SEBU8708-12 (en-us)
May 2019

Operation and Maintenance Manual

D10T2 Track-Type Tractor

JJW 1-UP (D10T2)
RAB 1-UP (D10T2)

Language: Original Instructions

Important Safety Information

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

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

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

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

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

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.

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

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

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

Table of Contents

Foreword

California Proposition 65 Warning

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

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

www.P65Warnings.ca.gov

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

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

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

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

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

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

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

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

Safety

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

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

Operation

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

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

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

Maintenance

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

Maintenance Intervals

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

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

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

Certified Engine Maintenance

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

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

Machine Capacity

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

Product Identification Number

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

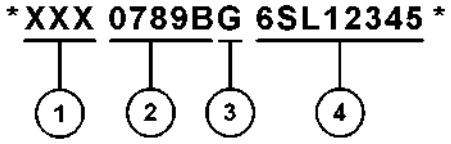

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i07764410

Safety Messages

SMCS Code: 7000; 7405

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

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

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

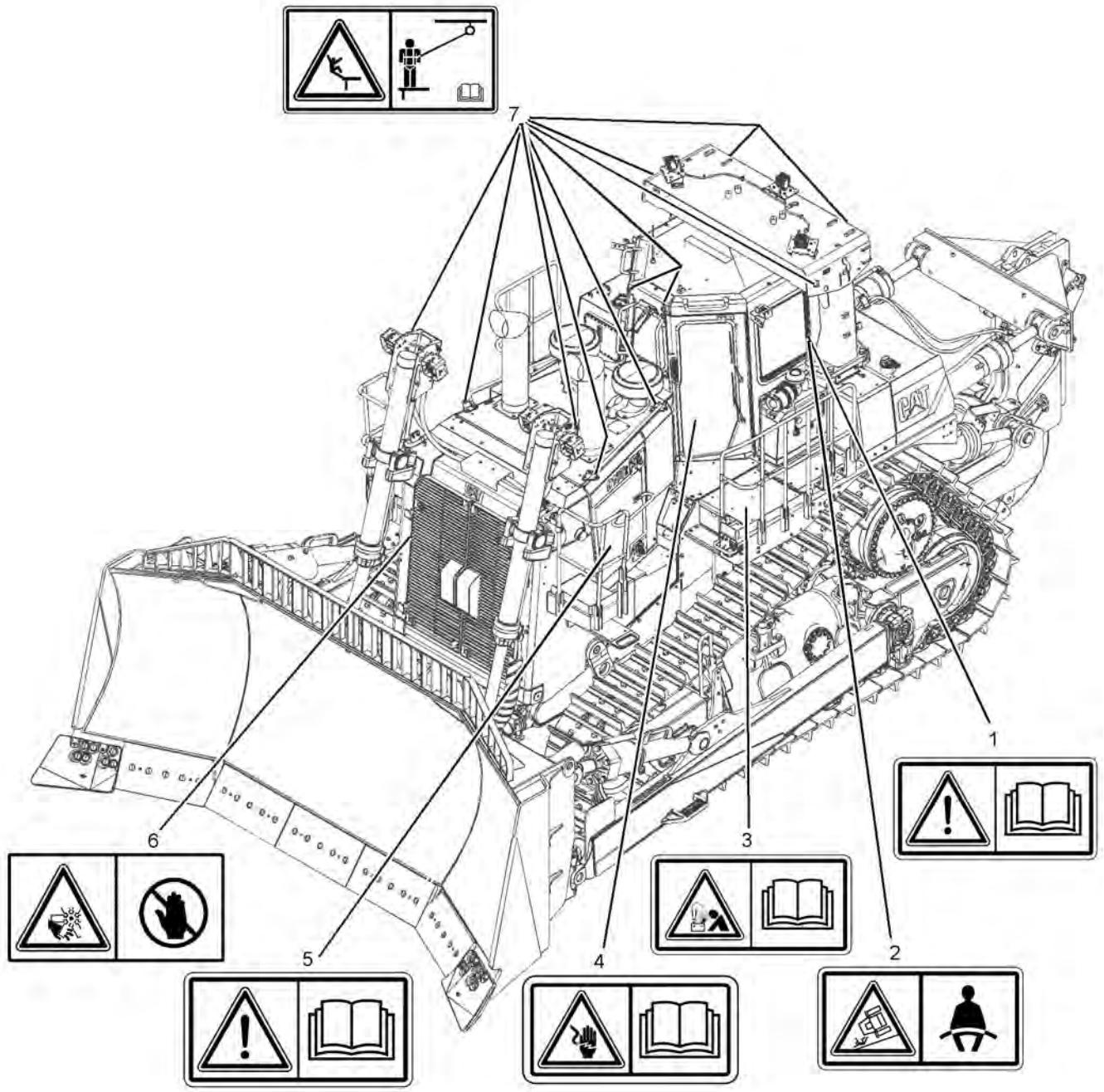

Illustration 2 g06266763

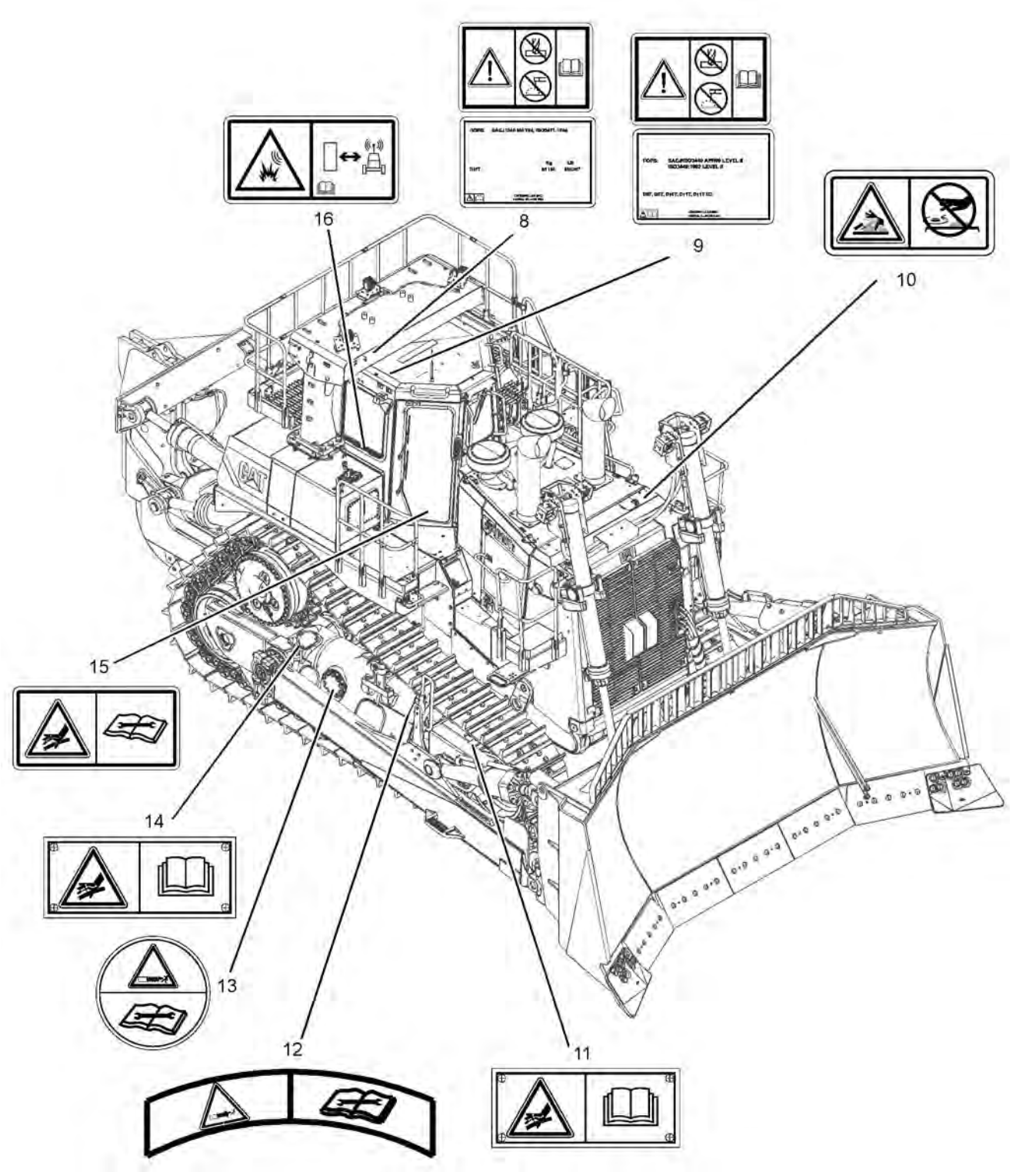

Illustration 3 g06338796

Do Not Operate (1)

This safety message is positioned inside the cab on the left B post

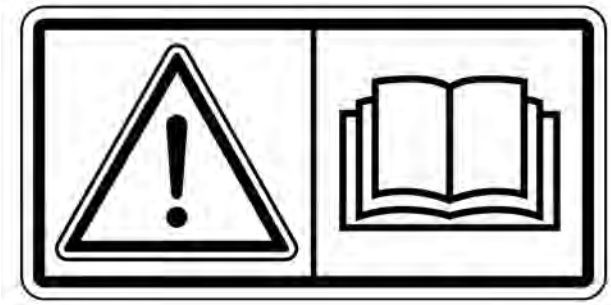

Illustration 4 g01370904

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 ANY CATERPILLAR DEALER FOR REPLACEMENT MANUALS. PROPER CARE IS YOUR RESPONSIBILITY.

Seat Belt (2)

This safety message is positioned on the left B post of the operator station.

Illustration 5 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.

Refer to Operation and Maintenance Manual, “Seat Belt” for more information.

Improper Connections for Jump-Start Cables (3)

This safety message is on the cover in the battery compartment on the left side of the machine. If equipped, this safety message also appears on the cover in the battery compartment on the right side of the machine with the cold start attachment option.

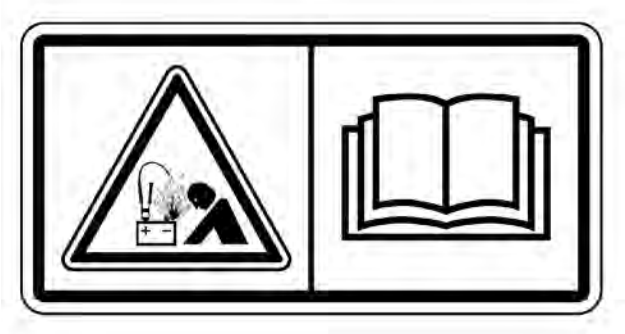

Illustration 6 g01370909

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 additional information.

Electrical Shock Hazard (4)

This safety message is on the main fuse in the fuse panel. The fuse panel is on the left side of the seat.

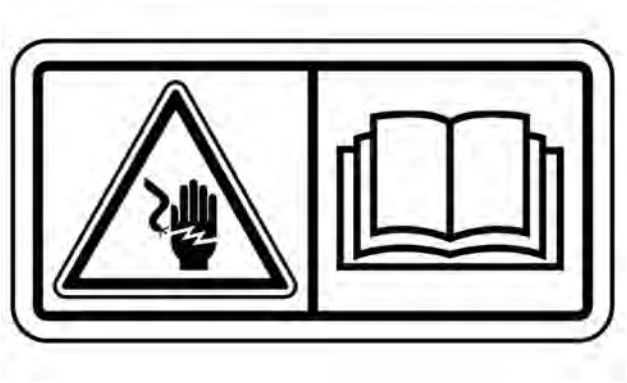

Illustration 7 g01372247

WARNING

WARNING! Shock/Electrocution Hazard! Read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could cause serious injury or death.

Refer to Operation and Maintenance Manual, “Fuses and Circuit Breakers - Replace/Reset” for additional information.

Do Not Operate (5)

This safety message is on both sides of the engine valve cover and on front of the engine ECM on the left side of the engine.

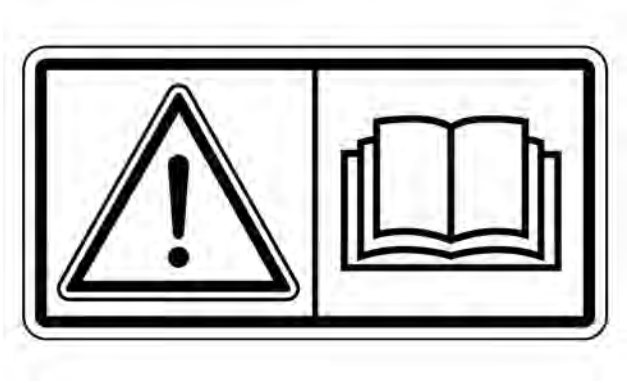

Illustration 8 g01370904

WARNING

Do not operate or work on this equipment unless you have read and understand the instructions and warnings in the Operation and Maintenance Manuals. Failure to follow the instructions or heed the warnings could result in serious injury or death.

Reversing Fan (6)

This safety message is on both sides of the radiator guard inside the grill doors.

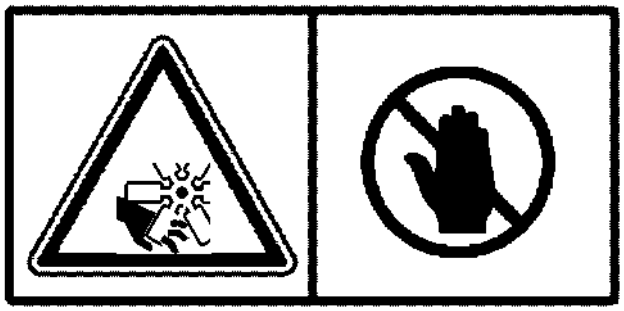

Illustration 9 g01053264

WARNING

During operation of the reversing fan, flying debris could be discharged from the machine which could result in personal injury or death. Stay clear of the reversing fan discharge area during reversing fan operation.

Lanyard Fixing Points (7)

This safety message is located next to the lanyard fixing points. Twelve lanyard fixing points are on the machine. One fixing point per cylinder spray shield, top front of cab, back rear corner of the ROPS, each side of the ROPS and each corner of the hood.

Illustration 10 g02726642

WARNING

Falling Hazard. May cause personal injury or death. Always attach safety lanyard to appropriate fixing point.

Do Not Weld On ROPS (8)

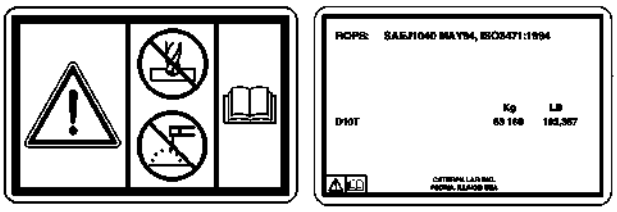

Illustration 11 g01448986

These safety messages are on the right front ROPS.

⚠ WARNING

Personal injury or death can result when voiding this certification.

Structural damage, an overturn, modification, alteration, or improper repair can impair the ROPS structure's protection capability thereby voiding this certification.

Do not weld on or drill holes in the structure.

To avoid possible weakening of this ROPS, consult a Caterpillar dealer before altering this ROPS in any way. The protection offered by this ROPS will be impaired if it has been subjected to structural damage.

Consult a Caterpillar dealer to determine this structure's limitations without voiding its certification.

Do Not Weld On FOPS (9)

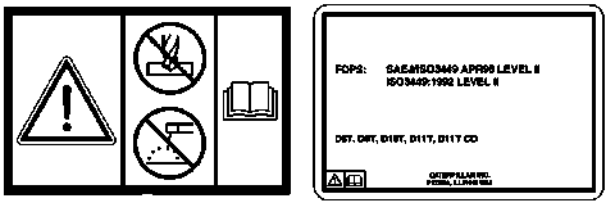

Illustration 12 g01448989

These safety messages are on the right outside of the cab.

⚠ WARNING

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

Hot Coolant Under Pressure (10)

This safety message is located under the access door to the radiator cap.

Illustration 13 g01371640

⚠ WARNING

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

High-Pressure Cylinder (11)

This safety message is on the track roller frame on both sides of the machine.

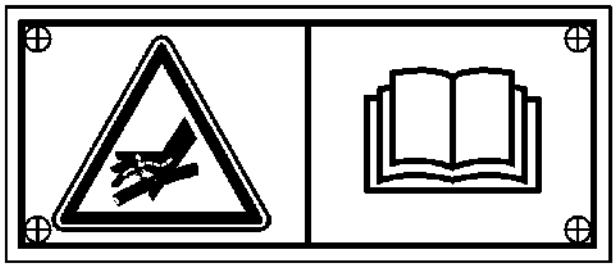

Illustration 14 g01076729

⚠ WARNING

High Pressure Cylinder. Do not remove any parts until all pressure has been relieved to avoid possible personal injury. Relieve pressure by opening relief valve one turn maximum. See the Operation and Maintenance Manual for correct procedure.

Refer to Operation and Maintenance Manual, “Track - Check/Adjust” for additional information.

Compressed Recoil Spring (12)

This safety message is located inside the track roller frame on both sides of the machine.

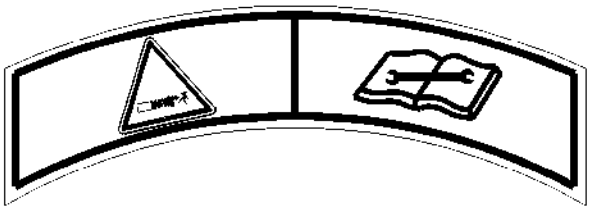

Illustration 15 g01065909

WARNING

Personal injury or death can result from a compressed recoil spring being released suddenly using incorrect disassembly procedures.

A recoil spring that is still held in compression can result in the recoil spring being released unexpectedly with extreme force which could cause serious injury or death.

Make sure that the correct disassembly procedure is used, if a front track roller frame that has a crack in the parent metal or weld connection (or a tubular section that has separated from the front of the frame assembly) when the recoil spring is still held in compression.

Refer to Special Instruction, SMHS8273 which contains the disassembly procedure that must be used to decrease the possibility of injury while performing service on the track roller frame.

Compressed Recoil Spring (13)

This safety message is located inside the track roller frame on both sides of the machine.

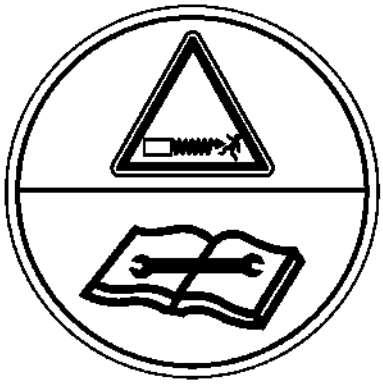

Illustration 16 g01448991

WARNING

Personal injury or death can result from a compressed recoil spring being released suddenly using incorrect disassembly procedures.

A recoil spring that is still held in compression can result in the recoil spring being released unexpectedly with extreme force which could cause serious injury or death.

Make sure that the correct disassembly procedure is used, if a front track roller frame that has a crack in the parent metal or weld connection (or a tubular section that has separated from the front of the frame assembly) when the recoil spring is still held in compression.

Refer to Special Instruction, SMHS8273 which contains the disassembly procedure that must be used to decrease the possibility of injury while performing service on the track roller frame.

High-Pressure Cylinder (14)

This safety message is attached to the inside cover for the recoil spring compartment on both sides of the machine.

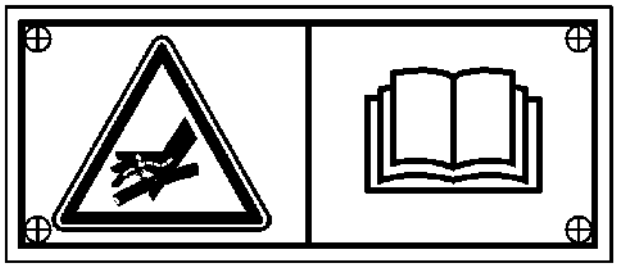

Illustration 17 g01076729

WARNING

High Pressure Cylinder. Do not remove any parts until all pressure has been relieved to avoid possible personal injury. Relieve pressure by opening relief valve one turn maximum. See the Operation and Maintenance Manual for correct procedure.

Refer to Operation and Maintenance Manual, “Track - Check/Adjust”.

Accumulator Location (15)

This safety message is attached to the front floorplate that is located in the cab. Remove the front floorplate to access the accumulator cylinder.

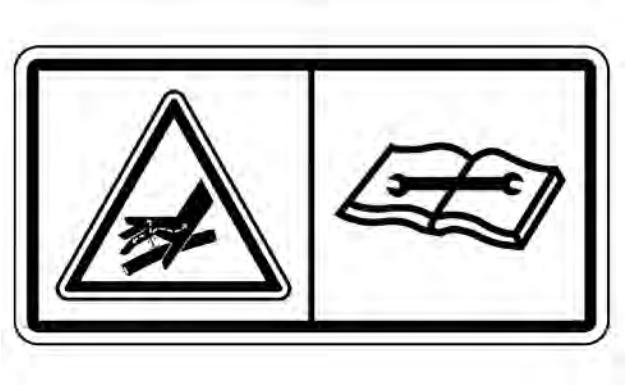

Illustration 18 g01372252

WARNING

HIGH PRESSURE CYLINDER AND LINES! Do not remove valve, hydraulic fitting, or valve core, nor disassemble any parts until pressure has been relieved. Personal injury or death could occur.

See your Caterpillar dealer who has tools and detailed information for servicing and charging cylinders.

Product Link (16)

If equipped, this safety message (17) is located inside the cab on the left B post.

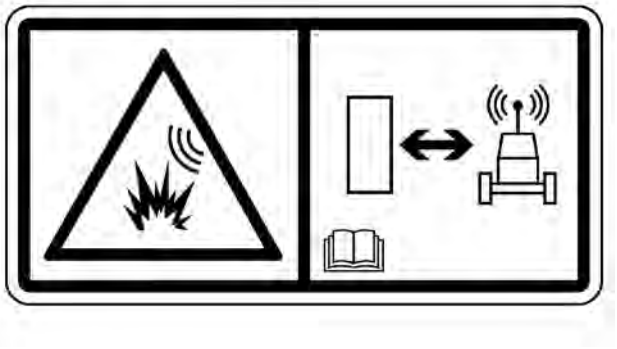

Illustration 19 g01370917

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 Special Instruction, REHS1642, “Operation of the Product Link System” for additional information.

i07496983

Additional Messages

SMCS Code: 7000; 7405

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

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

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

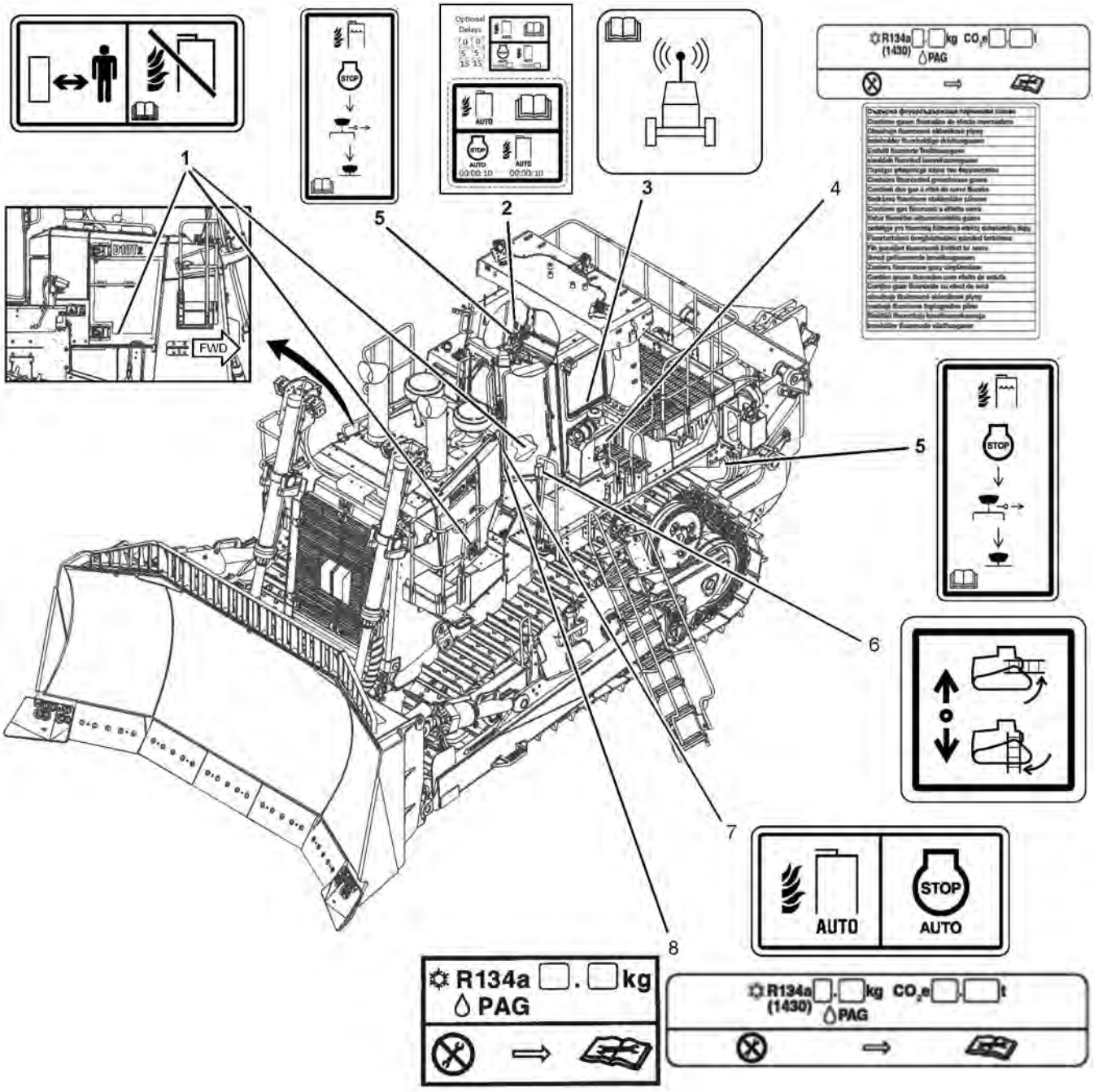

Illustration 20 g06254902

Fire Suppression System (1) (If Equipped)

Illustration 21 g06254932

This film is on the LH side and RH side engine compartment entry doors. This film is also located inside the cab on the floor plate.

The film indicates that the fire suppression system requires isolation before any service or maintenance is performed on or about the fire suppression system, or this particular location.

Fire Suppression System Time Delay (2) (If Equipped)

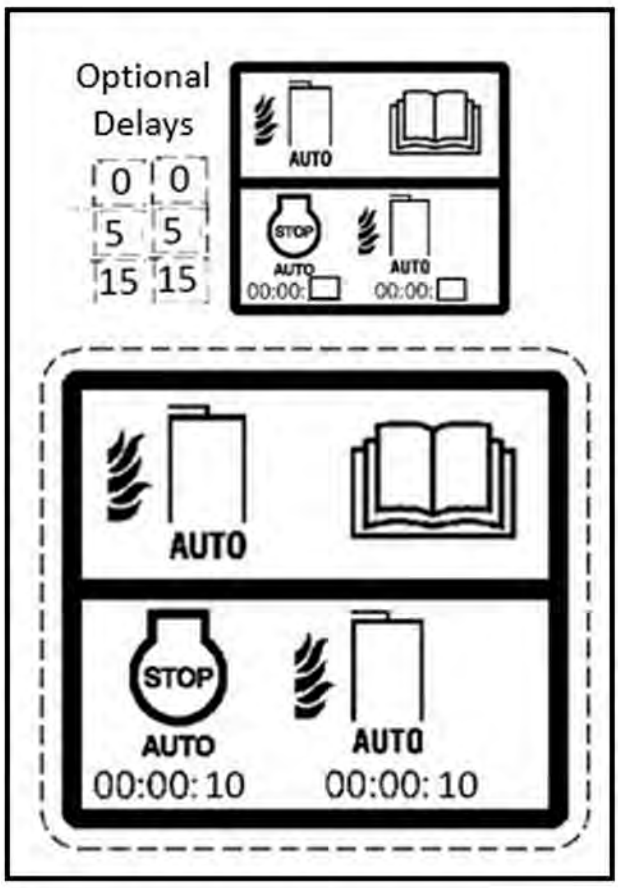

Illustration 22 g06254935

This film is located near the fire suppression system control area on the RH rear ROPS, inside the cab.

The fire suppression system control is equipped with time delays for the following functions:

- Equipment Shutdown delay
- Shutdown delay extension
- Fire suppression discharge delay

Note: The fire suppression system time delay film has extra film for reference. Place extra film behind operator seat.

Data Privacy (3)

This message is located inside the cab.

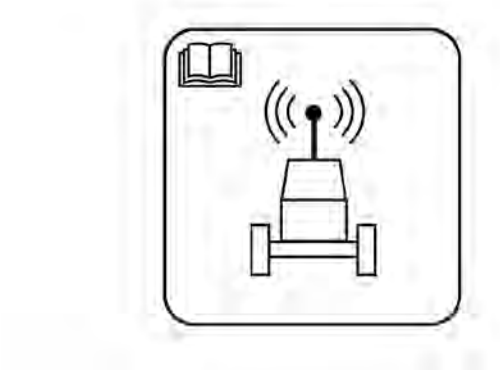

Illustration 23 g01418953

The Product Link System is a satellite or cellular communication device that transmits information regarding the machine back to Caterpillar and Cat dealers and customers. All logged events and diagnostic codes that are available, to the Caterpillar Electronic Technician (ET) on the CAT data link, can be sent to the satellite. Information can also be sent to the Product Link System. The information is used to improve Caterpillar products and Caterpillar services.

Reference: See Operation and Maintenance Manual, “Product Link” for additional information.

Air Conditioner (4) (If Equipped)

Illustration 24 g06196189

This film is located inside the conditioner access door on left-hand side of machine.

Do not service the air conditioner system unless you are following the correct maintenance repair procedures specified in the Service Manual.

The air conditioning system on this machine contains the fluorinated greenhouse gas refrigerant R134a (Global Warming Potential = 1430). The system contains 1.9 kg (4 lb) of refrigerant which has a CO2 equivalent 2.717 metric tonne. The lubricating oil type for this system is polyalkyleneglycol (PAG).

Fire Suppression Manual Actuators (If Equipped) (5)

These messages are located in the cab on the right rear ROPS, and on top of the left side, lower ripper cylinder.

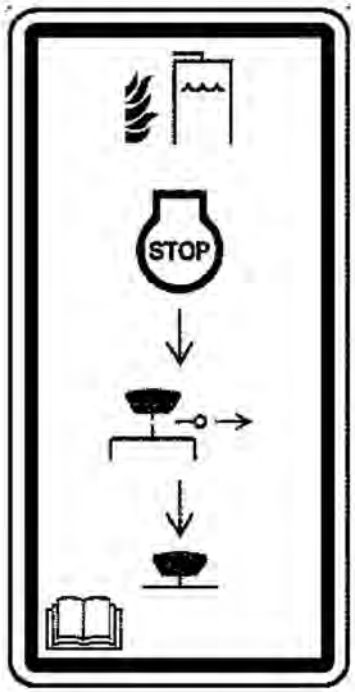

Illustration 25 g06189040

WARNING

Manual actuation of the fire suppression system will result in immediate system discharge which may obscure vision and affect the operator's ability to control the machine. This may result in personal injury or death. Make certain the machine is stopped safely before manually actuating the system. Manual actuation will bypass all auxiliary shutdown and alarm functions.

Access Ladder (6) (If Equipped)

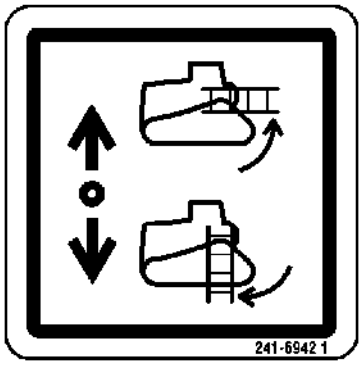

Illustration 26 g01181995

The film (6) for the access ladder is located next to the switch on the ladder control box.

Note: Warning alarms will sound if the parking brake is released or the blade is raised when the ladder is down.

Note: The ladder can move without the engine operating.

Automatic Fire Suppression System (7) (If Equipped)

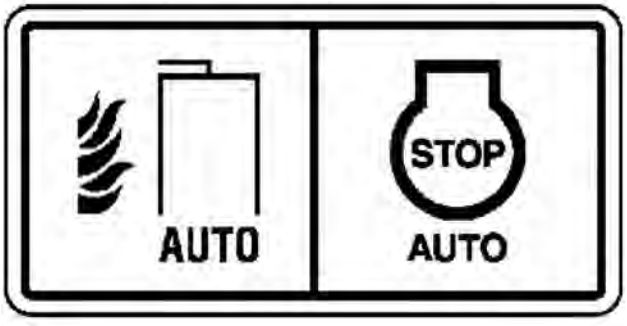

Illustration 27 g06254937

This film is on the cab at entry door.

This film indicates that this machine is fitted with a fire suppression system which may operate automatically. If there is an emergency, the fire suppression system may operate automatically and initiate equipment shutdown.

Air Conditioner (8) (If Equipped)

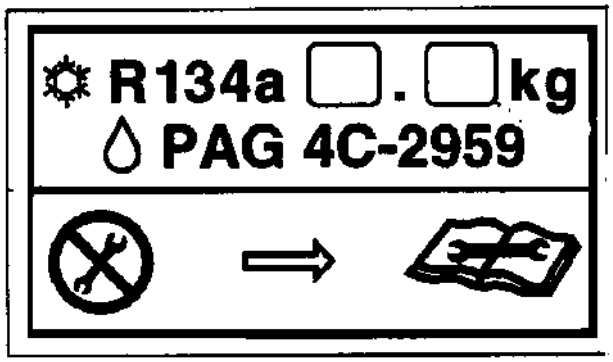

Illustration 28 g01118600

This film is located in the cab on the left side of the dash.

Air Conditioner (8) (If Equipped)

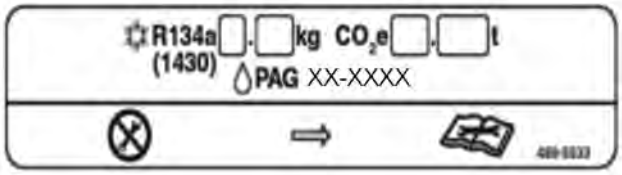

Illustration 29 g06196128

DEF Purge Indicator Lamp (If Equipped)

This message is located near the battery disconnect switch.

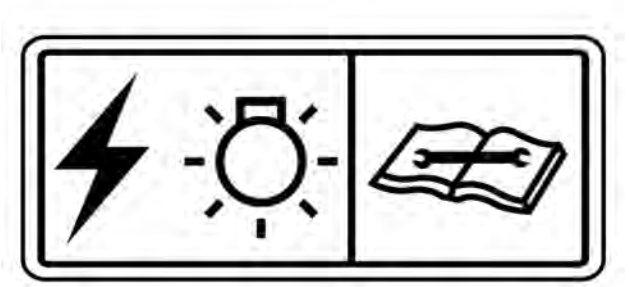

Illustration 30 g03796564

NOTICE
Do not conduct any service procedures on the DEF system until the DEF purge indicator lamp is not illuminated. The indicator lamp may remain illuminated for several minutes, even though the battery disconnect switch is OFF and the engine start switch is OFF. When the indicator lamp is on, the DEF system is still powered.

i07746355

General Hazard Information

SMCS Code: 7000

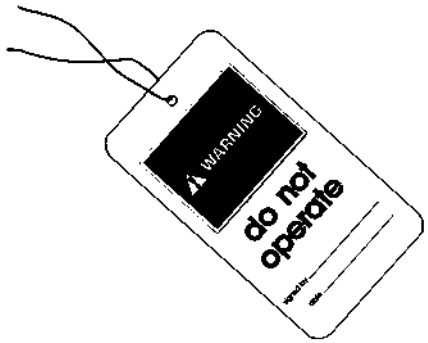

Illustration 31 g00104545
Typical example

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.

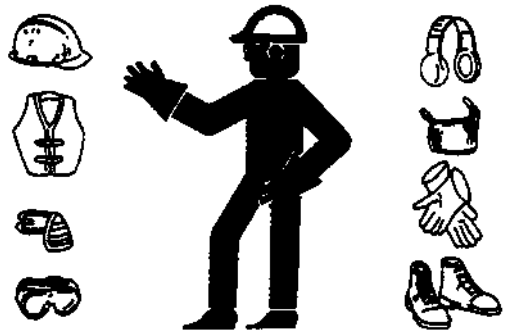

Illustration 32 g00702020

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.

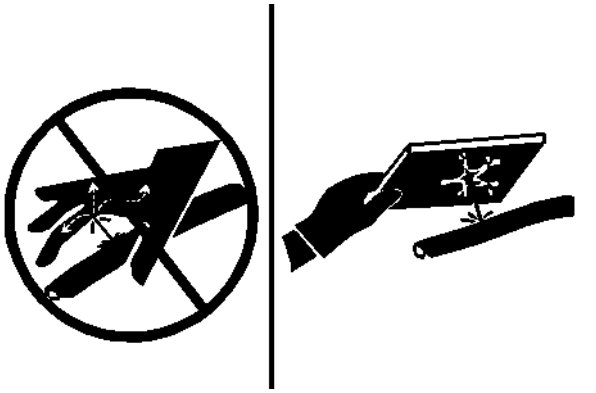

Illustration 33 g00687600

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

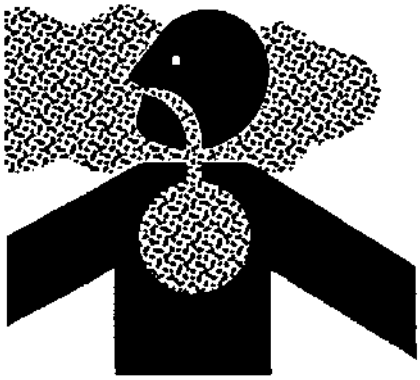

Illustration 34 g02159053

Exhaust

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

Asbestos Information

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

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

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

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

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

Dispose of Waste Properly

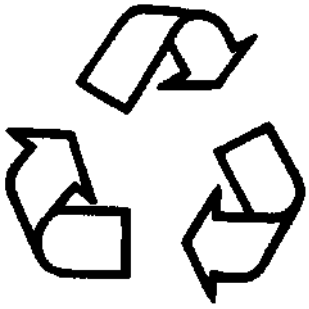

Illustration 35 g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07746334

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i07746336

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 36 g00704000

General

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

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

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

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

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

Illustration 37 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 38 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.

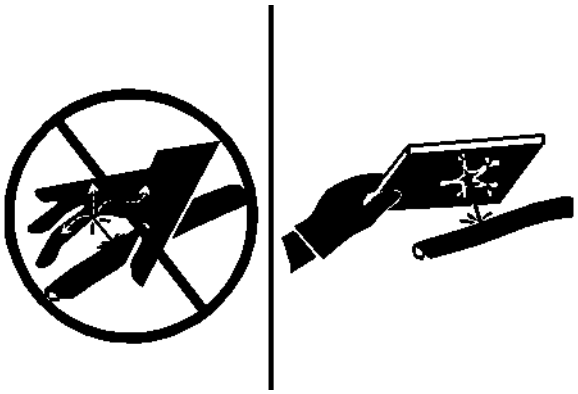

Illustration 39 g00687600

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

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

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

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

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

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

Ether

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

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

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

i07358446

Fire Suppression System

SMCS Code: 1000; 7000; 7401

Fire suppression systems are designed to detect and extinguish a machine fire to prevent the fire from spreading.

Fire suppression systems must be installed, maintained, and serviced by an authorized fire suppression system agent.

Fire suppression systems are not intended to extinguish all possible fires. Unusual amounts of combustible materials and flammable fuels present, fluids under high pressure, uncontrolled operating and environmental conditions, debris buildup, as well as extended machine operating periods with minimal machine maintenance, can result in fire conditions which exceed the extinguishing capacity of the fire suppression system.

Alternative fire fighting equipment will need to be available to supplement the system if re-ignition occurs, or when total extinguishment is not possible.

Reference: Refer to Operation Maintenance Manual, “Fire Prevention and Explosion Prevention” for information regarding the prevention of a machine fire.

Reference: Refer to Operation Maintenance Manual, “Fire Safety” for information regarding fire safety and what to do in the event of a machine fire.

Depending on the application, your machine may be equipped with one of the following fire suppression configurations:

Fire Suppression System - Ready – If equipped. connections are installed that are ready for the final installation and commissioning of a fire suppression system. Contact an authorized fire suppression system agent. Refer to REHS1666, “General Guidelines for Fire Suppression Equipment”.

Fire Suppression System - Non-commissioned – If equipped, the fire suppression system is installed, but not commissioned. The fire suppression system delivered with the machine is not completed, or commissioned by Caterpillar. Contact an authorized fire suppression system agent.

Fire Suppression System - Commissioned – If equipped, the fire suppression system is installed and commissioned. The fire suppression system delivered with the machine is functional.

Note: Refer to Operation Maintenance Manual, “Operation Section” for additional information that pertains to your machine.

i06871511

Fire Extinguisher Location

SMCS Code: 7419

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. Obey the recommendations on the instruction plate.

Mount the fire extinguisher in the accepted location per local regulations.

If your machine is equipped with a ROPS structure, install the fire extinguisher mounting bracket to the right rear ROPS post. The right rear ROPS structure has mounting points install at the factory. If the weight of the fire extinguisher exceeds 4.5 kg (10 lb), mount the fire extinguisher near the bottom of the ROPS. Do not mount the fire extinguisher at the upper one-third area of the ROPS.

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

Consult your Cat dealer for the proper procedure for mounting the fire extinguisher.

i01329108

Track Information

SMCS Code: 4170; 7000

Track adjusting systems use either grease or oil under high pressure to keep the track under tension.

Grease or oil under high pressure coming out of the relief valve can penetrate the body causing injury or death. Do not watch the relief valve to see if grease or oil is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

The pins and bushings in a dry track pin joint can become very hot. It is possible to burn the fingers if there is more than brief contact with these components.

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.

i05262474

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operator seat. Do not short across the battery terminals and do not short across the batteries. Bypassing the engine neutral start system can damage the electrical system.

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

Adjust the mirrors on your machine for the best operator vision. Adjust both the inside mirror and the outside mirror before you operate the machine.

Inspect the condition of the seat belt and mounting hardware. Replace any damaged parts or worn parts. Regardless of appearance, replace the seat belt after 3 years of use. Do not use an extension for a seat belt on a retractable seat belt.

Adjust the seat so that full pedal travel can be achieved. Make sure that the operator's back is against the back of the seat. Sit in the operator seat and secure the seat belt before you start the engine. This action closes the operator seat belt switch.

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 working on the machine, working underneath the machine or working close to the machine. Make sure that the area is free of personnel.

i03767670

Engine Starting

SMCS Code: 1000; 7000

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

Move all hydraulic controls to the HOLD position before starting the engine. Move the transmission control to NEUTRAL position.

Engage the parking brake switch.

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

Check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine.

Briefly sound the horn before you start the engine.

i01896559

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

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

Be sure that all windows are clean. Secure the doors and the windows in either the open position or the shut position.

Adjust the rearview mirrors (if equipped) for best vision close to the machine. Make sure that the machine horn, the backup alarm (if equipped) and all other warning devices are working properly.

Reference: Refer to Operation and Maintenance Manual, “Walk-Around Inspection” in this manual.

Fasten the seat belt securely.

i07746368

Visibility Information

SMCS Code: 7000

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

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

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

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

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

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

i03652660

Restricted Visibility

SMCS Code: 7000

The size and the configuration of this machine may result in areas that can not be seen when the operator is seated. Illustration 40 provides an approximate visual indication of areas of significant restricted visibility. Illustration 40 indicates restricted visibility areas at ground level inside a radius of 12 m (40 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 12 m (40 ft).

This machine may be equipped with optional visual aids that may provide visibility to some areas with restricted visibility. 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”.

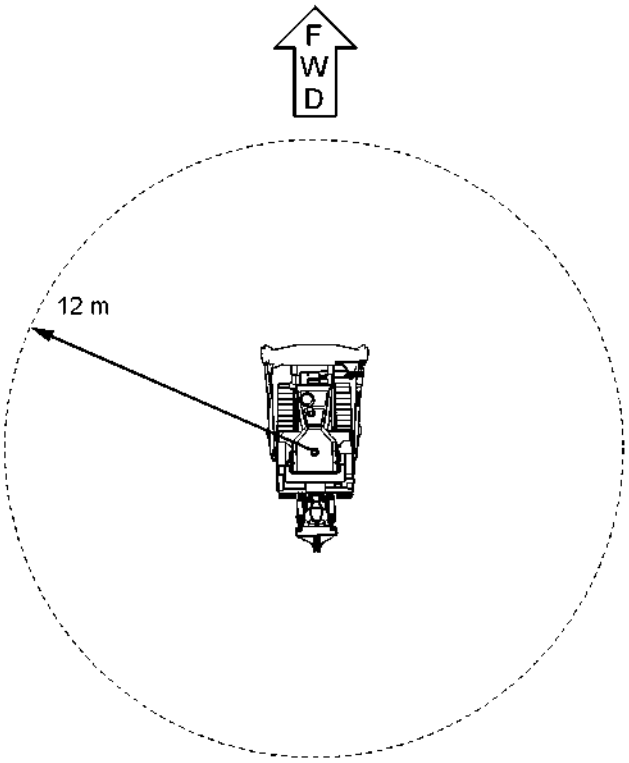

Illustration 40 g01960181
Top view of the machine

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

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Operation

SMCS Code: 7000

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of −18 °C (0 °F) to 50 °C (122 °F). Special configurations may be available to enhance operation within the specified temperature range. Special configurations may also be available to permit the operation of the machine outside the specified temperature range. 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.

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.

(continued)

(Table 1, contd)

System or Component Name	Limiting Condition	Criteria for Action	Required Action
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.
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. On machines that are disabled, the controls may be used when the engine is not running.

Check for proper operation of all controls and protective devices while you operate the machine slowly in an open area.

Before moving the machine, the operator must ensure that no one will be endangered.

During operation of the machine, flying debris could be discharged from the tracks. Keep all personnel a safe distance from the machine during operation.

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

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

Never use the work tool as a work platform.

Report any repairs that are needed and noted during operation.

Carry attachments close to the ground, 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, perform the following procedure:

- Discard the load.
- Turn the machine downhill.

Be careful to avoid any condition which could lead to tipping. Tipping can occur when you work on hills, banks and slopes. Also, tipping can occur when you cross ditches, ridges or other unexpected obstructions.

Whenever it is possible, operate the machine up the slopes and down the slopes. Avoid operating the machine across the slope, when possible.

Keep the machine under control. Do not overload the machine beyond capacity.

Towing devices and eyes that are not part of machine must be adequate.

Connect trailing equipment to a drawbar or to a hitch only.

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

When you maneuver to connect the equipment, make sure that no personnel are between the machine and trailing equipment. Block the hitch of the trailing equipment in order to align the equipment with the drawbar.

Know the maximum dimensions of your machine.

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

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Parking

SMCS Code: 7000

Note: When parked on a steep slope, fluid monitoring may return false low readings.

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

Apply the transmission modulator control (inching pedal) to stop the machine and the service brake to stop the machine. Move the transmission control switch to the NEUTRAL position. Move the throttle control to the LOW IDLE position.

Engage the parking brake.

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

Allow the engine to run for 2 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 month or more, 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.

i05511492

Engine Stopping

SMCS Code: 1000; 7000

Do not stop the engine immediately after the machine has been operated under load. This action 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. This action allows hot areas of the engine to cool gradually.

Note: With the key removed, a Delayed Engine Shutdown may operate. The engine will continue to operate for a time while the engine is in a cool down phase.

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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

The declared dynamic operator sound pressure level is 77 dB(A) when“ISO 6396:2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The cab was properly installed and maintained. The measurement was conducted with the cab doors and the cab windows closed.

The declared exterior sound power level is 116 dB(A) when the value is measured according to the dynamic test procedures and the conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

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

Hearing protection may be needed when the machine is operated with a cab that is not properly maintained. Hearing protection may also be needed when the doors and windows are open for extended periods, or in a noisy environment. Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment.

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

The declared dynamic operator sound pressure level is 77 dB(A) when “ISO 6396:2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed.

The declared exterior sound power level is 116 dB(A) when the value is measured according to the dynamic test procedures and the conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

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

Sound Level Information for Machines in Eurasian Economic Union Countries

The declared dynamic operator sound pressure level is 77 dB(A) when “ISO 6396:2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed.

The declared exterior sound power level (LWA) is 116 dB(A) when the value is measured according to the dynamic test procedures and the conditions that are specified in “ISO 6395:2008”. The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

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

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

Vibration Data for Track-Type Tractors

Information Concerning Hand/Arm Vibration Level

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

Information Concerning Whole Body Vibration Level

This section provides vibration data and a method for estimating the vibration level for track-type tractors.

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

Precise vibration levels are not possible for this machine. The expected vibration levels can be estimated with the information in Table 2 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 2

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."							
Machine Type	**Typical Operating Activity**	**Vibration Levels**			**Scenario Factors**		
		X axis	**Y axis**	**Z axis**	**X axis**	**Y axis**	**Z axis**
Track-Type Tractors	dozing	0 , 74	0 , 58	0 , 70	0 , 31	0 , 25	0 , 31
	ripping	1 , 25	1 , 19	1 , 02	0 , 40	0 , 41	0 , 28
	transfer	0 , 87	0 , 80	0 , 97	0 , 43	0 , 40	0 , 34

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

The Caterpillar suspension seat meets the criteria of "ISO 7096". The criteria represents vertical vibration level under severe operating conditions. This seat is tested with the input "spectral class EM6". The seat has a transmissibility factor of "SEAT<0.7".

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

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

2. Maintain machines according to the manufacturer recommendations.

a. Tire pressures

b. Brake and steering systems

c. Controls, hydraulic system, and linkages

3. Keep the terrain in good condition.

a. Remove any large rocks or obstacles.

b. Fill any ditches and holes.

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

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

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

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

5. Perform the following operations smoothly.

a. Steer

b. Brake

c. Accelerate.

d. Shift the gears.

6. Move the attachments smoothly.

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

a. Drive around obstacles and rough terrain.

b. Slow down, when necessary, over rough terrain.

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

a. Use machines that are equipped with suspension systems.

b. Use the ride control system on Track-Type Tractors.

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

d. Haul the machines between workplaces.

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

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

b. Adjust the mirrors to minimize twisted posture.

c. Provide breaks to reduce long periods of sitting.

d. Avoid jumping from the cab.

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

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

Sources

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

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

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

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

Consult your local 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; 7301

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.

i07746359

Guards
(Operator Protection)

SMCS Code: 7000; 7150; 7325

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

i07766888

Specifications

SMCS Code: 7000

Intended Use

This machine is a Track-Type Tractor that is classified as a “Tractor-dozer” . The machine is earthmoving equipment that is described in ISO 6165:2006. The machine propels the track forward. Also, the machine propels the track rearward. This action allows the machine to move independently. The machine uses equipment that is either a dozing attachment which cuts, moves, and grades material through forward motion of the machine or a mounted attachment that is used to exert a push or a pull force such as a ripper or towing winch. Additional applications include pushing scrapers during loading and pulling towed equipment by using a drawbar.

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 14,000 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.

Application/Configuration Restrictions

The Maximum approved Operating Weight: 83160 kg (183336 lb)

Maximum drawbar pull 98300 kg (216715 lb)

Maximum vertical drawbar load 31770 kg (70041 lb)

The maximum line pull for the winch is 617413 N (138800 lb).

The maximum slope that has the proper lubrication is 100 percent or 45 degrees.

The capability of the brake is equal to the ROPS capability under a 45 degree slope.

Use the machine only in environments that are not explosive with gases.

Special attachments and operating instructions are required for waste handling applications and other custom configurations.

Machine Specification

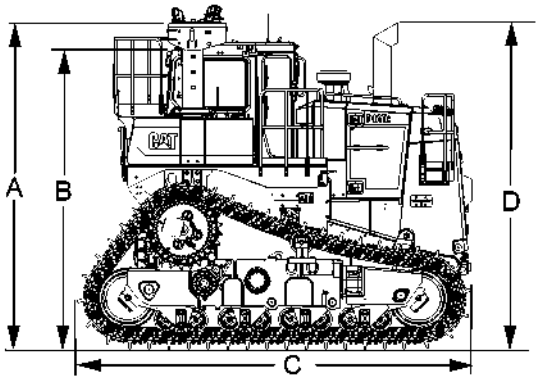


Illustration 41 g03487776

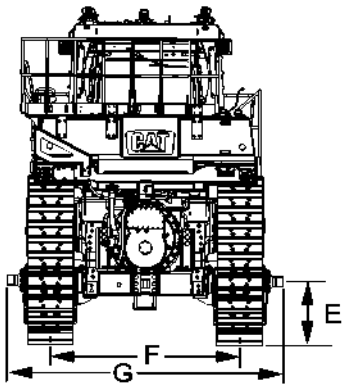


Illustration 42 g03487779

Basic machine specifications are listed below.

Table 3

D10T2 Track-Type Tractor	
Engine Power (FWD/REV)	447/538 kW (600/722 hp)
Engine (Make and Model)	Caterpillar C27 ACERT (ATAAC)
Engine Displacement	27 L (1648 in ^{3})
Engine Rated Speed	1800 rpm
Engine (No. of Cylinders)	12
Height of Machine	
Top of ROPS (A)	4406 mm (173.5 inch)
Top of FOPS Cab (B)	4098 mm (161.3 inch)
Top of Stack (D)	4356 mm (171.5 inch)
Ground Clearance (E)	664 mm (26.1 inch)

(continued)

(Table 3, contd)

D10T2 Track-Type Tractor	
Height of the Drawbar	864 mm (34.0 inch)
Length of Machine	
Length of Machine (1) (C)	5339 mm (210.2 inch)
Length of Track on Ground	3872 mm (152.4 inch)
Drawbar	1213 mm (47.8 inch)
Single Shank Ripper (2)(3)	1760 mm (69 inch)
Multiple Shank Ripper (2) (3)	1717 mm (67.6 inch)
Width of Machine	
Track Gauge (F)	2550 mm (100 inch)
Width Over Trunnions (G)	3736 mm (147.1 inch)
Width of Standard Track Shoe	610 mm (24 inch)
Weight of Machine	
D10T2 shipping weight (4)	49793 kg (109775 lb)
Operating Weight(5)	70171 kg (154700 lb)
D10T2 without a Ripper	63054 kg (139010 lb)
D10T2 (maximum weight)	83160 kg (183336 lb)
Single Shank Ripper	7117 kg (15690 lb)
Multiple Shank Ripper	7968 kg (17566 lb)
Blade Specification	
10SU Bulldozer Blade(2)	
Length	7416 mm (292 inch)
Width	4940 mm (194.5 inch)
Capacity	18.5 cubic meter (24.2 cubic yard)
10U Bulldozer Blade (2)	
Length	7750 mm (305 inch)
Width	5260 mm (207 inch)
Capacity	22.0 cubic meter (28.7 cubic yard)

(1) The length of the machine is measured from the trunnion of the tag link to the end of the track (standard).
(2) Add to length of the machine.
(3) Length is measured from the grouser tip with the ripper shank in a vertical position and the ripper tip at the ground.
(4) Shipping weight includes the following components: coolant, lubricant, 10% fuel, ROPS, FOPS cab, fast fuel and 610 mm (24 inch) (ES shoes)
(5) The weight includes the machine and the following items: full tank of fuel, all lubricants, coolant, SU Bulldozer Blade, dual tilt cylinders, single shank ripper with pin puller, hydraulic controls, fast fuel, 610 mm (24 inch) ES shoes, cab with EROPS and operator.

Identification Information

i05517054

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

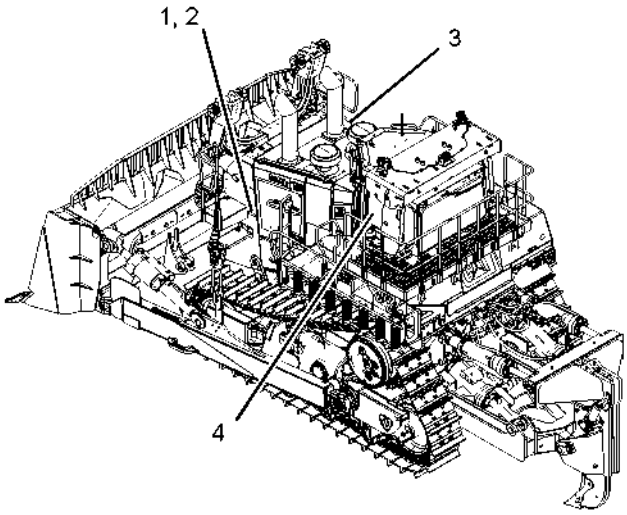


Illustration 43 g03490779

The plate for the Machine Pin (1) is located on the left side of the machine on the radiator guard.

