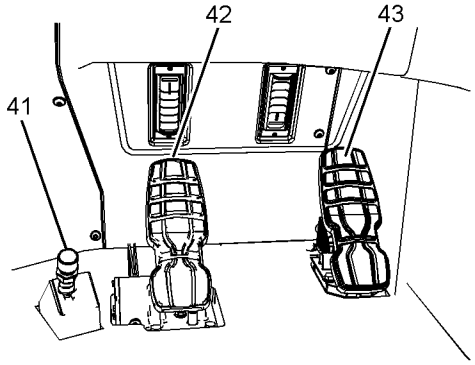


Illustration 85 g03084664

(41) Differential Lock Control
(42) Service Brake Control
(43) Throttle Control

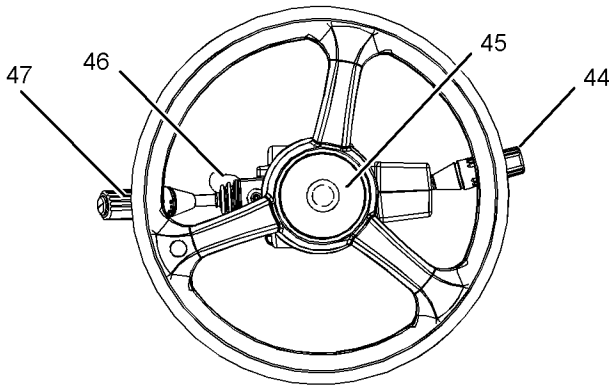


Illustration 86 g03430556

(44) Retarding Lever
(45) Horn
(46) Steering Column Tilt and Telescope Control
(47) Multifunction Switch

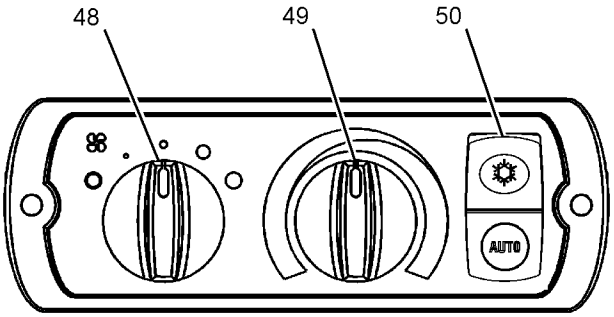


Illustration 87 g03084666

(48) Fan Speed Control
(49) Temperature Variable Control
(50) Heating and Air Conditioning Switch

Indicator Lights

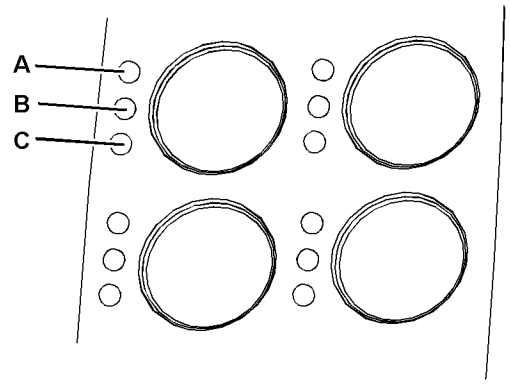


Illustration 88 g02155712

The indicator lights next to each button are described in the following method:

(A) Top light
(B) Middle light
(C) Bottom light

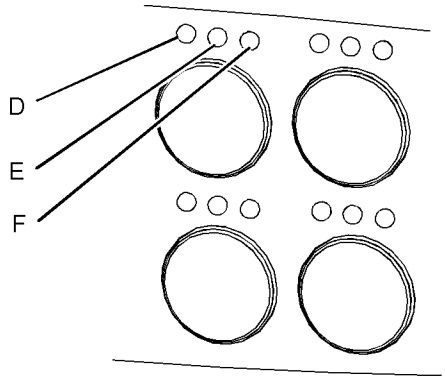


Illustration 89 g02155714

The indicator lights next to each button are described in the following method:

(D) Left light
(E) Middle light
(F) Right light

Sequence Assist (If Equipped)

Sequence assist allows you to simplify the control of specific machine and implement commands.

To use sequence assist you must program the implement positions for each sequence. Once programmed, the machine will remember each position, even after the machine has been turned off.

When programming the sequences, park the machine and place it in NEUTRAL position, unlock the implement lock, and disengage the parking brake. Manually adjust the bowl and apron to your desired position for the corresponding sequence to be programmed.

Hold the button, (1) through (4), for the corresponding sequence to be programmed. Indicator light (F) will illuminate. Release the button. Once the preset level has been saved, indicator light (E) will illuminate.

Repeat this process for the additional sequence assist positions by again adjusting the implements and programming them with the keypad.

Indicator light (F) is illuminated if a sequence assist feature is selected. To turn off the sequence assist feature press the button again and indicator light (F) will turn off.

The mode select button allows you to cycle through sequence assist features without pressing an individual switch. The cycle will follow this sequence: Ready to Dig, Ready to Haul, Ready to Unload, Ready to Return and back to Ready to Dig

Individual Sequence Assist features may be selected out of sequence by pressing the switch for that feature.

Note: When ready to dig is utilized the transmission will automatically be locked in SECOND SPEED position.

Note: The cushion hitch will engage with all sequence assist features except ready to dig.

Ready to Dig (Auto) (If Equipped) (1)

Ready to Dig – Push button (1) to initiate the ready to dig feature. Ready to dig will perform the following functions: move the bowl to a preset height, turn the elevator on in the forward direction, lock the cushion hitch and automatically engage the transmission hold when the operator shifts to 2F gear.

Ready to Haul (Auto) (If Equipped) (2)

Ready to Haul – Press button (2) to initiate the ready to haul feature. Ready to haul will perform the following functions: move the bowl to a preset height, turn the elevator off, unlock the cushion hitch and disengage the transmission hold.

Ready to Unload (Auto) (If Equipped) (3)

Ready to Unload – Press button (3) to initiate the ready to unload feature. Ready to unload will perform the following functions: lower the bowl to a preset fill height, turn the elevator on in the reverse direction, open the bowl floor and move the ejector forward.

Ready to Return (Auto) (If Equipped) (4)

Ready to Return – Push button (4) to initiate the ready to return feature. Ready to return will perform the following functions: raises the bowl to roading height, turn the elevator off, close the bowl floor and move the ejector fully rearward.

Cat Grade Control (If Equipped)

Cat Grade Control works to protect the design surface so that too much material is not removed. Grade protection allows the operator to perform manual tasks without going below the site design plane. During Cat Grade Control operation, automatics will not be engaged to keep the bowl on design. Grade protection will override and block manual lower commands when necessary to limit bowl travel. Refer to Operation and Maintenance Manual, SEBU8293 for more information on the Cat Grade Control system.

Cat Grade Control Decrement (If Equipped) (5)

Decrement – Push this button to lower the design plane. Cat Grade Control must be enabled to utilize this function.

Cat Grade Control Increment (If Equipped) (6)

Increment – Push this button to raise the design plane. Cat Grade Control must be enabled to utilize this function.

Cat Grade Control Select (If Equipped) (7)

Cat Grade Control – Press this button to select Cat Grade Control, indicator light (D) will illuminate. Push button (39) to activate Cat Grade Control , indicator light (E) will illuminate. When both indicators are illuminated the system in functional.

Load Assist (If Equipped) (8)

The Load Assist system automatically raises or lowers the bowl to load the bowl efficiently. When Load Assist is used with Cat Grade Control, the system ensures that the cutting edge does not go below the design plane.

Load Assist may be activated after the bowl has been manually brought to the ground or when the bowl is in the raised, travel position.

Load Assist may be used in self loading applications, push loading applications, or push-pull loading applications. Load Assist may be activated either before or after the push machine makes contact.

Load Assist may be deactivated by either pushing button (39) or by pushing button (8). Press both buttons to deactivate and deselect Load Assist.

Load Assist – Press button (8) in order to select load assist, indicator light (D) will illuminate. Press button (39) in order to activate load assist, indicator light (E) will illuminate.

Note: Load assist may only be used when the machine is in second gear. Load assist will not activate if the implement lockout switch is locked and/or the parking brake is engaged. Load assist will also not activate unless the engine is ON.

Note: Load assist will not activate with sequence assist initiated unless sequence assist is in the ready to dig setting.

Note: If an event or error occurs the indicator light (D) will blink. The indicator light will continue to blink until load assist is activated by pressing button (39).

Camera (WAVS) (9)

Camera – Press button to activate camera 1, indicator light (D) will illuminate. Press the button again to activate camera 2, indicator light (E) will illuminate. Press the button again to activate camera 3, indicator light (F) will illuminate. Press the button again to turn off the camera.

Note: This button can be overridden when buttons on the WAVS display are used. A flashing light on the WAVS display will indicate that the button is being overridden.

Ground Speed Control (10)

Ground Speed Control – Press the button in order to set the ground speed control speed, indicator light (E) will illuminate. Press the button again to disable the ground speed control setting, indicator light (E) will turn off.

Throttle Lock Control (11)

Throttle Lock Control button – The button maintains the engine rpm at a desired speed. Engage the button in order to keep the engine at the current rpm. When the throttle lock is active, an indicator light will illuminate on the front dash. Refer to the "Indicators" topic in Operation and Maintenance Manual, "Monitoring System" for more information about the indicator light. Use the throttle lock control on long hauls in order to avoid driver fatigue. Fatigue may result from depressing the manual throttle control for an extended time.

ON – Push the button in order to turn on the throttle lock control. Indicator light (E) will illuminate.

OFF – Push the button again or slightly depress the service brake pedal in order to turn off the throttle lock control.

Note: If there is a loss of throttle control to the engine, press and hold the throttle lock control button, this will raise the engine speed to 1300 rpm to allow the machine to be moved to a safe location for troubleshooting.

Tire Spin Reduction (12)

Tire Spin Reduction – Press the button to enable tire spin reduction mode, indicator light (E) will illuminate. Press the button again to disable tire spin mode, indicator light (E) will turn off.

Elevator Speed Increase (13)

Elevator Speed Increase button – Press the button in order to increase the speed of the elevator. To continue to increase the speed of the elevator press the button again until your desired elevator speed is achieved.

Elevator Speed Decrease (14)

Elevator Speed Decrease button – Press the button in order to decrease the speed of the elevator. To continue to decrease the speed of the elevator press the button again until your desired elevator speed is achieved.

Headlight/Marker Light (15)

Marker Light – Press button (15) to illuminate the marker lights. Indicator light (E) will also illuminate.

Headlight – Press button (1) again to illuminate the headlights. Indicator light (E) will also illuminate. The marker lights will still be illuminated and indicator light (D) will still be illuminated. In order to turn the headlights and position lights OFF press the button again.

Warning Hazard Light (16)

Warning Hazard Light button – Push the button in order to activate the hazard lights. Indicator light (E) will illuminate. Push the button again to turn off the hazard lights.

Powered Step (Up) (If Equipped) (17)

Access Step (Up) – Press and hold button in order to move the step up. Indicator light (E) will illuminate. Pressing button (17) will activate button (25) and will illuminate the access step light.

Help Assistance (18)

Keypad Help – Push the button in order to enable the help assistance feature. Indicator light (E) will flash. The help assistance feature will be active for 10 seconds. Push any flashing button in order to receive help information on the display panel. Push the help button again in order to cancel the help assistance feature.

Rear Window Washer (19)

Window Washer – Press and hold the button in order to activate the window washer. While the button is depressed, indicator light (E) will illuminate and washer fluid will spray from the nozzle. The window wiper will also operate while the button is depressed. After the button is released, the window wiper will stop.

Powered Step (Down) (If Equipped) (20)

Access Step (Down) – Press and hold button (20) in order to move the step down. Indicator light (E) will illuminate. Pressing button (20) will activate button (25) and will illuminate the access step light.

Rear Worklight (21)

Rear Worklight – Press button (21) to illuminate the rear worklights. Indicator light (E) will illuminate. Press the button again to turn off the rear worklights.

Note: The marker lights will also illuminate.

Front Worklight (22)

Front Worklight – Press button to illuminate the front worklights. Indicator light (E) will also illuminate. Press the button again to turn off the front worklights.

Note: The marker lights will also illuminate.

Powered Step (Up) (If Equipped) (23)

Access Step (Up) – Press and hold button (23) in order to move the step up. Pressing button (23) will activate button (25) and will illuminate the access step light.

Powered Step (Down) (If Equipped) (24)

Access Step(Down) – Press and hold button (24) in order to move the step down. Pressing button (24) will activate button (25) and will illuminate the access step light.

Powered Step Light (If Equipped) (25)

Access Step Light – Press button (25) in order to turn on the access step light. Press button (25) again to turn off the access step light.

Engine Start Switch (26)

When you turn the key to the ON position, electrical power is supplied to the systems.

Engine Stop (Shutdown) (Type 1) – Turn the key to this position in order to disable the delayed engine shutdown (DES). The engine will be shut down immediately.

Note: Shutting down the engine using this method is considered a hard shutdown which disables the DES.

Note: A warning message and/or Audible alarm will be initiated. A fault code will be logged for improper engine shutdown if exhaust temperature is above limit.

Note: Overriding delayed engine shutdown may reduce engine and machine system component life. **Use for emergency situations only.**

DELAYED ENGINE SHUTDOWN OVERRIDE (TYPE 2) – Turn the engine key switch to the DELAYED ENGINE SHUTDOWN OVERRIDE position and hold the engine key switch in that position for 1 second to override delayed engine shutdown (DES). The engine will be shut down immediately.

Note: Shutting down the engine using this method is considered a hard shutdown which disables the DES.

Note: A warning message and/or audible alarm will be initiated and a fault code will be logged for improper engine shutdown if exhaust temperature is above a limit.

Note: Overriding delayed engine shutdown may reduce engine and machine system component life. **Use for emergency situations only.**

OFF – When you insert the key and when you remove the key, the engine start switch must be in the OFF position. A running tractor engine and a running scraper engine will stop running when the key is returned to the OFF position.

ON – To activate the electrical circuits in the cab, turn the key clockwise to the ON position.

START – To start the tractor engine, turn the key clockwise to the START position. After the engine starts, release the key. The key will return to the ON position.

Note: If the engine fails to start, return the engine start switch key to the OFF position. This must be done before you attempt to start the engine again.

Forced Regeneration Switch (27)

Force Regeneration – Push in the top of the switch for 2 seconds in order to begin regeneration. An indicator light on the switch will become active showing that the regeneration is active. An indicator light on the dash will become active showing that the regeneration is active. The indicator lights will deactivate after regeneration is completed.

Disable Regeneration – Push in the bottom of the switch for 2 seconds in order to disable regeneration. An indicator light on the switch will become active showing that the regeneration is being disabled. The indicator light will deactivate after regeneration disable is completed.

Note: To re-enable the regeneration, cycle the engine start switch or push and hold the top of switch (27) for 3 seconds.

Implement Lockout Switch (28)

Note: Before the implement controls will function, switch (28) must be in the UNLOCK position.

LOCK – Push the top of the switch in order to lock out the implement controls. An indicator light on the dash will become active showing that the implements have been locked.

UNLOCK – Push the locking tab forward and push in the bottom of the switch in order to unlock the implement controls.

Parking Brake Switch (29)

ENGAGE – Push in the top of the switch in order to engage the parking brake. The parking brake indicator will illuminate. Refer to Operation and Maintenance Manual, “Monitoring System” for further information.

DISENGAGE – Push the locking tab forward and push in the bottom of the switch in order to disengage the parking brake. The parking brake indicator will go out. Refer to Operation and Maintenance Manual, “Monitoring System” for further information.

Secondary Steering Switch (If Equipped) (30)

Secondary Steering Test Switch – Switch (30) allows the operator to manually test the operation of the secondary steering system. Refer to Operation and Maintenance Manual, “Secondary Steering - Test” for the proper procedure.

12V Power Receptacle (31)

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

Cat Electronic Technician (ET) Port (32)

Cat ET Port – This service port allows service personnel to connect a laptop computer to the machine electronics using Cat Electronic Technician (ET) . This connection will allow service personnel to interrogate the machine systems and engine systems.

Transmission Control (33, 34, 35)

Refer to Operation and Maintenance Manual, “Transmission Control” for more information.

Joystick Control (36, 37, 38, 39, 40)

The joystick control is used to control the functions of the machine implements and the transmission hold.

Note: After the engine is started, all implement controls must be in the NEUTRAL position or the OFF position for 2 seconds before any of the implements are allowed to operate.

For specific information on the operation of the implement controls that are affected and the individual functions of the joystick control, refer to the following topics (if equipped):

- Operation and Maintenance Manual, “Bowl Control (Joystick)”
- Operation and Maintenance Manual, “Ejector Control (Joystick)”

- Operation and Maintenance Manual, “Elevator Control (Joystick)”
- Operation and Maintenance Manual, “Transmission Hold Control (Joystick)”
- Operation and Maintenance Manual, “Cushion-Hitch Control (Joystick)”
- Operation and Maintenance Manual, “Sequence Assist (Joystick)”
- Operation and Maintenance Manual, “Load Assist (Joystick)”

The joystick control will move forward and backward. Also, the joystick control can move left or right. The joystick control includes three push buttons and a thumb lever. The joystick control has a left push button and a right push button. The left push button is used to control the transmission hold control. The right push button is used for the cushion-hitch control. The thumb lever can move left or right. The thumb lever is used for the apron control.

Differential Lock Control Switch (41)

NOTICE
To prevent damage to the differential, do not engage the differential lock control at high speeds.

Do not turn machine with differential lock engaged.

Do not engage the differential lock control while one wheel is spinning. Decrease engine rpm until the wheel stops spinning. Anticipate using the differential lock before wheel slippage occurs.

In areas of high resistance, it may be necessary to turn the machine slightly in order to aid in unlocking the differential lock. Decreasing the engine rpm may also be helpful.

LOCK – Push down the switch and hold down the switch in order to lock the differential. The differential lock will help to prevent wheel slippage. Use the differential lock when you are loading on soft ground or on wet ground. Engage the differential lock only when the wheels are not spinning.

UNLOCK – Release the switch in order to unlock the differential.

Service Brake Control (42)

Engage – Depress the service brake pedal in order to engage the service brake. Use the service brake for reducing ground speed or for stopping the machine.

Disengage – Release the service brake pedal in order to disengage the service brake.

Note: The service brake is the primary braking system on the machine. Also, in the event of failure within the service brake system, the service brake control provides the secondary brake function on the machine. In order to allow the operator to bring the machine to a full stop during a secondary braking event, you may need to shift the machine to the NEUTRAL position.

Throttle Control (43)

Accelerate – Depress the throttle pedal in order to increase the travel speed.

Decelerate – Release the throttle pedal in order to decrease the travel speed.

Retarding Lever (44)

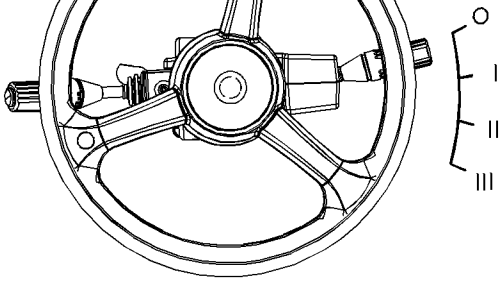


Illustration 90 g03418641

Retarding Lever – The retarding lever allows the operator to slow the machine without the service brakes, reducing brake wear and overheating.

Use the retarding lever in order to regulate the speed of the machine.

The lever has four positions:

OFF position – When the retarding lever is in position (O), retarding will disengage.

LOW position – Move the retarding lever to position (I) to provide a minimum of retarding.

MEDIUM position – Move the retarding lever to position (II) to provide medium engagement of retarding.

HIGH position – Move the retarding lever to position (III) to provide the maximum engagement of retarding.

Horn (45)

Horn – Depress the button in order to sound the horn.

Steering Column Tilt and Telescope Control (46)

Tilt – To tilt the steering column, pull up on the lever. Then move the steering column to the desired position. When the lever is released, the steering column will remain in the desired position.

Telescope – To telescope the steering column, push down on the lever. Then move the steering column to the desired position. When the lever is released, the steering column will remain in the desired position.

Multifunction Switch (47)

Front Window Wiper/Washer

Window Wiper – Rotate the handle away from the operator in order to activate the window wiper. There are six positions for the window wiper.

OFF – When the handle is in the OFF position, the wipers will be off.

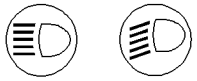
INTERMITTENT POSITION – The wipers will operate intermittently.

CONTINUOUS POSITION 1 – The wipers will operate continuously. This is the slow continuous speed.

CONTINUOUS POSITION 2 – The wipers will operate continuously. This is the fast continuous speed.

Window Washer – Push the button at the end of the handle in order to activate the window washer.

Dimmer Switch



Dimmer Switch – Push the dimmer switch away from the steering wheel in order to change the headlight beams from low beam to high beam. Also, pull the dimmer switch toward the steering wheel in order to change the headlight beams from high beam to low beam.

Directional Turn Signal Control

Right Directional Turn Signal – Push the lever away from the operator in order to activate the right turn signal. When the lever is pushed forward away from the operator, an indicator light will illuminate on the front dash. The right turn signal will flash until the lever is manually returned to the OFF position.

OFF – In the OFF position, the directional signal lights will not flash.

Left Directional Turn Signal – Pull the lever toward the operator in order to activate the left turn signal. When the lever is pulled back toward the operator, an indicator light will illuminate on the front dash. The left turn signal will flash until the lever is manually returned to the OFF position.

Note: Refer to the “Indicators” topic in Operation and Maintenance Manual, “Monitoring System” for more information about the indicator lights.

Fan Speed Control (48)

Fan Speed Switch – The fan speed switch controls the four-speed blower fan motor for heating and for the air conditioner. Turn fan speed switch (47) anywhere between OFF position (left) and MAXIMUM position (right).

Temperature Variable Control (49)

Temperature Variable Control – This knob will adjust the temperature of the operator compartment. The knob has a heating side and a cooling side. The heating side has a red marking. When you turn the knob all the way to the right, the heater will provide maximum heat. The cooling side has a blue marking. When you turn the knob all the way to the left, the air conditioner will provide maximum cooling. Position the knob for your comfort.

Heating and Air Conditioning Switch (50)

Heating and Air Conditioning Switch – This switch is a three-position switch. The CENTER position of the switch is OFF. In order to activate the air conditioner, push the switch to the TOP position. In order to activate the heater, push the switch to the BOTTOM position.

Pressurizing – When heating or cooling is not desired, pressurize the cab in order to prevent dust from entering. Turn the temperature variable control all the way to the left for the most cooling. Select a fan speed. Activate the heater control. The cab will be pressurized without being heated. The cab airflow will be filtered.

Defogging – Activate the air conditioning system. Select a fan speed. Set the temperature control in the warm area. This prevents moisture from forming on the window and the windows. Adjust the temperature control until the moisture level is lowered. Adjust the temperature control until the temperature of the cab is comfortable.

Interior Dome Light

Interior Dome Light – Push the light upward in order to turn on the dome light. Push the light downward in order to turn off the dome light.

i07561838

Diesel Particulate Filter Regeneration

SMCS Code: 108F

Regeneration

Regeneration is the process of increasing exhaust temperatures to remove soot from the DPF. Regeneration also reduces hydrocarbons across the DOC & DPF, reduce sulfur from SCR, and remove DEF deposits from the DEF injector.

The DPF traps both soot and ash. The ash is removed through a manual cleaning process. Refer to Operation and Maintenance Manual, "Diesel Particulate Filter - Clean" for more information on the service of the DPF.

Regeneration Indicators

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

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

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

Regeneration Switch

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

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

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

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

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

Modes of Regeneration

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

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

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

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

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

Regeneration Triggers

A regeneration may be required for the following reasons:

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

Start-Up Regeneration: A start-up regeneration is initiated by the ECM after a cold engine start. This regeneration is performed to heat the system to a required temperature for Diesel Exhaust Fluid (DEF) dosing to begin.

SCR Maintenance: A regeneration is performed to maintain the SCR system.

ARD Maintenance: A regeneration is performed to maintain the ARD system.

Regeneration System Warning Indicators

Illustration 91 g02117258

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

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

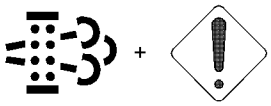


Illustration 92 g02117259

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

Illustration 93 g03676115

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

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

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

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

A fault code will be active for any DPF system-related issue. Follow the troubleshooting guide to rectify the issue.

If the DPF loses function, or is tampered with in any way, the check engine lamp, and an amber action lamp (if equipped) will illuminate. A fault code will also annunciate. The lamps and fault code will remain active until the problem is rectified.

NOTICE
The engine and emissions control system shall be operated, used, and maintained in accordance with the instructions provided. Failure to follow the instructions could result in emissions performance that does not meet the requirements applicable to the category of the engine. No deliberated tampering with, or misuse of the engine emissions control system should take place. Prompt action is critical to rectify any incorrect operation, use, or maintenance of the emissions control system.

Carbon Dioxide (CO_2) Emissions Statement

Emissions regulations require that the value of the CO_2 emissions be reported to the end user. For the engines listed below, the g/kWh was determined to be the CO_2 value during the EU type approval process. This value was recorded in EU type approval certificate. This CO_2 measurement results from testing over a fixed test cycle, under laboratory conditions, with a parent engine representative of the engine family. This value shall not imply or express any guarantee of the performance of a particular engine.

Table 10

Engine	CO_2 Value
C9.3B	696 g/kWh
C9.3	730 g/kWh
C13	717 g/kWh
C15 & C18	760 g/kWh
C18 > 560 kW	703 g/kWh

i09578205

Selective Catalytic Reduction Warning System

SMCS Code: 1091-WXX; 7400

The selective catalytic reduction (SCR) system is a system used to reduce NOx emissions from the engine. Diesel exhaust fluid (DEF) is pumped from the DEF tank and is sprayed into the exhaust stream. The DEF reacts with the SCR catalyst to reduce NOx and leaves a nitrogen and water vapor.

The engine and emissions control system shall be operated, used, and maintained in accordance with the instructions provided to the end user to maintain the emissions performance of the engine within the requirements applicable to the category of the engine. No deliberate tampering with, or misuse of the engine emissions control system should take place. In particular regarding deactivating, or not maintaining the SCR system.

NOTICE
Stopping the engine immediately after the engine has been working under load can result in overheating of SCR components.

Refer to the Operation and Maintenance Manual, “Engine Stopping” procedure to allow the engine to cool and to prevent excessive temperatures in the turbocharger housing and the DEF injector.

NOTICE
Allow at least 2 minutes after shutting down the engine before you turn the battery disconnect switch to OFF. Disconnecting the battery power too soon will prevent purging of the DEF lines after the engine is shut down.

Definitions

Observe the following definitions.

Self-correct – Fault condition no longer exists. An active fault code will no longer be active.

Notification – Action taken by the system to alert the operator of pending Inducement.

Inducement – Engine de-rates, vehicle speed limits, or other actions intended to prompt the operator to repair or maintain the emission control system.

Inducement Categories – The Inducements are separated into categories. DEF Levels have inducement fault codes separate from the other inducement categories. DEF level inducements are based on the DEF level, the other inducement categories are based on escalating time. The escalating time inducements will always have an associated fault code along with the inducement fault code. The associated fault is the root cause. The escalating time inducement fault code is just an indicator of what level of inducement the engine is in. The escalating time inducement fault code also indicates how much time remains until the next level of inducement. There are three inducement categories (two for European Union) that will trigger an escalating time inducement fault code.

Note: The associated codes for each of the escalating time categories can be found in the Troubleshooting Guide under SCR Warning System Problem.

First occurrence – When an escalating time inducement fault code becomes active for the first time.

Repeat occurrence – When any escalating time inducement fault code becomes active again within 40 hours of the first occurrence. Engine must run for 40 hours without tripping any escalating time inducement fault before returning get back to first occurrence times.

Safe Harbor Mode (Worldwide) – Safe Harbor Mode is a 20 minute engine run time period. During the **Safe Harbor Mode** the engine can be operated with full power after reaching a level 3 inducement. Once in level 3 inducement, the operator can perform a key cycle and the engine will enter Safe Harbor Mode. Safe Harbor Mode can only be implemented once. Safe Harbor Mode is not allowed for DEF level inducements with Worldwide configuration.

Safe Harbor Mode (European Union and China) – Safe Harbor Mode is a 30 minute engine run time period. During the **Safe Harbor Mode** the engine can be operated with full power after reaching a level 3 inducement. Once in level 3 inducement, the operator can perform a key cycle and the engine will enter Safe Harbor Mode. Safe Harbor Mode can only be implemented up to three times.

NOTICE
It is essential to take prompt action to rectify any incorrect operation, use, or maintenance of the emissions SCR control system in accordance with the rectification measures indicated by the warnings listed on the following pages.

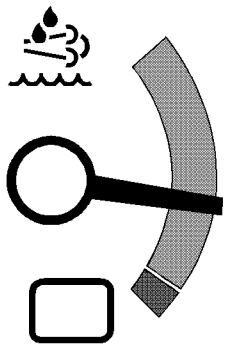


Illustration 94 g03623183

DEF Level Normal

Inducement Strategy for DEF Level (European Union and China)

Illustration 95 g03676107

If the DEF level falls below 20%, an amber indicator will illuminate next to the DEF level gauge on the dash. To avoid further inducements, turn the key to the OFF and add DEF to the DEF tank.

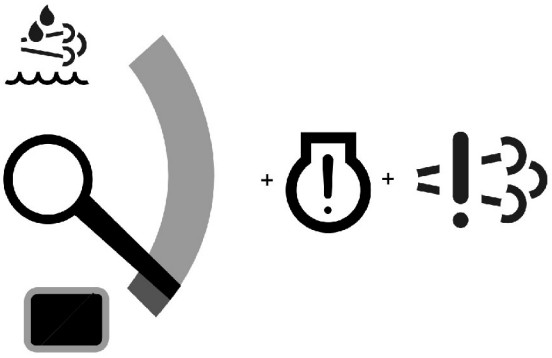


Illustration 96 g03676111

If the DEF level falls below 13.5%, a level 1 inducement event will occur. The check engine lamp and the emissions malfunction indicator lamp will illuminate. The amber indicator next to the DEF level gauge on the dash will remain lit.

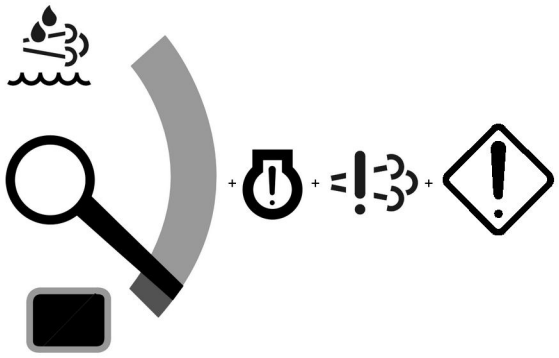


Illustration 97 g06766652

Reduced Performance

When the ECM is configured to "Reduced Performance" and the DEF level is below 1%, the engine will be in level 2 inducement. The check engine lamp and emissions malfunction indicator lamp will illuminate and flash slowly. The DEF level gauge amber lamp will remain lit. The engine will have a 50% derate. When the DEF tank has been emptied of all DEF, the engine will have a 100% derate. An empty DEF tank also limits the engine to 1000 rpm or low idle, whichever is greater. No further inducement action will occur for "Reduced Performance" configuration. Safe Harbor Mode is allowed for three key cycles.

Reduced Time

When the ECM is configured to “Reduced Time” and the DEF level is below 7.5%, the engine will be in level 2 inducement. The check engine lamp and emissions malfunction indicator lamp will illuminate and flash slowly. The DEF level gauge amber lamp will remain lit.

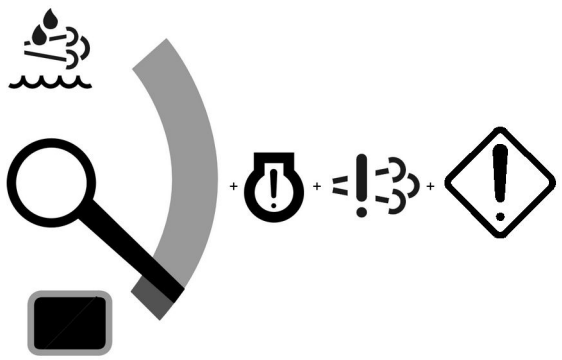


Illustration 98 g06766652

Reduced Time

If the ECM is configured to “Reduced Time” and the DEF level is 0%, the engine will be in level 3 inducement. The check engine lamp and emissions malfunction indicator lamp will illuminate and flash at a fast rate. An action lamp will also illuminate solid. The DEF level gauge amber lamp will remain lit. The engine will have a 100% derate and be limited to 1000 rpm or low idle, whichever is greater. If the final inducement action in ET is set to “Idle Down” , then the engine will continue to idle at derated condition. If set to “Shutdown” , engine will shut down after 5 minutes. Safe Harbor Mode is allowed for three key cycles. After Safe Harbor Mode is completed, the engine will return to idle or shut down. If in shutdown configuration, the engine may be restarted, but will only run for 5 minutes at derated condition before shutting down again. This action will continue until the issue is resolved.

Note: Turn the key to the OFF and add DEF to the DEF tank to reset the DEF level inducement.

Inducement Strategy for Escalating Time Inducement Faults (European Union and China)

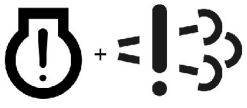


Illustration 99 g03677836

Reduced Performance

The check engine and emissions malfunction indicator lamp will illuminate for any inducement-related fault. There are two inducement categories. If the inducement is a result of a category 1 fault, then a level 1 inducement will occur for a duration of 36 hours. If the inducement is a result of a category 2 fault, then a level 1 inducement will occur for a duration of 10 hours. There is no repeat occurrence for level 1 faults.

Reduced Time

The check engine and emissions malfunction indicator lamp will illuminate for a level 1 inducement-related fault. There are two inducement categories. If the inducement is a result of a category 1 fault, then a level 1 inducement will occur for a duration of 18 hours. If the inducement is a result of a category 2 fault, then a level 1 inducement will occur for a duration of 5 hours. There is no repeat occurrence for level 1 faults.

Illustration 100 g03676138

Reduced Performance

If a fault condition exists for the entire duration of inducement level 1, the strategy advances to inducement level 2. The check engine lamp and the emissions malfunction indicator lamp will illuminate and flash slowly. If the inducement is a result of a category 1 fault, then a level 2 inducement will occur. The level 2 inducement occurs for a duration of 64 hours for first occurrence. For repeat occurrence, a category 1 level 2 inducement fault will occur for a duration of 5 hours.

If the inducement is a result of a category 2 fault, then a level 2 inducement will occur for a duration of 10 hours. For repeat occurrence, a category 2 level 2 inducement fault will occur for a duration of 2 hours.

The engine will have a 50% derate. If the fault is not corrected before the inducement duration ends, the engine will become 100% derated. The engine will also be limited to 1000 rpm or low idle, whichever is greater. No further inducements will occur for “Reduced Performance” configuration. Safe Harbor Mode is allowed for three key cycles.

Reduced Time

If a fault condition exists for the entire duration of inducement level 1, the strategy advances to inducement level 2. The check engine lamp and the emissions malfunction indicator lamp will illuminate and flash slowly. If the inducement is a result of a category 1 fault, then a level 2 inducement will occur. The level 2 inducement will occur for a duration of 18 hours for first occurrence. For repeat occurrence, a category 1 level 2 inducement fault will occur for a duration of 108 minutes.

If the inducement is a result of a category 2 fault, then a level 2 inducement will occur for a duration of 5 hours. For repeat occurrence, a category 2 level 2 inducement fault will occur for a duration of 1 hour.

Illustration 101 g03623191

Reduced Time

If configured to “Reduced Time” and a fault condition exists for the entire duration of inducement level 2, the strategy advances to inducement level 3. Inducement level 3 has the same actions for all categories. The check engine lamp and emissions malfunction indicator lamp will flash at a fast rate. An action lamp will also illuminate solid. The engine will have a 100% derate and be limited to 1000 rpm or low idle, whichever is greater. If, the final inducement action in Cat ET is set to “Idle Down” , then engine will continue to idle at derated condition. If set to “Shutdown” , engine will shut down after 5 minutes. A key cycle will allow safe harbor mode to initiate. Safe harbor is allowed up to three times. After safe harbor, the engine will be in level 3 final inducement. If set to “Shutdown” , the engine may be restarted, but will only run for 5 minutes at derated condition before shutting down again. This action will continue until the issue is resolved.

Note: Contact your Cat dealer for repairs if a fault occurs.

Inducement Strategy for DEF Level (Worldwide)

Illustration 102 g03676164

If the DEF level falls below 20%, an amber indicator will illuminate next to the DEF level gauge on the dash. To avoid inducements, turn the key to the OFF and add DEF to the DEF tank.

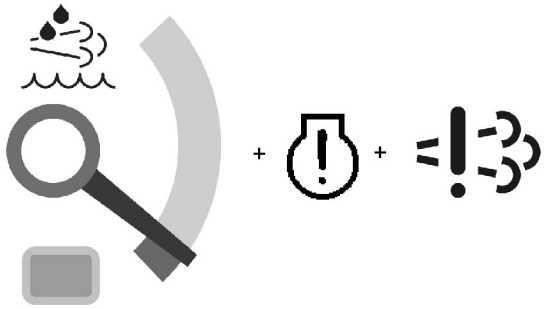


Illustration 103 g03676169

If the DEF level falls below 13.5%, a level 1 inducement event will occur. The check engine lamp and the emissions malfunction indicator lamp will illuminate. The amber indicator next to the DEF level gauge on the dash will remain lit.

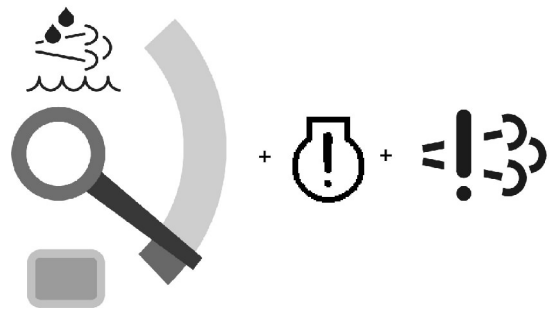


Illustration 104 g03676174

If the DEF level is below 7.5%, a level 2 inducement event will occur. The check engine lamp and the emissions malfunction indicator lamp will illuminate and flash slowly. The amber indicator next to the DEF level gauge on the dash will remain lit. If the ECM is configured to “Reduced Performance” and the DEF level has reached 1%, the machine will be limited to 75% torque.

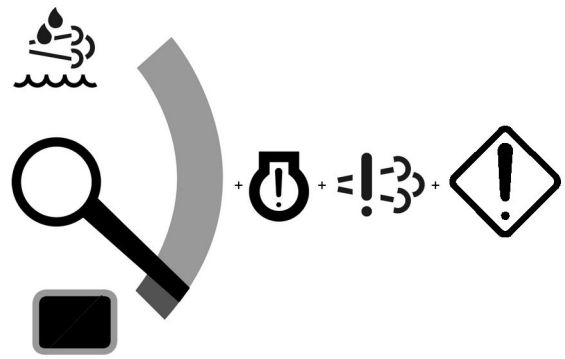


Illustration 105 g06766652

If the ECM is configured to “Reduced Performance” and the DEF tank has been emptied of all DEF, the engine will be in a level 3 final inducement. If the ECM is configured to “Reduced Time” and the DEF level is 3%, the engine will be in a level 3 final inducement. The check engine lamp and the emissions malfunction indicator lamp will flash at a fast rate and a action lamp will also illuminate solid. The engine will be taken to low idle or will be shut down. Once shut down, the engine can be restarted for 5 minute periods at reduced speed and torque. If set to idle, the engine will idle indefinitely at reduced torque. The amber indicator next to the DEF level gauge on the dash will remain lit.

Note: Turn the key to the OFF and add DEF to the DEF tank to reset the DEF level inducement.

Inducement Strategy for Escalating Time Inducement Faults (Worldwide)

Illustration 106 g03623191

Reduced Performance

The check engine and emissions malfunction indicator lamp will illuminate for a level 1 inducement-related fault. There are three inducement categories. If the inducement is a result of a category 1 fault, then a level 1 inducement will occur for a duration of 2.5 hours for first occurrence. For repeat occurrence, a category 1 level 1 inducement fault will occur for a duration of 5 minutes.

If the inducement is a result of a category 2 fault, then a level 1 inducement will occur for a duration of 10 hours. There is no repeat occurrence for category 2, level 1 inducement faults.

If the inducement is a result of a category 3 fault, then a level 1 inducement will occur for a duration of 36 hours. There is no repeat occurrence for category 3, level 1 inducement faults.

Reduced Time The check engine and emissions malfunction indicator lamp will illuminate for a level 1 inducement-related fault. There are three inducement categories. If the inducement is a result of a category 1 fault, then a level 1 inducement will occur for a duration of 2.5 hours for first occurrence. For repeat occurrence, a category 1 level 1 inducement fault will occur for a duration of 5 minutes.

If the inducement is a result of a category 2 fault, then a level 1 inducement will occur for a duration of 5 hours. There is no repeat occurrence for category 2, level 1 inducement faults.

If the inducement is a result of a category 3 fault, then a level 1 inducement will occur for a duration of 18 hours. There is no repeat occurrence for category 3, level 1 inducement faults.

Illustration 107 g03623191

Reduced Performance If a fault condition exists for the entire duration of inducement level 1, the strategy advances to inducement level 2. The check engine and emissions malfunction indicator lamp will illuminate and flash slowly for a level 2 inducement-related fault. The engine will have a 50% derate. If the inducement is a result of a category 1 fault, then a level 2 inducement will occur for a duration of 70 minutes for first occurrence. For repeat occurrence, a category 1 level 2 inducement fault will occur for a duration of 5 minutes.

If the inducement is a result of a category 2 fault, then a level 2 inducement will occur for a duration of 10 hours. For repeat occurrence, a category 2 level 2 inducement fault will occur for a duration of 2 hours.

If the inducement is a result of a category 3 fault, then a level 2 inducement will occur for a duration of 64 hours. For repeat occurrence, a category 3 level 2 inducement fault will occur for a duration of 5 hours.

Reduced Time

If a fault condition exists for the entire duration of inducement level 1, the strategy advances to inducement level 2. The check engine and emissions malfunction indicator lamp will illuminate and flash slowly for a level 2 inducement-related fault. If the inducement is a result of a category 1 fault, then a level 2 inducement will occur for a duration of 70 minutes for first occurrence. For repeat occurrence, a category 1 level 2 inducement fault will occur for a duration of 5 minutes.