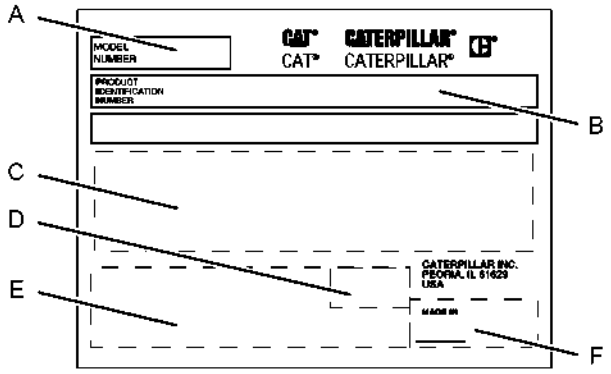


Illustration 44 g02436556

Model number (A)_____

Machine PIN (B)_____

Service Information Plate (C)_____

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

CE Plate (If Required) (E)

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

Local regulation may require documentation of the Month and/or Year of Manufacture in the Operations and Maintenance Manual. Enter on line (D) above if required.

Transmission Serial Number _____

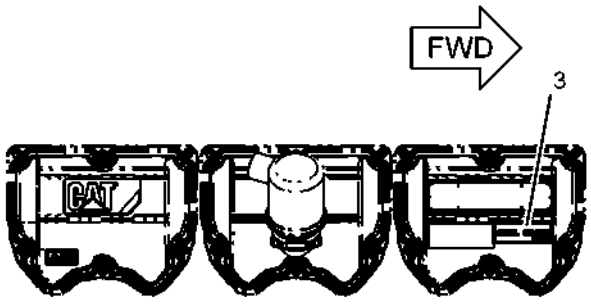


Illustration 45 g03535920

The Engine Serial Number (3) is located on the front right valve cover of the engine block, as shown.

Engine Serial Number _____

Service Information Number Plate (4) is located on the left-hand side of the front dash in the cab.

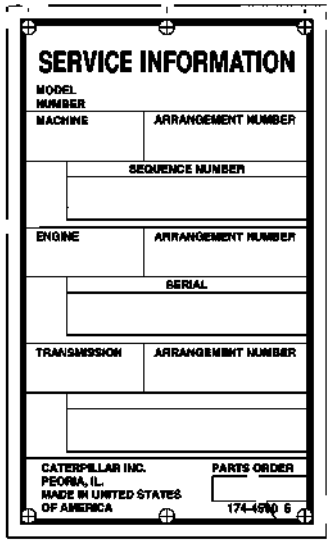


Illustration 46 g01014397

Service Information Number _____

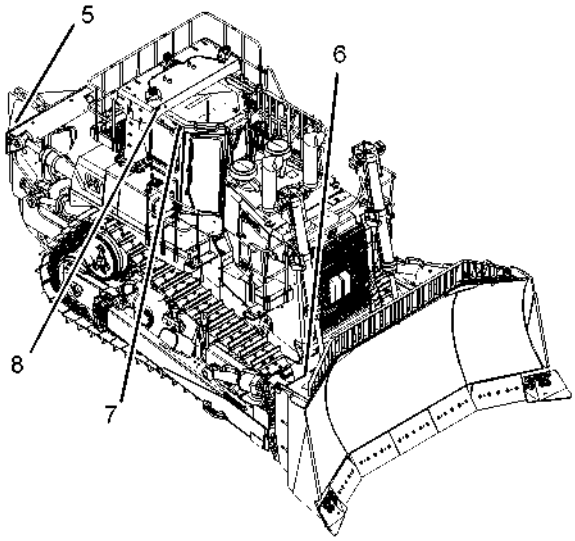


Illustration 47 g03490877

The serial number plate for the ripper (5) is located on the side of the ripper.

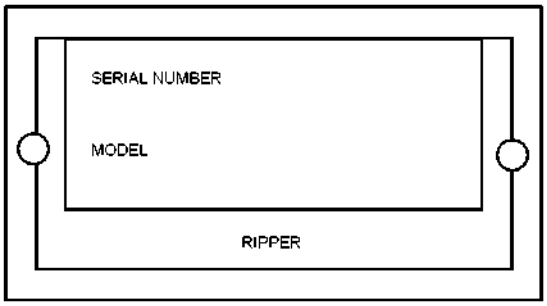


Illustration 48 g01057104

Ripper Serial Number _____

The serial number plate for the bulldozer (6) is located on the back of the blade.

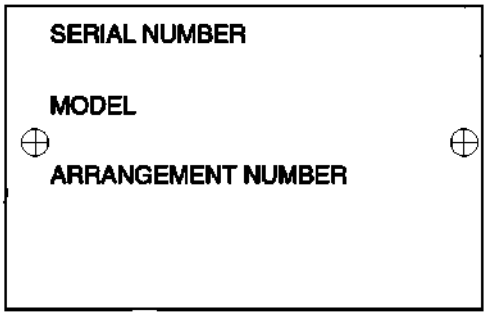


Illustration 49 g01057098

Bulldozer Serial Number _____

Eurasian Economic Union

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

Illustration 50 g06094564

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

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

Certification

FOPS Plate (7)

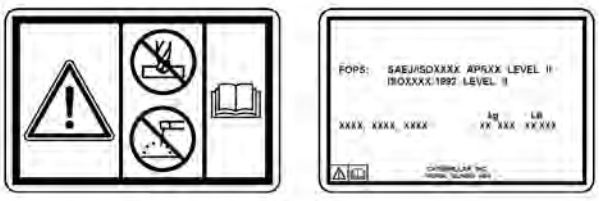


Illustration 51 g01955345

Certification plate (FOPS)

Message (7) is positioned on the outside, upper right of the cab.

WARNING

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

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

Film on ROPS (8)

Message (8) is positioned on the front, top right corner of the ROPS.

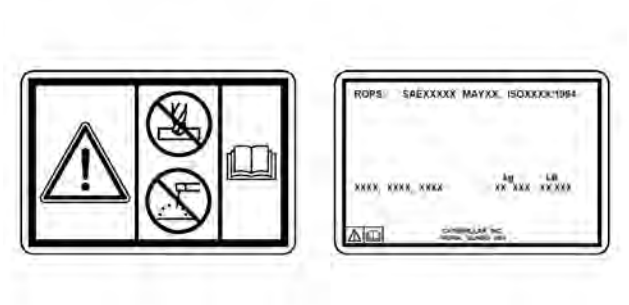


Illustration 52 g01955348

Certification plate D10T (ROPS)

WARNING

Structural damage, an overturn, modification, alteration, or improper repair, can impair this structure's protective 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.

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

Clean Emissions Module (CEM) (9)

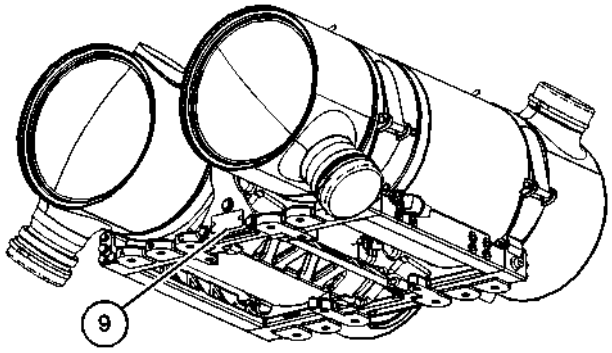


Illustration 53 g06350837

Sound Certification

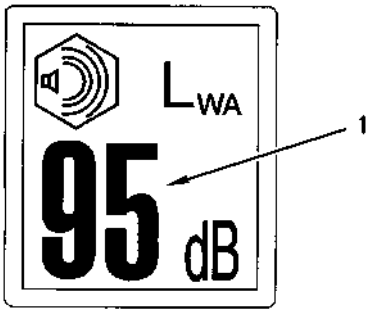


Illustration 54 g00919897

A typical example of this label is shown. Your machinery may have a different value.

If equipped, the certification label is used to verify the environmental sound certification of the machine to the requirements of the European Union. The value (1) that is listed on the label indicates the guaranteed exterior sound power level L_{WA} at the time of manufacture for the conditions that are specified in “2000/14/EC”.

European Union

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

If the machine is equipped with the plate for the European Union, this plate will be attached to the PIN plate. The CE plate is positioned on the bottom left side of the plate for the PIN.

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

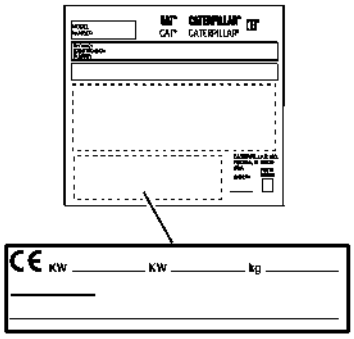


Illustration 55 g01883459

- Engine Power primary engine (kW)_____
- Engine Power for additional engine if equipped (kW)_____
- Typical machine operating weight for European market (kg)_____
- Year of construction_____
- Machine Type_____

For the name, the address and the country of origin for the manufacturer, see the PIN plate.

For machines compliant to “1998/37/EC”, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces provided below.

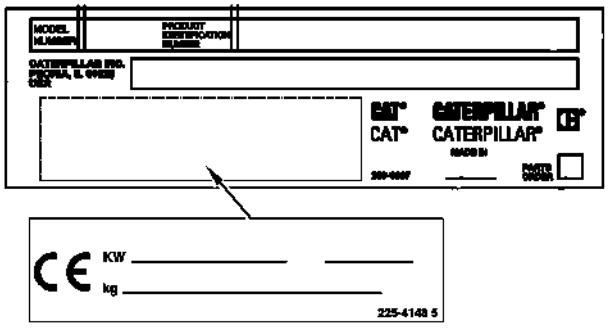


Illustration 56 g01062968

- Engine Power primary engine (kW)_____
- Typical machine operating weight for European market (kg)_____

- Year _____

Electromagnetic Emissions

Note: This label is on machines that are going into Canada.

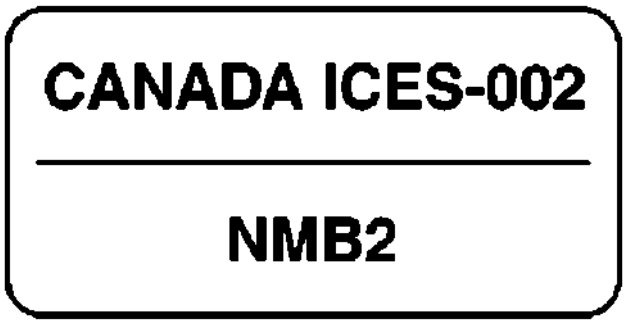


Illustration 57 g06063443

If equipped, this label is located next to the Pin plate. This label verifies that the product meets the requirements of ICES-002 Issue 6. Compliance to ICES-002 Issue 6 is accomplished by meeting electromagnetic emissions industry standard CISPR-12.

Declaration of Conformity

SMCS Code: 1000

Table 4

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

ORIGINAL EC or EU DECLARATION OF CONFORMITY

Manufacturer: CATERPILLAR INC.100 N.E. ADAMS STREET PEORIA, IL 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:	Steel Tracked Dozer
	Model/Type:	D10T2
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfils all the relevant provisions of the following Directives

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

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

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of November, 2013, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

i07709181

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

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

Consult your Cat dealer for an Emission Control Warranty Statement.

This label is located on the engine.

Operation Section

Before Operation

i06788680

Mounting and Dismounting

SMCS Code: 7000

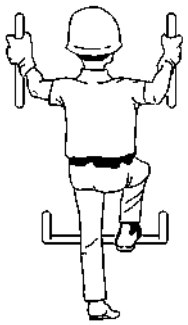


Illustration 58 g00037860

Typical example

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

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

Maintain a three-point contact with the steps and with the handholds.

Note: Three-point contact can be 2 feet and 1 hand. Three-point contact can also be 1 foot and 2 hands.

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

Machine Access System Specifications

The machine access system has been designed to meet the intent of the technical requirements in “ISO 2867:2011 Earth-moving Machinery – Access Systems”. The access system provides for operator access to the operator station and to conduct the maintenance procedures described in Maintenance section.

Alternate Exit

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

i07163798

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.

A thorough, regular visual inspection of the machine is necessary to maintain machine performance, availability, and safety. Make the inspection at the beginning of every shift or make the inspection after every 10 hours.

Methodically inspect all exposed, easily accessible areas of the machine for the following items: loose fasteners, missing parts, damaged parts, cracked parts, broken parts, worn parts, debris buildup, oil leaks, coolant leaks, and fuel leaks.

Initiate corrective action for the following problems: fluid leaks, damaged parts, excessively worn parts, loose fasteners, and missing parts. Remove accumulated trash, dirt, grease, or oil from the tractor.

Perform the following procedures daily.

- Operation and Maintenance Manual, “Backup Alarm - Test”
- Operation and Maintenance Manual, “Braking System - Test”
- Operation and Maintenance Manual, “Cab Filter (Fresh Air) - Clean/Inspect/Replace”
- Operation and Maintenance Manual, “Cooling System Coolant Level - Check”
- Operation and Maintenance Manual, “Belt - Inspect/Replace”
- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Equalizer Bar End Pins Oil Level (Grease) - Check”
- Operation and Maintenance Manual, “Fuel System Primary Filter (Water Separator) - Drain”
- Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”
- Operation and Maintenance Manual, “Horn - Test”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Indicators and Gauges - Test”
- Operation and Maintenance Manual, “Pivot Shaft Oil Level - Check”
- Operation and Maintenance Manual, “Power Train System Oil Level - Check”
- Operation and Maintenance Manual, “Seat Belt - Inspect”

During this general machine inspection, give special focus to the following items.

- Inspect the tracks, track roller frames, idlers, and rollers for oil leaks, and excessive wear. Visually evaluate the tightness of the track. See the Topic “Track Check/Adjust” in this manual.
- Inspect the final drives for debris that may be wrapped around the drive. Check duo-cone seals for oil leaks, and sprocket segments for wear.
- Inspect the GET (ground engaging tools) (bulldozer and ripper) and other wear surfaces for excessive wear and damage.
- Inspect the linkage for the bulldozer and inspect the linkage for the ripper. Also, inspect the fasteners for the linkage.
- Inspect exposed guards, shields, and covers.
- Inspect the winch for oil leaks.
- Inspect the implement hydraulic cylinders for damaged rods or bent rods and for leaks.
- Inspect exposed hoses and hose couplings for damage, wear, and leaks.
- Inspect the radiator for debris buildup, coolant leaks, and damaged fins and tubes.
- Inspect the aftercooler for debris buildup, coolant leaks, and damaged fins and tubes.
- Inspect the fan for damage to the blades or for oil leaks.
- Inspect the lights for broken bulbs and for broken lenses. Inspect light guards and shields for damage.
- Inspect exposed wiring and connectors for damage and wear.
- Inspect steps and handholds for damage and cleanliness. Inspect for missing or loose bolts/ hardware and damage.
- Inspect the precleaner screen for debris buildup.
- Inspect the engine compartment for fluid leaks, buildup of debris or trash, loose fasteners, worn hoses, and damaged wiring.
- Inspect the crankcase guard under the engine for debris buildup.
- Inspect the Roll Over Protective Structure (ROPS) for damage. Inspect the Falling Object Protective Structure (FOPS) for damage. Consult your Cat dealer for necessary repairs.
- Inspect the operator compartment for cleanliness.
- Inspect the status of the Fire Suppression System (FSS) on the operator control module. Ensure that the FSS is activated and system status is ready prior to operating the machine.

Record the engine shutdown delay, engine shutdown delay extension, and fire system discharge delay, for your machine

Machine Operation

i01930019

Alternate Exit

SMCS Code: 7254; 7308; 7310

Machines with cabs are equipped with alternate exits. If a door becomes disabled, the other door can be used as an alternate exit. Release the latch and open the door.

i06636138

Access Ladder Operation (If Equipped)

SMCS Code: 7254

Using the Access Ladder

WARNING

Do not ride on ladder or stand on platform while machine is moving.

NOTICE
To avoid damage to the ladder during machine operation, keep the ladder in the LATCHED position.

If equipped, the D10T2 Track-Type Tractor uses a powered access ladder to mount the machine.

Ladder Protection Interlock

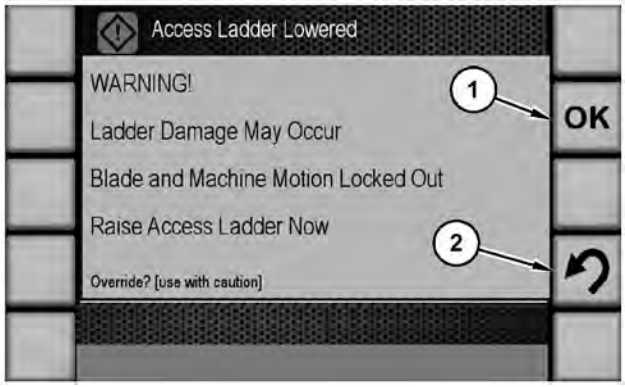


Illustration 59 g06060769

If an operator attempts to release the park brake with the ladder lowered, the ECM will send a warning message that is displayed on the screen. Press "OK" button (1) to acknowledge the warning. If "Back" button (2) is pressed, the override is engaged. The operator acknowledges that damage may occur when the park brake is disengaged with the ladder lowered. The override will be allowed until the next time the park brake is engaged.

Mount the Machine

Perform the preparation checklist in “Before Operation”.

1. Climb the ladder and use three points of contact. See “Mounting and Dismounting”.

Note: The ladder will operate with the start switch key in the OFF position and the main battery disconnect switch ON.

2. Return to the platform and ensure a minimum of 3 m clearance of the left side of the machine from any obstacle.

Note: Do not raise the ladder if there is any obstacle within 3 m of the left side of the machine. If necessary, remove that obstacle before you raise the ladder.

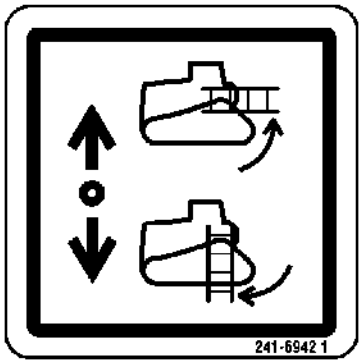


Illustration 60 g01198873
Control box switch

3. Press the control box switch that is located on the left platform to raise the ladder to the UP position. Hold the control box switch to continue the movement of the ladder upward.

Note: When you raise the ladder, releasing the control box switch stops the ladder immediately.

Note: If the parking brake is disengaged and the ladder is not stowed, a Level III warning will sound.

Note: A Level III warning also sounds if the blade is raised when the ladder is down.

4. Continue to hold the control box switch until the ladder stops and the ladder latch pins stop.

5. Enter the operator station and prepare to operate the machine. See “Operation” in this manual.

Using The Ground Level Service Center

If equipped, an additional control box switch is located on the left rear ripper cylinder. For a parked machine on level ground with the engine OFF or ON, use the following instruction.

1. Make sure that the main battery disconnect switch is in the ON position.

2. Use the control box switch at ground level to raise or lower the access ladder.

a. Use the light switch at ground level to illuminate the machine access lights, as necessary.

3. Follow the regular instructions to "Mount the Machine" or "Dismount the Machine" in this story.

Dismount the Machine

CAUTION

To avoid serious injury use ladder in a proper way.

Use the powered access ladder to dismount the machine.

1. Park the machine on a level surface. Use the service brake to stop the machine.

2. Put the transmission control lever in NEUTRAL. Put the engine speed in LOW IDLE. Engage the parking brake.

3. Lower all implements to the ground. Activate the switch for the hydraulic lockout to ON.

4. Return to the platform and ensure a minimum of 3 m clearance of the left side of the machine from any obstacle.

Note: Do not lower the ladder if there is any obstacle within 3 m of the left side of the machine. If necessary, move the machine to an area free of obstacles before you lower the ladder.

5. Press the control box switch for the ladder to lower the ladder to the DOWN position. Hold the control box switch to continue the movement of the ladder downward. See illustration 60 .

Note: When you lower the ladder, releasing the control box switch stops the ladder immediately.

Note: When the ladder is not stowed and the parking brake is not engaged, a Level III warning will sound. Stop the ladder. Engage the parking brake. Continue to lower the ladder.

6. Continue to hold the control box switch until movement of the ladder stops.

Note: The ladder will operate with the start switch key in the OFF position and the main battery disconnect switch ON.

7. Face the machine and descend the ladder to the ground.

Perform the operation checks in “Leaving the Machine” .

i07186591

Seat

SMCS Code: 7312

Adjusting the Seat

Note: The operator seat provided with this machine is in compliance with the appropriate class of ISO 7096.

Note: Adjust the air suspension seat at the beginning of each shift and for each new operator.

Adjust the seat to allow full travel of the pedals. Make the seat adjustments when the operator is sitting against the back of the seat.

Standard Seat

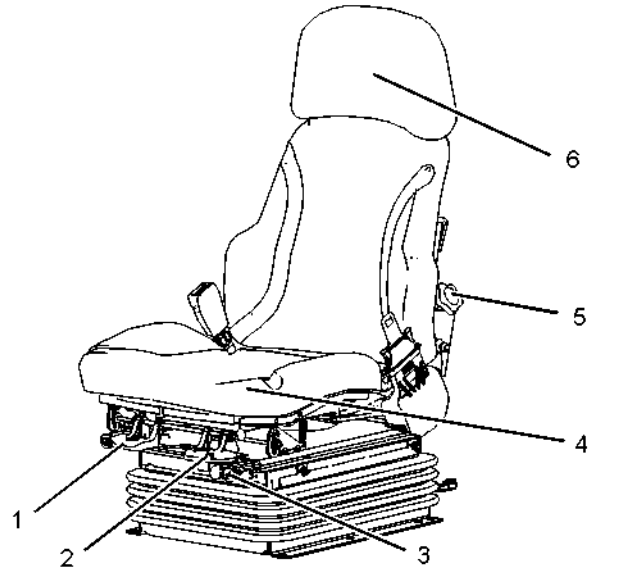


Illustration 61 g03050797

Back Cushion Angle Adjustment (1) – Pull the lever upward. Permit the back cushion to spring forward or lean backward into the cushion. Release the lever at the desired position.

Fore and Aft Position (2) – Pull the lever upward. Move the seat in the desired direction. Release the lever at the desired forward position or the desired rearward position.

Seat Height (3) – Push in the knob to raise the seat height. Pull out on the knob to lower the seat height.

Note: The engine start switch key must be turned ON or the engine must be running to adjust the height of the seat.

Seat Cushion Tilt (4) – The front of the seat cushion is pinned in a groove. There are three positions in the groove that can be used to adjust the seat cushion tilt. Grasp the seat pan and cushion, and rotate "forward−up−and−back" for a steeper angle position. Grasp the seat pan and cushion, and rotate "forward-down-and-back" for a less steep angle position.

Lumbar Support (5) – Rotate the knob counterclockwise to increase lumbar support. Rotate the knob clockwise to decrease lumbar support.

Back Extension (6) – Pull up on back extension to remove the back extension.

Heated and Ventilated Seat (If Equipped)

⚠ WARNING

Heat-induced burns can occur when some people use a seat heater. Do not use the seat heater if you have a reduced ability to sense temperature changes, a reduced ability to feel pain, or have sensitive skin.

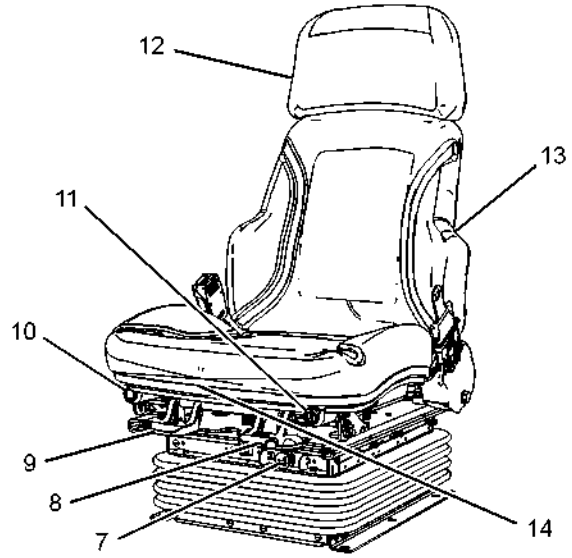


Illustration 62 g03050801

Seat Height (7) – Push in the knob to raise the seat height. Pull out on the knob to lower the seat height.

Note: The engine start switch key must be turned ON or the engine must be running to adjust the height of the seat.

Fore and Aft Position (7) – Pull the lever upward. Move the seat in the desired direction. Release the lever at the desired forward position or the desired rearward position.

Back Cushion Angle Adjustment (9) – Pull the lever upward. Permit the back cushion to spring forward, or lean backward into the cushion. Release the lever at the desired position.

Heated and Ventilated Seat (10) – Press the top of the rocker switch for high heat or ventilation. Press the bottom of the rocker switch for low heat or ventilation. The center switch position is OFF.

Heated and Ventilated Seat (11) – Press the top of the two position rocker switch for the heating mode. Press the bottom of the rocker switch for the ventilation mode.

Back Extension(12) – Pull up on the back extension to remove the back extension.

Lumbar Support (13) – The rocker switch for adjusting seat lumbar support is on the left-hand side of the seat back. Press the rocker switch to increase or decrease lumbar support.

Note: The engine start switch key must be turned ON or the engine must be running to adjust the lumbar support of the seat.

Seat Cushion Tilt (14) – The front of the seat cushion is pinned in a groove. There are three positions in the groove that can be used to adjust the seat cushion tilt. Grasp the seat pan and cushion, and rotate "forward−up−and−back" for a steeper angle position. Grasp the seat pan and cushion, and rotate "forward-down-and-back" for a less steep angle position.

Seat Belt

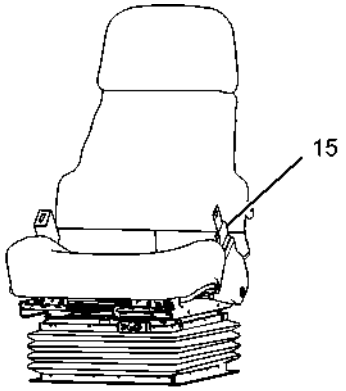


Illustration 63 g03050816

Retractable Seat Belt – When the seat has been adjusted to fit the operator, secure retractable seat belt (15).

Storage for the Operation and Maintenance Manual

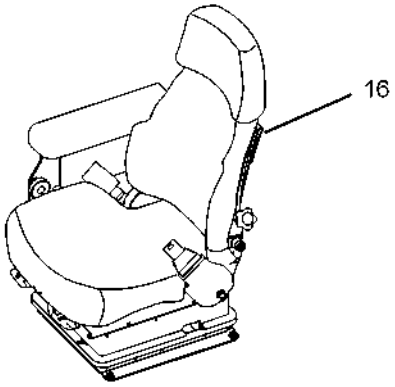


Illustration 64 g03050818

The Operation and Maintenance Manual should be stored and secured in the seat storage area (16).

i04200349

Seat Belt

SMCS Code: 7327

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

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

Seat Belt Adjustment for Non-Retractable Seat Belts

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

Lengthening the Seat Belt

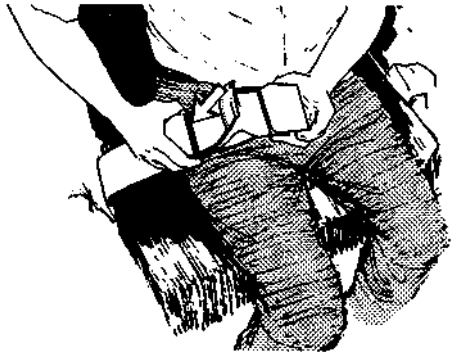


Illustration 65 g00100709

1. Unfasten the seat belt.

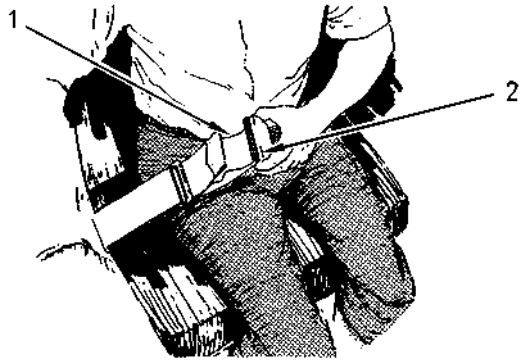


Illustration 66 g00932817

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

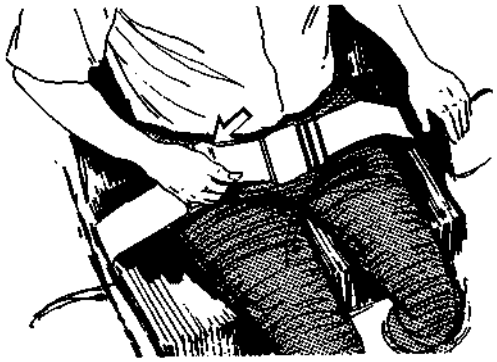


Illustration 67 g00100713

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

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

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

Fastening The Seat Belt

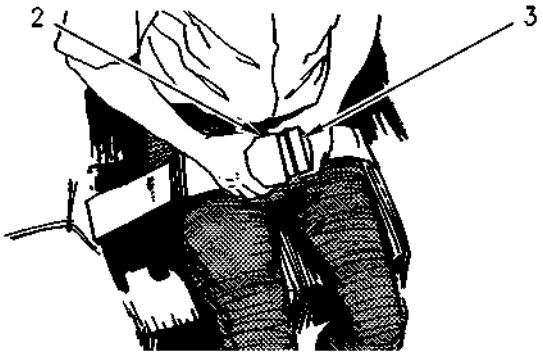


Illustration 68 g00932818

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

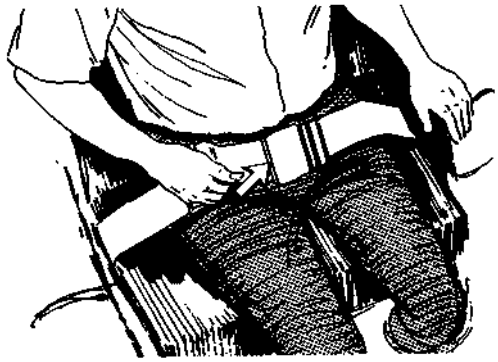


Illustration 69 g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

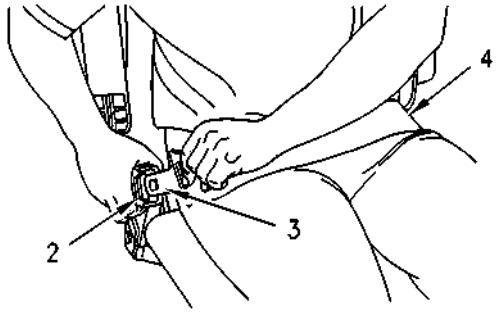


Illustration 70 g00867598

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

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

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

Releasing The Seat Belt

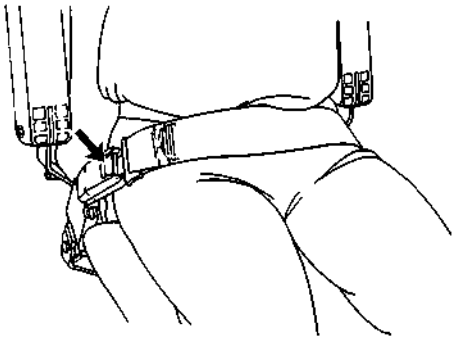


Illustration 71 g00039113

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

Extension of the Seat Belt

⚠ WARNING

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

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

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

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

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

i05521177

Mirror
(If Equipped)

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 machine's 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.

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

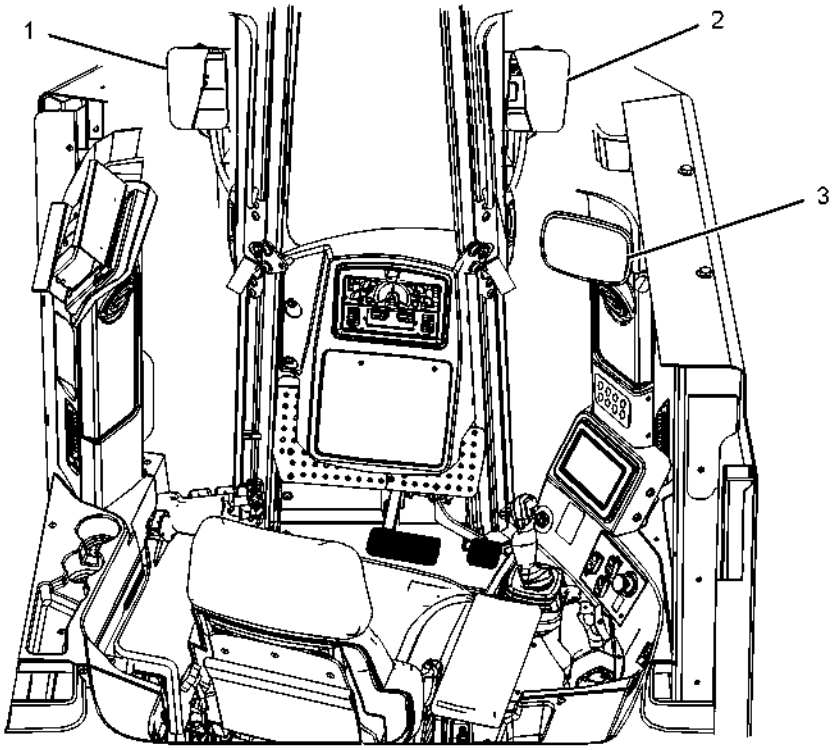


Illustration 72 g03494378

Some components are removed for clarity

(1) Left Mirror (If Equipped) (2) Right Mirror (If Equipped) (3) 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.

The appropriate job site organization is also recommended in order to minimize visible hazards. For more information refer to this Operation and Maintenance Manual, “Visibility Information”.

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

Mirror Adjustment

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Operator Controls”.
- Stop the engine.

- Adjust rear view mirrors in order to provide visibility behind the machine at a maximum distance of 30 m (98 ft) from the rear corners of the machine.

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

Left Mirror

If equipped, adjust the left mirror (1) for maximum field of view for the work site conditions.

Right Mirror

If equipped, adjust the right mirror (2) for maximum field of view for the work site conditions.

Rear View Mirror

If equipped, adjust the rear view mirror (3) for maximum field of view for the work site conditions.

i07119218

Operator Controls

SMCS Code: 7300; 7301; 7451

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

Operator Controls

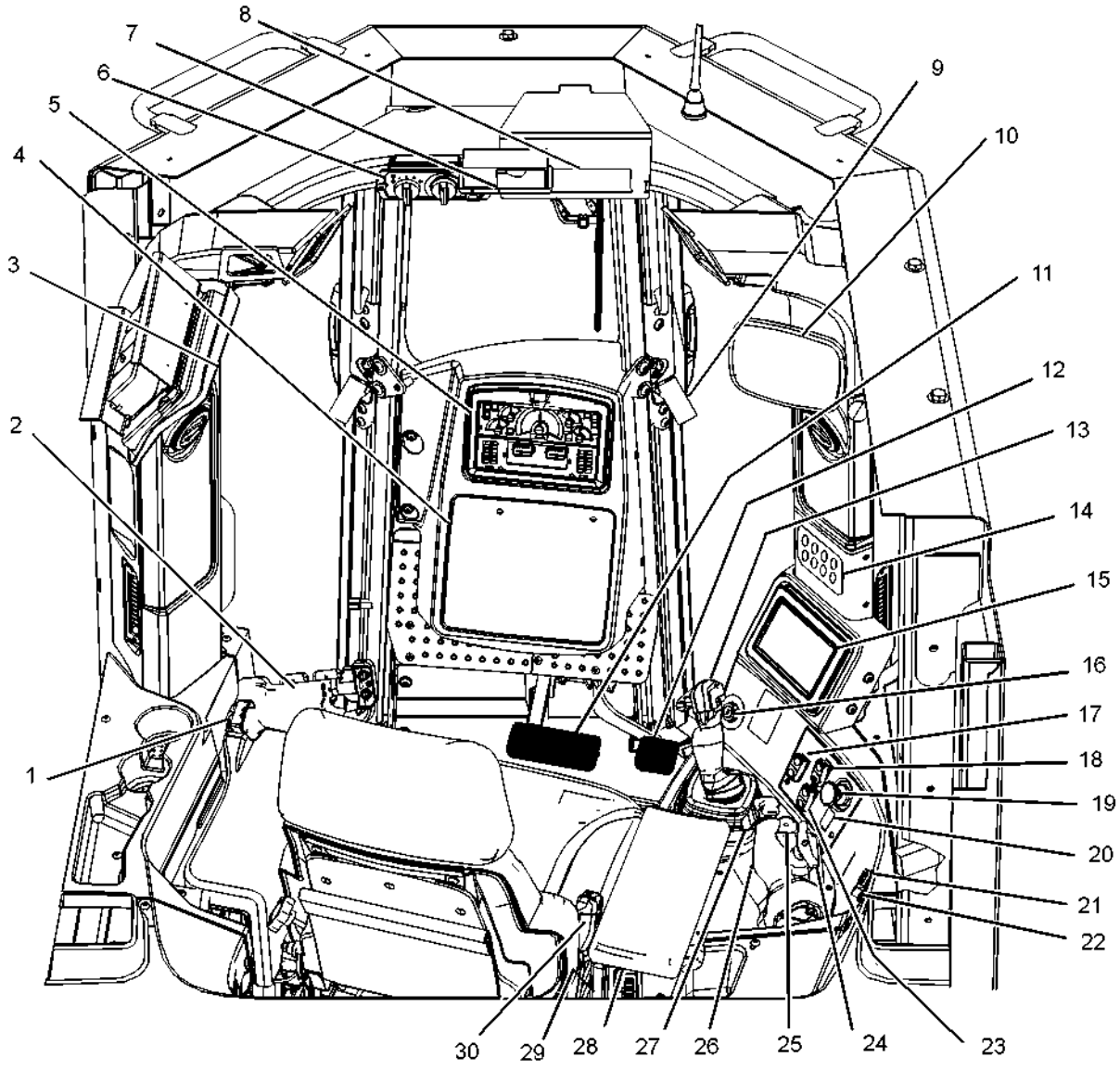


Illustration 73 g06230487

(1) Parking brake switch
(2) Steering, direction, and gear control
(3) Window wiper and washer controls
(4) Storage or Blade Control Display (if equipped)
(5) Gauges and Indication Display
(6) Heating and air conditioning switches
(7) Dome light
(8) AM/FM Radio, MP3, and Bluetooth media center (If equipped)
(9) Door latch
(10) Mirror
(11) Service brake pedal
(12) Decelerator pedal
(13) Bulldozer blade control lever
(14) Keypad module (If Equipped)
(15) Information display
(16) Engine start switch
(17) Engine speed switch
(18) Implement shutoff control
(19) Secondary engine stop switch
(20) Control for the ripper shank pin (if equipped)
(21) Action light
(22) 12 V power source
(23) Master light switch
(24) Ripper shank in/out lever
(25) Horn
(26) Ripper auto stow switches
(27) Ripper raise/lower
(28) Adjustable armrests
(29) 14-pin service connector and 12 V power connector
(30) Seatbelt

Parking Brake Switch (1)

Parking Brake – This switch is used to engage the parking brake. This switch is used to disengage the parking brake. Do not use the parking brake for stopping a moving machine.

Engaged – Depress the end of the switch with this symbol to engage the parking brake. The parking brake indicator on the dashboard will light if the engine start switch is in the ON position. This action will also lock the transmission in NEUTRAL.

Disengaged – Depress the lower switch to disengage the parking brake.

Note: The parking brake switch will need to be cycled when the “Operator Not Present” condition is activated. Sit in the operator seat, cycle the parking brake switch ON/OFF. The parking brake will engage.

Steering, Direction, and Gear Selection (2)

The control that is located forward of the left-hand armrest allows the operator to steer the machine, change machine direction, and select the transmission gear.

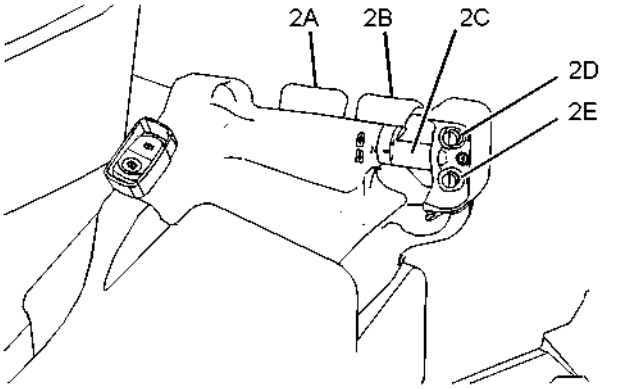


Illustration 74 g03346523

(2A) Left Steering Clutch and Brake Control
(2B) Right Steering Clutch and Brake Control
(2C) Transmission Direction Selector
(2D) Upshift Switch
(2E) Downshift Switch

The Finger Tip Control (FTC) allows simultaneous control for the steering clutch and the steering brake system.

There are two steering clutch/brake levers. The lever on the left controls the left steering clutch/brake. The lever on the right controls the right steering clutch/brake.

Left Steering Clutch and Brake Control (2A)

Left Steering Clutch and Brake Lever (2A) – Pull the lever backward. This action disengages the steering clutch and will also steer the machine to the left by slowing down or stopping the left track.

When you feel pressure, the steering brake begins to engage. The turning radius is controlled by the force that is exerted on the lever. When you exert more force on the lever, the turning radius will be smaller. Pull the lever fully backward to apply full brake for a pivot turn.

Right Steering Clutch and Brake Control (2B)

Right Steering Clutch and Brake Lever (2B) – Pull the lever backward. This action disengages the steering clutch and will also steer the machine to the right by slowing down or stopping the right track.

When you feel pressure, the steering brake begins to engage. The turning radius is controlled by the force that is exerted on the lever. When you exert more force on the lever, the turning radius will be smaller. Pull the lever fully backward to apply full brake for a pivot turn.

Transmission Direction Selection and Gear Selection

Illustration 75 g03354963

When the machine is started, the machine is in the manual mode. Gear selection is manual. The status indicator on the instrument panel for the active autoshift is not illuminated. If you depress switch (2D) or switch (2E), you make the gear selection in the NEUTRAL position.

Transmission Direction Selector – Rotate control (2C) to change the direction of the machine.

Forward – Rotate the top of control (2C) forward to move the machine forward.

Reverse – Rotate the top of control (2C) rearward (bottom forward) to move the machine backward.

Neutral – Align the marks on control (2C) to select NEUTRAL. When the transmission is in the NEUTRAL position, the display for the transmission indicates “N” . The transmission is disengaged in this position.

Gear Selection – Press and release switches (2D) and (2E) to change gears.

Upshift – Make transmission upshifts from first gear to second second gear to third gear by pressing and releasing upshift switch (2D).

Downshift – Press and release downshift switch (2E) to downshift the transmission to second gear. Press and release the downshift switch again to downshift the transmission to first gear.

Transmission Shifting (Automatic Modes)

An Automatic Mode provides the following benefits:

- Automatic upshifts and downshifts
- Reduced operator fatigue and shortened cycle times
- Fuel savings

Bidirectional Shift (Includes EAS Modes)

Bidirectional Mode – The bidirectional shift function allows the operator to preset the FORWARD and the REVERSE gear for directional changes and shifts out of NEUTRAL. The gear the machine will go into when changing direction or shifting out of NEUTRAL can be seen in the information display banner.

Autoshift ON – Select the function switch mode through the information display. A gear icon will appear with the term “Auto” in the front Indication Display. This indicator indicates that Auto Shift is ON.

Autoshift OFF – The gear icon with the term “Auto” on the front Information Display is not active. When this auto shift indicator is not active, the manual shift mode is active.

Whenever a directional shift or shifting from neutral occurs, the transmission shifts to the selected gear for that direction by the active mode. If the machine is operating in the third gear forward, with the autoshift mode at 1F-2R and a directional shift is requested, the machine will shift directly from third gear forward to second reverse gear. If another directional shift is requested, the machine will shift from second reverse gear to first gear forward. When the “Auto Shift” mode is ON, the machine will select the appropriate gear using “Auto Shift” . This action occurs by using the bidirectional machine speed as the fastest machine speed that “Auto Shift” can shift into.

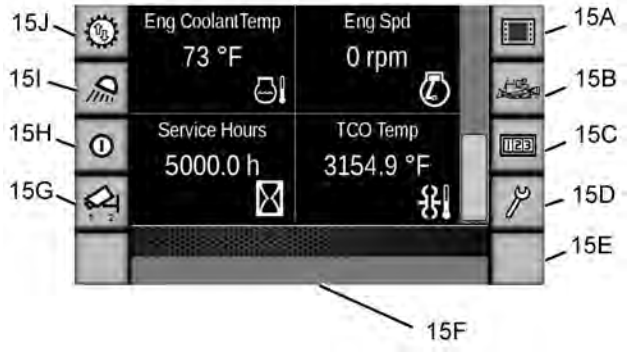


Illustration 76 g03344381

Default screen

Press power train button (15J) on the first performance page of the information display. See the section “Touchscreen Information Display (15)” for additional information on the information display.

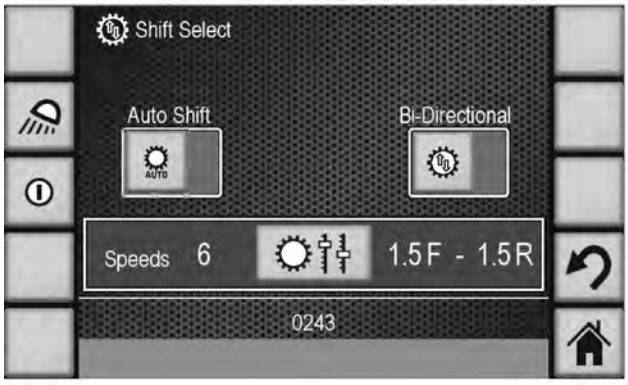


Illustration 77 g03499479

This action displays the “Auto Shift / Bi-Direction” menu. Select the shifting preference.

- The “Auto Shift” selection box allows turning the Auto Shift feature “On” or “Off” .
- The “Bi-Direction” selection box allows turning the Bi-Directional feature “Off” or “On” into the user-defined bidirectional mode that is programmed.

- The Auto Shift and Bi-Directional controls can be used independently from each other, or in conjunction.

The selected mode is shown in the display window of front indication display (5). The different modes can be selected by the operator in the information display.

Note: When the bidirectional shift mode is activated and the transmission direction selector is in the NEUTRAL position, the digital display window shows N only.

When an “Auto” mode is selected, the machine will select the appropriate gear.

When the machine powers up, the mode selection begins in the default mode with “Auto Shift” OFF and “Bi-direction” OFF.

The bidirectional autoshift function allows selection from only the appropriate options in machine configurations. These configurations include Maximum Gear Lockout and EAS mode lockouts.

Table 5

Bidirectional Mode
1.0F-2.0R
2.0F-1.0R
2.0F-2.0R
OFF

For the best results, change the options with the transmission in NEUTRAL. If the autoshift functions are not desired, the machine can be operated in the manual mode.

Enhanced Auto Shift (EAS)

Enhanced Auto Shift (EAS) is meant to be a fuel savings and convenience feature. This feature will act like an automatic transmission. The operator can set a desired machine speed using the upshift button (2D) and downshift button (2E) on transmission direction selector (2C). The machine will automatically adjust the gear and engine speed to get to the desired speed in the most efficient way. The machine will adjust to changing machine load, machine angle, blade load, or ripper drag. The machine will automatically adjust to keep the same track speed.

EAS is independent in the FORWARD and REVERSE directions. When in “EAS” mode, the operator will adjust the desired track speed by using the upshift/downshift controls.

Illustration 78 g03355880

The machine speed (A) that is next chosen in that direction of motion is shown in the top right of the display, as shown. This information includes bidirectional settings and “Auto” machine speed settings. The current machine speed setting (B) is shown at the top left of the display, as shown.

Auto Shift has two modes: “automatic” and “manual” .

Autoshift ON – the "automatic" mode. When in “automatic” mode, the operator will adjust the desired machine speed by using the upshift/downshift controls.

Autoshift OFF – The "manual" mode. When in “manual” mode, the operator directly controls the gear selection and engine speed.

EAS Configuration

Note: A service mode password must be entered before navigating into the configuration area.

From the main performance page, press “Service” button (15D). On the Service page, once the service mode password is entered, press “Configuration” to highlight in yellow.

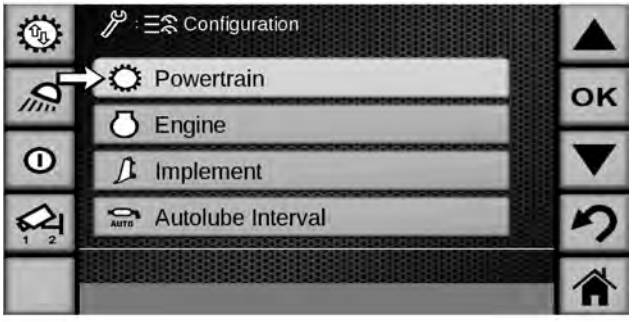


Illustration 79 g03533118

“Configuration list” screen

- Press OK and advance to the “Configuration List” page.
- Use the “Up” and “Down” buttons to scroll to the various configurable items in the list.
- Select and press the highlighted “Powertrain” option.
- Select and press the Auto Shift (EAS) option
- Select and press “Enable” or “Disable”

Illustration 80 g03499837
“Enhanced Auto Shift” (EAS) enablement screen

Both decelerator and brake pedals will continue to function, however both pedals affect operation while in the “automactic” mode in the current direction. While pressing the brake or decel pedal, the “automatic” mode will temporarily “suspend” and will return to the normal mode after releasing the pedals.

Setup

The owner is able to set a maximum track speed for the machine.

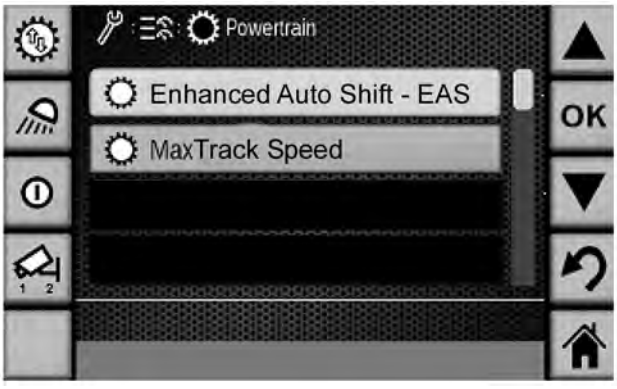


Illustration 81 g03499856
“Powertrain” configuration screen

Back Button – Press the Back button to return to the previous menu.

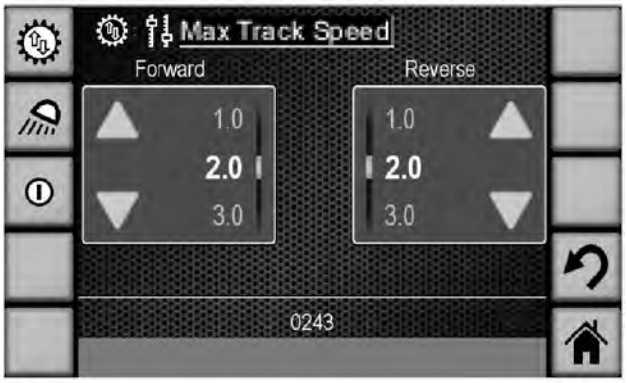


Illustration 82 g03499857
“Transmission maximum speed” screen

The owner maximum track speed can be found by entering the service password then navigating to the following menu. Select from the first performance page: Service, Configuration, Power train, Maximum Track Speed.

- Select a speed using up/down arrows to scroll through the list of available choices.
- When the desired speed appears centered in the list, the value will automatically be programmed by waiting momentarily for the value to turn white. This action means that the value has been accepted.
- Maximum track speed in the Forward and Reverse directions are determined on this page

The operator machine speed may never exceed the owner set maximum machine speed.

Note: The maximum machine speeds will not protect against engine overspeed. Engine overspeed can only be managed through traditional methods.

Bi-Directional Setting Screen

Auto Shift can be enabled through the Bi-Directional settings screen in the information display. This menu can be seen by navigating to the following menus:

1. Select the “HOME” option.

2. Then select the “Power Train” option.

3. Then turn ON the “BI-DIR” option.

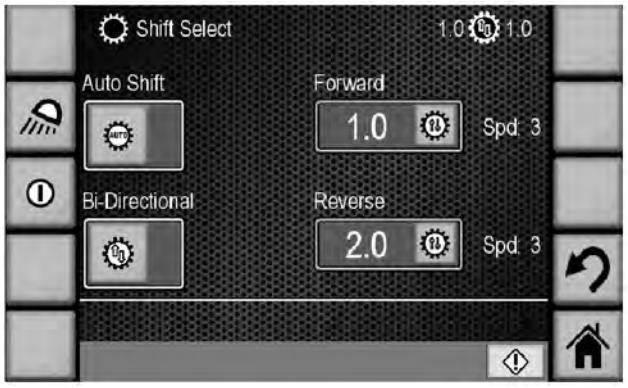


Illustration 83 g06055452

Bi-directional speed setting

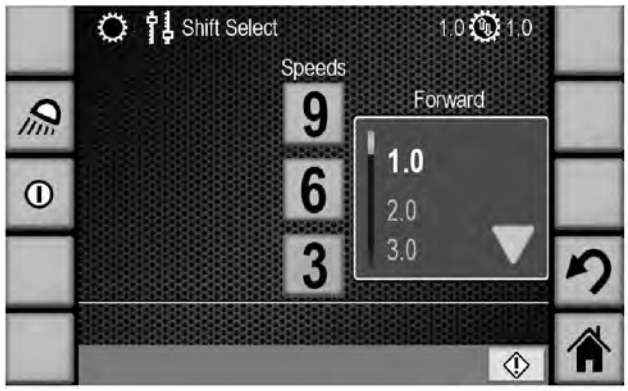


Illustration 84 g06055444

“Transmission maximum speed” screen

Illustration 85 g06055460

4. By pressing the button on the screen. This action activates the bi-directional speed setting that is displayed in the lower banner of the screen below the button. To change the programmed bi-directional setting, press the icon in the lower banner of the screen.

Bi-Direction settings can be set with Auto Shift.

Bi-Direction settings can be set with Auto Down Shift.

The operator-selected bi-directional values will not be stored when the engine start switch key is turned to the OFF position. To save settings for future use, an operator profile may be used.

Auto Down Shift

The electronic transmission system is equipped with a mode for the auto kickdown. If the torque divider speed ratio drops to a specified threshold, this function automatically downshifts the transmission. This function works in forward and reverse gears. The default setting for this machine is OFF. When the automatic downshift is activated, the default setting is medium.

The automatic downshift function is set by using the information display on the right post of the cab. When the machine is started, the transmission will be in the mode of automatic downshift that was selected prior to shutting down the machine. When the machine is started and the automatic downshift is not active, set the automatic downshift mode with the information display.

If the mode for the automatic downshift is active, a gear icon with the word 'auto' will appear in the LCD on the front Indication Display. Select the mode for the automatic downshift with the transmission in NEUTRAL. If the operation for the automatic downshift is not desired, the machine can be operated in the manual mode. Changes in performance for the automatic downshift can be made in the information display.

Using the information display (see illustration 108) select from the first performance page: Machine button (15B). The machine menu appears. Select the “Settings” category and press “OK.”

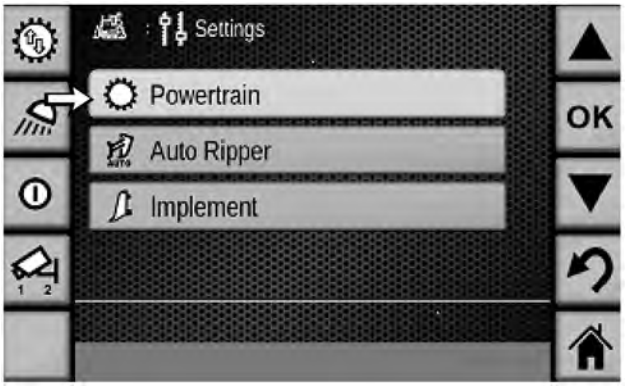


Illustration 86 g03345642

Select “Power Train” from the Settings menu.

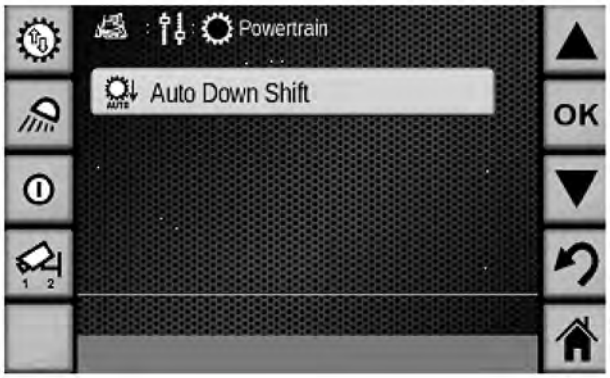


Illustration 87 g03345646

Select “Auto Down Shift” and press “OK.”

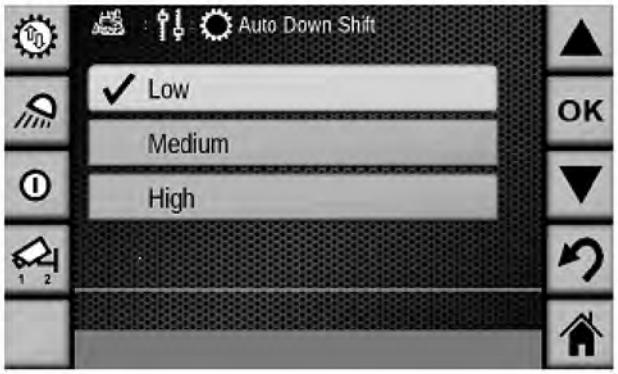


Illustration 88 g03345651

Scroll through the list of options, “Low, Medium, or High.” Select and press an option to highlight a setting. Press “OK” to set.

The operation for the automatic downshift can be used in the following modes.

Automatic Downshift (LOW) – Select the function switch mode on the first screen of the information display. Select “Auto Down Shift” and follow the prompts to activate the automatic downshift mode. The icon for the automatic downshift is ON. This setting allows the highest engine lug setpoint and the most reduction in travel speed before an automatic downshift occurs. The selection can be changed in the information display.

Automatic Downshift (MEDIUM) – This setting allows the middle engine lug setpoint and the medium range of reduction in travel speed before an automatic downshift occurs. This selection can be made in the information display menu.

Automatic Downshift (HIGH) – This setting allows the lowest engine lug setpoint and the least reduction in travel speed before an automatic downshift occurs. This selection can be made in the information display.

Manual Shift in Automatic Downshift – The automatic downshift allows the transmission to downshift automatically. After a manual upshift, the auto kickdown is prevented for 2 seconds. The operator can make manual shifts at any time.

Automatic Downshift (OFF) – The icon on the front Indication Display is not activated on the LCD. The manual shift mode is then active if no autoshift icons are on.

When Auto Shift is enabled, Auto Down Shift is not operable.

When the machine is powered down, the active mode for the automatic downshift is kept in ECM memory. When the machine is powered up, the automatic downshift is activated in the same mode.

Window Wiper and Window Washer Controls (3)

Wiper/Washer Controls

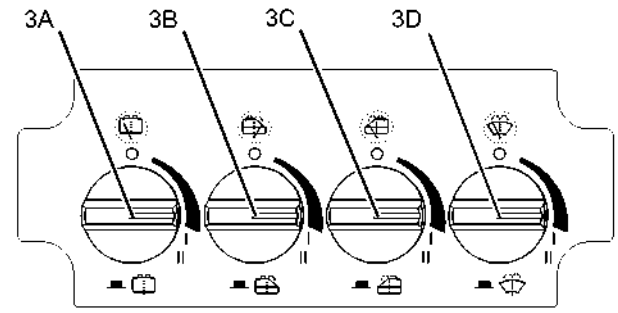


Illustration 89 g03341617

Rear Window Wiper/Washer (3A)

Left Window Wiper/Washer (3B)

Right Window Wiper/Washer (3C)

Front Window Wiper/Washer (3D)

Window Wiper Switch

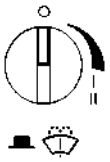


Illustration 90 g01523239

Off – Move the switch counterclockwise to the top position to stop the wiper.

Intermittent – The delay speed of the wipers can be adjusted by turning the switch clockwise through the "Intermittent" range.

Low – Turn the switch clockwise to the first detent position for a low setting of continuous movement of the window wiper.

High – Turn the switch clockwise to the second detent position for a high setting of continuous movement of the window wiper.

Window Washer

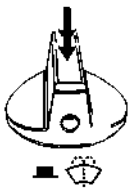


Illustration 91 g01529553

Window Washer – Depress the switch and hold the switch to activate the window washer and the window wiper. Releasing the switch allows a spring force to deactivate the window washer. The window wipers continue to clear the window of washer fluid for approximately 20 seconds.

Storage Or Blade Control Display (If Equipped) (4)

Use this area for storing important items.

Storage

Use this area for storing important items.

Blade Control Display

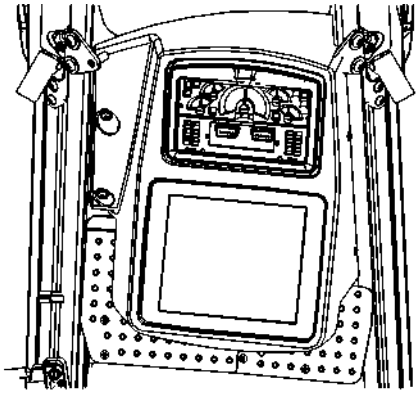


Illustration 92 g03341641

The blade control display gives machine operators highly accurate, in-cab display of grade plans. As the operator works, the display shows the exact position of the machine within the operating area, along with progress against plan. Refer to Operation and Maintenance Manual, SEBU8164, "Cat Terrain for Track-Type Tractor with Blade Control" for more information .

Gauges and Indicators (5)

Refer to Operation and Maintenance Manual, "Monitoring System" for more information.

Heating and Air Conditioning Controls (6)

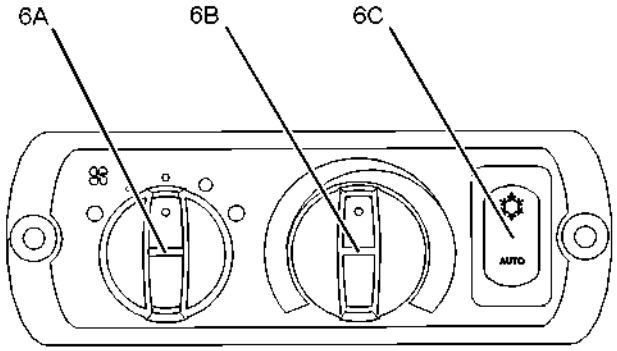


Illustration 93 g03342448

Fan Control (6A)

The Fan Speed Switch (6A) – The fan speed switch controls the four-speed blower fan motor.

OFF – Turn the fan speed switch counterclockwise to the far left stop to stop the blower fan.

LOW – Turn the switch clockwise to the first detent for the lowest fan speed.

MEDIUM – Turn the switch clockwise to the second detent for the medium fan speed.

MEDIUM-HIGH – Turn the switch clockwise to the third detent for the medium-high fan speed.

HIGH – Turn the switch clockwise to the fourth detent for the high fan speed.

Temperature Control (6B)

Temperature Control (6B) – The temperature control (6B) regulates the position of the water valve when the automatic air conditioning switch (6C) is in the A/C or OFF position. When the automatic air conditioning switch is in the BOTTOM position, the temperature dial determines the desired cab temperature. The temperature range for this dial in the AUTO position is 10° C (50° F) in the full cold position and 32° C (90° F) in the full hot position.

A/C Switch (6C)

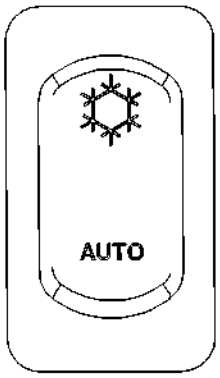


Illustration 94 g02106193

The A/C switch is used to determine the operating mode for the heating and air conditioning system. The rocker switch has three positions.

Top Position (A/C) – This position sets the heating and air conditioning system to manual mode. The switch turns on the compressor for the air conditioning. The switch allows temperature control (6C) to control the water valve.

Center Position (OFF Mode) – This position sets the air conditioning system into off mode. The switch allows temperature control (6C) to control the water valve.

Bottom Position (AUTO Mode) – This position sets the heating and air conditioning system to automatic temperature control. The ECM on the machine controls the compressor clutch for the air conditioning and the position of the water valve automatically. The desired and actual cab temperatures can be seen using the information display.

Adjusting the Cab Louver

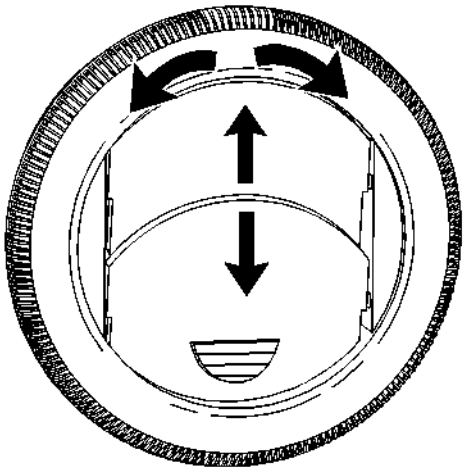


Illustration 95 g02059241

This cab louver is round. Two round louvers are located near the doors at the operator head level.

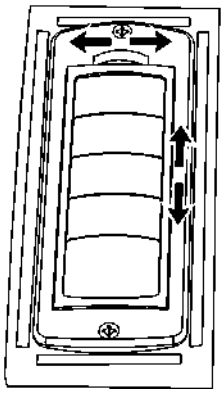


Illustration 96 g01537193

This cab louver is a square fin rectangle. Two louvers are located near the operator feet level by the doors.

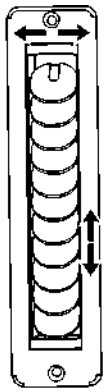


Illustration 97 g01537234

This cab louver is a round fin rectangle. Two rotating louvers are located above the rear window. Two are located next to the side windows. Two are at each door.

Round Louvers – Adjust the round louvers to circulate air in the cab. Adjustments are rotating clockwise or counterclockwise and adjusting from top to the bottom.

Louvers – Adjust the square fin louvers to circulate air in the cab. Adjustments are rotating from the side to the side and adjusting from top to the bottom.

Rotating Louvers – Adjust the round fin louvers to sweep air evenly across the window. Adjustments are rotating from the side to the side and adjusting from top to the bottom.

Heating and Air Conditioning System Operation (Auto Mode)

Temperature control switch (6B) communicates the operator requested cab temperature to the ECM when the A/C switch is in the AUTO position.

The automatic temperature control system maintains the operator requested cab temperature by increasing the air temperature or decreasing the air temperature from the louvers. The adjustment of the air temperature from the louvers is based on the existing air temperature of the cab.

- Open all louvers. Direct all air flow away from the operator.
- Place A/C switch (6C) to the AUTO position.
- Rotate temperature control to the middle position, that is approximately 21° C (70° F).
- After the machine has been operating at the rated engine temperature and speed, slightly rotate the temperature dial to change the temperature setpoint of the cab. Clockwise rotation increases the temperature setpoint of the cab up to 32° C (90° F). Counterclockwise rotation decreases the temperature setpoint of the cab to 10° C (50° F).
- Adjust fan control (6A) to desired fan speed. When outside ambient temperatures are warm or cold, set fan speed to HIGH. When the outside ambient temperatures are close to the operator requested temperature setpoint of the cab, set fan speed to LOW. If the heating and air conditioning system is not controlling cab temperature effectively, increase fan speed.

Note: After changing the position of the temperature dial, allow several minutes to pass in order for the heating and air conditioning system to modify cab temperature.

Note: For maximum cab pressurization, maintain highest level of fan speed.

Heating and Air Conditioning System Operation (Manual Mode)

Note: The operator will set the fan speed to the maximum. This action allows the system to achieve the desired environment in the cab in the shortest amount of time. After the cab reaches the desired temperature, the operator can change the position of the fan speed. The temperature of the cab is regulated with the fan control and the heater control.

Heating

Achieving the maximum heat

- Fully open all louvers.
- Place A/C switch (6C) to the OFF.
- Turn temperature control (6B) clockwise until the dial stops. The indicator should be in the red.
- Set fan control (6A) to the high position for the maximum fan speed.

Air Conditioning

Achieving maximum cooling

- Fully open all louvers.
- Place the A/C switch (6C) to the A/C.
- Turn the temperature control (6B) counterclockwise until the dial stops. The indicator should be in the blue.

- Set the fan control (6A) to the high position for the maximum fan speed.

Defogging

- Direct all louvers to the nearest window. Close all louvers that are designed to blow air directly onto the operator.
- Turn the temperature control (6B) clockwise until the dial stops. The indicator should be in the red.
- Set the fan control (6A) to the high position for the maximum fan speed.
- Place the A/C switch (6C) to the A/C.

Cab Dome Light (7)

Push the top part of the rocker switch to turn on the light. Push the bottom part of the switch to turn off the light.

AM/FM Radio, MP3, Bluetooth (8) (If equipped)

WARNING

If a radio other than one available from your Caterpillar dealer is installed, an in-line fuse must be provided. Failure to do so can damage the electrical system if an electrical short occurs in the radio circuit.

AM/FM/CD Radio

Note: Multiple radio installation groups are available. If a radio is not installed, a cover is available for the opening. Consult your Cat dealer for additional information. A mini-jack that is located in the front dash is available for the appropriate electronic devices.

Door Latch (9)

Machines with cabs are equipped with alternate exits. If a door becomes disabled, the other door can be used as an alternate exit. Release the latch and open the door.

Release latch (29) to unlock the cab door. Fully open the door until the door latches.

Note: A key is required to lock or unlock the exterior door handle of the cab. The interior latch will function to open the cab door if the exterior door handle is locked.

Mirror (10)

Mirrors provide more visibility around your machine. For best operator vision, adjust the rear view mirror. Adjust the mirror before you operate the machine after operators change.

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

Service Brake Pedal (11)

Applying the Brake Pedal – Push the brake pedal downward to apply the service brakes. Use the brake pedal to slow the machine and stop the machine. Use the service brake on a downgrade to prevent overspeed. The service brake should be applied to slow the machine or stop to the machine when you change directions on a steep slope.

Releasing The Brake Pedal – Release the brake pedal to allow the machine to move.

Decelerator Pedal (12)

Decelerator Pedal – Push down on the deceleration pedal to reduce the engine speed. This action will override the engine speed control. Use the pedal to reduce the engine speed when you make a directional shift. While in an Auto Shift Automatic mode, the pedal may need depressed further to change engine speed.

Bulldozer Blade Control (13)

Bulldozer Blade Lift

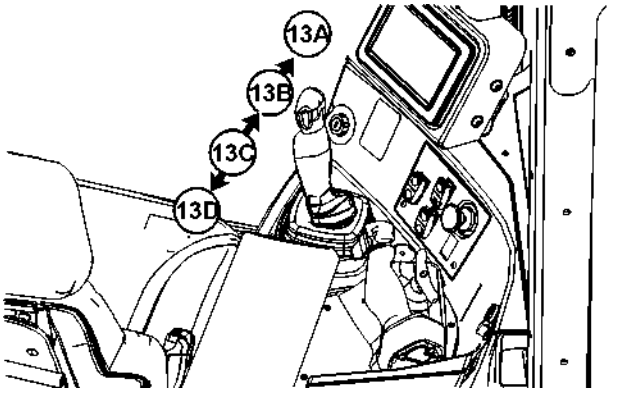


Illustration 98 g03342028

FLOAT (13A) – Push the lever forward past the detent force to activate the blade float function. The float function is not deactivated when the lever is released into the NEUTRAL position. When the float function is activated, the blade moves up and down with the ground contour. The top of the information display will change from MANUAL to FLOAT when FLOAT is activated.

The float will deactivate if the lever is moved through the NEUTRAL position to the RAISE position or the LOWER position.

Note: The default setting for the operator is ENABLE. The float function is enabled or disabled in the information display. Refer to Operation and Maintenance Manual, “Monitoring System” for the explanation of the functions of the information display.

LOWER (13B) – Push the lever forward to lower the blade. Release the lever. The lever will return to the HOLD position.

HOLD (13C) – The lever will return to the HOLD position, when you release the lever from the RAISE position and from the LOWER position. The movement of the bulldozer blade stops. If the lever is released from the float position, the float function remains active.

RAISE (13D) – Pull back on the lever to raise the blade. Release the lever. The lever will return to the HOLD position.

The information display allows the blade response to be automatically set. Refer to Operation and Maintenance Manual, “Monitoring Systems” for proper adjustment of this setting.

Bulldozer Blade Tilt (Single Tilt)

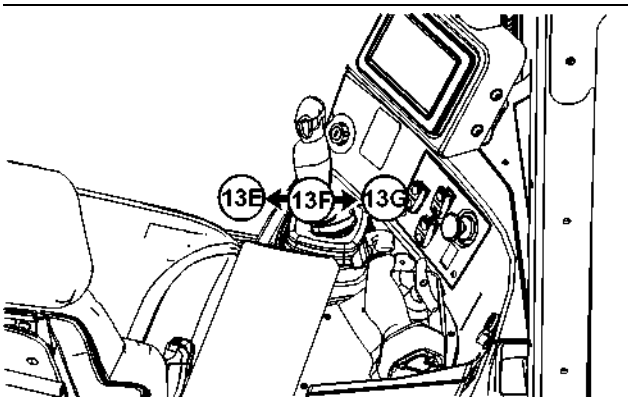


Illustration 99 g03342052

Single Tilt Control

Tilt Left (13E) – Pull the blade control lever toward the left to lower the left side of the bulldozer blade. When you release the lever, the lever returns to the HOLD position.

Tilt Hold (13F) – When you release the lever, the lever returns to the HOLD position. The movement of the bulldozer blade stops.

Tilt Right (13G) – Push the blade control lever toward the right to lower the right side of the bulldozer blade. When you release the lever, the lever returns to the HOLD position.

Bulldozer Blade Tilt (Dual Tilt)

Dual Tilt Machine (If Equipped)

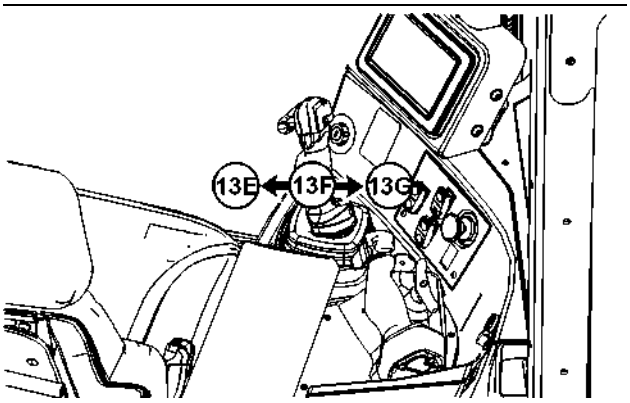


Illustration 100 g03341985

Trigger switch (Not Shown) – The trigger switch is on the underside of the joystick. Hold the trigger switch inward to operate the bulldozer blade in single tilt mode. Release the trigger switch to return the bulldozer blade to dual tilt mode.

Tilt Left (13E) – Pull the blade control lever toward the left to lower the left side of the bulldozer blade. When you release the lever, the lever returns to the HOLD position.

Tilt Hold (13F) – When you release the lever, the lever returns to the HOLD position. The movement of the bulldozer blade stops.

Tilt Right (13G) – Push the blade control lever toward the right to lower the right side of the bulldozer blade. When you release the lever, the lever returns to the HOLD position.

Pitch Control (Dual Tilt)

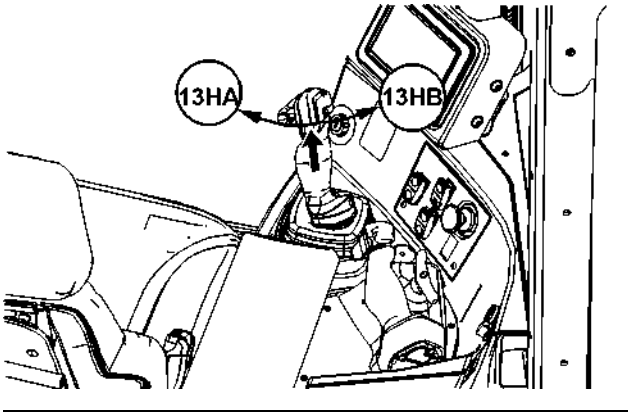


Illustration 101 g03342088

Thumb switch (13H) is used to pitch the blade forward and backward. This blade movement changes the performance of the blade.

Pitch Back – Move the thumb lever (13HA) on the bulldozer blade control lever to the left to pitch the blade backward. When you pitch the bulldozer blade to the rear, you will improve the ability of the bulldozer blade to carry the load.

Pitch Forward – Move the thumb lever (13HB) on the bulldozer blade control lever to the right to pitch the blade forward. When you pitch the bulldozer blade forward, you will improve the penetration of the bulldozer blade. This movement will also help to dump the load. This action will also help to minimize the carryback of the material.

Bulldozer Blade (Automatic Modes)

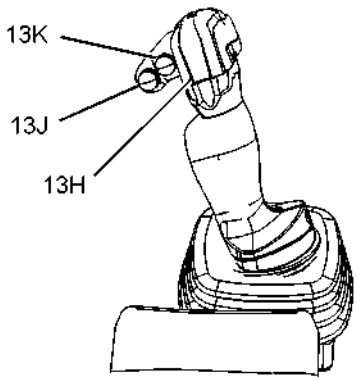


Illustration 102 g03342255

Dual tilt mode must be selected in the touchscreen display system. Buttons (13J) and (13K) can be used to assist with changing the blade pitch. Push button (13K) to toggle between the three positions of the blade pitch that are set with the touchscreen display.

Keypad Module (If Equipped) (14)

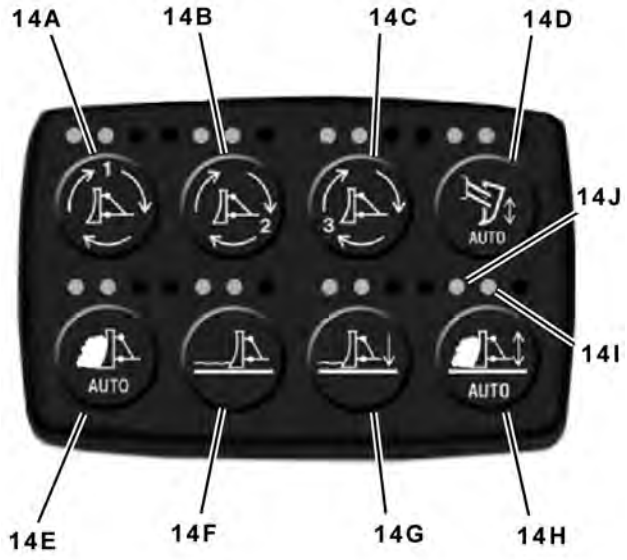


Illustration 103 g03504717

Keypad module (14)

(14A) ABA (Load)
(14B) ABA (Carry)
(14C) ABA (Spread)
(14D) Automatic Ripper Control
(14E) Autocarry
(14F) Grade Protection
(14G) Rough Grade Control
(14H) Grade Control
(14I) Mode “Select” indicator lamp
(14J) Mode “Active” indicator lamp

Auto Blade Assist (ABA) (If Equipped)

ABA is a feature that automates blade pitch and lift control during a typical dozing cycle to reduce operator fatigue. ABA can be operated with the Autocarry function.

Note: Use the right-hand button (13K) on the bulldozer blade control lever In order to cycle through the three ABA functions of Load, Carry, and Spread.

Note: There are lamps above each of the eight Keypad Module buttons. The first lamp (14I) indicates whether the feature of that button is selected, or in ready mode. The second lamp (14J) indicates whether the feature of that button is active, or in use. Both lamps remain visible when the feature is active.

Load (14A) – Press the button on the keypad (14A) one time to activate this function. The blade will adjust the pitch that was set in the information display for this portion of the application. The activation of the load function will recalibrate the blade. To recalibrate the pitch, the blade will pitch all the way to the back. Then, the blade will pitch forward to the selected angle. Another usage of this button is to set the blade pitch. Pressing and holding (3 secs) this button will preset blade pitch to the current location for the Load function only. Also, pressing this button when another function is already active will cause the blade to pitch to the Load preset position.

Carry (14B) – Press the button on the keypad (14B) one time to activate this function . The blade will adjust the pitch that was set in information display for this portion of the application. Another usage of this button is to set the blade pitch. Pressing and holding (3 secs) this button will preset blade pitch to the current location for the Carry function only. Also, pressing this button when another function is already active will cause the blade to pitch to the Carry preset position.

Spread (14C) – Press the button on the keypad (14C) one time to activate this function. The blade will adjust the pitch that was set in the information display for this portion of the application. Another usage of this button is to set the blade pitch. Pressing and holding (3 secs) this button will preset blade pitch to the current location for the Spread function only. Also, pressing this button when another function is already active will cause the blade to pitch to the Spread preset position.

Note: If the machine is equipped with the position sensor on the lift cylinder, the blade will rise at the set rate in the information display.

Note: The operator must manually cause ABA to cycle through the three functions of Load, Carry, and Spread once ABA is activated on the keypad. This cycling is done by pressing the right-hand button (13K) on the blade control lever.

Note: You can override the auto blade assist at any time by moving the bulldozer blade control lever. ABA can also be canceled by the selection/deselection of the buttons with the illuminated lamp on the keypad: (14A), (14B) and (14C).

Note: An error condition occurs when a machine condition prevents a feature from being selected. Mode "Select" lamp (14I) will begin to flash. When the operator acknowledges the error, the automation feature will be in a "Select" mode only.

Activating Auto Blade Assist with Information Display

The information display can be used to set the automatic feature for Auto Blade Assist (ABA) operation.

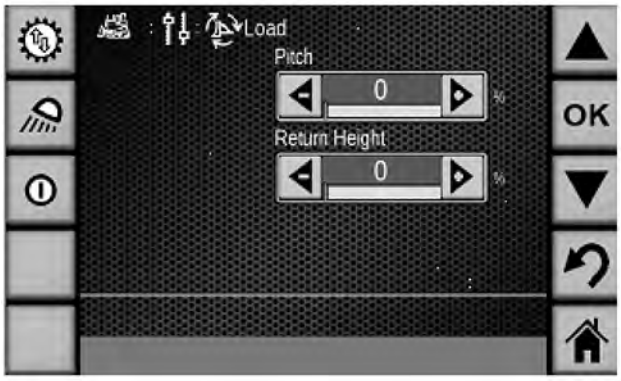


Illustration 104 g03346121

Load Settings (ABA)

Back Button – Press the Back button to return to the previous menu.

Home Button – Press the Home button to return to the first performance page.

Machine Button – This button is on the first performance page.

Note: The Auto Blade Assist function is available on machines that are equipped with dual tilt hydraulics. Return and height control segments are only available if a position sensing lift cylinder is installed. These segments are not dependent upon Autocarry. Autocarry does require a position sensing cylinder also.

Using the information display (see illustration 108) select from the first performance page: Machine, Settings, Auto Blade Assist, **"Load: Pitch"**

- Press the end of the incremental bar to increase or decrease "Pitch."
- When a desired number appears, press "OK" to set.

Note: The blade pitch for "Load, Carry, Spread" can also be set by holding down buttons (14A, 14B, 14C) on keypad module (14.)

Next, select from the first performance page: Machine, Settings, Auto Blade Assist, **"Load: Return Height"**

- Press the end of the incremental bar to increase or decrease "Return Height"
- When a desired number appears, press "OK" to set.

Next, select from the first performance page: Machine, Settings, Auto Blade Assist, **"Carry: Pitch"**

- Press the end of the incremental bar to increase or decrease "Pitch"
- When a desired number appears, press "OK" to set.

Use the same selection procedure to set the **"Carry: Load Factor."**

- Press the end of the incremental bar to increase or decrease "Load Factor"
- When a desired number appears, press "OK" to set.

Then, select from the first performance page: Machine, Settings, Auto Blade Assist, **"Spread: Pitch"**

- Press the end of the incremental bar to increase or decrease "Pitch"
- When a desired number appears, press "OK" to set.

Use the same selection procedure to set the **"Spread: Lift Rate" and "Spread: Spread Height"**

Automatic Ripper Control (If Equipped)

Button (14D) is used to select the Automatic Ripper Control . One indicator lamp above button (14D) will illuminate.

ARC will control track slip and maintain drawbar pull by adjusting the ripper height and engine speed. ARC will not adjust the ripper tip angle. ARC maintains maximum productivity, minimizes wear and tear on the machine and reduces operator fatigue.

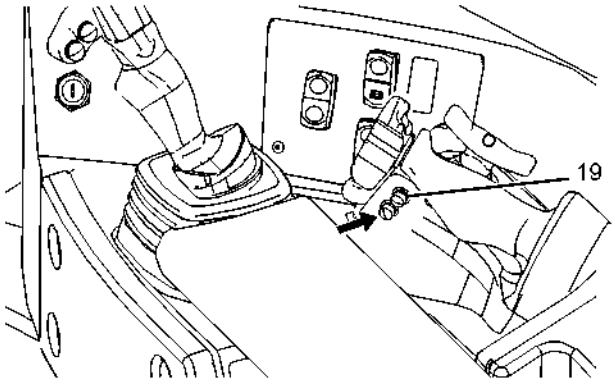


Illustration 105 g03344199

To activate Automatic Ripper Control, press the bottom button on the left side of the ripper control lever. The two indicator lamps above button (14D) will illuminate if the correct operating conditions are present.

When Automatic Ripper Control is activated, the ripper will start lowering regardless of what gear the transmission is operating in. When the gear is shifted into FORWARD, the machine will downshift into First gear if the machine is not already in First gear. Automatic Ripper Control begins to adjust the ripper height and the engine speed for the most efficient ripping operation.

NOTICE
Do not activate Automatic Ripper Control when traveling in reverse gear. Ripper tip and shank damage will result.

Manual control of the ripper will override the Automatic Ripper Control. Automatic Ripper Control will take over again when there is not movement from the ripper control lever. Manual control of engine deceleration will override Automatic Ripper Control but will not deactivate Automatic Ripper Control.

Automatic Ripper Control will be deactivated by the following actions:

- Press button (14D) on the keypad module
- Moving the machine into reverse
- Pressing the service brake pedal
- Activating the implement shutoff switch
- Press the Auto Ripper Control bottom button on the ripper control lever
- Press Auto Stow Button (26) on the ripper control lever

Note: Shifting into a reverse gear with the ripper in the ground is not recommended.

If any of the following situations occur, Automatic Ripper Control will enter a suspended condition.

- Engaging the parking brake
- Operator Not Present
- Diagnostic or event from implement

Automatic Ripper Control will activate a suspended condition and will cause a slow blinking lamp on the keypad module. Correcting the following condition will return a solid lamp on the keypad.

- Service brake

Back Button – Press the Back button to return to the previous menu.

Home Button – Press the Home button to return to the first performance page.

Service Button – This button is on the first performance page.

Illustration 106 g03501796
Load factor adjustment for “Auto Rip”

The Automatic Ripper Control load setting can be adjusted by the operator in the information display.

Autocarry (If Equipped)

Autocarry – Push the button (14E) to select the system or deselect the system. The indicator lamp will illuminate when the system is selected. Press the left-hand button (13J) on the bulldozer blade control lever to activate the Autocarry function. Press the left-hand button (13J) again to deactivate the Autocarry function. Press the right-hand button (13K) on the bulldozer blade control lever to cycle through the sequences of ABA.

Autocarry must be activated in each dozing pass. Autocarry must be in gear 1F or 2F and the machine must be moving to be activated. Shifting into neutral or reverse gear will de-activate Autocarry. Once Autocarry is activated, a second indicator lamp will be lit. Autocarry may not immediately control blade height. Autocarry will only control blade height once the blade is fully loaded. Load the blade manually.

Blade height may be manually adjusted at any time during Autocarry operation. Autocarry will not deactivate, and will resume control after the manual blade height adjustment.

Autocarry will stop controlling blade height if the decelerator or the service brake is used, and will resume controlling the blade when the decelerator pedal is released.

The Autocarry mode provides automatic control of the blade lift and blade lower functions during the Carry segment of a dozing cycle. This automatic control is to maintain an optimum blade load. Autocarry helps to reduce operator fatigue while the best productivity of the machine is maintained. Autocarry mode works best when the mode is used with ABA.

Illustration 107 g03343861

"Work Monitor" screen

Top bar: optimum green zone for Autocarry operation

Bottom bar: load factor adjustment

The Autocarry full load setting that can be adjusted in the information display. If the machine is slipping excessively during Autocarry operation, the full load setting must be reduced.

Note: An Automatic Load Select feature is available for more consistent operation parameters.

Terrain with Blade Control (If Equipped)

Terrain with Blade Control is a system which automates control of a blade to produce a more consistent grade. Blade Control is integrated into the machine which enables more advanced features. Each blade control mode is selected by pressing the keypad button. The control mode is then activated or deactivated mode by pressing the left-hand button (13J) on the blade control lever.

Grade Protection (14F) – Grade Protection is a blade control mode that overrides operator blade commands to prevent the blade tips from going below the site design plan.

Rough Grade Control (14G) – Rough Grade Control is a blade control mode that controls blade height at the center of the blade but does not control blade tilt. Blade tilt is controlled by the operator for steering and digging tasks without interference from blade control. Rough grade control is best used when removing difficult material or large amounts of material.

Grade Control (14H) – Grade control is a blade control mode that controls both blade lift and blade tilt to grade. Tilt commands are locked into single tilt mode in Grade control. Blade pitch is reset during the reverse cycle. Grade control can be selected and used with Autocarry. Grade control with Autocarry is best used when grading the site to design. If the machine is equipped with AccuGradeinstead of Grade Control, this button selects AccuGrade. AccuGrade cannot be used with Autocarry.

Using Grade Control with Autocarry

Autocarry and Grade Control may be used in combination. To configure the machine to run both features, select both Grade Control (14H) and Autocarry (14E) on keypad module (14). The activate/de-activate button will now control both features at the same time.

Touchscreen Information Display (15)

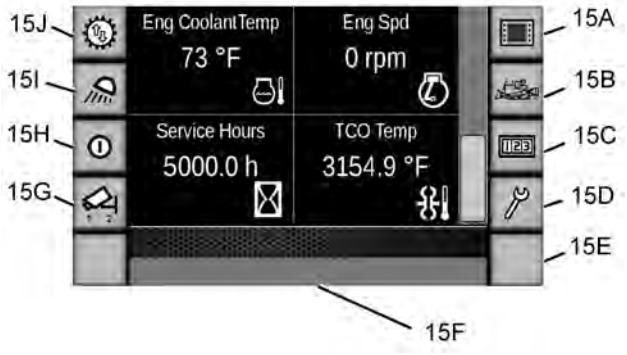


Illustration 108 g03344381

First performance page of information display

(15A) Display button
(15B) Machine button
(15C) Totals button
(15D) Service button
(15E) Home button
(15F) Information banner
(15G) Camera button
(15H) Function button
(15I) Machine lighting button
(15J) Power train button

The information display is at the front of the right side operator console. The information display communicates with the machine electronic control modules, and the instrument module. The information display provides information to the operator and allows the operator to have control of the machine system.

Some functions of the information display are password protected. Refer to Operation and Maintenance Manual, “Monitoring System” for additional information on the information display.

Reverse Fan (If Equipped)

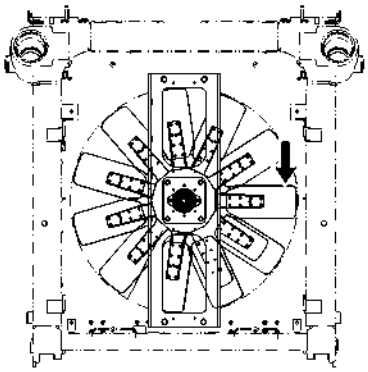


Illustration 109 g03502252

Front view (normal direction)

If the machine is equipped with the reverse fan function (attachment), the fan can reverse the direction of air flow from forward to the rearward direction. This action enables the fan to purge debris from the radiator, aftercooler cores, and engine access doors. The purge cycle will begin automatically when the purge interval expires.

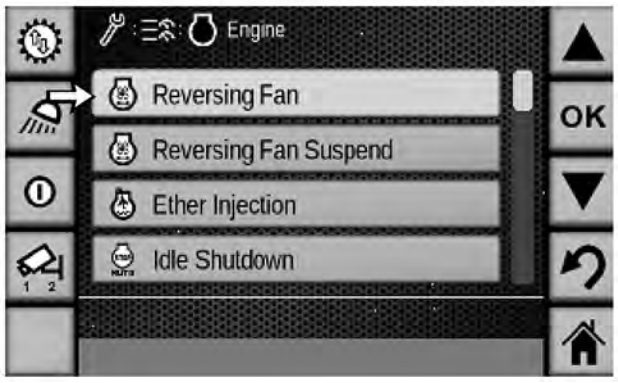


Illustration 110 g03345613

“Engine configuration” screen

Using the information display (see illustration 108) select from the first performance page: Service, enter Service Mode password, Configuration, Engine. Select and press “Reversing Fan” .

Reversing Fan Control – To initiate the continuous fan purge (cycle), perform the following actions. Use the information display to activate the reverse fan function while the machine is in NEUTRAL and the parking brake is ON. The fan will remain in a continuous purge cycle until the function is disabled or the parking brake is released.

The setting range during the fan purge is 5 - 60 seconds. The setting range for fan purge interval is 5 - 120 minutes.

If the purge interval expires, a purge cycle will begin when the track-type tractor is in a REVERSE gear or in NEUTRAL and the parking brake is released. If the purge interval expires and the track-type tractor is in a FORWARD gear, starting a purge cycle is prevented. If the purge interval expires and the track-type tractor is in NEUTRAL with the parking brake engaged, starting a purge cycle is prevented. A purge cycle is prohibited until there is a shift into REVERSE gear or the parking brake is released in NEUTRAL.

If the reverse fan button is manually depressed, a purge cycle will begin when the track-type tractor is in a REVERSE gear or in NEUTRAL and the parking brake is released. If the purge button is manually depressed, the request for a purge cycle will be ignored when the track-type tractor is in a FORWARD gear or in NEUTRAL and the parking brake is engaged.

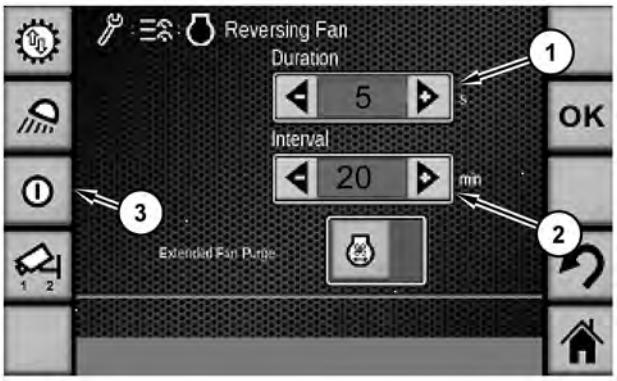


Illustration 111 g03502278

(1) Fan duration (seconds)
(2) Fan interval cycle (minutes)
(3) “Function” button for manual settings of fan purge operation

- Press the end of the incremental / decremental bar (1) to increase or decrease the duration of the reversing fan.
- When the desired number appears, press “OK” to set.

Back Button – Press the Back button to return to the previous menu.

Perform the following actions to activate the reversing fan interval: select Service, enter Service Mode password, Configuration, Engine, Reversing Fan Interval options.

- Press the end of the incremental / decremental bar (2) to increase or decrease the interval of the reversing fan.
- When a desired number appears, press “OK” to set.

Select the reversing fan option found by pressing “Functions” button (3) to activate the reversing fan duration and interval in the manual mode.

Back Button – Press the Back button to return to the previous menu.

Perform the following actions to activate the extended fan purge function: select Service, enter Service Mode password, Configuration, Engine, Extended Fan Purge options.

The “Extended Fan Purge” button activates the fan purge function while the switch is in the ON position. The Extended Fan Purge will not time out. Push the button again to deactivate fan purge.

When a purge cycle begins, the total purge cycle will pause while machine is in FORWARD, and will continue to count down the purge cycle until the next time machine is in NEUTRAL or REVERSE. When a purge cycle begins, and the cancellation of the Purge Cycle is set to ON, the purge cycle will stop automatically once the machine is put into FORWARD gear. If the Purge Cycle (Cancellation) occurs after 15 seconds of purge time, the purge interval timer is kept at zero. Then, the system is able to purge the cooling system and the purge cycle starts automatically at the next time. After one attempt fails to complete more than 15 seconds of purge time, the purge interval timer is reset to the purge interval.

The purge interval timer is reset upon full completion of every purge cycle regardless of an automatic start or manual start. The reverse fan function is disabled when the hydraulic oil temperature is below 30° C (86° F). Auto purge will not be allowed with a coolant temperature of greater than 109° C (228° F). Manual purge will not be allowed with a coolant temperature of greater than 145° C (293° F).

Procedures for the Reverse Fan Function (If equipped)

Reference: See the “Monitoring System” story in this manual for “Procedures for the Reverse Fan Function (If equipped)”.

Auxiliary Power

Auxiliary Circuit – The auxiliary electrical connector is on the inner face of the right fender below the hydraulic tank. A 24 V temporary duty light may be connected to the 2-pin connector. A 20 AMP fuse protects the circuit.

Note: The auxiliary circuit also serves as the switch for the rotating beacon. This circuit is provided for machines that are delivered to Europe.

Engine Start Switch (16)

STOP (4TH POSITION) – Turn the engine start switch key to the STOP position to override delayed engine shutdown (if enabled), and perform an immediate engine shutdown.

Note: Overriding delayed engine shutdown may reduce engine and machine system component life.

OFF – Inserting the engine start switch key and removing the key must be done from the OFF position. In the OFF position, there is no power to most electrical circuits in the cab. The cab lights, the panel lights, the tail lights, and the dome light are operational even when the start switch is in the OFF position.

ON – Turn the start switch key clockwise to ON to activate all cab circuits.

START – Turn the start switch key clockwise to START to crank the engine. Release the key after the engine starts. The key will return to the ON position.

Engine Speed Switch (17)


Engine Speed Switch – The rocker switch is on the right console. The switch is programmed to start the engine at LOW IDLE. When the top of the rocker switch is depressed, the engine speed increases to HIGH IDLE. When the bottom of the rocker switch is depressed, the engine speed decreases to LOW IDLE. To set the engine speed at less than HIGH IDLE, depress the decelerator pedal until the engine is running at the desired engine speed. Press the top of the switch for 2 seconds. To return the engine speed to LOW IDLE or to HIGH IDLE, press the switch.

Note: Also, by pressing and holding the top or bottom of the rocker switch the engine speed slowly ramps up or down before reaching High or Low Idle. Releasing the switch will maintain the engine speed at that setting.

Implement Shutoff Control (18)

This switch will make the controls for the ripper and the blade on the machine nonfunctional.


Implement Shutoff Control – Press the top of the switch to deactivate the hydraulic functions. Press the bottom of the switch to activate the hydraulic functions.

Note: The implement shutoff control is designed to deactivate the control levers. Depress the top of the switch to deactivate the control levers. The indicator for the implement control on the dash panel will illuminate when the hydraulic controls are deactivated. Deactivate the control levers before you exit the seat or before you service the machine. The control levers should be deactivated when the machine is left unattended.

Secondary Engine Stop Switch (19)

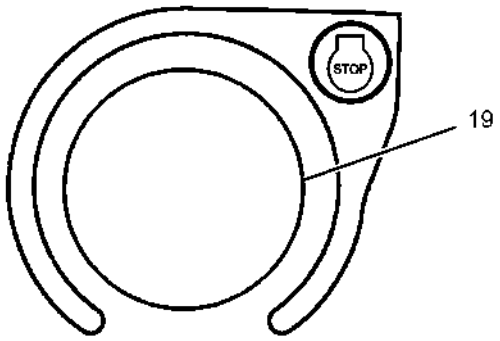


Illustration 112 g03736444

Engine Stop – Secondary engine stop switch (19) stops the engine when the switch is depressed.

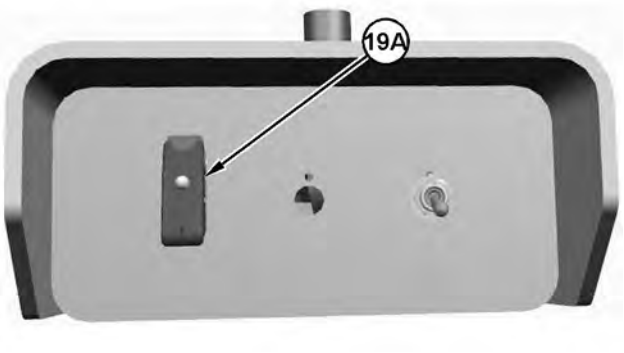


Illustration 113 g06230506

There is an additional secondary engine stop switch (19A) at the ground level service center on ripper or counterweight.

The engine continues to run after key-off of the engine start switch to allow more shutdown features to complete a cycle. The secondary engine stop switch immediately stops engine operation.

Control for the Ripper Shank Pin (20)

ENGAGED – Press the top of the switch to engage the ripper shank pin. Move the switch to the HOLD position to stop the ripper shank pin movement.

HOLD – Move the switch to the CENTER position to stop the ripper shank pin movement.

DISENGAGED – Press the bottom of the switch to disengage the ripper shank pin. Move the switch to the HOLD position to stop the ripper shank pin movement.

Action Light (21)

Action Light – The action light illuminates when a Warning Level 2 is active. The action light illuminates when a Warning Level 3 is active.

12 V Power Source (22)

12 V Power Source – This receptacle can be used to power automotive electrical equipment or accessories. 12 v power is only available when the engine start switch is in the ON position.

Master light switch (23)

Work lights (23) – Pressing this switch will turn ON all exterior work lights. Pressing this switch again will turn OFF all the exterior lights. If only some of the exterior lights are currently on, controlled through the Information Display (15), pressing this button will turn OFF all lights. Any time the exterior lights are ON, the information display will enter “night mode” , and the interior cab backlighting will be dimmed to a pre-configured intensity.

Ripper Shank In/Out Lever (24)

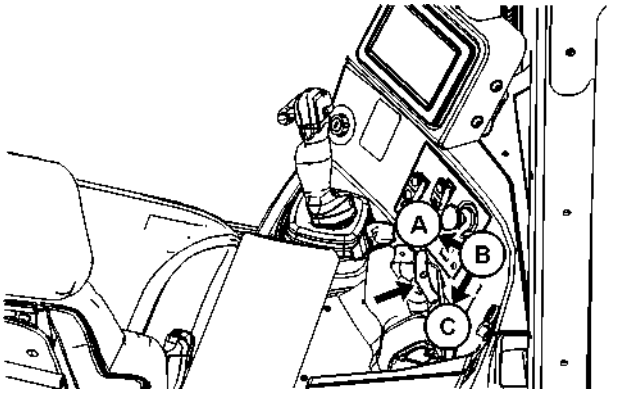


Illustration 114 g03342412

Shank In (A) – Pull the front of the ripper shank in/out lever toward the operator to move the shank in closer to the machine. Release the lever. The lever will return to HOLD position.

Hold (B) – The ripper shank in/out lever returns to the HOLD position. Ripper movement stops.

Shank Out (C) – Pull the rear of the ripper shank in/out lever toward the operator to move the shank out away from the machine. Release the lever. The lever will return to HOLD position.

Horn (25)

Horn – Push the knob downward to sound the horn. Use the horn to alert the personnel. Use the horn to signal the personnel.

Ripper Auto Stow Switch (26)

Push the ripper auto stow switch on the ripper control lever to raise the ripper to maximum height. If the machine is configured, move the ripper to a full SHANK IN position. The machine can also be configured to park the ripper in the SHANK OUT position.

While the ripper auto stow function is moving the ripper, press the ripper auto stow switch again to stop ripper movement.

Ripper Raise/Lower (27)

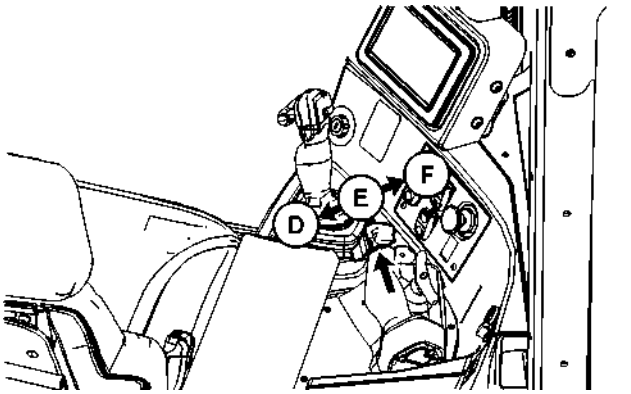


Illustration 115 g03342383

LOWER (D) – Push the bottom of the ripper lift control lever to lower the ripper. Release the lever. The lever will return to the HOLD position.

Hold (E) – The ripper lever automatically returns to the HOLD position. Ripper movement stops.

RAISE (F) – Push the top of the ripper lift control lever to raise the ripper. Release the lever. The lever will return to the HOLD position.

Adjustable Right Armrest (28)

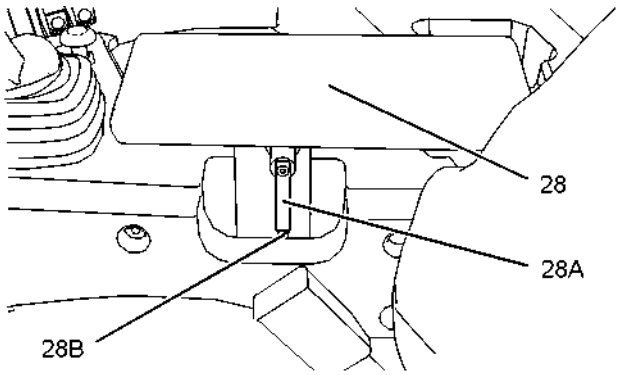


Illustration 116 g03354578

Use the following procedure to adjust the right and left armrest (28), if necessary.

1. Loosen the knob (28A) counterclock wise. The knob and bolt are on the inside armrest.

2. Move armrest (28) to the desired height.

3. Tighten the knob clockwise.

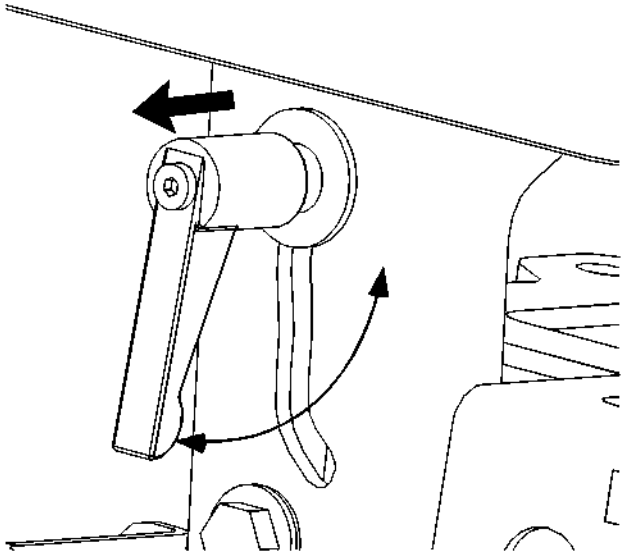


Illustration 117 g02290013

Note: To adjust lever position for more travel, pull-out on the lever and turn counterclockwise or clockwise.

12 V Power Sources

Additional 12 V power source locations are located behind and below the right-hand arm rest.

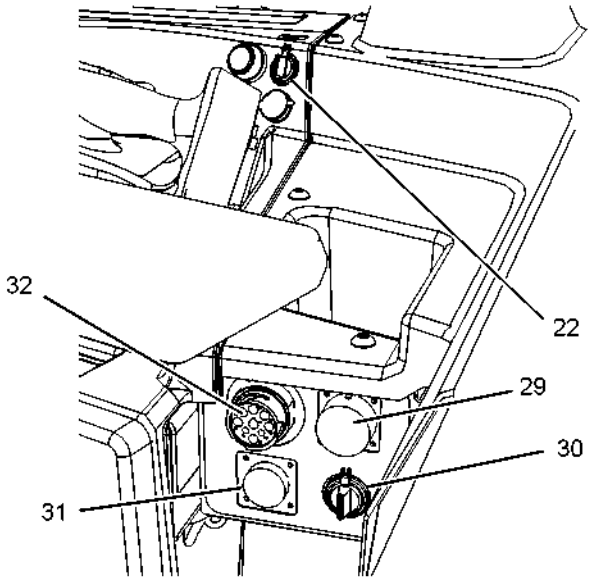


Illustration 118 g06079881

Type 1

(22) 12 v Power Source
(29) 9-Pin Diagnostic Port for Cat Electronic Technician (ET)
(30) 12 v Power Source
(31) 12 v 3 Pin Power Source
(32) 9-Pin Service Port for Vital Information Management System (VIMS)

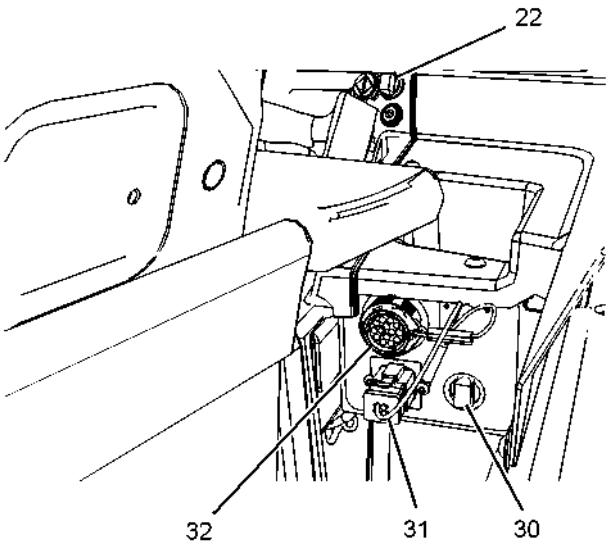


Illustration 119 g06079885

Type 2

(22) 12 v Power Source
(30) 12 v Power Source
(31) 12 v Power Connector
(32) 14-Pin Service Port for Cat ET and VIMS

12 V power source (22) – This receptacle can be used to power automotive electrical equipment or accessories. 12 V power that delivers 10 A of current is available only when the engine start switch is in the ON position.

12 V power source (30) – This receptacle can be used to power automotive electrical equipment or accessories. 12 V power that delivers 10 A of current is available when the engine start switch is in either the ON or the OFF position.

12V 3-pin power source or 12V Power Connector (Type 2)(31) – This receptacle delivers 20 A of current that can be used to power automotive electrical equipment or accessories from two different circuits. One circuit supplies 12 V power only when the engine start switch is in the ON position. The other circuit will supply 12 V power when the engine start switch is in either the ON or the OFF position.

A 154-9969 Connector Kit can be purchased from your Cat dealer to enable connection to 12 V 3-pin power source (31).

Cat Electronic Technician (ET) Diagnostic Port (29)

This service port allows the service personnel to connect a laptop computer. This feature will allow service personnel to diagnose machine systems and the engine.

Vital Information Management System (VIMS) Service Port or 14-Pin Service Port for Cat Electronic Technician (ET) and VIMS (Type 2) (32)

This connector will be used to service the machine with Cat ET and access VIMS information.

Additional Controls

Cab Door

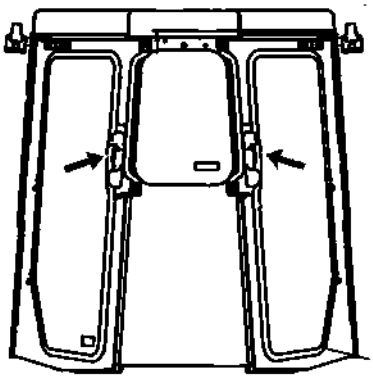


Illustration 120 g01043602

Front view

Machines with cabs are equipped with alternate exits. If a door becomes disabled, the other door can be used as an alternate exit. Release the latch and open the door.

Pull the inside top lever to release the cab door from the fully open position.

Window

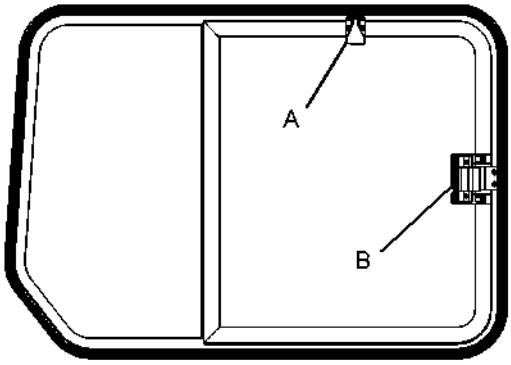


Illustration 121 g03342458

Lift latch (A) to release the sliding window. Squeeze latch (B) to move the window from the closed position. Pull latch (A) downward to secure the window in an open position.

i07142742

Fire Suppression System
(If Equipped)

SMCS Code: 1000; 7000; 7401

Detection and Actuation System

The machine is monitored with a detection and actuation system which is typically connected to a fire suppression system for 24-hour fire suppression protection. The operator of the machine should be provided with hands-on training by an authorized OEM Manufacturer.

Machines built with the optional factory installed fire suppression systems, are equipped with manual actuators. The quantity of actuators may vary, according to the machine. The manual actuators can be triggered by pulling the safety pin and depressing the red button. Prior to actuating the system, the machine should be brought to a complete stop in a safe location with the parking brake engaged.