If the inducement is a result of a category 2 fault, then a level 2 inducement will occur for a duration of 5 hours. For repeat occurrence, a category 2 level 2 inducement fault will occur for a duration of 1 hour.

If the inducement is a result of a category 3 fault, then a level 2 inducement will occur for a duration of 18 hours. For repeat occurrence, a category 3 level 2 inducement fault will occur for a duration of 108 minutes.

Illustration 108 g03623191

If a fault condition exists for the entire duration of inducement level 2, the strategy advances to inducement level 3. Inducement level 3 has the same actions for all categories. The check engine lamp and the emissions malfunction indicator lamp will flash at a fast rate. An action lamp will also illuminate solid. The engine will have a 100% derate and be limited to 1000 rpm or low idle, whichever is greater. If the final inducement action in Cat® ET is set to "Idle Down", then engine will continue to idle at derated condition. If set to "Shutdown" , engine will shut down after 5 minutes. A key cycle will allow safe harbor mode to initiate. Safe harbor is only allowed once. After safe harbor, the engine will be in level 3 final inducement. If set to "Shutdown", the engine may be restarted, but will only run for 5 minutes at derated condition before shutting down again. This action will continue until the issue is resolved.

Note: Contact your Cat dealer for repairs if a fault occurs.

Operator Inducement Emergency Override for Cat Engines Equipped with Selective Catalytic Reduction Systems (If Equipped)

Note: The inducement emergency override will only be allowed on a select number of engines that may be used in emergency situations. Contact your Cat dealer to find out if your engine is allowed to have this feature.

The operator Inducement emergency override can only be enabled using Caterpillar supplied passwords. The feature is disabled by default. The feature will be enabled at the factory if allowed. If the customer wants the feature enabled after delivery of engine, customers need to contact a Cat dealer. Operator Inducement emergency override is regulated by the Environmental Protection Agency (EPA) and European Union (EU). Operator Inducement emergency override is only supported in the United States. Operator Inducement emergency override is not supported in Europe, and not allowed to be used in Japan. For detailed information on activating, deactivating, or resetting override, contact your Cat dealer. Before you attempt the procedures documented below, make sure that you have read and understand all information in this document.

The United States EPA requires the limiting of engine speed and/or power (derate) in certain conditions, to help ensure proper functioning of the engines emission control system. The EPA allows the temporary disabling of these limits (restoration of full engine speed and power capability) during a qualified emergency situation. The EPA defines a qualified emergency situation as a significant direct or indirect risk to human life. Below are examples of direct versus indirect risks.

Direct – An emission control condition that inhibits performance of an engine being used to rescue a person from life-threatening situation.

Indirect – An emission control condition that inhibits performance of an engine used to provide electrical power to a data center that routes 911 emergency response communications.

The emissions-related derate can be disabled for up to 120 hours of engine operation. The temporary disabling of emissions-related derate is referred to as “Operator Inducement Emergency Override” and must be reported to the United States EPA. The override must be paused by the operator if the emergency ends before the 120 hours of override operation has expired. While the override is paused, the equipment will be subject to derate. The override may only be reactivated if an emergency situation returns prior to reaching an hour threshold of total engine operation since initially activating the override. This threshold is referred to as the backstop timer. This threshold could vary by application, but will typically be 300 hours. After 120 hours of override use, or backstop timer threshold met, override will expire, and the equipment will be subject to derate. Once the override has expired, a Cat dealer will need to reset the override to use the override again.

The override can only be enabled or disabled by an authorized Cat dealer using Caterpillar supplied passwords. Once enabled, the override can be activated by the operator using a switch or through an electronic display menu (if equipped). Upon activation, the check engine and action lamps will be illuminated until and the override is reset. A code indicating that the inducement emergency override is active will also be active until the override is reset. The override can only be reset by the engine manufacturer, Caterpillar. A Cat dealer can reset the override using Caterpillar supplied passwords.

The following are prohibited under federal regulations and subject to penalties imposed by the US EPA:

- Improper use of the override
- Failure to deactivate the override when emergency has ended
- Failure to report use of the override.

Civil penalties may be assessed per day operated in violation, and can be severe.

Override Activation Method

The override can be activated using Cat Electronic Technician (ET). Commercial applications may have a switch near the engine, or an electronic display menu to activate the override through. The display menu and switch location may differ by application. The override will only be available when engine is already in inducement (derate). If the override has already been enabled by an authorized Cat dealer, then the operator can turn on the override without further input from Caterpillar. Upon activation, the amber warning lamp will illuminate to alert the operator that the override is active. A code will also become active indicating that the engine emission operator inducement emergency override is active. The override must be paused by the operator if the emergency ends before the 120 hours of override operation has expired.

Setting the Override through Cat Electronic Technician (ET)

- Go to “Configuration Parameters”
- Select “Aftertreatment Configuration”
- Select “Operator Inducement Emergency Override Activation” to activate the override

- The “Value” field should be switched to “Activated” (to pause the override change the “Value” field to “Not Activated”)

Setting the Override with Switch

Commercial applications may choose to install a switch or jumper harness near the engine for activating the override. There is a dedicated STG pin on the J1 side of the Electronic Control Module (ECM) that can be used. Operators must be trained properly to understand where override switch is located. Operators must be trained properly to understand that there could be severe penalties as mentioned above for misusing the switch. To pause override, simply turn override switch to OFF position or unplug the jumper harness. A decal will be next to switch or jumper harness stating: “EMERGENCY USE ONLY. SEE OWNERS MANUAL. PENALTIES APPLY FOR MISUSE” .

Setting the Override through Electronic Display Menu

Some applications may be able to activate or deactivate the override through an electronic display menu. Operators must be trained properly to understand where override is located and that there could be severe penalties as mentioned above for misusing the override. There will be a warning on display stating: “EMERGENCY USE ONLY. SEE OWNERS MANUAL. PENALTIES APPLY FOR MISUSE” .

Resetting the Override

The override needs to be reset through Cat Electronic Technician (ET) whenever the override has expired. The override cannot be used again until the override is reset. The check engine and action lamps will continue to be illuminated until the override is reset. The override may be reset at any point after the initial activation. The override can only be reset by the engine manufacturer, Caterpillar, or an authorized Cat dealer using Caterpillar supplied passwords. Resetting the override will require the operator to provide the information in the Usage Report below to the service technician.

Override Usage Report

To comply with federal regulations, the operator must report usage of the override to Caterpillar Inc. within 60 days of activating the override. Failure to meet this reporting requirement may subject the operator to penalties under 40 CFR 1068.101. Caterpillar Inc. will in turn report override usage annually to the United States EPA. Although submitted to Caterpillar Inc., the override usage reports are deemed to be submissions to the United States EPA. Federal regulations prohibit submitting false information. The following information must be included in the report:

- Contact name, mail and e-mail addresses, and telephone number for the responsible company or entity
- A description of the emergency situation, the location of the engine during the emergency, and the contact information for an official who can verify the emergency situation (such as a county sheriff, fire marshal, or hospital administrator)
- The reason for the activation of the override during the emergency situation, such as the lack of DEF, or the failure of an emission-related sensor when the engine was needed to respond to an emergency situation
- The engine serial number (or equivalent)
- A description of the extent and duration of the engine operation while the override was active, including a statement describing whether the override was manually deactivated (paused) after the emergency situation ended

The Override Usage Report may be sent via e-mail or regular mail to one of the following addresses:

Email :

Emissions_Compliance@cat.com

Regular Mail :

Caterpillar Inc.
P.O. Box 610
Mossville, IL 61552-0610
Attention: Emissions Compliance Manager

i05435795

Battery Disconnect Switch

SMCS Code: 1411

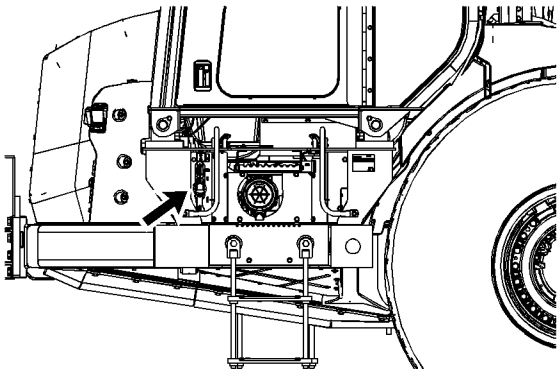


Illustration 109 g02129778

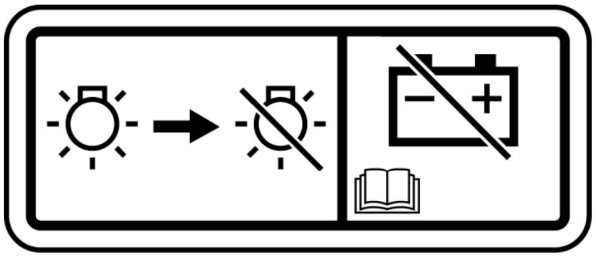


Illustration 110 g03408962

NOTICE
Do not turn off the battery disconnect switch until the indicator lamp has turned off. If the switch is turned off when the indicator lamp is illuminated the Diesel Exhaust Fluid (DEF) system will not purge the DEF. If the DEF does not purge, DEF could freeze and damage the pump and lines.

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

Battery Disconnect Switch – The battery disconnect switch can be used in order to disconnect the battery from the machines electrical system. The key must be inserted into the battery disconnect switch before the battery disconnect switch can be turned.

Disconnect Switch ON – To activate the electrical system, insert the key for the battery disconnect switch and turn the key clockwise. The battery disconnect switch must be turned to the ON position before you start the engine.

Disconnect Switch OFF – To deactivate the electrical system, turn the key for the battery disconnect switch counterclockwise to the OFF position.

The battery disconnect switch and the engine start switch perform different functions. To disable the entire electrical system, turn off the battery disconnect switch. When you only turn off the engine start switch, the battery remains connected to the electrical system.

Turn the battery disconnect switch to the OFF position and remove the key when you service the electrical system or any other machine components and when the machine will not be used for an extended period of a month or more. Turing off the battery disconnect switch will prevent the battery from being discharged.

i01804595

Backup Alarm

SMCS Code: 7406

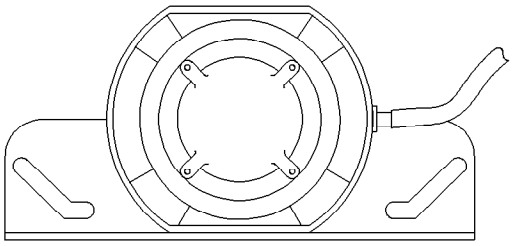


Illustration 111 g00923208

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

The alarm sounds when the transmission control lever is in the REVERSE position. The backup alarm is used to alert people behind the machine.

i07925276

Engine Shutdown Switch

SMCS Code: 7418-ZS

NOTICE
Perform a walk around inspection after actuation of a shutdown device.

Take necessary corrective action to resolve the cause of the shutdown.

Ensure that no additional damage has been done or could occur before returning to operation.

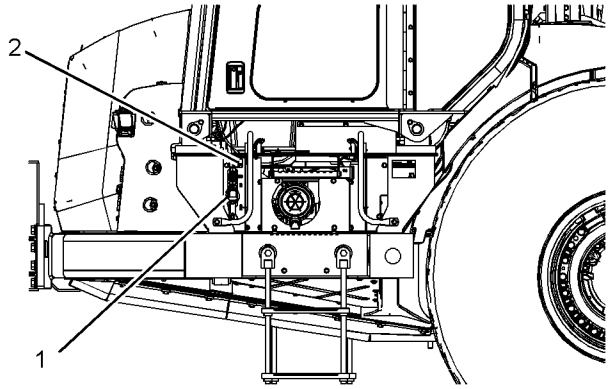


Illustration 112 g02176265

The battery disconnect switch and the engine shutdown switch are on the front left of the tractor.

If the engine needs to be stopped quickly, use engine shutdown switch (2).

ENGINE STOP – Lift the guard of the engine shutdown switch. Move the engine shutdown switch to the STOP position. Move the engine start switch key and battery disconnect switch key (1) to the OFF position. Remove the keys.

Note: The engine shutdown switch does not deactivate the machines electrical system.

ENGINE RUN – Lower the guard of the engine shutdown switch. The engine shutdown switch will be returned to the ON position.

i08001446

Product Link

SMCS Code: 7490; 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 Systems”
- Special Instruction, M0109130, “Installation Procedure for Product Link PL683 and PL783 Systems”

i07493350

Retarding

SMCS Code: 1000; 3121; 7000

Retarding Guidelines (Film)

NOTICE
Retarding performance charts provide an indication of the energy absorption capability of a given scraper power train on a specified continuous decline. Retarding performance charts serve to indicate the correct transmission gear selection and ground speed that should be used on a given grade. The charts help you avoid situations which may result in machine overspeed and damage to the machine. Retarding performance charts do not give an indication of the ability of the scraper to stop. Retarding performance charts do not give an indication of the ability of the scraper to remain stationary on the grades.

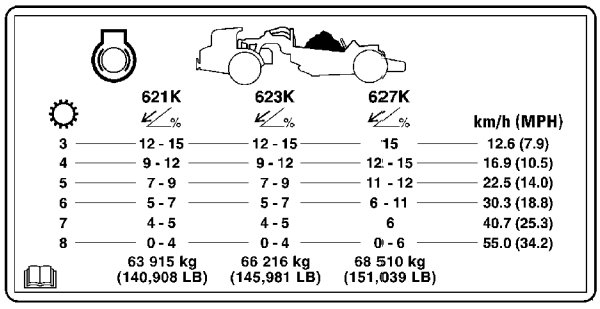


Illustration 113 g03706902

The film for retarding guidelines is located inside the cab.

Maximum Operating Weight – The maximum operating weight of a loaded Scraper

Transmission Gear for the Downgrade – The selected gear for downhill travel

Downhill Slope Percentage – The percentage value of the slope for downhill travel

The retarding capabilities for each gear will vary depending on the following conditions: rolling resistance, load, tire size, and altitude.

Retarding Information and Conditions

The retarders equipped are an engine compression brake which releases compressed air before the air can act as a spring and continue to propel the machine. Engage the retarder control to slow the machine ground speed. The tractor transmission must be in the DRIVE position and the throttle controls must be disengaged, in order for the retarders to engage. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

Use the retarder to help to stop the machine. The retarder will not completely stop the machine and the retarder will not hold the machine stationary. For maximum retarder performance on a given grade, selection of the proper gear is essential for effective operation of the retarder system. When starting down a known grade, refer the film for retarding guidelines to select the proper maximum gear limit. Select the proper maximum gear limit on the transmission control before you start down the grade. For more information on refer to Operation and Maintenance Manual, “Transmission Control”. When the film does not address the current conditions, use the following rule: the desired gear on a downgrade is the gear that is required to go up the grade when the machine is loaded.

If the machine builds up excessive speed during retarding, the engine can overspeed and the transmission may upshift to protect the engine. If more braking is still needed, depress the service brake. Maintain a constant vehicle speed. Do not speed up and brake. Do not stop in a short distance. Do not try to do all the braking at the bottom of the hill. Excessive service brake use will damage the brake system.

The brake lights will illuminate when the retarder is activated.

i04359589

Transmission Control

SMCS Code: 3065

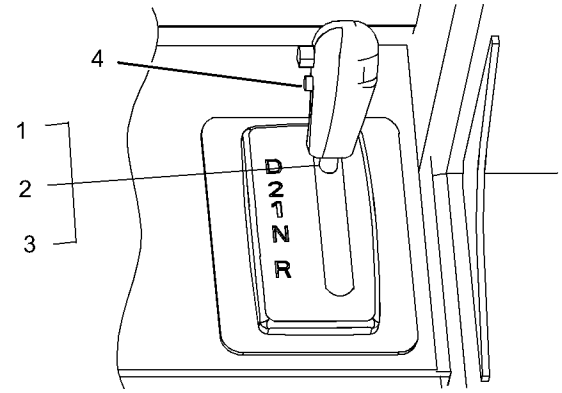


Illustration 114 g01146622

Transmission Control – The transmission control is to the right of the operator seat. When you want to shift into gear, push in the black button on the left side of the lever. The button is used to mechanically lock the control into the current gear. The top gear function is set by top gear control (4).

DRIVE (1) – Move the lever to the desired forward speed. The transmission will shift automatically between second speed and any higher speed that is selected. Manual shifting is required when you shift between first speed and second speed. Top gear control (4) is used to set a limit for upshifts. The engine must be running and the lever must be moved to “D” in order for you to select a limit. “D” is the DRIVE position. When the switch is held in the ON position, the actual gear indicator will flash. Next, the actual gear indicator will cycle through the available gears. When the switch is released, the top drive gear will be set to the value on the display. The display will show the top gear for 4 seconds. After the 4 seconds, the display will revert to the actual gear. The maximum gear that is available to the operator will never be greater than the maximum gear that is set by the service personnel. The minimum top gear that is available to the operator is third gear in the forward direction. The transmission will operate with a high gear limit until the machine is turned off or until another gear is selected.

Note: When the engine experiences an overspeed condition, the shift control logic will allow the transmission to upshift one gear in order to correct the overspeed condition. Only one protect upshift will be allowed.

“2” – SECOND SPEED position

“1” – FIRST SPEED position

Note: This machine is equipped with an engine neutral start system. The engine will not start unless the lever is in the NEUTRAL position.

NEUTRAL (2) – Move the lever to the “N” which is the NEUTRAL position when you park the machine or when you start the engine. The machine should not move when the lever is in the NEUTRAL position and the parking brake is applied.

REVERSE (3) – Move the lever to the “R” which is the REVERSE position. The machine will move in reverse.

i06722072

Transmission Hold Control (Joystick)

SMCS Code: 3065

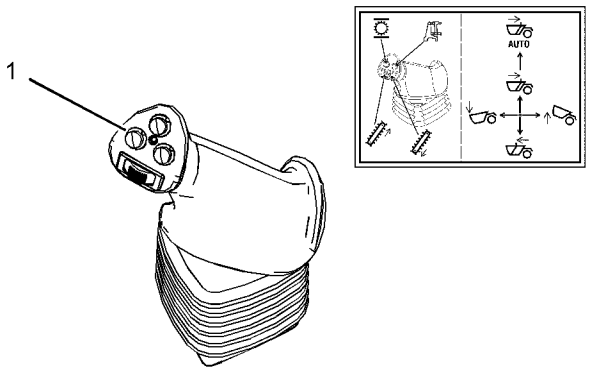


Illustration 115 g03427336

Transmission Hold Control – The joystick control is located on the right side of the operator compartment. Push button (1) for the transmission hold is located on the left side of the joystick control. The transmission hold control prevents the transmission from shifting during normal operation. Use the transmission hold to prevent frequent transmission shifts on rough terrain. Use transmission hold in second gear to load the machine. Use transmission hold to unload the machine.

ENGAGE – When the transmission hold is not engaged, push in on push button (1) to engage the transmission hold. The transmission will remain in the same gear. When the transmission hold is engaged, an indicator light will illuminate on the front dash. Refer to the “Indicators” topic in Operation and Maintenance Manual, “Monitoring System” for more information.

DISENGAGE – When the transmission hold is engaged, push in on push button (1) to disengage the transmission hold. The transmission will shift automatically.

i05430707

Bowl Control (Joystick)

SMCS Code: 5063; 5702

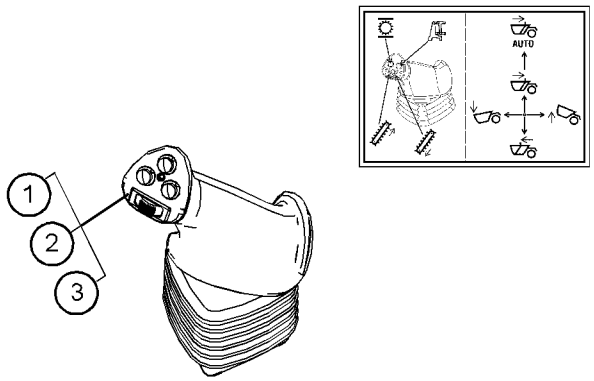


Illustration 116 g03427340

Bowl Control – The joystick control is located on the right side of the operator compartment. The joystick controls the direction and speed of the scraper bowl. When the engine is off and there is electrical power, the joystick control will lower the scraper bowl. When there is no electrical power to the machine, the joystick control will not lower the bowl.

Bowl LOWER (1) – Push the joystick control partially forward in order to lower the scraper bowl. The speed of the scraper bowl will increase as the joystick control is moved further from the HOLD position up to the DETENT position. The joystick control will return to the HOLD position when the joystick control is released.

Bowl HOLD (2) – The joystick control will return to the HOLD position when the joystick control is released. The bowl will remain in the position that is selected.

Bowl RAISE (3) – Pull back the joystick control in order to raise the bowl. The speed of the scraper bowl will increase as the joystick control is moved further from the HOLD position, up to the end of joystick travel. The joystick control will return to the HOLD position when the joystick control is released.

i05430713

Ejector Control (Joystick)

SMCS Code: 5063; 5702

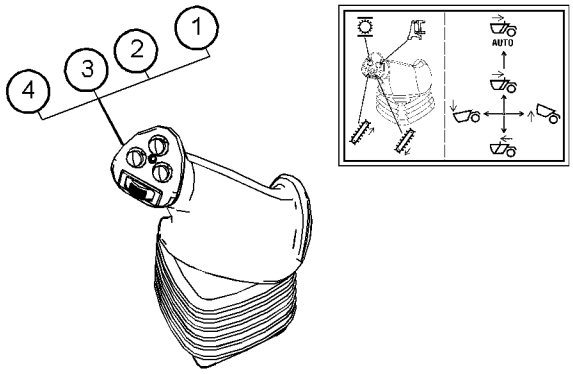


Illustration 117 g03427356

Ejector Control – The joystick control is located on the right side of the operator compartment. The joystick controls the direction and speed of the ejector.

Ejector AUTO RETURN (1) – Push the joystick control to the right, past the DETENT position and allow the joystick to return to the HOLD position in order to turn on the auto return function. Move the joystick control to the left or right in order to turn off the auto return function. When AUTO RETURN is active, an indicator light will illuminate on the front dash. Refer to the "Indicators" topic in Operation and Maintenance Manual, "Monitoring System" for more information.

Ejector RETURN (2) – Push the joystick control partially to the right in order to move the ejector backward. The speed of the ejector will increase as the joystick control is moved further away from the HOLD position up to the DETENT position. The joystick control will return to the HOLD position when the joystick control is released.

Ejector HOLD (3) – The joystick control will return to the HOLD position when the joystick control is released. The ejector will remain in the position that is selected.

Ejector FORWARD (4) – Push the joystick control to the left in order to move the ejector forward. The speed of the ejector will increase as the joystick control is moved further from the HOLD position up to the end of joystick travel. The joystick control will return to the HOLD position when the joystick control is released.

i05430726

Elevator Control (Joystick)

SMCS Code: 5063; 5702

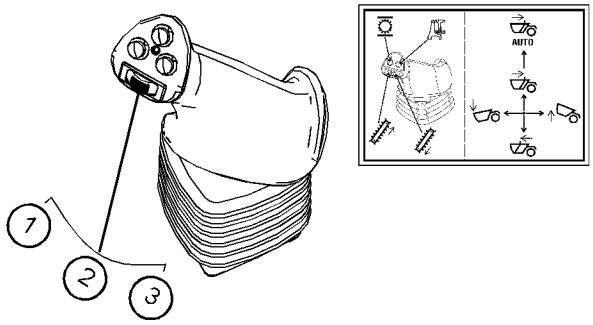


Illustration 118 g03427363

Elevator Control – The joystick is located to the right of the operators seat. The thumb lever is located on the top of the joystick. The thumb lever controls the direction of the elevator.

Elevator LOAD (1) – Push the thumb lever to the left in order to move the elevator in the forward direction. When the elevator is moving in the forward direction, the elevator will load the scraper bowl.

HOLD (2) – The thumb lever will return to the HOLD position when the thumb lever is released. The elevator will remain in the position that is selected.

Elevator UNLOAD (3) – Push the thumb lever to the right in order to move the elevator in the reverse direction. When the elevator is moving in the reverse direction, the elevator will unload the scraper bowl.

Note: The elevator does not need to be running when you are unloading fine material.

Note: Under most conditions, you do not need to run the elevator in the UNLOAD position. Material with a high percentage of green plants may be a condition for unloading in the UNLOAD position. Running the elevator in the UNLOAD position may cause faster wear of the elevator chain.

i05430733

Cushion-Hitch Control (Joystick)

SMCS Code: 5063; 5702; 7107

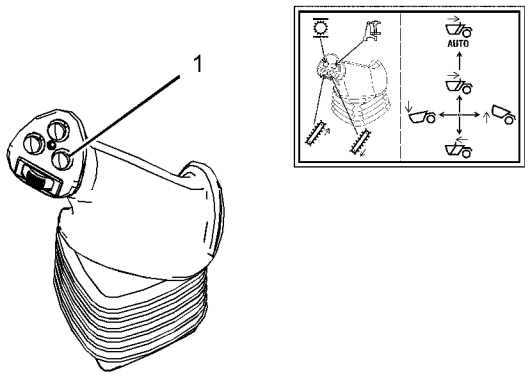


Illustration 119 g03427369

Cushion-Hitch Control – The joystick control is located on the right side of the operator compartment. The cushion-hitch is controlled by push button (1).

ON – When the cushion-hitch is not turned on, push the button in order to turn on the cushion-hitch.

OFF – When the cushion-hitch is turned on, push in the button in order to turn off the cushion-hitch.

Note: The cushion-hitch should be turned on at all times except when you are loading materials or when you are dumping materials. When the cushion-hitch is turned off, the material will spread more smoothly and will help you to achieve faster cycle times.

i06545890

Monitoring System

SMCS Code: 7000

The Monitoring System is designed to alert the operator to an immediate problem with any of the machine systems that are monitored. The Monitoring System is also designed to alert the operator to an impending problem with any of the machine systems that are monitored and to provide the operator with machine status information.

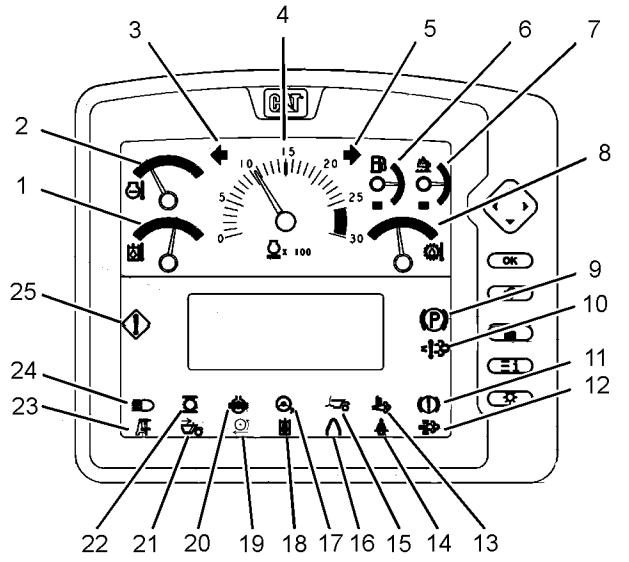


Illustration 120 g02892796

(1) Hydraulic Oil Temperature
(2) Engine Temperature
(3) Left Turn Signal
(4) Engine RPM
(5) Right Turn Signal
(6) Fuel Level Gauge
(7) Diesel Exhaust Fluid (DEF) Level Gauge
(8) Transmission Oil Temperature
(9) Parking Brake
(10) Emissions Malfunction Indicator Lamp
(11) Brake Warning
(12) Diesel Particulate Filter (DPF)
(13) Regeneration Active
(14) Seat Belt
(15) Apron Float
(16) Bail Down (If Equipped)
(17) Secondary Steering
(18) Implement Lockout
(19) Tire Spin Reduction
(20) Differential Lock
(21) Ejector Return
(22) Transmission Hold
(23) Cushion Hitch
(24) High Beam Lights
(25) Alert Indicator

Gauges

Hydraulic Oil Temperature (1) – This gauge displays the hydraulic oil temperature.

Engine Temperature (2) – This gauge displays the engine temperature.

Engine RPM (4) – This gauge displays the engine speed.

Fuel Level (6) – This gauge displays the fuel level.

Diesel Exhaust Fluid (DEF) Level Gauge (7) – This gauge indicates the amount of DEF in the tank. The red range indicates that the DEF level is low on fluid.

Transmission Oil Temperature (8) – This gauge displays the transmission oil temperature.

Indicators

Left Turn Signal (3) – This indicator illuminates when the left turn signal is activated.

Right Turn Signal (5) – This indicator illuminates when the right turn signal is activated.

Parking Brake (9) – This indicator illuminates when the parking brake is engaged. The indicator should flash during start-up.

Emission Malfunction Indicator (10) – This indicator will illuminate when an emissions system has failed. Refer to Operation and Maintenance Manual, "Selective Catalytic Reduction Warning System" for more information.

Brake Warning (11) – This indicator illuminates when there is a problem with the braking system.

Diesel Particulate Filter (DPF) (12) – This indicator illuminates to show that a regeneration is needed.

Regeneration Active (13) – This indicator will illuminate when the CRS is active. This indicator shows that elevated emission temperatures are possible and low idle engine speed may be elevated. This indicator will turn off when regeneration is complete.

Seat Belt (14) – This indicator illuminates to indicate that the seat belt needs fastened.

Apron Float (15) – This indicator illuminates when the apron float is active.

Bail Down (16) – This indicator illuminates when the bail is commanded down.

Secondary Steering (17) (If Equipped) – This indicator illuminates when the secondary steering is functioning. The indicator will illuminate in an amber color during a secondary steering test. The indicator will illuminate red if there is a fault with the steering system. Do not operate the machine until the fault has been corrected.

Implement Lockout (18) – This indicator illuminates when the implements have been locked.

Tire Spin Reduction (19) – This indicator illuminates when tire spin reduction is enabled.

Differential Lock (20) – This indicator illuminates when the differential is locked.

Ejector Auto Return(21) – This indicator illuminates when the ejector auto return is active.

Transmission Hold (22) – This indicator illuminates when the transmission hold is active.

Cushion Hitch (23) – This indicator illuminates when the cushion hitch is active.

High Beam Lights (24) – This indicator illuminates when the high beams are on.

Alert Indicator (25) – This indicator illuminates when a Level 2 or Level 3 warning fault has been detected by the monitoring system.

Additional Indicators

Regeneration Disabled – This indicator illuminates to show that auto regeneration has been disabled.

Warning Categories

The Caterpillar Monitoring System provides three warning categories. The first category requires only operator awareness. The second warning category requires an operator response. The third warning category requires immediate shutdown of the machine.

Table 11

WARNING OPERATION					
	Warning Indications (1)				
Warning Category	Flashing Alert Indicator	Flashing Action Lamp	Action Alarm	Action	Possible Result(2)
1				No immediate action is required. The system needs attention soon.	No damage will occur to the machine. Minor reductions in machine performance may occur.
2	X	X		Change machine operation or perform maintenance to the system.	Severe damage to components can occur.
2S	X	X	X (3)	Change machine operation or perform maintenance to the system.	Severe damage to components can occur.
3	X	X	X (4)	Immediately perform a safe engine shutdown.	Injury to the operator or severe damage to components can occur.

(1) The active warning indications are marked with an X.
(2) This is the possible result, if the operator takes no action.
(3) A steady alarm sounds.
(4) A pulsating action alarm sounds.

Functional Test

The Caterpillar Monitoring System performs an automatic internal test when the machine is activated. Turning the engine start switch from the OFF position to the ON position will activate the test.

The test verifies proper operation of the outputs (displays, indicator lamps, and audible alarms).

The internal circuits are automatically checked.

The operator must observe the outputs in order to determine whether the displays are operating properly. The length of time for the test is approximately 3 seconds.

During this test, the alert indicators flash, the gauges will sweep, the Cat logo will display, and the operator profile selection will display. Also, the display window shows the following information:

- All units of measurement (degrees, pressure, distance, rotational speed, and volume)
- “X10” indicator
- Symbol for hour meter
- “8.8.8.X.8.8.” on the digital readout

The tachometer and the gauge needles ramp straight up. Then, the gauge needles go to the right and to the left. The gauge needles then go to the final position.

- The gear/direction readout shows an asterisk.
- The digital speedometer shows “188” mph and km/h.
- The indicator lamp is on continuously.
- The audible alarm sounds once.

The display then goes into the Normal Mode of operation.

Message Display

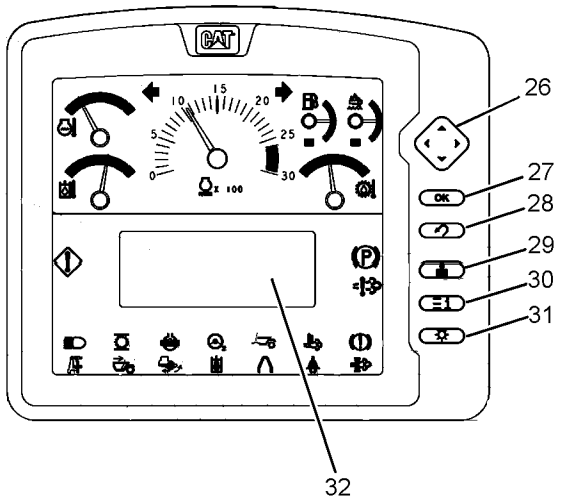


Illustration 121 g02892880

Control Buttons

(26) Four Way Navigation Key
(27) OK/Select
(28) Back/Previous
(29) Operator Select
(30) Information
(31) Backlight

Four Way Navigation Key (26) – This button is used for the following purposes: navigation, data information and a decrease in a setting value or an increase in a setting value.

OK/Select Button (27) – This button selects the currently highlighted menu option. The “OK” button also acknowledges any Level 1, Level 2, or Level 3 diagnostic message on the display screen.

Back/Previous Button (28) – This button is used in order to return to the previous screen.

Operator Select Button (29) – This button is used in order to return to the operator menu.

Information Button (30) – This button is used in order to display the main menu. Press the Information Button twice in order to return to the performance menu.

Backlight Button (31) – This button is used in order to adjust the light on the display area. Press the button and hold the button in order to adjust the backlight intensity with the left arrow key and the right arrow key. Press the back light button again while in backlight adjust mode in order to adjust the contrast.

Digital Display Area (32) – This Message system shows information on digital display area (29).

Default Menu

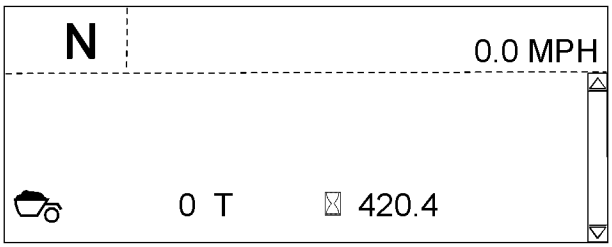


Illustration 122 g03603636

The default menu will display the engine rpm, the gear, the machine speed, and payload estimator (if equipped).

Payload Estimator – Payload estimator is used to estimate the weight of material in the scraper bowl during a haul segment. The weight estimate will be recorded at the conclusion of the haul segment. If the cutting edge contacts the ground, or is in the fully raised position during the haul segment, the weight estimate will not be valid. Maximum payload estimate accuracy is achieved when using Sequence Assist. If the sequence assist cycle is not followed, payload estimator accuracy may be reduced. The cumulative payload is displayed in the default menu as well as the trip totals menu. The cumulative payload and load counter may be reset in the trip totals menu. The lifetime total payload weight is shown in the lifetime totals menu.

If the cutting edge contacts the ground, or is in the fully raised position during the haul segment, the weight estimate will not be valid. Maximum payload estimate accuracy is achieved when using Sequence Assist. If the sequence assist cycle is not followed, payload estimator accuracy may be reduced.

Recommended practices include:

1. Run standard cut-haul-fill-return work cycles, using Sequence Assist to switch between each segment of the work cycle.

Note: Sequence Assist usage is not required, but operating with it will result in more accurate payload estimates.

2. Dig for at least 20 seconds, with the ejector fully retracted and apron open normally.
3. Haul loaded for at least 30 seconds before dumping.
4. Haul with the apron closed and in float and with the bowl carried clear of the ground and not against the top cylinder stops.
5. Do not make large bowl movements or turn apron float off and on during the haul.
6. Do not move the ejector other than while unloading the bowl or returning empty.
7. Do not change the Sequence Assist mode at nonstandard times. For example, do not switch to Ready to Haul if the haul is almost finished and the unload is about to begin.
8. Do not perform any other nonstandard machine or implement operations. For example, dozing with ejector forward, operating Sequence Assist without digging, etc.

Machine operation that does not follow the above guidelines can result in inaccurate payload estimates. The accuracy of this feature, if operated correctly, is + or – 5% of true scaled weight. Payload data estimates are available in VisionLink.

Performance Menu

From the default menu, press down on the Four Way Navigation key to display the “PERFORMANCE” pages.

The following options are available through the “PERFORMANCE” pages:

- Time to Regen
- Regen Status
- Eng Oil Press
- Eng Coolant Temp
- Hyd Oil Temp
- Transmission Gear
- Trans TC Oil Temp
- Trans Battery Voltage
- Fuel Level
- Total Distance Traveled
- Load Count
- Bowl Payload

Main Menu

Press the Information Button to show the main menu options, which include: Settings, Totals, Service, Machine Status and Operator. The Settings menu will be highlighted. Press the “OK” button to select the Settings menu.

Settings Menu

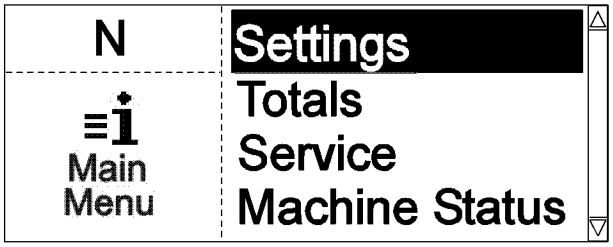


Illustration 123 g02556397

The following options are available through the “Settings” menu:

- Display
- Machine

Totals Menu

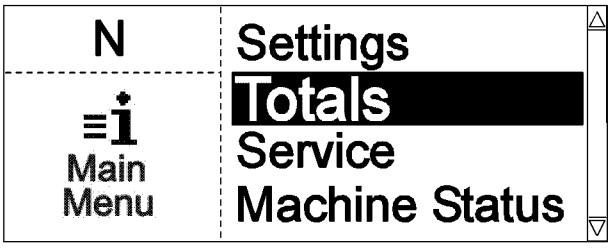


Illustration 124 g02556401

There are two menu options are available through the “Totals” menu:

- Trip
- Lifetime

Service

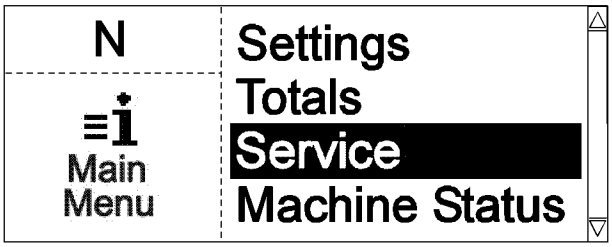


Illustration 125 g02556404

The following options are available through "Service" :

- Diagnostics
- ECM Summary

Machine Status

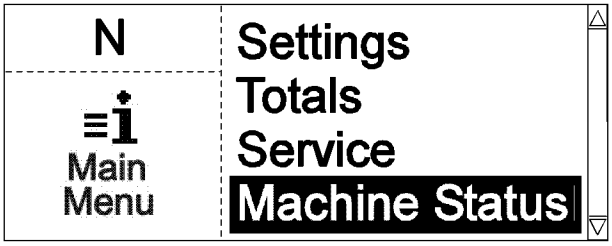


Illustration 126 g02556405

The following options are available through "Machine Status" :

- Engine
- Brake
- Steering
- Implement
- Transmission
- HVAC
- Tool Automation

Operator

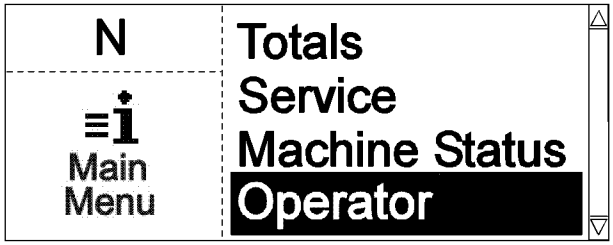


Illustration 127 g02556407

The following options are available through "Operator" :

- Select
- Edit
- Create

i05867220

Camera
(If Equipped)

SMCS Code: 7347; 7348

The Work Area Vision System (WAVS) is a closed circuit television system that is designed to supplement the view for the operator during machine operation. The WAVS on this machine has a rear mounted camera, a cutting edge camera, a right side mounted camera, and a cab mounted monitor. Prior to operating the machine, ensure proper orientation of the image on the monitor.

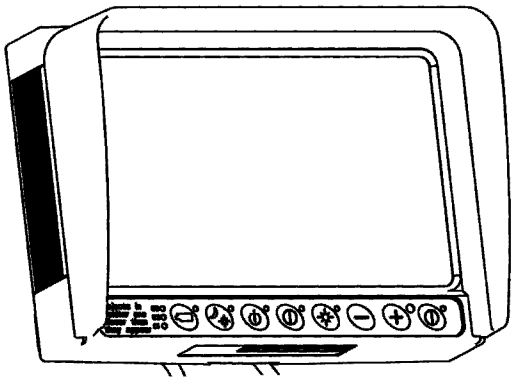


Illustration 128 g01223034

Display for WAVS

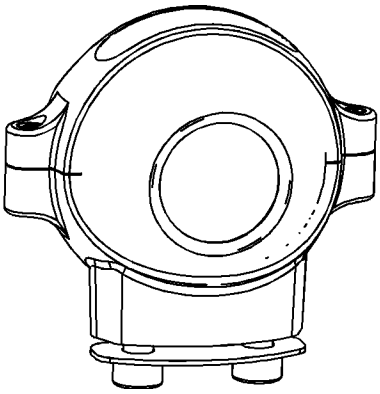


Illustration 129 g01223051

Camera for WAVS

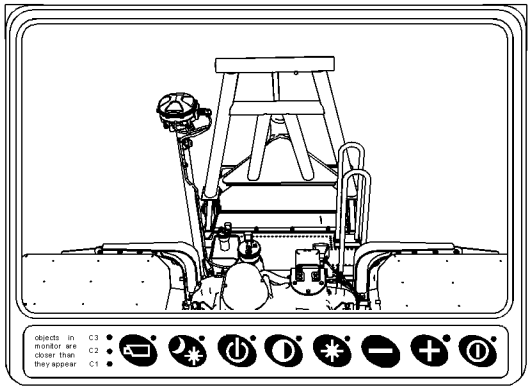


Illustration 130 g02592840

The rear facing camera has been set by the factory or by a Cat dealer in order to provide the following view:

- Partial view of the push block.
- View of an object on the ground 2.1 m (6 ft 10 inch) behind the push block.
- View of an object on the ground at a minimum 24 m (78 ft 9 inch) behind the push block.