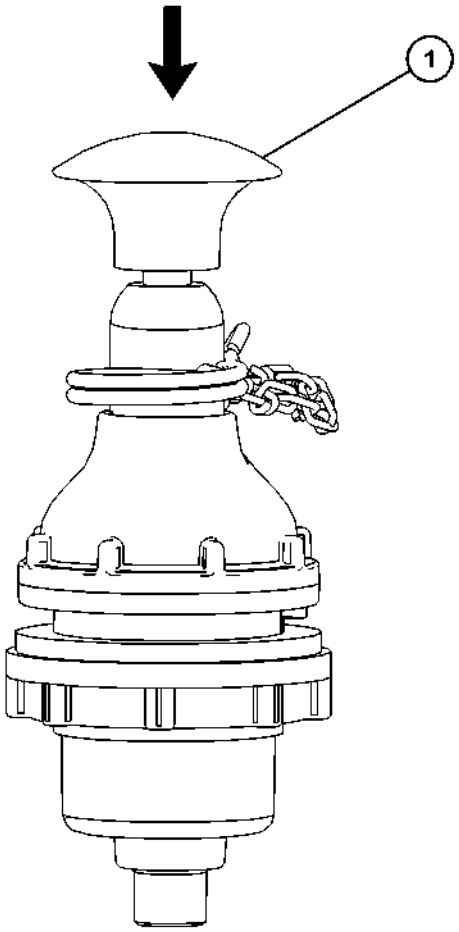


Illustration 122 g06256624

Typical example of fire suppression system manual actuator

(1) Electric Manual Actuator (Quantity may vary)

Fire Suppression Display Module

The Fire Suppression Display Module displays the fire suppression system status, provides to functionality electronically actuate the fire suppression system, and delay fire suppression system actuation. The delay allows the machine to be moved to a safe location and provides visual and audible alarms in the case of system fault or actuation.

The fire suppression system module has default delay times that are factory programmed. The customer and OEM authorized technician, commissioning the system, should analyze the work site application and determine desired settings.

Record the results in Table 124 . Apply the appropriate values on the film located in the cab.

Note: Extra film is supplied for the machine, located in the literature pack.

Illustration 123 g06235337

Typical fire suppression monitor

(1) Delay/Reset/Silence Button
(2) Visual Seal
(3) Push To Activate/Alarm When Lit Button with LED

Fill-In System Information (as installed)

Power: ☐ Internal Only ☐ Dual (External & Internal)

External Power Supply (vehicle battery, power panel, etc.):

_____

TD1 (Time Delay 1, seconds): ☐ 0 ☐ 5 ☐ 10 ☐ 15

TD2 (Time Delay 2, seconds): ☐ 0 ☐ 5 ☐ 10 ☐ 15

Time Delay Restarts: ☐ 2 ☐ Unlimited

Relay #1: ☐ Alarm ☐ Fault ☐ Not Used

Relay #2: ☐ Shutdown ☐ Alarm ☐ Not Used

Pressure Switch Auxiliary Operation: _____

_____

_____

Illustration 124 g06235318

Fire Suppression-Manual Actuation

IN CASE OF FIRE:

1. Safely bring machine to complete stop, set brake, and shut off engine.
2. Break visual seal and open guard door.
3. Push the red “PUSH To Activate / Alarm When Lit” (3) button.
4. Release circuit immediately activates the connected fire suppression system (if included, pressure switch activates auxiliary operation).

Note: The red “PUSH To Activate / Alarm When Lit” LED and sounder remain steady-on for 10 sec. during initiation (release) of fire suppression system. Post release: Detection 1 and/or Detection 2, Shutdown, and Release LEDs and sounder continue to pulse 1 x 10 sec.

5. Safely exit machine and stand-by with supplemental fire fighting equipment.
6. Optional manual actuation: Pull ring pin and strike red button on electric or pneumatic manual actuators.

Note: If safe to reenter equipment, push “DELAY/ Reset/Silence” button to silence. The sounder will silence for 2 hours.

Use the following table to document manual actuator location information (as installed)

ELECTRIC OR PNEUMATIC MANUAL ACTUATOR LOCATION(S):

Illustration 125 g06235191

Fire Suppression-Automatic System Actuation

IN CASE OF FIRE:

1. Detector registers alarm condition in hazard area and initiates the time delay notification on display module.
2. “PUSH To Activate / Alarm When Lit” , plus Detection 1 and/or Detection 2 LED plus sounder:

- Pulse 2 x 1 sec. until last 5 sec. of TD1, then pulse 4 x 1 sec. with Shutdown LED at start of final 5 sec. Refer to Step 1 for TD1 restart), then, only Shutdown LED is steady-on for 1 sec. indicating TD1 transferring to TD2 (restart no longer available).
- Pulse 4 x 1 sec. with Shutdown LED during TD2.
- Steady-on 10 sec. with Shutdown LED during initiation (release) of fire suppression system (if included, pressure switch activates auxiliary operation).

3. When time delay begins: Safely stop equipment, set brake, shut off engine, and exit the machine. Standby with supplemental fire fighting equipment.

4. Post release: LEDs and sounder pulse 1 x 10 sec.

Delay/Reset/Silence Button

1. Restart Time Delay: Press and release for each restart of TD1 during alarm condition. (Limit: 2 restarts or Unlimited, See Graphic 124).

Must be initiated before last second of TD1. (No response after TD1 until post release.)

Note: Press and hold will not extend time delay period.

2. Silence sounder (post discharge or fault notification) for 2 hours: Press and release to silence sounder. The LED fault indication will continue until fault is cleared. Any new fault or detection event will reactivate sounder.

3. Reset function: is for an authorized OEM Manufacturer service technician.

Illustration 126 g06238048

Typical fire suppression monitor

(4) Power LED

Power LED indicator lights:

Green-Steady on – Indicates normal **external** power.

Green-Pulsing 1 every 3 seconds – Indicates normal **internal** power.

Amber-Pulsing 1 every 3 seconds – Indicates external power fault. The system is operating on internal power. Contact an Authorized Fire Suppression Service Technician for service.

Amber-Pulsing 1 every 10 with sound – Indicates internal or external power fault. Contact an Authorized Fire Suppression Service Technician. for service.

OFF – Indicates no system power. Contact Authorized Fire Suppression Distributor for service.

All other LED indicator lights:

LED-Off – Indicates normal status.

Amber/Red Pulsing With Sound – Contact an Authorized Fire Suppression Service Technician for service.

⚠ WARNING

Personal Injury or death could result if the fire suppression system is not functioning properly. Ensure that the fire suppression system is in proper working order without any faults or damaged components. Immediately contact an authorized fire suppression distributor for any repairs before operating the machine.

Basic Fire Suppression Function

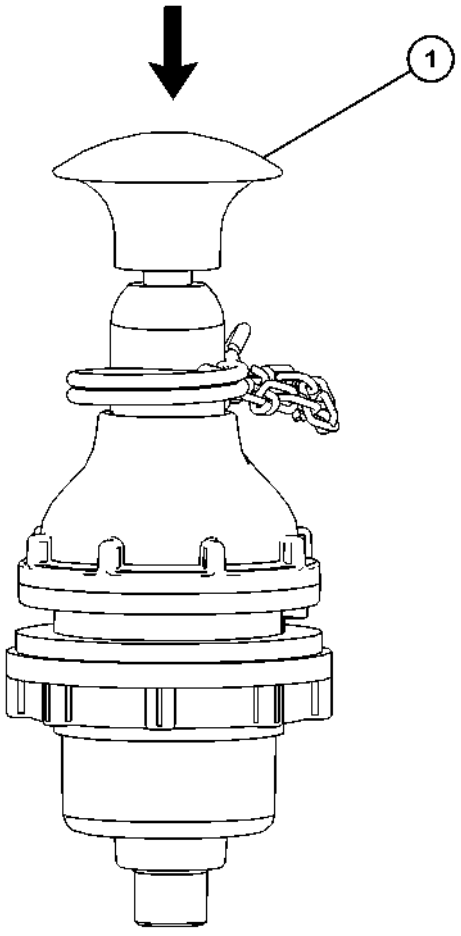


Illustration 127 g06256624

Typical example of fire suppression system manual actuator

(1) Electric Manual Actuator (type and quantity may vary)

Thermal detectors are place throughout specific locations on the machine. Automatic detection occurs when a fire triggers a thermal detector.

The fire detection cable sends a signal through the interface control module to the operator display. The operator depresses the illuminated “push to activate” button on the display module.

After a predetermined time delay period, a signal is sent back through the interface control module to the gas cylinder cartridges. Gas is expelled into agent tanks. The fire fighting agent is forced by the expelled gas into agent tank. The fire agent is distributed throughout the hose network to various nozzles placed towards targeted areas, on the machine.

Electric manual actuators (1) are located along the paths of egress. When the manual actuator (1) is depressed, the signal is sent to the interface control module, display module, back to the interface control module, and to the gas cartridge with the same result as automatic detection.

Note: The quantity of electric manual actuators (1) and the locations, may vary.

i07142180

Monitoring System

SMCS Code: 7490

Functional Test

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

⚠ WARNING

If the action alarm does not sound during this test or machine monitoring displays are not functioning, do not operate the machine until the cause has been corrected. Machine operation with faulty action alarms or displays could result in injury or death as any Warning Category 3 notifications will not be relayed to the operator.

When the engine start switch key is turned to the ON position, the monitoring system runs a test. The operator must observe the monitoring system during the test to determine proper operation.

The self testing feature verifies that the modules of the monitoring system are properly operating. The self testing feature verifies that the display module is properly operating.

The operator must observe the outputs in order to determine if the modules are operating properly. This self testing feature is approximately 5 seconds long.

During the self test, all status indicators on the instrument module light.

The digital display window on the instrument module will be blank throughout the startup sequence however the LCD backlight will turn on.

The pointers in the indication display will start to the left, sweep all the way to the right, then go to the final position.

- The rear action light “ON then OFF”
- The forward action light stays illuminated.
- The action alarm sounds once.

The monitoring panel is then in the normal operating mode.

Action Light

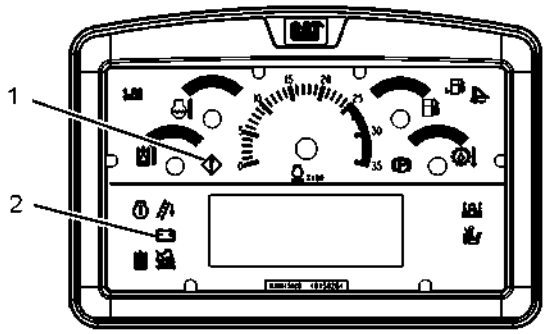


Illustration 128 g03357169
Indication display

Action Lamp (1) – There are two action lamps. One action lamp (1) is on the instrument module. The rearward action lamp is located on the right console. The rearward action lamp is viewed when the operator is facing rearward.

Electrical Fault

Electrical System (2) – This indicator indicates a malfunction in the electrical system. If this alert indicator lights, the system voltage is too low for machine operation.

Increase the engine speed to high idle, if the electrical loads are high. The electric loads consist of the air conditioning and/or the lighting. An alternator will generate more output when the engine is at high idle. If the alert indicator for the electrical system stops within 1 minute, the electrical system is operating normally. During the periods of low engine speeds, the alternator may be overloaded.

Modify the operating cycle. This modification will prevent the electrical system from overloading and prevent the electrical system from discharging the batteries. You can also reduce the loads on the electrical system. Use the medium fan speed in the cab instead of the high fan speed.

Run the engine speed at normal rpm. Run the electrical system at a light load. If the light remains on, drive the machine to a convenient stop. Investigate the cause of the problem. The cause may be a loose alternator belt, a broken alternator belt, a faulty battery, a faulty alternator, etc.

Status Indicators

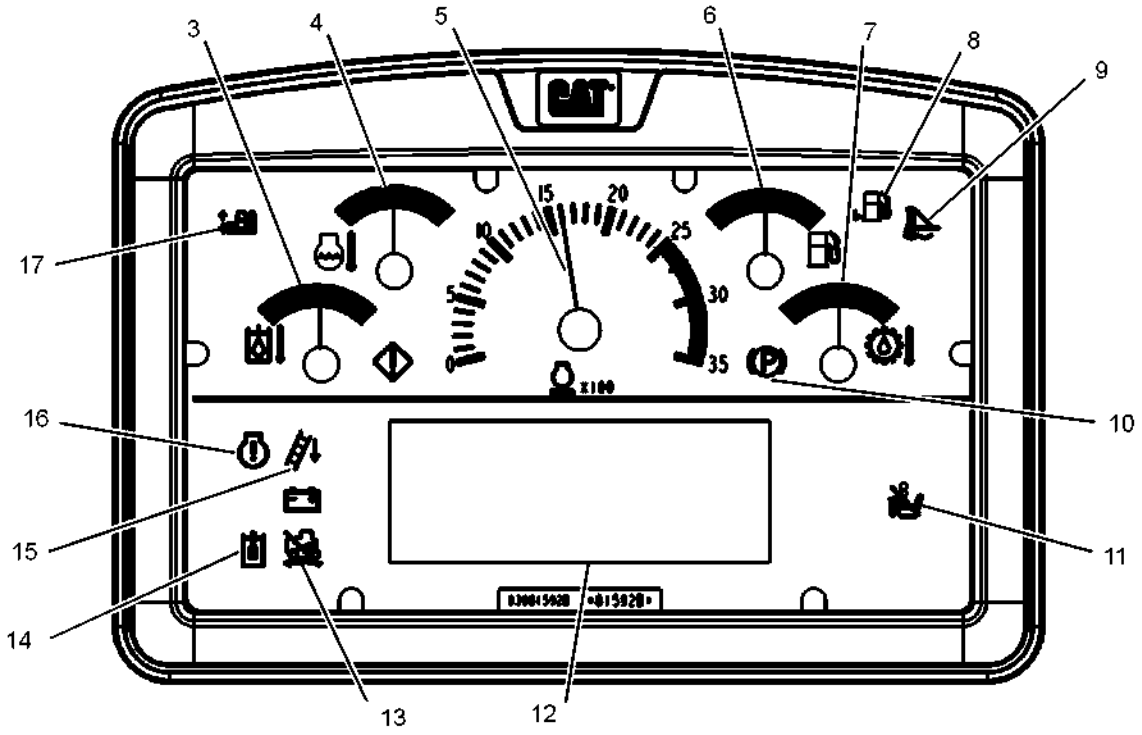


Illustration 129 g03502514

Fuel Level Check (8) – This indicator is illuminated when the fuel level is at a low enough level to indicateadditional fuel is necessary for continued operation.

Float (9) – This status indicator is illuminated when the float mode is selected.

Parking Brake (10) – This status indicator indicates that the parking brake is engaged. If this indicator lights, disengage the parking brake.

Operator Not Present (11) – This status indicator is illuminated when the key is "ON" and the operator leaves the seat unoccupied.

The seat switch that is mounted in the operator seat prevents movement of the machine or implements that is not intended if the operator is out of the seat.

When the switch indicates that an operator is present in the seat, the Machine ECM will enable the operation of the travel system of the machine and the implement control system.

Note: When the machine is moving and the operator raises from the seat, the power train systems and the implement operation will not shut down until the machine is stopped.

After the machine is stopped, the Machine ECM will again require the switch to indicate that an operator is in the seat before the travel and implement systems will be enabled.

Note: The brakes will not disengage and the implements will not unlock unless the operator is seated or the brake pedal is depressed.

Ground speed lost icon (13) – Ground speed lost icon will turn on whenever the sensor is not read properly. This action could happen because of a sensor issue or GPS does not have a good signal.

Note: Ground speed of the machine displays on the Information Display in appropriate performance pages when features requiring the GPS ground speed sensor are enabled.

Implement Lockout (14) – This indicator is illuminated when the implement lockout is activated.

Ladder Down (15) – This indicator alerts the operator when the ladder is in the DOWN position.

Engine Failure/Malfunction (16) – This indicator is illuminated when the engine operation is malfunctioning severely or engine failure is imminent. Stop the machine immediately.

Single Tilt (17) – This status indicator is illuminated when a dual tilt machine is placed into single tilt mode.

Additional Indicators

Seat Belt – This indicator illuminates and an audible alarm will sound to indicate that the seat belt needs fastened.

Gauges

Hydraulic Oil Temperature (3) – The gauge indicates the temperature of the hydraulic oil in the hydraulic oil sump for the steering and implement circuits. If the gauge needle reaches the red zone, the touchscreen information display will display a warning. If necessary, reduce the load that is on the machine until the hydraulic oil temperature decreases. Move the implement cylinders without a load, or clean the hydraulic oil cooler.

Engine Coolant Temperature (4) – The water temperature regulator regulates the coolant temperatures. This gauge indicates engine coolant temperature. If the gauge needle reaches the red zone, the information display will display a warning. Continued operation of the machine during the sounding of the warning alarm or the gauge needle in the red zone may damage the engine.

Fuel Level (6) – The fuel level gauge indicates the amount of fuel that remains in the fuel tank. A gauge needle in the red zone indicates a low fuel level. Refill the fuel tank before the machine is empty of fuel.

NOTICE
Running out of fuel can cause engine damage. Do not continue to operate the machine when critically low on fuel.

Torque Converter Oil Temperature (7) – This gauge indicates torque converter oil temperature. If the gauge needle reaches the red zone, the information display will display a warning. If necessary, reduce the load that is on the machine until the torque converter oil temperature decreases.

Fan Speed

All D10T Track-Type Tractors have a hydraulic fan drive.

Fan speed will vary. The fan speed depends on the following temperatures: inlet manifold air temperature, engine coolant temperature and hydraulic oil temperature. These temperatures rise as the load and ambient temperatures increase. Under the condition of light loads and cooler ambient temperatures, the fan operates at minimum forward speed in order to conserve fuel. As the load and ambient temperatures increase the fan speed increases. Under heavy load and high ambient temperatures, the fan reaches maximum forward speed.

Engine Speed (5)

Do not allow the engine speed to exceed 3150 rpm. Severe engine damage may result.

The following range marks are displayed on the tachometer (5) : White zone, Yellow zone and Red zone.

Engine Speed (White zone) – 0 - 2500 RPM

Engine Speed (Yellow zone) – 2500 - 2700 RPM is only a visual caution. This visual caution indicates that the machine is approaching the Level 2 Warning.

Engine Speed (Red zone) – 2700 - 3500 rpm is a visual warning that immediate action is required. The action is to maintain the engine speed below the maximum allowable engine speed of 3150 rpm. A Level 2 Warning begins at 2700 rpm. A Level 3 Warning starts at 3150 rpm. Apply the service brake in order to reduce engine speed immediately.

Note: See the Topic “Engine Overspeed” in this manual for more information.

NOTICE
Do not exceed 3150 rpm in any situation. Overspeeding when downshifting, going downhill, etc., can result in serious damage to your engine.

Digital Display Window (12)

The digital display window (12) provides readouts that show the following items:

- Operational hours (service hours)
- Selected machine speed and direction
- Programmed forward and reverse machine speeds
- Prelube indication
- Seat belt indication
- Active “Auto Shift” or Auto “Downshift”

Service Hour Meter – This display indicates the total operating hours of the engine. Use the display in order to determine the service hour maintenance intervals.

Note: The service hour meter is visible at all times. The service hour meter displays anytime the engine start switch key is OFF and the battery disconnect switch is ON.

Warning Levels

The operator will be warned of immediate problems with a machine system or impending problems with a machine system by the information display.

The machine monitoring system provides three warning levels. Warning Level 1 requires no immediate action. The first level requires only operator awareness. The system needs attention. Warning Level 2 requires a response to the warning. Change the machine operation or perform maintenance to the system. In all events except engine overspeed, warning Level 3 requires immediate shutdown of the machine. Engine overspeed requires an immediate reduction in engine speed.

The the information display will display a text message for the current highest level active event.

Table 6

Warning Operation						
Warning indications[1]					"Operator Action Required"	"Possible Result" [2]
Warning Category	Front Action Lamp[3]	Rear Action Lamp [4]	Action Alarm SOUNDS	Monitoring Display		
1				X[5]	No immediate action is required. The system needs attention soon.	No machine damage occurs. Minor reductions in machine performance may occur.
2	X Red	X [4]		X[5]	Change machine operation or perform maintenance to the system.	Severe damage to components can occur.
3	X Red	X [4]	X [6]	X[5]	[7]Immediately perform a safe engine shutdown.	Injury to the operator or severe damage to components can occur.

(1) The active indicators are marked with an X.
(2) A possible result, if the operator takes no action.
(3) The lamp is color coded. The lamp flashes at Level 2 and 3.
(4) Rear action lamp flashes at Level 2 and 3.
(5) Information display indicates an active fault.
(6) The action alarm sounds.
(7) Engine overspeed does not require engine shutdown. Engine overspeed requires applying the brake in order to reduce engine speed immediately.

If an action alarm, alert indicator, or Warning occurs, the message will override the screen that was displayed on the information display.

Touchscreen Information Display

Note: Software parameters and specifications are subject to changes without notice.

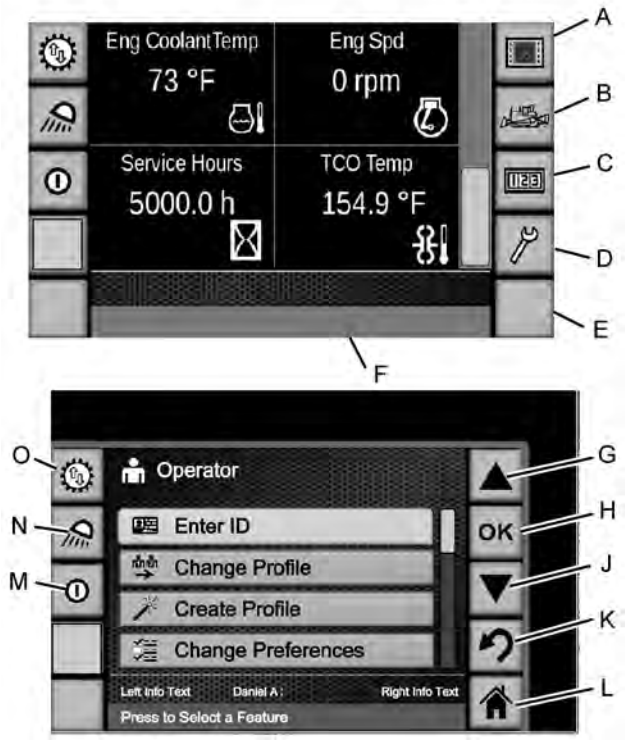


Illustration 130 g03522416

Display (A) – This button is used for selecting the following items: language, screen brightness and units.

Machine (B) – This button is used to select or confirm menu items from the following options: diagnostics, settings, ECM summary and parameters.

Totals (C) – This menu allows the operator to access collected data about machine usage. This button is used for the following purposes: lifetime totals and trip totals.

Service menu (D) – This button is used to configure the selections for the operation of the power train and engine.

Operator (E) – This button opens the operator profile menus (if equipped). Also, use this button to confirm a password entry or use the button to save an operator profile.

Display area (F) – This display area shows the numerous menus and submenus in order to navigate from one screen to another screen. The display area depends on the menu or the submenu that is selected in order to show the information in the system. Examples are system status, operator warnings, and pop-up messages.

Up button (G) – This button highlights upward to the next selected menu item.

OK button (H) – This button opens the selected menu item. Also, pressing the highlighted menu item on the information display opens the selected menu item.

Down button (J) – This button highlights downward to the next selected menu item.

Back button (K) – This button is used to return to the previous screen.

Home button (L) – This button is used to return to the default performance Work Monitor screen.

Functions (M) – This button is used to select additional options for the transmission operation, if equipped.

Work Lights (N) – This button is used to select the active machine lighting.

Bidirectional (O) – This button is used for power train operations such as Auto Shift and Bidirectional shifting.

Note: After all screens with warning messages are acknowledged, the first “Quad screen” will appear. This screen is the default screen.

Pop-up Messages

Pop up messages within the Information Display inform the operator of a pending or immediate machine condition.

Information Pop-ups provide non-safety critical messages to the operator. If multiple information Pop-ups are active, an arrow will appear and indicate so. The operator can press the arrow and page through all active Pop-ups. If the operator has not pressed the arrow for 5 seconds, the display automatically pages through active information Pop-ups, provided no warnings are active. An information Pop-up may be snoozed for 3 seconds.

Table 7

Popup Message	Condition/Action
Event / Diagnostic	
Engine Prelube	Active
Engine Cool Down	ACTIVE / Wait
No Tilt Limiting	Implement ECM

Pop-up Warnings

Illustration 131 g03349115

“Level 1, 2, or 3 Warnings” are pop-up messages that supersede any active information Pop-Ups. A Level 3 Warning (red banner) always supersedes an active Level 2 (or lower) Pop-up. If multiple warnings are active, an arrow appears indicating so. Pressing the arrow enables the operator to page through all active warnings.

A Level 1 Warning may be snoozed for 10 hours. Level 2 Warnings may be snoozed for 1 hour. A Level 3 Warning may be snoozed for 6 minutes.

Home Button

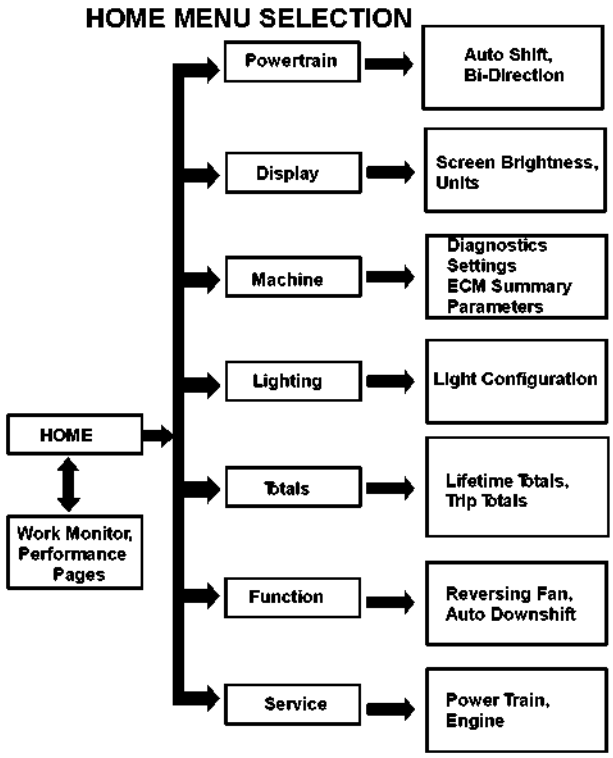


Illustration 132 g03503717

The structure of the information display menu is arranged in a layered list. When the operator selects an option from a menu, the next screen is one level below the previous screen. More selections may be available from the resulting screen. There may also be more than one page of information or options that can be displayed from any level. This action is indicated by the “Arrow” icon. The “Arrow” icon may point in the following directions:

- Up
- Down

The direction depends on the arrangement of the data.

The main menu can be displayed at any time by pressing the “Home” button. At key “ON” , the information display will display CAT logo followed by the “Fluid Level Monitoring” screen. This screen will show until the engine is started or the “OK” button is pressed. Then the information display will go to the first “Performance” screen.

Performance Menu

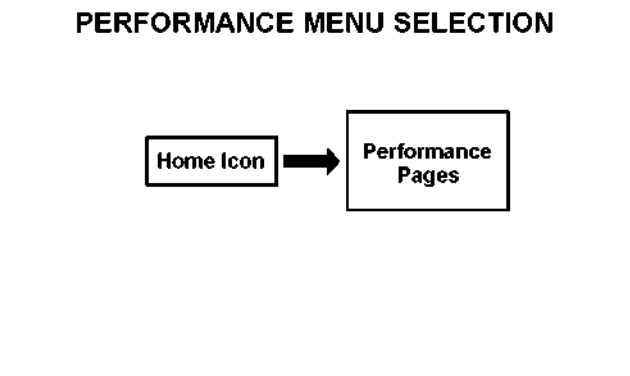


Illustration 133 g03173836

The “Performance” menu allows the operator to view specific machine information. This page monitors critical data from the machine systems during machine operation. This information can only be viewed.

The “Performance” menu option is accessed from the “Home” menu. Also, by pressing the Display icon button at the top right banner the “Quad screen” with four information cells will appear.

The “Performance” menu option allows the user to view the machine parameters that are being monitored. Up to four parameters are displayed on the screen at one time. Double pressing one of the quad cells will allow the user to display other data from a list of optional parameters in each quadrant.

Illustration 134 g03163657

Work monitor screen

Touch the screen below the down arrow on the right banner on the work monitor page. The next performance page will now be displayed. Repeat this action to display the final performance page.

The “Performance” menu uses three screens for the real-time monitoring of the following information:

Table 8

“Quad Screen” (1)	
Machine Slope (%)	Machine Side Slope (%)
Track Speed	Fuel Rate

(1) Double clicking any cell will allow the operator to select from a short list of other optional information.

Table 9

“AutoCarry” (1)(2)
AutoRip(2)

(1) If the machine is equipped with AutoCarry, AutoRip, or GPS, the Work Monitor displays on screen.
(2) Load factor adjustment is available when this function is enabled.

“Settings” Menu

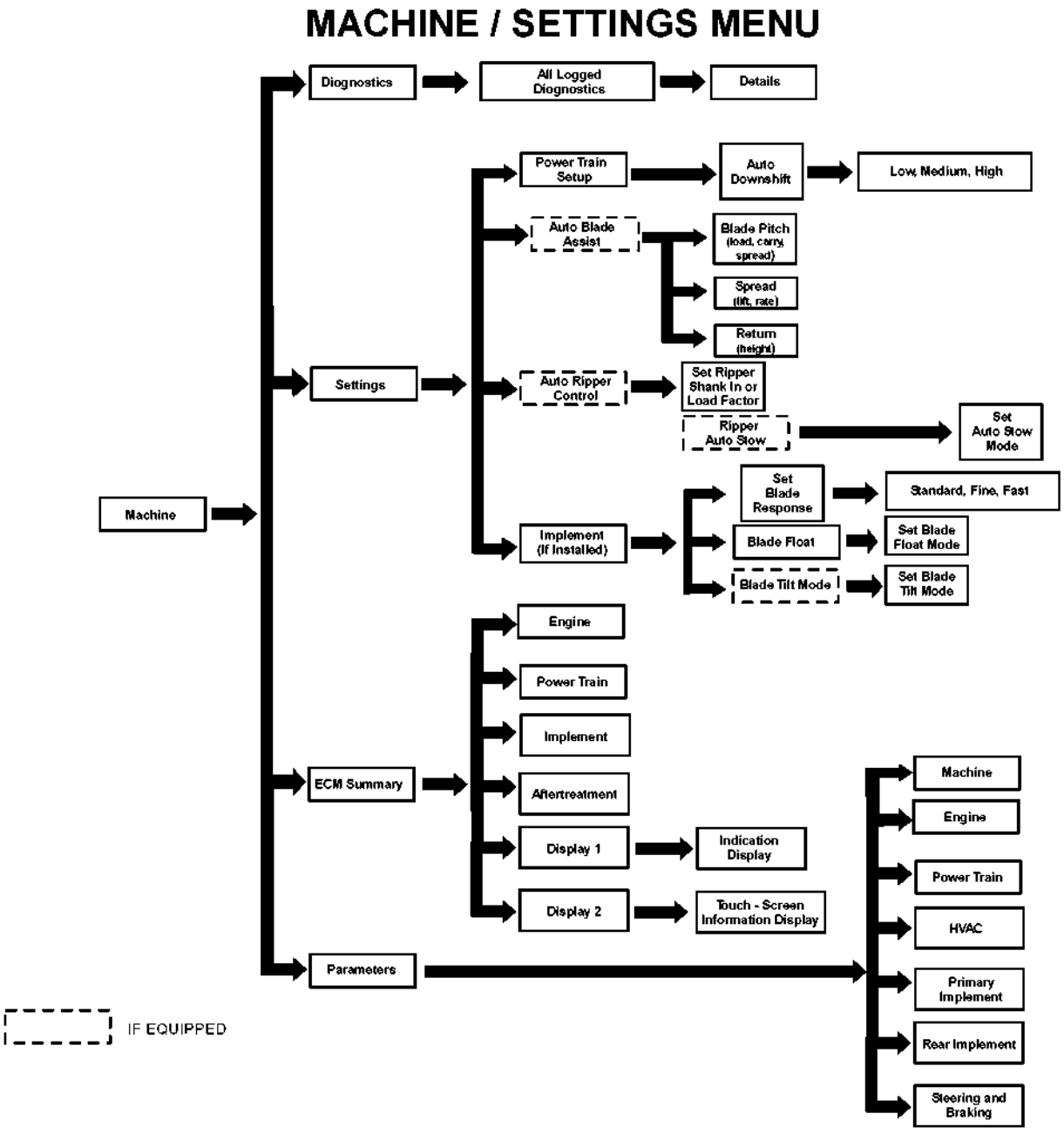


Illustration 135 g03504041

The “Settings” menu option is accessed from the “Main Performance Page” . Press the Machine button on the right banner and the Machine “Settings” options will display on screen.

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

Diagnostics

The “Diagnostics” menu option will show a complete list of all active events, logged events, and diagnostic codes.

Each line that is listed contains the following information about that event or that code.

MID – Module Identifier

Code – Component Identifier and Failure Mode Identifier (CID/MID)

Occ – Number of occurrences

First – Service meter hour of the first occurrence

Last – Service meter hours of the last occurrence

Act – “X” means that the event or the code is currently active.

Logged codes and events that are “Level 1 & 2” are cleared with service password only.

Some “Level 1 & 2” engine events will not be cleared by using the information display.

Note: The information display will require the entry of the service password in order to clear “Level 3” events that are logged. The park brake must also be engaged to acknowledge any level 3 pop-ups.

Settings for the Power Train

From the “power train” menu, use the appropriate arrow button to highlight the desired parameter. Then press the “OK” button. This action will allow access to that parameter screen. Then follow the prompts on the screen in order to adjust the parameter. The parameters in this category relate the operator preferences for operational modes of the power train. The following parameters may be adjusted:

Auto Downshift

- Low
- Medium
- High

Implement Settings

From the Implement Settings menu, use the arrow buttons to highlight the desired parameter. Then press the “OK” button. This action will allow access to that parameter screen. Then follow the screen prompts in order to adjust the parameter. All the parameters in this category relate to the operator preferences for the work tool operational modes. The following parameters may be adjusted:

Blade Response – Standard, fine, fast

Blade Float – Enable or Disable the blade float function (does not depend on machine direction).

Blade Tilt Mode – Dual tilt or single tilt

Quick Drop – Enable or Disable

Ripper auto stow function (If equipped) – The function contains the following components: Ripper raise, ripper shank in and ripper shank out.

Auto Blade Assist (If equipped) – This function performs the following operations: Loading, carrying and spreading.

Blade Pitch – The submenu for the auto pitch feature allows the operator to adjust settings (%) for the current pitch position. If equipped, the operator is allowed to adjust the actual pitch position for each function.

- **Load** - The setting of the dozer blade pitch is positioned when the blade is loading.
- **Carry** - Then setting of the dozer blade pitch is positioned when the machine is in the carry function.
- **Spread** - The setting of the dozer blade pitch is positioned when the machine is in the spread function.

Spread – The spread feature allows the operator to adjust the settings for the blade during the spread.

- **Lift** -The height the blade will lift off the ground at the end of the spread.
- **Rate** - The speed at which the blade will raise during the spread.

Return – The spread at which the blade will raise during the spread.

- **Height** - The height the blade will return to while returning.

These parameters may be adjusted in the same fashion as the adjustable parameters from the Implement Setup menu.

ECM Summary

The “ECM Summary” menu option allows the user to display a list of all the ECM's. Also, the corresponding software part numbers on the machine are provided for the following items.

- Engine
- Power Train
- Implement
- Display 1 (front indication display)
- Display 2 (information display)

Parameters

The “Parameters” menu option allows the operator to view the real-time data (usage) of components in the machine major systems.

Press the Machine menu button from the home menu in the information display and select the Parameters menu option.

From the Parameters Menu, use the appropriate arrow button in order to highlight the appropriate function. Then, press the “OK” button in order to access the information for particular system. The following categories are available.

- Machine
- Engine
- Power train
- HVAC
- Primary implement
- Rear implement
- Steering and brake

Note: Items are not configurable from the Parameters menu.

Totals Menu Option

Totals – The “Totals Menu” menu option is entered by pressing the “Totals” button on the “Main Performance Page” . On the Totals page, press “Lifetime Totals” and select the Lifetime Totals information that is desired.

The “Totals” display allows the operator or the serviceman to access lists of collected data about machine systems. This data is useful in order to determine when service work needs to be performed.

Use the appropriate arrow button to highlight the desired category. Then, press the “OK” button. Use the “Totals” information in order to view the totals in each category only. This information may not be changed using the information display.

The following information may be viewed by using the “Lifetime Totals” screens.

Distance Travelled “km/mi”

- Total forward travel distance
- Total reverse travel distance

Fuel Consumption

- Total fuel consumed “Gal or L”
- Total maximum fuel “Gal or L”
- Total idle fuel “Gal or L”
- Average fuel consumption rate “Gal/hr or L/hr”

Idle Modes

- Total idle engine time “Machine hrs”

Operator Menu

Illustration 136 g03504137

When the operator menu button (E) is pressed, the Operator ID can be selected (if equipped).

Operator ID

This screen displays the “Operator ID” . Press the “OK” button in order to set the operator ID. A listing of VIMS events that have occurred can be displayed with the particular ID.

Note: The “Home Menu” can be displayed from any screen by pressing the Home button.

Service Menu

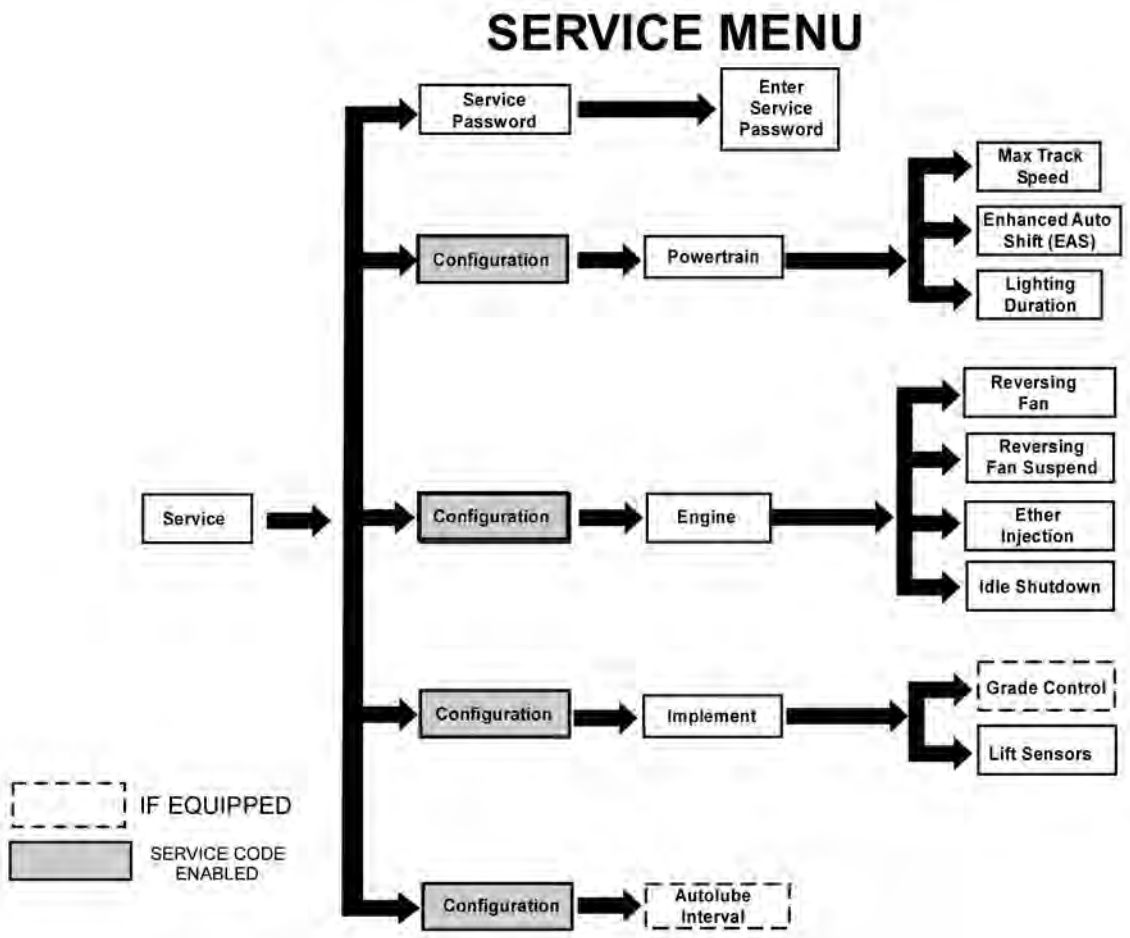


Illustration 137 g03504217

The “Service” menu option is entered by pressing the “Service” button on the “Main Performance Page” . On the Service page, press Configuration to highlight in yellow.

Service Button – This button is on the main performance page.

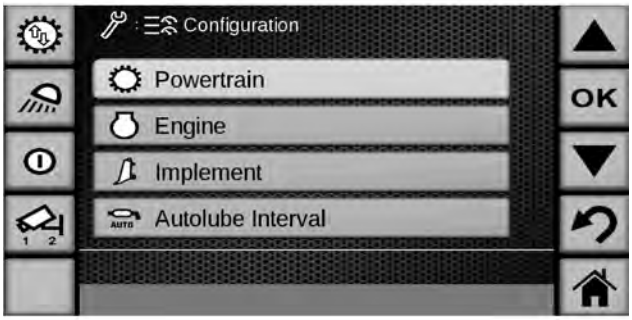


Illustration 138 g03535017

Configuration list screen

- Press the “OK” button and advance to the “Configuration List” page.

- Use the “Up” and “Down” buttons to scroll to the desired configurable item.
- Select and press an item to view the configurable options and adjust settings.

The Service Menu contains the following four categories.

- Power train
- Engine
- Implement
- Autolube interval

Service Password

The “Service Mode” menu is used in order to access the password protected menu options. The “Service Mode” protects certain features from access by the operator. Features that are protected from the operator can be enabled or disabled with a password.

Note: A password may be required or a password may not be required. This action depends on the settings that have been made in Cat ET.

A Service Tool must be used to program the password into the display. The password cannot be changed within the Information Display.

The menu option for a Service Password allows the technician to enter a service password of five digits. This password allows the display of the “Configuration” options from the “Service” menu. Then, access to the options is allowed.

Power Train Configurations

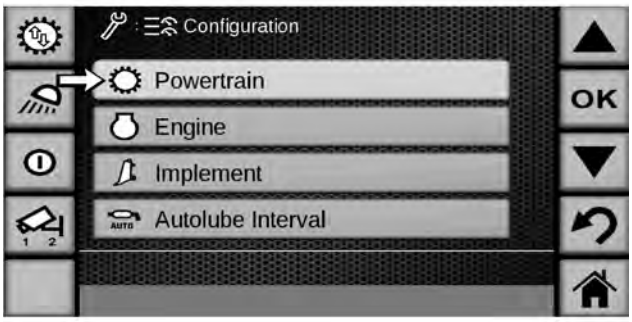


Illustration 139 g03533118

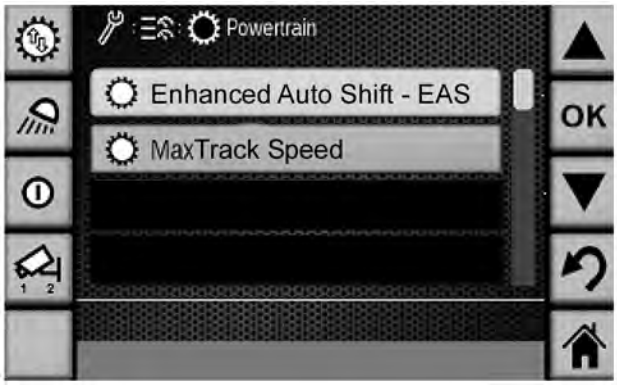


Illustration 140 g03504481

Power train configuration screen

Illustration 141 g03499837

Using the information display select from the main performance page: Service, Configuration, Power train. Select and press **“Enhanced Auto Shift”** . Select “Enabled or Disabled” status.

Back Button – Press the Back button to return to the previous menu.

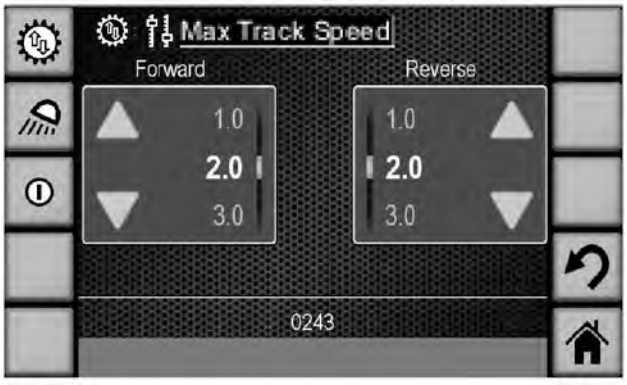


Illustration 142 g03499857

"Transmission maximum speed" screen

Using the information display select from the main performance page: Service, Configuration, Power train. Select and press **"Max Track Speed"** .

- Select a speed using up/down arrows to scroll through the list of available choices.
- When the desired speed appears centered in the list, the value will automatically be programmed by waiting momentarily for the value to turn white. This action means that the value has been accepted.

The operator machine speed may never exceed the owner set maximum machine speed.

Note: The maximum machine speeds will not protect against engine overspeed. Engine overspeed must still be managed through traditional methods.

Engine Configurations

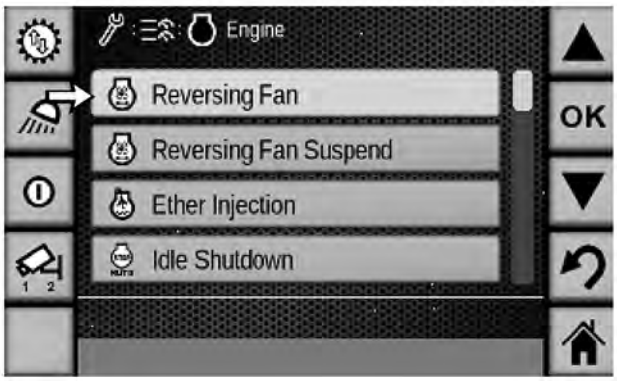


Illustration 143 g03348708

Engine configuration screen

Using the information display select from the main performance page: Service, Configuration, Engine. Select and press **"Reversing Fan"** .

Reverse Fan Function (If equipped) – The settings for reversing the fan are Purge "Interval" , Purge "Duration" , and "Extended Fan Purge."

The "Extended Fan Purge" button activates the fan purge function while the switch is in the "ON" position. This "Extended Fan Purge" will not time out. This selection ignores the preset duration value. Push the button again to deactivate the fan purge.

"Reversing Fan Suspend" and "Engine Idle Shutdown" can be configured to "Enabled or Disabled" status.

"Ether Injection" can be configured to "Not Installed or Installed" status.

Implement Configurations

If equipped, the following attachments may be "Enabled or Disabled" using the same process for selection.

- **Grade Control System Enable Status**

If equipped, the following lift sensors may be configured to "Installed or Not Installed" status.

- **Left lift cylinder position sensor**
- **Right lift cylinder position sensor**

Listing of Abbreviations and Terms

The information display and indication display use abbreviations when the display area shows the information inputs. The following table describes the abbreviations in full terminology.

Table 10

Abbreviation and Term For the Information Display	
Abbreviation	**Term**
ABA	Auto Blade Assist
act	active
autocal	automatic calibration
aux	auxiliary
bi-dir	bidirectional
bld	blade
cal	calibration
ctrl	control
cur	current
cyl	cylinder

(continued)

(Table 10, contd)

Abbreviation and Term For the Information Display	
Abbreviation	**Term**
DC	direct current
degrs	degrees
dist	distance
ecm	electronic control module
eng	engine
exten	extension
f	forward
fil	filter
filt	filter
forwrd	forward
freq	frequency
ft	feet
ftlb	foot pound
Gal	US Gallon
Gal/Hr	“US Gallons / Hour”
hi	high
hrs	hours
hyd	hydraulic
IGal	Imperial Gallon
IGal/Hr	“Imperial Gallons / Hour”
imp	implement
in	inch
in/sec	“inches / second”
init	initialization
km	kilometer
kPa	kilopascal
KPH	“Kilometers / Hour”
kpig	“kilometers / Imperial gallon”
kpl	“kilometers / liter”
L	Liter
L/Hr	“Liters / Hour”
lt	left
m	Meter
max	maximum
Mi	Miles
min	minimum

(continued)

(Table 10, contd)

Abbreviation and Term For the Information Display	
Abbreviation	**Term**
mm	millimeter
mm/s	“millimeters / second”
mpg	“miles / US gallon”
MPH	“MILES / HOUR”
mpig	“miles / Imperial gallon”
n	neutral
Nm	Newton meter
occ	occurrence
p/n	part number
pos	position
pres	pressure
press	pressure
PSI	Pounds per square inch
ptrain	power train
pwr	power
r	reverse
rel	release
ren	renewal
req	required
ret	return
rev	reverse
rpm	revolutions per minute
rt	right
scrn	screen
sec	Second
secs	seconds
seg	segment
set	setting
shkin	shank in
shkout	shank out
snr	sensor
snsr	sensor
sol	solenoid
spd	speed
stat	status

(continued)

(Table 10, contd)

Abbreviation and Term For the Information Display	
Abbreviation	**Term**
std	standard
steer	steering
sw	switch
tc	torque converter
tco	torque converter output
temp	temperature
term	terminal
trans	transmission
V	volt

i05559830

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 system may include one, two, or three cameras, depending on the type of machine and the application.

This system operates in the “automatic” mode by design. The screen remains dark until the machine is placed in the REVERSE gear for a one camera system.

A two camera system works in the following manner:

- In a forward gear the camera shows a narrow angle view of the ripper tip.
- In reverse gear the camera shows a wide angle view.

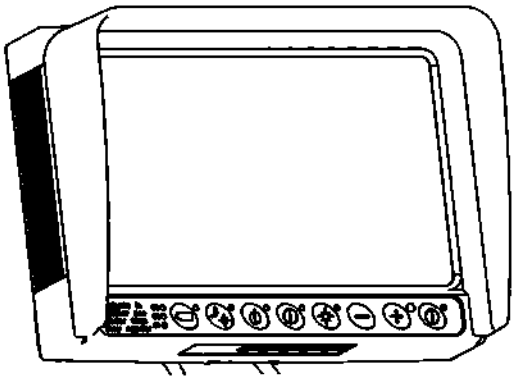


Illustration 144 g01223034

Display for WAVS

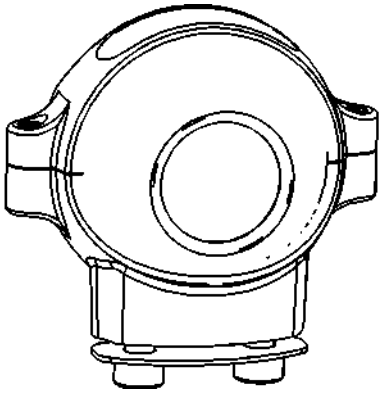


Illustration 145 g01223051

Camera for WAVS

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

Note: Rear facing cameras should always be set to the mirror image configuration.

Upon power up of the monitor, the following will appear in the upper left-hand corner: “REAR1 M” . The monitor may switch from C1 to C2. The switch to C2 can occur when the tractor is in reverse, regardless of whether the tractor has either one or two cameras. If the monitor switches from C1 to C2, the following will appear in the upper left-hand corner: “CHNL 2 M” . If “CHNL 2” is displayed instead of “CHNL 2 M” , contact the technical communicator at the Cat dealership for proper adjustments to the monitor.

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, the display is positioned to provide clear visibility of the display from the operator seat. Do not operate the machine with a display that causes the following conditions:

- Covers any safety messages or other important information.
- Impedes the entry to the cab or impede the exit from the cab.
- Obstructs the visibility of the operator.
- Obstructs the view of any indicators, gauges, or monitoring system.
- Impairs 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. Also, see Special Instruction, REHS3120, “WAVS Installation Guide for Generic Applications” and Special Instruction, REHS7242, “WAVS Generic Installation Guide for Certain Cat® Products”.

i07742538

Product Link

SMCS Code: 7606

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

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

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

Data Broadcasts

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

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

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

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

Operation in a Blast Site for Product Link Radios

WARNING

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

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

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

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

i07680862

Operation Information

SMCS Code: 7000

To prevent injury, make sure that no maintenance work is being performed on the machine or near the machine. Keep the machine under control at all times in order to prevent injury.

Clear the Hazard Range of the Machine

WARNING

Flying Debris Hazard! During operation of the machine, flying debris could be discharged from the tracks which could result in personal injury or death. Keep a safe distance from the machine during operation.

Check the surrounding area around the machine (the hazard range of the machine):

- No personnel around the machine
- No personnel on the machine outside the cab

Reduce the engine speed when you maneuver the machine in tight quarters or when you break over a rise.

Select the gear that is necessary before you start the downgrade. Do not change gears when you are going downhill.

When you drive down a grade, use the same gear that is used for driving up a grade.

Note: If equipped, a machine with a hydraulically operated access ladder is 0.5 m (1.64 ft) wider over the fenders.

NOTICE
Avoid hitting tall obstructions. Severe damage to the ladder can result.

Changing Direction and Gear

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

Gear changes and directional changes at full engine speed are possible. However, deceleration and/or braking is recommended when you change direction. This action will maximize operator comfort and the service life of power train components.

1. Push the decelerator pedal downward in order to decrease the engine speed.

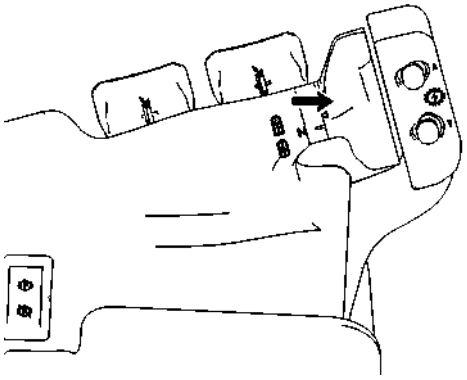


Illustration 146 g01056752

2. Rotate the directional control to the desired direction.

3. Push the upshift or downshift to the desired gear.

4. Increase the engine speed by releasing the decelerator pedal.

Normal Steering

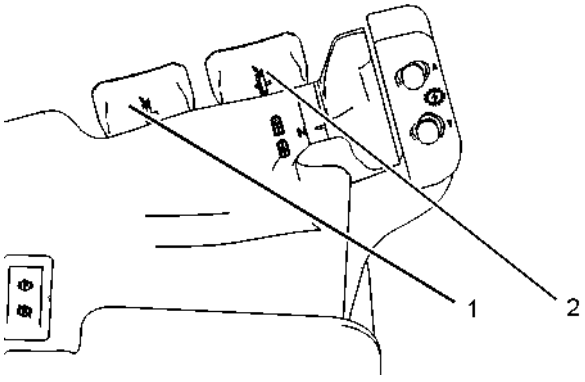


Illustration 147 g01056754

Pull the right steering clutch/brake lever (2) toward the rear of the machine in order to make a gradual right turn.

Pull the lever until the lever stops in order to make a sharp right turn. This action applies the right brake.

Pull the left steering clutch/brake lever (1) toward the rear of the machine in order to make a gradual left turn.

Pull the lever until the lever stops in order to make a sharp left turn. This action applies the left brake.

Note: When the machine is under load, use the bulldozer blade tilt lever in order to aid steering. This technique allows equal power to be maintained by both tracks against the load.

Steering on a Steep Downgrade

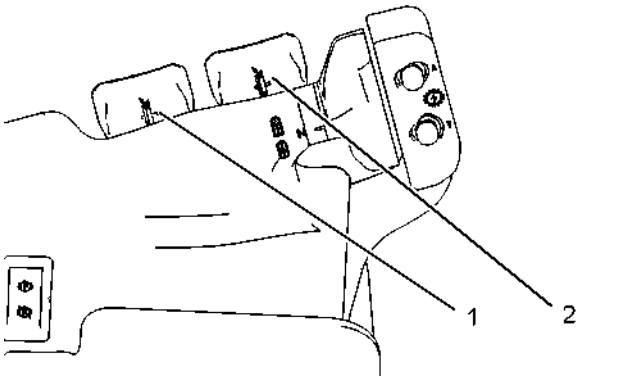


Illustration 148 g02174579

“Cross-steering” is a gradual turn that is made on a steep downgrade. The turn is accomplished by declutching without braking.

To make a gradual right turn, pull back the left steering clutch/brake lever (1) (cross steering) to the detent. This action releases the left steering clutch.

To make a sharp right turn, pull back the right lever (2) against the stop. This action applies the right brake (normal steering).