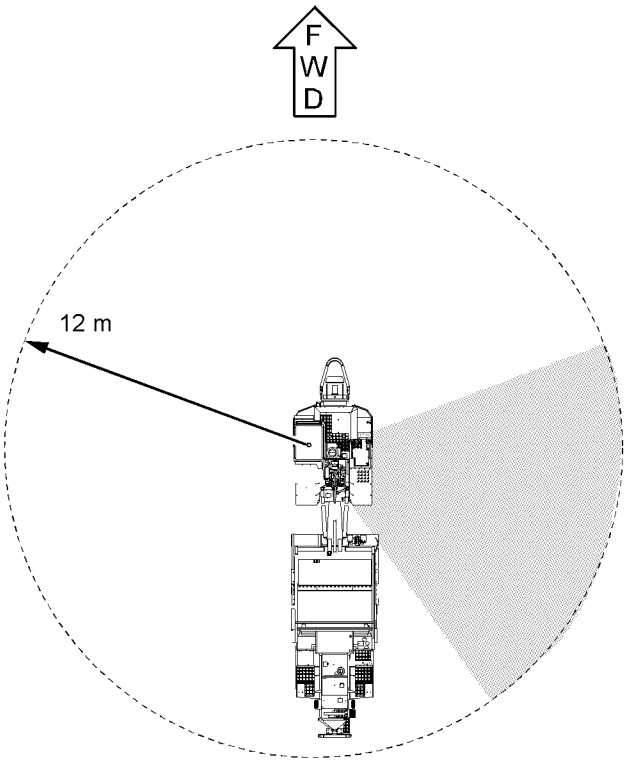


Illustration 131 g02513916

Top View of the Machine

Adjust the right side camera in order to provide visibility to the right side of the machine. Approximate camera view should be adjusted to view the areas shown in the shaded area.

Consult your Cat dealer before any adjustments are made to the camera.

Prior to operating the machine, ensure proper orientation of images by the cameras. The cameras have been set up by the factory or by a Cat dealer in order to provide views which comply with the guidelines that have been documented. Consult your Cat dealer before any adjustments are made to the cameras.

Prior to operating the machine, ensure that the features of the display are properly adjusted. Ensure that the brightness and the contrast are adjusted prior to operating the machine. Ensure that the brightness and the contrast are adjusted after changes in the conditions for ambient light.

Prior to operating the machine, ensure that the display is positioned in order to provide clear visibility of the display from the operator seat. Do not position the display in a way that will cause the following conditions:

- Cover any safety messages or other important information.

- Impede the entry to the cab or impede the exit from the cab.
- Obstruct the visibility of the operator.
- Obstruct the view of any indicators, gauges, or monitoring system.
- Impair access to any operator controls or impair movement of any operator controls.

Prior to operating the machine, ensure that the camera lens and the display are clean.

Refer to Operation and Maintenance Manual, SEBU8157, “Work Area Vision System” for additional information about WAVS.

i07493439

Operation Information

SMCS Code: 7000

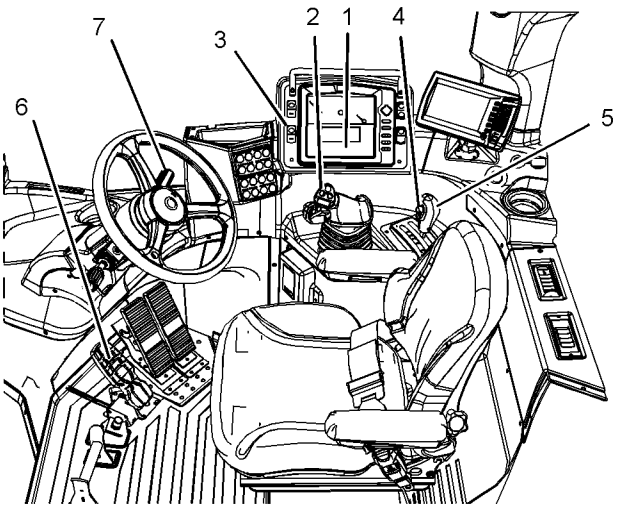


Illustration 132 g03077962

Typical View Shown

(1) Alert indicator for the secondary steering system
(2) Transmission hold control (joystick)
(3) Parking brake control switch
(4) Top gear control
(5) Transmission control
(6) Service brake control
(7) Retarder control

⚠ WARNING

When you operate the machine in very rough ground conditions or at travel speeds not suitable for the ground conditions, this may result in excessive seat vertical travel with impact of the suspension against the travel stops, which may cause injury. Do not operate the machine on ground conditions and at travel speeds that could result in the seat suspension travel stops being contacted. In order to minimize impact loading on the operator, properly adjust the seat controls based upon your weight and based upon your height. Refer to the Operation and Maintenance Manual, “Seat” for more information.

⚠ WARNING

There is restricted visibility to the area directly behind the machine. Failure to make sure the area is clear could result in injury or death. Use a second person on the ground to make sure that the area is clear before you operate the machine in the REVERSE position. Refer to the Operation and Maintenance Manual, “Operation Information” for more information.

Visibility behind the machine is restricted from the operator station. Before you operate the machine in the REVERSE position, a second person on the ground is to be used to make sure the area is clear. The person that provides the direction must remain in sight of the operator at all times. Stop the machine if the person that provides the direction cannot be seen or understood.

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

Reduce engine speed when you maneuver in tight quarters or when you are going over a hill.

Select the appropriate travel speed before you begin to drive the machine downhill. Do not shift the transmission control while you are going downhill.

When you drive the machine downhill, use the same gear speed that would be used to drive the machine uphill.

Do not allow the engine to overspeed when you go downhill. Do not disengage the transmission while you are traveling downhill. Use the service brake control to reduce engine overspeed when you are going downhill. Never coast the machine.

Adjust the operator seat. Fasten the seat belt.

Do not operate the machine when the parking brake is applied.

Load the machine in a straight line.

Load the machine in second gear using transmission hold to prevent frequent transmission shifts to inhibit power train and tire wear for maximum efficiency.

Do not overload the bowl.

Operating The Machine

1. Check for adequate clearance around the machine.

2. Adjust the operator seat.

3. Adjust the mirrors.

4. Adjust the steering column.

5. Fasten the seat belt.

6. Move the implement lockout switch to the unlocked position.

7. Raise the bowl to pass over any obstacles.

8. Depress service brake control (6) to prevent the machine from moving.

9. Push the bottom of parking brake control switch (3) to release the parking brake.

NOTICE
For operator comfort and maximum service life of power train components, deceleration and/or braking is recommended before any directional shifts are made.

10. Move the transmission control to the desired direction and the appropriate gear speed.

11. Release the service brake control.

12. Depress the throttle pedal until you achieve the desired engine speed.

13. Drive the machine forward to have the best visibility and the best control.

Secondary Steering (If Equipped)

⚠ WARNING

If the secondary steering system activates during operation, immediately park the machine in a safe location. Do not continue to operate the machine using the secondary steering system.

Extended operation of the secondary steering motor could damage the motor and result in a loss of emergency steering capability. The secondary steering system should be used for towing the machine or other service procedures.

Personal injury or death can result if steering is lost during operation.

If alert indicator (1) illuminates red, steer the machine immediately to a convenient location and stop the machine.

Make any necessary repairs before you return the machine to operation.

Alert indicator (1) illuminates amber to indicate that the secondary steering system is engaged. When the secondary steering system is engaged, the primary steering system has failed. The secondary steering system will provide steering for a limited time. The secondary steering indicator will illuminate when the secondary steering system is active. The system uses an electric driven steering pump to allow steering of the machine. The secondary steering system will provide steering for a minimum of 1 minute when a typical single component failure occurs. The secondary steering system operates when the machine is stationary or when the machine is traveling in FORWARD or REVERSE direction.

Changing Direction and Speed

Reverse speed, first gear forward must be manually selected.

The automatic range is second gear through eighth gear. For each job condition, the transmission will automatically upshift and downshift the transmission between second gear and the top gear being used. Move transmission control (5) in one smooth motion. During load cycles, haul cycles and dump cycles, manual shifting is not recommended.

Use transmission hold control (2) to prevent unwanted shifts.

Use top gear control (4) to set the top speed to be used.

NOTICE
The machine must be stopped and the engine at low idle before changing direction. After moving the transmission control, do not accelerate until after hearing or feeling the transmission clutches engage.

Upshifting

As the engine is accelerated and the ground speed increases, the transmission will upshift. The transmission will upshift one speed at a time. The transmission will upshift automatically between second gear and the highest gear that has been selected.

Moving transmission control (5) does not force immediate shifting of the transmission. The shifting of the transmission is governed by the machine ground speed.

Use transmission hold control (2) to prevent unwanted transmission shifts, such as when approaching a downgrade, or operating on rough terrain.

Use transmission hold control (2) in second gear to prevent frequent transmission shifts when loading to inhibit power train and tire wear for maximum efficiency.

Use transmission hold control (2) to prevent frequent transmission shifts when unloading for maximum efficiency.

Downshifting

If the ground speed is reduced or if the engine speed is reduced by an increased load, the transmission will automatically downshift to select the correct transmission speed.

NOTICE
The transmission is equipped with a downshift inhibitor. The transmission will not necessarily downshift when the transmission control is moved. This protects against engine overspeed.

Accidental downshifting of the transmission control does not mean forced or immediate shifting of the transmission.

As the machine slows, the transmission will automatically downshift to match operating conditions. Move transmission control (5) to the NEUTRAL position if you intend to stop the machine.

Shift Inhibiting

A shift from any FORWARD gear into NEUTRAL position is inhibited when the machine is traveling at a speed greater than 5.6 km/h (3.5 mph).

Normal Shifting

An automatic downshift will occur when the engine speed decreases to approximately 1280 rpm. An automatic upshift will occur when the engine speed increases to approximately 1800 rpm. The shifting of the transmission is determined by the load that is put on the machine.

If the ground speed is less than 5 km/h (3 mph) in any forward speed and the transmission control is moved to the REVERSE position, the transmission immediately shifts intoREVERSE.

If the ground speed is more than 8 km/h (5 mph) in any forward speed and the transmission control is moved to REVERSE, the transmission will not shift to REVERSE until the ground speed of the machine has been reduced to 5 km/h (3 mph). When the ground speed is less than 5 km/h (3 mph) in NEUTRAL and the transmission control has been moved to REVERSE, the transmission immediately shifts to REVERSE.

Top Gear Control

Top gear control (4) is used to set a limit for upshifts. The transmission control must be moved to “D” in order for you to select a limit. “D” is the DRIVE position. When the switch is depressed, the actual gear indicator will have the reverse image of the normal display. Next, the actual gear indicator will cycle through the available gears. When the switch is released, the top drive gear will be set to the value on the display. The display will show the top gear for 4 seconds. After the 4 seconds, the display will revert to the actual gear. The maximum gear that is available to the operator will never be greater than the maximum gear that is set by the service personnel. The minimum top gear that is available to the operator is third gear in the forward direction. The transmission will operate with a high gear limit until the machine is turned off or until another gear is selected.

Note: When the engine experiences an overspeed condition, the top gear control will allow the transmission to upshift one speed to correct the overspeed condition.

Transmission Hold Control Activated

When transmission hold control (2) is placed in the ENGAGED position, automatic shifts are inhibited. Automatic downshifts are inhibited unless the engine is in an underspeed condition. The transmission will automatically downshift if the engine rpm drops too low. Underspeed conditions will occur when the engine rpm drops below 1000 rpm. Automatic upshifts are inhibited unless the engine is in an overspeed condition. If the engine speed reaches 2400 rpm, the transmission will automatically upshift.

Braking Operation

The braking system consists of three separate controls: service brake control (6), parking brake control switch(3) and retarder control (7).

Service Brake

The service brakes on Wheel Tractor-Scrapers are designed to stop the machine.

Parking Brake

The two front wheels of the Wheel Tractor-Scraper are equipped with parking brakes. The parking brakes and service brakes use the same brake actuator to activate the brakes.

Push in the top of the parking brake control switch (3) to engage the parking brake. The parking brake indicator will illuminate. Push the locking tab forward and push in the bottom of the parking brake control switch to disengage the parking brake. The parking brake indicator will go out

Note: Allow the machine to reach normal operating temperature before engaging or releasing the parking brake. The parking brake may take up to 10 seconds to engage or disengage during extreme cold ambient temperatures. If the parking brake does not engage within 2 seconds, the parking brake indicator will illuminate and flash. Once the parking brake engages, the parking brake indicator will stay illuminated but will not flash. If the parking brake does not engage within 6 seconds, a warning will be displayed on the digital display.

The action alarm will also sound if the transmission control is moved out of the NEUTRAL position during engagement of the parking brake.

Retarder

The retarder equipped is an engine compression brake which releases compressed air before it can act as a spring and continue to propel the machine.

Engage the retarder control in order to slow the machine ground speed. The tractor transmission must be in 3F and the throttle controls must be disengaged, in order for the retarders to engage. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

Use the retarder on a downgrade to prevent engine overspeed.

Use the retarder to help to stop the machine. The retarder will not completely stop the machine and the retarder will not hold the machine stationary.

Retarding on a Downgrade

Machine speed is very important because a lower speed increases the effective force of the retarder. Generally, the speed that is used to negotiate an empty machine on an upgrade should be used to drive a loaded machine on a downgrade of the same slope. Readjust the speed after a trial run.

Before you approach a downgrade, slow the machine. Anticipate the need to use the retarder. Select retarding level to engage the retarder and disengage the throttle controls to disengage the retarder. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

The retarder will engage in less than one second. The transmission control will allow the transmission to shift as necessary to maintain higher engine speeds and higher retarding force.

Select the proper transmission gear that will allow the retarder to maintain a safe ground speed. with little use of the service brake control.

Never coast down a grade in NEUTRAL. Always keep the transmission in gear. The chassis ECM will prevent shifting from a forward gear to NEUTRAL at ground speeds that are greater than 8 km/h (5 mph). The chassis ECM will also prevent shifting from a forward gear to REVERSE at grounds speeds that are greater than 5 km/h (3 mph). If you attempt to prevent upshifting on a downgrade that is long or steep, retarding can be unsuccessful. The transmission control should be in the desire gear before you start the downgrade. If you rely on retarding, engine speed may reach the upshift point.

Differential Lock

For the location of the differential lock control switch, refer to Operation and Maintenance Manual, “Operator Controls”.

Lock the differential when traction is poor. Both wheels will turn at the same speed.

The differential lock will provide maximum traction at all times. The differential lock can prevent wheel slippage. Depress the differential lock control switch when the machine is moving on soft ground or on wet ground. Excessive wheel spin and uncontrolled wheel spin can cause accelerated wear to certain components of the drive train.

To prevent damage to the differential lock, do not engage the differential lock control switch at high speeds.

Do not turn the machine while the differential lock is engaged.

Do not engage the differential lock control switch while one wheel is spinning. Decrease the engine rpm until the wheel stops spinning. Anticipate using the differential lock before wheel slippage occurs.

The differential normally unlocks when the floor switch is released. In areas of high resistance, it may be necessary to turn the machine slightly to unlock the differential. Decreasing the engine rpm may also be helpful.

Engine Starting

i04909342

Engine Starting

SMCS Code: 1000; 7000

⚠ WARNING

Diesel engine exhaust contains products of combustion which may cause personal injury.

Always start and operate the engine in a well ventilated area, and, if in an enclosed area, vent the exhaust to the outside.

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking again.

Turbocharger (if equipped) damage can result, if the engine rpm is not kept low until the engine oil light/ gauge verifies the oil pressure is sufficient.

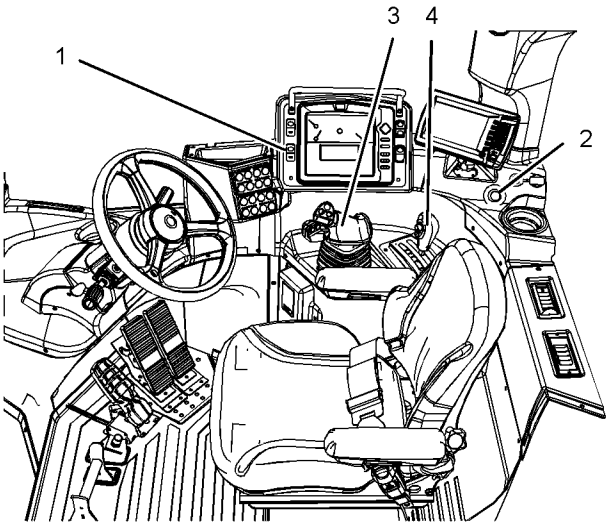


Illustration 133 g03078017

1. Turn the battery disconnect switch for the tractor to the ON position.

2. Move transmission control (4) to the NEUTRAL position.

3. Unlock the steering column. Move the steering column to the desired position and lock the steering column.

4. Engage parking brake control switch (1) .

5. Move joystick control (3) to the HOLD position.

Note: Before any implements will operate, all implement controls must be in the NEUTRAL position or the OFF position for 2 seconds after the engine is started.

6. Move all implement controls to the NEUTRAL position or the OFF position. For specific information on the operation of the implement controls that are affected, refer to the following topics (if equipped):

- Operation and Maintenance Manual, “Bowl Control (Joystick)”
- Operation and Maintenance Manual, “Ejector Control (Joystick)”
- Operation and Maintenance Manual, “Elevator Control (Joystick)”
- Operation and Maintenance Manual, “Elevator Speed Control (Joystick)”
- Operation and Maintenance Manual, “Transmission Hold Control (Joystick)”
- Operation and Maintenance Manual, “Cushion-Hitch Control (Joystick)”

Note: If the temperature of the coolant is below 0 °C (32 °F), the coolant temperature switch will cause ether to be automatically injected into the engine.

7. Turn engine start switch (2) in order to start the engine. Release the engine start switch when the engine starts.

i05885208

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE
Keep engine speed low until the engine oil pressure registers on the gauge. If the oil pressure does not register, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

During machine warm-up in cold ambient temperatures, engine speed may elevate to help warm transmission oil.

The engine may automatically change speeds when the machine is stationary and idling in cold ambient temperature for an extended time. This is to:

- Maintain desired coolant temperature.

- Maintain desired operation of engine systems.
- Maintain desired operation of the regeneration system.

During extended idling in cold ambient conditions, engine speed may operate between 1000 rpm and 1600 rpm. Operation at 1600 rpm is minimal and will only last for up to 20 minutes. The high exhaust system temperature indicator may also illuminate during extended idling conditions to signal that a low speed regeneration is in progress. A regeneration done in cold ambient extended idling conditions will typically last for 5-10 minutes.

1. When the engine is cold, operate the engine at low idle for at least 5 minutes.

Cycle all controls in order to allow warm oil to circulate through all hydraulic cylinders and through all hydraulic lines.

Idle the engine. If the hydraulic functions are sluggish, additional time may be required for warm-up.

2. Release the brake. Move the equipment forward and backward for several meters (yards). Exercise the machine for several minutes.

In order to reduce the total warm-up time, start exercising the entire machine before you complete the hydraulic warm-up time.

3. Operate under a light load until the systems reach normal operating temperatures.

4. During machine operation, frequently look at the alert indicators and the gauges.

Adjustments

i02500857

Blocking the Bowl

SMCS Code: 6201

⚠ WARNING

Bowl or apron movement can cause serious injury or death.

To prevent movement, block the bowl and apron when performing maintenance in the bowl area.

Note: Any material that might fall on the worker should be removed from the apron.

1. Park the machine on level ground.

2. Engage the parking brake.

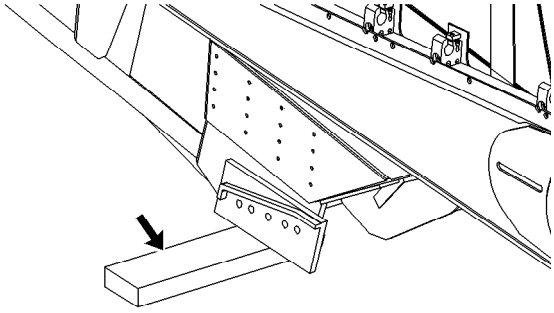


Illustration 134 g00927653

3. Raise the bowl. Place a block under the bowl. Blocks should be of material that is suitable for carrying the weight of the bowl.

4. Lower the bowl to the block. Block the bowl only to a height so that the bowl can be worked on.

5. Move the joystick control to the HOLD position.

6. Stop the engine. Turn the battery disconnect switch to the OFF position.

Parking

i07493369

Stopping the Machine

SMCS Code: 7000

NOTICE
Park on a level surface. If it is necessary to park on a grade, block the wheels securely.

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

1. Apply the service brakes to stop the machine.

2. Move the transmission control to the NEUTRAL position.

3. Turn off the cushion-hitch and lower the bail (if equipped).

4. Lower all implements to the ground. Apply a slight downward pressure.

5. Move the implement lockout switch to the lock position.

6. Engage the parking brake.

Note: Allow the machine to reach normal operating temperature before engaging or releasing the parking brake. The parking brake may take up to 10 seconds to engage or disengage during extreme cold ambient temperatures. If the parking brake does not engage within 2 seconds, the parking brake indicator will illuminate and flash. Once the parking brake engages, the parking brake indicator will stay illuminated but will not flash. If the parking brake does not engage within 6 seconds, a warning will be displayed on the digital display.

Note: If the machine is restarted with the parking brake switch disengaged, engage the parking brake switch for 2 seconds, then disengage the parking brake switch to disengage the parking brake.

i05917727

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.

Refer to the following stopping procedure, to allow the engine to cool, and to prevent excessive temperatures in the turbocharger center housing, (if equipped) which could cause oil coking problems.

Stopping The Engine From The Operator Compartment

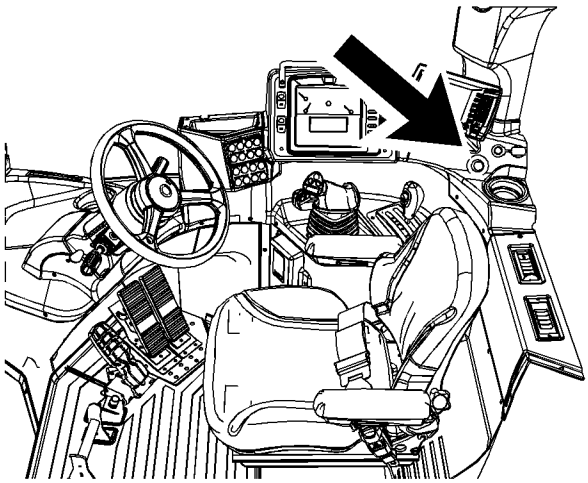


Illustration 135 g03724190

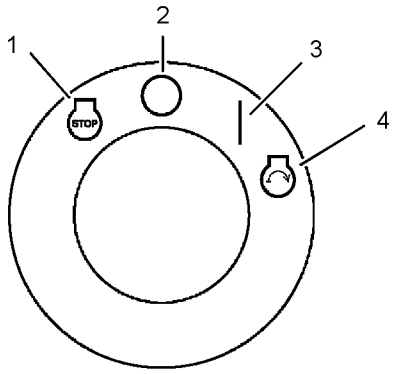


Illustration 136 g03732119

Type 1

(1) STOP
(2) OFF
(3) ON
(4) START

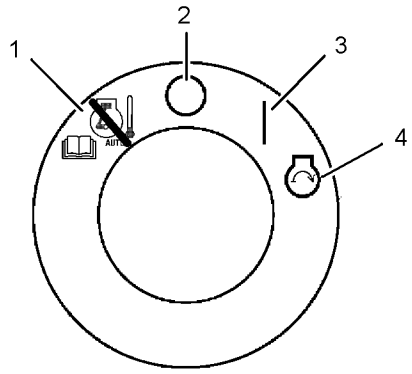


Illustration 137 g03724164

Type 2

(1) Delayed Engine Shutdown Override
(2) OFF
(3) ON
(4) START

Note: This procedure is used for shutting down the engine. When engine start switch is turned to the OFF position, the engine will be shut down.

1. Use the procedure that is described in Operation and Maintenance Manual, “Stopping the Machine” in order to stop the machine.

2. Run the engine at low idle for 5 minutes. Do not stop the engine immediately after the engine has been working under load.

Note: If the “Regen Active” indicator is illuminated, do not shut off the engine. Refer to Operation and Maintenance Manual, “Monitoring System” for more information.

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

Note: The engine may delay before completely shutting down. Delayed engine shutdowns aid in cooling the engine and after-treatment components.

Stopping The Engine From Outside Of The Operator Compartment

Note: Use the engine shutdown switch only when engine start switch does not work or engine start switch cannot be accessed.

1. Run the engine at low idle for 5 minutes. Do not stop the engine immediately after the engine has been working under load.

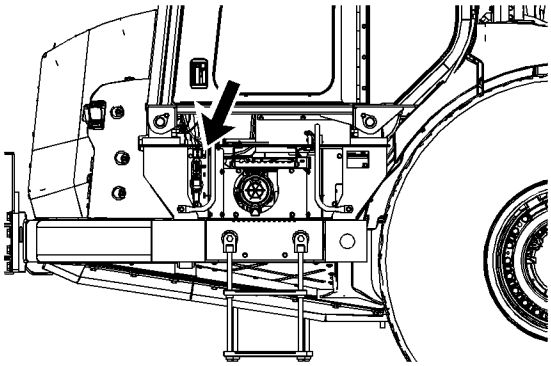


Illustration 138 g02126282

2. Move the engine shutdown switch to the OFF position. Refer to Operation and Maintenance Manual, “Engine Shutdown Switch” for further information.

Note: The engine shutdown switch does not shut off the machines electrical system.

Delayed Engine Shutdown

The Delayed Engine Shutdown allows the engine to run for a time after the engine start switch key is turned to the OFF position to cool the engine and system components. The engine start switch key may be removed.

Note: The DEF purge process will run for 2 minutes once the engine is shut down and must complete. The purge process may occur during delayed engine shutdown. Do not turn off battery disconnect switch during the purge process. Do not turn off the battery power disconnect switch until the battery disconnect switch indicator lamp has turned off. If the purge process does not complete, a diagnostic code will become active.

Note: There may be regulations that define the requirements for the operator and/or support personnel to be present when the engine is running.

⚠ WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the travel controls, lower the work tools to the ground and deactivate all work tools, and place the lever for the hydraulic lockout control in the LOCKED position.

Note: Leaving the engine unattended while running may result in property damage in the event of a malfunction.

Turn the engine start switch to the OFF position.

Delayed Engine Shutdown – The delayed engine shutdown indicator will illuminate or the following text will be displayed, ENGINE COOL DOWN ACTIVE.

Delayed engine shutdown will run whenever the exhaust temperature is above a threshold at engine shutdown. Delayed engine shutdown will run for a minimum of 76 seconds and will continue to run until the engine and system components are cooled.

Note: At any time during a delayed engine shutdown, the engine start switch may be turned to the ON position. The engine may be placed back into service.

Immediate Engine Shutdown

When an immediate engine shutdown is necessary and needs to disable the delayed engine shutdown feature, turn the engine start switch to Delayed Engine Shutdown Override (1) and hold for one second.

Note: A warning message and/or audible alarm will be initiated if Delayed Engine Override is used. A fault code will be logged for improper engine shutdown if exhaust temperature is above the limit.

Note: If Delayed Engine Shutdown Override is used repeatedly there is a risk of premature engine and after treatment component damage. **Use for emergency situations only.**

i04369648

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

If the engine does not stop after turning the engine start switch key to the OFF position, perform the following procedure:

1. Lower the bowl to the ground.

2. Apply the parking brake.

3. Dismount the machine.

4. Locate the engine shutdown switch. Activate the engine shutdown switch in order to stop the engine. Refer to Operation and Maintenance Manual, “Engine Shutdown Switch” for further information.

Note: Do not operate the machine until the malfunction has been corrected.

i05917869

Equipment Lowering with Engine Stopped

SMCS Code: 7000

⚠ WARNING

Be sure all personnel are clear of equipment while equipment is being lowered.

Failure to stay clear may result in personal injury.

Note: The implement controls must have electrical power in order to move the implements.

Lowering The Equipment With Electrical Power

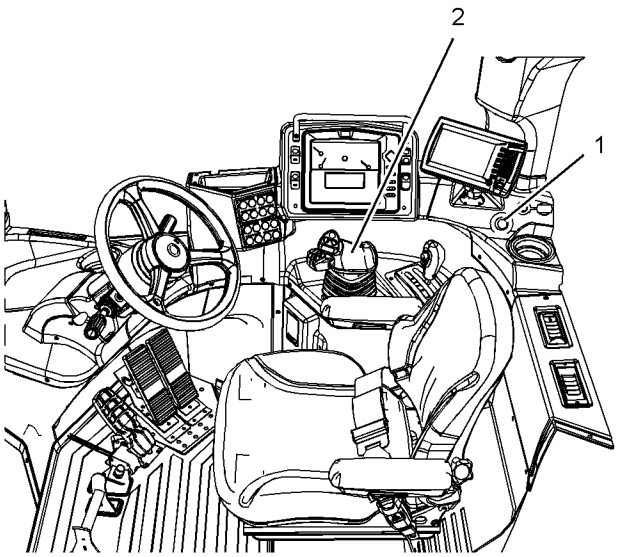


Illustration 139 g03078057
Typical View

When the electrical system is operating properly, use joystick (2) to lower the implements. The parking brake must be disengaged. Lower the implements within 10 minutes of shutting the engine down. The joystick is located on the right side of the operator compartment. Engine start switch (1), which is located on the front dash, must be turned to the ON position. Push the joystick forward in order to lower the scraper bowl. Move the thumb lever to the left in order to lower the apron. When the implements have been lowered to the ground, turn the engine start switch to the OFF position.

Lowering The Equipment Without Electrical Power

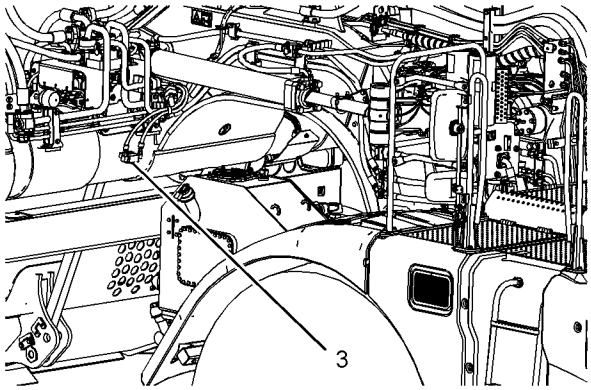


Illustration 140 g02138192

If the electrical system has malfunctioned or if the electrical system has failed, use shutoff valve (3) to lower the implements. The parking brake must be disengaged. Lower the implements within 10 minutes of shutting the engine down. The valve is located on the front of the draft frame. The valve must be opened in order to lower the bowl and the apron to the ground. Turn the head of the valve clockwise in order to open the valve. Use a wrench or pliers in order to turn the head of the valve. When the implements have been lowered to the ground, turn the head of the valve counterclockwise in order to close the valve.

Note: A portable access platform may be necessary to access the valve safely.

i07493382

Leaving the Machine

SMCS Code: 7000

1. Use the steps and the handholds when you get off the machine. Face the machine and use both hands. Make sure that the steps are clear of debris before you dismount.

2. Inspect the engine compartment for debris. Clean out any debris and paper to avoid a fire.

3. Remove all flammable debris to reduce a fire hazard. Dispose of all debris properly.

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

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

6. Install all covers and all vandalism protection locks.

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

i01693803

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. This is especially important for machines that are equipped with a ROPS, with a FOPS, with a cab, or with a canopy.

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

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

Remove the ether starting aid cylinder, if equipped. Make sure the cooling system has proper antifreeze if moving machine to a colder climate.

Observe all regulations governing wide loads.

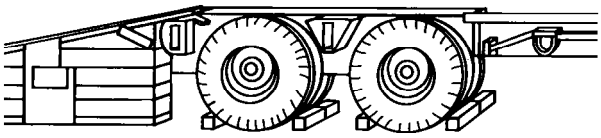


Illustration 141 g00100962

1. Before you load the machine, block the trailer wheels or the rail car wheels, as shown.
2. Lower all attachments to the floor of the transport machine. Move the transmission control (lever) to the NEUTRAL position.
3. Engage the parking brake.
4. Stop the engine.
5. Turn the engine start switch to the OFF position. Remove the engine start switch key.
6. Turn the battery disconnect switch to the OFF position. Remove the battery disconnect switch key.
7. Lock the door and the access covers. Attach any vandalism protection.
8. Block the tires. Secure the machine with tie-downs.
9. Cover the exhaust opening or secure the rain cap in order to prevent the turbocharger from windmilling in transit.

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 coolant into a suitable container.

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

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.

i00058527

Roading the Machine

SMCS Code: 7000; 7500

Before you road a machine, consult your tire dealer for recommended tire pressures and for speed limitations.

Limitations for TON-kilometer per hour (TON-mile per hour) must be obeyed. Consult your tire dealer for the speed limit of the tires that are used.

When you travel for long distances, schedule stops in order to allow the tires and the components to cool. Stop for 30 minutes after every 40 km (25 miles) or after every hour.

Inflate the tires to the correct pressure.

Use a self-attaching inflation chuck and stand behind the tire tread during the tire inflation. See the Operation and Maintenance Manual for your machine for information on tire inflation.

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

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

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

i07793252

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

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

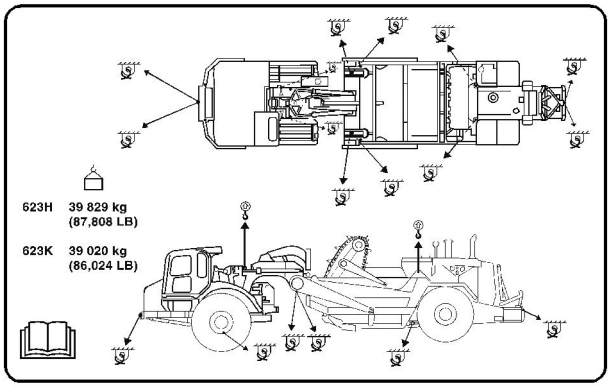


Illustration 142 g06438263

This message is on the right side of the hydraulic tank.

Note: The shipping weight that is listed is the weight of the most common configuration of the machine. If attachments have been installed on your machine, the weight of your machine and the center of gravity of your machine may vary.

See Operation and Maintenance Manual, “Rated Load” for the weight of the machine.

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

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

Lifting the Machine

For lifting objects, use properly rated cables and properly rated slings. Position the crane for a level lift.

A tool such as a spreader bar may be used to lift the machine. The width of the spreader bar should be sufficient for preventing contact with the side of the machine.

Steering cylinder locks and hitch pivot locks are required to lift the machine. Contact your local Cat dealer for more information on the hitch pivot locks.

1. Shut off the engine. Engage the parking brake. Leave the bowl in a RAISED position.
2. Place stops on the steering cylinders to prevent the tractor from turning.
3. Place stops above the pivot stops to prevent the tractor from pivoting.
4. Attach two lifting cables to the lifting eyes that are located above the bowl near the fuel tank.
5. Wrap a sling around the left steering arm. Wrap a sling around the right steering arm. The slings should be placed as close to the hitch as possible.
6. Connect the four lifting cables and center the cables over the machine.
7. Lift the machine. Move the machine to the desired position.

Tying down the Machine

Each machine is equipped with tie-down brackets. Attach the tie-down chains or attach the tie-down straps to the tie-down brackets.

1. Lower the bowl before you install the tie-downs.
2. Place blocks under the front wheels and place blocks under the rear wheels. If the blocks cannot be placed under the wheels, place the blocks in a suitable location to prevent machine movement during transport.
3. Install tie-downs at several locations.
4. Use the front machine retrieval pin to tie down the front of the machine. If the machine is equipped with a bail in the tractor, the bail can be used as a tie-down from several angles.
5. Use the rear machine retrieval pins or use the rear machine retrieval hooks to tie down the rear of the machine from several angles.
6. Use a bowl spreader tube, which is located in the scraper bowl, to tie down the middle of the machine.
7. Obey all the laws that govern the actual loads weight, the actual loads width, the actual loads height, and the actual loads length. Extra chains or straps may be required.

See your Cat dealer for shipping instructions for your machine. See the Operation and Maintenance Manual, “Shipping the Machine” for further information.

Jacking Location Information

i07307655

Jacking/Blocking Locations

SMCS Code: 7000

Park the machine on level ground. Engage the parking brake. Lower the bowl to the ground. Shut off the engine.

Note: Empty the bowl before you jack up the machine.

Raising the Machine

Do not raise the tractor and the scraper at the same time without installing oscillation and articulation stops. Consult your Cat dealer for information on oscillation and articulation stops for your machine.

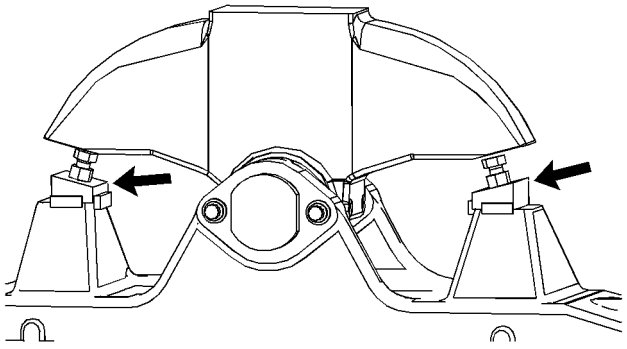


Illustration 143 g06278030

Install the oscillation stops on the frame on both sides of the oscillation joint. Adjust the bolt on top of each stop until the machine cannot oscillate.

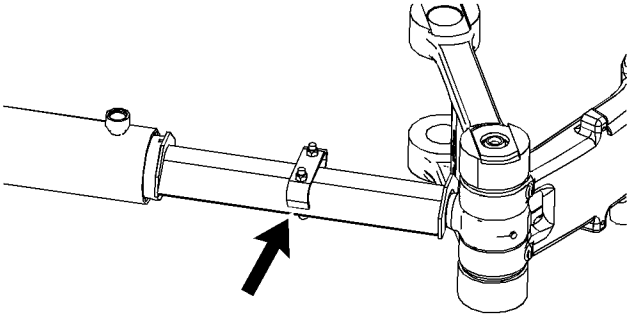


Illustration 144 g06278035

Install the articulation stops on both steering cylinders. Place the brace on the rod of the cylinder, then tighten the u-bolt around the rod to hold the brace in place.

Raising with a Jack and Supporting with Blocks

Place the jack in a location that will sustain the weight of the machine such as a frame member. The frame member should be parallel to the ground. The head of the jack should be against a flat surface. Use a jack which will support the weight of the machine.

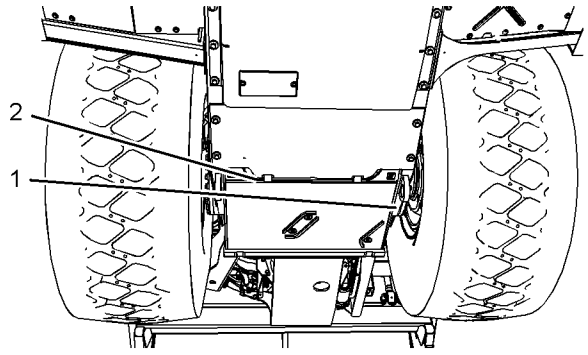


Illustration 145 g02126161

Location (1) is a suitable place for jacking up the tractor. This location is part of the frame rail of the tractor. After you have jacked up the machine to the height that is required for you to perform the work that is needed, place wood blocks for cribbing at location (2). The wood blocks should be placed on level ground.

Make sure that the machine is stable before you proceed to work on the machine.

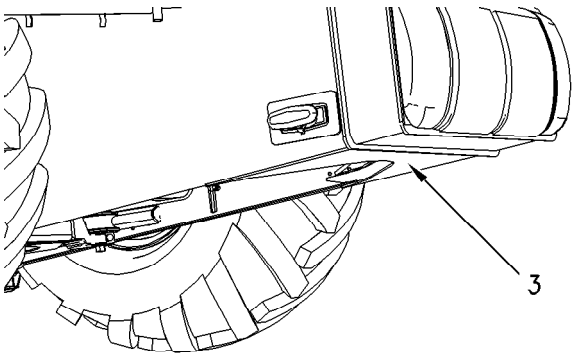


Illustration 146 g00929652

A suitable place for jacking up the scraper is at location (3). After you have raised the machine to the height that is required for you to perform the work that is needed, place wood blocks for cribbing at this location. Once the wood blocks for cribbing are in place, lower the jack until the machine is supported by the blocks.

Make sure that the machine is stable before you proceed to work on the machine.

Note: A stand is available from your Caterpillar dealer which may be substituted for wood blocks that are used for cribbing. Stands should only be used on a concrete surface. Consult your Caterpillar dealer for further information.

Raising and Supporting with a Lift Stand

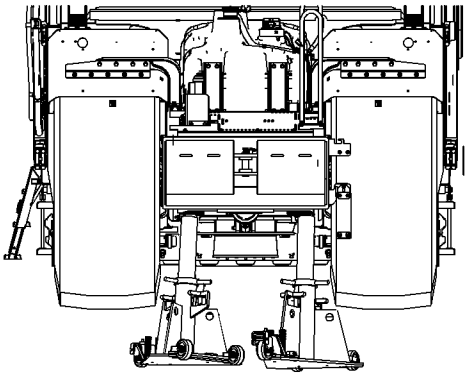


Illustration 147 g02165113
Typical example

The lift stand is available from your Caterpillar dealer. Consult your Caterpillar dealer for further information. The lift stand combines lifting and supporting functions. Two of these lift stands should be used if you are lifting both sides of the machine. Lift stands should only be used on concrete surfaces.

Place the lift stand in a location that will sustain the weight of the machine such as a frame member. The frame member should be parallel to the ground. The head of the lift stand should be against a flat surface. Use a lift stand which will support the weight of the machine.

Make sure that the machine is stable before you proceed to work on the machine.

Towing Information

i05966231

Towing the Machine

SMCS Code: 7000

⚠ WARNING

Personal injury or death could result when towing a disabled machine incorrectly.

Block the machine to prevent movement before releasing the brakes. The machine can roll free if it is not blocked.

Follow the recommendations below, to properly perform the towing procedure.

⚠ WARNING

Personal injury or death can result from a brake malfunction.

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

⚠ WARNING

Personal injury or death can result from a machine moving during driveshaft removal and installation.

Block the wheels securely so that the machine cannot move.

The towing connection must be rigid, or towing must be done by two machines of the same size or larger than the towed machine. Connect a machine on each end of the towed machine.

This machine is equipped with a parking brake that is spring-applied and electro-hydraulically released. If the engine or the system for brake pressure is inoperable, the parking brake is applied and the machine cannot be moved.

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. Always haul the machine if long distance moving is required.

This machine can be towed by removing the drive shaft from the machine. Refer to the machines Service Manual or consult your Cat dealer for the removal procedure for the drive shaft and for the installation procedure for the drive shaft.

Shields 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 you tow the machine, 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 tow line or of the tow bar should be at least 150 percent of the gross weight of the towing machine. This requirement is for a disabled machine that is stuck in the mud and for towing on a grade.

Attach tow line to the towing eyes on the scraper, the tow pin on the tractor, or the bail on push-pull machines.

Do not use a chain for pulling a disabled machine. A chain link can break. This may cause personal injury. Use a wire cable with ends that have loops or rings. Put an observer in a safe position in order to watch the pulling procedure. The observer can stop the procedure if the wire cable starts to break. Stop pulling whenever the towing machine moves without moving the towed machine.

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.

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

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

When any towed machine is loaded, the machine must be equipped with a brake system that is operable from the cab.

Consult your Cat dealer for the equipment that is necessary for towing a disabled machine.

Stopped Engine

Perform the following steps before you tow the machine:

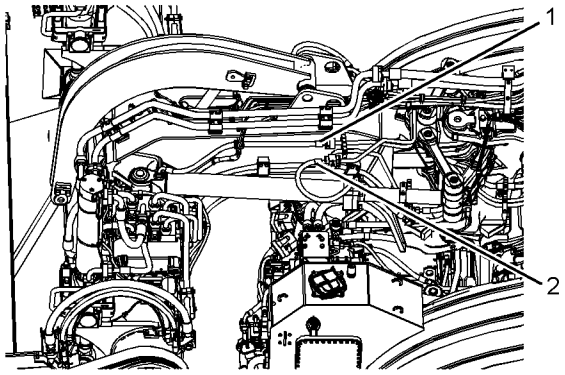


Illustration 148 g02138415

1. Disconnect steering hose (1) and disconnect steering hose (2). Connect steering hose (1) at the original location of steering hose (2) and connect steering hose (2) at the original location of steering hose (1).

NOTICE
Be sure the cylinder hoses are connected correctly before operating the machine. With the hoses reversed, the steering system will not function.

2. If failure of the internal transmission or of the drive line is suspected, remove the drive shaft.

For the removal procedures for the drive shaft and the installation procedures for the drive shaft, consult your Cat dealer or refer to the Service Manual.

3. Release the parking brake.

NOTICE
Release the parking brake to prevent excessive wear and damage to the parking brake system, when towing without hydraulic oil pressure.

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

4. Inspect the machine for power train damage. If damage is suspected, remove the axle shafts.

5. Fasten the tow bar.

6. Remove the wheel blocks. Tow the machine slowly. Do not exceed 2 km/h (1.2 mph).

Operable Engine and Hydraulics

1. Start the tractor engine and operate until the brake warning indicator on the cab display disappears.

2. Disengage the parking brake switch.

3. If you engage the service brake control during towing or enough leakage occurs in the system, the fan and brake control valve will automatically control the cut-in and cut-out pressure to maintain proper brake system operating pressures when the tractor engine is running.

Note: The fan and brake system will operate normally as long as the engine is running and the hydraulic system is not damaged.

4. Before servicing any components of the hydraulic system, the stored pressure in the accumulators should be released.

Note: The service brake control should be depressed until there is no pressure at the brake accumulator test port.

Inoperable Engine or Inoperable Fan and Brake Hydraulics

1. Chock the wheels.

2. Remove the rear belly guard.

3. If the engine or the fan/brake hydraulic system is inoperable, the machine will be unable to charge the brake accumulator that is used to release the park brake.

Note: The machine must have battery power to allow the park brake to be disengaged. If the machine does not have battery power, supply 24 v power directly to the park brake solenoid to release the park brake.

4. Disengage the park brake switch.

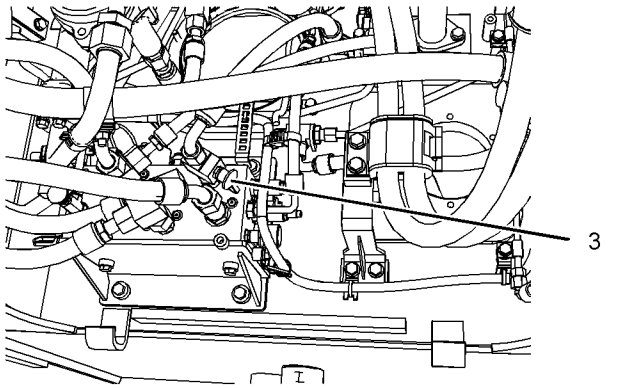


Illustration 149 g03741038

(3) Park brake pressure test port

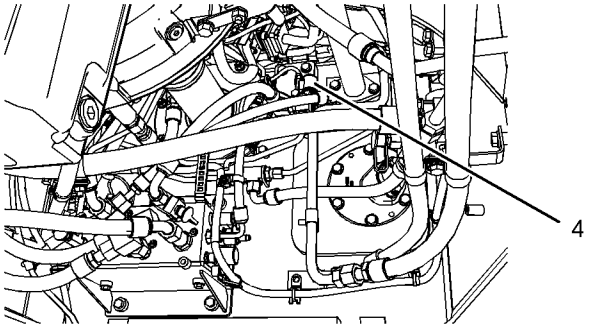


Illustration 150 g03741040

(4) Park brake solenoid

5. Install 1U-7544 Hand Pump to the park brake pressure test port (3).

Note: If the 164-5567 Pressure Test Port and 7X-0872 Tee are not installed, install the tee fitting and pressure test port.

6. Pump the hand pump until the pressure is greater than 4251 kPa (616 psi). This is the pressure required to retract the park brake.

7. Secure the hand pump in the cab to monitor the pressure so that the park brake does not reengage unexpectedly.

Note: The brake warning indicator will be illuminated in the cab during the towing process as the towing pressure is less than the low-pressure warning pressure.

Note: If the service brake control is pressed, the pressure in the accumulator will be reduced and the park brake will engage. The park brake will release when there is sufficient pressure and voltage has been applied to the park brake solenoid (4).

8. Before servicing any components of the hydraulic system, the stored pressure in the accumulators should be released.

Note: The service brake control should be depressed until there is no pressure at the brake accumulator test port.

i08125571

Parking Brake Manual Release

SMCS Code: 4267; 7000

⚠ WARNING

When the parking brakes are released manually, the machine has no brakes. To avoid possible personal injury, the tracks must be blocked securely before the parking brakes are manually released.

1. Chock the wheels.

2. Remove the rear belly guard.

3. If the engine or the fan/brake hydraulic system is inoperable, the machine will be unable to charge the brake accumulator that is used to release the park brake.

Note: The machine must have battery power to allow the park brake to be disengaged. If the machine does not have battery power, supply 24 v power directly to the park brake solenoid to release the park brake.

4. Disengage the park brake switch.

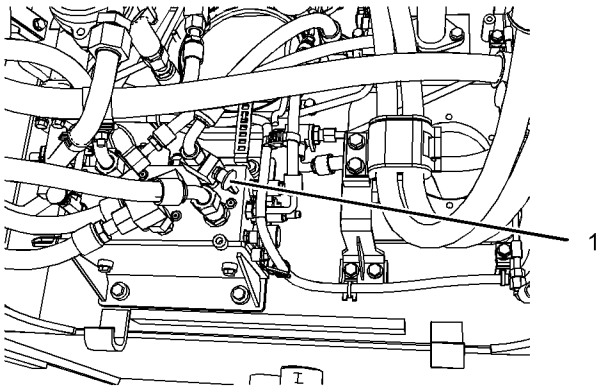


Illustration 151 g03741049

(1) Park brake pressure test port

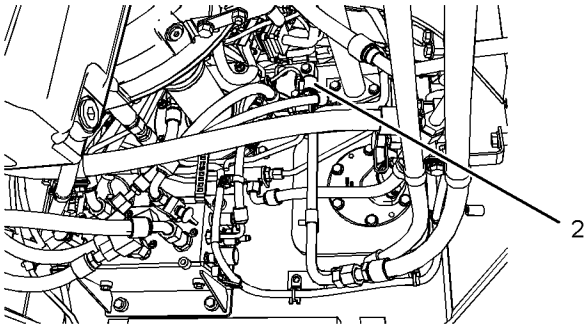


Illustration 152 g03741051

(2) Park brake solenoid

5. Install 1U-7544 Hand Pump to the park brake pressure test port (1).

Note: If the 164-5567 Pressure Test Port and 7X-0872 Tee are not installed, install the tee fitting and pressure test port.

6. Pump the hand pump until pressure reads 5735 ± 345 kPa (832 ± 50 psi), which is the pressure required to retract the park brake.

7. Secure the hand pump in the cab to monitor the pressure so that the park brake does not reengage unexpectedly.

The parking brake will release when there is sufficient pressure and voltage has been applied to the parking brake solenoid (2).

Engine Starting (Alternate Methods)

i02504064

Engine Starting with Jump Start Cables

SMCS Code: 1000; 1401; 7000

⚠ WARNING

Never "hotwire" or short across the starter terminals! Hotwiring or shorting across the starter terminals could bypass the engine neutral start system, damage the electrical system, and result in unexpected machine motion or behavior. This could cause personal injury or death.

⚠ 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.

Electrolyte is an acid and can cause personal injury if it contacts the 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.

When using jumper cables, always connect the positive (+) jumper cable to the positive (+) battery terminal first. Next, connect the negative (-) jumper cable to the frame away from the batteries. Follow the procedure in the Operation and Maintenance Manual.

Jump start only with an energy source of 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

Ensure that the machine that is used as an electrical source does not touch the stalled machine. This could prevent damage to engine bearings and electrical circuits.

Turn on the disconnect switch on the electrical source. This will help to prevent damage to electrical components on the stalled machine.

This machine has a 24 volt starting system. Use only equal voltage for jump starting. Use of a higher voltage will damage the electrical system.

Severely discharged maintenance free batteries will not fully recharge from the alternator alone after you jump start the machine. The batteries must be charged to the proper voltage with a battery charger. Many batteries that are considered to be unusable can still be recharged.

Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for complete information about testing and about charging. This document is available from your Caterpillar dealer.

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

1. Engage the parking brake on the stalled machine. Place the transmission into NEUTRAL. Lower the equipment to the ground. Refer to Operation and Maintenance Manual, “Equipment Lowering with Engine Stopped”. Move all controls to the HOLD position.
2. Turn the engine start switch on the stalled machine to the OFF position. Turn off all accessories.
3. Turn the battery disconnect switch on the stalled machine to the ON position.
4. Move the machine that is being used as an electrical source near the stalled machine so that the jump start cables reach the stalled machine. **Do not allow the machines to contact each other.**
5. Stop the engine of the machine that is being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.
6. Ensure that the battery caps on both machines are tight and correctly placed. Ensure that the batteries in the stalled machine are not frozen.
7. The positive ends of the jump start cable are red. Connect one positive end of the jump start cable to the positive cable terminal of the discharged battery. Some machines have battery sets.

Note: Batteries that are in series may be in separate compartments. Use the terminal that is connected to the starter solenoid. This battery or battery set is normally on the same side of the machine as the starting motor.

Note: Do not allow the positive cable clamps to contact any metal except for the battery terminals.

8. Connect the other positive end of the jump start cable to the positive cable terminal of the electrical source.

9. Connect one negative end of the jump start cable to the negative cable terminal of the electrical source.

Note: In 24 volt battery systems, the negative cable terminal of the electrical source is connected to the battery disconnect switch in the same battery set that is used in Step 8.

10. Connect the other negative end of the jump start cable to the frame of the stalled machine. Do not connect the jump start cable to a painted surface on the machine or on the engine. Do not connect the jump start cable to the battery post. Do not allow the jump start cables to contact the battery cables, the fuel lines, the hydraulic lines, or any moving parts.

11. Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.

12. Wait at least two minutes before you attempt to start the stalled machine. This will allow the batteries in the stalled machine to partially charge.

13. Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, “Engine Starting” in the Operation Section for the proper starting procedure for your machine.

14. Immediately after you start the stalled engine, disconnect the jump start cables in the reverse order.

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Engine Starting with Auxiliary Start Receptacle

SMCS Code: 1000; 7000

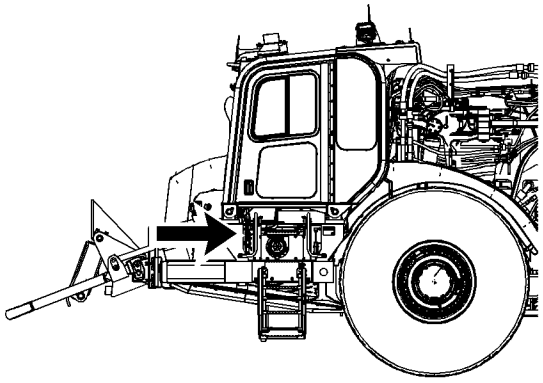

Illustration 153 g02111473

Auxiliary start receptacle is located on the front left side of the machine.

Some Cat products may be equipped with auxiliary start receptacles as a standard part. All other machines can be equipped with a receptacle for parts service. Then, a permanent receptacle is always available for jump starting.

Two cable assemblies are also available in order to jump-start the stalled machine from another machine that is also equipped with this receptacle or with an auxiliary power pack. Your Cat dealer can provide the correct cables for your application.

1. Move the transmission control of the stalled machine into the NEUTRAL position. Engage the parking brake. Lower the attachment to the ground. Refer to Operation and Maintenance Manual, “Equipment Lowering with Engine Stopped”. Move all controls to the HOLD position.

2. Turn the engine start switch on the stalled machine to the OFF position. Turn off all accessories.

3. On the stalled machine, turn the battery disconnect switch to the ON position.

4. Move the machine that is being used as a power source so that the auxiliary starting 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. Remove the dust covers on the auxiliary start receptacles.

7. On the stalled machine, connect the appropriate auxiliary starting cable to the auxiliary start receptacle.

8. Connect the other end of the auxiliary starting cable to the auxiliary start receptacle that is on the power source.

9. 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.

10. Wait for a minimum of 2 minutes while the batteries in the stalled machine partially charge.

11. Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, “Engine Starting” in the Operation Section for the proper starting procedure for your machine.

12. Immediately after you start the stalled engine, disconnect the auxiliary starting cable from the power source.

13. Disconnect the other end of the auxiliary starting cable from the stalled machine.

14. Install the dust covers on the auxiliary start receptacles.

15. 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.

16. Severely discharged batteries will not fully recharge from the alternator alone after you jump-start the machine. The batteries must be charged to the proper voltage with a battery charger. Many batteries that are considered to be unusable can still be recharged.

Maintenance Section

Tire Inflation Information

i00072696

Tire Inflation with Nitrogen

SMCS Code: 4203

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

⚠ WARNING

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

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

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

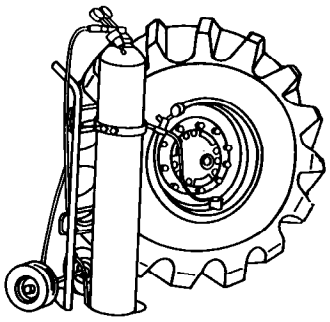

Illustration 154 g00103698

⚠ WARNING

Personal injury or death could result with improper tire inflation techniques.

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

Note: Do not set the tire inflation equipment regulator higher than 140 kPa (20 psi) over the recommended tire pressure.

Use 6V-4040 Nitrogen Tire Inflation Group or an equivalent part to inflate tires from a nitrogen gas cylinder. Refer to Special Instruction, SMHS7867 for tire inflation instructions.

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

i05494020

Tire Shipping Pressure

SMCS Code: 4203; 7500

As shown, the tire inflation pressure is cold inflation shipping pressure.

Table 12

Size	Ply Rating or Strength Index	Shipping Pressure	
		kPa	psi
623K Front			
33.25R29 Michelin	Two Star	448	65
33.25R29 Bridgestone	Two Star	448	65

Table 13

Size	Ply Rating or Strength Index	Shipping Pressure	
		kPa	psi
623K Rear			
33.25R29 Michelin	Two Star	414	60
33.25R29 Bridgestone	Two Star	448	65

The operating inflation pressure is based on the weight of a ready-to-work machine without attachments, at the rated payload, and in average operating conditions. The inflation pressure for each application may vary. Tire air pressure should always be obtained from your tire supplier.

Refer to Operation and Maintenance Manual, “Tire Inflation - Check” for further information.

Refer to Operation and Maintenance Manual, “Tire Inflation with Nitrogen” for further information.

Refer to Operation and Maintenance Manual, “Tire Inflation Pressure Adjustment” for further information.

i02610518

Tire Inflation Pressure Adjustment

SMCS Code: 4203

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

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

Lubricant Viscosities and Refill Capacities

i08795690

Lubricant Viscosities

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 TDTO Cold Weather is recommended.

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

Selecting the Viscosity

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

The proper lubricant viscosity grade is determined by the minimum outside temperature when the machine is started. The proper lubricant viscosity grade is also determined by the maximum outside temperature while the machine is operated. Use the column on the table that is designated “Min” in order to determine the lubricant viscosity grade that is required when you start a cold machine and when you operate a cold machine. Use the column on the table that is designated “Max” to select the lubricant viscosity grade when you operate the machine at the highest temperature that is anticipated. When you start the machine, use the oil with the highest lubricant viscosity that is allowed for the temperature.

Machines that are continuously operated should use the oils with a higher viscosity in the final drives and differentials in order to 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

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

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

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

Typical aftertreatment systems include the following:

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

Other systems may apply.

Table 14

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Engine Crankcase for all Machines	**Cat DEO-ULS Cold Weather**	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS SYN	SAE 5W-40	−30	50	−22	122
	Cat DEO-ULS	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS	SAE 15W-40	−9.5	50	15	122

Other Oil Applications

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.

Cat HYDO Advanced fluids are the preferred oils for use in Cat machines hydraulic systems.

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%.

Table 15

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 HYDO Advanced 30** **Cat BIO HYDO Advanced** Cat MTO Cat DEO-ULS Cat DEO Cat DEO-ULS SYN Cat DEO SYN Cat TDTO Cat TDTO-TMS Cat Cold Weather DEO-ULS Cat Cold Weather TDTO Cat ECF-1-a, Cat ECF-2, Cat ECF-3, Cat TO-4, Cat TO-4M, Cat BF-2	SAE 0W-20	−40	40	−40	104
		SAE 0W-40	−40	40	−40	104
		SAE 0W-30	−40	40	−40	104
		SAE 5W-40	−30	40	−22	104
		SAE 10W	−20	50	−4	122
		SAE 30	10	50	50	122
		Bio HYDO Advanced	−40	40	−40	104
		SAE10W-30	−20	40	−4	104
		SAE15W-40	−15	50	5	122
		Cat MTO	−20	40	−4	104
		Cat TDTO-TMS	−15	50	5	122

Except for the hydraulic drive winch gear case. Use SAE 30 viscosity grade for 0 °C (32 °F) to 43 °C (110 °F) or Cat TDTO-TMS for −20 °C (−4 °F) to 50 °C (122 °F).

If the ambient temperature is below −15 °C (5 °F), warm up the oil prior to operation. The oil must be maintained to a temperature above −15 °C (5 °F) during operation. If the ambient temperature is below −15 °C (5 °F), perform the procedures in the Operation and Maintenance Manual, “Engine and Machine warmup” prior to operation. If the ambient temperature is below −25 °C (−13 °F), consult your Caterpillar dealer for instructions. Failure to warm up the oil prior to operation will cause damage to the machine.

Table 16

Wheel Tractor-Scrapers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Transmission	**Cat TDTO Cold Weather**	SAE 0W-20	−40	0	−40	32
	Cat TDTO	SAE 10W	−20	10	−4	50
		SAE 30	0	50	32	122
	Cat TDTO-TMS	Multi-Grade	−15	50	5	122
Nondriven Scraper Wheels and Elevator Speed Reducers	**Cat FDAO**	SAE 60	−7	50	19	122
	Cat TDTO	SAE 30	−25	15	−13	59
	Cat FDAO SYN	Multi-Grade	−15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−35	15	−31	122
Differentials and Final Drives Elevator Lower Rollers	**Cat Synthetic GO**	SAE 75W-140	−30	45	−22	113
	Cat GO (Gear Oil)	SAE 80W-90	−20	40	−4	104
		SAE 85W-140	−10	50	14	122
	API GL-5 gear oil	SAE 75W-90	−30	40	−22	104
		SAE 90	0	40	32	104
Scraper (rear) Brake Circulation for 620 Series	**Cat TDTO Cold Weather**	SAE 0W-20	-40	40	-40	104
	Cat TDTO	SAE 10W	-20	50	-4	122

Grease Applications

Table 17

Type of Cat Grease								
Application Point	**Typical Load and Speed**	**Load Factor**	**Ambient Temperature Range**				**NLGI Grade**	**Grease Type**
			° C		**° F**			
			Min	**Max**	**Min**	**Max**		
Drive Shaft Slip Spline, Ejector Carrier, and Support Rollers, Sprocket Shaft Support Bearings	High	Continuous high total resistance conditions with steady cycling.	−35	40	−31	104	1	Ultra 5Moly Grease
			−30	50	−22	122	2	
	Medium	Typical road building use.	−20	40	−4	104	2	Advanced 3Moly Grease
	Low	Average use but with considerable idling, favorable grades, low rolling resistance, and easy loading material.	−30	40	−22	104	2	Multipurpose Grease
Structure Joints (Articulation, Cushion Hitch, Oscillation, Steering)	High	Continuous high total resistance conditions with steady cycling.	−35	40	−31	104	1	Ultra 5Moly Grease
			−30	50	−22	122	2	
	Medium	Typical road building use.	−20	40	−4	104	2	Advanced 3Moly Grease
Fan Drive Bearings			−20	40	−4	104	2	High Speed Ball Bearing Grease

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for additional information about grease. This manual may be found on the Web at Safety.Cat.com.

Diesel Fuel Recommendations

Diesel fuel must meet Caterpillar Specification for Distillate Fuel and the latest revisions of “ASTM D975-09a” and “EN 590” in order to ensure optimum engine performance. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for the latest fuel information and for Cat fuel specification. This manual may be found on the Web at Safety.Cat.com.

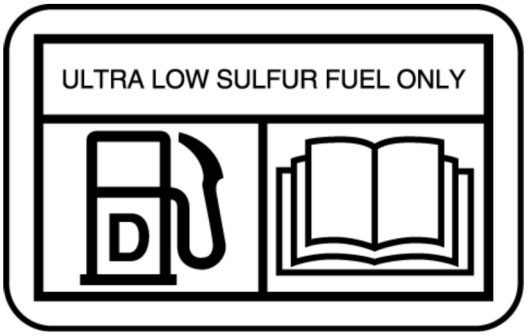

Illustration 155 g02157153

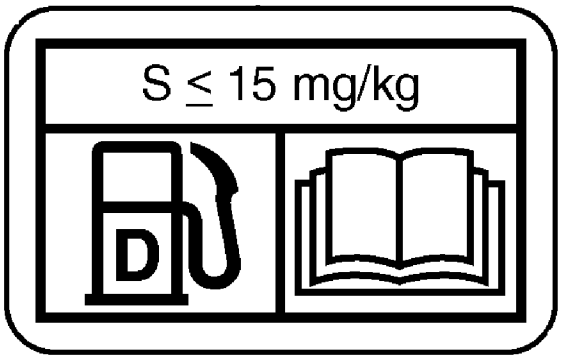

Illustration 156 g02052934

NOTICE

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

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

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

- **Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)**
- **Adversely impact the performance and life of aftertreatment devices (cause loss of performance)**
- **Reduce regeneration intervals of aftertreatment devices**
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

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

Caterpillar does not require the use of ULSD in nonroad and machine applications that are not Tier 4/ Stage IIIB/ Stage IV certified engines and are not equipped with aftertreatment devices. For Tier 4/ Stage IIIB/Stage IV certified engines, always follow operating instructions and fuel tank inlet labels to insure the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels, lubricants, and Tier 4 requirements. This manual may be found on the Web at Safety.Cat.com.

Diesel Exhaust Fluid

General Information

Diesel Exhaust Fluid (DEF) is a liquid that is injected into the exhaust system of engines equipped with Selective Catalytic Reduction (SCR) systems. SCR reduces emissions of nitrogen oxides (NOx) in diesel engine exhaust.

Diesel Exhaust Fluid (DEF) is also known under other names including Aqueous Urea Solution (AUS) 32, AdBlue, or generically referred to as urea.

In engines equipped with SCR emissions reduction system, DEF is injected in controlled amounts into the engine exhaust stream. At the elevated exhaust temperature, urea in DEF is converted to ammonia. The ammonia chemically reacts with NOx in diesel exhaust in the presence of the SCR catalyst. The reaction converts NOx into harmless nitrogen (N2) and water (H2O).

DEF Recommendations

For use in Cat engines, DEF must meet all the requirements defined by “ISO 22241-1” Requirements.

Caterpillar recommends the use of DEF available through the Cat parts ordering system for use in Cat engines equipped with SCR systems.

In North America, commercial DEF that is API approved and meets all the requirements defined in “ISO 22241-1” may be used in Cat engines that are equipped with SCR systems.

Outside of North America, commercial DEF that meets all requirements defined in “ISO 22241-1” may be used in Cat engines that are equipped with SCR systems.

The supplier should provide documentation to prove the DEF is compliant with the requirements of “ISO 22241-1”.

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

NOTICE
Do not use agriculture grade urea solutions. Do not use any fluids that do not meet “ISO 22241-1” Requirements in SCR emissions reduction systems. Use of these fluids can result in numerous problems including damage to SCR equipment and a reduction in NOx conversion efficiency.

DEF is a solution of solid urea that is dissolved in demineralized water to produce a final concentration of 32.5% urea. DEF concentration of 32.5% is optimal for use in SCR systems. DEF solution of 32.5% urea has the lowest attainable freeze point of −11.5° C (11.3° F). DEF concentrations that are higher or lower than 32.5% have higher freeze points. DEF dosing systems and “ISO 22241-1” specifications are designed for a solution that is approximately 32.5%.

Caterpillar offers a refractometer, Cat part number 360-0774, that can be used to measure DEF concentration. Follow the instructions provided with the instrument. Appropriate commercial portable refractometers can be used to determine urea concentration. Follow the instructions from the manufacturer.

DEF Guidelines

DEF solution is typically colorless and clear. Changes to color or clarity are indicators of quality issues. Quality of DEF can degrade when stored and handled inappropriately or if DEF is not protected from contamination. Details are provided below.

If quality issues are suspected, testing of DEF should focus on urea percentage, alkalinity as NH3 and biuret content. DEF that does not pass all these tests or that is no longer clear should not be used.

Materials compatibility

DEF is corrosive. Due to the corrosion caused, DEF must be stored in tanks constructed of approved materials. Recommended storage materials:

Stainless Steels:

- 304 (S30400)
- 304L (S30403)
- 316 (S31600)
- 316L (S31603)

Alloys and metals:

- Chromium Nickel (CrNi)
- Chromium Nickel Molybdenum (CrNiMo)
- Titanium

Non-metallic materials:

- Polyethylene
- Polypropylene
- Polyisobutylene
- Teflon (PFA)
- Polyfluoroethylene (PFE)
- Polyvinylidene fluoride (PVDF)
- Polytetrafluoroethylene (PTFE)

Materials NOT compatible with DEF solutions include Aluminum, Magnesium, Zinc, Nickel coatings, Silver and Carbon steel and Solders containing any of the above. Unexpected reactions may occur if DEF solutions come in contact with any non-compatible material or unknown materials.

Bulk storage

Follow all local regulations covering bulk storage tanks. Follow proper tank construction guidelines. Tank volume typically should be 110% of planned capacity. Appropriately vent indoor tanks. Plan for control of overflow of the tank. Heat tanks that dispense DEF in cold climates.

Bulk tank breathers should be fitted with filtration to keep airborne debris from entering the tank. Desiccant breathers should not be used because water will be absorbed, which potentially can alter DEF concentration.

Handling

Follow all local regulations covering transport and handling. DEF transport temperature is recommended to be −5° C (23° F) to 25° C (77° F). All transfer equipment and intermediate containers should be used exclusively for DEF. Containers should not be reused for any other fluids. Ensure that transfer equipment is made from DEF-compatible materials. Recommended material for hoses and other non-metallic transfer equipment include:

- Nitrile Rubber (NBR)
- Fluoroelastomer (FKM)
- Ethylene Propylene Diene Monomer (EPDM)

The condition of hoses and other nonmetallics that are used with DEF should be monitored for signs of degradation. DEF leaks are easily recognizable by white urea crystals that accumulate at the site of the leak. Solid urea can be corrosive to galvanized or unalloyed steel, aluminum, copper, and brass. Leaks should be repaired immediately to avoid damage to surrounding hardware.

Cleanliness

Contaminants can degrade the quality and life of DEF. Filtering DEF is recommended when dispensed into the DEF tank. Filters should be compatible with DEF and should be used exclusively with DEF. Check with the filter supplier to confirm compatibility with DEF before using. Mesh-type filters using compatible metals, such as stainless steel, are recommended. Paper (cellulose) media and some synthetic filter media are not recommended because of degradation during use.

Care should be taken when dispensing DEF. Spills should be cleaned immediately. Machine or engine surfaces should be wiped clean and rinsed with water. Caution should be used when dispensing DEF near an engine that has recently been running. Spilling DEF onto hot components will cause harmful vapors.

Stability

DEF fluid is stable when stored and handled properly. The quality of DEF rapidly degrades when stored at high temperatures. The ideal storage temperature for DEF is between −9° C (15.8° F) and 25° C (77° F). DEF that is stored above 35° C (95° F) for longer than 1 month must be tested before use. Testing should evaluate Urea Percentage, Alkalinity as NH3 and Biuret content.

The length of storage of DEF is listed in the following table:

Table 18

Storage Temperature	Expected DEF Life
Below 25° C (77° F)	18 months
25° C (77° F) to 30° C (86° F)	12 months
30° C (86° F) to 35° C (95° F)	6 months
Above 35° C (95° F)	test quality before use

Refer to “ISO 22241” document series for more information about DEF quality control.

Note: Dispose of all fluids according to applicable regulations and mandates.

Fuel Additives

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

Biodiesel

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

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

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

Note: Up to B20 biodiesel blend level is acceptable for use in Scraper engines.

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤15 ppm (mg/kg)) or less per “ASTM D975-09a”. In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel ULSD 0.0010 percent (≤10ppm (mg/kg) or less per “EN 590”. The final blend must have (≤15 ppm (mg/kg)) sulfur or less.

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

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

All of 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.

i06866857

Capacities (Refill)

SMCS Code: 1000; 7000; 7560

Table 19

623K Approximate Refill Capacities			
Component or System	**Liters**	**US gal**	**Recommended Type**
Engine Crankcase	37	9.7	Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
Transmission	97	25.5	
Hydraulic System	83	21.9	
Cooling System	42	11.1	
Fuel Tank	818	216.0	
Differential	158	41.7	
Each Final Drive	19	5.0	
Brake Cooling Oil (Scraper)	33	8.7	
Rear Wheels (Non-Driven Wheels)	4	1	
Window Washer Reservoir	5	1.3	
Elevator Speed Reducer	10	2.64	
Diesel Exhaust Fluid	30.5	8.1	
	kg	**lbs**	

(continued)

(Table 19, contd)

623K Approximate Refill Capacities			
Component or System	**Liters**	**US gal**	**Recommended Type**
Refrigerant(1)	1.8	4.0	R-134a
	mL	**oz**	
Refrigerant Oil (Compressor)(1)	180	6	Polyalkylene Glycol (PAG) Oil
Refrigerant Oil (Lines Group) (1)	137	4.63	Polyalkylene Glycol (PAG) Oil

(1) Refer to Service Manual, “Air Conditioning and Heating R-134a for All Caterpillar Machines” for additional information

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S·O·S Information

SMCS Code: 1000; 7000; 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

i07035097

System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 3000-553-PX; 4250-553-PX; 4300-553-PX; 5050-553-PX; 5612-553-PX; 5615-553-PX; 6700-553-PX; 7540-553-PX

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, move the engine start switch to the OFF position. Allow the cooling system pressure cap to cool. The cap must be cool enough to touch with a bare hand. Remove the cooling system pressure cap slowly to relieve pressure.

Engine Oil System

To relieve the pressure from the engine oil system, move the engine start switch to the OFF position.

Fuel System

To relieve the pressure from the fuel system, move the engine start switch to the OFF position.

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 work tools have been lowered to the ground, and the 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.

⚠ WARNING

Cylinders equipped with load control valves can remain pressurized, even with hoses removed.

Failure to relieve pressure before removing a load control valve or disassembling a cylinder can result in personal injury or death.

Ensure all pressure is relieved before removing a load control valve or disassembling a cylinder.

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.

Use the following procedure to relieve the pressure from the hydraulic system:

1. Lower the scraper bowl to the ground. Retract the ejector cylinder and disengage the cushion-hitch.
2. Shut off the engine.
3. Turn the engine start switch to the ON position.
4. Move the control levers through the full range of travel. This movement will relieve any pressure that may be present in the hydraulic system.
5. Turn the engine start switch to the OFF position.
6. Press the breaker relief valve release button on the hydraulic tank to release the pressure within the hydraulic tank.
7. Slowly loosen the hydraulic tank filler cap.

Hydraulic Tank (Brake Oil Expansion Tank) (If Equipped)

⚠ 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, “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.

Use the following procedure to relieve the pressure from the brake cooling system:

1. Lower the bowl to the ground, and lower the apron onto the bowl.
2. Turn the engine start switch to the OFF position.
3. Slowly loosen the filler cap for the brake cooling system oil tank to release the pressure.

Braking and Hydraulic Fan 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.

⚠ 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.

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.

Use the following procedure to relieve the pressure from the braking and hydraulic fan system:

1. Lower the bowl to the ground, and lower the apron onto the bowl.
2. Turn the engine start switch to the OFF position.
3. Chock the wheels.
4. The pressure in the brake accumulators can only be drained by repeatedly depressing the service brake foot pedal until the oil pressure is drained. Do not assume that all the pressure is removed from the system because the brake pedal does not have resistance.

To relieve the pressure from the braking and hydraulic fan system, lower the bowl to the ground, and lower the apron onto the bowl. Turn the key to the OFF position and chock the wheels. The pressure in the brake accumulators can only be drained by repeatedly depressing the service brake foot pedal until the oil pressure is drained. Do not assume that all the pressure is removed from the system because the brake pedal does not have resistance.

Brake Accumulators

⚠ WARNING

Pressurized System!

Hydraulic accumulators contain gas and oil under high pressure. DO NOT disconnect lines or disassemble any component of a pressurized accumulator. All gas pre-charge must be removed from the accumulator as instructed by the service manual before servicing or disposing of the accumulator or any accumulator component.

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

Only use dry nitrogen gas to recharge accumulators. See your Cat dealer for special equipment and detailed information for accumulator service and charging.

Relieving the pressure in the brake circuit will not release the nitrogen precharge pressure in the brake accumulators.

Transmission

⚠ 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, “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.

Use the following procedure to relieve the pressure from the transmission:

1. Lower the bowl to the ground, and lower the apron onto the bowl.
2. Turn the engine start switch to the OFF position.
3. Slowly loosen the filler cap for the transmission oil tank to release the pressure.

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Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

Proper welding procedures are necessary 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 to prevent heat related damage. The following steps should be followed to weld on a machine or an engine with electronic controls.

1. Turn off the engine. Place the engine start switch in the OFF position.
2. If equipped, turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

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

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure 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 to weld the materials together.

i04807435

Severe Service Application

SMCS Code: 1000; 7000

An engine which operates outside of normal conditions is operating in a severe service application.

An engine that operates in a severe service application may need more frequent maintenance intervals in order to maximize the following conditions:

- Reliability
- Service life

The number of individual applications cause the impossibility of identifying all of the factors which may contribute to severe service operation. Consult your Caterpillar dealer for the unique maintenance that may be necessary for your engine.

An application is a severe service application if any of the following conditions apply:

Severe Environmental Factors

- Frequent operation in dirty air
- Frequent operation at an altitude which is above 1525 m (5000 ft)
- Frequent operation in ambient temperatures which are above 32° C (90° F)
- Frequent operation in ambient temperatures which are below 0° C (32° F)

Severe Operating Conditions

- Frequent operation with inlet air which has a corrosive content
- Operation with inlet air which has a combustible content
- Operation which is outside of the intended application
- Operation with a plugged fuel filter
- Extended operation at low idle (more than 20% of hours)
- Frequent cold starts at temperatures below 0° C (32° F)
- Frequent dry starts (starting after more than 72 hours of shutdown)
- Frequent hot shutdowns (shutting down the engine without the minimum of 2 minutes to 5 minutes of cool down time)
- Operation above the engine rated speed
- Operation below the peak torque speed
- Operating with fuel which does not meet the standards for distillate diesel fuel as stated in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Distillate Diesel Fuel”
- Operating with a blend of distillate fuel which contains more than 20 percent biodiesel

Improper Maintenance Procedures (Maintenance Procedures Which May Contribute to a Severe Service Application)

- Inadequate maintenance of fuel storage tanks from causes such as excessive water, sediment, and microorganism growth.
- Extending maintenance intervals beyond the recommended intervals
- Using fluids which are not recommended in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Extending maintenance intervals for changing the engine oil and engine coolant without S·O·S validation
- Extending maintenance intervals for changing air filters, oil filters, and fuel filters
- Failure to use a water separator
- Using filters which are not recommended by Special Publication, PEWJ0074, “2008 Cat Filter and Fluid Application Guide”
- Storing the engine for more than 3 months but less than 1 yr (For information about engine storage, refer to Special Publication, SEHS9031, “Storage Procedure for Caterpillar Products”)

i09600266

Maintenance Interval Schedule

SMCS Code: 1000; 7000; 7500; 7519

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

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

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

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

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

Use the service hour meter for the machine or machine system to determine when maintenance should be performed.

When Required

Every 10 Service Hours or Daily

Every 50 Service Hours or Weekly

Initial 250 Service Hours

Every 250 Service Hours or Monthly

Initial 500 Service Hours

Every 500 Service Hours or 3 Months

Every 1000 Service Hours or 6 Months

Every 2000 Service Hours or 1 Year

Every 2500 Service Hours

Every 3000 Service Hours or 2 Years

Every 3 Years

Every 5000 Service Hours

Every 6000 Service Hours

Every 10 000 Service Hours

Every 12 000 Service Hours or 6 Years

i04928690

ARD Spark Plug - Clean

SMCS Code: 1555-070

NOTICE
If the engine is running or the key is in the ON position the ARD plug will continue to fire. Turn the key to the OFF position before servicing the ARD plug.

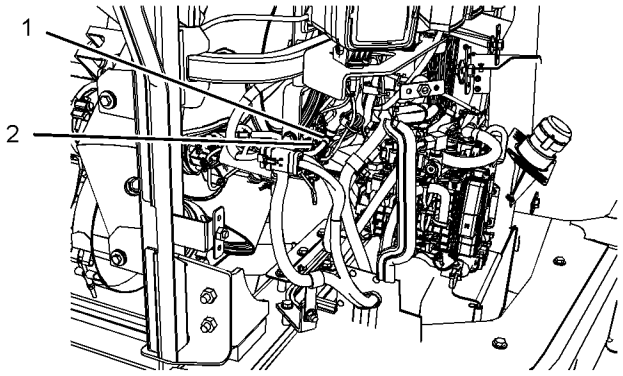

Illustration 157 g03097940

Tractor

(1) Wiring harness
(2) Spark plug

1. Remove wire harness (1) from spark plug (2).

2. Use a deep well socket and a breaker bar to loosen the spark plug. If necessary, see your Cat dealer for the part number of the socket. After the spark plug has been loosened, use the socket to remove the spark plug by hand in order to detect problems with the threads.

3. Clean the ground probe inside of the ARD combustion head. Run a plug bore brush through the hole in the ARD combustion head. Run the brush through the hole several times.

4. Carefully clean the spark plug with a nonmetallic cleaning pad. If the probe is bent, replace the spark plug.

NOTICE
Do not overtighten the spark plug. The shell can be cracked and the gasket can be deformed. The metal can deform and the gasket can be damaged. The shell can be stretched. This will loosen the seal that is between the shell and the insulator, allowing combustion pressure to blow past the seal. Serious damage to the engine can occur.

Use the proper torque.

5. Install the spark plug by hand until the spark plug contacts the ARD. Torque the spark plug to the proper specification. Refer to Specifications, “Spark Plug” for the proper torque specification.

Note: Damage to the spark plug can occur if dropped. Do not install a dropped spark plug.

6. Connect the wiring harness.

i05835812

Accumulator (Brake) - Check

SMCS Code: 4263-535

⚠ WARNING

Pressurized System!

Hydraulic accumulators contain gas and oil under high pressure. DO NOT disconnect lines or disassemble any component of a pressurized accumulator. All gas pre-charge must be removed from the accumulator as instructed by the service manual before servicing or disposing of the accumulator or any accumulator component.

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

Only use dry nitrogen gas to recharge accumulators. See your Cat dealer for special equipment and detailed information for accumulator service and charging.

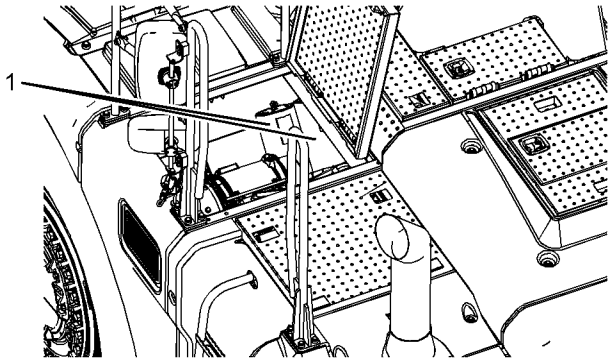

Illustration 158 g03027714

Brake accumulators (1) are located on the front of the tractor.

Consult your Cat dealer for the correct checking procedure, the correct filling procedures, and the recommended pressure.

i05835819

Accumulator (Cushion Hitch) - Check

SMCS Code: 5077-535

⚠ WARNING

Pressurized System!