To make a gradual left turn, pull back the right steering clutch/brake lever (2) (cross steering) to the detent. This action releases the right steering clutch.

To make a sharp left turn, pull back the left lever (1) against the stop. This action applies the left brake (normal steering).

To make a long gradual turn, you should make a correction that is short in duration. This exercise is especially true for roading the machine. This method improves brake life.

i07499175

Battery Disconnect Switch

SMCS Code: 1411

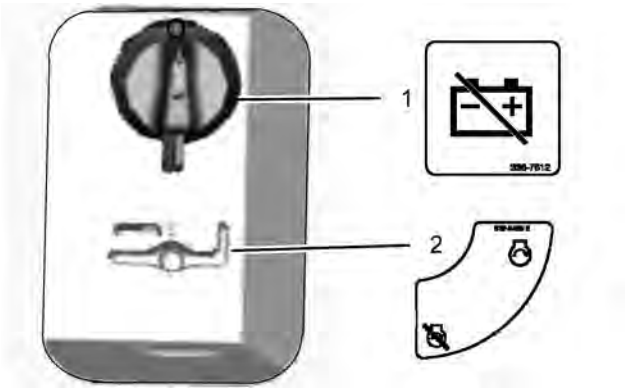


Illustration 149 g03504790

(1) Battery disconnect switch (electrical system)
(2) Engine lockout switch (engine starter)

The battery disconnect switch is on the left side of the machine behind the hood support and next to the cab door.

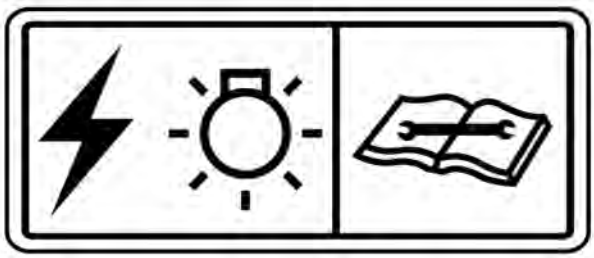


Illustration 150 g03796564

NOTICE
Do not conduct any service procedures on the DEF system until the DEF purge indicator lamp is not illuminated. The indicator lamp may remain illuminated for several minutes, even though the battery disconnect switch is OFF and the engine start switch is OFF. When the indicator lamp is on, the DEF system is still powered.

Battery Disconnect Switch (Electrical System)

ON – To activate the electrical system, turn battery disconnect switch (1) clockwise. Engine lockout switch (2) must be turned ON before you start the engine.

OFF – To deactivate the electrical system, turn the battery disconnect switch (1) counterclockwise.

Battery disconnect switch (1) operates differently than engine lockout switch (2). When battery disconnect switch (1) is in the OFF position, the electrical system is disabled. When the engine lockout switch is turned OFF and the battery disconnect switch is turned ON, the battery remains connected to the entire electrical system.

Turn the battery disconnect switch OFF when you service the electrical system or other components on the machine.

Turn the battery disconnect switch OFF if you do not operate the machine for a month or more. This action will prevent drainage of the battery. Lock the disconnect switch.

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

Checking the Battery Disconnect System

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

Perform the following procedure to check the battery disconnect system.

1. With the battery disconnect switch in the ON position, verify that electrical components in the operator compartment are functioning. Verify that the hour meter is displaying information. Verify that the engine will crank.
2. Turn the battery disconnect switch to the OFF position.

3. Verify that the following items are not functioning: electrical components in the operator compartment, hour meter, and engine cranking. If any of the items continue to function with the battery disconnect switch in the OFF position, contact your Cat dealer.

Fire Suppression System-Battery Disconnect Switch

In the event of a power disruption, the (optional) factory installed fire suppression system will remain activated by the fire suppression system battery backup. Also, when the machine battery disconnect switch is in the OFF position, the fire suppression system will remain powered by the fire suppression system backup battery.

i05534742

Engine Lockout Switch

SMCS Code: 1000; 7000

The engine lockout switch allows the engine to be safely locked out while service is performed.

When the engine lockout switch is OFF, the following conditions exist:

- The engine starter key switch is disabled.
- 24 V power remains connected to the engine starters.
- The battery remains connected to the electrical system.

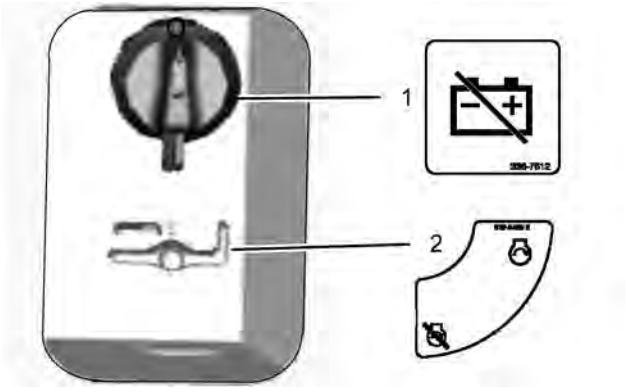


Illustration 151 g03504790

(1) Battery disconnect switch (reference)
(2) Engine lockout switch

The engine lockout switch (2) is located on the left side of the machine behind the hood support and next to the cab door.

ON – To activate the engine starter, turn engine lockout switch (2) clockwise. Engine lockout switch (2) must be turned to the ON position before you start the engine.

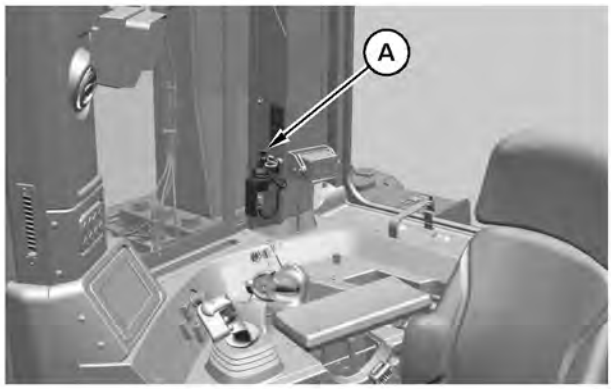
OFF – To deactivate the engine starter, turn engine lockout switch (2) counterclockwise to the OFF position.

When engine lockout switch (2) is OFF, the machine cannot be turned on. The electrical systems are still ON when the engine lockout switch is OFF.

i07163255

Engine Shutdown Switch

SMCS Code: 1259; 7418-ZS



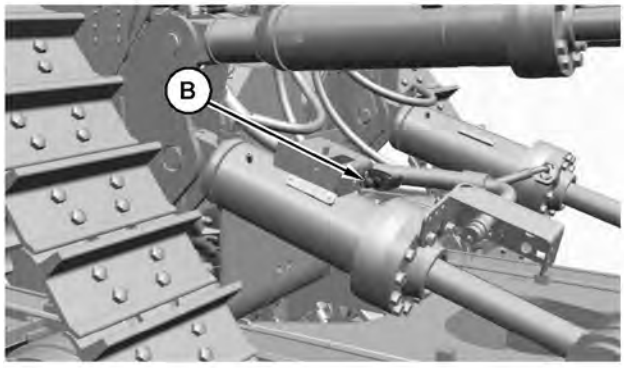


Illustration 152 g06200773

Note: When the fire suppression system is actuated, either through the in-cab display module or the manual actuators (A) and (B), the engine will shut down automatically.

Engine Starting

i05534756

Engine Starting

SMCS Code: 1000; 7000

Battery disconnect switch (1) and the engine lockout switch (2) are located on the left side of the machine behind the hood support and next to the cab door.

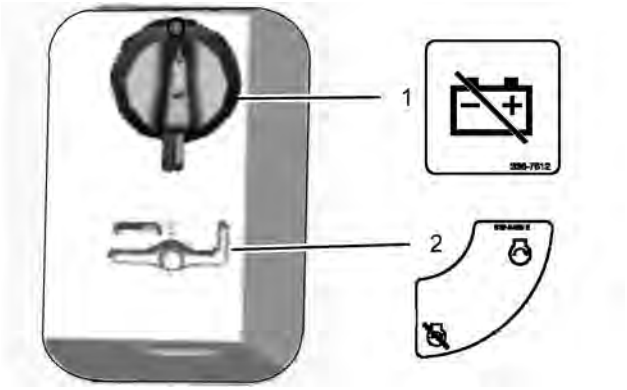


Illustration 153 g03504790

(1) Battery disconnect switch
(2) Engine lockout switch

ON – To activate the system, turn the switch clockwise to the ON position. Engine lockout switch (2) must be turned to the ON position before you start the engine.

OFF – To deactivate the system, turn the switch counterclockwise to the OFF position.

1. Turn battery disconnect switch (1) to the ON position. Make sure that engine battery disconnect switch (2) is in the ON position (engine starter).

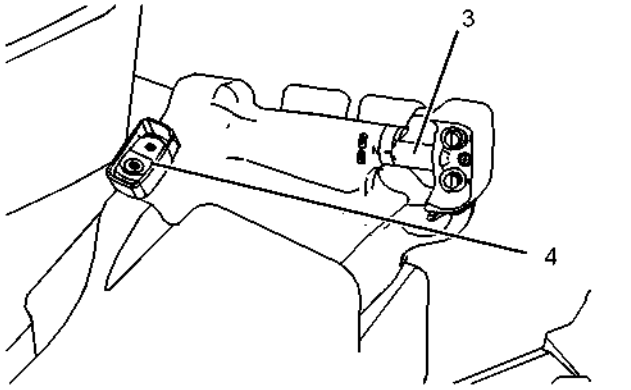


Illustration 154 g03505870

2. Move direction selector (3) to the NEUTRAL position.

3. Engage the parking brake (4).

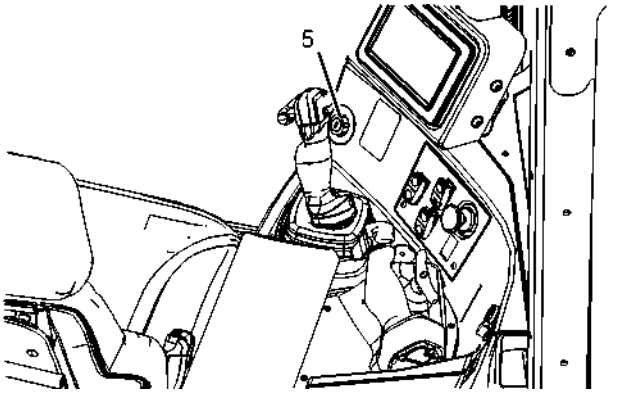


Illustration 155 g03505850

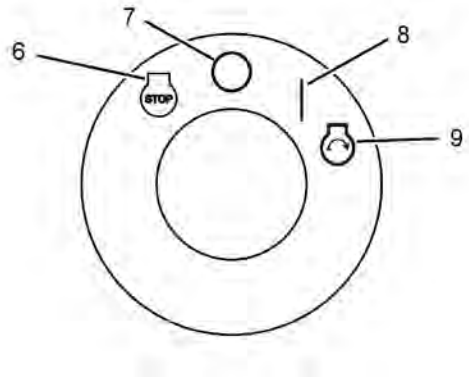


Illustration 156 g03505893

Ignition Keyswitch

(6) Engine Forced Shut down -Stop
(7) Off
(8) On
(9) Start

4. Turn engine start switch key (5) to the ON position (8). The monitoring system performs an automatic self test. The action alarm sounds and all of the indicator lights come on briefly.

   The indicator light for the parking brake stays on until the parking brake is released.

   If the system detects a fault, check the electrical system. Make all of the necessary repairs before you start the engine.

⚠ WARNING

If the action alarm does not sound during this test or machine monitoring displays are not functioning, do not operate the machine until the cause has been corrected. Machine operation with faulty action alarms or displays could result in injury or death as any Warning Category 3 notifications will not be relayed to the operator.

5. Turn engine start switch key (5) to the START position (9). Crank the engine. Release the key when the engine starts.

See the Topic “Starting With Engine Prelubrication System”. This article is located in the “Engine Starting” section of this manual.

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starter to cool for two minutes before cranking again. Turbocharger damage can result if the engine rpm is not kept low until the oil gauge display verifies that the oil pressure is sufficient.

Ether Starting Aid

For starting below the approximate temperature of −1 °C (30 °F), the use of the ether starting aid is automatic. Continue the procedure for Engine Starting.

For starting below −18°C (0°F), the use of the cold weather starting aids is recommended. A fuel heater, a jacket water heater, and extra battery capacity may be required.

At temperatures below −23°C (−10°F), consult your Cat dealer. For information on starting the engine in cold weather, refer to the Operation and Maintenance Manual, SEBU5898, “Cold Weather Recommendations for all Caterpillar Machines”.

i05534921

Engine Starting with Prelubrication System

SMCS Code: 1000

1. Move the transmission direction control lever to the NEUTRAL position.
2. Engage the parking brake.
3. Move the attachment control levers to the HOLD position.
4. Turn the battery disconnect switch to the ON position. The battery disconnect switch is located on the left side of the machine behind the hood support and next to the cab door .
5. Turn the key start switch to the START position. Hold the key in the START position. The prelubrication system is now activated. When the oil pressure is adequate, the prelubrication system will disengage. **The system will automatically start the engine.**
6. When the engine starts, release the key start switch.

Note: The engine prelubrication can be bypassed. Turn the key to the ON position. Then turn the key to the OFF position and immediately turn the key to the ON position.

i02277511

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE
Keep engine speed low until the engine oil pressure registers on the gauge or the engine oil indicator light goes out.

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

1. Allow a cold engine to warm up at low idle for at least five minutes. Engage the implement controls and disengage the implement controls in order to warm up the hydraulic component.

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

2. Look at the hydraulic oil tank and the transmission oil levels. Maintain the oil levels to the “FULL” marks.

3. Frequently look at the action light and the gauge display during operation.

Elevated Low Idle

If the jacket water coolant temperature is less than 70 °C (158 °F),the ECM will set cold start conditions. The brakes must be applied and the machine must be in low idle. The system will activate after ten minutes. Low idle RPM may be increased to 1000 RPM, and engine power will be limited. Ether may be injected by the ECM, if necessary. Cold Mode will be deactivated when the engine is above 60 °C (140 °F) or after 14 minutes of running.

Elevated low idle can be disabled by placing the transmission in gear from neutral or by releasing the parking brake. Cold Mode may reactivate if the temperature conditions still exist, and the transmission is not in gear. Cold Mode also varies the fuel injection amount and timing for white smoke limiting.

Adjustments

i05534940

Tracks

SMCS Code: 4170

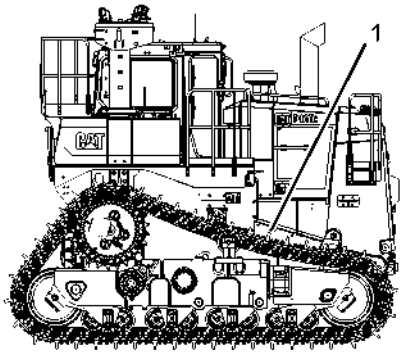


Illustration 157 g03505936

Adjust the tracks (1) on both sides of the machine.

NOTICE
If tracks are too tight or loose, wear of components is accelerated.

If they appear too tight or too loose, adjust the track.

Follow the procedures in the Maintenance Section for adjustment.

Parking

i02206882

Stopping the Machine

SMCS Code: 7000

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

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

1. Apply the service brakes in order to stop the machine.

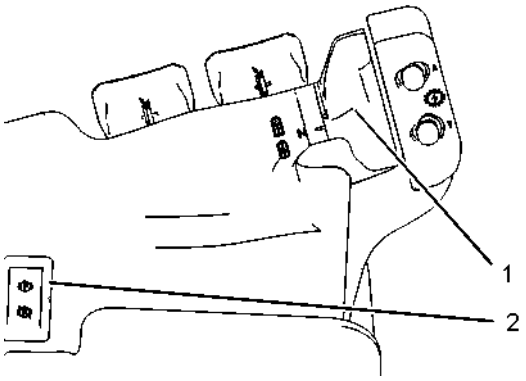


Illustration 158 g01056770

2. Move the transmission control (1) to NEUTRAL.

3. Engage the parking brake switch (2).

4. Lower the dozer blade and lower all of the attachments to the ground. Apply slight downward pressure.

i05534965

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.

See the following stopping procedure, to allow the engine to cool, and to prevent excessive temperatures in the turbocharger center housing, which could cause oil cooking problems.

1. Stop the machine. Push down on the bottom of engine speed switch (2) in order to put the engine speed to “LOW IDLE” .

Note: This step (low idle) can be performed automatically with the delayed engine shutdown feature.

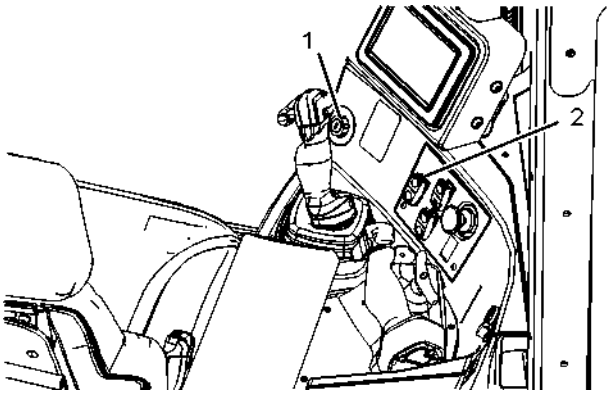


Illustration 159 g03505945

2. Run the engine for 5 minutes at LOW IDLE.

3. Turn engine start switch key (1) to the OFF position. Remove the key.

i05952668

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

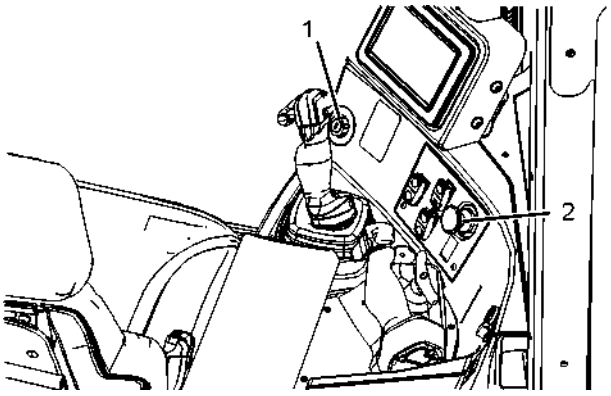


Illustration 160 g03505954

Turn engine start switch key (1) to the OFF position. If the engine does not stop, perform the following procedure.

Open the access door at the front left-hand side of the fuel tank. Turn the red handle of the fuel shutoff valve in order to shut off the fuel supply.

Press the secondary engine stop button (2) to ON (Closed). This button is located in the cab on the right console.

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

i05535022

Equipment Lowering with Engine Stopped

SMCS Code: 7000

Machines with Electrical Power

Before you lower any equipment with the engine stopped, clear the area around the equipment of all personnel.

Turn the ignition key to the ON position. Press the lower portion of the implement shutoff control in order to activate the NOT LOCKED OUT implement function.

Operate the control levers for the bulldozer and the ripper in order to lower the bulldozer and the ripper.

Machines without Electrical Power

Before you lower any equipment with the engine stopped, clear the area around the equipment of all personnel.

1. Relieve the pressure in hydraulic tank by slowly removing the hydraulic tank cap.

2. Remove the floorplate that is located in the front of the cab under the floor mat.

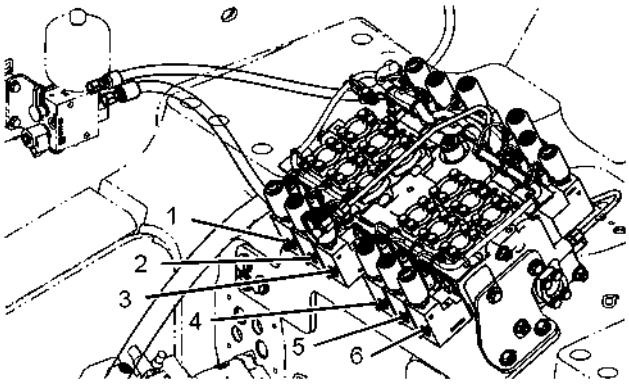


Illustration 161 g03507674

Dual tilt, lift, and ripper control valve

(1) Right dozer lift
(2) Right dozer tilt
(3) Ripper lift
(4) Ripper tip
(5) Left dozer tilt
(6) Left dozer lift

3. Remove the outlet fitting from the appropriate control valve, as shown.

4. Install the 245 - 1737 Hex Bolt into the outlet fitting port. Slowly turn the threaded bolt in the clockwise direction to move the implement downward.

Note: Make sure that the valve is opened slowly. This action is important for if the valve is opened too quickly, the implement may fall to the ground rapidly.

5. Once the implement is resting on the ground, rotate the threaded bolt counterclockwise. Remove the threaded bolt.

6. Install outlet fitting into the control valve. Make sure that the seal is tight.

7. Install the threaded hex bolt in the case drain manifold.

8. Install the floorplate.

9. Install the hydraulic oil tank cap.

i05535310

Leaving the Machine

SMCS Code: 7000

Park on a level surface. If you must park on a grade, point the blade downhill.

Apply the service brake in order to stop the machine. Move the transmission control lever to NEUTRAL position and the speed control to LOW IDLE position. Engage the parking brake switch.

Lower all implements to the ground.

Stop the engine.

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

Turn the battery disconnect switch to the OFF position.

1. When you dismount, use the steps and the handholds. Use both hands and face the machine.

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

3. Remove all flammable debris from the front bottom guard in order to reduce the fire hazard.

4. If the machine is parked overnight, turn off the disconnect switch.

Note: Light for dismounting may be provided by leaving the switch for the fender flood light on when you shut off the engine. This action will leave the fender flood light on for a period. Then, the lights will automatically shut off.

5. Install all the locks.

Padlocks are provided for the following areas:

- Engine Enclosures
- Radiator Cap
- Oil Filler Cover
- Cover for the Dipstick
- Battery Box and Master Switch Cover
- Compartment for the Washer Fluid Bottle
- Fuel Cap
- Fuel Drain
- Bulldozer Control Lever
- Ripper Control Lever
- Hydraulic Tank Cap
- Operation and Maintenance Manual Compartment on the Seat

6. Lock the cab, if equipped.

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

i01671778

Shipping the Machine

SMCS Code: 7000; 7500

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance if the machine that is transported has a ROPS, a cab, or a canopy.

Remove ice, snow, or other slippery material from the loading dock and from the transport machine before you load the machine. This will help to prevent slippage of the machine. This will also help to prevent a shift while the machine is moving in transit.

Obey the appropriate laws that govern the parameters of the load (weight, width, and length).

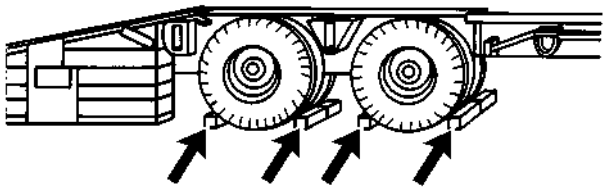


Illustration 162 g00863991

Properly chocked trailer wheels

1. Chock the trailer wheels or the rail car wheels before you load the machine.
2. After the machine is positioned, connect the steering frame lock in order to hold the front frame and the rear frame in place.
3. Lower the bucket or the work tool to the floor of the transport vehicle. Move the transmission control to the NEUTRAL position.
4. Engage the parking brake.
5. Turn the engine start switch to the OFF position. Remove the engine start switch key.
6. Move all of the control levers in order to relieve any trapped pressure.
7. Turn the battery disconnect switch to the OFF position. Remove the battery disconnect switch key.
8. Lock the door and the access covers. Attach any vandalism protection.
9. Secure the machine, any equipment, and any tools with adequate tie-downs in order to prevent movement during shipping.
10. Cover the exhaust opening. The turbocharger (if equipped) should not rotate when the engine is not operating. Damage to the turbocharger can result.

i07391145

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

⚠ WARNING

Improper lifting and improper tie-downs can allow the load to shift or fail and cause injury or damage. Use only properly rated cables and slings with lift and tie down points provided.

Follow the instructions in Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for the proper technique for securing the machine. Refer to Operation and Maintenance Manual, "Specifications" for specific weight information.

NOTICE
Improper lifting or tiedowns can allow load to shift and cause injury or damage.

Engage the parking brake before you sling the machine and before you secure the machine with tie-downs.

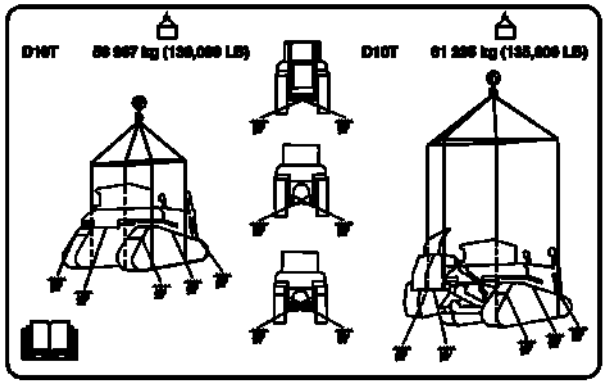


Illustration 163 g03506262

This message is located on the right-hand fender of the machine below the step.

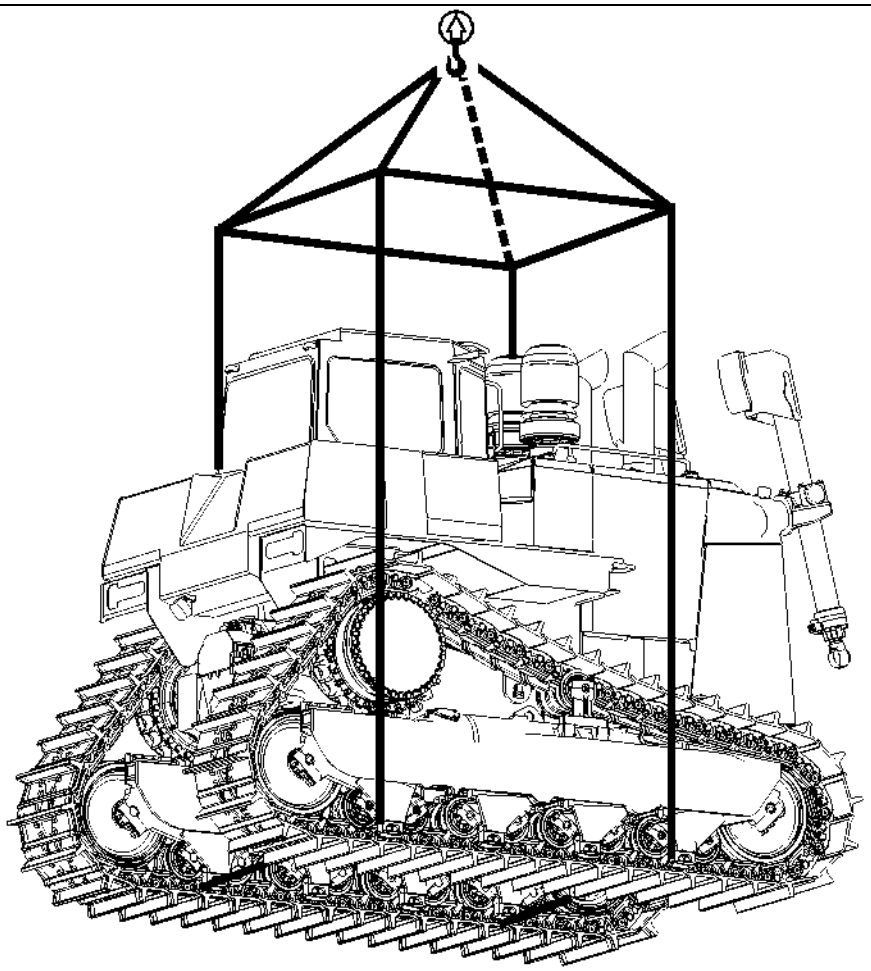


Illustration 164 g06305922

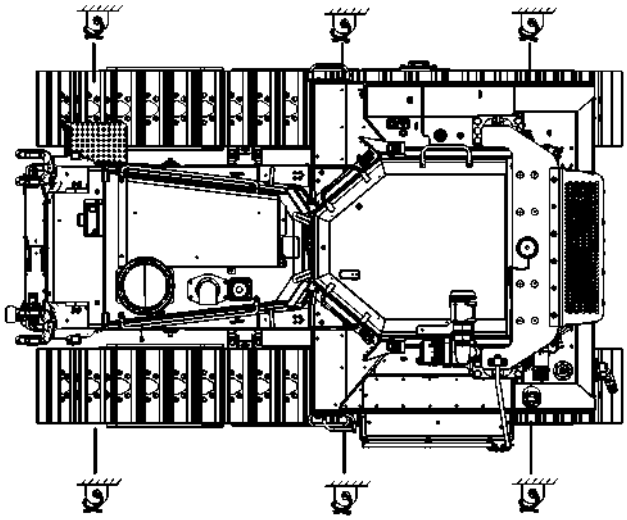


Illustration 165 g06313685

Tie down points

Note: Do not use handles, steps, or sweeps to lift or tie down the machine.

1. The approximate machine shipping weights are found in the Operation and Maintenance Manual, “Specifications”.

Note: Significant deviations from the standard shipping weight can affect shipping or lifting the machine. Some examples of these deviations are listed below:

- Different implements
- Additional fuel
- Wider track shoes
- Tracks with accumulated mud

2. The parking brake must be engaged before you sling the machine. Engage the parking brake before you secure the machine with tie-downs.

3. Use properly rated cables and use properly rated slings for lifting. For a machine without a ripper, position the slings beneath the front of the track and beneath the rear of the track. For a machine with a ripper, position the slings beneath the front of the track and under the ripper at the rear of the machine.

4. On sharp corners, use corner protectors. The crane should be positioned so that the machine may be lifted in a level plane. The spreader bars should be wide enough to prevent contact with the machine.

5. Locations for Tie-downs

- Inside the track shoes.
- Use the inside edge of the track shoe for the side tie-downs.
- Use the drawbar, the ripper, or the outer edge of the track shoe for the rear tie-downs.

Check the state laws and the local laws that govern the following load characteristics.

- Weight
- Width
- Length
- Height

Move the hydraulic activation control lever to the LOCKED position.

Consult your Caterpillar dealer for shipping instructions for your machine.

Towing Information

i05537777

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.

WARNING

Personal injury or death can result from worn wire rope cable.

Worn or frayed cable could break causing injury.

Check the wire rope cable. If cable is worn or is frayed install a new cable.

This machine is equipped with spring applied brakes. These brakes are also oil pressure released brakes. If the engine or the system for pressure oil is inoperable, the brakes are applied and the machine cannot be moved. The machine can be moved if a brake release pump is used.

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

This machine can be towed by removing the axle shafts from the final drives. This procedure will make the machine brakes inoperable and the machine can move freely. Refer to the machine Service Manual or consult your Caterpillar dealer for the removal procedure for the axle shaft and for the installation procedure for the axle shaft.

Shields must be provided on both machines. Proper shielding will protect the operator if either the tow line or the bar breaks.

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

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

For towing, only attach the tow line to the tow eyes on the frame, if equipped.

Do not use a chain for pulling a disabled machine. A chain link can break. This event may cause possible 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 necessary. The procedure should be stopped if the cable starts to break. Also, stop the procedure if the cable starts to unravel. 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° angle from the straight ahead position.

Quick machine movement could overload the tow line or the bar. This action could cause the tow line or the 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.**

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

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. 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 Caterpillar dealer for the equipment that is necessary for towing a disabled machine.

Running Engine

If the engine is running, the machine can be towed for a short distance under certain conditions. The power train and the steering system must be operable. **Tow the machine for a short distance only.** For example, pull the machine out of mud or pull the machine to the side of the road.

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

If an internal transmission or a drive line failure is suspected, remove the axle shafts.

Consult your Caterpillar dealer or refer to the machine Service Manual for axle shaft removal and installation procedures.

⚠ WARNING

When the final drive sun gears are removed, the machine has NO parking brakes. The machine can roll and cause personal injury or death.

Block the tracks 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 towed machine.

Be 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.

Ensure that all instructions that are outlined in the Towing Information are carefully followed.

Stopped Engine

You can move the machine when the engine is not operable. You must use a brake release pump.

Consult your Caterpillar dealer for the equipment that is necessary for towing a disabled machine.

The pressure hose from the pump connects to the brake valve. The pump takes oil from the sump of the brake release pump. Then, the pump pressurizes the brake piston cavity in order to release the brake.

Note: This machine is free to move. This machine is free to roll away and this machine has no braking ability when both brakes have been released.

Connection of Brake Release Pump

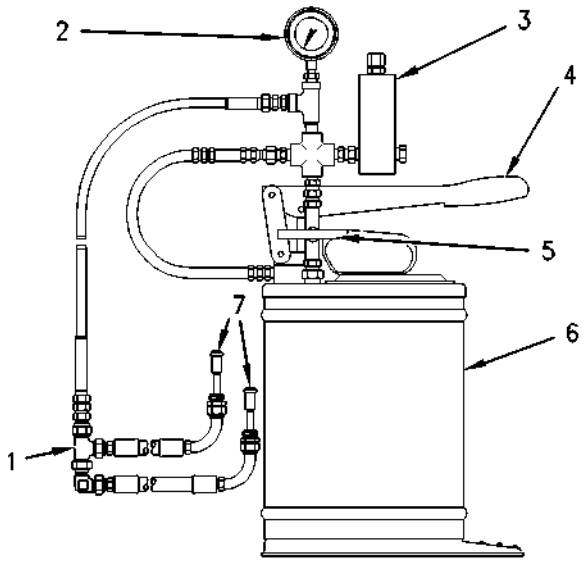


Illustration 166 g00544401

(1) Pump adapter
(2) Gauge
(3) Relief valve
(4) Handle
(5) Bypass valve
(6) Brake release pump
(7) Brake release adapter

The machine brakes can be released for towing. Use FT1973 Adapter Group (1). Use FT1845 Pump Group (6) and two 450-4258 Adapters (7).

Pump Test

NOTICE
Possible brake piston seal damage could result without checking relief valve. Opening pressure must be checked and adjusted before connection is made.

1. The main pressure hose connects to the FT1973 Adapter Group (1) and the two 450-4258 Adapters (7). Plug the pressure hose at the connection.
2. Turn the handle of the bypass valve (5) to the closed position.
3. While you are pumping the handle (4), observe the opening pressure of the relief valve (3).

4. Adjust the opening pressure of the relief valve. Set the pressure to 3030 ± 70 kPa (440 ± 10 psi).

Connection for the Pump

Remove the floorplate in order to access the steering valve ports before you proceed.

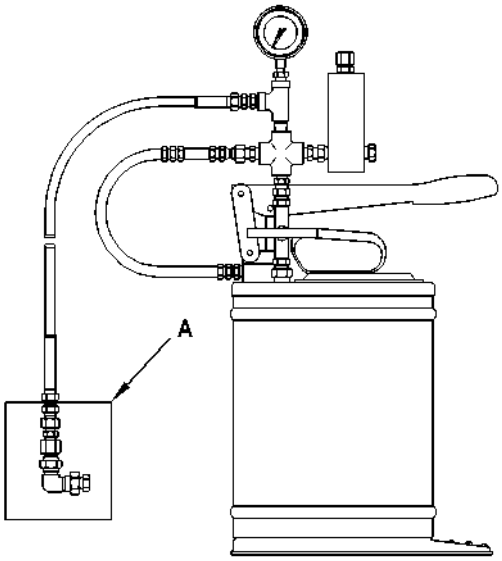


Illustration 167 g00543819

1. Remove the components that are indicated by shaded area (A).

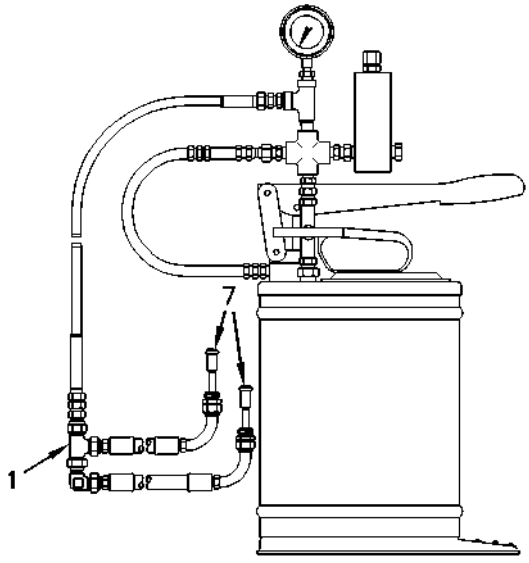


Illustration 168 g00543758

(7) Brake release adapter
(1) Pump adapter

1. Connect two brake release adapters (7) to FT1973 Adapter (1). Connect FT1973 Adapter (1) to the pump pressure hose.

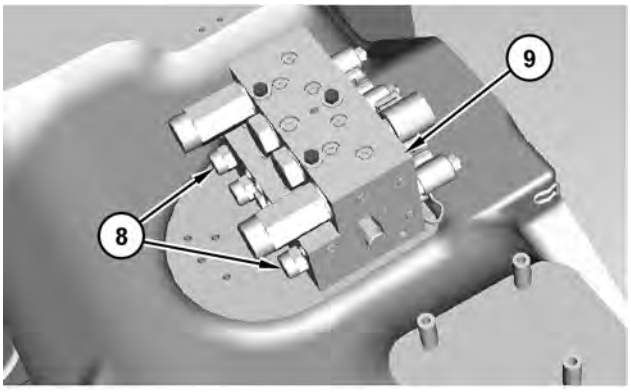


Illustration 169 g03507466

(8) Main stage cartridge valves
(9) Clutch/brake valve assembly

2. Remove main stage cartridge valves (8) from clutch/brake valve assembly (9).

3. Install the 450-4258 Adapters (7) into the ports of the clutch/brake valve assembly (9).

4. Route the pressure hose under the floorplate in the cab. Then route the pressure hose to the pump. The pump is temporarily on the platform.

5. Replace the floorplate.

6. Place the pump group in front of the operator.

7. Move the parking brake switch to the DISENGAGED position.

8. Fasten the seat belt. Continue to the next topic.

Brake Release

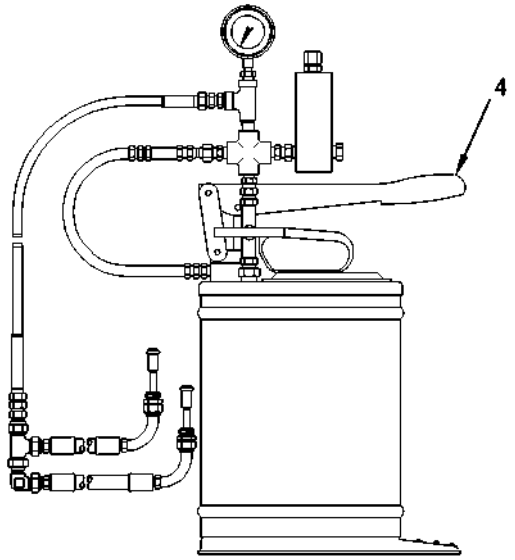


Illustration 170 g00544462

(4) Bypass valve handle

1. Turn the bypass valve handle (4) to the CLOSED position.

2. Initially, rapidly move the pump handle. This action will produce a large volume of oil flow.

3. The brake piston seal must be fully seated. Seating the seal is evident by a sudden rise in the oil pressure.

When the seal is properly seated, the pressure rises to the maximum.

4. The machine can now be towed.

NOTICE
Do not allow pressure to drop below 2756 kPa (400 psi) while towing.

Partial brake engagement could occur and can result in brake damage.

Brakes must be fully released when towed machine is moving.

Brake Engagement

NOTICE
Do not use the machine brakes to slow or stop the machine. Extensive brake damage and system contamination can result.

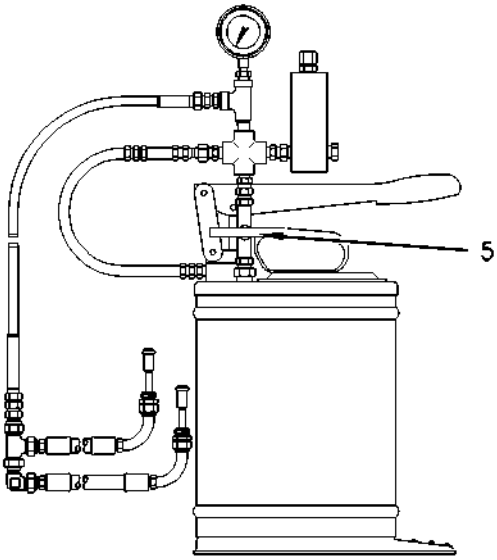


Illustration 171 g00544463

(5) Bypass valve

Open the bypass valve (5) in order to apply the brakes. This will completely dump the oil.

The brake system can only be applied by turning the bypass valve. The service brake pedal and the steering levers do not function.

After towing, remove the pump group. Repair the machine. Install the floorplate.

Consult your Cat dealer for towing a disabled machine.

Engine Starting (Alternate Methods)

i05535331

Engine Starting with Jump Start Cables

SMCS Code: 1000; 7000

⚠ WARNING

Failure to properly service the batteries may cause personal injury.

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

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts 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
When starting from another machine, make sure that the machines do not touch. This could prevent damage to engine bearings and electrical circuits.

Turn on (close) the battery disconnect switch prior to the boost connection to prevent damage to electrical components on the stalled machine.

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

Do not mix maintenance free batteries with low maintenance batteries for usage.

This machine has a 24 volt starting system. Use only the same voltage for jump starting. Use of a welder or higher voltage damages the electrical system.

Refer to Tool Operating Manual, 271-8590 Analyzer Group (24 Volt) , NEHS0973, available from your Caterpillar dealer, for complete testing and charging information. Use 281-8579, 24 Volt Analyzer, to test battery equipment.

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

1. Determine the failure of the engine to start. Refer to Service Magazine25 September 2005, on the use of 271 - 8590 Analyzer Group (24 V). Use this procedure if the machine does not have a diagnostic connector.
2. 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.

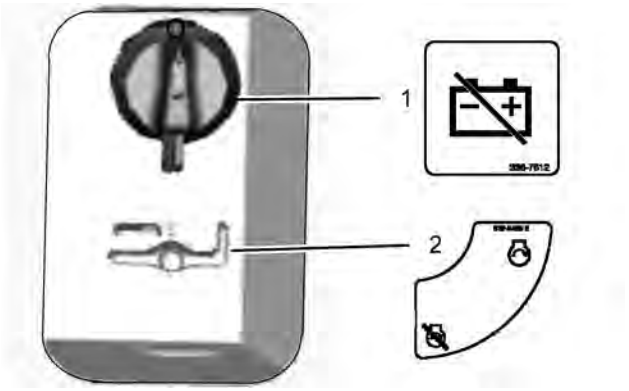


Illustration 172 g03504790

(1) Battery disconnect switch (electrical system)
(2) Battery disconnect switch (engine starter)

3. Turn engine start switch (2) on the stalled machine to the OFF position. Turn off all accessories.

4. Turn battery disconnect switch (1) on the stalled machine to the ON position.

Reference: See “Battery Disconnect Switch” in this manual for additional information.

5. 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.**

6. 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.

7. Ensure that battery caps on both machines are tight and correctly placed, if necessary. Ensure that batteries in the stalled machine are not frozen. Make sure that the batteries have enough electrolyte, if necessary.

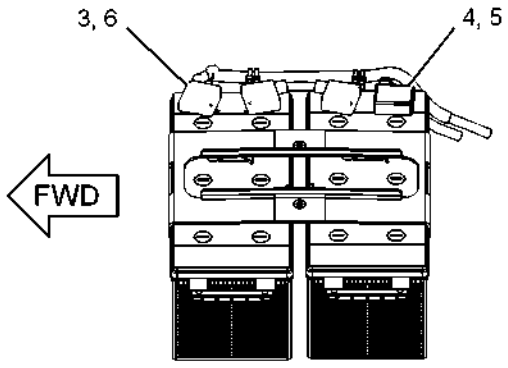


Illustration 173 g03506182

(3) Positive cable
(4) Negative cable
(5) Negative cable terminal
(6) Positive cable terminal

8. 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: 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.

9. Connect the other positive end of the jump-start cable to the positive cable terminal of the electrical source.

10. Connect one negative end of the jump-start cable to the negative cable terminal of the electrical source.

Note: In 24 V 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 9.

11. Finally, 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 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.

12. Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.

13. Wait at least 2 minutes before you attempt to start the stalled machine. This action will allow the batteries in the stalled machine to partially charge.

14. Attempt to start the stalled engine. See Operation and Maintenance Manual for the proper starting procedure for your machine.

15. Immediately after you start the stalled engine, disconnect the jump-start cables in reverse order.

16. Conclude the failure analysis on the starting system of the stalled machine and/or on the charging system of the stalled machine.

i05535967

Engine Starting with Auxiliary Start Receptacle

SMCS Code: 1000; 1463; 7000

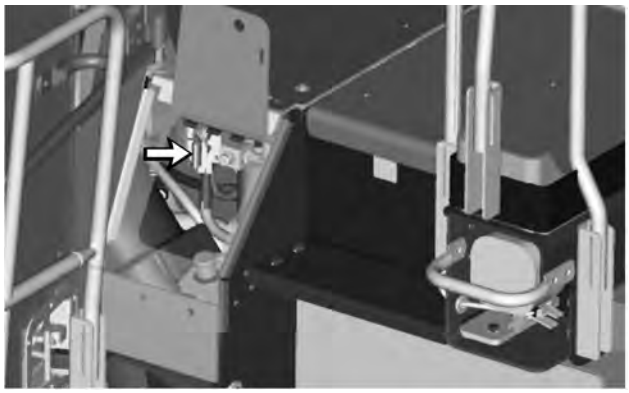


Illustration 174 g03506473

The auxiliary starting plug is inside the forward facing compartment on the left side of the machine beneath the cab door.

Some Caterpillar products may be equipped with auxiliary starting plugs. All other machines can be equipped with a receptacle for parts service. A permanent receptacle is always available for jump starting.

There is a cable assembly that can be used to jump the stalled machine. The part number is 9S-3664 Plug Assembly. The 9S-3664 Plug Assembly has a 15 foot cable. You can jump the machine from another machine that is equipped with this receptacle or an auxiliary power pack. Your Cat dealer can provide the correct cable lengths for your application.

1. Determine the failure of the machine to start. Refer to Service Magazine25 September 2005, on the use of 271-8590 Analyzer Group (24 V).
2. Place the transmission control in the NEUTRAL position on the stalled machine. Engage the parking brake. Lower all attachments to the ground. Keep all controls in the HOLD position.
3. On the stalled machine, turn the start switch key to the OFF position. Turn all of the accessories to the OFF position.
4. Turn the battery disconnect switch ON.
5. Move the machine that is used for the electrical source close to the stalled machine. The cables must reach. **DO NOT ALLOW THE MACHINES TO CONTACT.**
6. Stop the engine on the machine that is used for the electrical source. When you use an auxiliary power source, turn the charging system to the OFF position.
7. On the stalled machine, connect the 9S-3664 Plug Assembly to the auxiliary starting plug.
8. Connect the other end of this cable to the electrical source. Connect the cable to the auxiliary starting plug.
9. Start the engine on the machine that is used for the electrical source. You can also energize the charging system on the auxiliary power source.
10. Allow the electrical source to charge the batteries on the stalled machine for 2 minutes.
11. Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, “Engine Starting”. See the beginning of this topic.
12. Immediately after the stalled engine starts, disconnect the jump-start cable from the electrical source.
13. Disconnect the other end of this cable from the stalled machine.
14. Conclude with a failure analysis on the starting charging system. Check the stalled machine, as required. Check the machine when the engine is running and the charging system is in operation.

Maintenance Section

Cooling System Specifications

i01827464

Model Specific Coolant Information

SMCS Code: 1000

The following two coolants are used in Caterpillar machine engines:

Preferred – Caterpillar Extended Life Coolant (ELC) or a commercial ELC that meets the Caterpillar specification (EC-1)

Acceptable – A Caterpillar Diesel Engine Antifreeze/Coolant (DEAC) or a commercial heavy-duty coolant/antifreeze that meets “ASTM D4985” or “ASTM D5345” specifications

NOTICE
Do not use a commercial coolant/antifreeze that only meets the “ASTM D3306” specification. This type of coolant/antifreeze is made for light duty automotive applications.

Caterpillar recommends a 1:1 mixture of water and glycol. This mixture of water and glycol will provide optimum performance.

Note: Caterpillar DEAC does not require a treatment with an SCA at the initial fill. A commercial coolant/antifreeze that meets “ASTM D4985” or “ASTM D5345” specifications requires a treatment with an SCA at the initial fill.

Table 11

Service Life before Flushing and before Refilling	
Coolant	**Service Life**
Caterpillar ELC	12,000 hours or 6 years
Caterpillar DEAC	3000 hours or 2 years
Commercial Heavy-Duty Coolant/ Antifreeze	3000 hours or 1 year

Lubricant Viscosities and Refill Capacities

i05536490

Lubricant Viscosities
(Fluids Recommendations)

SMCS Code: 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 Caterpillar dealer.

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold Weather TDTO is recommended.

Caterpillar has determined that Track-Type Tractors equipped with the High Ambient Cooling Attachment can operate with Cat HYDO Advanced 10 Hydraulic System Oil in ambient temperatures from −20° C (−4° F) to 50° C (122° F).

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

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

Selecting the Viscosity

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

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

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

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

Engine Oil

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

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

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

Typical aftertreatment systems include the following:

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

Other systems may apply.

Table 12

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

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

Hydraulic Systems

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

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

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

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

Second choice oils are listed below.

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

Table 13

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

Transmission and Axles

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

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

Table 14

Track Type Tractors Lubricant Viscosities for Ambient Temperatures							
Compartment or System	**Application**	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
				Min	**Max**	**Min**	**Max**
Power Shift Transmissions	Normal	Cat Cold Weather TDTO	SAE 0W-20	−40	10	−40	50
		Cat TDTO	SAE 10W	−20	10	−4	50
		Cat TDTO	SAE 30	0	35	32	95
		Cat TDTO	SAE 50	10	50	50	122
		Cat TDTO-TMS	Multi-grade	−20	43	−4	110
Final Drive	Moderate Usage or Intermittent Operation	Cat FDAO	SAE 60	−7	50	19	122
		Cat TDTO	SAE 50	−15	32	5	90
		Cat TDTO	SAE 30	−25	15	−13	59
		Cat TDTO-TMS	Multi-grade	−35	15	−31	59
		Cat FDAO SYN	Multi-grade	−15	50	5	122

(continued)

(Table 14, contd)

Track Type Tractors Lubricant Viscosities for Ambient Temperatures							
Compartment or System	Application	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
				Min	Max	Min	Max
	Severe Usage or Continuous Operation (Multiple Shifts)	Cat FDAO	SAE 60	−25	50	−13	122
		Cat TDTO	SAE 50	−33	14	−27	58
		Cat TDTO	SAE 30	−40	0	−40	32
		Cat TDTO-TMS	Cat TDTO-TMS	−40	0	−40	32
		Cat FDAO SYN	Cat FDAO SYN	−33	50	-27	122

Special Applications

Table 15

Special Track Type Tractors Lubricant Viscosities for Ambient Temperatures							
Compartment or System	**Application**	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
				Min	**Max**	**Min**	**Max**
End Pin Joints for the Equalizer Bar, Bogie Cartridge Pins, and Track Pins	Normal	Cat Synthetic GO	SAE 75W-140	−30	45	−22	113
		Cat GO	SAE 80W-90	−20	40	−4	104
		Cat GO	SAE 85W-140	−10	50	14	122
Winches (hydraulic drive)	Normal	Cat TDTO	SAE 10W	−20	10	−4	50
		Cat TDTO	SAE 30	0	43	32	110
		Cat TDTO-TMS	Cat TDTO-TMS	−10	35	14	95
Track Roller Frame Recoil Spring Pivot Shaft Bearings	Normal	Cat Cold Weather TDTO	SAE 0W-20	−40	0	v40	32
		Cat TDTO	SAE 10W	−30	0	−22	32
		Cat TDTO	SAE 30	−20	25	−4	77
		Cat TDTO	SAE 50	0	50	32	122
		Cat TDTO-TMS	Cat TDTO-TMS	−25	25	−13	77
Track Idlers and Track Rollers	Normal	Cat DEO	SAE 30	−20	25	−4	77
		Cat FDAO SYN	Cat FDAO SYN	−33	50	-27	122
Variable Pitch Fan	Normal	Cat DEO	SAE 0W40	−40	40	−40	104

Track Idlers

Caterpillar recommends the usage of Cat FDAO Syn oil at the idler rebuild. Cat FDAO Syn oil is a full synthetic final drive and axle oil. This oil is designed for operation in a wide temperature range and is suitable for machines that operate under high load and/or high speed conditions. This condition is when the protection of the bearings is a primary concern. Machines that are operating continuously may use FDAO even if the ambient temperature is below the recommendations in the Operation and Maintenance Manual. The higher weight FDAO oil will maintain the highest possible oil film thickness and reduce overheating of the idlers.

Special Lubricants

Grease

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

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

Table 16

Vehicle	Application Point	Typical Load and Speed	Load Factor	Ambient Temperature Range				NLGI Grade	Grease Type
				° C		° F			
				Min	Max	Min	Max		
Track-Type Tractors	Adjust Track, Angle Blade Tilt Brace, Equalizer Bar Pins, Fan Drive Belt Tightener, Lift Cylinder Yoke Bearing, Winch Drum Bearing, Winch Fairlead Rollers	High	Ditching, fill spreading, spreading base material, ripping, heavy road maintenance, snow plowing.	−35	40	−31	104	1	Ultra 5Moly Grease
				−30	50	−22	122	2	
		Medium	Average road maintenance, road mix work, scarifying, snow plowing.	−20	40	−4	104	2	Advanced 3Moly Grease
		Low	Finish grading, light maintenance, road travel.	−30	40	−22	104	2	Multipurpose Grease
	Fan Drive Bearings			−20	40	−4	104	2	High Speed Ball Bearing Grease

Grease for the Autolube System (If Equipped)

The grease used with the automatic lubrication system must not contain any graphite or PTFE.

Note: Pumpability is based on “US Steel Mobility and Lincoln Ventmeter Tests”. Performance may vary depending on lubrication equipment and the length of the lines.

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.

Table 17

Recommended Grease for the Autolube System				
Compartment or System	GreaseType	NLGI Grade	°C	°F
			Min	Min
Cat Autolube System	Cat 3Moly Grease	NLGI Grade 2	−18	0
	Cat Ultra 5Moly	NLGI Grade 2	−7	20
		NLGI Grade 1	−18	0
		NLGI Grade 0	−29	−20
	Cat Arctic Platinum	NLGI Grade 0	−43	−45
	Cat Desert Gold	NLGI Grade 2	2	35

Diesel Fuel Recommendations

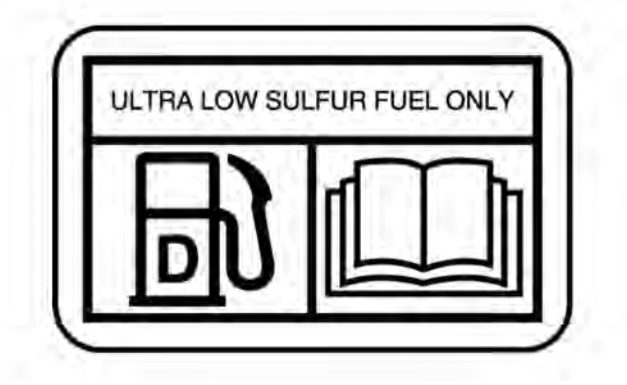


Illustration 175 g02157153

North American Film

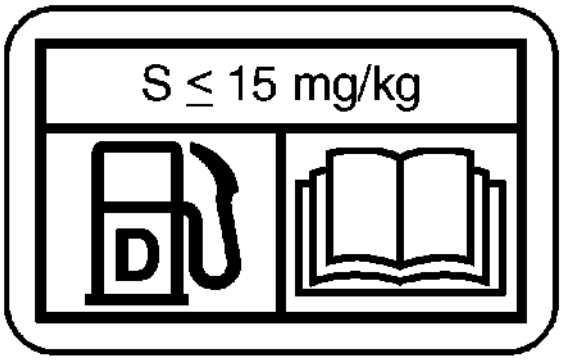


Illustration 176 g02052934

EU and Japan Film

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

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

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

- **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
- Negatively impact engine emissions

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

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

Provide clean fuel to the fuel tank according to the specification for Max Tank Fuel Cleanliness to be 18/ 16/13 when measured by “ISO 4406”. Use only fuel filters that are of the type specified Ultra High Efficiency (UHE) for Tier 4 engines.

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

Reference: Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”, Special Publication, SEBD0717, “Diesel Fuel and Your Engine”, Special Publication, SENR9620, “Improving Component Durability - Fuel Systems”, and Special Publication, PEDJ0127, “Bulk Filtration”.

Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” may be found on the Web at Safety.Cat.com.