Hydraulic accumulators contain gas and oil under high pressure. DO NOT disconnect lines or disassemble any component of a pressurized accumulator. All gas pre-charge must be removed from the accumulator as instructed by the service manual before servicing or disposing of the accumulator or any accumulator component.

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

Only use dry nitrogen gas to recharge accumulators. See your Cat dealer for special equipment and detailed information for accumulator service and charging.

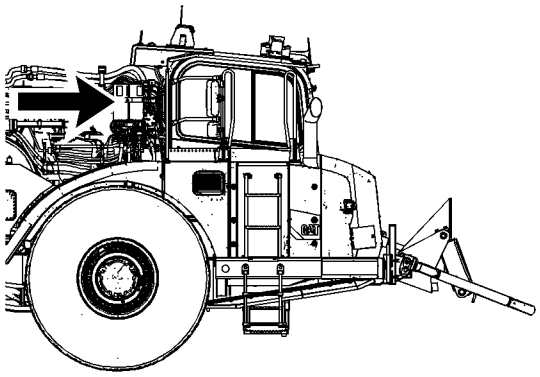

Illustration 159 g02108720

The cushion-hitch accumulators are located on the right side of the machine near the center hitch.

Check the precharge pressure in the cushion-hitch accumulators. Add nitrogen, if necessary. Refer to Specifications, Systems Operation, Testing and Adjusting, “Accumulator (Cushion-Hitch) - Test and Charge”. You may need to consult your Cat dealer for the checking procedure.

i03639910

Backup Alarm - Test

SMCS Code: 7406-081

The backup alarm is on the rear of the machine.

1. Turn the engine start switch to the ON position in order to perform the test.
2. Apply the service brakes.
3. Move the transmission control lever to the REVERSE position. The backup alarm should start to sound immediately.

   The backup alarm should sound immediately. The alarm alerts the personnel behind the machine that the machine is backing up. The backup alarm should continue to sound until the transmission control lever is moved to the NEUTRAL position or to the FORWARD position.

i01851167

Battery - Clean/Check

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

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. At the battery disconnect switch, disconnect the negative battery cable that is connected to the frame.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Check the battery terminals for corrosion. If corrosion is present, clean the battery terminals with a wire brush.
5. Coat the battery terminals with petroleum jelly, if necessary.
6. Connect the negative battery cable at the battery disconnect switch.
7. Install the key for the battery disconnect switch. Turn the key to the ON position.

i08316356

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

i01851175

Battery or Battery Cable - Inspect/Replace

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

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

2. Turn the battery disconnect switch to the OFF position. Remove the key.

3. At the battery disconnect switch, disconnect the negative battery cable that is connected to the frame.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Disconnect the negative battery cable from the terminals of the battery.

5. Perform the necessary repairs. Replace the cable or the battery, as needed.

6. Connect the negative battery cable to the terminals of the battery.

7. Connect the negative battery cable at the battery disconnect switch.

8. Install the key for the battery disconnect switch. Turn the key to the ON position.

i07331569

Belts - Inspect/Replace

SMCS Code: 1397-040; 1397-510

Inspect

1. Park the machine on level ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.

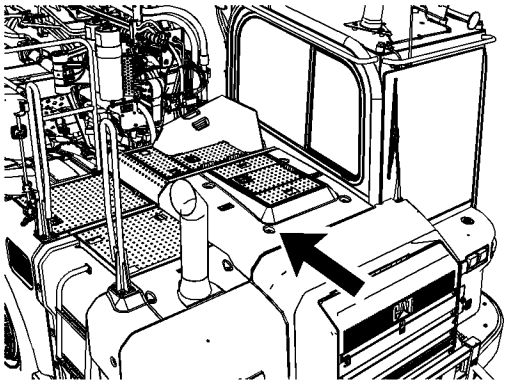

Illustration 160 g03027728

2. Unbolt and remove the engine access cover on the top of the tractor.

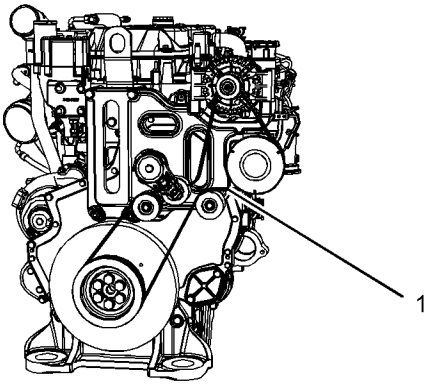

Illustration 161 g03027821

3. Inspect the condition of the belt (1). Inspect the belt for the following conditions:

- excessive cracking
- excessive wear
- excessive stretching
- excessive damage
- missing pieces
- frayed areas

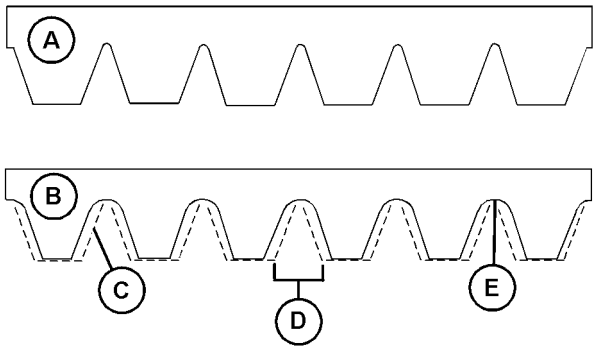

Illustration 162 g06114636

(A) New belt
(B) Worn belt

4. 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.

5. Close the engine access cover.

Replace

If the belt needs replacement, refer to the Service Manual or contact your local Cat dealer.

i02556173

Bowl Lift Cylinder Bearings - Lubricate

SMCS Code: 5303-086-BD

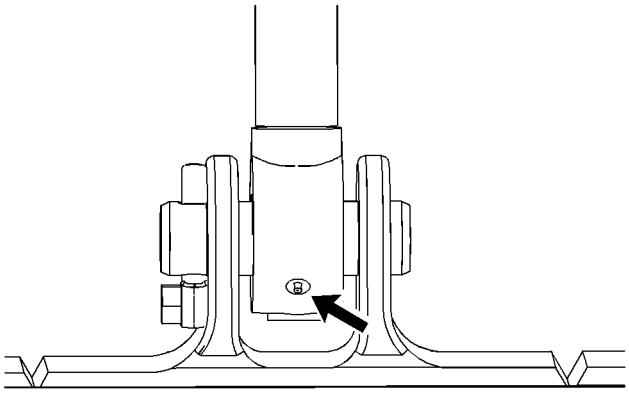

Illustration 163 g01128849

The fittings for the bowl lift cylinder bearings are located on the front of the bowl.

1. Wipe the fittings before you apply lubricant through the fittings.

2. Apply the appropriate lubricant through each fitting in order to lubricate the bowl lift cylinder bearings.

i06786383

Brake Cooling Oil - Change

SMCS Code: 5050-044-OC

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.

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

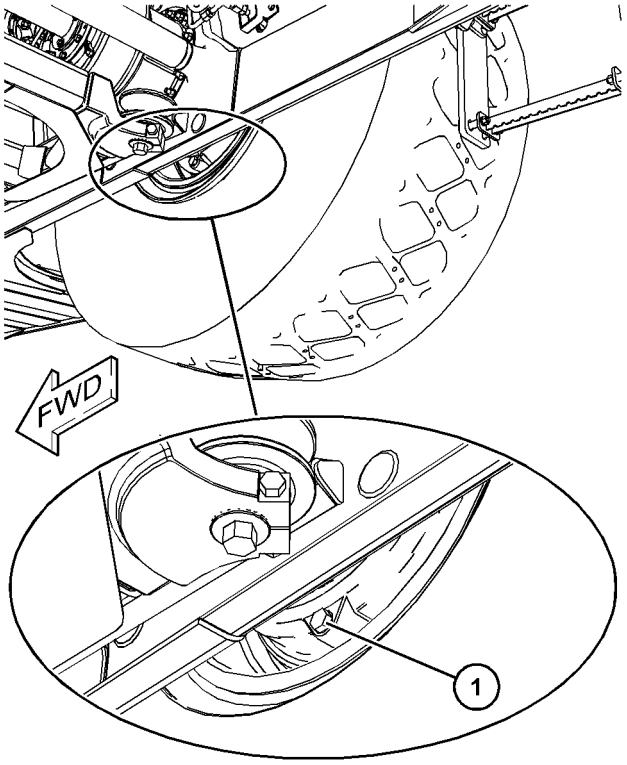

Illustration 164 g06115817

(1) Drain valve

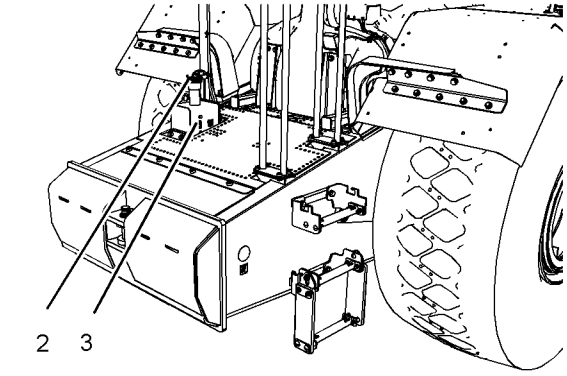

Illustration 165 g03468678

(2) Filler tube
(3) Oil level sight gauge

Drain valve (1) is on the back of the right rear wheel of the machine.

1. Engage the parking brake. Stop the engine.

2. Clean the area around drain valve (1). The drain valve is on the bottom of the brake cooling tank.

3. Open drain valve (1). Drain the oil into a suitable container.

Note: Filler tube (2) is on the right-hand side of the scraper .

4. Clean the area around filler tube (2). Remove the cap.

5. Fill the brake cooling tank with oil through the filler tube. Fill the brake cooling tank to the “MAX” mark on the oil level sight gauge (3). Refer to Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities” for further information.

6. Clean the filler cap. Install the filler cap.

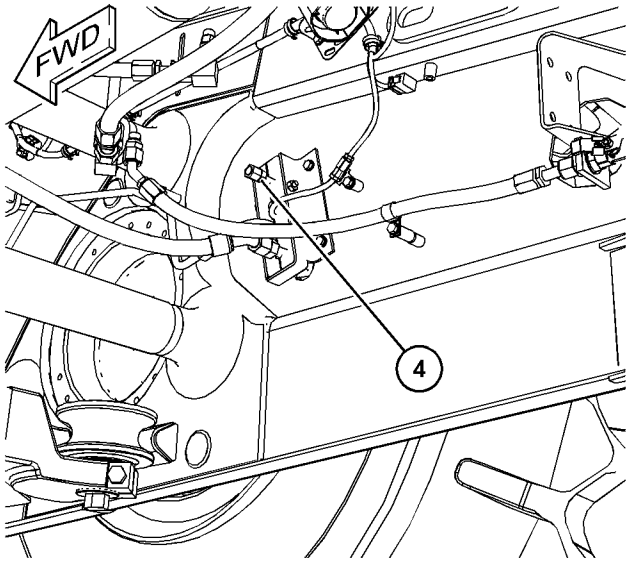

Illustration 166 g06115829

View of the rear of the scraper arrangement

(4) Bleeder cap

Note: If oil is coming out of the filler tube after changing the brake cooling oil, the brake cooling oil system may require bleeding. Refer to Illustration 166 for the location of bleeder cap (4).

7. Remove bleeder cap (4) from each side and allow any trapped air to escape.

8. Install bleeder caps (4). Check the oil level in the brake cooling oil tank and fill the brake cooling oil tank to the “Max” mark on the oil level sight gauge (3).

i05191547

Brake Cooling Oil Level - Check

SMCS Code: 5050-535-FLV

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

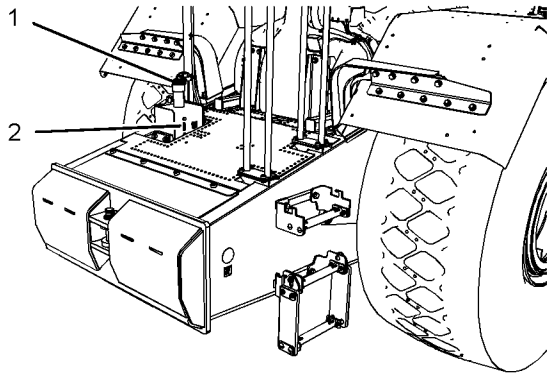

Illustration 167 g02830156

The hydraulic tank sight gauge is positioned on the rear of the machine.

1. Operate the machine until the oil is warm.

2. Park the machine on a level surface with the front wheels straight ahead.

3. Lower all attachments to the ground.

4. Engage the parking brake. Stop the engine.

5. Maintain the oil level above the “MIN” mark on sight gauge (2).

6. If necessary, add oil. Clean the area around hydraulic oil filler cap (1) of any dirt or debris. This must be done before the hydraulic oil filler cap can be removed.

7. Slowly remove the hydraulic oil filler cap in order to relieve the tank pressure.

8. Add oil through the filler tube.

9. Clean the hydraulic oil filler cap and install the hydraulic oil filler cap.

i05191588

Brake Cooling Oil Sample - Obtain

SMCS Code: 5050-008-OC; 7542

⚠ 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, “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.

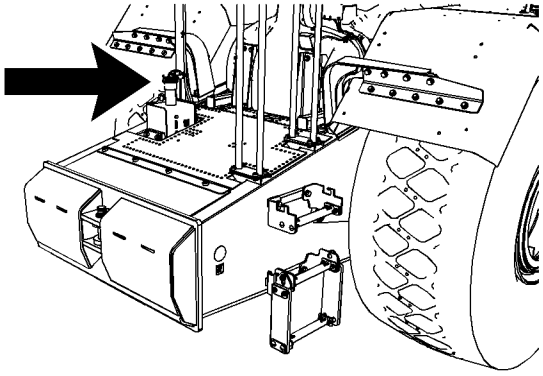

Illustration 168 g03326933

The oil sample must be taken from the filler tube.

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

i02444593

Brakes, Indicators and Gauges - Test

SMCS Code: 4251-081; 4267-081; 4269-081; 7000-081; 7450-081; 7490-081

Before you operate the machine, perform the following checks and make any necessary repairs:

1. Look for broken lenses on the gauges, broken indicator lights, broken switches, and other broken components in the cab.
2. Start the engine.
3. Look for inoperative gauges.
4. Turn on all machine lights. Check for proper operation.
5. Sound the forward horn.
6. Move the machine forward and test the service brakes. If the service brakes malfunction, consult your Caterpillar dealer for proper repair.
7. Engage the parking brake.
8. Move the machine forward in order to test the parking brake. If the parking brake malfunctions, consult your Caterpillar dealer for proper repair.
9. Stop the engine.

i04041873

Braking System - Test

SMCS Code: 4251-081; 4267-081

Service Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move during test, reduce the engine speed immediately and engage the parking brake.

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

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

This test determines whether the service brake is functional. This test is not intended to measure the maximum brake holding effort.

1. Start the tractor engine and the scraper engine.
2. Disengage the scraper transmission by moving the scraper transmission neutral/run switch to the DISENGAGE position.
3. Raise the bowl.
4. Apply the service brake and release the parking brake.
5. While the engine is at an idle and the service brake is applied, move the transmission control to the SECOND SPEED position.
6. Gradually increase the engine rpm. The service brake should prevent machine movement when the engine is running at 1200 rpm or less.

   If the machine moves with the engine rpm less than 1200 rpm, consult your Cat dealer for an inspection of the machine.
7. Reduce the engine speed to low idle and move the transmission control to the NEUTRAL position. Engage the parking brake. Lower the bowl to the ground and stop the engine.

NOTICE
If the machine moved while testing the brakes, contact your Caterpillar Dealer. Have the dealer inspect and, if necessary, repair the service brakes before returning the machine to operation.

Note: If the friction material for the brakes needs to be replaced, the new friction material may require conditioning for maximum performance. Consult your Cat dealer or see Special Instruction, SEHS9187 for the procedure for conditioning.

Parking Brake Holding Ability Test

Make sure that no people or obstacles are in the area around the machine.

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

This test determines whether the parking brake is functional. This test is not intended to measure the maximum brake holding effort.

1. Start the tractor engine and the scraper engine.
2. Disengage the scraper transmission by moving the scraper transmission neutral/run switch to the DISENGAGE position.
3. Raise the bowl.
4. Apply the parking brake.
5. While the engine is at an idle and the parking brake is applied, move the transmission control to the SECOND SPEED position.

⚠ WARNING

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

6. Gradually increase the engine rpm. The parking brake should prevent machine movement when the engine is running at 900 rpm or less.

If the machine moves with the engine rpm less than 900 rpm, consult your Cat dealer for an inspection of the machine.

7. Reduce the engine speed and move the transmission control to the NEUTRAL position. Lower the bowl to the ground and stop the engine.

NOTICE
If the machine moved while testing the brakes, contact your Caterpillar Dealer. Have the dealer inspect and, if necessary, repair the service brakes before returning the machine to operation.

Note: If the friction material for the brakes needs to be replaced, the new friction material may require conditioning for maximum performance. Consult your Cat dealer or see Special Instruction, SEHS9187 for the procedure for conditioning.

i05665613

Breather (Brake Cooling) - Replace

SMCS Code: 4257-510-BRE

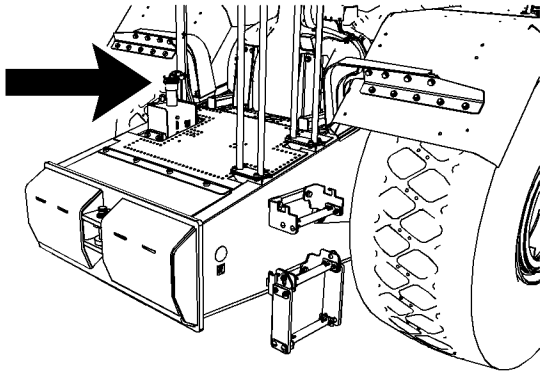

Illustration 169 g03326933

The brake cooling breather is located on the rear of the machine.

Use the following procedure to replace the breather.

1. Park the machine on a level surface. Engage the parking brake and stop the engine.

2. Remove the old breather.

3. Install the new breather.

i05474539

Breather (Differential and Final Drive) - Replace

SMCS Code: 3258-510-BRE; 4050-510-BRE

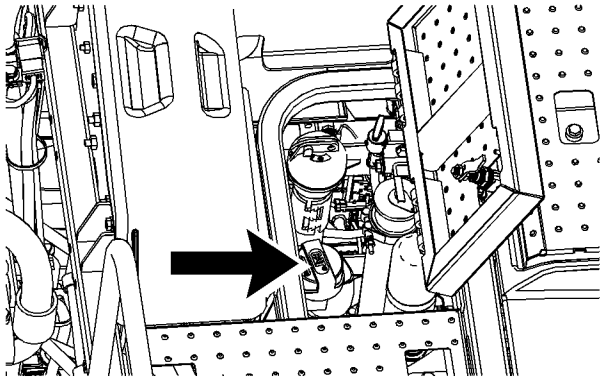

Illustration 170 g03028279

The differential and final drive breather for the tractor is located on the top of the tractor.

Use the following procedure to replace the breather.

1. Remove the breather.

2. Clean the area around the breather.

3. Install the new breather.

i03980009

Breather (Fuel Tank) - Replace

SMCS Code: 1273-510-BRE

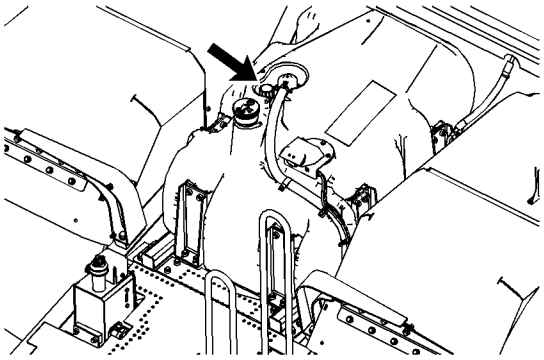

Illustration 171 g02164933

The fuel tank breather is located on top the fuel tank on the scraper.

Use the following procedure to replace the breather.

1. Park the machine on a level surface. Engage the parking brake and stop the engine.
2. Remove the old breather.
3. Install the new breather.

i04912205

Breather (Transmission) - Replace

SMCS Code: 3030-510-BRE

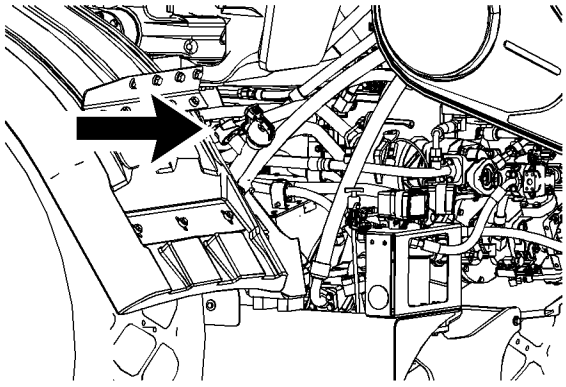

Illustration 172 g03079956

The transmission breather for the tractor is located on the left of the tractor.

Use the following procedure to replace the breather.

1. Park the machine on a level surface. Engage the parking brake and stop the engine.
2. Remove the breather.
3. Install the new breather.

i03898689

Cab Air Filter - Clean/Replace

SMCS Code: 7311-070-FI; 7311-510-FI; 7342-070; 7342-510

Cleaning the Filters

Outside Filters

Note: Clean the air filters more often during dusty conditions.

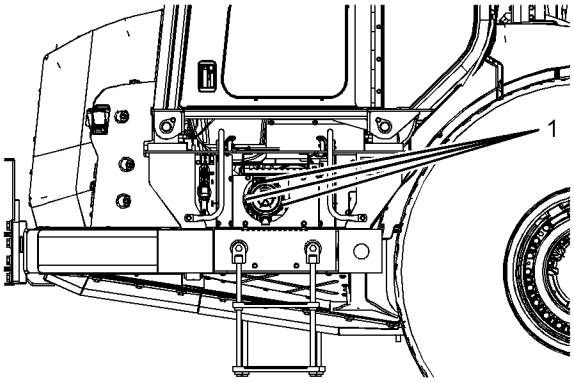

Illustration 173 g02142165

1. Remove latches (1) which hold the filter element in place.
2. Remove the filter element. Clean the filter element with pressure air or wash the filter element in warm water. Use a nonsudsing household detergent. Rinse the filter element in clean water and air dry the filter element thoroughly.
3. After you clean the filter element, inspect the filter element. Do not use a filter element with damaged pleats or a damaged seal. If the filter element is damaged, replace the filter element.
4. Install the filter element. Replace latches (1).

Inside Filter

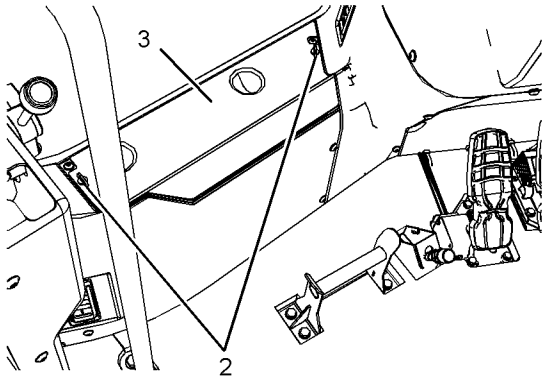

Illustration 174 g02142169

1. Turn thumb screws (2) counterclockwise in order to remove the thumb screws. Remove the filter cover (3).

2. Remove the filter element. Clean the filter element with pressure air or wash the filter element in warm water. Use a nonsudsing household detergent. Rinse the filter element in clean water and air dry the filter element thoroughly.

3. After you clean the filter element, inspect the filter element. Do not use a filter element with damaged pleats or a damaged seal. If the filter element is damaged, replace the filter element.

4. Install the filter element. Reinstall filter cover (3).

5. Turn thumb screws (2) clockwise in order to install the thumb screws.

i04909553

Circuit Breakers - Reset

SMCS Code: 1420-529

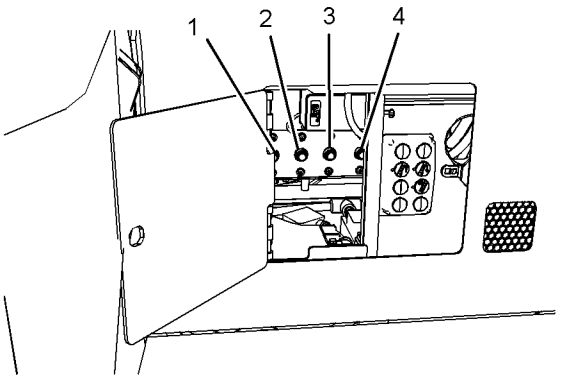

Illustration 175 g03028442

The circuit breakers for the tractor are located on the front of the cab.

Note: Ensure that the engine start switch is in the ON position.

Circuit Breaker/Reset – Push in the button in order to reset the circuit breaker. If the electrical system is working properly, the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.

Switched Power (1) – 80 AMP

Chassis/Relay Block (2) – 80 AMP

Unswitched Power (3) – 80 AMP

Alternator (4) – 150 AMP

i05736498

Clearance between Elevator Flight and Cutting Edge - Check/Adjust

SMCS Code: 6232-025; 6232-535

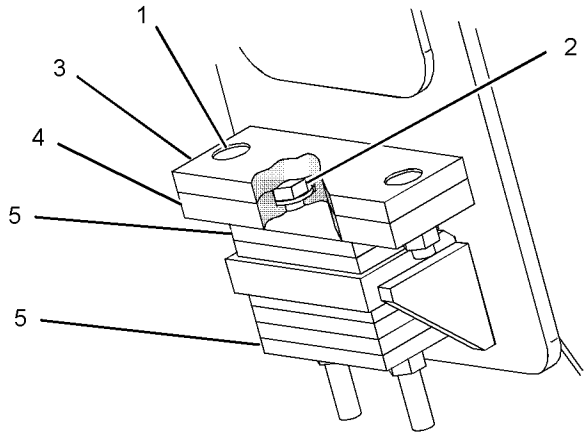

Illustration 176 g03645081

The clearance between the elevator flights and the top of the cutting edge may be adjusted. The distance between the top of the cutting edge and the elevator flights is set at the factory at approximately 61 mm (2.4 inch). Two shims (5) are located on top of the welded bracket when the machine is shipped from the factory. The welded brackets are located on each side of the bowl. Place the shims equally on each of the brackets. Special plates (3) and (4) are located above the removable shims (5). Plates (3) and (4) must remain in the top position. The top two plates prevent damage to the attaching bolts (2). Four shims (5) are located on the bottom of the welded bracket when the machine is shipped from the factory.

Shims may need to be added to the top of the bracket when you are working in material which is compacted. The space that is between the cutting edge and the elevator flight will become wider. Shims may also need to be added to the top of the bracket when the components of the elevator become worn.

Shims may need to be removed from the top of the bracket when you are working in loose material. The space that is between the cutting edge and the elevator flight will become narrower.

1. Park the machine on level ground. Lower the bowl. Apply the parking brake.

2. Raise the front of the elevator with a jack or a hoist. Place blocks or stands under the front of the elevator once the elevator has been raised. Lower the elevator until the elevator is resting on the blocks or stands.

Note: The front of the elevator must not be resting on the top plate.

3. Remove bolts (1) that hold plate (3) in place. Remove plate (3).

4. Remove bolts (2). Remove plate (4).

5. Reposition shims (5) in order to achieve the proper distance.

6. Replace plate (4). Replace bolts (2).

7. Replace plate (3). Replace bolts (1).

Note: Bolts (1) have a special torque requirement. Refer to Specifications, SENR3130, “Torque Specifications” “Ground Engaging Tool (G.E.T.) Fasteners” for the correct information.

8. Follow Steps 3 through 5 in order to position the shims on the other side of the bowl.

9. Lower the front of the elevator.

i05481710

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

NOTICE
If excessively dirty, clean condenser with a brush. To prevent damage or bending of the fins, do not use a stiff brush.

Repair the fins if found defective.

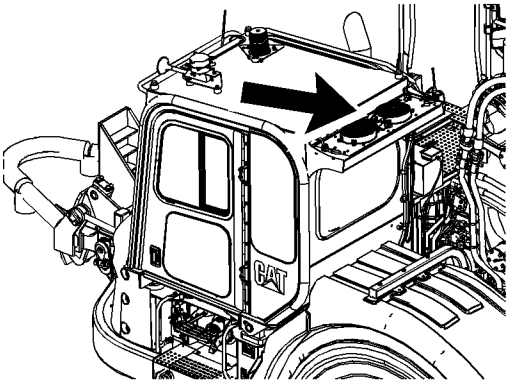

Illustration 177 g03464679
Typical View

The refrigerant condenser is located behind the cab.

1. Inspect the condenser for debris. If necessary, clean the condenser.
2. Use clean water in order to wash off all dust and dirt from the condenser.
3. Replace the grill.

i05436363

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL; 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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

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

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

NOTICE
Mixing ELC with other products 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 see the topic Extended Life Coolant (ELC) in the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

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.

If the coolant in the machine is changed to Extended Life Coolant (ELC) from another type of coolant, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Cat Extended Life Coolant (ELC)”.

If the coolant is dirty or if you observe any foaming in the cooling system, drain the coolant before the recommended interval.

1. Park the machine on a level surface and engage the parking brake. Stop the engine. Allow the engine to cool.
2. Clean the area around the cooling system pressure cap of any dirt or debris. This must be done before the cooling system pressure cap can be removed.
3. Slowly remove the cooling system pressure cap in order to release pressure.

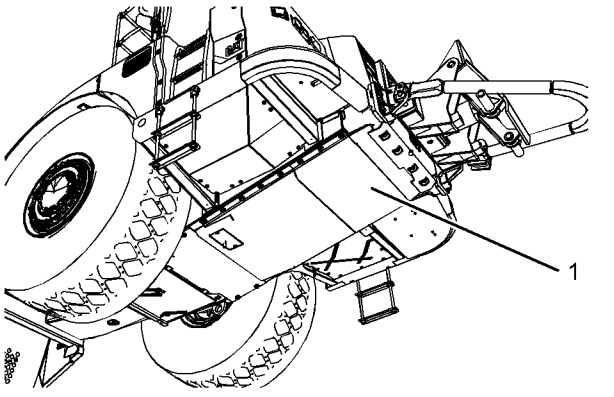

Illustration 178 g03427890

4. The coolant drain valve is located behind guard (1). Remove the guard for the coolant drain valve.
5. Open the coolant drain valve. Drain the coolant into a suitable container.
6. Flush the cooling system. Follow step 6a through step 6h in order to flush the cooling system.

   a. Close the drain valve.

b. Fill the cooling system with clean water.

c. Install the pressure cap.

NOTICE
Do not run the engine with plain water in the cooling system for more than 5 min. The water may vaporize and trapped air may damage the NRS cooler.

d. Start the engine and run the engine until the engine reaches operating temperature.

e. Stop the engine and allow the engine to cool.

f. Loosen the pressure cap slowly in order to relieve any pressure in the cooling system.

g. Open the drain valve that is on the bottom of the radiator and allow the coolant to drain into a suitable container.

h. Flush the radiator with clean water until the draining water is transparent.

7. Close the coolant drain valve. Install the access cover.

8. Add ELC. Refer to the following topics:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Cooling System Specifications”
- Operation and Maintenance Manual, “Capacities (Refill)”

9. After the cooling system has been filled, perform the following procedures during initial start-up:

a. Start the engine without the filler cap.

b. Run the engine at low idle for 10 minutes.

c. Then, increase the engine speed to a high idle until the water temperature regulator is open and the coolant level is stabilized.

d. Maintain the coolant at the proper level as the water temperature regulator opens, and the air is purged from the system. Refer to Operation and Maintenance Manual, “Cooling System Coolant Level - Check”.

10. Install the cooling system pressure cap.

11. Stop the engine.

i02336986

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-538-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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

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

Table 20

Amount of Caterpillar Extender (ELC)	
Cooling System Capacity	Recommended Amount of Caterpillar Extender
22 to 30 L (6 to 8 US gal)	0.57 L (20 oz)
31 to 38 L (8 to 10 US gal)	0.71 L (24 oz)
39 to 49 L (10 to 13 US gal)	0.95 L (32 oz)
50 to 64 L (13 to 17 US gal)	1.18 L (40 oz)
65 to 83 L (17 to 22 US gal)	1.60 L (54 oz)
84 to 114 L (22 to 30 US gal)	2.15 L (72 oz)
115 to 163 L (30 to 43 US gal)	3.00 L (100 oz)
164 to 242 L (43 to 64 US gal)	4.40 L (148 oz)

Note: For cooling systems with larger capacities, use the formula in Table 21 in order to determine the correct amount of extender.

Table 21

Calculation of ELC Extender
$V^{(1)} \times 0.02 = X^{(2)}$

(1) V is the total volume of the cooling system.
(2) X is the amount of ELC Extender that is required.

For additional information about adding an extender, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Extended Life Coolant (ELC)” or consult your Caterpillar dealer.

i04909641

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

⚠ 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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

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

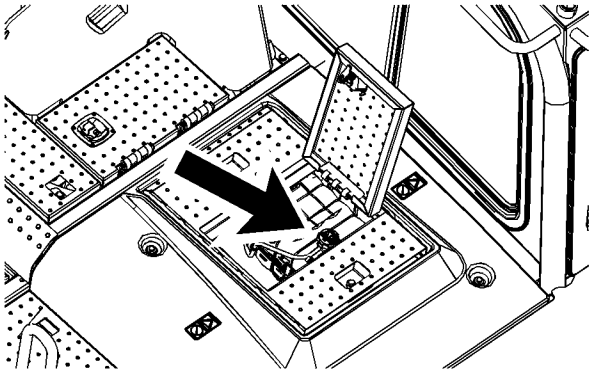

Illustration 179 g03028550

1. If necessary, add the appropriate coolant mixture.

2. Open the cover.

3. Clean the area around the cap of any dirt or debris. This cleaning must be done before the cap can be removed.

4. Remove the cap slowly in order to relieve pressure.

5. Add coolant to the shunt tank.

6. Install the cap. Close the cover.

i04929991

Cooling System Coolant Sample (Level 1) - Obtain

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

⚠ 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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

Note: Ensure that the engine is warmed up to operating temperature and running in order to obtain the sample.

Note: A Coolant Sample (Level 1) is not required 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. Including 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 coolant/antifreeze

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

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

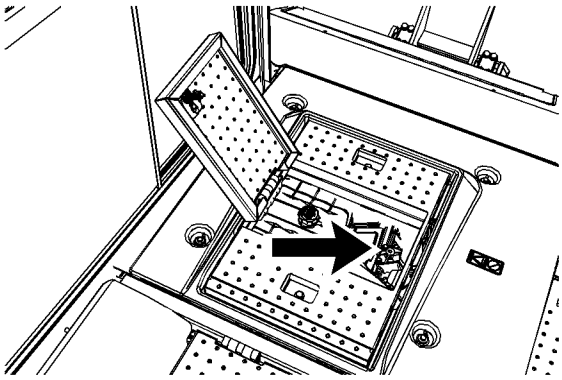

Illustration 180 g03098077

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

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

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

i04054030

Cooling System Coolant Sample (Level 2) - Obtain

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

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.

⚠ 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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

Note: Ensure that the engine is warmed up to operating temperature and running in order to obtain the sample.

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

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

Submit the sample for Level 2 analysis.

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

i04909660

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 filler cap slowly to relieve pressure only when engine is stopped and radiator 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 Conditioner contains alkali. Avoid contact with skin and eyes.

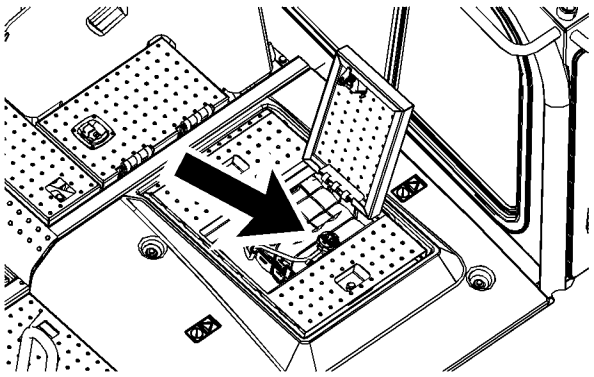

Illustration 181 g03028550

The cooling system pressure cap is located on top of the engine compartment.

1. Clean the area around the cooling system pressure cap of any dirt or debris. This cleaning must be done before the cooling system pressure cap can be removed.
2. Remove the cooling system pressure cap slowly in order to relieve pressure.
3. Inspect the cooling system pressure cap and the cap seal for damage, deposits, and foreign material. Clean the cooling system pressure cap with a clean cloth. Replace the cooling system pressure cap if the cap is damaged.
4. Install the cooling system pressure cap.

i09597983

Cutting Edges and End Bits - Inspect/Replace

SMCS Code: 6801-510; 6801-040; 6804-510; 6804-040

WARNING

Personal injury or death can result, if the bowl is not blocked up. Block the bowl before changing cutting edge.

WARNING

Bowl or apron movement can cause serious injury or death.

To prevent movement, block the bowl and apron when performing maintenance in the bowl area.

WARNING

Retaining bolts can have sharp edges that may cause personal injury. Do not hold the bolts by hand. Use appropriate tools to hold and remove bolts.

NOTICE
Do not attempt to increase wear life by welding on cutting edges. This may result in premature failures.

Change or rotate the cutting edges or router bits, before the mounting surfaces become worn.

Note: Any material that might fall on the worker should be removed from the apron and from the sides of the bowl.

1. Park the machine on level ground.

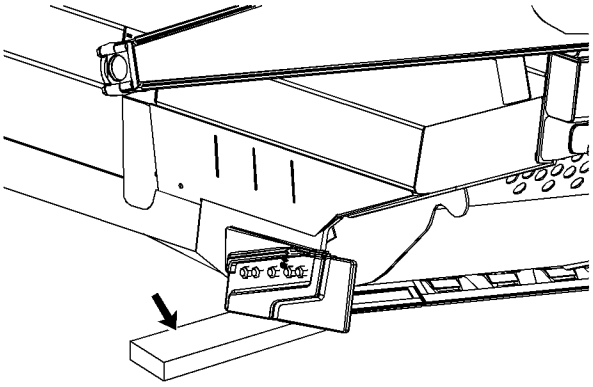

Illustration 182 g02109639

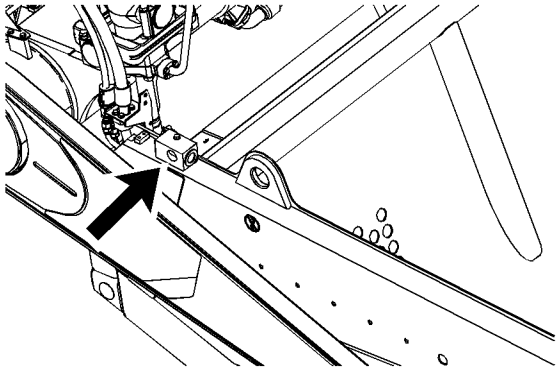

Illustration 183 g02481477

2. Raise the bowl and block up the bowl. Block the bowl on both sides. Blocks should be of material that is suitable for carrying the weight of the bowl. Only block up the bowl to a sufficient height for the removal of the cutting edges. Raise the apron and pin the apron. Refer to Operation and Maintenance Manual, “Blocking the Bowl and Apron” for more information.

3. Engage the parking brake.

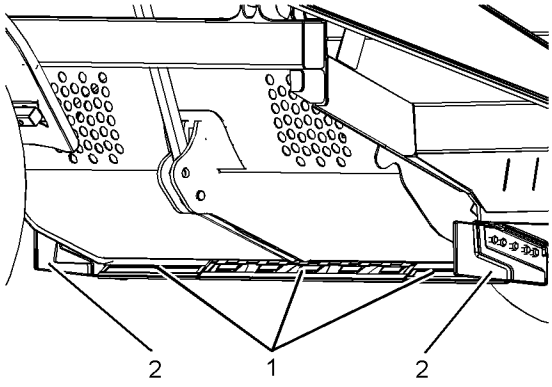

Illustration 184 g02109640

4. If the cutting edges (1) are worn, remove the bolts for the cutting edges (1). If the opposite sides of the cutting edges are not worn, rotate the cutting edges and install the opposite sides of the cutting edges outward. Clean the contact surfaces before installing.

5. Install new cutting edge sections if the cutting edges are worn on both sides.

6. If the end bits (2) are worn, remove the bolts for the end bits (2). If the opposite sides of the end bits are not worn, rotate the end bits and install the opposite sides of the end bits outward. Clean the contact surfaces before installing.

7. Install new end bits if the end bits are worn on both sides.

8. Install the bolts and tighten the bolts to the specified torque. See Service Manual, SENR3130, “Torque Specifications” “Ground Engaging Tool (G. E.T.) Fasteners”.

9. Raise the bowl and remove the blocking. Lower the bowl to the ground.

10. After a few hours of operation, check the bolts for proper torque. Tighten the bolts, if necessary.

i08373285

DEF Filler Screen - Clean
(Emission Related Component)

SMCS Code: 108K-070-Z3

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

The filler neck adapter filter screen in the diesel exhaust fluid tank will need to be cleaned or replaced if contaminated.

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

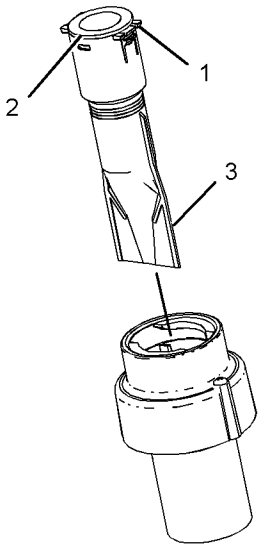

Illustration 185 g03618438

2. Use a screwdriver or pick to press the tabs (1).

3. Pull the screen assembly (2) upward from both sides and remove from the fill neck adapter

4. Use water or compressed air to clean out the filter screen (3). If there is any debris inside, let dry and remove the debris by turning the screen upside down and dumping debris out. If the debris cannot be removed or the filter screen is damaged, replace the filler neck adapter filter screen.

i08364413

DEF Manifold Filters - Replace
(Emission Related Component)

SMCS Code: 108K-510-FI

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools 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: Refer to Special Instruction, REHS8231, “Removal Procedures for Diesel Exhaust Fluid (DEF) Connectors” for the correct removal procedure of hose assemblies (1) and (5).

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

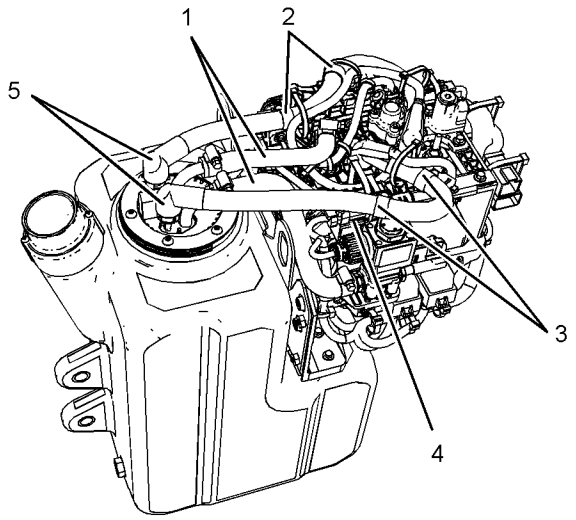

Illustration 186 g03662693
Typical Example

2. Clamp off hoses (1).

3. Remove clips (2) and (3). Disconnect harness assemblies (4). Remove hose assemblies (1) and (5).

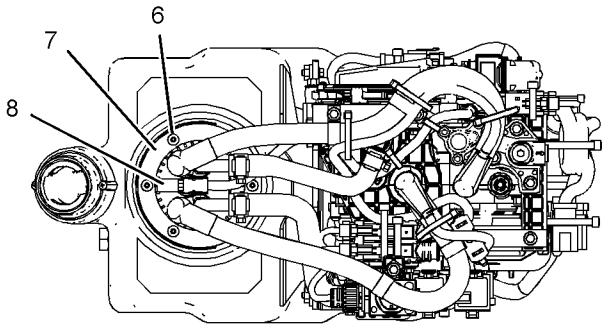

Illustration 187 g03665701
Typical Example

4. Remove bolts (6), plate (7), tank manifold (8), and gasket (not shown).

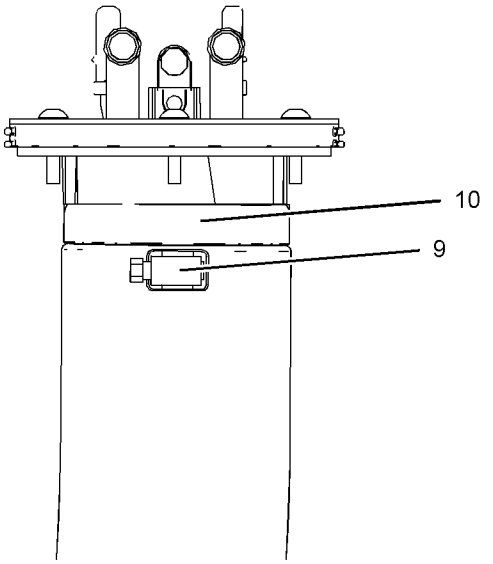

Illustration 188 g03665737

5. Unscrew the band clamp (9) and remove the band clamp from the filter base (10).

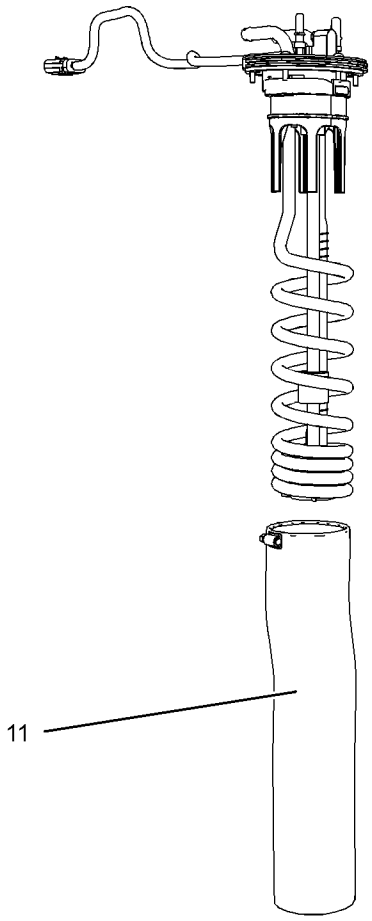

Illustration 189 g03664911

6. Remove the filter (11) from the filter base.

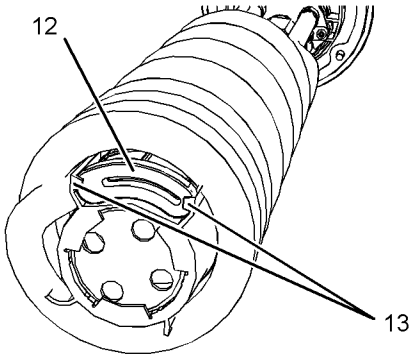

Illustration 190 g03666075

7. Remove the suction filter (12) at the bottom of the header coils by pulling tabs (13). Replace with a new suction filter.

8. Install new filter by pulling filter over the manifold coils up to the bottom of the assembled filter base.

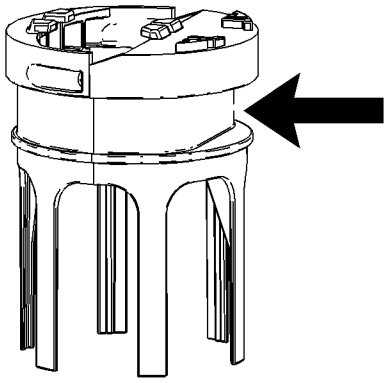

Illustration 191 g03665754

9. Tighten the band clamp 4.5 ± 0.7 N·m (40 ± 6 lb in), ensuring that the band clamp is aligned, as shown in illustration 191 , to the flat spot on the base. Ensure that the filter does not bunch when tightening the band clamp.

10. Install the tank manifold following steps 4 through 6 in reverse order with a new gasket.

11. Tighten bolts (6) in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Tighten bolts (6) a second time in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Apply rubber lubricant to the o-ring seal inside of hose assemblies (1).

i05436401

Diesel Exhaust Fluid - Fill

SMCS Code: 108K-544

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

Dispose of all fluids according to local regulations and mandates.

Reference: See Operation and Maintenance Manual, “Capacities (Refill)” for the capacity of the fuel tank for your machine.

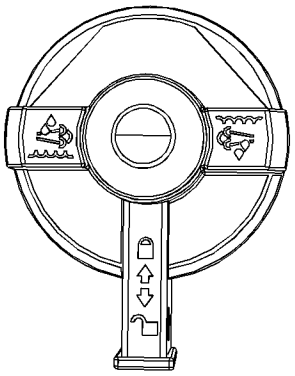

Illustration 192 g03379943
DEF Tank Filler Cap

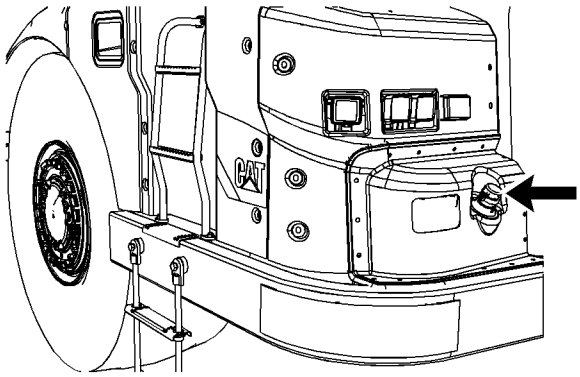

Illustration 193 g03379950

1. Clean blue DEF tank filler cap (1) and the surrounding area.

2. Remove the blue DEF tank filler cap.

3. Fill the tank with diesel exhaust fluid (DEF).

Note: Do not fill the DEF tank from a contaminated container or funnel.

Note: Do not over fill the tank. DEF can freeze and needs room for expansion.

4. Install the blue DEF tank filler cap.

Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on diesel exhaust fluid (DEF) guidelines.

i08781596

Diesel Exhaust Fluid Filter - Replace
(Emissions Related Component)

SMCS Code: 108K-510-FI

⚠ WARNING

Personal injury can result from improper handling of chemicals.

Make sure you use all the necessary protective equipment required to do the job.

Make sure that you read and understand all directions and hazards described on the labels and material safety data sheet of any chemical that is used.

Observe all safety precautions recommended by the chemical manufacturer for handling, storage, and disposal of chemicals.

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

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

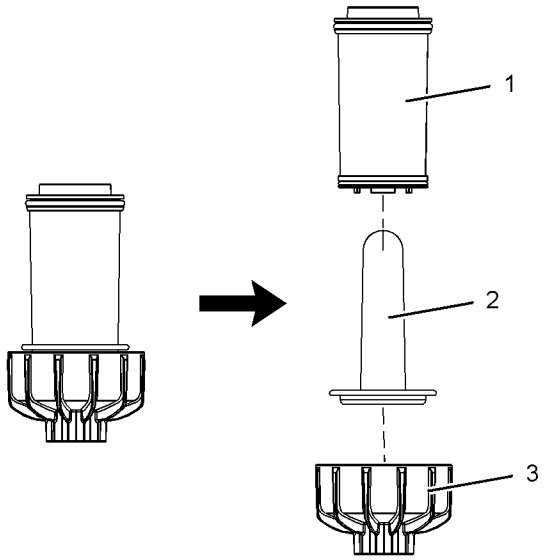

Illustration 194 g03332612
Typical Example

2. Remove the diesel exhaust fluid (DEF) filter cap (3) with a 27 mm (1.06 inch) wrench.

3. Remove the rubber cone insert (2) from the DEF filter (1).

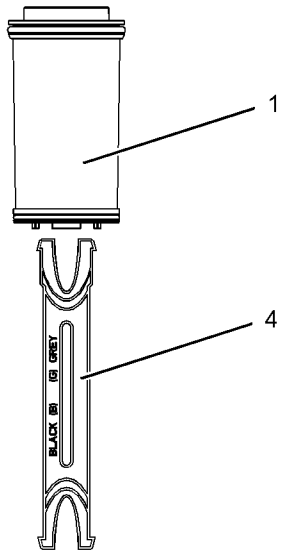

Illustration 195 g03332637
Typical Example

4. Insert the DEF filter removal tool (4) into the DEF filter (1) and remove the DEF filter (1).

Note: Avoid twisting the DEF filter (1) upon removal. Twisting may cause a tear.

5. Clean the area around the filter housing.

6. Lubricate the seals of the new DEF filter (1) with diesel exhaust fluid or distilled water.

7. Install new DEF filter (1) and rubber cone insert. Torque the filter to 20 ± 5 N·m (14.8 ± 3.7 lb ft) with a 27 mm (1.06 inch) wrench.

Note: Avoid twisting the DEF filter (1) upon installation. Twisting may cause a tear.

i08364429

Diesel Exhaust Fluid Injector - Replace
(Emission Related Component)

SMCS Code: 108I-510

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

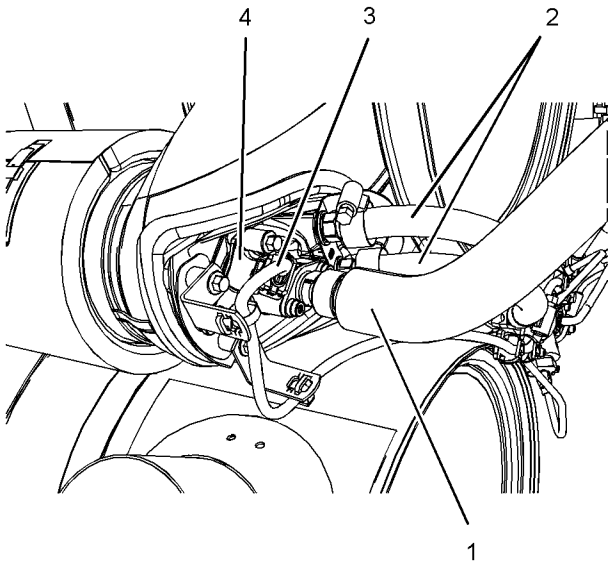

Illustration 196 g03363165
Typical example shown

2. Remove the diesel exhaust fluid (DEF) line (1) from the injector (4).

3. Remove the coolant lines (2) from the injector.

4. Remove the electrical connector (3) from the injector.

5. Remove the bolts from the injector and remove the injector.

6. Replace gasket. The steel side of the gasket should face towards diesel particulate filter (DPF) outlet.

7. Replace the injector.

8. Apply anti-seize to bolt threads.

9. Torque the bolts of the injector to 5 N·m (3.7 lb ft). Retighten all bolts to 5 N·m (3.7 lb ft), then turn 90°.

10. Connect the electrical connector.

11. Connect the coolant lines.

12. Connect the DEF line.

i08778225

Diesel Particulate Filter - Clean
(Emission Related Component)

SMCS Code: 108F-070; 1091-070

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

Consult your Cat dealer when the DPF needs to be cleaned.

The approved Caterpillar DPF maintenance procedure requires that one of the following actions be taken when the DPF needs to be cleaned:

- The DPF from your machine can be replaced with a new DPF
- The DPF from your machine can be replaced with a remanufactured DPF
- The DPF from your machine can be cleaned by your local authorized Cat dealer, or a Caterpillar approved DPF cleaning machine, and reinstalled

Note: To maintain emissions documentation, the DPF that is removed from the machine when the DPF is cleaned must be reinstalled on the same machine.

Note: A specific ash service regeneration must be performed before removing a DPF that will be cleaned. All three scenarios listed above require a reset of the ash monitoring system in the engine ECM.

i03899269

Differential Thrust Pin Clearance - Check

SMCS Code: 3258-535-T9

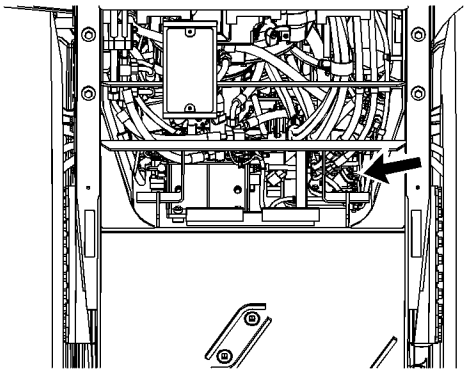

Illustration 197 g02142655

The differential thrust pin is located under the machine on the left side. Remove the rear belly guard in order to access the differential thrust pin.

For the correct procedure to adjust the differential thrust pin, refer to the Power Train Systems Operation, Testing and Adjusting, “Differential and Bevel Gear - Adjust” for your machine or consult your Caterpillar dealer.

i04912231

Differential and Final Drive Oil - Change

SMCS Code: 3258-044; 4050-044

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

Refer to Special Publication, NENG2500, “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.

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

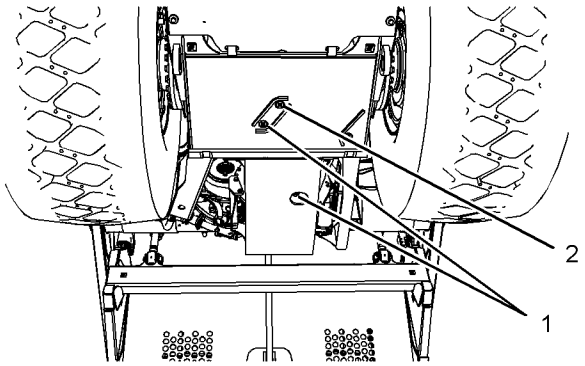

Illustration 198 g02159691

(1) Drain plug for the transmission
(2) Drain plug for the differential

Drain plug (2) is located under the transmission of the tractor. Drain plug (1) is located behind drain plug (2). Drain plug (2) is located closer to the front of the machine.

Operate the machine until the differential oil is warm. Park the machine on a level surface. Lower the bowl.

1. Engage the parking brake. Stop the engine.

2. Clean the area around drain plug (2).

3. Remove drain plug (2). Drain the oil into a suitable container.

4. Clean drain plug (2). Install drain plug (2).

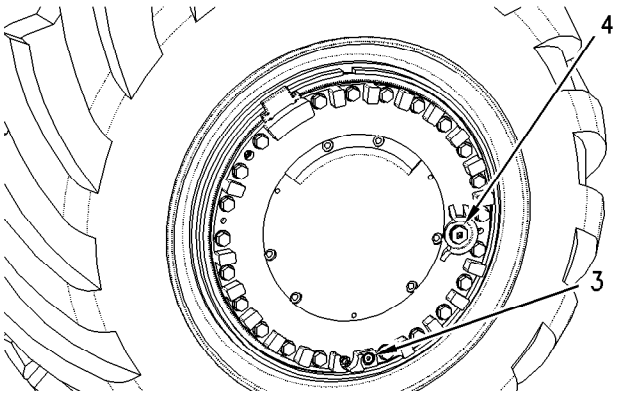

Illustration 199 g00920185

(3) Drain plug for the final drive
(4) Filler plug for the final drive

Note: Drain plug (3) is located on the hub of the wheel. Drain plug (3) must be at the lowest point in order to drain the final drive.

5. Clean the area around drain plug (3).

6. Remove drain plug (3). Drain the oil into a suitable container.

7. Clean drain plug (3). Install drain plug (3).

8. Repeat this procedure for the other wheel.

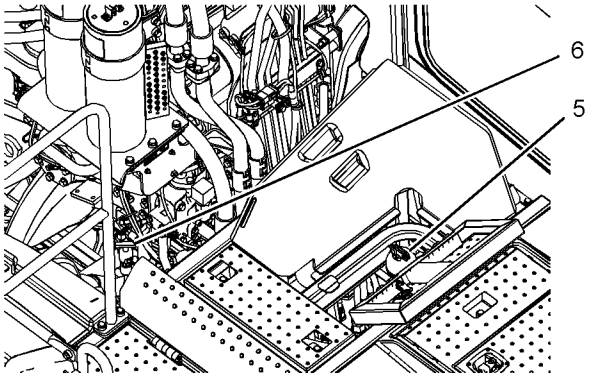

Illustration 200 g03080036

(5) Filler tube for the differential
(6) Oil level gauge

Note: Filler tube (5) is located at the right rear of the tractor.

9. Clean the area around filler tube (5). Remove the cap.

10. Fill the differential with oil through the filler tube. Fill the differential to the “FULL” mark on the oil level gauge (6). Refer to Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities” for further information.

11. Clean the filler cap. Install the filler cap.

Note: The differential and the final drives share a common reservoir. However, the oil level of the final drives should be checked. The filler plug for the final drive must be horizontal with the center of the final drive in order to check the oil level of the final drive. Drain plug (3) will be at the bottom of the wheel.

12. Clean the area around filler plug (4). Remove filler plug (4).

13. Add oil to the final drive if oil is needed. Oil should be dripping out of the filler hole when the final drive is full of oil.

14. Clean filler plug (4). Install filler plug (4).

i04912241

Differential and Final Drive Oil Level - Check

SMCS Code: 3258-535-FLV; 4050-535-FLV

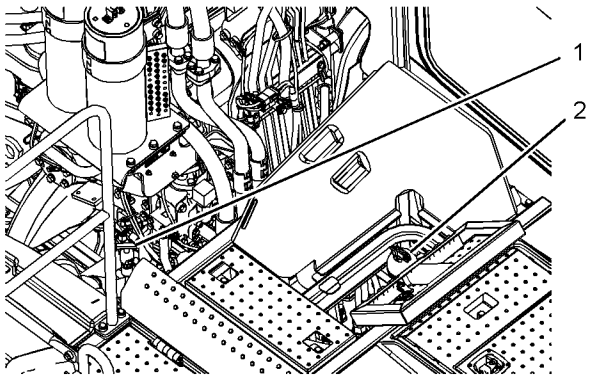

Illustration 201 g03080064

1. Park the machine on level ground.

2. Lower the bowl. Shut off the engine.

3. Maintain the oil level between the “FULL” and the “ADD” marks on the oil level gauge (1).

4. Remove oil filler cap (2). Add oil, if necessary.

5. Clean oil filler cap (2) and install oil filler cap (2).

i04912249

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3258-008; 4050-008; 7542-008

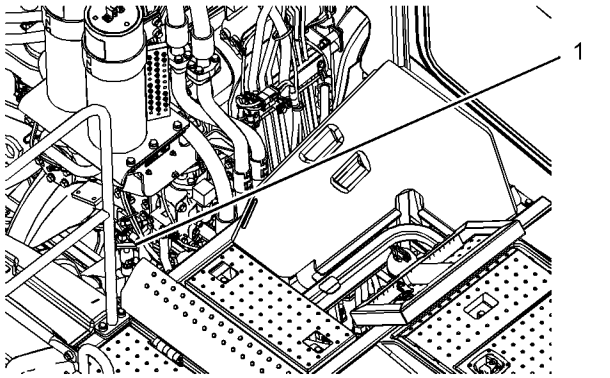

Illustration 202 g03080069

(1) Oil level gauge for the differential and final drive (tractor)

A sample of the differential and the final drive oil can be obtained by pulling a sample through the oil level gauge tube. Oil level gauge tube (1) is located behind the hood compartment, next to the hitch. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the differential and final drive oil.

i06131458

Draft Arm Wear Plates - Check/Adjust

SMCS Code: 6204-535-WK; 6204-025-WK

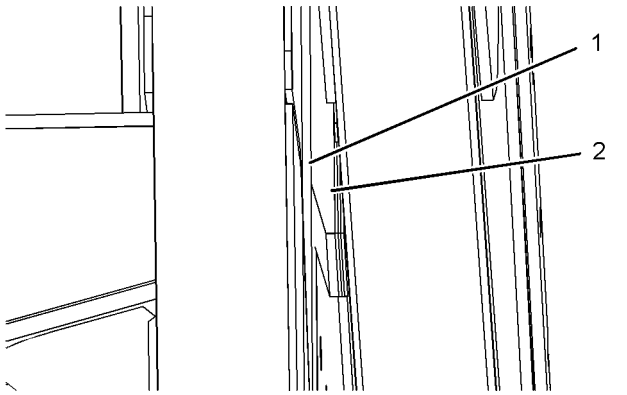

Illustration 203 g01128904

1. Check the clearance between the draft arm wear plate (1) and the shoe (2). Refer to Specifications, “Draft Frame” for the necessary clearance. Add shims, if necessary. As required use the shims to 2.5 ± 2.5 mm (0.10 ± 0.10 inch) between the bowl and the draft arm wear plates. No gouging or peeling of base material allowed.

2. Chock the wheels.

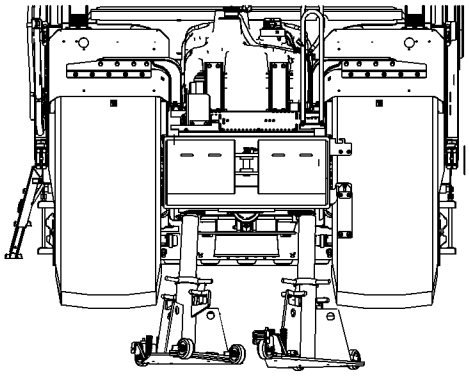

Illustration 204 g02165113

3. Use a suitable lifting device in order to lift the rear of the scraper. Lift the rear of the scraper in order to place the bowl in the lowest possible position. Support the rear of the scraper for safety.

4. Remove the upper bolts for the wear plate.

5. Remove cribbing and raise the bowl as far as possible.

6. Remove lower bolts for the wear plate.

7. Replace shims or replace the wear plate.

Repeat the procedure for the other side of the bowl.

i05939904

Ejector Carrier Rollers - Check/Adjust

SMCS Code: 6229-025; 6229-535

Two ejector carrier rollers are located at the base of the ejector. These rollers prevent the ejector from contacting the floor of the bowl.

Check the adjustment for the ejector carrier rollers. The ejector carrier rollers are correctly adjusted if the ejector does not contact the bottom of the bowl.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl and the apron to the ground.

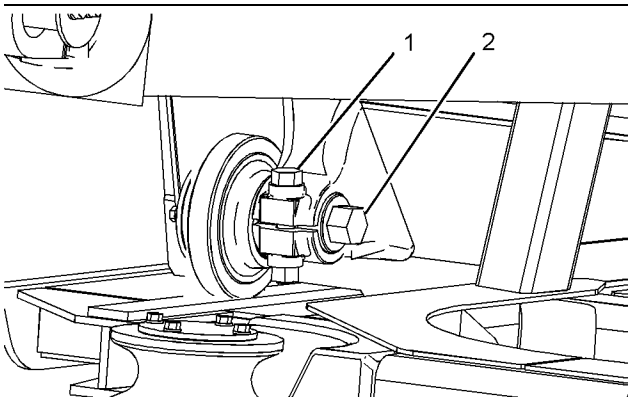

Illustration 205 g01221477

3. Loosen roller shaft clamping bolt (1).

4. Move eccentric roller shaft (2) to a position that allows the ejector to pass over the bottom of the bowl. The ejector carrier rollers must be adjusted so that the clearance between the bottom of the ejector and the bottom of the bowl is between 2.0 to 4.0 mm (0.08 to 0.16 inch).

5. Tighten roller shaft clamping bolt (1). Tighten the bolt to 370 ± 50 N·m (273 ± 37 lb ft).

6. Repeat Step 3 through Step 5 in order to adjust the other ejector carrier roller.

7. Start the engine.

8. Move the ejector forward and backward.

9. Stop the engine.

10. Check for drag between the ejector and the bottom of the bowl. Repeat the adjustment procedure, if necessary.

For more information refer to Testing and Adjusting, “Ejector Clearance - Adjust”.

i02444688

Ejector Carrier Rollers - Inspect/Pack/Replace

SMCS Code: 6229-086; 6229-510; 6229-040

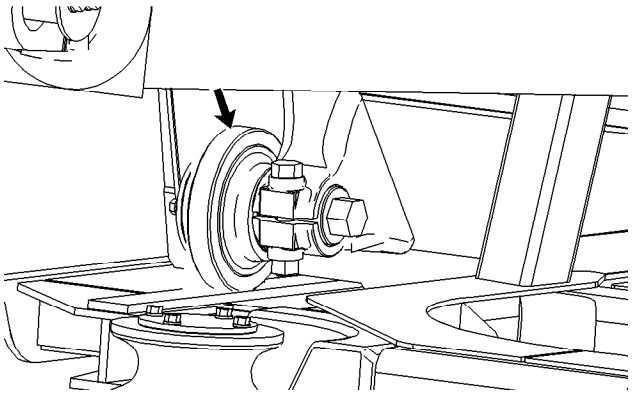

Illustration 206 g00920884

Two ejector carrier rollers are located at the base of the ejector.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl and the apron to the ground.

3. Remove the debris from each roller in order to inspect the rollers.

4. Pack the bearings of the rollers.

Reference: Machine Systems Disassembly and Assembly, “Roller (Ejector Carrier)”

Reference: Hydraulic System Specifications, “Ejector”

i06561520

Ejector Guide Rollers - Check/Adjust

SMCS Code: 6230-535; 6230-025

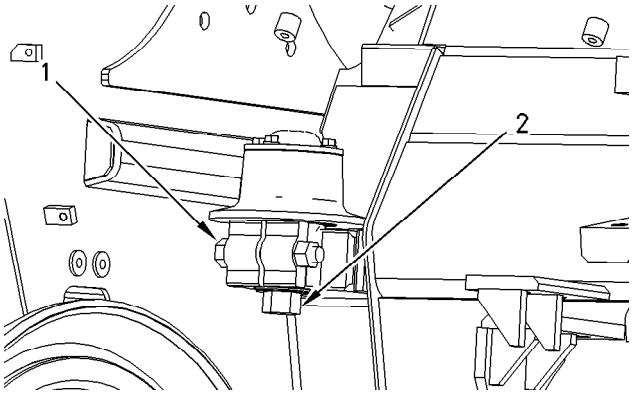

Illustration 207 g00920596

The ejector guide rollers are at the middle of the ejector. There are two ejector guide rollers. These rollers prevent the ejector from contacting the sides of the bowl. These rollers prevent the ejector from cocking.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Take the measurement between the ejector guide rails to determine the narrowest point.

4. Move the ejector to the narrowest point inside the bowl.

5. Loosen roller shaft clamping bolt (1).

6. Move eccentric roller shaft (2) to a clearance of 2.0 to 4.0 mm (0.08 to 0.16 inch) between the ejector rollers and the ejector guide rails.

7. Tighten roller shaft clamping bolt (1). Tighten the bolt to 370 ± 50 N·m (273 ± 37 lb ft).

8. Repeat Step 4 through Step 7 to adjust the other ejector guide roller.

9. Start the engine.

10. Move the ejector forward and backward.

11. Stop the engine.

12. Check for drag between the ejector guide rollers and the sides of the bowl. Repeat the adjustment procedure, if necessary.

For more information refer to Testing and Adjusting, “Ejector Clearance - Adjust”.

i02501076

Ejector Guide Rollers - Inspect/Pack/Replace

SMCS Code: 6230-040; 6230-086; 6230-510

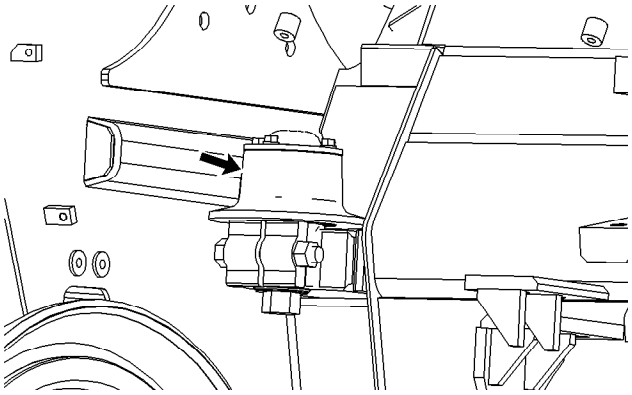

Illustration 208 g00920902

The ejector guide rollers are located at the middle of the ejector. There are two ejector guide rollers. These rollers prevent the ejector from contacting the sides of the bowl. These rollers prevent the ejector from cocking.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Remove any debris from each ejector guide roller.

4. Inspect the ejector guide rollers for damage. Replace the ejector guide rollers, if necessary.

5. Pack the ejector guide rollers. Consult your Caterpillar dealer for further information on this procedure.

i07789871

Ejector Support Rollers - Check/Adjust

SMCS Code: 6230-025; 6230-535

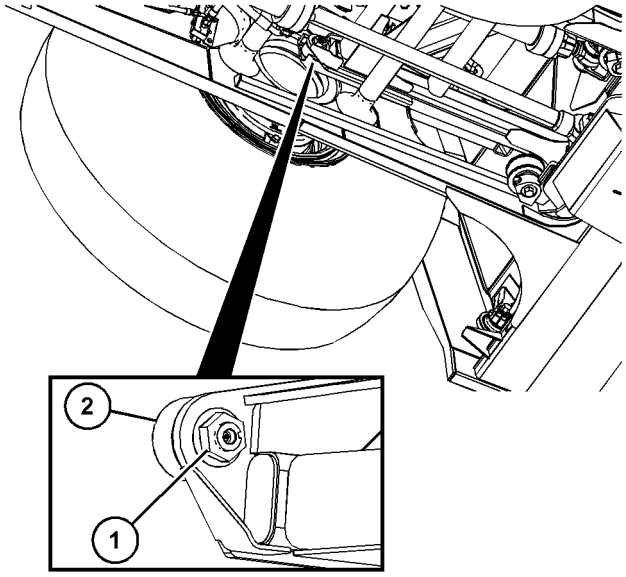

Illustration 209 g06438060

The ejector support rollers are at the rear of the ejector. There are two ejector support rollers. These rollers support the rear portion of the ejector.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Take the measurement between the ejector support rails to determine the narrowest point.

4. Move the ejector support rollers to the narrowest point inside the bowl.

5. Loosen roller shaft clamping bolt (1).

6. Move eccentric roller shaft (2) to obtain a clearance of 2.0 to 4.0 mm (0.08 to 0.16 inch) between the ejector support rollers and the ejector support rails.

7. Tighten roller shaft clamping bolt (1). Tighten the bolt to 370 ± 50 N·m (273 ± 37 lb ft).

8. Repeat Step 4 through Step 7 to adjust the other ejector support roller.

9. Start the engine.

10. Move the ejector forward and backward.

11. Stop the engine.

12. Check for drag between the ejector and the sides of the frame. Repeat the adjustment procedure, if necessary.

For more information refer to Testing and Adjusting, “Ejector Clearance - Adjust”.

i07789798

Ejector Support Rollers - Inspect/Lubricate

SMCS Code: 6230

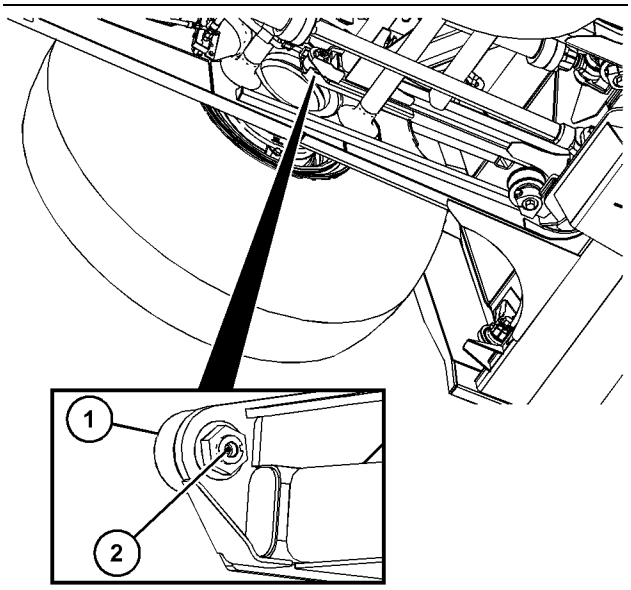

Illustration 210 g06438045

Two ejector support rollers (1) are at the rear of the ejector.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Remove any debris from each ejector support roller.

4. Inspect the ejector support rollers for damage. Replace the ejector support rollers, if necessary.

5. Clean the grease fittings (2) and lubricate the grease fittings for the ejector support rollers.

i01798044

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1251-040; 1251-025; 1290-040; 1290-025

⚠ WARNING

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting the unit injectors.

The electronic unit injectors use high voltage. Disconnect the unit injector enable circuit connector in order to prevent personal injury. Do not come in contact with the injector terminals while the engine is running.

Only qualified service personnel should perform this maintenance. Refer to the following topics for your machine for the correct checking procedure and for the correct adjustment procedure.

- Engine Systems Operation, Testing and Adjusting, “Electronic Unit Injector - Test”
- Engine Systems Operation, Testing and Adjusting, “Electronic Unit Injector - Adjust”

The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

i05339246

Elevator Chain - Inspect/ Adjust

SMCS Code: 6231-025; 6231-040

Inspect the Elevator Chain

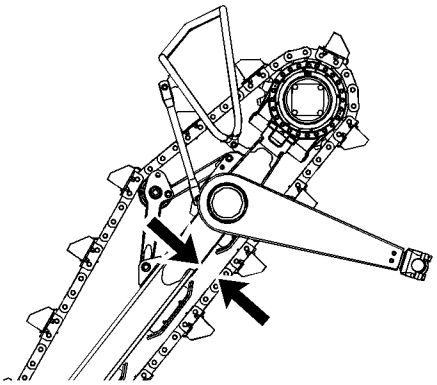

Illustration 211 g03381857
Bowl has been removed for ease of viewing

1. Park the machine on level ground. Engage the parking brake.
2. Lower the bowl to the ground. Shut off the engine.
3. Inspect the slack of the elevator chain at the widest space that is between the arrows. The widest space will be halfway between the upper sprocket and the lower idler. The upper arrow is located at the lower edge of the frame assembly for the elevator. The lower arrow is on the upper side of the elevator chain. The slack in the elevator chain should be 254 to 356 mm (10 to 14 inch).

Note: Adjust the elevator chain when the distance between the arrows exceeds 356 mm (14 inch).

4. Inspect the elevator chain for wear.
5. Measure the length of ten chain links. Replace the elevator chain if the ten links measure more than 1079 mm (42.5 inch). Refer to Disassembly and Assembly, “Flight (Elevator) - Remove and Install” for further information.

Note: Failure to replace a worn elevator chain will result in excessive wear to the drive sprockets.

Adjust the Elevator Chain

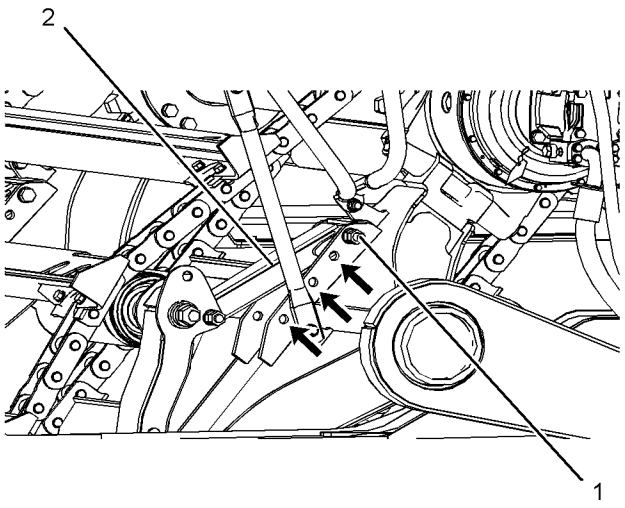

Illustration 212 g02206233

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground. Shut off the engine.

3. Remove bolt (1).

4. Move the elevator adjustment arm (2) to the desired opening.

5. Replace bolt (1).

6. Repeat steps 3 through 5 for the other elevator chain.

i05288849

Elevator Chain Idler - Clean/ Repack

SMCS Code: 6248-070-BD; 6248-086-BD

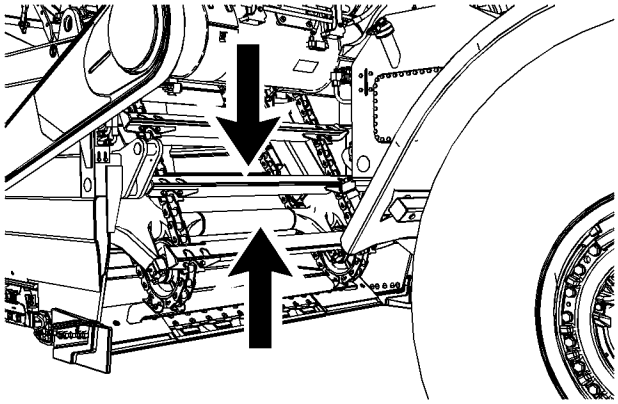

Illustration 213 g03368134

1. Place chains around lower flights and the lower cross beam of the frame to prevent chain and flight movement.

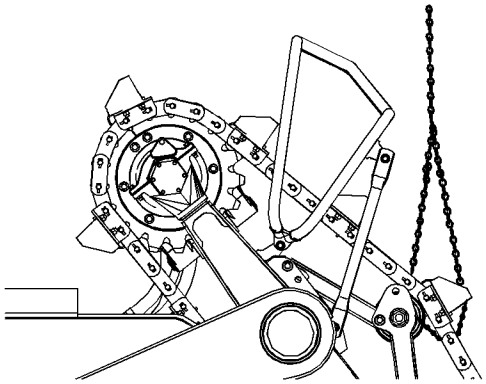

Illustration 214 g03358888

2. Place lift chains around the flight nearest the idler rollers (3).

3. Use a crane to lift the chains off the idler rollers (3).

4. Remove the end cap of the idler roller (3).

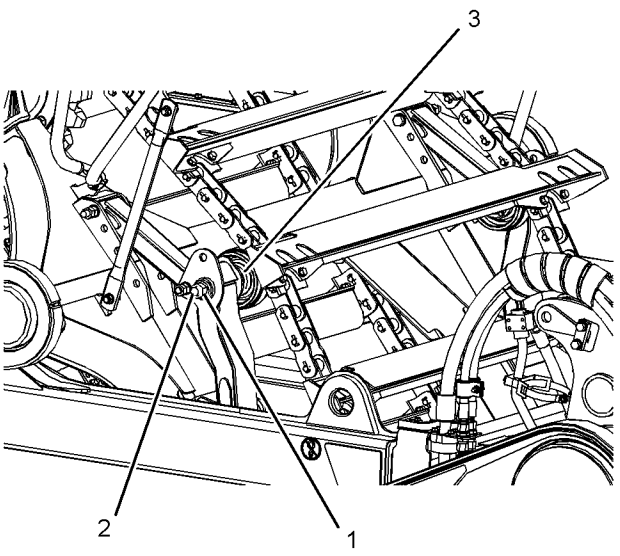

Illustration 215 g03358875

5. Remove the nut (1) and the bolt (2) from the idler roller and remove the idler roller (3).

6. Remove the inner shield, inner sleeve, and bearings of the idler roller.

7. Pack the bearings.

8. Reinstall in the idler roller.

i07360878

Elevator Chain Roller - Check/ Lubricate

SMCS Code: 6260-535; 6260-086

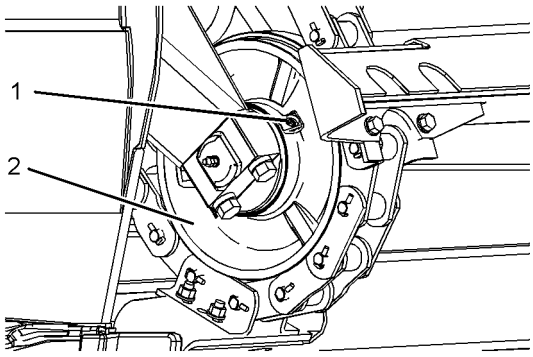

Illustration 216 g06294882

Elevator chain rollers (2) are at the lower end of the elevator frame. One roller is on each side of the elevator frame.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground.

3. Position filler plug (1) so that the plug is near the top center of the roller. Refer to Illustration 216 .

4. Clean the area around the filler plug. Remove the filler plug.

5. Maintain the oil level to the bottom of the filler hole. If necessary, add oil.

6. Clean the filler plug. Install the filler plug.

7. Repeat Step 1 through Step 6 for the other elevator chain roller.

i06787269

Elevator Drive Tube Roller Bearing - Clean/Repack

SMCS Code: 7551

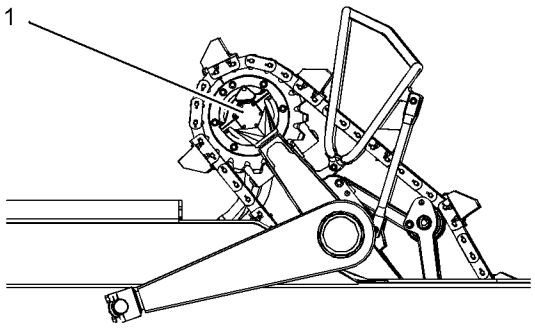

Illustration 217 g02166273

The roller bearing for the elevator drive tube (1) is on the right side of the elevator drive tube.