Fuel Additives

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

Biodiesel

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

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

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

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

Note: Up to B20 biodiesel blend level is acceptable for use in Large Track-Type Tractor engines.

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

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

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

Coolant Information

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

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

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/ Coolant)

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

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Capacities (Refill)

SMCS Code: 7560

Table 18

Approximate Refill Capacities			
Compartment or System	**Liters**	**US gal**	**Imperial gallon**
Cooling System	180	47.6	39.6
Fuel Tank	1190	314	262
Engine Oil (includes filters)	68	18	15
Power Train Oil (includes filters)	230	60.7	50.6
Hydraulic Tank Oil	131	34.6	28.8
Final Drives (each)	23	6.1	5
Recoil Spring Compartment	64	17	14.5
Pivot Shaft	33	8.7	7.2
	kg	**lbs**	**Type**
Refrigerant Condenser (1)	1.93	4.25	R-134a

(continued)

(Table 18, contd)

Approximate Refill Capacities			
Compartment or System	**Liters**	**US gal**	**Imperial gallon**
	mL	**oz**	
Refrigerant Oil (Compressor)(1)	300	10.2	Polyalkylene Glycol (PAG) Oil
Refrigerant Oil (Lines Group)(1)	126	4.2	Polyalkylene Glycol (PAG) Oil

(1) Refer to Service Manual, "Air Conditioning and Heating with R-134a for All Caterpillar Machines"

Note: Run the engine for several minutes before you check the engine oil level on the dipstick.

180 L (47.6 US gal)

Note: When you are operating on severe slopes, the quantity of oil in the transmission can be increased up to 10 percent. When you are operating with the increased oil quantity, prolonged operation in some machines can cause high transmission oil temperatures. After the work on the severe slopes has been completed, drain the excessive oil quantity from the transmission.

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S·O·S Information

SMCS Code: 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

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Fire Suppression System Shutdown and Isolation

SMCS Code: 7000; 7401

WARNING

To prevent accidental discharge of the Fire Suppression Agent, while performing any service or maintenance, the machine must be isolated. Fire Suppression isolation is necessary since the Fire Suppression System will remain active with the battery disconnect switch in the OFF position.

Failure to follow these instructions could result in personal injury or death.

The Fire Suppression System isolation procedure should be performed by a trained technician, authorized by the OEM manufacturer.

Before any service or maintenance on the machine is performed, you must isolate the fire suppression system. The isolation procedure should be performed by a trained technician, authorized by the OEM manufacturer.

In the event of a power loss, the fire suppression system is equipped with a backup battery. The battery will ensure that the fire suppression system will remain active during such period.

During normal operation, service, or maintenance, the engine shutdown switch turned to the OFF position, will not deactivate the fire suppression system.

Service or maintenance, on or near the fire suppression system, could inadvertently activate the system and release the fire suppression agent.

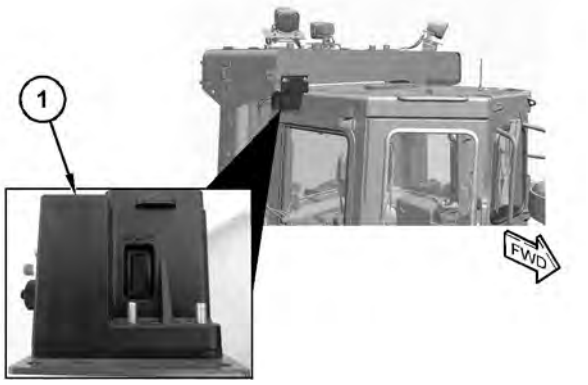

Illustration 177 g06200855

(1) Fire Suppression Isolation Switch

1. Turn off the engine. Place the engine start switch in the OFF position.
2. Switch the battery disconnect switch to the OFF position. Refer to Operation Maintenance Manual Operation Information “Battery Disconnect Switch”.

Note: The following steps should be performed by a trained technician, authorized by the OEM manufacturer:

3. Locate the fire suppression isolation switch (1).
4. Switch the fire suppression isolation switch (1) to the OFF position.

When the service or maintenance of the machine is complete, the fire suppression system switch (1) must be turned to the ON position.

Note: The fire suppression system should be energized by a trained technician, authorized by the OEM manufacturer.

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System Pressure Release

SMCS Code: 7000

Coolant System

WARNING

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

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

Fuel System

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

High Pressure Fuel Lines (If Equipped)

WARNING

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

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

This condition is because of the following differences:

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

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

1. Stop the engine.

2. Wait for 10 minutes.

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

Engine Oil

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

i07410185

Prepare the Machine for Maintenance

SMCS Code: 1000; 7000

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

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

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

3. Lower all the machine implements to the ground. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

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

This machine is equipped with lockout controls to suit the following types of machine maintenance.

Maintenance with the Engine Running

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

1. Run the engine at an idle.

2. Deactivate the implements by using the hydraulic lockout switch. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

Maintenance without the Engine Running

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

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

Maintenance with Electrical System Disabled

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

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

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

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Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

NOTICE
Do not weld near the thermal detection wire. Heat from welding may cause the thermal detection wire to activate the fire suppression system.

When performing any machine maintenance or service, the fire suppression system must be isolated. If equipped with fire suppression system, isolate the system. Refer to this Operation and Maintenance Manual.

Note: Machines built with the optional factory installed fire suppression are equipped with a backup battery. The fire suppression system will remain powered when the machine battery disconnect switch is in the OFF position.

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.

i07764419

Maintenance Interval Schedule

SMCS Code: 7000

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

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, 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.

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

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

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

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

When Required

Every 10 Service Hours or Daily

Every 10 Service Hours

Every 50 Service Hours

Every 250 Service Hours

Initial 500 Service Hours

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

Every 500 Service Hours

Every 1000 Service Hours or 6 Months

Every 2000 Service Hours

Every Year

Every 2 Years

Every 3 Years

Every 4000 Service Hours

Every 6000 Service Hours or 3 Years

Every 6000 Service Hours or 4 Years

Every 12 000 Service Hours or 6 Years

Every 600 000 L (158 500 US gal) of Fuel

Every 1 200 000 L (317 000 US gal) of Fuel

i05572050

Automatic Lubrication Grease Tank - Fill
(If Equipped)

SMCS Code: 7540-544-TNK; 7540-544

Reservoir Location

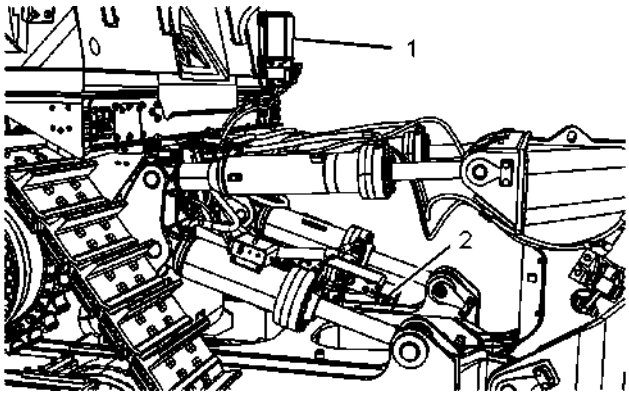

Illustration 178 g03531941

Grease reservoir (1) for the automatic lubrication system is located on the rear of the machine.

Procedure for Refilling Reservoir

Location for Ground Level Fill

Coupling (2) on the filler assembly is located on the left-hand ripper cylinder.

Filling the Reservoir

1. Ensure that the hose is full of grease in order to prevent air from being pumped into the reservoir.
2. Clean the coupling for filling and the coupling of the hose for filling.
3. Attach the hose for filling to the coupling for refilling. Refill the reservoir to the maximum level. The air is allowed to purge off during the filling of the reservoir.
4. Disconnect the hose for filling and clean both couplings.

Location for Lubricating

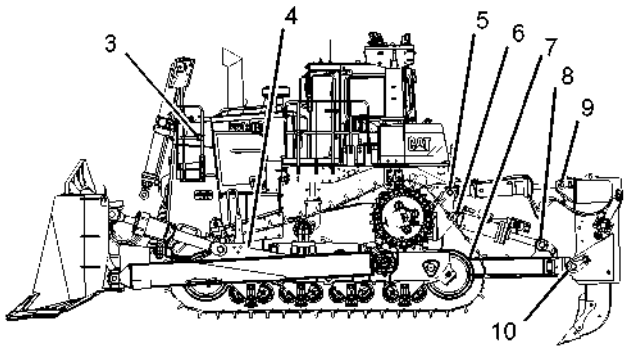

Illustration 179 g03531938

(3) Lift cylinder yoke, left and right (one location on each side)
(4) Equalizer bar end pins, left and right
(5) Ripper tilt cylinder, left and right frame pivot bearings
(6) Ripper lift cylinder, left and right frame pivot bearings
(7) Ripper frame, left and right pivot bearings
(8) Ripper lift cylinder, left and right pivot bearings
(9) Ripper tilt cylinder, left and right pivot bearings
(10) Beam/Carriage, left and right pivot bearings

i05572092

Automatic Lubrication System Components - Check

SMCS Code: 7540-535

⚠ WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

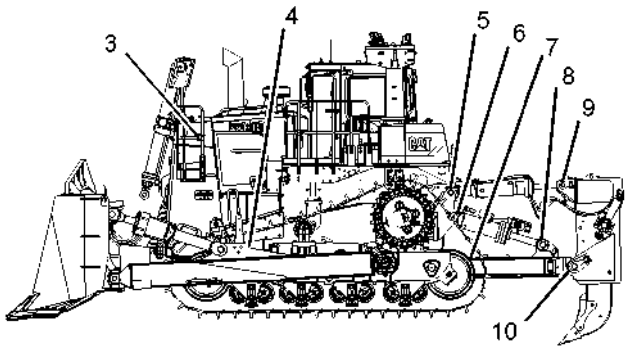

Illustration 180 g03531938

(3) Lift cylinder yoke, left and right (one location on each side)
(4) Equalizer bar end pins, left and right
(5) Ripper tilt cylinder, left and right frame pivot bearings
(6) Ripper lift cylinder, left and right frame pivot bearings
(7) Ripper frame, left and right pivot bearings
(8) Ripper lift cylinder, left and right pivot bearings
(9) Ripper tilt cylinder, left and right pivot bearings
(10) Beam/Carriage, left and right pivot bearings

1. Remove any buildup of grease at the fitting locations. Check that each pin joint is receiving a fresh supply of grease.

2. Check the grease level at the top vent port of the reservoir.

Reference: Refer to Operation and Maintenance Manual, “Automatic Lubrication Grease Reservoir - Fill (If Equipped)” for information on filling the reservoir.

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Backup Alarm - Test

SMCS Code: 7406-081

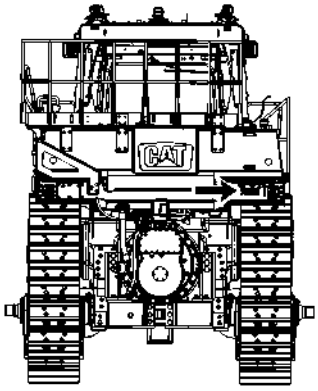

Illustration 181 g03509190

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

Turn the engine start switch to the ON position in order to perform the test.

Apply the service brakes. Move the transmission control lever to the REVERSE position.

The backup alarm should sound immediately. The backup alarm should continue to sound until the transmission control lever is moved to the NEUTRAL position or to the FORWARD position.

The backup alarm has one sound level. The sound level is not adjustable.

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Battery - Inspect

SMCS Code: 1401-040

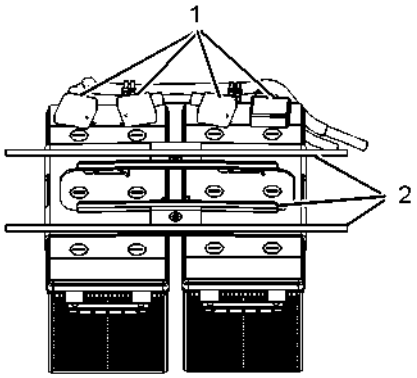

Illustration 182 g03509265

(1) Terminals and Terminal Covers
(2) Retainers

Note: Perform the following procedures at every 1000 hour interval. Check the following areas more often, as required.

1. Open the battery access covers. The battery access covers are on the left and right side of the machine next to the operator compartment.

2. Tighten the battery retainers on all batteries at every 1000 hour interval.

3. Clean the top of the batteries with a clean cloth. Keep the terminals clean and coat the terminals with petroleum jelly. Install the terminal covers after you coat the terminals.

1. Close the battery access cover.

i02019456

Battery, Battery Cable or Battery Disconnect Switch - Replace

SMCS Code: 1401-510; 1402-510; 1411-510

1. Turn the engine start switch key to the OFF position. Turn all of the switches to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the battery cable at the battery disconnect switch. The battery disconnect switch is inside the left engine access door.
4. Disconnect the negative battery cable at the battery.
5. Replace the disconnect switch, the battery cables, or the batteries, as required.
6. Connect the negative battery cable at the battery.
7. Connect the negative battery cable at the battery disconnect switch.
8. Install the key and turn the battery disconnect switch to the ON position.

Battery Recycle

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i06838251

Belt - Inspect/Replace

SMCS Code: 1397-040; 1397-510

Your engine is equipped with a serpentine belt that drives the alternator and the air conditioner compressor, if equipped.

This engine is equipped with a belt tightener that automatically adjusts the belt to the correct tension.

Inspect the Belt

1. Park the machine on level ground. Lower the dozer blade to the ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.
2. Turn the battery disconnect switch to the OFF position.

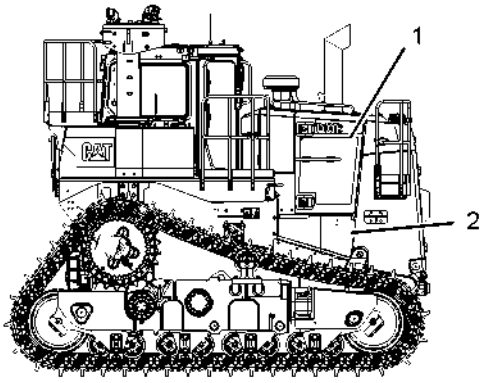

Illustration 183 g03509323

3. Open the access door (2) and hinged plate (1) on the right side of the engine.

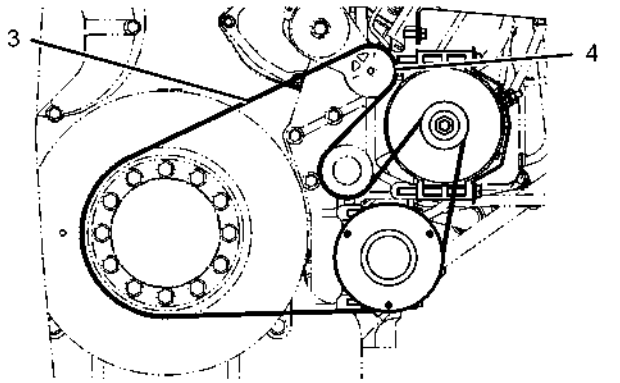

Illustration 184 g03358730

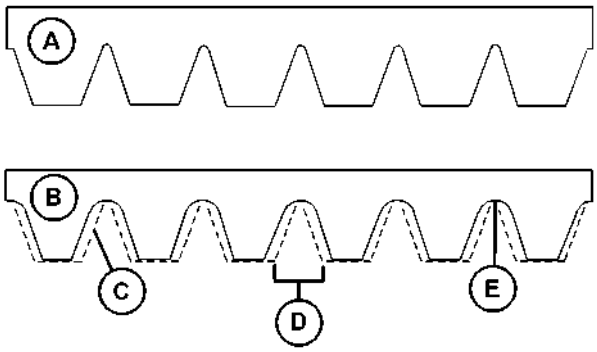

Illustration 185 g06114636

(A) New belt
(B) Worn belt

4. Inspect the condition of the serpentine belt (3). 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 doors.

6. Turn the battery disconnect switch to the ON position.

Replace the Belt

1. Replace the belt if any of the following conditions exist:

- excessive cracking
- excessive wear
- excessive damage

2. Park the machine on level ground. Lower the dozer blade to the ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.

3. Turn the battery disconnect switch to the OFF position.

Remove the Belt

1. Open the engine access doors. Turn belt tensioner (4) in order to release the tension from the belt with a square drive.

a. Insert a 12.7 mm (0.50 inch) ratchet into square hole on belt tensioner (4).

b. Pry the belt tensioner in a counterclockwise direction in order to remove the tension from the belt.

2. Remove the belt from the pulleys.

3. Install the new belt.

Note: The first spare belt for the first belt replacement is equipped with the machine.

a. Insert a 12.7 mm (0.50 inch) ratchet into the square hole in the tensioner. Push up the ratchet and install the new belt on tensioner (4).

b. Pry the belt tensioner in a clockwise direction in order to install the belt.

c. To achieve the correct belt tension, move the belt tensioner inward. Tighten belt tensioner (4) in place. Recheck the belt adjustment.

4. Close the engine access doors

5. Turn the battery disconnect switch to the ON position.

Note: If a new belt is installed, check the belt adjustment after 30 minutes of operation. A belt is a used belt after 30 minutes of operation.

i06124920

Braking System - Test

SMCS Code: 4100-081; 4267-081

⚠ 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.

Note: The brakes will not hold the machine if you select the “1F” gear position.

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

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

The following test is used to determine whether the service brake is functional. This test is not intended to determine the maximum brake holding effort. The brake holding effort to hold the brake on this machine will be different. This response is because of variations in the engine setting, in the power train efficiency, and in the brake holding ability.

Compare the engine speed at the beginning of machine movement to the engine speed of a prior test. This comparison will be an indication of the amount of system deterioration.

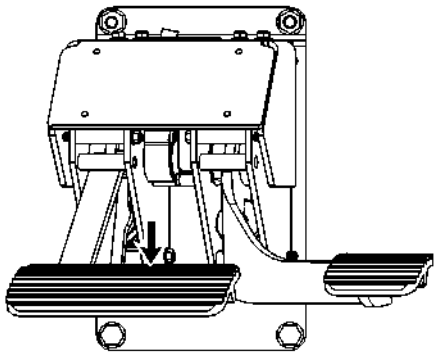

Illustration 186 g03509420

1. Start the engine.

2. Raise all attachments.

3. Depress the brake pedal.

4. Release the parking brake switch.

5. While the brake pedal is depressed, move the directional control lever to the SECOND SPEED FORWARD position.

6. Gradually increase the engine speed to full load speed. The machine should not move.

7. Move the throttle switch to LOW IDLE. Turn on the parking brake switch. Lower all attachments to the ground. Apply a slight down pressure. 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 brake before returning the machine to operation.

i05943845

Breaker Relief Valve (Expansion Tank) - Replace
(If Equipped)

SMCS Code: 1354-510-BRL; 5118-510

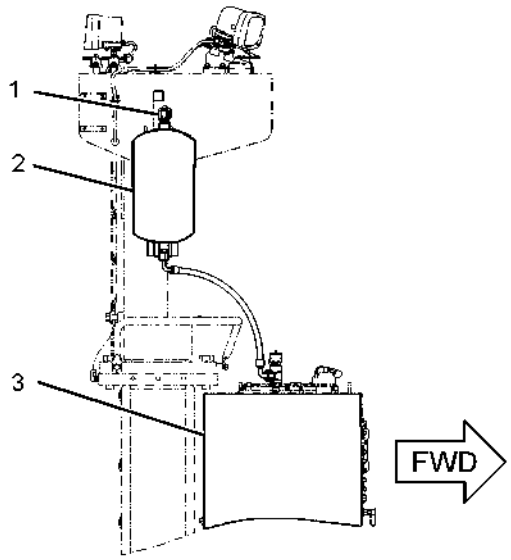

Illustration 187 g03732743

(1) Breaker relief valve
(2) Air expansion tank
(3) Hydraulic oil tank

Breaker relief valve (1) is mounted on the top of air expansion tank (2) for hydraulic oil tank (3).

1. Press the button on breaker relief valve (1) in order to relieve any tank pressure.

2. Remove the breaker relief valve.

3. Properly dispose of the used breaker relief valve.

4. Install a new breaker relief valve.

i03954091

Bulldozer Tilt Brace and Tilt Cylinders - Lubricate

SMCS Code: 5104-086; 6050-086; 6074-086

Lubricate the tilt cylinders and the tilt braces.

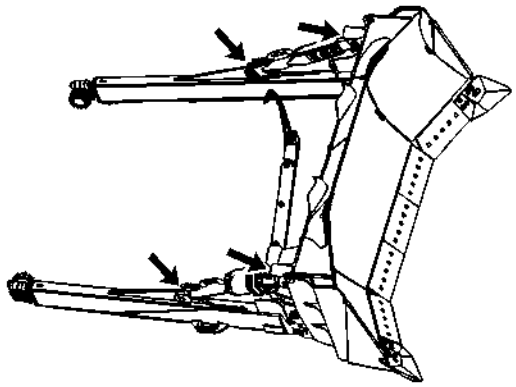

Illustration 188 g02158909

One grease fitting is located at the left front brace assembly or left tilt cylinder (if equipped).

One grease fitting is located at the rod end of the right tilt cylinder.

A grease fitting is located at the cylinder connection to each push arm.

i05287753

Cab Filter (Fresh Air) - Clean/ Inspect/Replace

SMCS Code: 7342-510; 7342-070; 7342-040

Note: Clean the filters more often in dusty conditions.

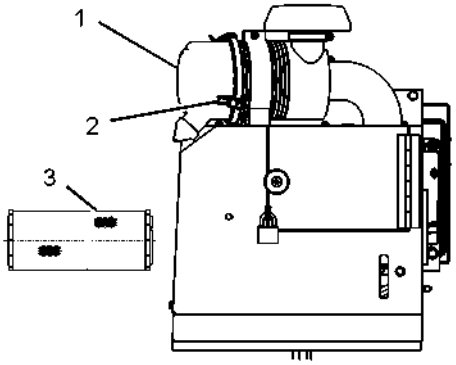

Illustration 189 g01768834

1. Loosen three clamps (2) and remove filter cover (1). The filter cover is located outside the left side of the cab.
2. Remove filter element (3).
3. The filter element can be cleaned by using pressure air. Use a maximum air pressure of 205 kPa (30 psi). Direct the air from the clean side to the dirty side.
4. Look through the filter toward a bright light. Inspect the element for damage. Inspect the gaskets for damage. Replace damaged filters.
5. Install filter element (3) and install filter cover (1). Close three clamps (2).

i02041123

Cab Filter (Recirculation) - Clean/Inspect/Replace

SMCS Code: 7342-070; 7342-040; 7342-510

The recirculation filter is located to the left of the operator's seat.

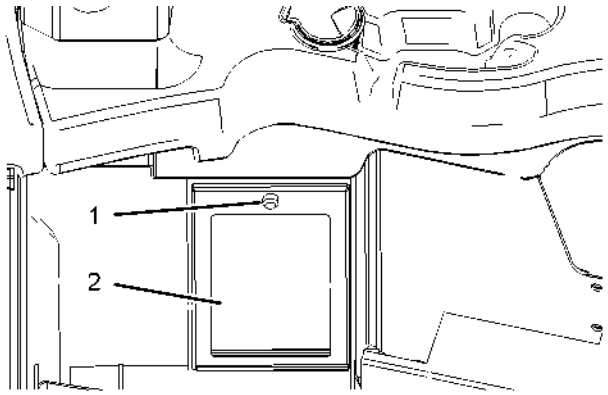

Illustration 190 g01049402

1. Unscrew the bolt (1) in order to remove the filter cover (2). Remove the filter element.
2. The filter element can be cleaned by using compressed air. Use a maximum air pressure of 205 kPa (30 psi). Direct the air from the clean side to the dirty side.
3. Look through the filter toward a bright light. Inspect the element for damage. Inspect the gaskets for damage. Replace damaged filters.
4. Install the filter element.

Note: Clean the filters more often in dusty conditions.

i03680600

Camera - Clean/Adjust (WAVS (If Equipped))

SMCS Code: 7348

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

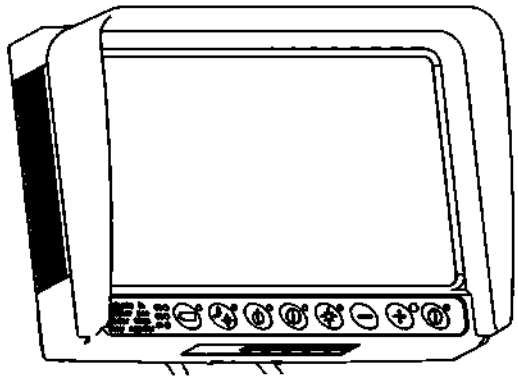

Illustration 191 g01223034

The WAVS display is located in the operator station.

Use a soft, damp cloth in order to clean the display. The display has a soft plastic surface that can be easily damaged by an abrasive material. **The display is not sealed. Do not immerse the display with liquid.**

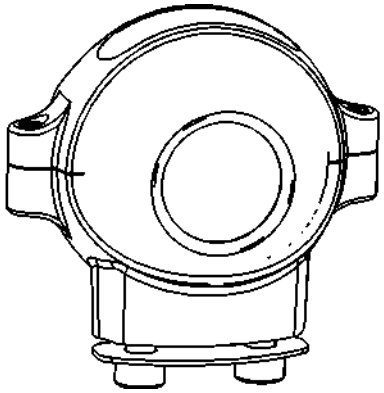

Illustration 192 g01223051

A WAVS camera is located on the rear of the machine, mounted on top of the ROPS, or mounted on the fuel tank.

Use a damp cloth or water spray in order to clean the camera lens. The camera is a sealed unit. The camera is not affected by high pressure spray.

Note: The camera is equipped with an internal heater to help counteract the effects of condensation, snow, or ice.

For more information on WAVS, refer to Operation and Maintenance Manual, SEBU8157, “Work Area Vision System”.

i05544400

Cooler Cores and A/C Condenser - Clean

SMCS Code: 1064-070; 1353-070; 1374-070; 7320-070

Cooler Cores

The following cooler cores are cooled by the hydraulic fan that is located in the radiator guard at the front of the track-type tractor.

Aftercooler cores – The aftercooler cores cool the inlet manifold air to the engine.

Radiator cores – The radiator cores cool the engine coolant.

A/C condenser core – The air conditioning condenser core cools the refrigerant in the air conditioning system.

Aftercoolers

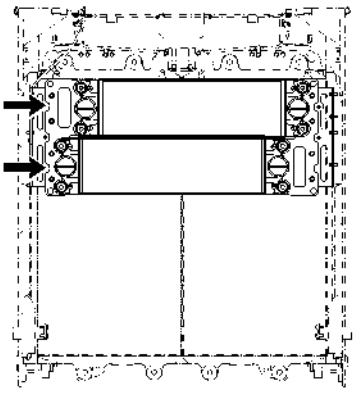

Illustration 193 g03358464

Rear view of dual aftercooler cores

Radiator Core

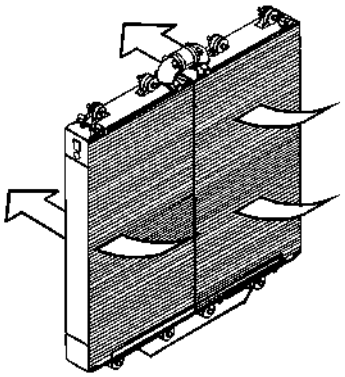

Illustration 194 g03510464

A/C Condenser Core

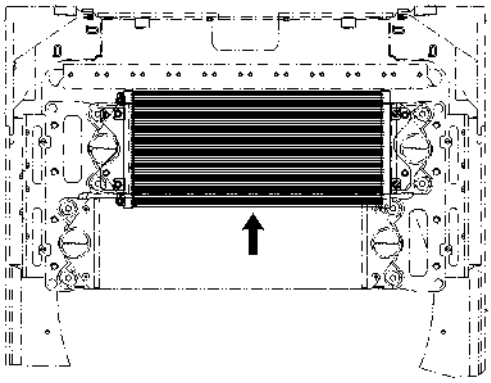

Illustration 195 g03511297

A common arrangement for the air conditioner condenser is located behind the radiator.

Remote A/C Condenser Core

In some machine arrangements, the a/c condenser core is remotely located. A remote mounted a/c condenser core is cooled by fans with electric drive.

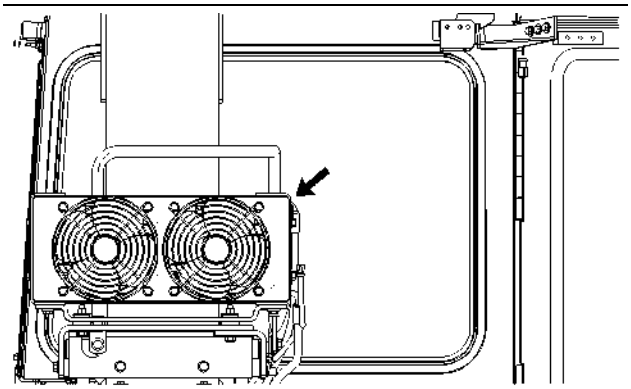

Illustration 196 g01053048

An optional arrangement for the air conditioner condenser is located on the right side fender.

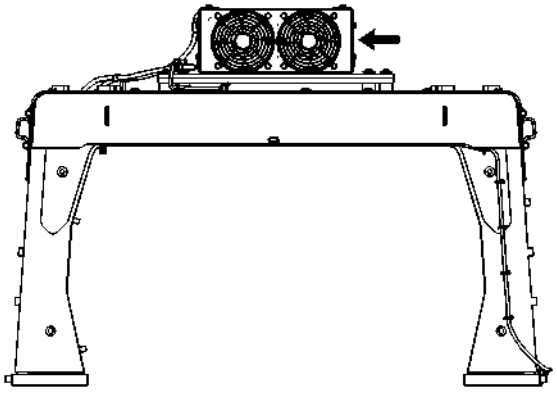

Illustration 197 g03512596

An optional arrangement for the air conditioner condenser is located on the top of the ROPS.

Inspect

Note: Adjust the frequency of inspection according to the effects of the operating environment.

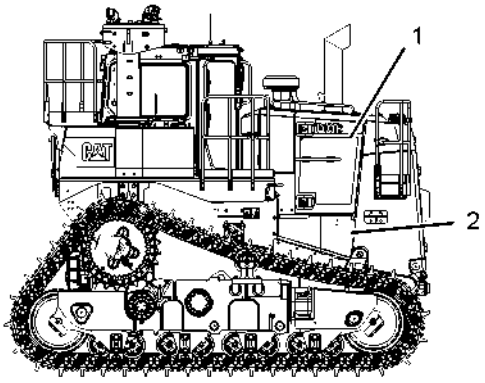

Illustration 198 g03509323

Turn off the engine.

Open both of engine access doors (1).

Inspect the cooling system for the following conditions: coolant leaks, oil leaks, damaged fins and tubes. Inspect the following parts of the cooling systems: air lines, connections and clamps for damage .Make repairs for damage, if necessary.

Note: If parts of the aftercooler system appear to be damaged or if parts of the aftercooler system are repaired, a leak test is highly recommended. Refer to Special Instruction, SEHS8622, “Using the FT1984 Air-to-Air Aftercooler Leak Test Group”. The FT-1984 Aftercooler Testing Group can be used for aftercoolers that have hoses with an inside diameter of 102 mm (4.00 inch) or 114 mm (4.50 inch).

For more detailed information on testing and inspection, see Special Publication, SEBD0518, “Know Your Track-Type Tractor Cooling System”.

Clean

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

Radiator cores, aftercooler cores, and a/c condenser cores needed to be cleaned regularly. Adjust the frequency of cleaning according to the effects of the operating environment.

Blow out the cores with compressed air. Move the air nozzle in a systematic pattern so that the air flow covers the whole core that includes areas in the corner. Clean the middle space between the aftercooler core and the a/c condenser core.

Use a bent copper tube that is approximately 1/4 -3/8 inch diameter as an extension to the air nozzle. This action will facilitate cleaning of the middle spaces.

Do not use steam or high-pressure water for cleaning frequently. If steam or high-pressure water is required to dislodge any debris that is held deep in the cores, make sure that the cleaning is thorough. This operation may require partial removal or total removal of the air conditioner condenser for better access. Incomplete cleaning with water may cause remaining debris to harden in place. Use lights and wire probes in order to ensure that the cleaning is thorough and complete. If the debris has hardened in the center of the cores, removing these cores for thorough cleaning is recommended.

If you use a degreaser and steam for removal of oil and grease, wash the core with detergent and hot water. Thoroughly rinse the core with clean water. Dry the cores completely before operating the machine in the work mode.

Dry

If steam or water is used to clean the cores, make sure that the cores are dry before the track-type tractor is put back to work.

Use compressed air to blow dry the wet cores, the engine, engine access doors, and the hood.

Close both engine access doors.

If the machine is in a clean environment, start the engine and allow the fan to run until the cooling system has dried. Allow the machine to sit overnight before operating the machine in the work mode.

i05547430

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044

⚠ 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.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

NOTICE
Make sure you read and understand the information in the topics Safety and Cooling System Specifications for all information pertaining to water, antifreeze and supplemental coolant additive requirements before you proceed with maintenance of the cooling system.

The access door for the cooling system filler cap is located on top of the engine enclosure on the left side.

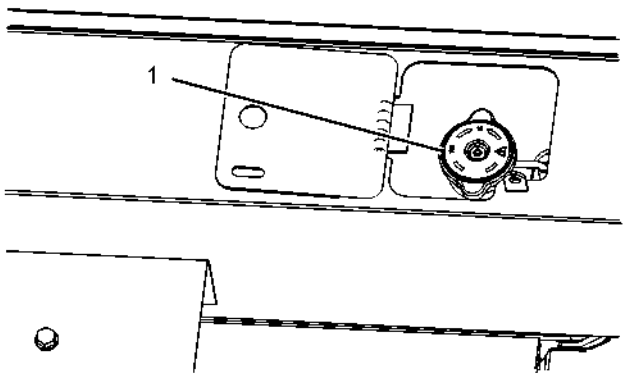

Illustration 199 g03512762

1. Slowly loosen filler cap (1) to relieve system pressure. Remove the filler cap.

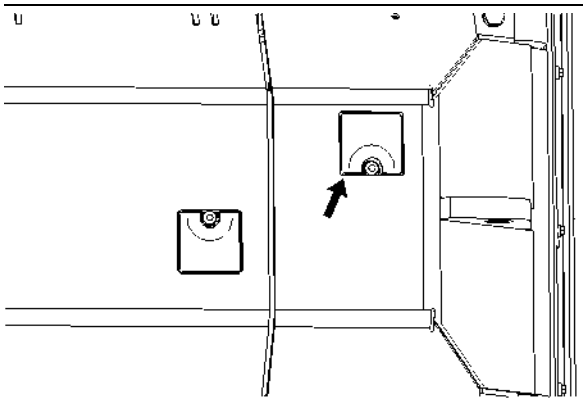

Illustration 200 g01048307

2. Remove the access cover for the coolant drain. The cover is located in the front, bottom guard.

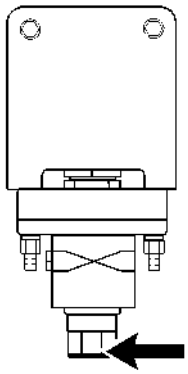

Illustration 201 g01113507
Bottom view

3. Remove the plug from the drain valve. Install a 12.7 mm (.5 inch) pipe into the drain valve. The pipe requires 1/2 - 14 NPTF threads. Clamp a hose to the pipe in order to direct the coolant into a suitable container.

4. Open the drain valve. Allow the coolant to drain into a suitable container.

5. Flush the system with water. Flush the system until the draining water is clear.

Note: If the cooling system is already using ELC, cleaning agents are not required at the specified coolant change interval. Cleaning agents are only required if the system has been contaminated by the addition of some other type of coolant or by cooling system damage. Clean water is the only cleaning agent that is required when ELC is drained from the cooling system.

6. Close the drain valve and install the plug.

7. Replace the access cover.

8. Add the ELC solution. Refer to Operation and Maintenance Manual, “Capacities - Refill”.

9. Start the engine. Run the engine without the filler cap until the thermostat opens and the coolant level stabilizes. Check the level of the coolant. Refer to Operation and Maintenance Manual, “Cooling System Coolant Level - Check”.

10. If the gasket is damaged, replace the filler cap. Install the filler cap.

11. Stop the engine.

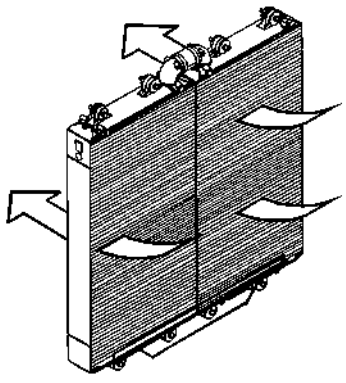

Illustration 202 g03510464

12. Clean the radiator cores with compressed air. You may need to use water in order to remove debris.

For additional information about the coolant, see Operation and Maintenance Manual, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i05546932

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-538

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.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

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

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

Dispose of all fluids according to local regulations and mandates.

Table 19

Amount of the Caterpillar Extended Life Coolant Extender by Cooling System Capacity	
Cooling System Capacity	Recommended Amount of Caterpillar Extender
208 L (55 US gal)	4.16 L (1.1 US gal)

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

For additional information about adding an extender, see Operation and Maintenance Manual, “Model Specific Coolant Information” or consult your Caterpillar dealer.

Use a 8T-5296 Coolant Test Kit to check the concentration of the coolant.

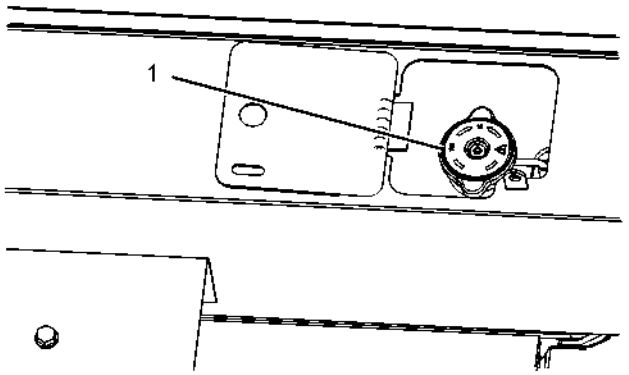

Illustration 203 g03512762

1. The access door for the radiator cap for the coolant is located on the top left of the engine enclosure. Loosen the radiator cap (1) slowly in order to relieve pressure. Remove the radiator cap.

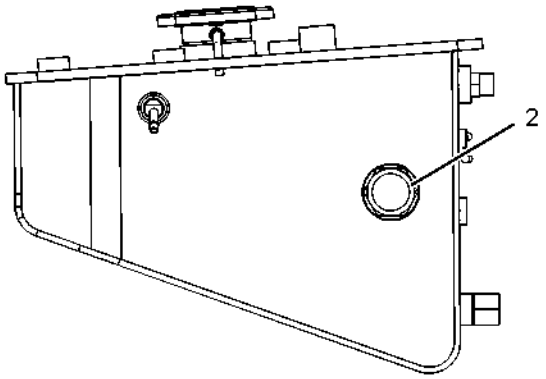

Illustration 204 g03513018

2. Open the left engine access door to view sight glass (2)

3. Draining some coolant from the radiator may be necessary so that Extender can be added to the cooling system.

4. Add 4.16 L (139 oz) of Extender to the cooling system.

5. Observe sight glass (2) in order to verify the level of coolant. If the coolant level is at the middle of the sight glass, the coolant level is correct. If the coolant level is below the middle of the sight glass, the coolant level is low.

6. Replace radiator cap (1) if the cap gasket is damaged. Install the radiator cap.

i05547594

Cooling System Coolant Level - Check

SMCS Code: 1353-535-FLV; 1395-535-FLV

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

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

The access door for the radiator cap for the coolant is located on the top left of the engine enclosure.

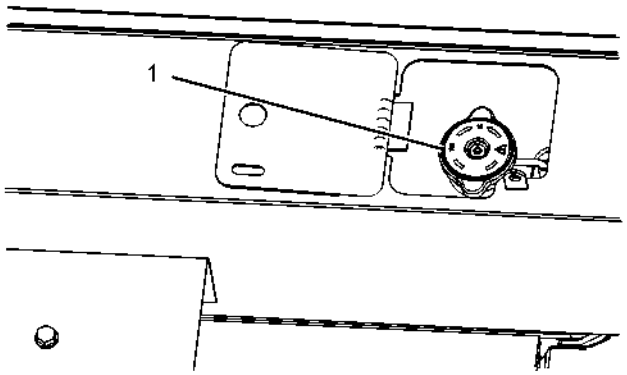

Illustration 205 g03512762

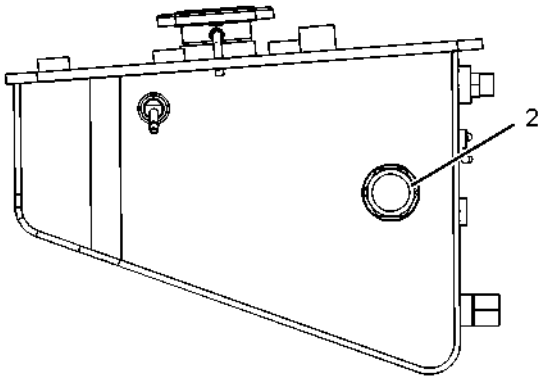

Illustration 206 g03513018

1. Open the left engine access door. Observe sight glass (2) to verify the level of the coolant. If the coolant is above the middle of the sight glass, the coolant level is correct. If the coolant level is below the middle of the sight glass, the coolant level is low.
2. If adding coolant is necessary, remove radiator cap (1) slowly to relieve the pressure.
3. Inspect radiator cap (1) and the radiator cap seal for debris, for foreign material, or for damage. Clean the radiator cap with a clean cloth. Replace the radiator cap if the radiator cap is damaged.
4. Install radiator cap (1).
5. Inspect the radiator core for debris. Clean the radiator core, if necessary.

Use compressed air, high-pressure water, or steam to remove dust and debris from the radiator core. However, the use of compressed air is preferred.

i05547632

Cooling System Coolant Sample (Level 2) - Obtain

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

Level 2 Analysis

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.

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.

Testing the coolant can be done at your Cat dealer. Caterpillar S·O·S Coolant Analysis is the best way to monitor the condition of your coolant and your cooling system. S·O·S Coolant Analysis is a program that is based on periodic samples. See Operation and Maintenance Manual, SEBU6250, “Caterpillar Machine Fluid Recommendations” “S.O.S Coolant Analysis” for more information.

Perform a Coolant Analysis (Level 2) at the initial 500 hours. Perform the analysis yearly after the initial 500 hours.

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 shipping sleeve 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.

1. Park the machine on a hard, level surface. Set the engine at low idle speed.

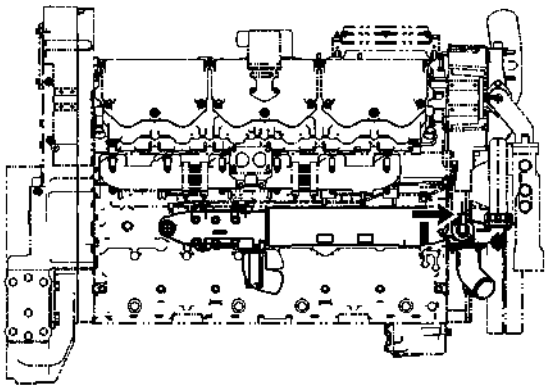

Illustration 207 g03513578

2. The sampling valve for the coolant is located on the right side of the engine. Remove the protective cap from the sampling valve.

3. Use a 169-8373 Fluid Sampling Bottle in order to obtain a sample.

4. Replace the protective cap.

Submit the sample for Level 2 analysis.

i05540568

Cooling System Water Temperature Regulators - Replace

SMCS Code: 1355-510

Replace the water temperature regulator before the water temperature regulator fails. Replacing the water temperature regulator is a recommended preventive maintenance practice. Replacing the water temperature regulator reduces the chances for unscheduled downtime. Refer to this Operation and Maintenance Manual, “Maintenance Interval Schedule” for the proper maintenance interval.

A water temperature regulator that fails in a partially opened position can cause overheating or overcooling of the engine.

A water temperature regulator that fails in the closed position can cause excessive overheating. Excessive overheating could result in cracking of the cylinder head or piston seizure problems.

A water temperature regulator that fails in the open position will cause the engine operating temperature to be too low during partial load operation. Low engine operating temperatures during partial loads could cause an excessive carbon buildup inside the cylinders. This excessive carbon buildup could result in an accelerated wear of the piston rings and wear of the cylinder liner.

NOTICE
Failure to replace your water temperature regulator on a regularly scheduled basis could cause severe engine damage.

Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a water temperature regulator installed.

If the water temperature regulator is installed incorrectly, the engine may overheat, causing cylinder head damage. Ensure that the new water temperature regulator is installed in the original position. Ensure that the water temperature regulator vent hole is open.

Do not use liquid gasket material on the gasket or cylinder head surface.

Refer to two articles in the Service Manual, Specifications, “Water Temperature Regulator” and Disassembly and Assembly Manual, “Water Temperature Regulator Housing - Remove and Install” for the replacement procedure of the water temperature regulator, or consult your Cat dealer.

Note: If the water temperature regulators are replaced, drain the coolant from the cooling system to a level that is below the water temperature regulator housing.

i03204387

Cutting Edges and End Bits - Inspect/Replace

SMCS Code: 6801-040; 6801-510; 6804-040; 6804-510

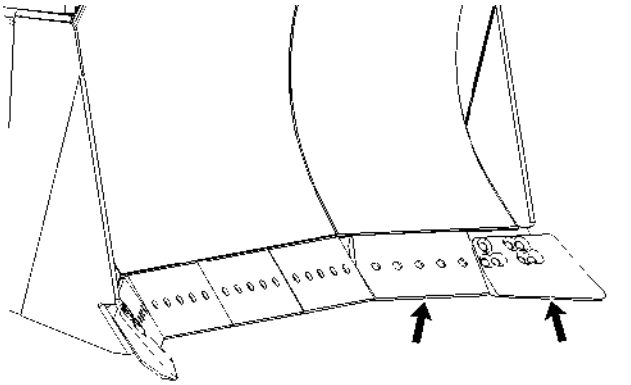

Illustration 208 g01051836

1. Raise the bulldozer blade and block up the bulldozer blade. When you remove the cutting edges and the end bits, maintain the bulldozer blade at a minimum height.

2. Remove the bolts. Then remove the cutting edge and the end bits.

3. Thoroughly clean all contact surfaces.

4. Inspect the opposite side of the cutting edge. If the opposite side of the cutting edge is not worn, turn the opposite side of the cutting edge outward and install the cutting edge.

5. If both sides of the cutting edge are worn, install a new cutting edge section.

Note: When the cutting edge is within 10 mm (0.4 inch) of the bottom of the support, change the cutting edge. **Do not allow wear to occur on the support.**

6. If the bottom edge or the outside edge of the end bit is worn, install a new end bit.

Note: When the end bit is within 10 mm (0.4 inch) of the bottom of the support, change the end bit. When the end bit is within 10 mm (0.4 inch) of the outside edge of the support, change the end bit. **Do not allow any wear to occur on the support.**

7. Install all bolts and tighten the bolts to the specified torque.

Reference: For more information, refer to Specifications, “Torque Specifications”.

8. Raise the bulldozer blade and remove the blocking. Lower the bulldozer blade to the ground.

9. After you operate the machine for a few hours, check all bolts for the proper torque.

i05547933

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1290-040; 1290-025

WARNING

The Electronic Control Module produces high voltage. To prevent personal injury make sure the Electronic Control Module is not powered and the unit injector solenoids are disconnected.

NOTICE
The camshafts must be correctly timed with the crankshaft before an adjustment of the unit injector lash is made. The timing pins must be removed from the camshafts before the crankshaft is turned or damage to the cylinder block will be the result.

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.

Adjust the electronic unit injector at the same interval as the valve lash adjustment.

Only qualified service personnel should perform this maintenance. Refer to Systems Operation Testing and Adjusting, “Electronic Unit Injector - Test” for the test procedure. Refer to Systems Operation Testing and Adjusting, “Electronic Unit Injector - Adjust” for the adjustment procedure.

i03619440

Engine Air Filter Primary and/or Secondary Element - Clean/Replace

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

Primary Filter

NOTICE
Service the primary filter element only when the alert indicator for the intake air filter is flashing. Do not open the filter compartment unless it is time for service. Opening the filter compartment can cause dirt to get into the clean side of the filter housing.

NOTICE
Extremely short air filter life can result if the precleaner system malfunctions. If air filter life is drastically reduced from typical for the operating conditions, consult your Caterpillar Dealer. The exhaust system dust ejector for the strata tube precleaner must pull a minimum vacuum of 508 mm (20 inch) of water.

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

NOTICE
Always leave the secondary filter element in place while you clean the primary element, or while you clean the air cleaner housing.

NOTICE
Do not use the filter for longer than one year.

1. Open the engine compartment's access door, if equipped.

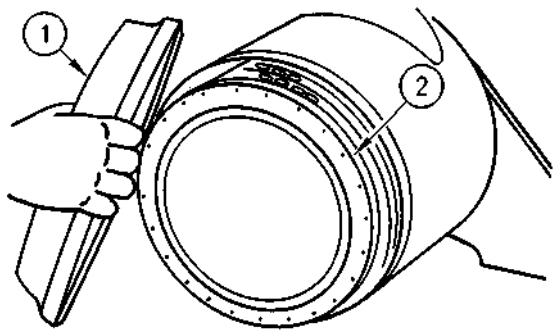

Illustration 209 g00470852

2. Remove the air cleaner cover (1). Pull out in order to remove the element.

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

4. Mark the secondary filter element in order to show that the primary filter element has been serviced. The secondary filter element should be replaced when the primary filter element is serviced for the third time. Refer to the section “Secondary Filter”.

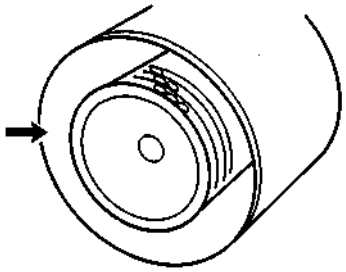

Illustration 210 g00470857

5. Clean the inside of the air cleaner housing. Keep the secondary filter element in place while you clean the housing.

6. If the primary filter element has not been cleaned six times, inspect the primary filter element. If the primary filter element has been cleaned six times, replace the primary filter element. Proceed to Step 9.

7. Inspect the primary filter element. Inspect the filter element for holes and for tears by looking through the filter element. Look toward a bright light. Inspect the element for damaged gaskets or for dented metal parts. Replace damaged filters. Always crush damaged filter elements. Properly discard the filter elements. If you replace the primary filter element, proceed to step 9.

8. If the primary filter element is not damaged and the element has not been previously cleaned six times, clean the element. The filter element can be cleaned by using pressure air. Use a maximum air pressure of 205 kPa (30 psi). Direct the air from the clean side to the dirty side. In order to show that the filter element has been cleaned, mark the element. The primary filter element can be cleaned up to six times.

NOTICE
Do not clean the filter elements by bumping or tapping them. Do not use filter elements with damaged pleats, gaskets, or seals. Do not wash the filter elements.

9. Push the filter element firmly in order to properly seat the element. Write the date on the element, if the primary element is replaced.

10. Install the air cleaner cover.

11. Close the access door, if equipped.

Secondary Filter

NOTICE
Always replace the secondary filter element. Never attempt to reuse it by cleaning.

The secondary filter element should be replaced at the time the primary element is serviced for the third time.

The secondary filter element should also be replaced if the yellow piston in the filter element indicator enters the red zone after installation of a clean primary element, or if the exhaust smoke is still black.

NOTICE
The filter should be kept in service for no longer than one year.

NOTICE
Always leave the secondary filter element in place while you clean the air cleaner housing.

1. Open the engine access door, if equipped.

2. Remove the air cleaner housing cover.

3. Remove the primary filter element. Refer to the section “Primary Filter”.

4. Clean the inside of the air cleaner housing.

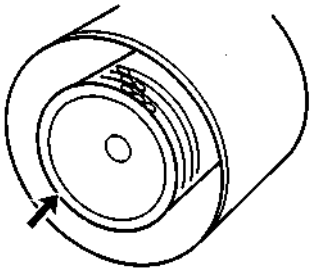

Illustration 211 g00470240

5. Remove the secondary filter element. Pull out in order to remove the element.

6. Install a new secondary filter element. Push the element firmly in order to properly seat the element. Write the date on the element, if the element is replaced.

7. Install the primary filter element and the air cleaner housing cover.

8. Close the engine access door, if equipped.

i05548329

Engine Air Precleaner - Clean

SMCS Code: 1055-070

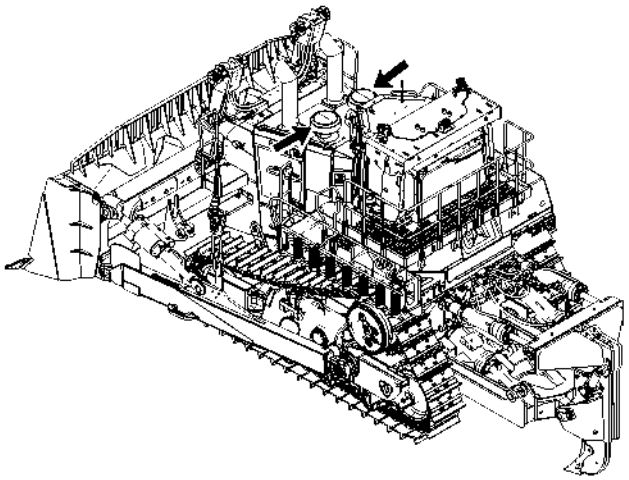

Illustration 212 g03514080

Inspect the air inlet screen for dirt and for trash.

1. Remove the screen. Clean the screen if the screen is dirty.

2. Inspect the precleaner tube for dirt and for dust.

3. Clean the precleaner tube with pressure air if the precleaner tube is dirty.

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

Run the engine at high idle. If the engine air filter indicator still flashes, service the air filter. Stop the engine.

i07518330

Engine Components - Clean/Inspect, Rebuild/Install Reman, Install New
(Every 1,200,000 L (317,000 US gal) of Fuel)

SMCS Code: 1000

Caterpillar recommends this additional maintenance for the following engine components. Consult your Cat dealer for further information.

Clean Components and Inspect Components for Reusability

- Camshaft
- Connecting rods
- Crankshaft
- Cylinder block
- Cylinder liners
- Damper
- Gear train
- NOx Reduction System (NRS) venturi
- Pistons
- Piston pins
- Rocker arm assemblies
- Rocker arm shaft
- Spacer plates (head)

Rebuild Components and/or Install Remanufactured Components

- Cylinder heads
- NOx reduction system (NRS) control valve
- Oil coolers (if equipped)
- Oil pump
- Scavenge oil pump (if equipped)

Install New Components

- All seals, gaskets, and O-rings
- Camshaft bearings
- Diesel Oxidation Catalyst (DOC)
- Engine fuel lines
- Engine mounts
- Fuel pressure regulating valve
- Fuel priming pump
- Gear train bushings, bearings, and thrust plates
- Heat shields
- Main bearings, rod bearings, and crankshaft thrust plates
- NRS Cooler and bellows
- Piston rings
- Updated engine software
- Wiring harness

i07534891

Engine Components - Clean/Inspect, Rebuild/Install Reman, Install New
(Every 600,000 L (158,500 US gal) of Fuel)

SMCS Code: 1000

Caterpillar recommends this additional maintenance for the following engine components. Consult your Cat dealer for further information.

Clean Components and Inspect Components for Reusability

- Heat shields

Rebuild Components and/or Install Remanufactured Components

- Fuel transfer pump
- Injectors
- Turbochargers
- Water pump

Install New Components

- Water temperature regulators

- Diesel Oxidation Catalyst (DOC) bellows
- Rubber NRS Hoses

i06990293

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

The crankcase breathers are on the top of the engine.

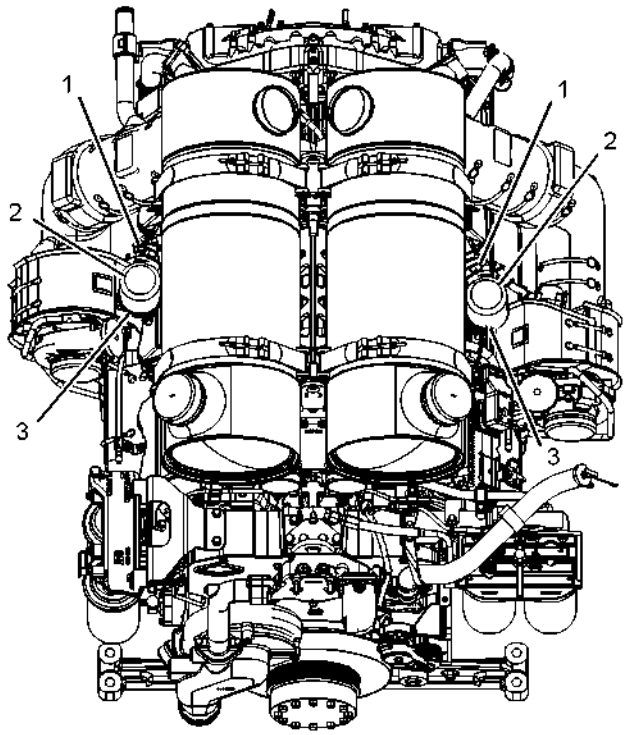

Illustration 213 g03514100
Top view

1. Remove hose (1) from the outlet of the breather (2) on each side of the engine.

Note: Perform steps 2 through 8 on each crankcase breather.