Refer to Disassembly and Assembly, “Elevator Drive - Assemble” for further information on repacking the bearings.

Consult your Cat dealer for further information.

i03982949

Elevator Speed Reducer - Check/Lubricate

SMCS Code: 6236-086-ELV; 6236-535-ELV

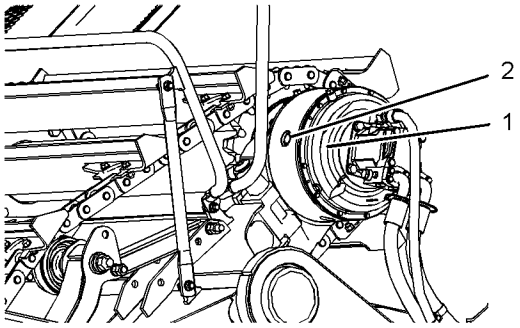

Illustration 218 g02166293

The elevator speed reducer (1) is located at the top of the elevator. The elevator speed reducer is on the left side of the elevator.

1. Park the machine on level ground. Lower the bowl. Apply the parking brake.

2. Clean the area around the filler plug (2).

3. Remove the filler plug. Oil should drip out of the filler hole. Add oil if oil is needed. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for further information.

4. Clean the filler plug. Install the filler plug.

i03982959

Elevator Speed Reducer Oil - Change

SMCS Code: 6236-044-ELV

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.

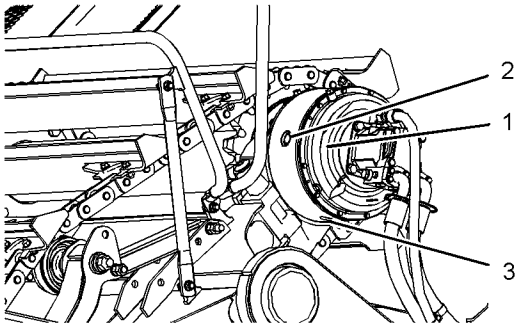

Illustration 219 g02166333

Elevator speed reducer (1) is located at the top of the elevator. The elevator speed reducer is on the left side of the elevator.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground.

3. Clean the area around filler plug (2).

4. Clean the area around drain plug (3).

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

6. Clean the drain plug. Install the drain plug.

7. Remove the filler plug. Fill the gear case with oil. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

Note: Oil should drip out of the filler hole when the gear case is full of oil.

8. Clean the filler plug. Install the filler plug.

i08397657

Engine - Clean

SMCS Code: 1000-070

⚠ WARNING

Personal injury or death can result from high voltage.

Moisture can create paths of electrical conductivity.

Make sure that the electrical system is OFF. Lock out the starting controls and tag the controls "DO NOT OPERATE" .

NOTICE
Accumulated grease and oil on an engine is a fire hazard. Keep the engine clean. Remove debris and fluid spills whenever a significant quantity accumulates on the engine.

Periodic cleaning of the engine is recommended. Steam cleaning the engine will remove accumulated oil and grease. A clean engine provides the following benefits:

- Easy detection of fluid leaks
- Maximum heat transfer characteristics
- Ease of maintenance

Note: Caution must be used to prevent electrical components from being damaged by excessive water when you clean the engine. Avoid electrical components such as the alternator, the starter, and the ECM.

i04912050

Engine Air Filter Primary Element - Replace

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

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

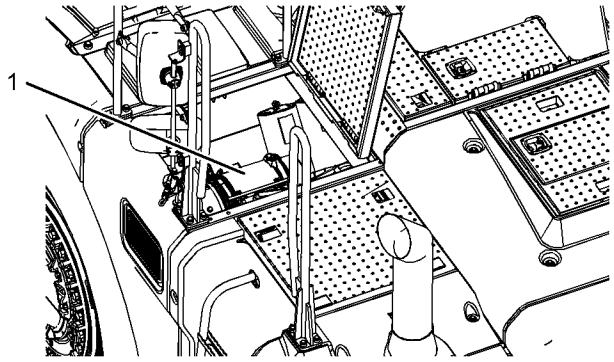

Illustration 220 g03079538

1. Remove cover (1) for the air filter housing.

2. Remove the primary filter element from the air filter housing.

3. Clean the inside of the air filter housing.

4. If the machine is equipped with a vacuator valve, clean the vacuator valve on the cover for the air filter housing.

5. Install a new primary air filter element when the Caterpillar Monitoring System displays the proper air filter restriction code. Install the cover for the air filter housing.

i04131129

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the engine air filter secondary element when you service the engine air filter primary element for the third time. Replace the secondary element if the exhaust smoke remains black and a clean primary element has been installed. Also, replace the secondary element if the element has been in service for 1 yr.

1. Remove the air cleaner cover and the primary element.

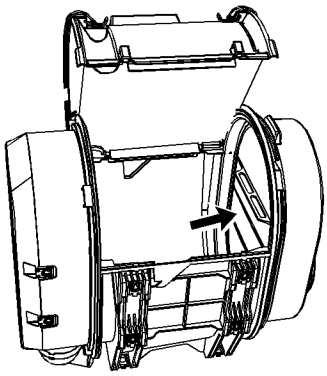

Illustration 221 g02149651

2. Remove the secondary element.

3. Cover the air inlet opening. Clean the inside of the air cleaner housing.

4. Uncover the air inlet opening. Install a new secondary element.

5. Install the primary element and the air cleaner cover.

i05543998

Engine Compression Brake Valve Lash - Check

SMCS Code: 1129-535

⚠ WARNING

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel.

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

NOTICE
Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar Dealer for the complete engine valve lash adjustment procedure.

For information on checking the engine compression brake valve lash on C9.3 engines, refer to Systems Operation, Testing and Adjusting, KENR9368, “C9.3 Engine for Caterpillar Built Machines” or consult your Cat dealer.

For information on checking the engine compression brake valve lash on C13 engines, refer to Systems Operation, Testing and Adjusting, UENR0946, “C13 Engine for Caterpillar Built Machines” or consult your Cat dealer.

i04912256

Engine Oil Level - Check

SMCS Code: 1348-535-FLV

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

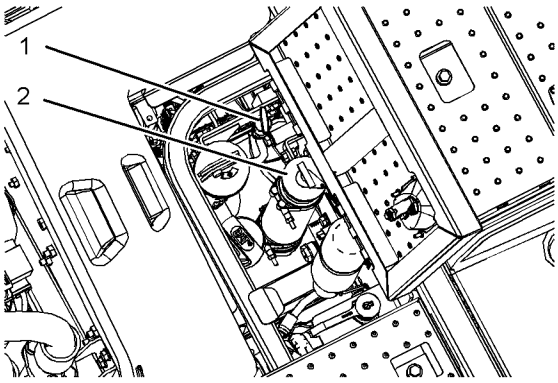

Illustration 222 g03080136

The dipstick (1) for the tractor engine is located on the right side of the tractor.

1. Park the machine on level ground. Lower the bowl.

2. Open the engine access cover that is on the right side of the machine.

3. Check the “LOW IDLE” side of dipstick (1) while the engine is running. Maintain the oil level between the “ADD” mark and the “FULL” mark.

Check the “ENGINE STOPPED” side of dipstick (1) while the engine is stopped. Maintain the oil level between the “ADD” mark and the “FULL” mark.

Note: When you operate the machine on severe slopes, check the oil level. The oil level in the engine crankcase must be at the “FULL” mark on the “ENGINE STOPPED” side of the dipstick (1).

4. Clean the area around the oil filler cap (2). Remove the oil filler cap. If necessary, add oil.

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

6. Close the engine access cover.

i04930001

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

⚠ 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, “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.

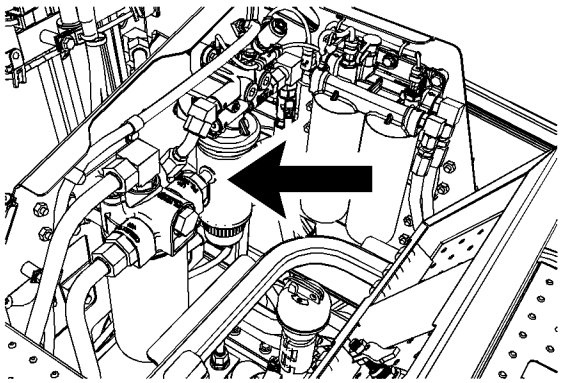

Illustration 223 g03099939

The sampling valve for the engine oil is located on the filter mounting base. The filter mounting base is located on the right side of the engine in the engine compartment.

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

i04930100

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

Selection of the Oil Change Interval

NOTICE
A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

Cat oil filters are recommended.

Refer to this Operation and Maintenance Manual, “Lubricant Viscosities” for further information about oils that may be used in Cat engines.

Refer to this Operation and Maintenance Manual, “Severe Service Application ” to determine if oil change interval should be reduced from the normal change interval. If operating in any of the conditions or environments outlined in the Severe Service Application, use S·O·S Services oil analysis to determine the best oil change interval. If S·O·S Services oil analysis S is not being used, oil change interval should be reduced to 250 hrs.

Table 22

Oil Change Interval (1)		
Multigrade Oil Type	**Operating Conditions**	
	Normal	**Severe Service Application**
Cat DEO-ULS	500 hr	250 hr
Oil meeting the requirements of the Cat ECF-3 Specification or the API CJ-4 classification 8 minimum TBN Preferred	500 hr	250 hr
Oil meeting the requirements of the ACEA C9/ E6 Specification TBN below 10.4	500 hr	250 hr

(1) The standard oil change interval in this engine is 500 hours, if the operating conditions and recommended oil types that are listed in this table are met. If the type of oil, the quality of the oil and the operating conditions fail to meet certain standards, the oil change intervals must be decreased to 250 hours. Refer to Special Publication, PEHJ0192, “Optimizing Oil Change Intervals” in order to determine whether the oil change interval should be reduced to 250 hours.

Procedure for Changing the Engine Oil and Filter

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.

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

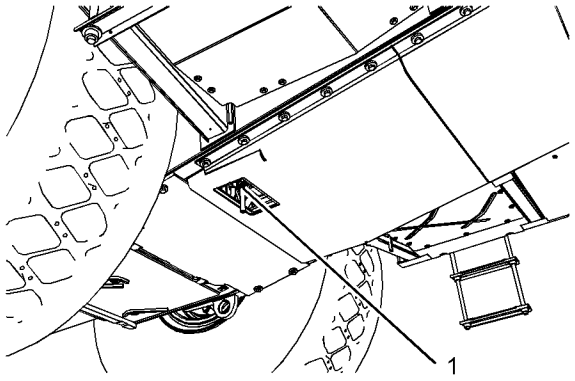

Illustration 224 g02149366

The crankcase drain for the tractor engine is located on the oil pan of the engine.

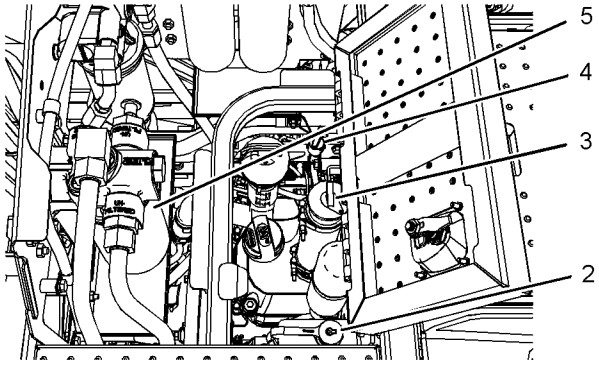

Illustration 225 g03099976

Your machine may be equipped with a high speed arrangement for changing the engine oil. The high speed arrangement allows the oil to be quickly withdrawn. The high speed arrangement allows the oil to be quickly replaced.

Note: Clean the area around dust cover for the male quick coupler that is on the hose. Remove the dust cover. Clean the male fitting. Remove the dust cover from female fitting of the suction hose. Clean the female fitting. Attach the suction hose to the male fitting. Remove the oil from the engine.

The oil filter for the scraper is located on top of the engine.

Note: Drain the crankcase while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

1. Park the machine on a level surface and engage the parking brake. Stop the engine.

2. Open crankcase drain (1).

3. Allow the oil to drain into a suitable container.

4. Close the drain.

5. Remove engine oil filter (4) with a strap type wrench. See Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filter properly.

6. Clean the filter mounting base with a clean towel. Make sure that all of the old filter seal has been removed.

7. Apply a thin film of clean engine oil to the seal of the new engine oil filter.

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

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

9. Tighten the oil filter according to the instructions that are printed on the filter. Use the index marks as a guide for tightening the oil filter.

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

10. Clean the area around oil filler cap (2). Remove the padlock from the oil filler cap (if equipped). Remove the oil filler cap. Fill the crankcase with new oil. See the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”
- Operation and Maintenance Manual, “Engine Oil Level - Check”

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

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

13. Remove the padlock from the oil gauge (if equipped). Run the engine and check oil gauge (3) after the engine has been running for 10 minutes. Maintain the oil between the marks on the “LOW IDLE” side of the oil gauge. If necessary, add oil.

i08227948

Engine Valve Lash - Check

SMCS Code: 1105-535

⚠ WARNING

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

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

NOTICE

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

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

The initial valve lash adjustment is recommended at the first scheduled oil change. The valve lash adjustment should then be made at every 2500 hour interval. The adjustment is necessary due to the initial wear of the valve train components and to the seating of the valve train components.

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

Ensure that the engine is stopped before measuring the valve lash. To obtain an accurate measurement, allow the valves to cool before this maintenance is performed.

Note: To check the valve lash on the tractor engine, use the right-hand timing calibration port.

Refer to the Service Manual for more information.

i04912130

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

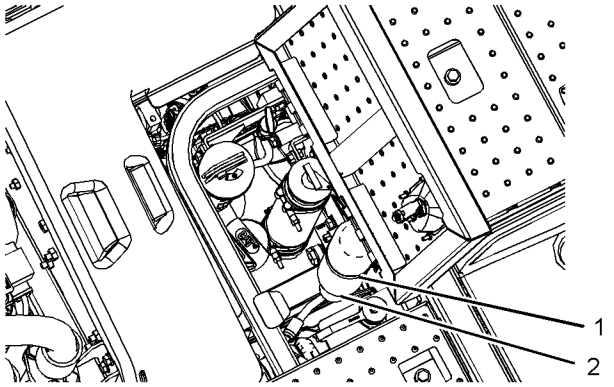

Illustration 226 g03079756

The ether starting aid cylinder is mounted in the engine compartment underneath the engine hood.

1. Loosen the ether starting aid cylinder retaining clamp (1). Unscrew the ether cylinder.
2. Remove used gasket (2). Install the new gasket. A new gasket is provided with each new ether cylinder.
3. Install the new ether cylinder. Tighten the ether cylinder hand tight. Tighten the cylinder retaining clamp with your fingers.

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”.

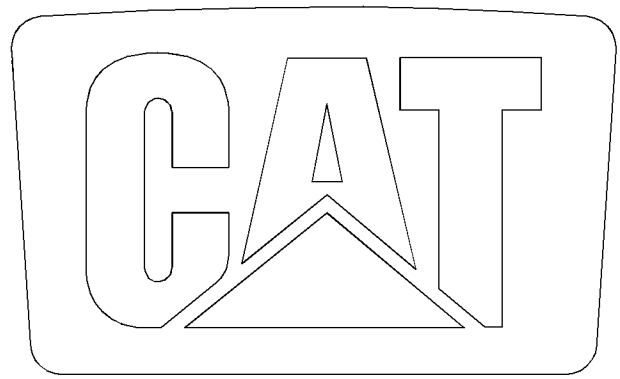

Illustration 227 g02174985

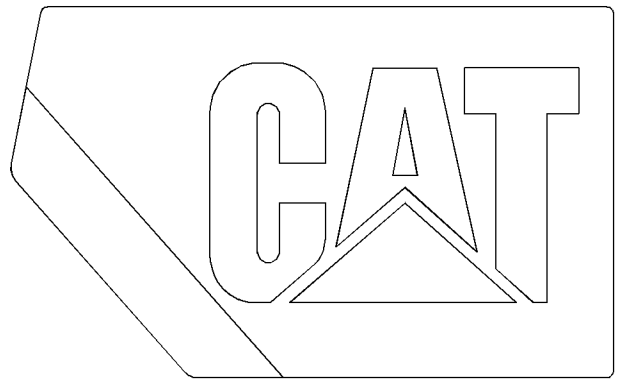

Illustration 228 g02175297

Illustration 229 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.

i07584501

Floor Rollers - Lubricate

SMCS Code: 6228-086

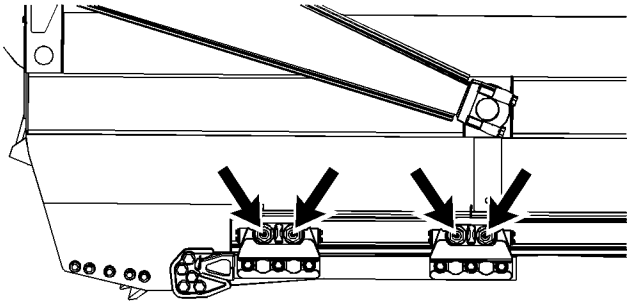

Illustration 230 g06370781

The elevator floor rollers are on the door assembly. There are four rollers on each side of the machine.

1. Park the machine on level ground. Engage the parking brake.
2. Lower the bowl to the ground.
3. Clean the area around the grease fittings for the rollers.
4. Apply grease to the fittings on both sides of the machine.

i07789860

Floor Support Rollers - Check/Adjust

SMCS Code: 6228

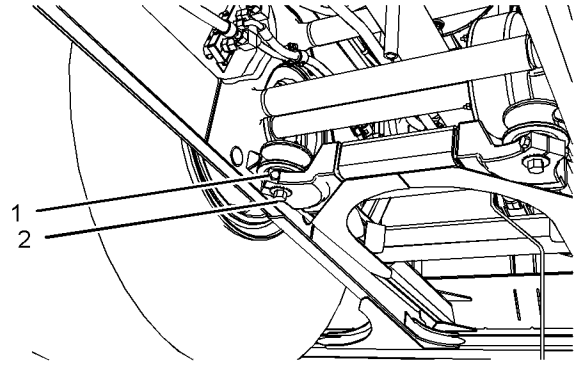

Illustration 231 g02163707

The floor support rollers are at the rear of the machine. There are two floor support rollers. These rollers support the rear portion of the floor.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Take the measurement between the floor support rails to determine the narrowest point.

4. Move the floor support rollers to the narrowest point inside the bowl.

5. Loosen roller shaft clamping bolt (1).

6. Move eccentric roller shaft (2) to obtain a clearance of 2.0 to 4.0 mm (0.08 to 0.16 inch) between the floor support rollers and the floor support rails.

7. Tighten roller shaft clamping bolt (1). Tighten the bolt to 370 ± 50 N·m (273 ± 37 lb ft).

8. Repeat Step 4 through Step 7 to adjust the other floor support roller.

9. Start the engine.

10. Move the floor forward and backward.

11. Stop the engine.

12. Check for drag between the floor and the sides of the frame. Repeat the adjustment procedure, if necessary.

i07789864

Floor Support Rollers - Inspect/Pack/Replace

SMCS Code: 6228

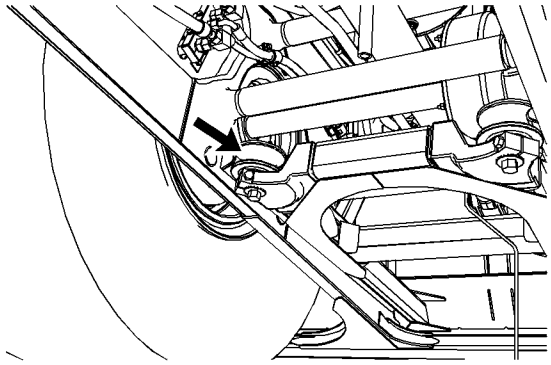

Illustration 232 g02163712

Two floor support rollers are at the rear of the machine.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground and close the apron.

3. Remove any debris from each floor support rollers.

4. Inspect the floor support rollers for damage. Replace the floor support rollers, if necessary.

5. Pack the floor support rollers. Consult your Caterpillar dealer for further information on this procedure.

i04930112

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510; 1263-070

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 fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts. Fuel system should be primed prior to starting the engine.

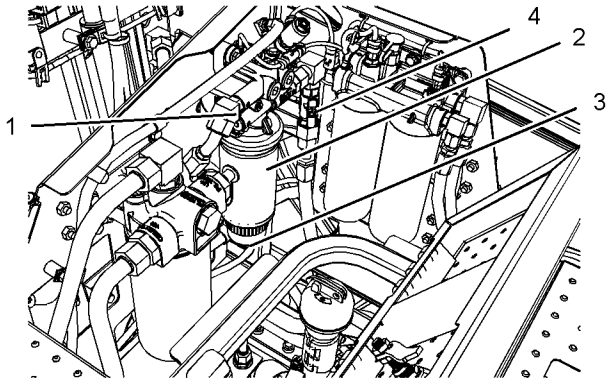

Illustration 233 g03100036

The primary fuel filter is on the right side of the engine compartment underneath the hood.

1. Park the machine on a level surface.

2. Lower the bowl.

3. Shut off the engine.

4. Move fuel shutoff valve (4) to the CLOSED position.

5. Clean primary fuel filter (2). Clean filter mounting base (1), which is located above the filter.

6. Turn the filter to the left in order to loosen the filter. Loosen the filter with a strap type wrench.

7. Remove the filter. Clean the bottom of the filter mounting base. Make sure that all of the old filter seal is removed.

8. Remove water separator bowl (3) from fuel filter (2). Clean the water separator bowl and clean the groove for the O-ring.

Note: Check the water separator bowl for damage. Reuse the water separator bowl if no damage is present.

9. Lubricate the O-ring with clean diesel fuel or lubricate the O-ring with clean motor oil. Place the O-ring in the groove on the water separator bowl.

10. Install water separator bowl (3) onto the new fuel filter (2) by hand.

11. Apply clean diesel fuel to the seal of the new filter.

12. Install the new fuel filter hand tight until the seal of the fuel filter contacts the filter mounting base. Note the position of the index marks on the filter in relation to a fixed point on the filter mounting base.

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

13. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide for tightening the filter.

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

14. Return the fuel shutoff valve to the OPEN position.

15. Purge the air from the fuel system. See the Operation and Maintenance Manual, “Fuel System - Prime” for further instructions.

Note: The secondary fuel filter should also be changed at this time. See the Operation and Maintenance Manual, “Fuel System Secondary Filter - Replace” for further instructions.

16. Start the engine and check for leaks.

i04930124

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

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.

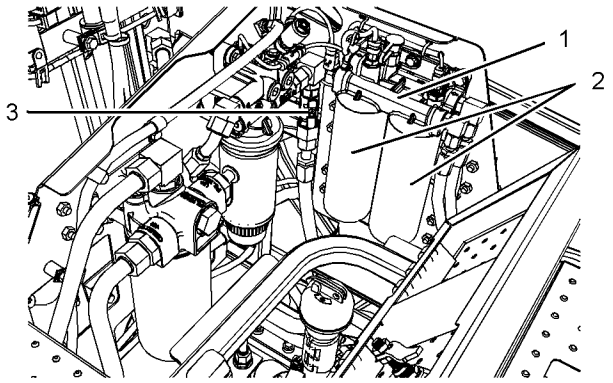

Illustration 234 g03100096

The secondary fuel filters are on the left side of the engine compartment.

1. Park the machine on a level surface.

2. Lower the bowl.

3. Shut off the engine.

4. Remove the access cover.

5. Move fuel shutoff valve (3) to the CLOSED position.

6. Clean secondary fuel filters (2). Clean filter mounting base (1), which is located above the filters.

7. Turn the filter to the left in order to loosen the filters. Loosen the filters with a strap type wrench.

8. Remove the filters. Make sure that all of the old filter seal is removed.

9. Apply clean diesel fuel to the seal of the new secondary filters.

10. Install the new fuel filters hand tight until the seal of the fuel filter contacts the filter mounting base. Note the position of the index marks on the filter in relation to a fixed point on the filter mounting base.

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

11. Tighten the filters according to the instructions that are printed on the filters. Use the index marks as a guide for tightening the filters.

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

12. Return the fuel shutoff valve to the OPEN position.

13. Purge the air from the fuel system. See the Operation and Maintenance Manual, “Fuel System - Prime” for further instructions.

Note: The fuel system water separator also should be changed at this time. See Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) Element - Replace”.

14. Replace the access cover.

15. Start the engine and check for leaks.

i02502138

Fuel System Water Separator - Drain

SMCS Code: 1263-543

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

Refer to Special Publication, NENG2500, “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.

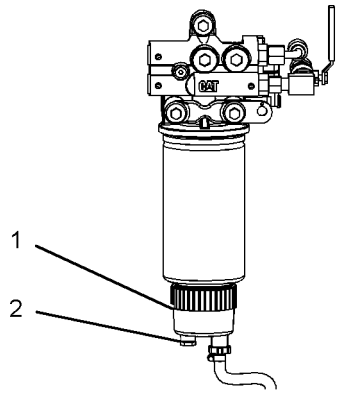

Illustration 235 g01115402
Typical example

Fuel system water separator (1) is mounted below the primary fuel filter. Refer to Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) Element - Replace” for the location of the primary fuel filter.

1. Open drain (2) on water separator bowl (1).

2. Drain the water from the water separator bowl.

3. Close the drain.

i03980371

Fuel Tank Cap and Strainer - Clean

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

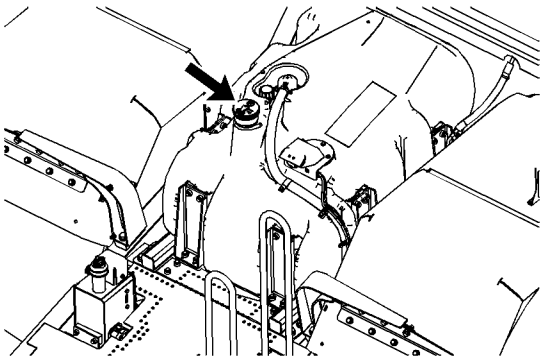

Illustration 236 g02165016

The fuel tank cap is located on the top of the fuel tank.

The fuel tank cap has a filter element that is located within the cap. The filter element filters the air that enters the fuel tank as the fuel level changes.

The strainer is located under the fuel tank cap. The strainer will strain the fuel as the fuel enters the fuel tank.

1. Clean the area around the fuel tank cap.

2. Remove the fuel tank cap.

3. Remove the gasket that is part of the fuel tank cap. Inspect the gasket for damage. If the gasket is damaged, replace the gasket.

4. Disassemble the fuel tank cap. Remove the filter elements. Clean the filter elements in clean, nonflammable solvent.

5. Apply a thin coat of oil to the filter elements. Assemble the fuel tank cap.

6. Install the gasket.

7. Remove the strainer. Clean the strainer in clean, nonflammable solvent.

8. Install the strainer.

9. Clean the fuel tank cap. Install the fuel tank cap.

i04930165

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-MAS

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.

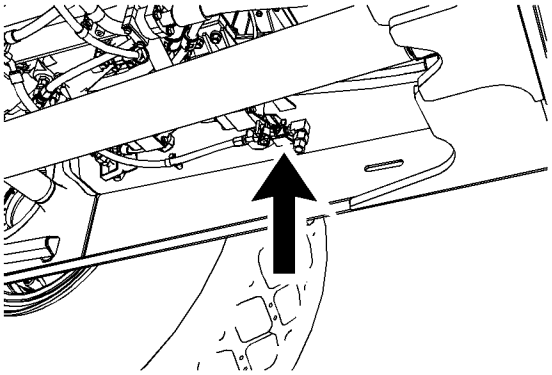

Illustration 237 g03100219

The drain valve for the fuel system is located behind the right scraper wheel. The drain valve is located inside the rear frame. This drain valve is used for draining diesel fuel from the fuel tank.

1. Move the drain valve to the OPEN position.

2. Collect the fuel in a clear container that is suitable.

3. Move the drain valve to the CLOSED position in order to examine the fuel that is collected.

4. Examine the fuel that is collected for water and for sediment. Water collects below the diesel fuel.

5. If water or sediment is in the fuel, repeat Step 1 through Step 4 until no water or no sediment is found in the fuel.

i04930756

Fuses - Replace

SMCS Code: 1417-510

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

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

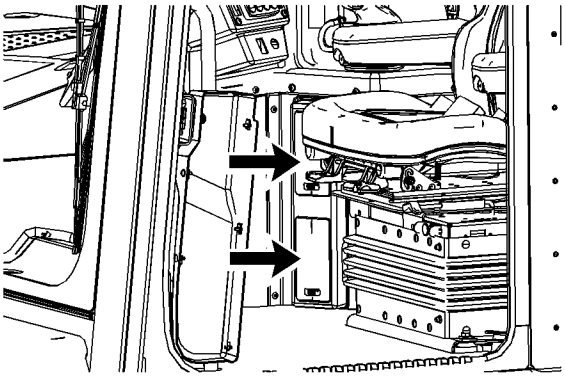

Illustration 238 g02175638

The fuse box is located on the right side of the operators seat.

Note: Your machine may not utilize all of the fuses that are listed below.

Fuses

Fuses – The fuses protect the electrical system from damage that is caused by overloaded circuits. If the element inside the fuse separates, replace the fuse. Check the circuit if the element is separated in the new fuse. Repair the circuit, if necessary.

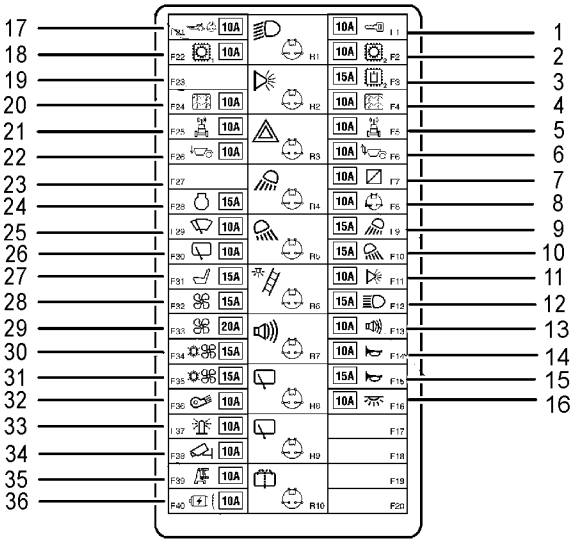

Illustration 239 g03100876

A film with pictographs is located on the inside of the fuse box cover. The location of a fuse matches the location of the pictograph.

(1) Keyswitch – 10 amp

(2) Transmission/Chassis Control 2 – 10 amp

(3) Hydraulic Control 2 – 15 amp

(4) Monitoring Enable – 10 amp

(5) Product Link – 10 amp

(6) Accugrade Enable – 10 amp

(7) 12V Converter – 10 amp

(8) Relay Coil – 10 amp

(9) Front Worklight – 15 amp

(10) Rear Worklight – 15 amp

(11) Tail Lights – 10 amp

(12) Headlamps – 15 amp

(13) Trumpet Horn – 10 amp

(14) Horn – 10 amp

(15) Horn – 15 amp

(16) Dome Light – 10 amp

(17) Scraper Main Relay Coil – 10 amp

(18) Transmission/Chassis Control 1 – 10 amp

(19) Blank – 10 amp

(20) Monitoring Enable – 10 amp

(21) Product Link – 10 amp

(22) Bowl Lower – 10 amp

(23) Blank – 10 amp

(24) Engine Enable – 15 amp

(25) Front Window Wiper – 10 amp

(26) Rear Window Wiper – 10 amp

(27) Seat – 15 amp

(28) Fan 1 – 15 amp

(29) Fan 2 – 20 amp

(30) Condenser Motor 1 – 15 amp

(31) Condenser Motor 2 – 15 amp

(32) Precleaner Motor – 10 amp

(33) Warning Beacon – 10 amp

(34) WAVS – 10 amp

(35) Cushion Hitch – 10 amp

(36) Exciter – 10 amp

Relays

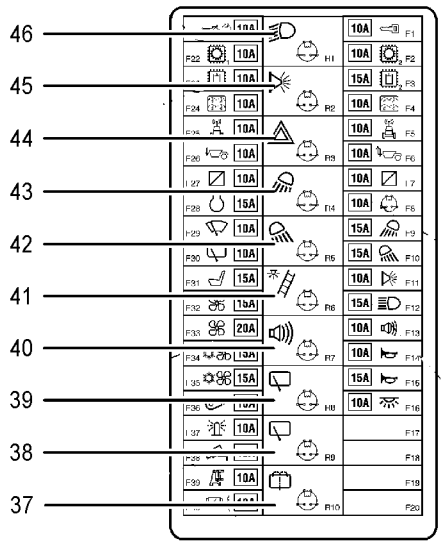

Illustration 240 g03100916

Bottom Panel

(37) Rear Washer – Relay

(38) Wiper – Relay

(39) Wiper – Relay

(40) Backup Alarm – Relay

(41) Access Step Lamps – Relay

(42) Rear Worklight – Relay

(43) Front Worklight – Relay

(44) Hazard Lamps – Relay

(45) Tail Lights – Relay

(46) Headlamps – Relay

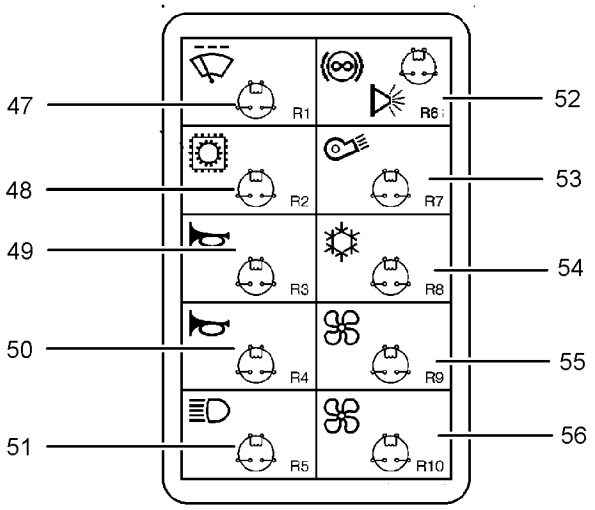

Illustration 241 g03100917

Top Panel

(47) Front Wiper Delay – Relay

(48) Transmission Control – Relay

(49) Forward Horn (Low Tone) – Relay

(50) Forward Horn (High Tone) – Relay

(51) Headlamps – Relay

(52) Retarding/Taillights – Relay

(53) Precleaner Motor – Relay

(54) Compressor Clutch – Relay

(55) Blower (Medium/High) – Relay

(56) Blower (High) – Relay

i03916649

Hitch - Inspect

SMCS Code: 4305-040; 7107-040; 7113-040

Consult your Caterpillar Dealer for the allowable tolerance of all the pins.

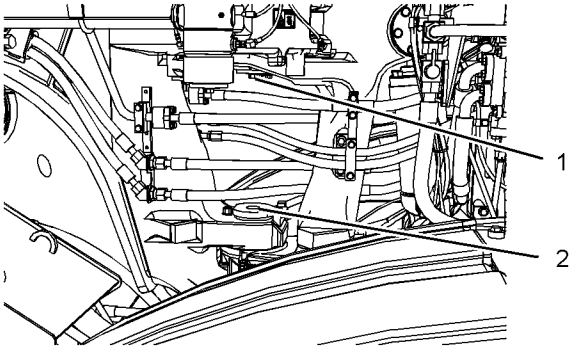

Illustration 242 g02150823

Inspect the upper hitch pin (1) for wear. Inspect the lower hitch pin (2) for wear. Replace the pins if necessary.

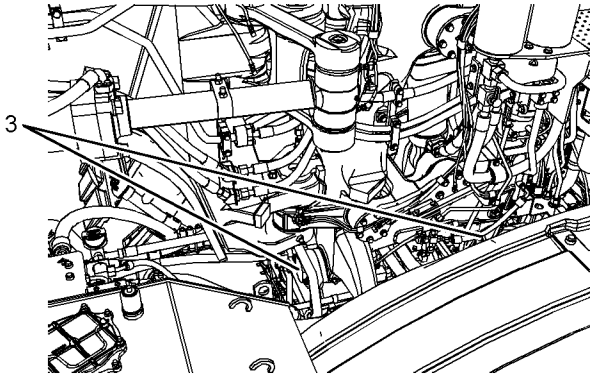

Illustration 243 g02150825

Inspect the two horizontal hitch pins (3) for wear or for damage. Replace the horizontal hitch pins, if necessary.

Note: Only one of the horizontal hitch pins is shown.

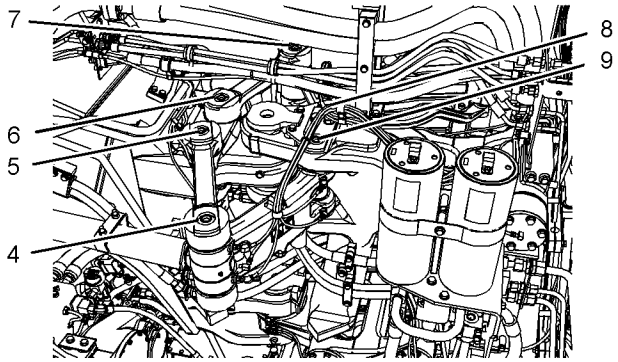

Illustration 244 g02150826

There are six pins (4), (5), (6), (7), (8) and (9) in the links for the steering. Inspect the pins for wear or for damage. Replace the pins in the links for the steering if necessary.

Note: Refer to the Disassembly and Assembly for further information.

i03905550

Hitch - Lubricate

SMCS Code: 7107-086; 7113-086

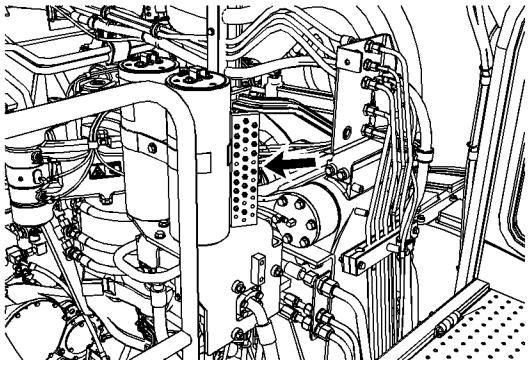

Illustration 245 g02147396

Note: Clean all of the fittings before you apply grease.

24 grease fittings are located near the cushion-hitch accumulator.

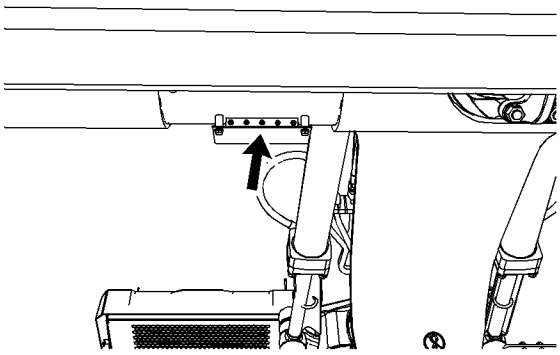

Illustration 246 g02147398

Five grease fittings are located under the spreader assembly.

Note: If any of the remote lines are damaged, replace the damaged lines. Fill the new lines with grease.

i01276876

Hydraulic Oil Cooler - Clean

SMCS Code: 1374-070

The hydraulic oil cooler (if equipped) is located in front of the radiator for the tractor.

Clean the oil cooler and clean the radiator at the same time. Clean the oil cooler in the same manner as you clean the radiator.

You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator core. However, the use of compressed air is preferred.

Note: Care must be taken when you are using high pressure water. High pressure water can cause damage to the radiator. Use of a water spray nozzle on the pressure washer which will disperse the water pressure is preferred.

Note: At the same interval, clean the air conditioner condenser.

i04892333

Hydraulic System Oil - Change

SMCS Code: 5056-044

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

Refer to Special Publication, NENG2500, “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.

⚠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

Note: The normal hydraulic oil change interval is at every 2000 Service Hours or one Year. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 Service Hours or two Years. S·O·S oil analysis must be performed at every 500 Service Hours or 3 Months in order to extend the hydraulic oil change interval. The results from the S·O·S oil analysis will determine if the hydraulic oil change interval may be extended. If S·O·S oil analysis is not available, the hydraulic oil change interval must remain at every 2000 Service Hours or one Year . Refer to the Operation and Maintenance Manual, “S·O·S Information”.

Note: Cat HYDO Advanced 10 has 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 following 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. Contact your Cat dealer for details.

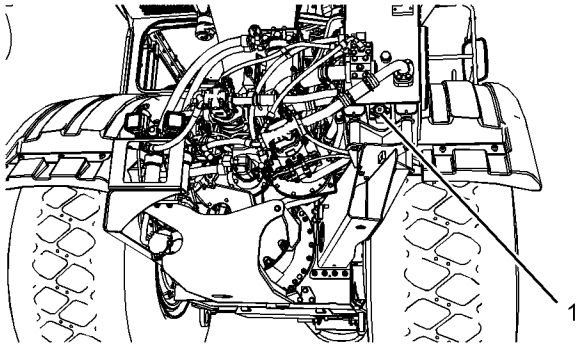

Illustration 247 g03029216

Hydraulic tank drain plug (1) is located on the side of the hydraulic tank in front of the right tractor wheel.

Note: Before you change the hydraulic tank oil, the machine must meet the following conditions:

- The machine must be level.
- The parking brake must be applied.
- The hydraulic oil must be warm.
- The transmission control must be in NEUTRAL.
- The bowl must be lowered.

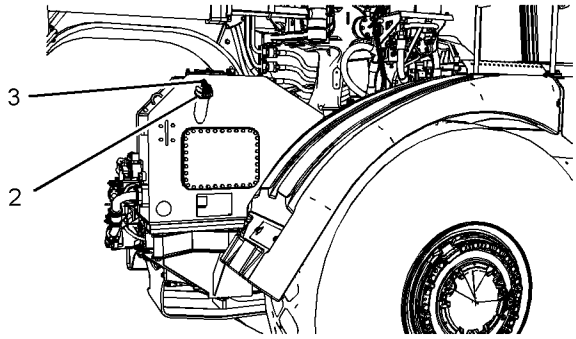

Illustration 248 g03029217

Note: An approved service platform is required to access the hydraulic tank.

Hydraulic oil filler cap (2) is located on top of the hydraulic tank.

1. Clean the hydraulic oil filler cap.

2. The hydraulic oil filler cap is a locking cap. If a padlock is on the cap, remove the padlock. Raise lever (3) in order to engage the lug.

3. Turn the hydraulic oil filler cap counterclockwise in order to remove the cap. Slowly remove the cap in order to relieve pressure in the hydraulic tank.

4. The hydraulic tank is equipped with an ecology drain (1). Attach a hose to a suitable drain adapter. Install the adapter in the drain valve and allow the oil to drain into a suitable container.

5. Change the hydraulic system filters. Refer to the following topics that apply to your machine:

- Operation and Maintenance Manual, “Hydraulic System Oil Filter (Gear Pump and Case Drain) - Replace”
- Operation and Maintenance Manual, “Hydraulic System Oil Filter (Pilot) - Replace”
- Operation and Maintenance Manual, “Hydraulic System Oil Filter - Replace”

6. Clean the hydraulic tank drain plug. Install the hydraulic tank drain plug.

7. A screen is located under hydraulic oil filler cap (2). Remove the screen.

8. Wash the screen in clean, nonflammable solvent. Inspect the screen for damage. If the screen is damaged, replace the screen.

9. Install the screen.

10. Fill the hydraulic tank to the proper level. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”

11. Inspect the cap seal for damage. If the seal is damaged, replace the seal.

12. Install the hydraulic oil filler cap.

13. Start the machine. Run the machine at a low idle.

14. Check the hydraulic oil level. The oil level should be above the “ADD” level in the sight gauge. Add oil, if necessary.

Note: The oil must be free from bubbles. If there are bubbles in the oil, then air is entering the hydraulic system. Inspect the suction hoses and the clamps. If necessary, tighten any loose clamps and any loose connections. Replace any damaged hoses.

15. Stop the engine.

i08773223

Hydraulic System Oil Level - Check

SMCS Code: 5050-535-FLV

Note: Before you check the hydraulic tank oil level, the machine must meet the following conditions:

- The machine must be level.
- The parking brake must be applied.
- The hydraulic oil must be warm.
- The engine must be running at low idle.
- The transmission control must be in NEUTRAL.
- The ejector must be moved forward.
- Slight downward pressure must be applied on the bowl.

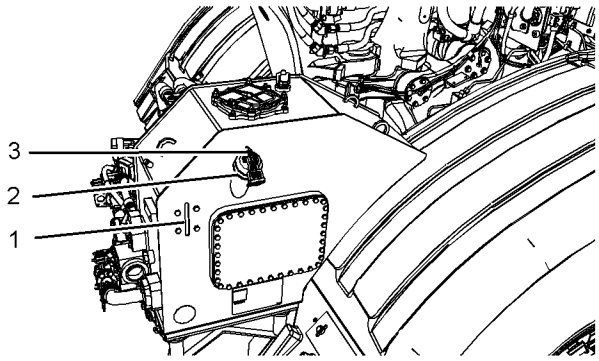

Illustration 249 g03029237

Note: An approved service platform is required to access the hydraulic tank.

The hydraulic tank is located behind the right tractor wheel. Hydraulic oil filler cap (2) is on top of the hydraulic tank.

1. Clean sight gauge (1) to view the hydraulic tank oil level.

2. If necessary, add oil to the hydraulic tank.

Note: Clean hydraulic oil filler cap (2) before adding oil to the hydraulic tank.

3. The hydraulic oil filler cap is a locking cap. If a padlock is on the cap, remove the padlock. Raise lever (3) to engage the lug.

4. Turn the hydraulic oil filler cap counterclockwise to remove the cap. Slowly remove the cap to relieve pressure in the hydraulic tank.
5. Add hydraulic oil until the oil level in the sight gauge is at the “FULL” level.
6. Inspect the hydraulic oil filler cap for damage to the seal. If the seal is damaged, replace the seal.
7. Install the hydraulic oil filler cap.

i06131426

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 7542

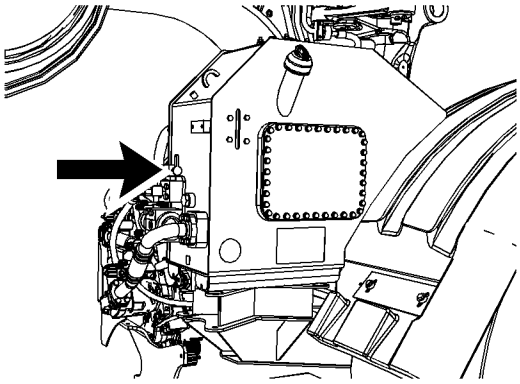

Illustration 250 g03449676

Type 1

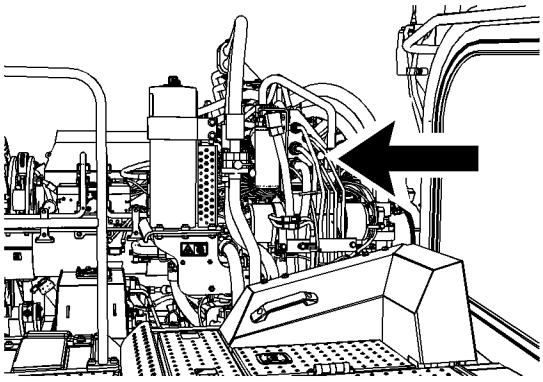

Illustration 251 g03819112

Type 2

The hydraulic oil sampling valve is located on the hydraulic tank on the right side of the machine or on top of the machine.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” for information that pertains to obtaining a sample of hydraulic oil.

Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of hydraulic oil.

i04892336

Hydraulic Tank Breaker Relief Valve - Replace

SMCS Code: 5118; 5118-510; 5118-510-PV

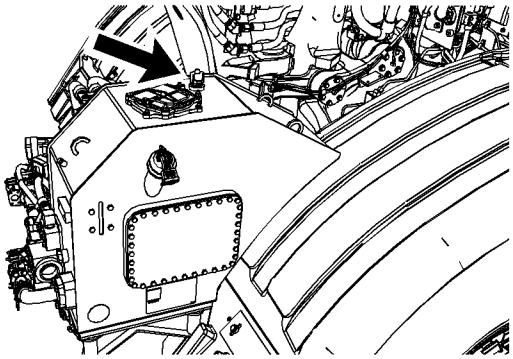

Illustration 252 g03029239

The hydraulic tank breaker relief valve is located on the top of the hydraulic tank near the hydraulic oil filler cap. The hydraulic tank breaker relief valve controls the pressure in the tank and the vacuum in the tank.

Note: An approved service platform is required to access the hydraulic tank.

1. Clean debris from the breaker relief valve.
2. Turn the breaker relief valve counterclockwise in order to remove the breaker relief valve. Slowly remove the breaker relief valve in order to relieve pressure in the hydraulic tank.
3. Remove the retaining ring from the top of the breaker relief valve.
4. Remove the metal cover that is under the retaining ring. A filter is under the metal cover.
5. Wash the breaker relief valve and wash the filter in a clean nonflammable solvent.
6. Dry the breaker relief valve. Dry the filter. Use compressed air in order to speed the drying.
7. Inspect the filter for damage. If the filter is damaged, replace the filter.

8. Inspect the O-ring that is between the filter and the housing of the hydraulic tank breaker relief valve. If the O-ring is damaged, replace the O-ring.

9. Inspect the breaker relief valve for damage. If the breaker relief valve is damaged, replace the breaker relief valve.

10. Apply a thin film of clean hydraulic oil to the O-ring. Assemble the filter on the breaker relief valve.

11. Install the breaker relief valve on the hydraulic tank.

i04892337

Oil Filter (Brake, Hydraulic Fan) - Replace

SMCS Code: 5068-510-BRK; 5068-510-HFN

⚠ 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, “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.

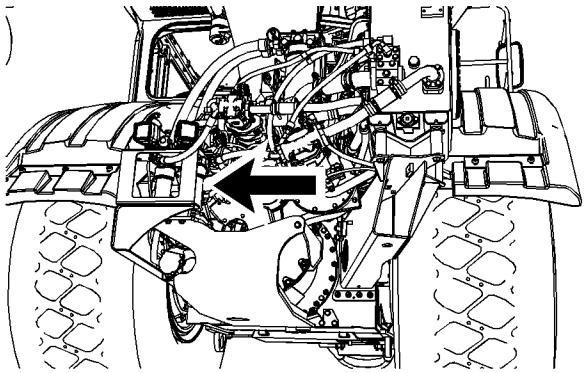

Illustration 253 g03029262

The brake and hydraulic fan oil filter is located at the left rear of the tractor.

1. Park the machine on a level surface and apply the parking brake.

2. Stop the engine. Lower the bowl to the ground.

3. Clean the area around the oil filter.

4. Remove the filter with a strap type wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filter properly.

5. Clean the filter mounting base. Make sure that all of the old filter seal has been removed.

6. Apply a thin film of clean hydraulic oil to the seal of the new filter.

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

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

8. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide for tightening the filter. For non Cat filters, refer to the installation instructions that are provided by the supplier of the filter.

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

9. Start the engine. Check for leaks at the brake and hydraulic fan oil filter.

10. Check the hydraulic oil level. Add oil to the hydraulic tank, if necessary. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for more information.

i04892339

Oil Filter (Cushion-Hitch) - 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, “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.

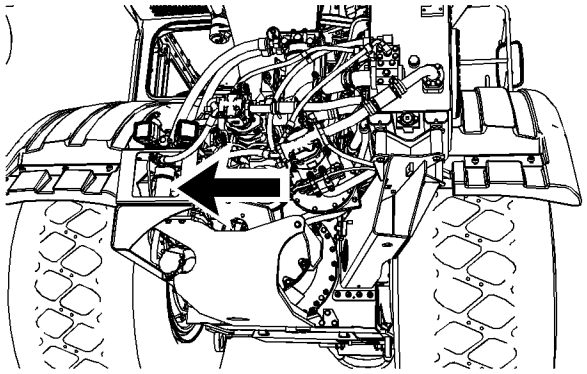

Illustration 254 g03029265

The cushion hitch oil filter is located at the left rear of the tractor.

1. Park the machine on a level surface and apply the parking brake.

2. Stop the engine. Lower the bowl to the ground.

3. Clean the area around the oil filter.

4. Remove the filter with a strap type wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filter properly.

5. Clean the filter mounting base. Make sure that all of the old filter seal has been removed.

6. Apply a thin film of clean hydraulic oil to the seal of the new filter.

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

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

8. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide for tightening the filter. For non Cat filters, refer to the installation instructions that are provided by the supplier of the filter.

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

9. Start the engine. Check for leaks at the brake and hydraulic fan oil filter.

10. Check the hydraulic oil level. Add oil to the hydraulic tank, if necessary. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for more information.

i05665651

Oil Filter (Elevator) - Replace (Motor Case Drain & Pump Case Drain)

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, “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.

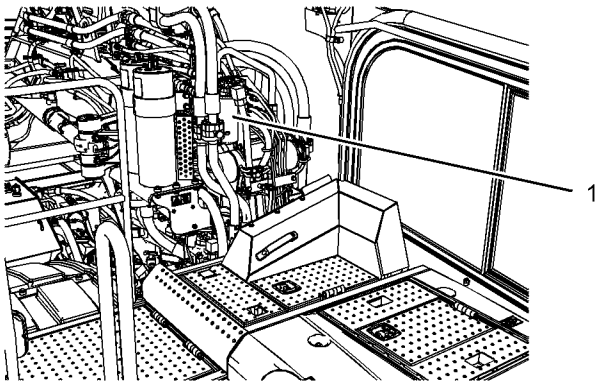

Illustration 255 g03592242

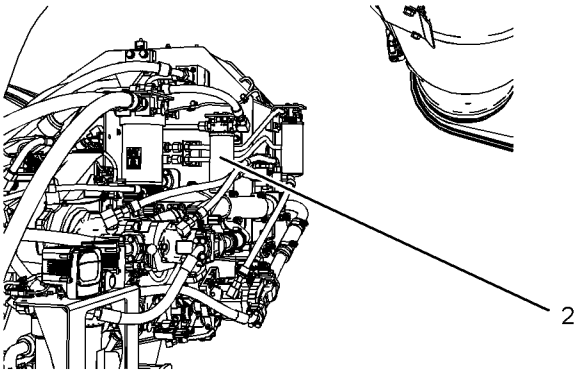

Illustration 256 g03592243

The motor case drain oil filter (1) and the pump case drain oil filter (2) are located on the tractor.

1. Park the machine on a level surface and apply the parking brake.
2. Stop the engine. Lower the bowl to the ground.
3. Clean the area around the oil filters.
4. Remove the filters with a strap type wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filters properly.
5. Clean the filter mounting bases. Make sure that all of the old filters seal has been removed.
6. Apply a thin film of clean hydraulic oil to the seal of the new filters.
7. Install the new filters hand tight until the seal of the filters contacts the filter mounting bases. Note the position of the index marks on the filters in relation to a fixed point on the filter mounting bases.

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

8. Tighten the filters according to the instructions that are printed on the filters. Use the index marks as a guide for tightening the filters. For non Cat filters, refer to the installation instructions that are provided by the supplier of the filters.

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

9. Start the engine. Check for leaks at the motor case drain oil filter and the pump case drain oil filter.
10. Check the hydraulic oil level. Add oil to the hydraulic tank, if necessary. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for more information.

i05665752

Oil Filter (Elevator) - Replace
(Charge Pump)

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, “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.

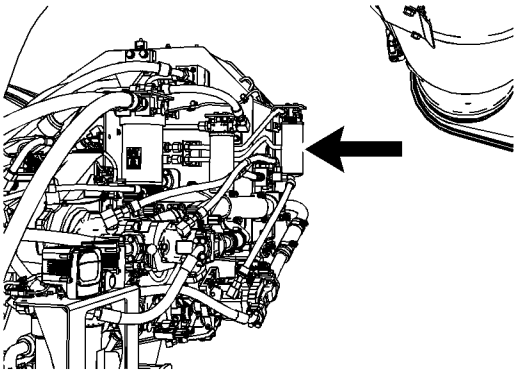

Illustration 257 g03592322

The charge pump oil filter is located on the tractor.

1. Park the machine on a level surface and apply the parking brake.

2. Stop the engine. Lower the bowl to the ground.

3. Clean the area around the oil filter.

4. Remove the filter with a strap type wrench. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filter properly.

5. Clean the filter mounting base. Make sure that all of the old filter seal has been removed.

6. Apply a thin film of clean hydraulic oil to the seal of the new filter.

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

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

8. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide for tightening the filter. For non Cat filters, refer to the installation instructions that are provided by the supplier of the filter.

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

9. Start the engine. Check for leaks at the charge pump oil filter.

10. Check the hydraulic oil level. Add oil to the hydraulic tank, if necessary. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for more information.

i02106227

Oil Filter - Inspect

SMCS Code: 5068-040

Inspect a Used Filter for Debris

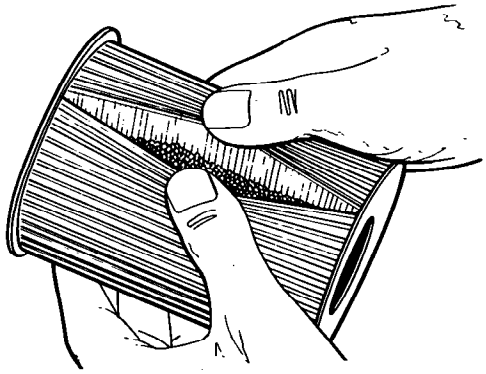

Illustration 258 g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i01696128

Radiator Core - Clean

SMCS Code: 1353-070-KO

You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator core. However, the use of compressed air is preferred.

Note: Care must be taken when you are using high pressure water. High pressure water can cause damage to the radiator. If you use high pressure water, use a water spray nozzle on the pressure washer which will disperse the water pressure.

See Special Publication, SEBD0518, “Know Your Cooling System” for the complete procedure for cleaning the radiator core.

i05546992

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

NOTICE
Do not attempt to straighten the ROPS structure. Do not repair the ROPS by welding reinforcement plates to the structure.

If there are any cracks in the welds, in the castings, or in any metal section of the ROPS, consult your Caterpillar dealer for repairs.

1. Inspect the ROPS for loose bolts. Inspect the ROPS for damaged bolts. Replace the damaged bolts and the missing bolts with original equipment parts only. Torque the bolts to 800 ± 100 N·m (590 ± 74 lb ft).

Note: Apply oil to all ROPS bolt threads before you install the bolt. Failure to apply oil can result in improper bolt torque.

2. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS makes a noise or if the ROPS rattles.

If there are any cracks in the welds, in the castings, or in any metal section of the ROPS, consult your Cat dealer for repairs.

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.

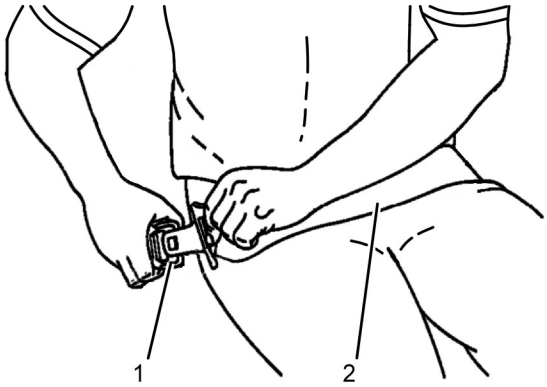

Illustration 259 g02620101
Typical example

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).

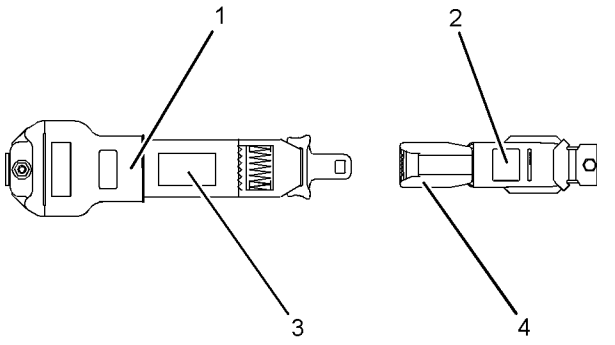

Illustration 260 g01152685

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.

i04892343

Secondary Steering - Test

SMCS Code: 4300-081-SST

⚠ WARNING

Personal injury or death can occur if steering is lost completely during operation.

Do not continue to operate the machine using the secondary steering.

If the secondary steering activates during operation, immediately park the machine in a safe location. Inspect the machine and correct the condition which made the use of the secondary steering necessary.

NOTICE
The secondary steering switch should always be in the AUTO position during normal operation. This will ensure that secondary steering capability is immediately available if the primary steering system fails.

NOTICE
To minimize battery drain, leave the switch in the MANUAL position only long enough to test the secondary steering. Return the switch to the AUTO position immediately after testing.

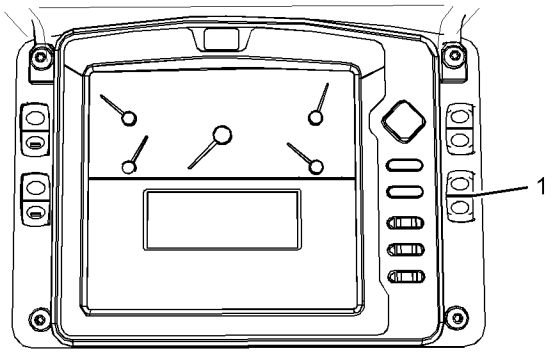

Illustration 261 g03428816

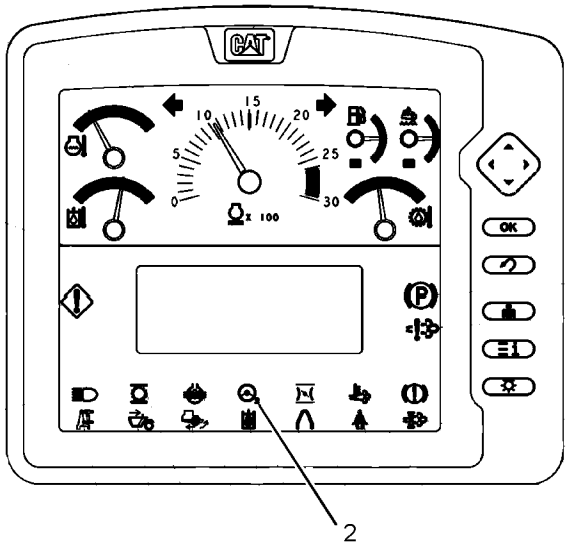

Illustration 262 g03029279

1. Stop the machine on a level surface. Place the transmission control in the PARK position. The tractor engine must be running.

2. Push and hold the top half of secondary steering switch (1) for 2 seconds in order to manually activate the secondary steering pump. Release the switch when the secondary steering indicator (2) illuminates with an amber color.

3. Release the switch in order to return the switch to the AUTO position.

Note: If the secondary steering is functioning properly, the secondary steering indicator will stay illuminated with an amber color. The indicator then will turn off after releasing the secondary steering switch.

If the secondary steering does not function properly, the secondary steering indicator will illuminate with a red color and Level 3 alarm will sound. An error message will also be displayed. Consult your Cat dealer should this occur.

i03937311

Service and Parking Brake - Inspect

SMCS Code: 4251-040; 4267-040

Record the initial measurement of the service brake disc thickness when the machine is new or when the brakes are rebuilt. Compare subsequent measurements to the initial measurement in order to determine the amount of wear.

Inspect the front brakes for wear and inspect the brake system for leakage.

Inspect the rear brakes for wear and inspect the rear brakes for system leakage.

Inspect the parking brake for wear and inspect the parking brake for system leakage.

i03981049

Suction Screen (Transmission Scavenge) - Clean

SMCS Code: 3030-070-Z3

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.

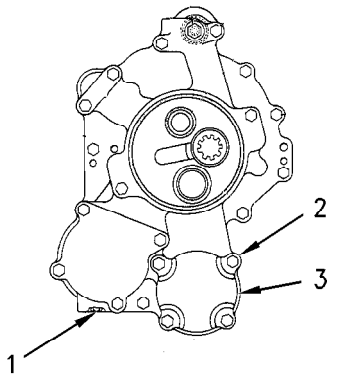

Illustration 263 g00927795

The suction screen for the transmission is located at the left rear of the transmission for the tractor.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground. Shut off the engine.

3. Clean the area around the housing for the suction screen.

4. Remove drain plug (1). Allow the oil to drain into a suitable container.

5. Remove bolts (2) for the cover of the suction screen.

6. Remove cover (3).

7. Remove the suction screen. Clean the suction screen in nonflammable solvent.

8. Inspect the suction screen for damage. If the suction screen is damaged, replace the suction screen.

9. Install the suction screen.

10. Inspect the seal for the cover. Replace the seal if the seal is damaged.

11. Clean the cover. Install the cover.

12. Clean the drain plug. Install the drain plug.

13. Start the engine.

14. Check the area around the screen housing for leaks.

15. Check the transmission oil level. Add oil, if necessary. Refer to Operation and Maintenance Manual, “Transmission Oil Level - Check” for the proper procedure.

16. Stop the engine.

i02449833

Tire Inflation - Check

SMCS Code: 4203-535-PX; 4203-535-AI

⚠ WARNING

Personal injury can result from improper tire inflation.

A tire blowout or rim failure can result from improper or misused equipment.

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

Proper inflating equipment, and training in using the equipment, are necessary to avoid overinflating.

Before inflating tire, put the tire in a restraining device.

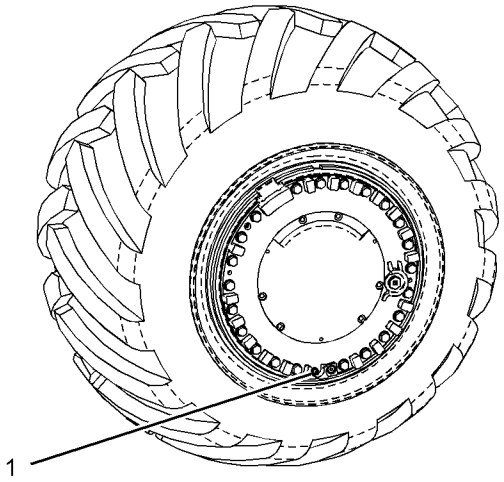

Illustration 264 g01222964

Measure the pressure of each tire with a tire gauge. A regular tire gauge will work on tires that are inflated with nitrogen.

Note: Scraper tires should be inflated with nitrogen gas in order to prevent the tires from exploding.

1. Park the machine on level ground. Apply the parking brake.

2. Lower the bowl to the ground. Shut off the engine.

3. Clean the area around the valve stem for the tire.

4. Remove valve stem cap (1).

5. Measure the pressure of each tire with a tire gauge. Add nitrogen gas if the pressure is low.

6. Install the valve stem cap on the valve stem.

Refer to the following additional information about tire inflation:

- Operation and Maintenance Manual, “Tire Inflation with Nitrogen”
- Operation and Maintenance Manual, “Tire Shipping Pressure”
- Operation and Maintenance Manual, “Tire Inflation Pressure Adjustment”

Consult your Caterpillar dealer for further information on the correct operating pressures and the correct load ratings.

i04912285

Transmission Oil - Change

SMCS Code: 3030-044

⚠ 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, “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.

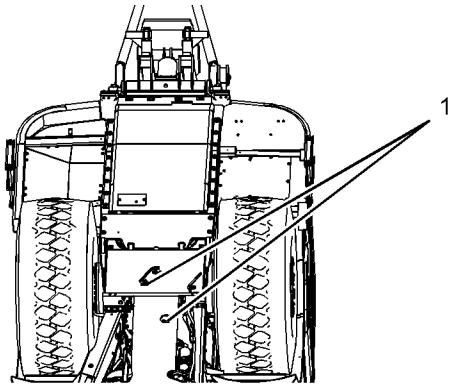

Illustration 265 g02151524

(1) Transmission drain plugs

Transmission drain plugs (1) are located under the tractor.

Note: Operate the machine until the transmission oil is warm.

1. Park the machine on a level surface. Engage the parking brake.

2. Lower the bowl to the ground. Stop the engine.

3. Clean the area around drain plugs (1).

4. Remove drain plugs (1). Drain the oil into a suitable container.

Note: Clean the suction screen at this time. Refer to Operation and Maintenance Manual, “Suction Screen (Transmission Scavenge) - Clean” for the proper procedure.

5. Clean drain plugs (1). Install the drain plugs.

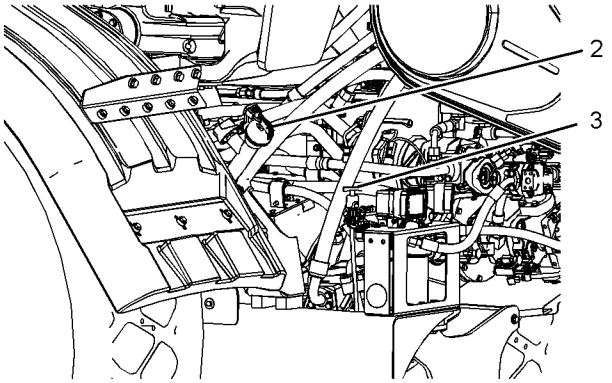

Illustration 266 g03080242

6. Clean the area around oil filler cap (2). Remove the oil filler cap. Fill the transmission with oil through the filler tube to the “FULL” mark on the oil level gauge (3). Refer to Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities” for additional information.

Note: Red dye is added to the transmission oil at the factory. If oil is leaking from the transmission, see your Cat dealer for further information. 9U-5031 Red Oil Dye may be added to your transmission oil. See your Cat dealer for further information.

7. Clean the oil filler cap. Install the oil filler cap.

8. Start the engine. Run the engine at low idle.

9. Inspect the transmission for leaks.

10. Slowly operate the transmission control in order to circulate the oil.

11. Maintain the oil level between the “FULL” and “ADD” marks on the oil level gauge (3). Add oil through the filler tube, if necessary.

12. Stop the engine.

i04912293

Transmission Oil Filter and Magnetic Screen - Replace/ Clean

SMCS Code: 3030-070-MGS; 3067-510

⚠ 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, “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.

Transmission Oil Filter

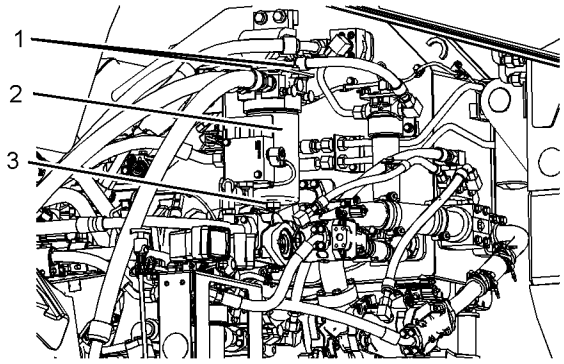

Illustration 267 g03080258

Transmission oil filter housing (2) is located on the top left side of the transmission case at the left rear of the tractor.

1. Park the machine on level ground. Engage the parking brake.

2. Lower the bowl to the ground. Stop the engine.

3. Clean the transmission oil filter housing. Clean the area around the cover for the transmission oil filter housing. Clean the area around drain plug (3).

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

5. Remove bolts (1) from the transmission oil filter housing. Remove the cover from the transmission oil filter housing.

6. Remove the used filter element and discard the used filter element according to local regulations.

7. Clean the inside of the transmission oil filter housing with a clean towel.

8. Insert a new filter element into the transmission oil filter housing.

9. Inspect the seal for the transmission oil filter housing. Replace the seal if the seal is damaged.

10. Install the cover on the transmission oil filter housing. Install the bolts on the transmission oil filter housing.

11. Clean the drain plug. Install the drain plug in the transmission oil filter housing.

Magnetic Screen

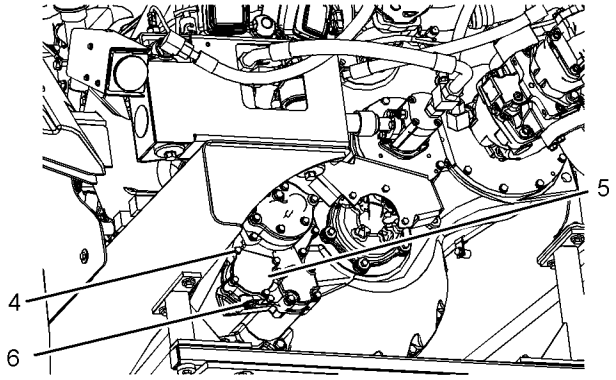

Illustration 268 g02142329

The magnetic screen is located below the transmission oil filter at the rear of the transmission case.

1. Clean the area around drain plug (6). Clean the area around cover (5).

2. Remove the drain plug. Drain the oil into a suitable container.

3. Remove bolts (4).

4. Remove cover (5).

5. Remove the magnetic screen.

6. Separate the magnets from the magnetic screen. Wash the magnetic screen and the magnets in a nonflammable solvent.

Note: Do not rap the magnets on hard objects. The magnets may be damaged. Replace any damaged magnets.

7. Allow the cleaned parts to dry. Use compressed air in order to speed the drying of the parts.

8. Clean the magnets with a towel or clean the magnets with a stiff bristle brush.

9. Install the magnets into the magnetic screen.

10. Install the magnetic screen into the transmission case.

11. Install the cover and the bolts.

12. Clean the drain plug. Install the drain plug.

13. Add transmission oil. Maintain the oil level between the “FULL” mark and the “ADD” mark in the sight gauge for the transmission. Refer to Operation and Maintenance Manual, “Transmission Oil Level - Check” for the proper procedure.

14. Start the engine. Run the engine at low idle.

15. Check the transmission oil filter for leaks. Check the magnetic screen for leaks.

16. Check the oil level of the transmission. Add oil, if necessary.

17. Stop the engine.

i04912302

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

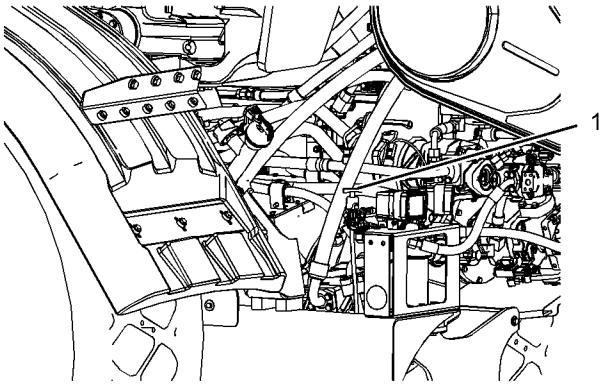

Illustration 269 g03080278

Clean the area around the oil level gauge (1).

1. Start the engine and run the engine at low idle. Remove the oil level gauge.

2. Maintain the oil level between the marks on the oil level gauge.

3. Stop the engine.

i04912306

Transmission Oil Sample - Obtain

SMCS Code: 3030-008; 7542

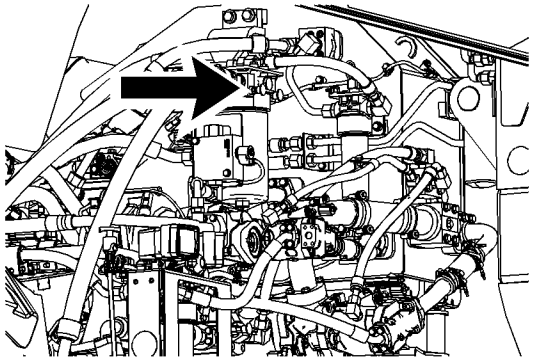

Illustration 270 g03080285

The sampling valve for the transmission is located at the rear of the transmission.

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

i02503917

Wheel Bearing Oil - Change

SMCS Code: 4234-044-OC

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.

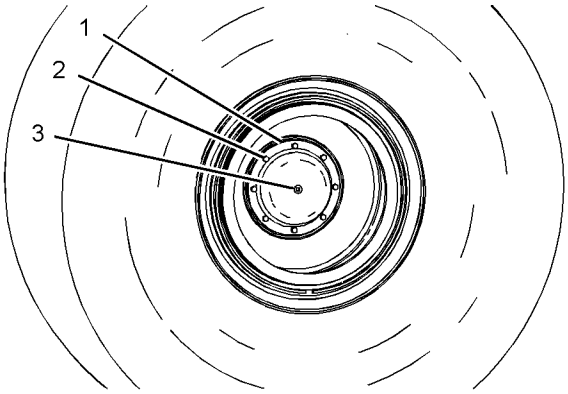

Illustration 271 g01128800

The wheel bearings are located on the rear wheels of the scraper.

1. Clean the area around cover (1).

2. Loosen bolts (2). Allow the oil to drain into a suitable container.

3. Remove the bolts. Clean the cover. Clean the wheel.

4. Inspect the gasket that is between the cover and the wheel for damage. Replace the gasket, if necessary.

5. Install the cover. Install the bolts.

6. Remove oil filler plug (3). Fill the wheel bearing with oil. Maintain the oil level at the bottom of the opening for the oil filler plug. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

7. Clean the oil filler plug and install the oil filler plug.

Repeat the procedure for the other wheel.

i02503939

Wheel Bearing Oil Level - Check

SMCS Code: 4234-535-FLV

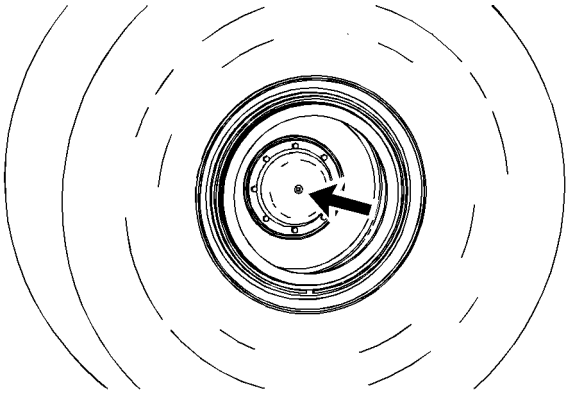

Illustration 272 g01128618

The wheel bearings are located on the rear wheels of the scraper.

1. Clean the surface around the oil filler plug. Remove the oil filler plug.

2. Ensure that the oil level is maintained at the bottom of the opening for the oil filler plug.

3. Clean the oil filler plug and install the oil filler plug.

Repeat the procedure for the wheel.

i03864306

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
Use Caterpillar nonfreezing window washer solvent or a commercially available windshield washer fluid in order to prevent freezing of the windshield washer system.

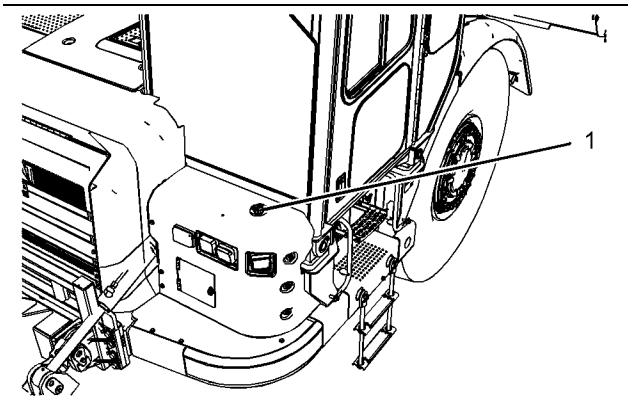

Illustration 273 g02108117

The window washer reservoir is located on the front of the cab on the left side of the machine.

1. Remove cap (1).

2. Fill the window washer reservoir through the filler tube.

3. Replace cap (1).

i03864262

Window Wiper - Inspect/ Replace

SMCS Code: 7305-040; 7305-510

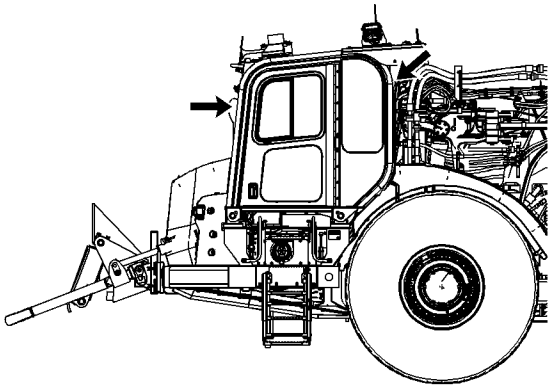

Illustration 274 g02108075

One window wiper is located at the cab front window. One window wiper is located at the cab rear window. The window wipers have replaceable wiper blades.

Replace the wiper blades when the following conditions occur:

Note: Use a portable access system to change the wiper blades.

- The wiper blades streak the windows of the cab.

- The wiper blades are damaged.
- The wiper blades are worn.

Note: Damaged wiper blades may cause permanent damage to the glass of the cab windows.

i04769373

Windows - Clean

SMCS Code: 7310-070

⚠ WARNING

When cleaning the windows, use the recommended procedure in this manual. Serious injury or death could result from falling if the appropriate procedure and equipment is not used.

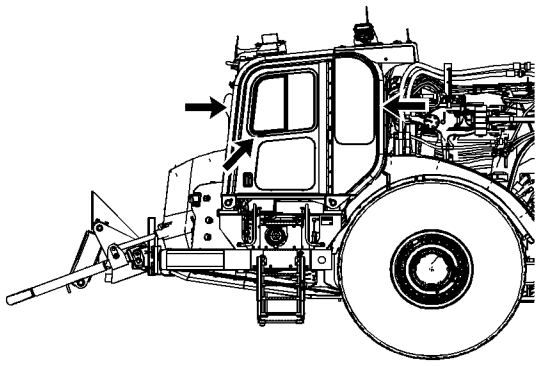

Illustration 275 g02100282

Clean the front window, the left side windows, and the rear window of the cab while you are standing on the ground or on a stable work platform. Use the appropriate equipment in order to reach the left side windows and the rear window. If you are standing on the ground, use a squeegee with an extension handle.

Clean the right side windows from the top of the engine enclosure. Access this area by using the ladders and the walkways that are located on the right-hand side of the machine. Be sure to use the areas of the walkways that are covered with a slip resistant surface. Use the provided handholds on the cab to maintain a secure position.

Use commercially available window cleaning solutions to clean the windows.

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

i05835866

Reference Material

SMCS Code: 1000; 7000

The following literature can be obtained from any Cat dealer:

Special Instruction, PEHJ0192, “Optimizing Oil Change Intervals”

Special Instruction, PEHJ0191, “S·O·S Fluid Analysis”

Special Publication, SEBD0518, “Know Your Cooling System”

Special Publication, SEBD0970, “Coolant and Your Engine”

Special Publication, SEBD0717, “Diesel Fuels and Your Engine”

Special Instruction, SEHS9031, “Storage Procedure for Caterpillar Products”

Special Publication, SEBU5898, “Cold Weather Recommendations”

Special Publication, SEBD0640, “Oil and Your Engine”

Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”

Special Publication, SELF9001, “Federal Emission Control Warranty”

Special Publication, SEBF8029, “Guideline For Reusable Parts and Salvage Operations”

Operation and Maintenance Manual, SEBU8257, “The European Union Physical Agents (Vibration) Directive “2002/44/EC” ”

Service Manual, "Air Conditioning and Heating R-134a for All Caterpillar Machines

Special Instruction, REHS0354, “Charging System Troubleshooting”

Special Instruction, REHS1642, “Operation of the Product Link System”

Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog”

Service Magazine, SEHS6929, “Inspection, Maintenance, and Repair of ROPS and Attachment Installation Guidelines”

Specifications, SENR3130, “Torque Specifications”

System Operation, Troubleshooting, Testing and Adjusting, RENR7911, “Product Link 121SR/321SR”

Special Instruction, REHS2365, “An Installation Guide for the Product Link PL121SR and for the PL300”

Service Parts, PECP9067, “One Safe Source”

Special Instruction, SEHS7332, “Warning Tag - Danger Do Not Operate”

Special Instruction, SEHS7633, “Battery Test Procedure”

Special Publication, PEGJ0047, “How to Take a Good Oil Sample”

Special Publication, PEGJ0046, “S·O·S Services: Understanding Your Results”

Special Publication, PEWJ0074, “Caterpillar Filter and Fluid Application Guide”

Special Publication, PMEP5027, “Extended Life Coolant/Antifreeze Label”

Special Publication, SEBD0400, “Dictionary of Pictograph Symbols”

Operation and Maintenance Manuals are available in other languages. Consult your Cat dealer for information about obtaining these Operation and Maintenance Manuals.

Additional Reference Material

ASTM D2896, “TBN Measurements” can normally be obtained from your local technological society, from your local library, or from your local college.

SAE J313, “Diesel Fuels” can be found in the SAE handbook. Also, this publication can be obtained from your local technological society, from your local library, or from your local college.

SAE J754, “Nomenclature” can normally be found in the SAE handbook.

SAE J183, “Classification” can normally be found in the SAE handbook.

Engine Manufacturers Association, “ Engine Fluids Data Book”

Engine Manufacturers Association
Two North LaSalle Street, Suite 2200
Chicago, Illinois, USA 60602
E-mail: ema@enginemanufacturers.org
(312) 827-8700
Facsimile: (312) 827-8737

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.

Index

E

F

G

T

V

W

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:	_____	_____	_____