2. Remove clamp (3) at the base of the breather (not shown). Remove the breather from the engine.

3. Remove the elbow attached to the valve cover (not shown). Check the condition of the seal. Replace the seal if the seal is damaged.

4. Remove the breather element. Wash the breather element and the breather in a clean nonflammable solvent.

5. Shake the breather element until the breather element is dry. You may also use pressure air to dry the breather element.

6. Check the condition of the hose. Replace the hose if the hose is damaged.

7. Install the element into the breather and install the breather.

8. Install the hose onto the outlet of the breather cover and tighten the clamp.

i05379594

Engine Mounts and Equalizer Bar - Inspect

SMCS Code: 1152-040; 7206-040

Engine Mounts

Caterpillar recommends checking the engine mounts for deterioration. This recommendation will prevent excessive engine vibration that is caused from improper mounting.

Equalizer Bar End Pins

⚠ WARNING

Personal injury or death can occur from not following the proper procedure or the recommended tooling.

To prevent the possibility of injury or death, follow the established procedure using the recommended tooling.

NOTICE
The machine must be parked on a level surface to perform this procedure.

Note: All the weight of the machine must be removed from the equalizer bar. Equalizer bar must have free movement in order to be measured.

To check the equalizer bar end pin for movement and unusual wear, perform the following steps.

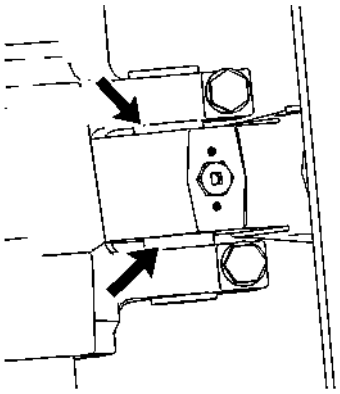

Illustration 214 g01108793

1. Clean the areas that are around the end pin with a high-pressure wash. Inspect the condition of the seal.

2. Check the area for oil leakage and a neutral seal position.

3. Check the oil in both end pin joints.

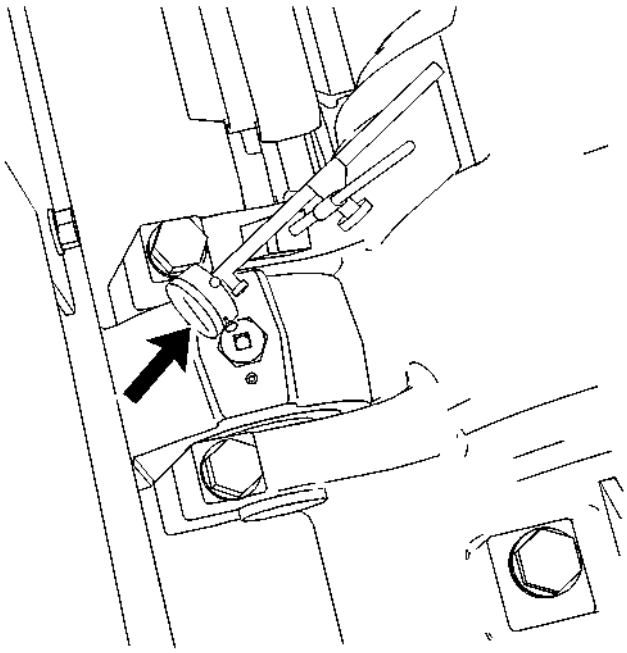

Illustration 215 g01108795

4. Position a dial indicator on the bracket for the pin on the roller frame. Set the dial indicator probe on top of the equalizer bar. Set the dial indicator to zero.

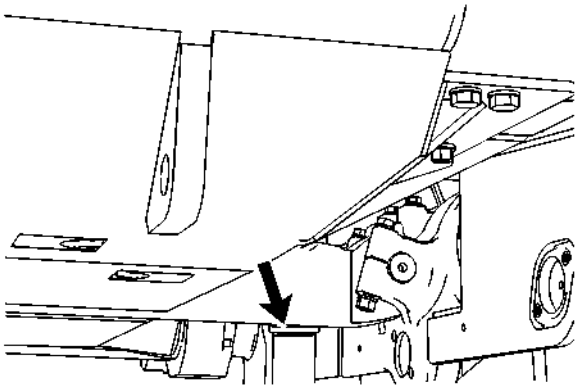

Illustration 216 g01108798

5. Put a 55 ton hydraulic jack in position under the end of the equalizer bar.

6. Jack up the equalizer bar and take a reading on the dial indicator in order to determine the amount of wear.

Note: Schedule the end pin joint for repair if the reading on the dial indicator exceeds 1.50 mm (.059 inch).

7. Repeat the inspection and the measurement procedure for the other end of the equalizer bar and end pin.

Consult your Caterpillar dealer for an inspection and for repair instructions.

Equalizer Bar Center Pin

⚠ WARNING

Personal injury or death can occur from not following the proper procedure or the recommended tooling.

To prevent the possibility of injury or death, follow the established procedure using the recommended tooling.

NOTICE
The machine must be parked on a level surface to perform this procedure.

Note: All the weight of the machine must be removed from the equalizer bar. Equalizer bar must have free movement in order to be measured.

To check the equalizer bar center pin for looseness and for unusual wear, perform the following steps.

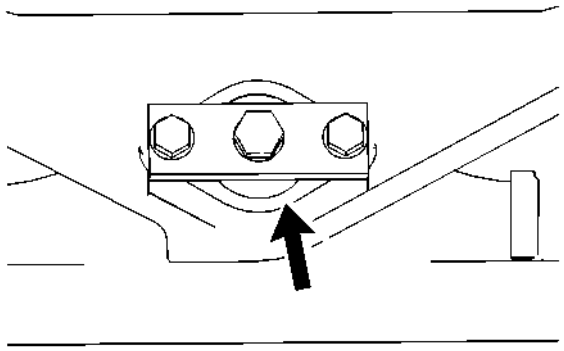

Illustration 217 g01108801

1. Clean the areas that are around the center pin and equalizer bar.

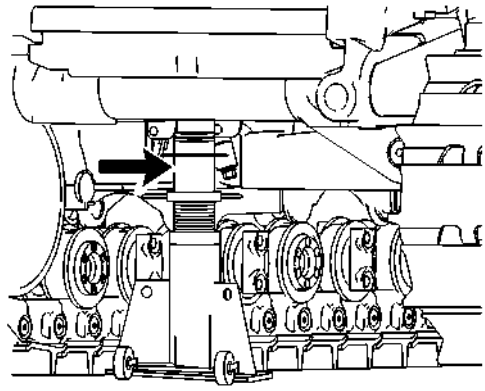

Illustration 218 g01108803

2. Put a 55 ton hydraulic jack in position under the main frame, as shown.

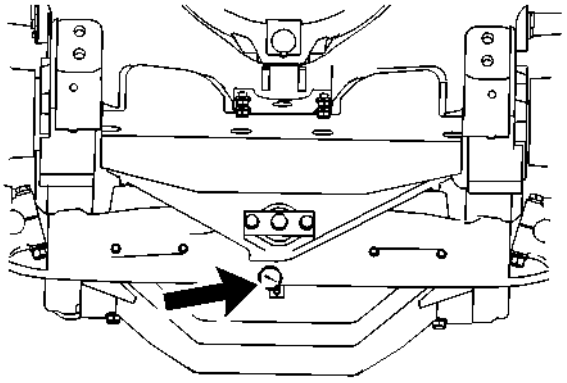

Illustration 219 g01108804

3. Position a dial indicator on the equalizer bar and place the probe of the dial indicator under the center of the frame for the pin. Set the dial indicator to zero.

4. Jack up the front of the machine until the weight of the roller frames are supported by the equalizer bar.

5. Take a reading of the dial indicator in order to determine the amount of wear on the pin and bearing.

Note: Schedule the center pin joint for repair if movement exceeds 2.54 mm (.100 inch).

Consult your Caterpillar dealer for an inspection and for repair instructions.

Equalizer Bar Pads

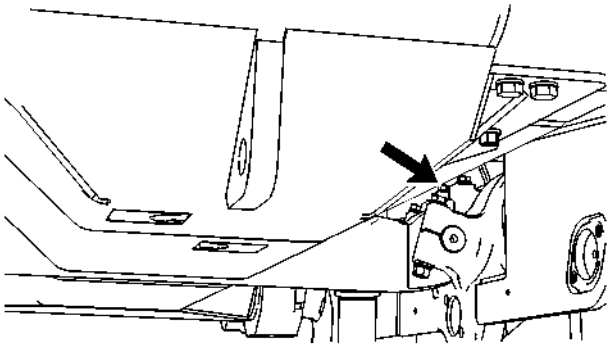

Illustration 220 g01108806

The equalizer bar pads are under the front guard, which is underneath the machine. Inspect the equalizer bar pads for cracked rubber and for missing portions of rubber. Consult your Caterpillar dealer for replacement parts and for replacement instructions.

i05548967

Engine Oil Level - Check

SMCS Code: 1302-535-FLV; 1326-535-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

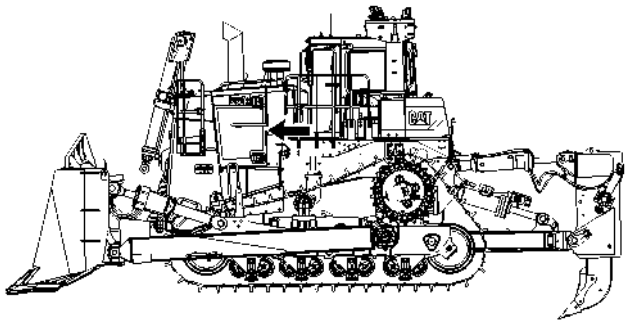

Illustration 221 g03514596

1. Open the access cover on the left side of the machine.

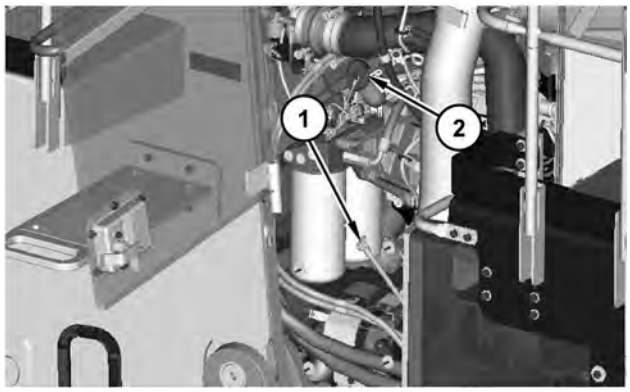

Illustration 222 g03358524

Note: Your machine is equipped with one of the two dipsticks that are shown.

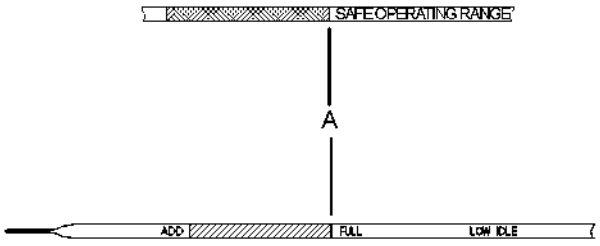

Illustration 223 g01223388

(A) Full mark at the engine running position(“LOW IDLE”)

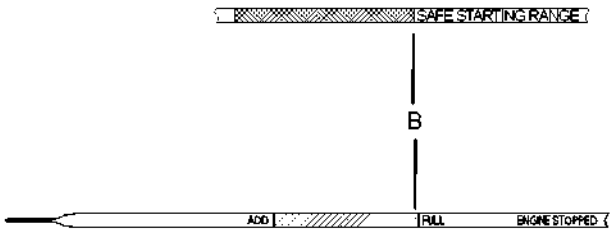

Illustration 224 g01218685

(B) Full mark with cold engine oil (“ENGINE STOPPED”)

2. Check the “SAFE OPERATING RANGE” side or the “LOW IDLE” side of dipstick (1) while the engine is running at low idle. The oil should be at operating temperature. Maintain the oil level to the “FULL” mark.

Check the “SAFE STARTING RANGE” side or the “ENGINE STOPPED” side of dipstick (1) before starting the engine when the engine oil is cold. Maintain the oil level to the “FULL” mark.

Note: When you operate the machine on severe slopes, the oil level in the engine crankcase must be in the “SAFE OPERATING RANGE” zone or “LOW IDLE” zone of the dipstick.

3. Remove oil filler cap (2). If necessary, add oil.

4. Clean the oil filler cap and install the oil filler cap.

5. Close the access cover.

i05548270

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 7542-008

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

Obtain the sample of the engine oil as close as possible to the recommended sampling interval. The sampling interval may vary for some S·O·S oil analysis programs. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

Supplies for collecting samples can be obtained from your Caterpillar dealer. These supplies include the following: probes, probe holders, tubing and sampling bottles.

Use the following guidelines for proper oil sampling:

- Always take samples when the machine is at operating temperature and the oil has had time in order to circulate through the oil system.
- Always drain about 100 mL (4 oz) of oil into a container before you take the sample. This action will flush the sampling valve.
- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from the drain for a system, a pan of used oil or a used filter.

1. Operate the machine until the machine reaches operating temperature.

2. Set the engine at low idle.

3. Open the access cover (if equipped) that is on the right side of the machine.

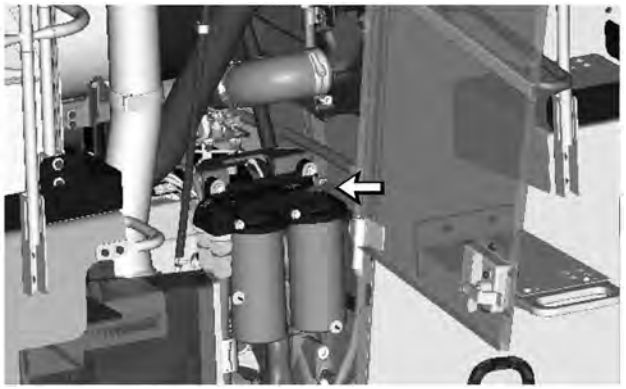

Illustration 225 g03358535

4. Clean the area around the sampling valve and the protective cap in order to avoid contamination of the sample. Remove the protective cap.

5. Flush the sampling valve. Insert the probe into the sampling valve. Collect about 100 mL (4 oz) of oil into a container. This action will flush the sampling valve. Remove the probe.

Note: Increasing the engine RPM may be necessary if the oil flow is too slow at low idle.

6. Collect the sample. Do not allow dirt or other contaminants to enter the sampling bottle. Insert the probe into the sampling valve and fill the sampling bottle three-fourths from the top. Do not fill the bottle completely.

7. Remove the probe from the sampling valve. Put the cap securely on the sampling bottle. Place the sampling bottle with the completed label into the mailing tube.

8. Replace the protective cap on the sampling valve.

9. Close the access cover (if equipped).

Engine Without a Sample Port

If the engine is not equipped with a sampling valve, use the 1U-5718 Vacuum Pump . This pump is designed to accept sampling bottles. Disposable tubing must be attached to the pump for insertion into the sump. For instructions, see Special Publication, PEGJ0047, “How To Take A Good S·O·S Oil Sample”. Consult your Cat dealer for complete information and assistance in establishing an S·O·S program for your engine.

i05549127

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1318-510

Selection of the Oil Change Interval

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
This D10T2 Track-Type Tractor with serial number JJW1–Up is equipped with a C27 engine with Acert technology. This engine meets EPA Tier 4 Final, Euro Stage IV, or MILT Step 4 emission regulations. A 500 hour engine oil change interval is available, if the following conditions are met. Acceptable operating conditions, recommended multigrade oil types, and an S·O·S oil sampling and analysis program are used. Otherwise, use a 250 hour engine oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

For a D10T2 machine with another serial number, the 500 hour engine oil change is still available if the following conditions are met. Acceptable operating conditions, recommended multigrade oil types, and an S·O·S oil sampling and analysis program are used. Otherwise, use a 250 hour engine oil change interval.

CAT oil filters are recommended.

Recommended multigrade oil types are listed in Table 20 .

Note: Do not use API CF-4 oils in Caterpillar machine diesel engines.

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or dusty conditions may require a reduction in engine oil change intervals from the recommendations in Table 20 . Also refer to Manual, SEBU5898, “Cold Weather Recommendations for all Caterpillar Machines”. Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. See your Cat dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Table 20

D10T Engine Oil Change Interval[1]				
Multigrade Oil Type	Operating Conditions			
	Standard [1]	Extended [1]	Severe	
			Fuel Sulfur above 0.3% [2]	Altitude above 1830 m (6000 ft)
Cat DEO-ULS, ECF-3, API CJ4[3]	250 hr	500 hr	NA	250 hr
Cat DEO-ULS, DEO Preferred	250 hr	500 hr	250 hr	250 hr[3]
ECF-2 Preferred	250 hr	500 hr	250 hr	250 hr
ECF-1-a	250 hr	250 hr	150 hr[4]	250 hr[4]

(1) The standard oil change interval for engines is 250 hours. The extended oil change interval in this machine is 500 hours if the following conditions are met. Acceptable operating conditions, recommended oil types, and an S·O·S oil sampling and analysis program are used. This extended interval is not permitted for other machines. Refer to the applicable Operation and Maintenance Manuals for the other machines.
(2) For sulfur content above 0.1%, refer to this topic in the Manual, SEBU6250, “Caterpillar Machine Fluid Recommendations”.
(3) Required oils for Tier 4 engines
(4) Use “Program B” below to determine an appropriate interval.

Adjustment of the Oil Change Interval

Note: Your Cat dealer has additional information on these programs.

Program B

Optimizing Oil Change Intervals

Begin with the standard oil change interval. The oil change intervals are adjusted by increments. Each interval is adjusted an additional 50 hours. Periodic oil sampling and analysis are done during each interval. The analysis includes oil viscosity and infrared (IR) analysis of the oil. Repeat Program B if you change the application of the machine.

If an oil sample does not pass the analysis, shorten the oil change interval.

References

Reference: Form, PEDP7035, “Optimizing Oil Change Intervals”

Reference: Form, PEDP7036, “S·O·S Fluid Analysis”

Reference: Form, PEHP7076, “Understanding the S·O·S Oil Analysis Tests”

Procedure for Changing the Engine Oil and Filter

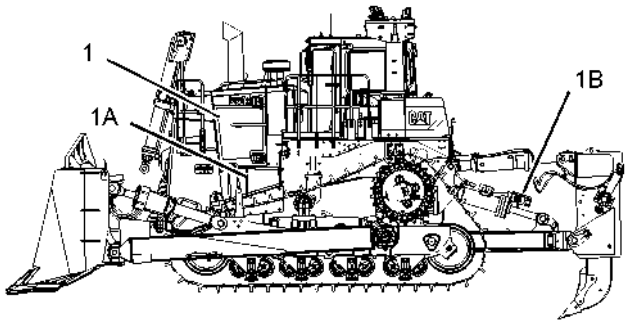

Illustration 226 g03515516

1. Open left engine access door (1). Open left lower engine panel (1A).

a. The high speed oil change arrangement is at location (B) on the left ripper cylinder for machines with a ripper.

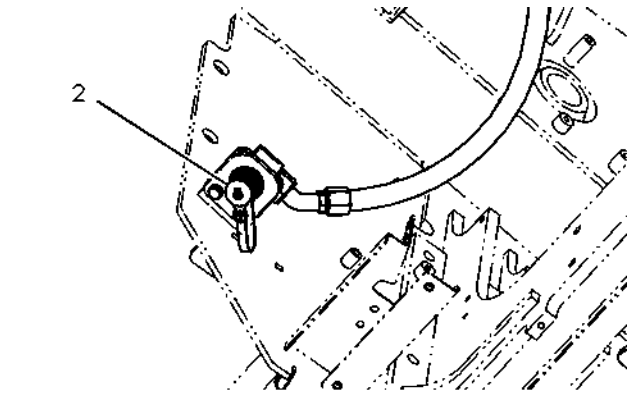

Illustration 227 g03515265

2. If the machine is equipped with a high speed oil change arrangement (2), use a nozzle assembly to drain the oil from the crankcase.

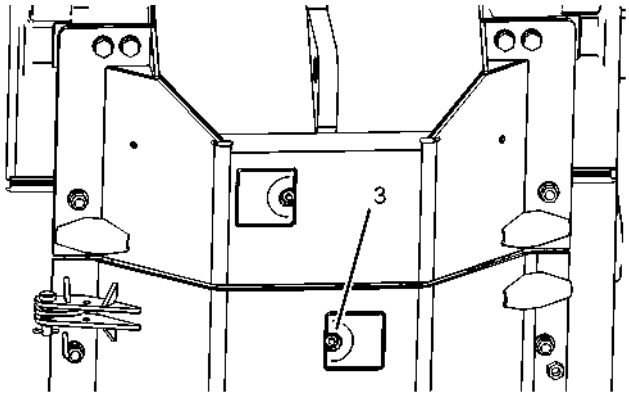

Illustration 228 g01051220

3. The access cover for the crankcase drain is located in the belly guard underneath the front of the machine. Remove the bolt in order to remove the access cover.

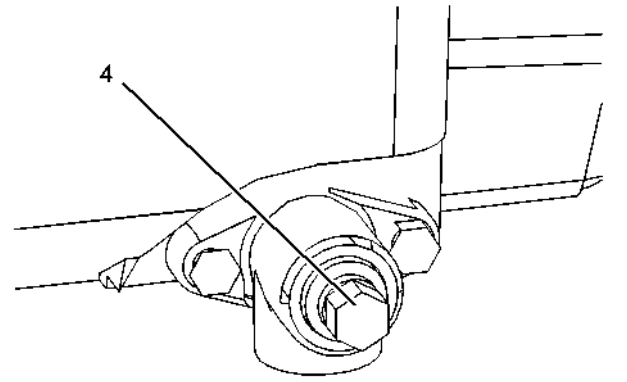

Illustration 229 g01047321

4. Open the crankcase drain valve. Allow the oil to drain into a suitable container. A drain hose may be attached to the crankcase drain valve in order to aid the draining of the oil.

5. When the oil has been drained from the crankcase, close the crankcase drain valve. Close the crankcase drain access cover.

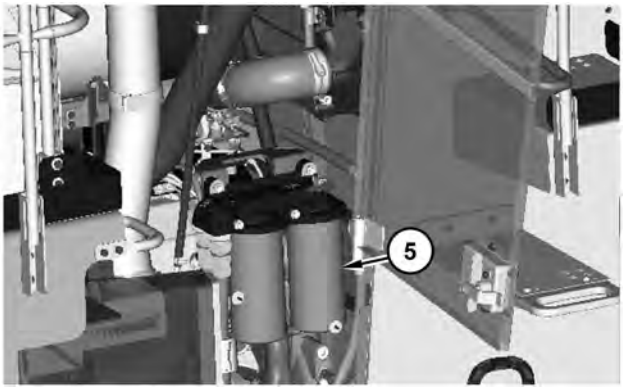

Illustration 230 g03356965

6. Remove the crankcase oil filter elements (5) and discard the crankcase oil filter elements properly. Make sure that all of the old filter seals are removed from the filter base.

7. Apply a thin film of clean engine oil to the sealing surface of the new filter element.

8. Install the new oil filter elements by hand.

Instructions for the installation of the filters are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

9. Open the left engine compartment door.

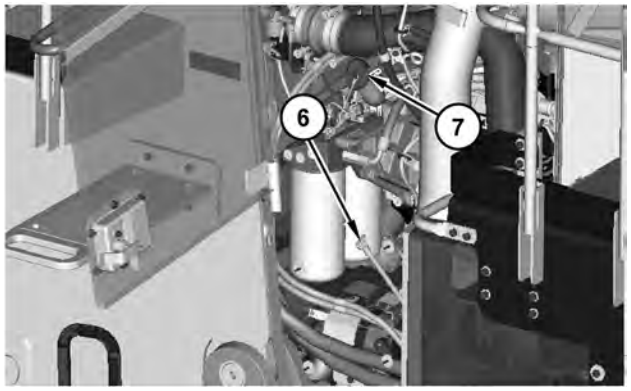

Illustration 231 g03356967

10. Remove oil filler cap (7). Fill the crankcase with new oil. See Operation and Maintenance Manual, “Capacities (Refill)”. Clean the oil filler cap and install the oil filler cap.

11. Always measure the oil level with dipstick (6) in order to ensure that the correct amount of oil was added.

12. Start the engine in order to warm the oil.

Note: Your machine is equipped with one of the two dipsticks that are shown.

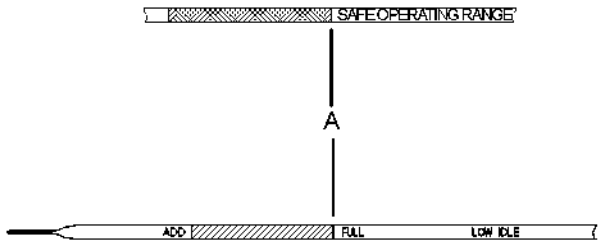

Illustration 232 g01223388

(A) Full mark at the engine running position (“LOW IDLE”)

13. Check the “SAFE OPERATING RANGE” side or the “LOW IDLE” side of the dipstick while the engine is running. The oil should be at operating temperature. Maintain the oil level in the “SAFE OPERATING RANGE” or the “LOW IDLE” range.

14. Close the engine access doors and engine panels on both sides of the machine, as needed.

i05550689

Engine Valve Lash - Check/ Adjust

SMCS Code: 1102-025

WARNING

To prevent possible injury, do not use the starter motor to turn the flywheel.

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

WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

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

NOTICE
Measure the valve clearance with the engine stopped. To obtain an accurate measurement, allow at least 20 minutes for the valves to cool to engine cylinder head and engine block temperature.

Check the valve bridge before setting the valve lash. Ensure that the valve bridge is seated equally on both valve stems.

Refer to Systems Operation Testing and Adjusting, “Valve Lash Adjustment” for the valve lash adjustment procedure. Consult your Cat dealer for assistance.

i07730205

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn, to prevent being burned by hot oil or spray.

WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

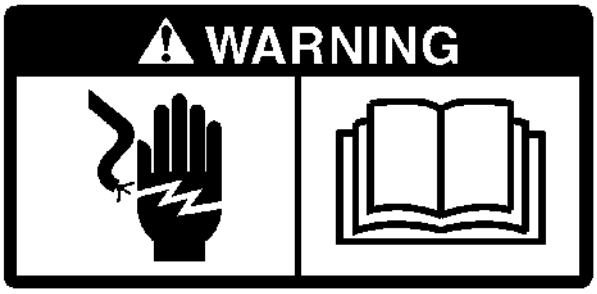

Illustration 233 g00941949

1. Install camera that can be viewed on a remote display.

2. Start the engine and operate the engine at low idle.

3. Via the display. Observe the top surface of each valve rotator. The valve rotators should turn slightly when the valves close.

4. If a valve rotator fails to rotate, consult your Caterpillar dealer for service.

Note: Caterpillar recommends replacing valve rotators that are operating improperly. An improperly operating valve rotator will shorten valve life because of accelerated wear on the valves.

Note: If a damaged valve rotator is not replaced, some valve face guttering could result. Metal particles from the valve could fall into the cylinder. This could cause damage to the piston head and to the cylinder head.

i05550553

Equalizer Bar End Pins - Lubricate

SMCS Code: 7206-086-PN; 7207-086-PN

NOTICE
Care should be used when adding grease to equalizer bar end pin joints. Excessive grease pressure could cause the equalizer bar end pin seals to bulge outward and result in a premature seal failure.

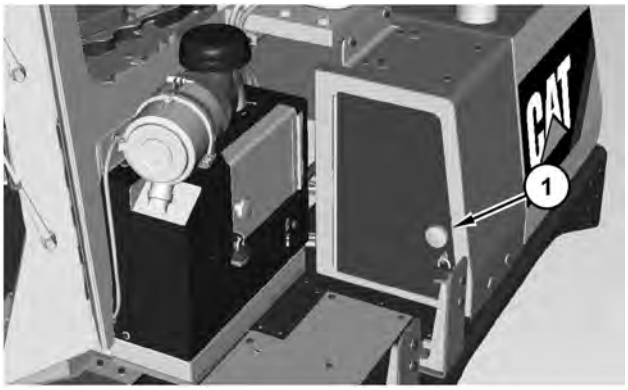

Illustration 234 g03516016

Equalizer bar end pins on both the left-hand and right-hand side of the machine are lubricated from a remote location. The equalizer bar end pin lubrication manifold is located in a compartment (1) on the left side of the machine.

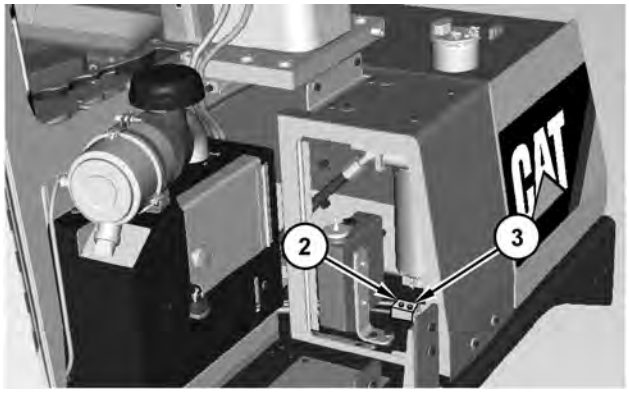

Illustration 235 g03515821

Equalizer bar end pin lubrication manifold

(2) Equalizer bar end pin grease fitting
(3) Equalizer bar end pin grease fitting

1. Open the access door to the compartment (1) which houses the equalizer bar end pin lubrication manifold.

2. Use equalizer bar end pin grease fitting (2) to lubricate the end pin on one side of the equalizer bar.

3. Use equalizer bar end pin grease fitting (3) to lubricate the end pin on the other side of the equalizer bar.

Note: Some resistance should be detected when grease is flowing to the equalizer bar end pin properly. If grease flows too easily, a problem such as a broken supply line may exist. If no grease can be applied, an obstruction is interfering with grease flow. If either of these situations exists, perform an investigation to determine the cause of improper grease flow.

4. When finished, close the left side access door.

A visual confirmation of proper equalizer bar end pin lubrication can be made by examining the equalizer bar end pin relief valve.

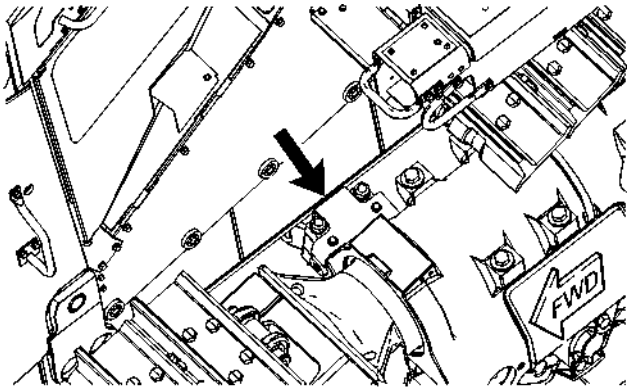

Illustration 236 g02712021

Portion of left-hand track removed for visibility

Left-hand equalizer bar end pin guard

Remove the two retaining bolts and washers that secure the equalizer bar end pin guard. Lift the guard from position to reveal the equalizer bar end pin relief valve.

Note: If necessary, clear dirt and debris from above the equalizer bar end pin guard before removal.

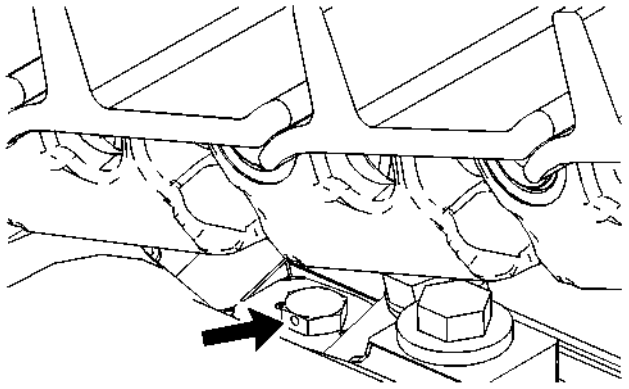

Illustration 237 g02703659

One of two vent holes in left-hand equalizer bar end pin relief valve

Clean any remaining debris from around the equalizer bar end pin relief valve after removal of the equalizer bar end pin guard. Grease will escape from the vent holes of the equalizer bar end pin relief valve once the chamber around the equalizer bar end pin is filled with grease.

Note: Lubrication routes are separate for both the left-hand and right-hand side equalizer bar end pins. Each side must be checked separately to ensure that proper lubrication is occurring.

Note: Excessive wear will occur to the equalizer bar end pin joint components if these components do not receive adequate lubrication.

i05584369

Equalizer Bar End Pins Oil Level - Check
(If Equipped)

SMCS Code: 7206-535-FLV

Note: If your machine is equipped with this arrangement, perform this procedure every 10 service hours or daily, which ever occurs first.

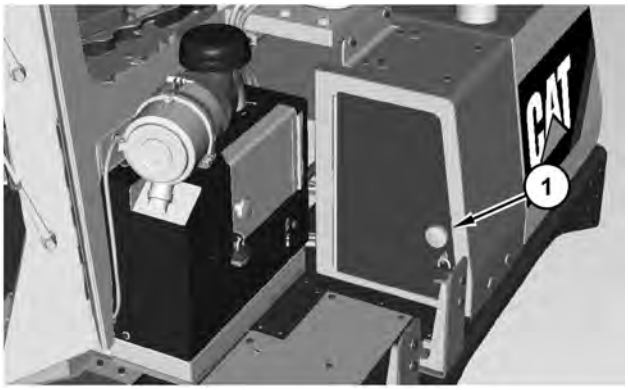

Illustration 238 g03516016

1. Open the access door on the left side of the cab.

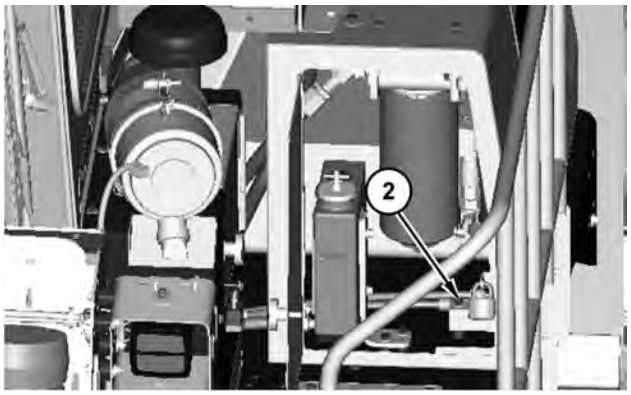

Illustration 239 g03543416

2. Check the oil level (2). Add the oil to the oil reservoir. See Operation and Maintenance Manual, “Equalizer Bar End Pins - Lubricate” for additional information.

i05282349

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

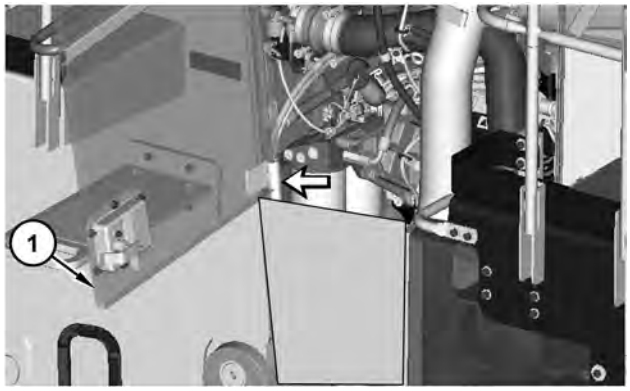

Illustration 240 g03356958

1. Open the left engine compartment door (1).

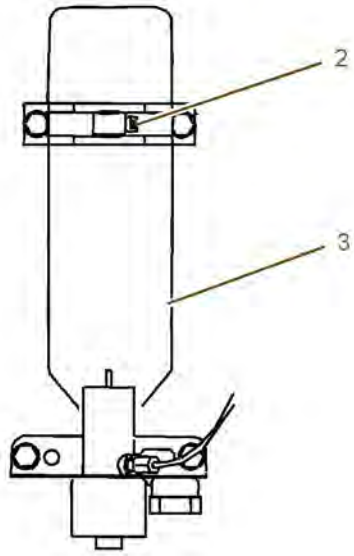

Illustration 241 g01053304

2. Loosen the cylinder retaining clamp (2). Unscrew the empty ether starting aid cylinder (3) and remove the cylinder.

3. Remove the used gasket. Install the new gasket that is provided with each new cylinder.

4. Install the new cylinder. Tighten the cylinder by hand. Tighten the cylinder retaining clamp securely.

5. Close the left engine compartment door.

i01834830

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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 machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids.

Dispose of all fluids according to local regulations and mandates.

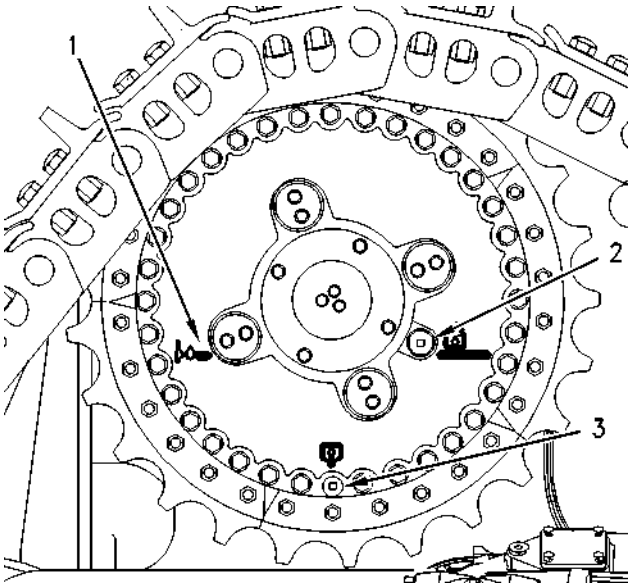

Illustration 242 g00937318

1. Position one final drive so that oil level mark (1) is horizontal. Drain plug (3) should face downward.

2. Remove drain plug (3). Allow the oil to drain into a suitable container.

3. Remove oil filler plug (2) in order to vent the final drive as the oil drains out of the final drive.

4. Inspect the drain plug seal. Replace the drain plug seal if the drain plug seal is damaged.

5. Clean drain plug (3) and install the drain plug.

6. Remove oil filler plug (2).

7. Fill the final drive with oil to the bottom of the filler plug opening. See Operation and Maintenance Manual, “Refill Capacities”.

8. Inspect the condition of the plug seal. Replace the plug seal if the plug seal is damaged.

9. Repeat Step 1 to Step 8 in order to change the oil in the other final drive.

i01834822

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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 machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids.

Dispose of all fluids according to local regulations and mandates.

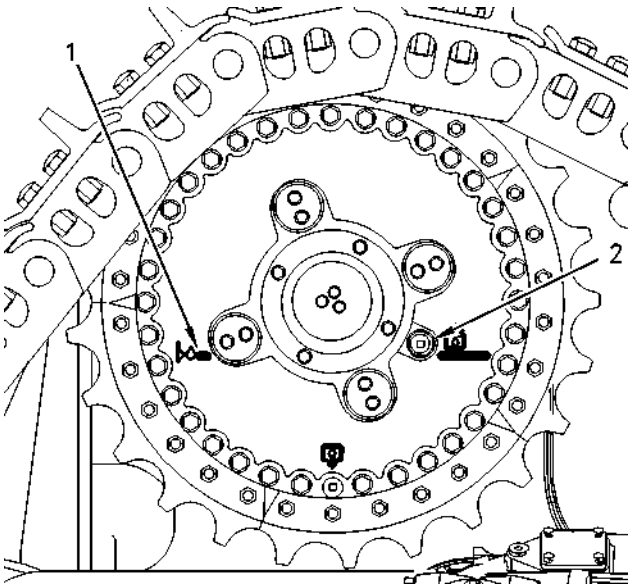

Illustration 243 g00937314

1. Position one final drive so that oil level mark (1) is horizontal with the oil filler plug (2).

2. Remove oil filler plug (2).

3. The oil level should be at the bottom of the filler plug opening. Add oil, if necessary.

4. Wipe the magnet in order to clean the plug.

5. Install oil filler plug (2).

6. Repeat Step 1 to Step 5 in order to check the oil level in the other final drive.

i01835051

Final Drive Oil Sample - Obtain

SMCS Code: 3258-008; 4050-008; 7542-008

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

Obtain the sample of the differential and final drive oil as close as possible to the recommended sampling interval. The recommended sampling interval is every 500 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data.

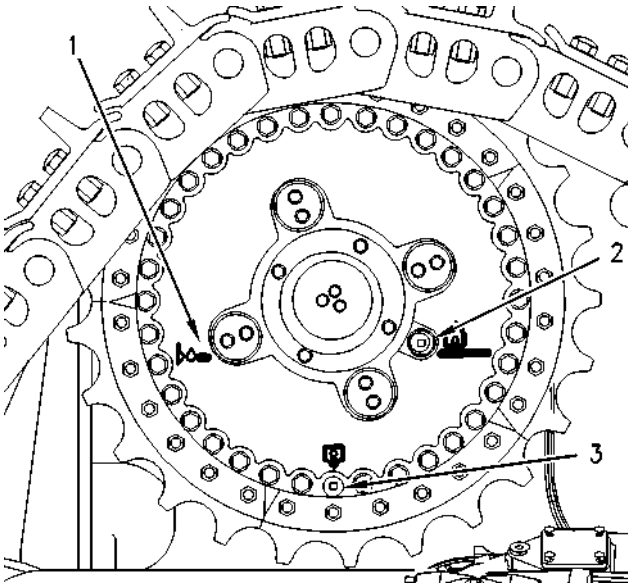

Illustration 244 g00937447

1. Position one final drive so that oil level mark (1) is horizontal. Drain plug (3) should face downward.

2. Remove oil filler plug (2) and obtain the oil sample with a proper suction device.

3. Install oil filler plug (2).

4. Repeat Step 1 through Step 3 in order to sample the oil in the other final drive.

i07433276

Fire Suppression System - Service

SMCS Code: 7401

The factory installed fire suppression system requires periodic inspection and service. These activities must be carried out by an authorized fire suppression distributor. Contact an authorized fire suppression distributor for recommended service.

When performing maintenance, or service, the fire suppression system must be isolated.

Note: Only authorized personnel should perform visual inspections of the fire suppression system.

Note: In the event of a low power indication or if the battery life is less than 25% the fire suppression system battery must be replaced.

1. Isolate the system. Refer to this Operation and Maintenance Manual.

2. Visually inspect all fire suppression system components for damage or debris which includes:

- Agent tanks
- Gas cylinders
- Fire suppression system electronic components and detectors
- Fire suppression system heat sensing wires and agent lines for damage or abrasion
- Nozzles and nozzle caps for damage or debris buildup

Immediately repair or replace any damaged components.

Contact an authorized fire suppression agent for inspection, if required.

i05559657

Fuel System - Prime

SMCS Code: 1250-548; 1258-548

If the engine does not start, air may be trapped in the fuel lines to the engine. Use the following procedure in order to purge air from the fuel lines.

1. Turn the key to the ON position. The electric fuel priming pump is activated in this way.

2. Leave the key in the ON position for 2 minutes. This action allows the system to fully prime.

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

3. Start the engine. If you cannot start the engine, the engine needs more priming. If the engine continues to misfire or to smoke, more priming is necessary.

4. The fuel system will need to be primed when the fuel filters are replaced or fuel has been lost in the fuel supply system.

i05282269

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

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 allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over disconnected fuel system component.

The fuel system water separator is located in the rear compartment on the left side of the machine.

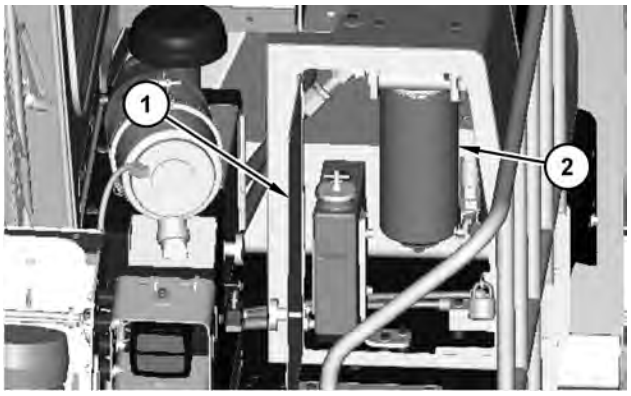

Illustration 245 g03356912

Primary fuel filter (water separator) (2) should be monitored daily for signs of water. If water is present, drain the water from the filter.

1. Open the left side access door (1) to the rear compartment.

2. Place drain hose (4) on the outside of the machine.

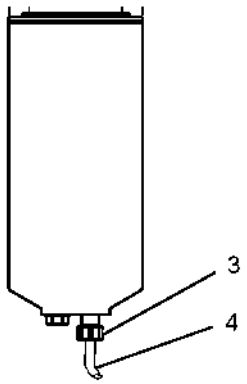

Illustration 246 g03356916

3. Open drain valve (3). The drain is a self-ventilated drain. Catch the draining water in a suitable container. Dispose of the water properly.

4. Close drain valve (3).

5. Reposition drain hose (4).

6. Close access door (1).

NOTICE
The water separator is under suction during normal engine operation. Ensure that the drain valve is tightened securely to help prevent air from entering the fuel system.

i05282314

Fuel System Primary Filter - Clean/Replace

SMCS Code: 1260-070-PY; 1260-510-PY

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

WARNING

Personal injury can result when using cleaner solvents.

To help prevent personal injury, follow the instructions and warnings on the cleaner solvent container before using.

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

The fuel system primary filter (water separator) is located in the rear compartment on the left side of the machine.

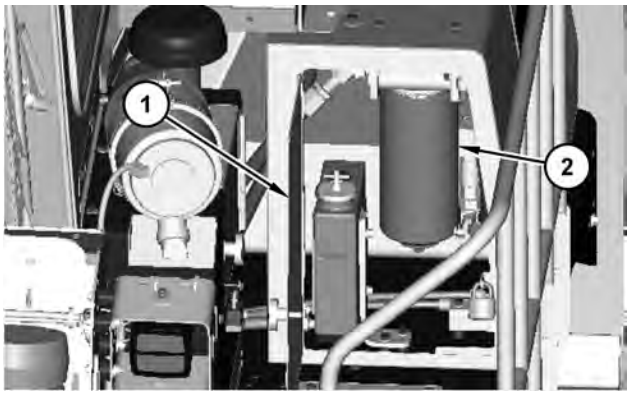

Illustration 247 g03356912

1. Open left side access door (1) to the rear compartment.

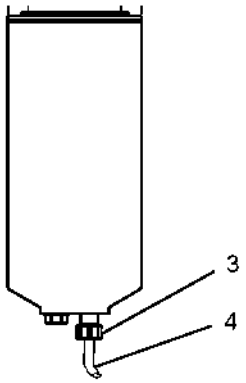

Illustration 248 g03356916

2. Place drain hose (4) on the outside of 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.

3. Open drain valve (3) under primary fuel filter (2). Catch the draining water in a suitable container. Dispose of the water properly.

4. Remove primary filter element (2). Make sure that all of the old filter seal is removed from the filter base.

5. Clean the filter base.

6. Coat the seal of the new primary filter element with clean diesel fuel.

7. Install a new primary filter element (2) onto the filter base. Only hand tighten the primary filter element. **When the seal contacts the base, tighten the primary filter element for an additional 1/3 to 1/2 turn.**

8. Place drain hose (4) in position.

9. Close drain valve (3).

10. Close access door (1).

i05551512

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

WARNING

Personal injury can result when using cleaner solvents.

To help prevent personal injury, follow the instructions and warnings on the cleaner solvent container before using.

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

Note: Before you replace the secondary fuel filter elements, replace the primary fuel filter element.

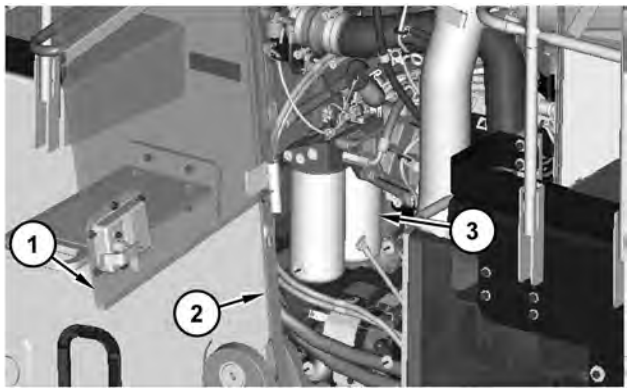

Illustration 249 g03356950

The secondary fuel filters (3) are located behind the left engine compartment door (1).

1. Remove the left lower engine panel (2), not shown.

2. Close the fuel shutoff valve. The fuel shutoff valve is located next to the fuel system primary filter.

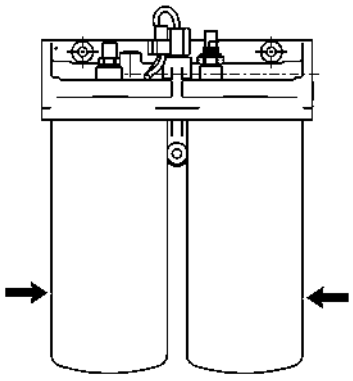

Illustration 250 g03356943
Front view at the left front of the engine

3. Remove the filter elements. Discard the filter element properly.

4. Clean the filter housing base. Make sure that all of the old seals are removed.

5. Coat the seals of the new filter element with clean diesel fuel.

6. Install the new filter elements by hand. **When the seal contacts the base, tighten the filter elements according to the instructions on the filters.**

   Rotation index marks are positioned on the filter element at 90 degree intervals. Use these rotation index marks as a guide when you tighten the filter.

7. Open the fuel shutoff valve.

8. Prime the fuel system.

i05551549

Fuel Tank Cap Filter and Strainer - Replace/Clean

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

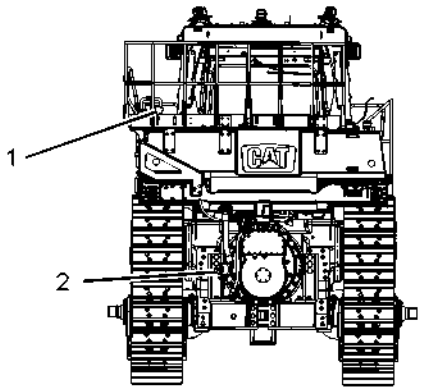

Illustration 251 g03516156

The fuel tank is located on the rear of the machine. The filler cap (1) is on the left side of the machine next to the ROPS.

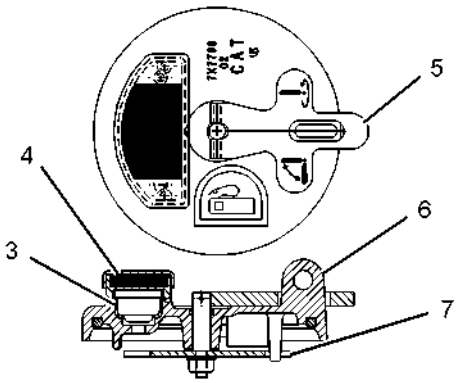

Illustration 252 g01110732

1. Lift lever (5) in order to remove the fuel tank filler cap. Turn the lever counterclockwise until the lever stops. Lift the cap straight up in order to remove the cap.

2. Remove the fuel strainer from the filler neck.

3. In order to replace the filter assembly, remove two screws that secure filter assembly (4) to the fuel cap. Remove filter assembly (4), valve (3), and the gaskets.

4. Wash the cap and the strainer in a clean, nonflammable solvent.

5. Inspect the tank cap seal. If the seal is damaged, replace the seal.

6. Replace the filter assembly, the valve, the gaskets, and the screws. Use a 9X-2205 Cap Filter Kit.

7. Install the strainer.

8. Install the fuel cap. Rotate the fuel cap clockwise until three tabs (7) drop into the slots in the adapter. Rotate lever (5) clockwise until the lever stops. Lower lever (5) over locking tab (6).

Fast Fill Fuel Adapter (If Equipped)

See illustration 251 .

Machines that are equipped with a fast fill fuel adapter (2) have identical fuel caps as systems without a fast fill fuel adapter. Use the same procedure for changing the filter in the two systems.

i05943793

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

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

Refer to Special Publication, NENG2500, “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.

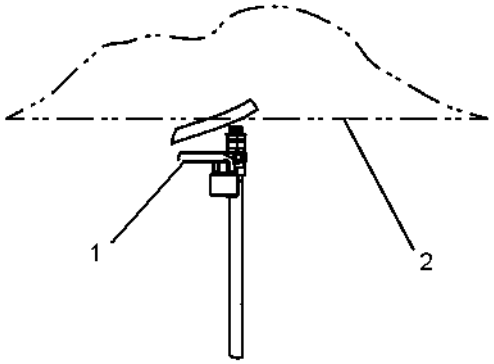

Illustration 253 g01390659

Rear view

The drain valve is under the fuel tank at the rear of the machine.

1. Open drain valve (1) under the left side of fuel tank (2). (Unlock the drain valve, as needed.) Allow the water and the sediment to drain into a suitable container.
2. Close the drain valve. Lock the drain valve, if necessary.

i05770876

Fuses and Circuit Breakers - Replace/Reset

SMCS Code: 1417-510; 1420

Fuses – Fuses protect the electrical system from damage that is caused by overloaded electrical circuits. Replace a fuse if the element separates. If the fuse of a particular electrical system requires frequent replacement, check the electrical circuit. Repair the electrical circuit, if necessary.

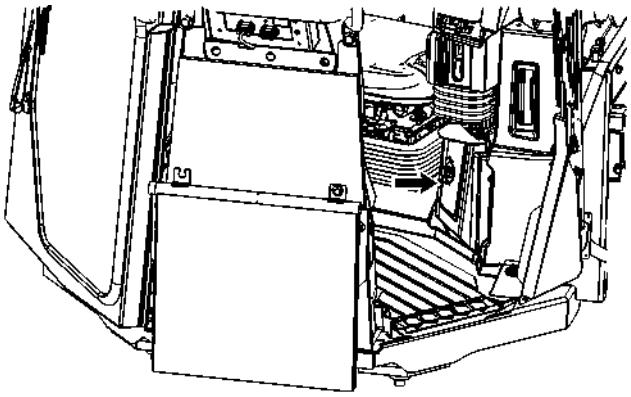

Illustration 254 g03516759

The access cover for the fuses and the circuit breakers is located inside the cab on the left side of the seat.

Open the cover for access to the circuit breakers and the fuses.

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

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

Contact your Cat dealer.

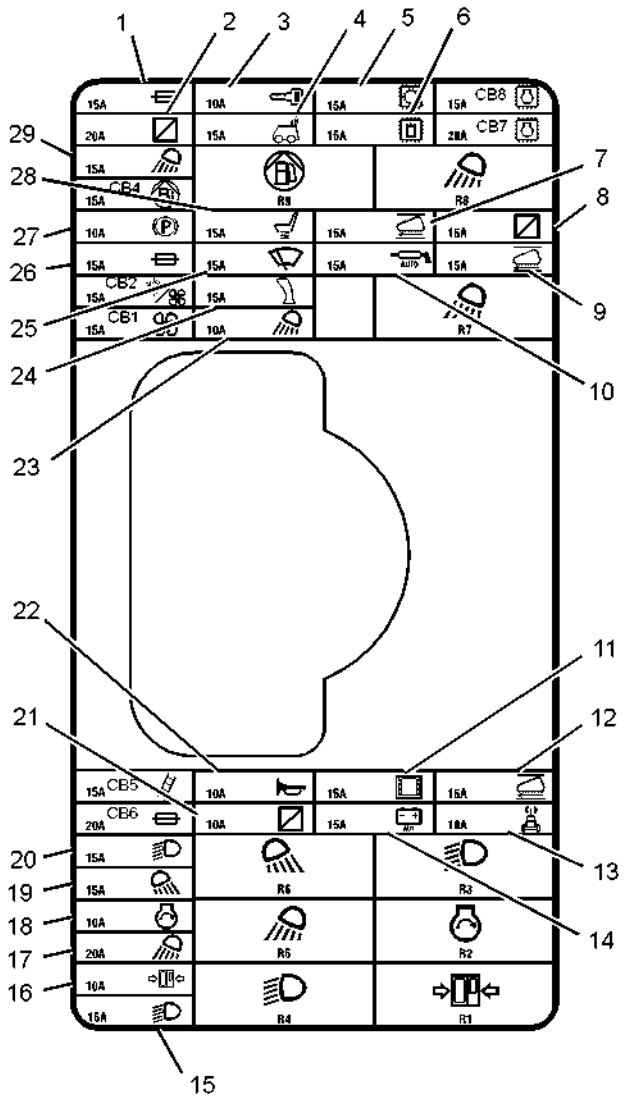

Illustration 255 g03661271

Spare (1) – 15 Amp

24 VA − 12 VA Converter (2) (Attachment) – 20 Amp

Ignition Key (3) – 10 Amp

Remote control (4) – 15 Amp

Power train ECM (5) – 15 Amp

Implement ECM (6) – 15 Amp

Tool Automation 1(7) – 15 Amp

Switched Auxiliary / Converters Wake up (8) – 15 Amp

Tool Automation 2 (9) – 15 Amp

Auto Lube (10) – 15 Amp

Information / Indication display (11) – 15 Amp

Tool Automation - Unswitched (12) – 15 Amp

Product Link / VIMS (13) – 15 Amp

Unswitched Auxiliary (14) – 15 Amp

Cylinder lights 2 (15) – 15 Amp

Precleaner (16) (Reset button) – 10 Amp

Fender Floodlights (17) – 20 Amp

Dual starters (18) – 10 Amp

Rear ROPS floodlights(19) – 15 Amp

Cylinder lights(20) – 15 Amp

Standard Converter (21) – 10 Amp

Horn (22) – 15 Amp

Ripper floodlights (23) (Cylinder) – 15 Amp

Ripper Pin Puller or Implements (24) – 15 Amp

Wipers (25) – 15 Amp

Spare (26) – 15Amp

Secondary Brake (27) – 15 Amp

Seat (28) – 15 Amp

Forward ROPS, dome lights. air conditioner (29) – 15 Amp

i07349182

High Intensity Discharge Lamp (HID) - Replace
(If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE
Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.
2. Disassemble the housing for the HID lamp in order to have access to the bulb.

Note: On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

3. Remove the bulb from the HID lamp.
4. Install the replacement bulb in the HID lamp.

   If the bulb is an integral part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: In order to avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.
6. Reattach the electrical power to the HID lamp.
7. Check the HID lamp for proper operation.

Note: Consult your Cat dealer for additional information on HID lamps.

i02054663

Horn - Test

SMCS Code: 7402-081

Test the horn on a daily basis. Press downward on the horn button in order to sound the horn. If the horn does not sound, make the necessary repairs before you operate the machine.

i06990326

Hoses and Clamps - Inspect

SMCS Code: 7554-040

Inspect the Lines and the Clamps

The fuel lines and the clamps must be inspected periodically to ensure safe operation and continuous operation of the engine fuel system. Take proper safety precautions before inspecting or replacing fuel lines and clamps.

Note: Always use a board or cardboard when the engine components are checked for leaks. Leaking fluid that is under pressure can cause serious injury or possible death. This proceeding includes leaks that are the size of a pin hole. Refer to Operation and Maintenance Manual, “General Hazard Information” for more information.

Fuel Lines

Note: Make sure that the fuel lines do not contact nearby components. Contact with other surfaces will produce chafing that could lead to a leak. A properly installed fuel line will contact only the clips.

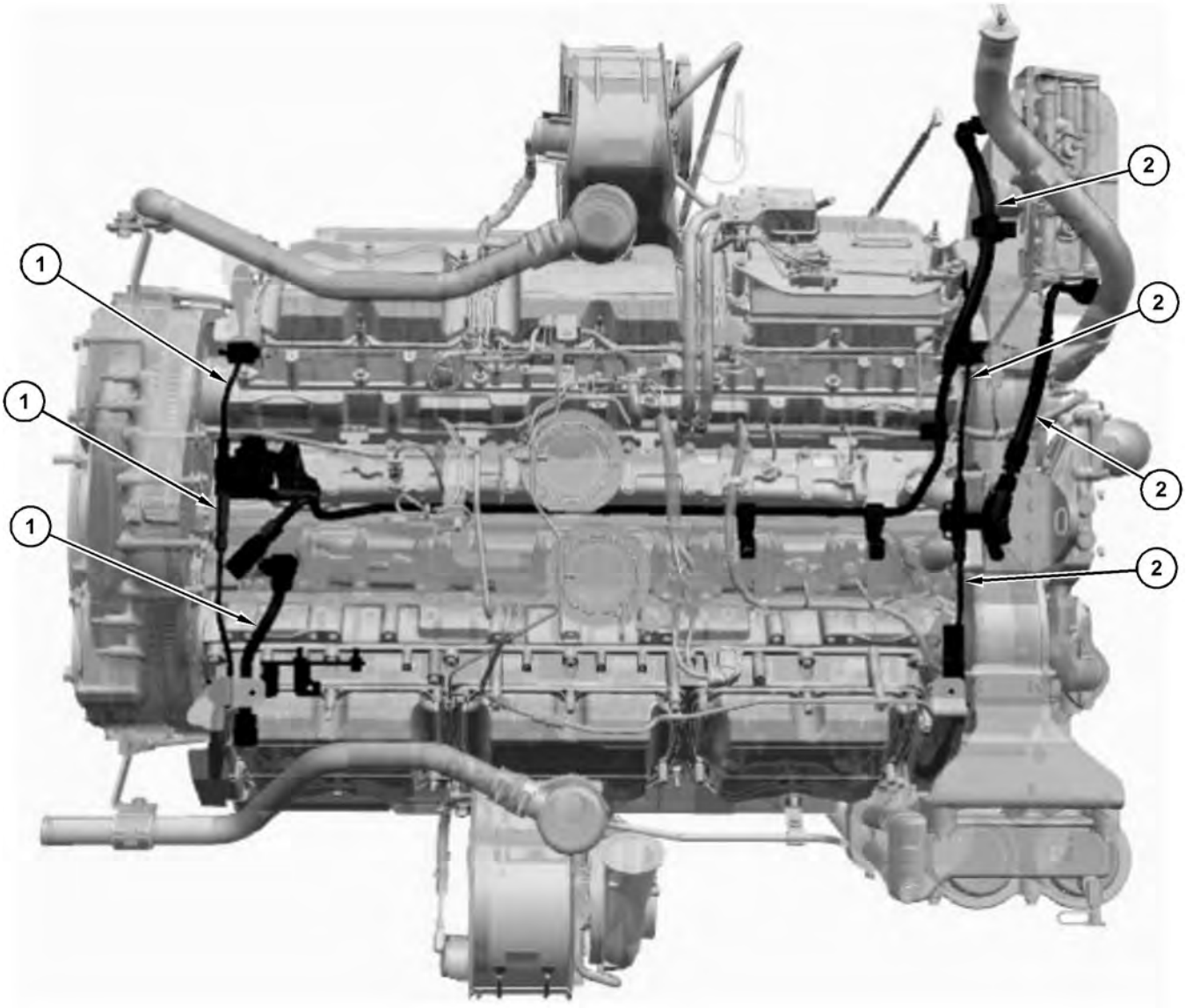

Illustration 256 g06190429

Top view of engine

Inspect fuel lines (1, 2) of the engine fuel system for the following conditions.

Replace any fuel line which exhibits any of the following conditions.

- Fuel lines which are cracked
- Hoses which are soft
- Outer covering that is chafed or cut
- Outer covering that is ballooning locally
- Flexible part of the hose that is kinked or crushed
- Fuel lines which exhibit signs of leakage which are not the result of loose couplings or clamps

Inspect all fuel line couplings for leaks. Replace any fuel line that exhibits signs of coupling leakage.

Inspect all clamps for the following conditions. Replace any parts that exhibit signs of any of the following conditions.

- Missing or damaged grommets
- Missing fasteners
- Missing clamps

Failure to replace a fuel line which exhibits any of the above conditions may result in a leak.

i05552112

Hydraulic System Filter Bypass Screen - Clean

SMCS Code: 5068-070

The screen should be cleaned especially when one of the following situations have occurred:

- Failure of the Implement Pump
- Failure of the Fan Pump
- Failure of the Fan Motor
- Cleaning of the Hydraulic Tank
- PCR (Engine Overhaul)

1. Park the machine on a level surface. Lower the work tool to the ground. Engage the parking brake.

2. Turn the engine start switch key to ON.

3. Move the hydraulic control levers through all of the positions in order to release pressure.

4. Turn the engine start switch key to OFF.

⚠ WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

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

Before removing the filler cap, press the valve relief button on the hydraulic tank in order to relieve the tank pressure.

Remove the filler cap only when the engine is stopped and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve any remaining pressure.

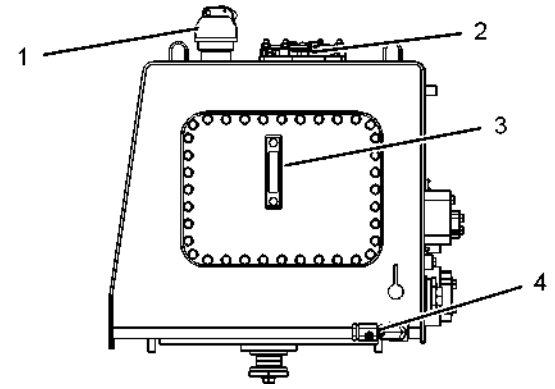

Illustration 257 g03517118

Front view of the hydraulic tank

(1) Filler Cap
(2) Breaker Relief Valve
(3) Sight Glass
(4) Drain Valve

5. Press the button on the breaker relief valve (2) in order to relieve any tank pressure. Slowly remove filler cap (1).

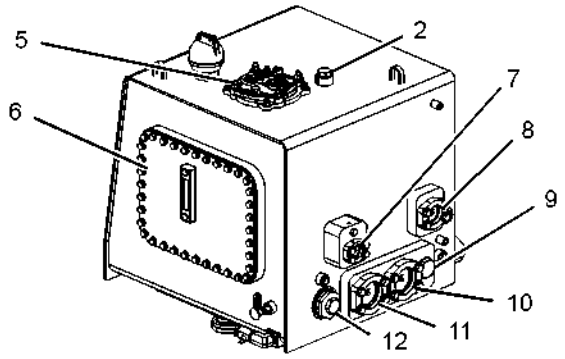

Illustration 258 g03517119

Side view of the Hydraulic Tank

(2) Breaker Relief Valve
(5) Suction for Implement Pump
(6) Hydraulic tank access cover
(7) Kidney loop return port
(8) Implement return port
(9) Fan and kidney loop suction port
(10) Implement 2 suction port
(11) Implement 1 suction port
(12) Fan and implement case drain return

6. Drain the hydraulic oil tank at drain (4).

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil - Change”.

7. Disconnect the drain lines.

8. Unbolt hydraulic tank access cover (6).

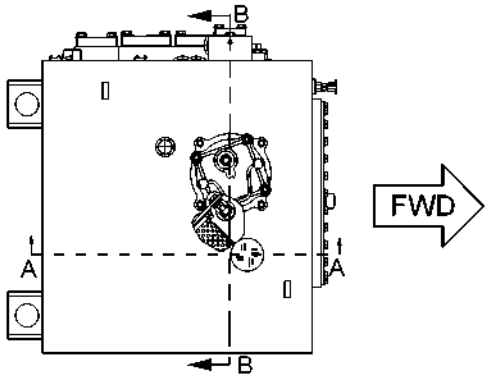

Illustration 259 g03517136
Top view of the Hydraulic Tank

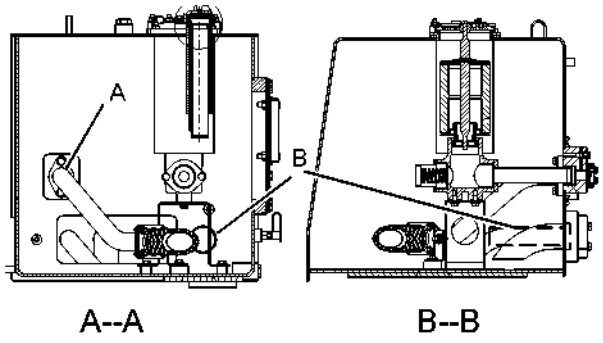

Illustration 260 g03517139
Return screens
(A) Implement return
(B) Fan and case drain return

9. Remove return screens that are within reach. Removing the filter from the top to reach one return screen may be necessary. Clean the screens with a clean, nonflammable solvent.

10. Inspect the O-ring seal, if the casting is removed. If the seal is damaged, replace the seal.

11. Replace the return screens.

12. Replace hydraulic tank access cover (6).

13. Assemble the drain lines.

14. Fill the hydraulic tank.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil - Change”.

15. Replace filler cap (1).

i05282133

Hydraulic System Oil - Change

SMCS Code: 5050-044

Interval

Note: If Cat HYDO Advanced 10 hydraulic oil is used, the hydraulic oil change interval will change. The normal interval of 2000 hours is extended to 3000 hours. S·O·S Services may even extend the oil change to a longer interval. Consult your Cat dealer for details.

Cat HYDO Oil Change Interval

The standard Cat HYDO oil change interval is every 2000 service hours or 1 year.

A 4000 service hour or a 2 year maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines that are used in severe conditions are not included in the 4000 service hour or the 2 year maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Cat HYDO Advanced 10 Oil Change Interval

The standard Cat HYDO Advanced 10 oil change interval is every 3000 service hours or 18 months.

New machines are filled with Cat HYDO Advanced 10 oil at the factory.

A 6000 service hour or a 3 year maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines that are used in severe conditions are not included in the 6000 service hour or the 3 year maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on hydraulic oils.

Change the Hydraulic Oil

⚠ WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

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

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve pressure.

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.

Operate the machine in order to warm the oil. Park the machine on level ground. Lower the blade to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

The hydraulic tank is located on the right side of the cab.

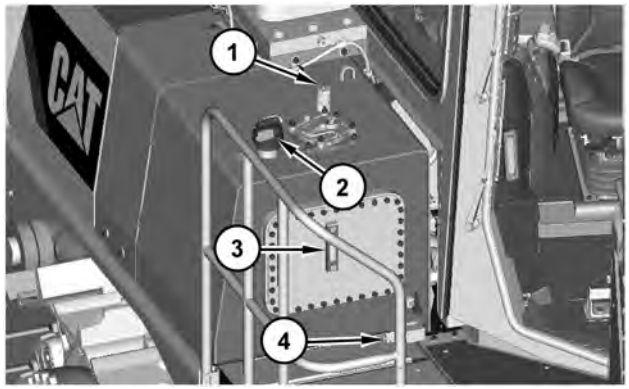

Illustration 261 g03356875

1. Remove the pressure in the hydraulic tank. Press the stem in the center of the valve (1).

2. Remove the hydraulic tank filler cap (2) slowly in order to prevent the rapid escape of oil or air.

3. Clean the filler strainer and the filler cap in a clean nonflammable solvent.

4. Remove the oil drain plug (4).

5. Attach a hose to a swivel. Install the swivel and the hose into the drain plug opening. A pipe nipple and a hose can also be used. Do not tighten the pipe.

6. Use an 8 mm wrench or an adjustable wrench to open the drain valve. Allow the oil to drain into a suitable container.

Note: If there is a failure, the hydraulic tank and the hydraulic screen must be cleaned. Refer to Operation and Maintenance Manual, “Hydraulic System Filter Bypass Screen-Clean” for the procedure.

7. Remove the swivel. The valve for the hydraulic tank will close.

8. Clean the drain plug and install the drain plug. Tighten the drain plug to a torque of 68 ± 7 N·m (50 ± 5 lb ft). Install the oil drain plug cover.

9. Change the hydraulic system filter. See Operation and Maintenance Manual, “Hydraulic System Oil Filter - Replace”.

10. Install the filler strainer.

11. Fill the hydraulic oil tank. See Operation and Maintenance Manual, “Capacities (Refill)” in order to determine the amount of hydraulic oil that is needed to fill the hydraulic oil tank.

12. Inspect the filler cap gasket. Replace the gasket if damage or wear is evident.

13. Install the filler cap.

14. Start the engine. Run the engine for a few minutes.

15. Maintain the oil level to the “FULL” mark in the sight gauge (3). Add oil, if necessary.

16. Stop the engine.

i05553507

Hydraulic System Oil Filter (Pilot) - Replace

SMCS Code: 5068-510; 5068-510-PS; 5092-510

Charge Oil 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.

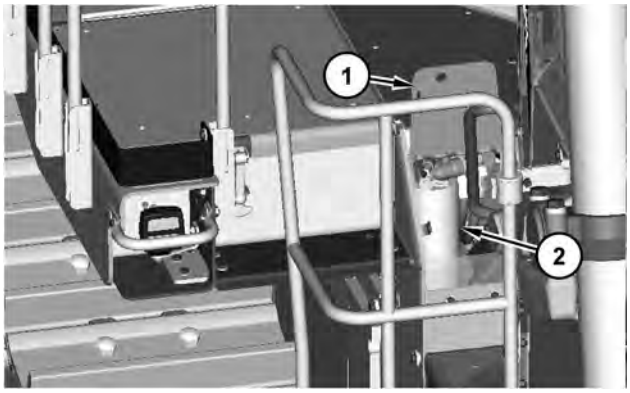

Illustration 262 g03356835

The charge oil filter is located inside access door (1) on the right side of the machine.

1. Remove filter element (2). Dispose of the used filter element properly.

2. Install a new filter element.

3. Start the machine. Allow the hydraulic oil to warm.

4. Check the machine for leaks. Repair any leaks, if necessary.

i05278612

Hydraulic System Oil Filters - Replace

SMCS Code: 5068-510

WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

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

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve pressure.

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.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids.

Dispose of all fluids according to local regulations and mandates.

Note: The hydraulic tank is equipped with two filter elements. The hydraulic tank is located on the right side of the cab.

1. Lower the bulldozer and the ripper to the ground.

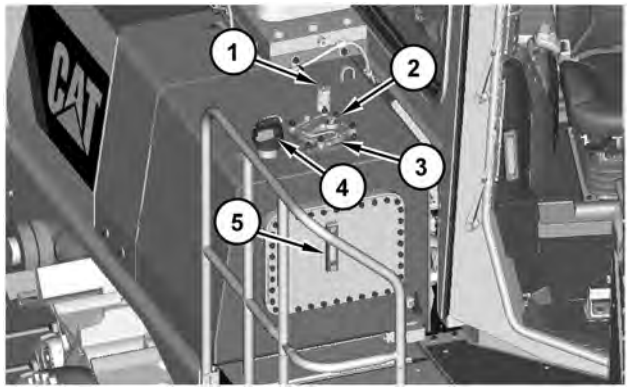

Illustration 263 g03356249

2. Check the pressure in the hydraulic tank. Press the stem in the center of the valve (1) in order to relieve the system pressure.

3. Remove nuts (2) from cover (3). Rotate the cover counterclockwise in order to remove the cover. Remove the cover seal. Replace the cover seal if the seal is damaged.

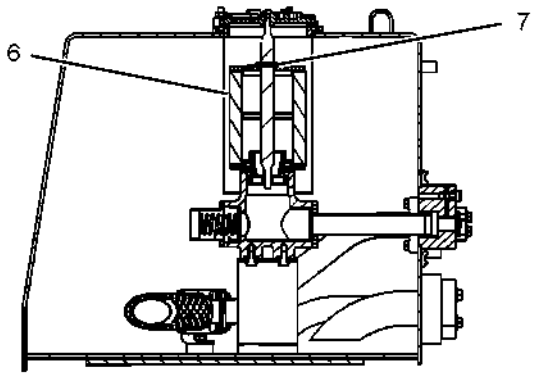

Illustration 264 g03356299

4. Remove the rod (7) that retain the filter element. Unscrew the nut that is located at the bottom of the rod. Remove the filter element (6) by sliding the filters off rod (7). Properly discard the filter element. Install new filter element. Screw the nuts onto the rod and tighten the nuts to a torque of 10 ± 1.5 N·m (7.4 ± 1.1 lb ft).

5. Place filter back into the hydraulic tank.

6. Wash the cover in a clean nonflammable solvent.

7. Install the seal and the cover.

8. Maintain the hydraulic oil to the “FULL” mark in the sight gauge (5).

i05282068

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV

WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

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

Remove the filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand. Remove the filler cap slowly in order to relieve pressure.

Lower the bulldozer and the ripper to the ground.

The hydraulic tank is on the right side of the cab.

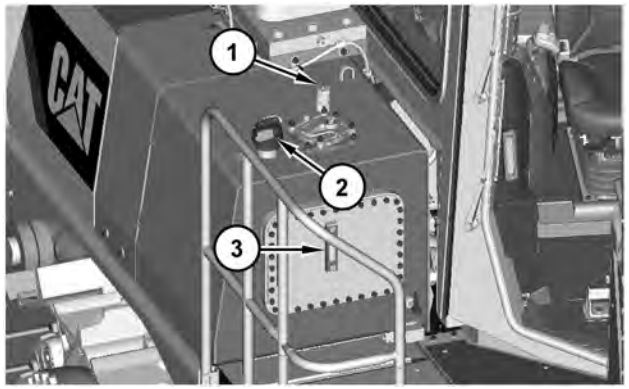

Illustration 265 g03356844

1. Maintain the oil level to the “FULL” mark in the sight gauge (3). Put the tilt cylinders in the center position before you check the oil level. Check the oil level when the oil is cold. Verify that the oil level is below the “FULL” mark before you remove the filler cap.

If the hydraulic system requires additional hydraulic oil, perform the following procedure.

1. Check for pressure in the hydraulic tank. Press the stem in the center of the valve (1).

2. Use caution to remove filler cap (2). Slowly remove the filler cap and add oil through the filler tube.

3. Clean the filler cap and install the filler cap.

i05282094

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

Obtain the hydraulic oil sample as close as possible to the recommended sampling interval. The recommended sampling interval is every 500 service hours. In order to receive the full effect of S·O·S oil analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent oil samplings that are evenly spaced.

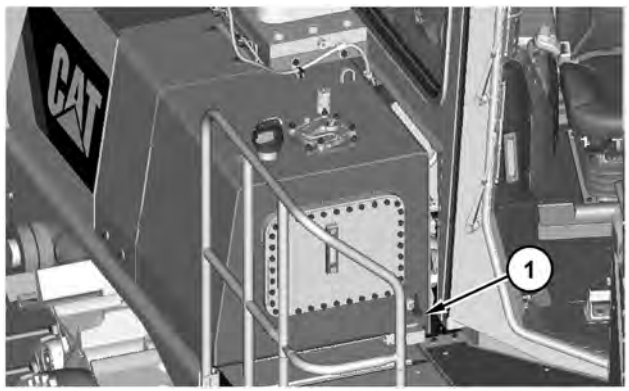

Illustration 266 g03356861

1. Remove the protective cap from the sampling valve (1).
2. Use 169-8373 Fluid Sampling Bottle in order to obtain the sample.
3. After you take a sample, remove the cap with the tube and the probe from the bottle. Discard the cap with the tube and the probe. Install the sealing cap that is provided with 169-8373 Fluid Sampling Bottle.
4. Replace the protective cap.

Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the correct fluid for your machine.

i05552053

Indicators and Gauges - Test

SMCS Code: 7450-081

WARNING

If the action alarm does not sound during this test or machine monitoring displays are not functioning, do not operate the machine until the cause has been corrected. Machine operation with faulty action alarms or displays could result in injury or death as any Warning Category 3 notifications will not be relayed to the operator.

Check the operation of the Monitoring System. Observe the self test when you start the engine.

The system performs an automatic self test when you turn the engine start switch to the ON position.

The self test verifies that the monitoring panel and the display modules are operating properly.

The internal circuits, the indicators, and the gauges are automatically checked.

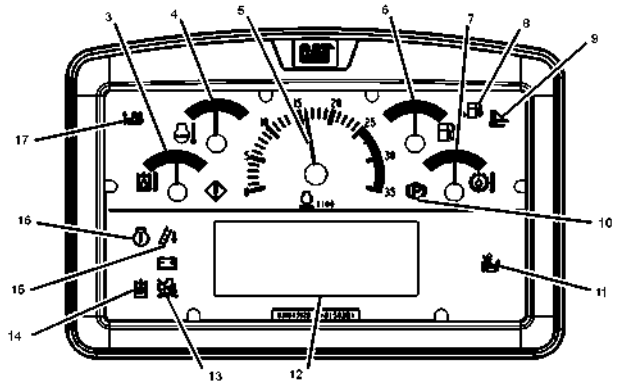

Illustration 267 g03516858

The operator must observe the indicators and the gauges to determine whether gauge modules, the action light, the alert indicators, and the display screen are operating properly. The self test lasts for approximately 3 seconds.

During the self test, all alert indicators flash.

The pointers in the gauges point upward. Then, the pointers point to the left. Then, the pointers point to the right. Then, the pointers point to the final positions.

- The action light stays illuminated.
- The action alarm sounds once.

The monitoring panel is then in the normal operating mode.

If the above tests are not correctly completed, the system will not function in the normal operating mode. Consult your Caterpillar dealer for an electrical system check. Any repairs must be made before you start the engine.

Turn on all of the machine lights. Check for proper operation. Sound the forward horn.

Stop the engine.

Make any necessary repairs before you operate the machine.

i04371323

Ladder - Adjust

SMCS Code: 0634-025; 7254-025

Adjust the Access Ladder

⚠ WARNING

Do not ride on ladder or stand on platform while machine is moving.

NOTICE
To avoid damage to the ladder during machine operation, keep the ladder in the LATCHED position.

1. Position adjustment for the hinge.

a. Adjust the hinge so that the ladder is parallel to the top surface of the fender with the ladder in the UP position.

2. Adjustment for the location of the latch

a. The latch should be adjusted so that the pins for the latch are equally engaged in the top and the bottom of the ladder.

3. Adjustment for the contact plates on the latch

a. The contact plates on the latch should be adjusted in order to prevent any vertical movement or any side to side movement of the ladder when the latch pins are engaged in the ladder.

4. Adjustment for the location of the proximity switch

a. With the ladder in the UP position, adjust the proximity switch so that the switch and the magnet are aligned.

b. There must be a gap between the magnet and the switch in order to prevent contact when the ladder moves. The gap between the magnet and the switch must be close enough to function correctly.

i02055282

Lift Cylinder Yoke Bearings - Lubricate

SMCS Code: 5102-086-BD

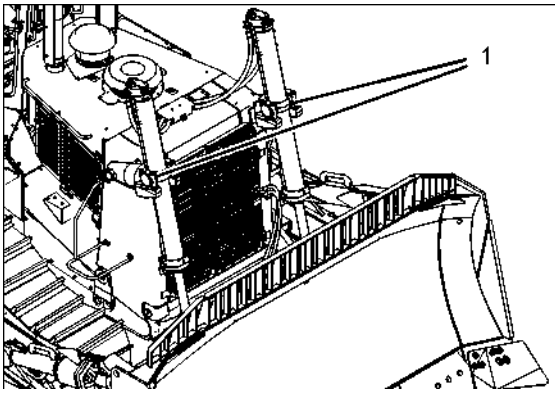

Illustration 268 g01053980

(1) Lift cylinder yoke

The fittings are on the left front side of the machine and on the right front side of the machine. Lubricate the bearings by applying MPGM grease to the fittings.

i02106227

Oil Filter - Inspect

SMCS Code: 1318-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

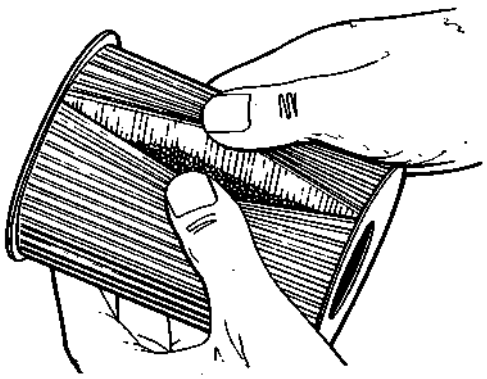

Illustration 269 g00100013

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.

i05553530

Pivot Shaft Oil Level - Check

SMCS Code: 4153-535-FLV

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

Note: The initial fill of pivot shaft may trap air in the tube. The level of the oil may fall as air escapes. Barometric pressure and altitude changes may also cause the oil level to raise or lower. The reservoir must be filled in several times to remain consistently full.

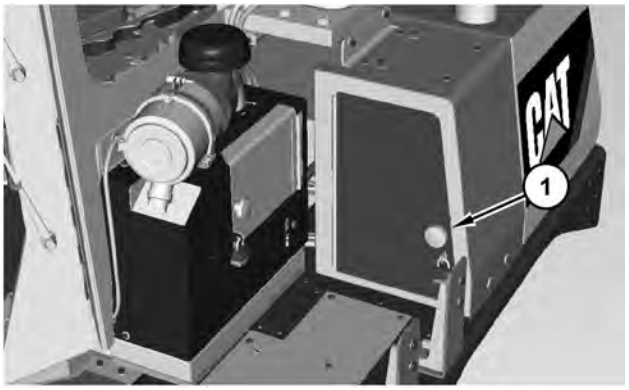

Illustration 270 g03516016

Open the access door on the left side of the cab (1).

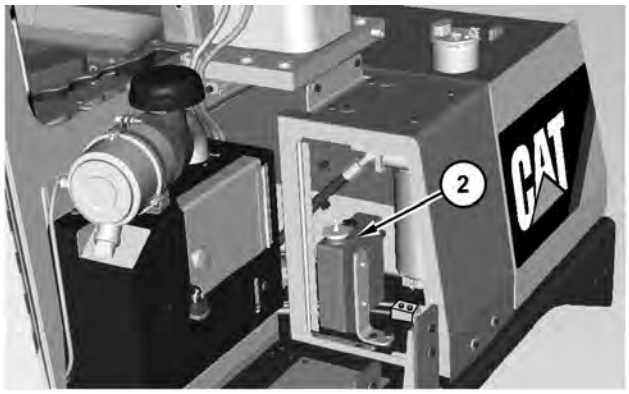

Illustration 271 g03518076

Maintain the oil within the limits of the dipstick for the oil reservoir (2). Do not overfill the oil reservoir. Hot oil can overflow the reservoir.

Remove the oil filler cap in order to add the oil to the oil reservoir.

i05553689

Power Train Breather - Replace

SMCS Code: 3030-510-BRE

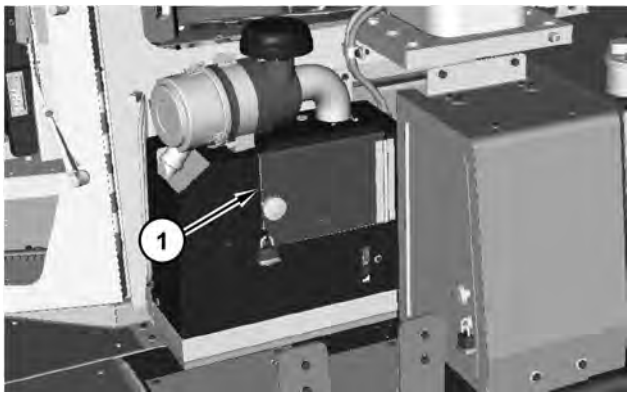

Illustration 272 g03518116

1. Open access door (1) on the left side of the cab that is below the cab fresh air filter.

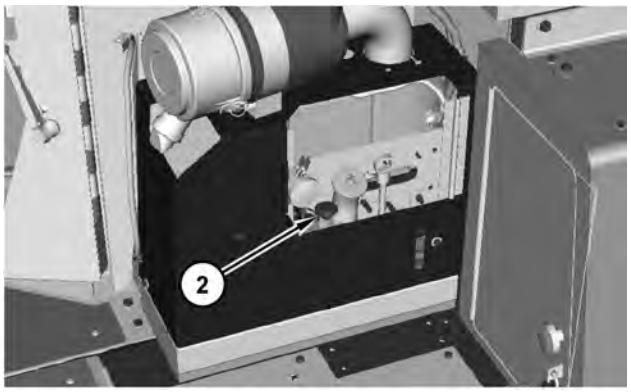

Illustration 273 g03518117

2. Remove power train breather (2). Discard the breather.

3. Install the new power train breather.

i05553749

Power Train Oil - Change

SMCS Code: 4000-044-OC

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

Operate the machine in order to warm the power train oil. The machine must be level. Lower the attachments with slight down pressure.

Engage the parking brake switch. Stop the engine.

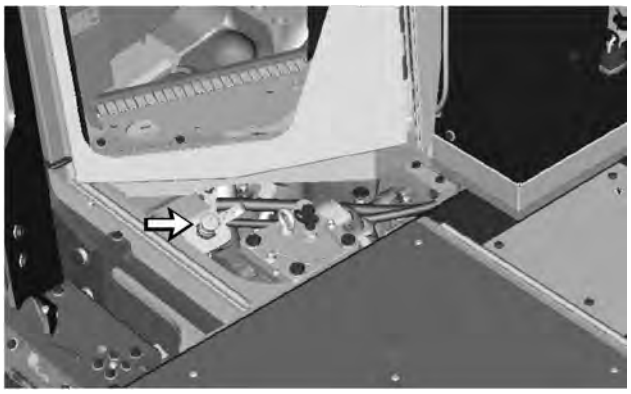

Illustration 274 g03518136

High speed oil change (power train)

1. Remove the tread plate below the door on the left side of the cab. The machine may be equipped for a high speed oil change. Use a 126-7538 Nozzle Assembly. The high speed oil change removes oil from the sump in the bevel gear case. The high speed oil change does not remove oil from the torque converter or from the transmission case.

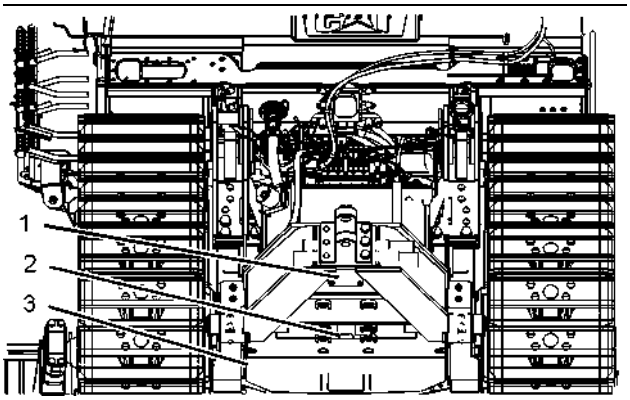

Illustration 275 g03530081

Partial view of machine underside from rear of machine

(1) Transmission drain valve access cover (if equipped)
(2) Bevel gear case drain plug
(3) Bottom guard beneath torque converter (if equipped)

2. If the machine is not equipped with the high speed oil change system, remove drain plug (2) from the bevel gear case. Install a 4C-8563 Swivel into the valve. Clamp a hose to the swivel. A 25.4 mm (1 inch) pipe and hose can be used. Use a 25.4 mm (1 inch) pipe with 1-11 1/2 NPTF threads. Do not tighten the pipe.

3. Turn the swivel or pipe clockwise in order to open the internal drain valve. Allow the oil to drain into a suitable container.

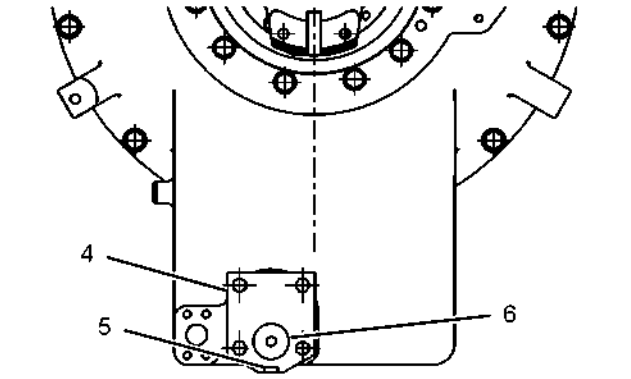

Illustration 276 g03531597

Rear view of bottom of torque converter

(4) Drain valve housing
(5) Pipe plug
(6) Drain valve

4. Lower bottom guard (if equipped) (3) beneath the torque converter to access the torque converter drain. Remove pipe plug (5) from the bottom of drain valve housing (4) on the torque converter. Install a 12.7 mm (0.5 inch) pipe into the drain valve housing. Use a 12.7 mm (0.5 inch) pipe with 1/2-14 NPTF threads.

Note: Refer to Disassembly and Assembly, KENR5629, “D10T Track-Type Tractor Engine Supplement” for more information on lowering the bottom guard.

5. Clamp a hose to the pipe in order to direct the oil into a suitable container.

6. Open drain valve (6) and drain the oil into a suitable container.

7. Remove the access cover (1) for the transmission drain valve.

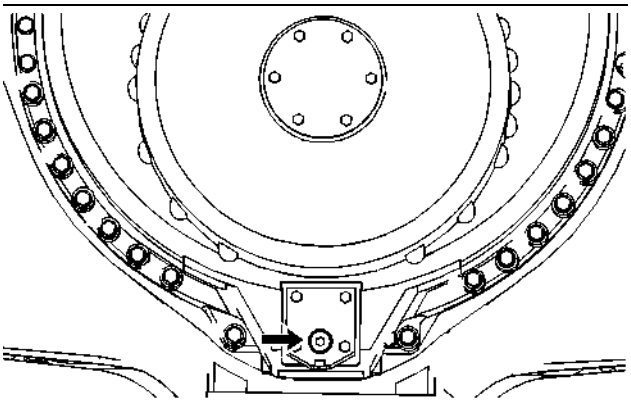

Illustration 277 g02161317

Transmission drain valve at rear of machine

8. Remove the plug from the drain valve in the transmission. Install a 12.7 mm (.50 inch) pipe into the transmission valve. Use a 12.7 mm (.50 inch) pipe with 1/2-14 NPTF threads.

9. Clamp a hose to the pipe in order to drain the oil into a suitable container.

10. Open the transmission drain valve and drain the oil into a suitable container.

11. Close the drain valve on the torque converter. Close the drain valve in the transmission case.

12. Remove the hoses and remove the pipes from the drains. Clean the oil drain pipe plugs and install the oil drain pipe plugs.

13. Install any access covers or bottom guards that were removed or lowered to access the drain valves.

14. Remove the swivel or remove the pipe from the drain in the bevel gear case. The drain valve will close.

15. Clean the oil drain plugs and install the oil drain plugs.

16. Change the filter element. See Operation and Maintenance Manual, “Power Train Oil Filters - Replace”.

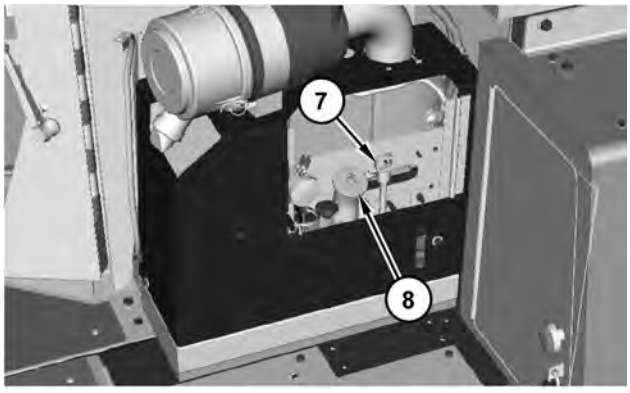

Illustration 278 g03518137

17. Open the access door on the left side of the cab that is below the cab fresh air filter for the power train oil filler cap.

18. Remove power train oil filler cap (8).

19. Add oil. To determine the correct amount of oil, see Operation and Maintenance Manual, “Capacities (Refill)”.

20. Clean the power train oil filler cap and install the power train oil filler cap.

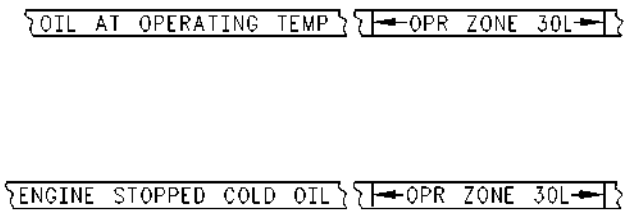

Illustration 279 g00611366

21. Maintain the oil level in the “OPR ZONE” on the dipstick (17). Close the access door.

i05553769

Power Train Oil Filters - Replace

SMCS Code: 3067-510

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

Replace the Filters

NOTICE
The element in the transmission oil filter can become plugged with debris.

The flow of clean oil to the system will decrease or stop.

Follow maintenance recommendations to ensure element will not fill up with debris.

NOTICE
Dirty oil or debris left in the transmission filter housing during filter change can enter the transmission and cause serious damage.

Use a clean, dry cloth to clean the bottom of the housing.

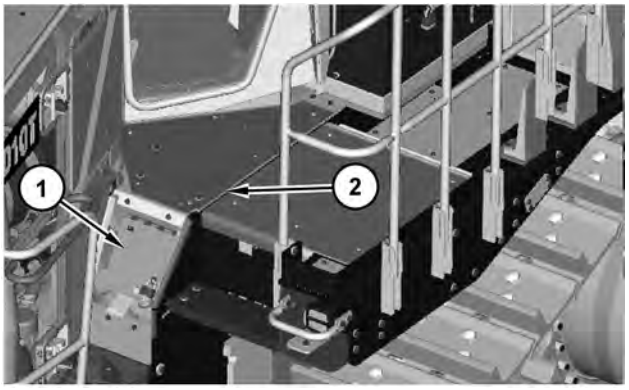

Illustration 280 g03518156

1. Open access door (1) on left side of the cab. Remove the bolts to remove cover plate (2) .

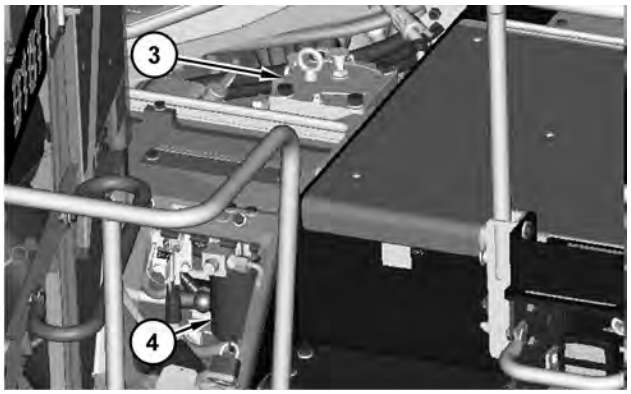

Illustration 281 g03356691

2. Remove four bolts and remove filter cover at main power train filter (3) . Remove the non-metallic filter element and properly discard the filter element.

3. Clean the inside of the filter element housing with a clean, dry cloth.

4. Remove filter (4) .

5. Inspect the seals for the housings. If a seal is damaged, replace the seal.

6. Install the new filter element at main power train filter (3). Install the bolts and filter cover.

7. Install new filter (4).

Note: The Caterpillar recommended filters are a special high efficiency design. Use only the recommended filter.

8. Start the engine.

9. Check the power train oil level. Refer to Operation and Maintenance Manual, “Power Train Oil Level - Check” for details.

10. Install cover plate (2).

11. Close access door (1).

i05553789

Power Train System Oil Level - Check

SMCS Code: 3030-535-FLV

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

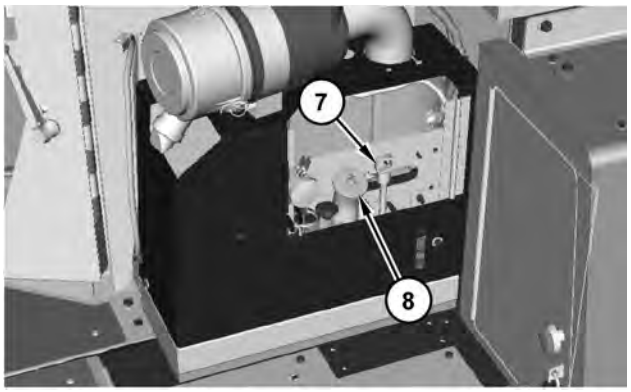

Illustration 282 g03518137

Open the access door on the left side of the cab that is below the cab fresh air filter.

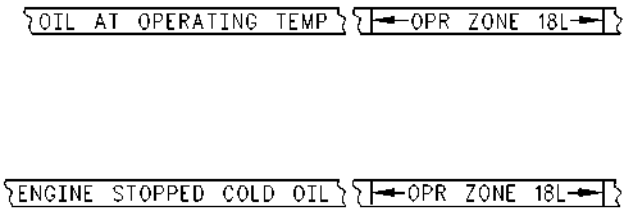

Illustration 283 g00594099

HOT TRANSMISSION OIL

Use the “TRANSMISSION IN NEUTRAL, ENGINE AT LOW IDLE, AND OIL AT OPERATING TEMPERATURE” side of the dipstick (1). Check when the transmission is in NEUTRAL and the engine is running at LOW IDLE. The oil should be at operating temperature. Maintain the oil level between the “OPERATING ZONE” marks. This method is the only accurate way to check the oil level.

Remove filler plug (2). If necessary, add oil.

Clean the filler plug and install the filler plug.

COLD TRANSMISSION OIL

Check the “ENGINE STOPPED COLD OIL” side of dipstick (1) while the engine is stopped. Maintain the oil between the “OPERATING ZONE” marks. This method should be used as reference only.

Remove filler plug (2). If necessary, add oil.

Clean the filler plug and install the filler plug.

Note: When you are operating the machine on severe slopes, the quantity of oil in the power train system can be increased up to 10 percent. When you are operating with the increased oil quantity, prolonged operation in some machines can cause high power train system oil temperatures. After the work on the severe slopes has been completed, drain the excessive oil quantity from the bevel gear case.

i05553790

Power Train System Oil Sample - Obtain

SMCS Code: 3080-008

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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.

The power train oil filter is under the tread plate that is below the door on the left side of the cab.

1. Remove the tread plate.

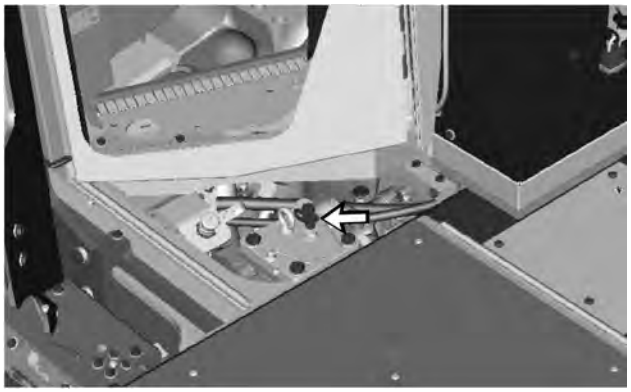

Illustration 284 g03518176

S·O·S sampling valve t is on top of the power train oil filter

2. Remove the protective cap from the sampling valve.

Note: Flush the fitting with oil into an approved container before you obtain the oil sample.

3. Use the 8T-9190 Fluid Sampling Bottle in order to obtain a sample.

4. After you take a sample, remove the cap with the tube and the probe from the bottle. Discard the cap with the tube and the probe. Install the sealing cap that is provided with 8T-9190 Fluid Sampling Bottle.

5. Install the tread plate.

i05553809

Power Train System Screens - Clean

SMCS Code: 3067-070

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or 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 machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide”, for tools and supplies suitable to collect and contain fluids in Caterpillar machines.

Dispose of all fluids according to local regulations and mandates.

Operate the machine in order to warm the power train oil. The machine must be level. Lower the work tools with slight down pressure.

When you change the power train oil, clean the scavenge screens.

Transmission

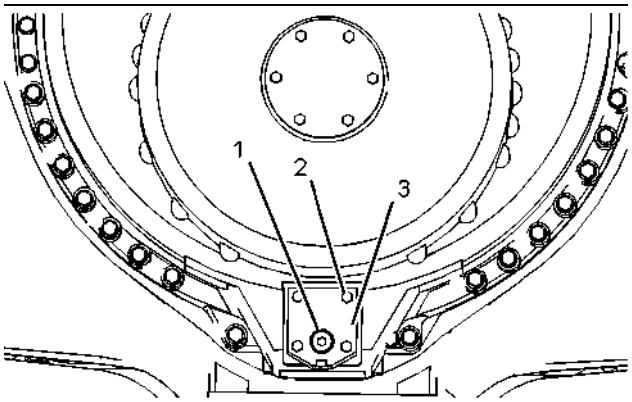

Illustration 285 g02161128

1. Remove the plug from the drain valve in the transmission cover (1). Install a 12.7 mm (.50 inch) pipe with 1/2-14 NPTF threads into the valve.

2. Clamp a hose to the pipe in order to drain the oil into a suitable container.

3. Open the drain valve and drain the oil into a suitable container.

4. Close the drain valve.

5. Remove the hose and remove the pipe from the drains.

6. Remove the bolts for the drain cover (2) and remove the drain cover(3). Remove the seal and remove the screen that is located behind the cover.

7. Wash the screen in a clean, nonflammable solvent.

8. Inspect the seal. If the seal is damaged, replace the seal.

9. Install the screen, the seal, and the drain cover on the transmission.

10. Clean the oil drain plug and install the oil drain plug.

Suction Screen

The suction screen for the power train is located below the cab.

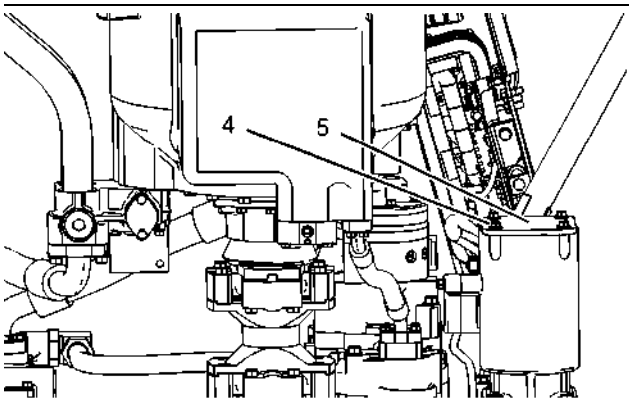

Illustration 286 g02161135

1. Remove the bolts (4) and remove the cover (5). Remove the screen that is located behind the housing.

2. Clean the screen in clean, nonflammable solvent.

3. Install the screen. Install the cover.

4. Refill the power train system with oil. Refer to Operation and Maintenance Manual, “Power Train Oil Level - Check” and Operation and Maintenance Manual, “Capacities - Refill”.

i05554696

Radiator Pressure Cap - Clean/Replace

SMCS Code: 1353-070-Z2; 1353-510-Z2

⚠ WARNING

Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure.

The radiator cap is located inside the access door on top of the engine enclosure on the left side.

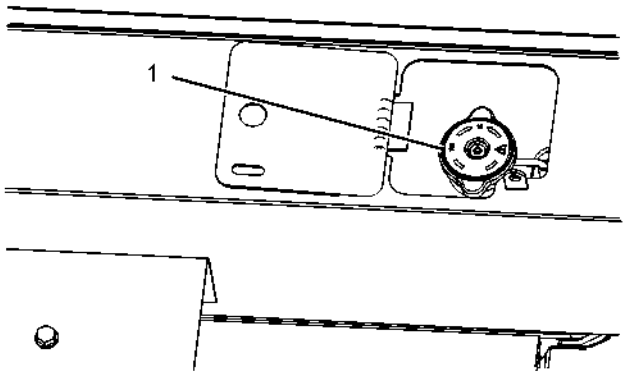

Illustration 287 g03512762

1. Slowly remove radiator cap (1) to relieve system pressure.

2. Inspect the radiator cap for damage, for deposits, or for foreign material. Clean the radiator cap with a clean cloth. Replace the radiator cap if the radiator cap is damaged.

3. Install the radiator cap.

i05554969

Recoil Spring Compartment Oil Level - Check

SMCS Code: 4158-535-OC

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

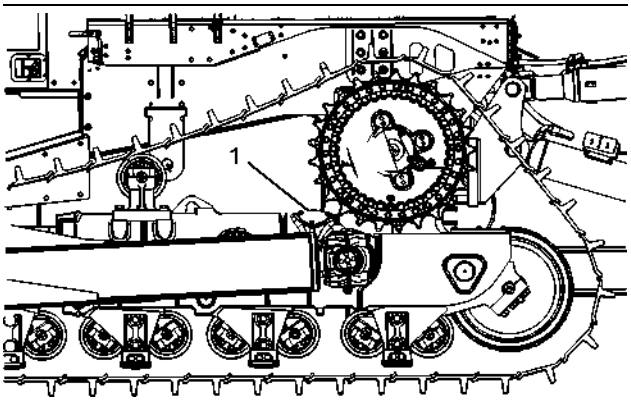

Illustration 288 g03519420

1. Remove all of the debris around the cover plate (1) on the top of the track roller frame.

2. Remove the cover plate for the oil filler.

3. Maintain the oil level above the bottom edge of the visible track roller frame bore .

4. Install the cover plate.

5. Repeat the procedure for the other recoil compartment.

i05555389

Refrigerant Dryer - Replace
(If Equipped)

SMCS Code: 7322-510

⚠ WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

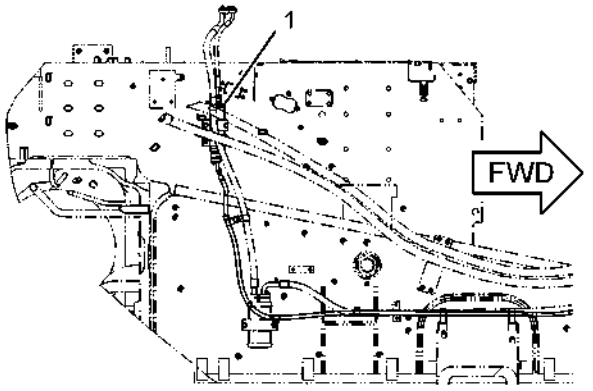

Illustration 289 g03519798

View from the right side

In-line dryer(1) is located inside the left side frame rail below the cab.

The in-line dryer is accessible by removing the cab floor plates.

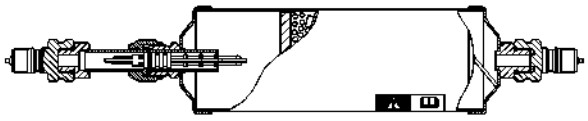

Illustration 290 g01017640

Note: The “R-134a” refrigerant dryer should be replaced annually. Humid operating conditions may require more frequent replacement of the dryer. The dryer should also be replaced if the air conditioning system has been leaking or if the system has been opened for service repair.

Reference: For the correct procedure, refer to Air Conditioning and Heating Service Manual, SENR5664 or the Disassembly and Assembly Manual for your machine.

Note: A qualified mechanic should replace the components of the refrigerant system since special tooling and training are required.

i02039230

Ripper Linkage and Cylinder Bearings - Lubricate

SMCS Code: 6313-086-L4; 6313-086-BD

Note: There are a total of twelve grease fittings for the ripper linkage and hydraulic cylinder bearings.

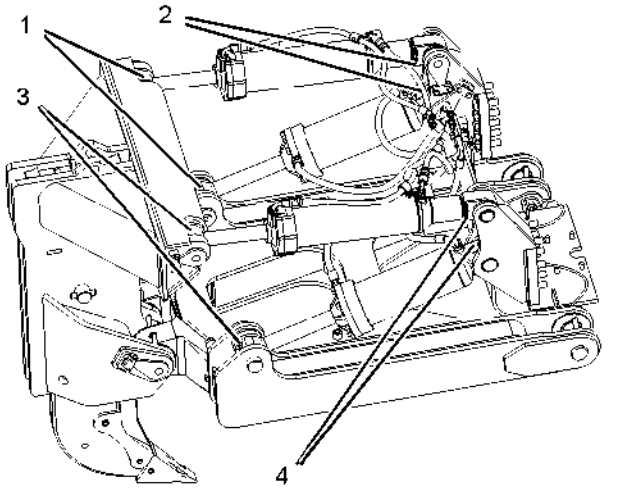

Illustration 291 g01048827

Lubricate the grease fittings for the hydraulic cylinder bearings (1), (2), (3) and (4).

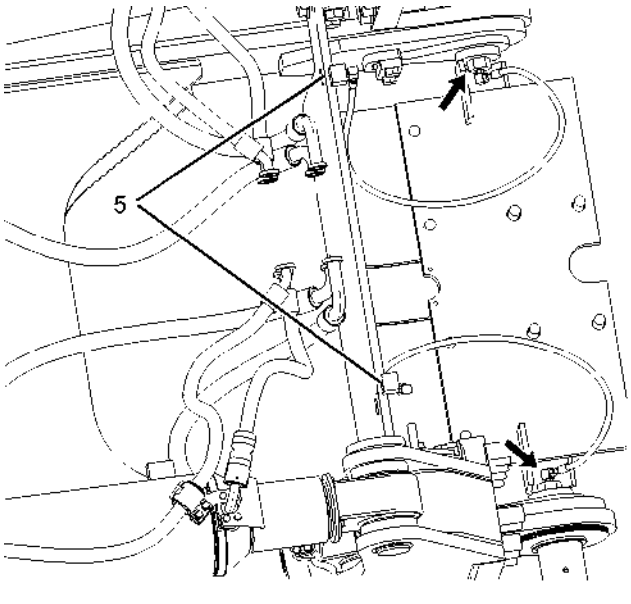

Illustration 292 g01048866

Lubricate the remote grease fittings for the pins (5).

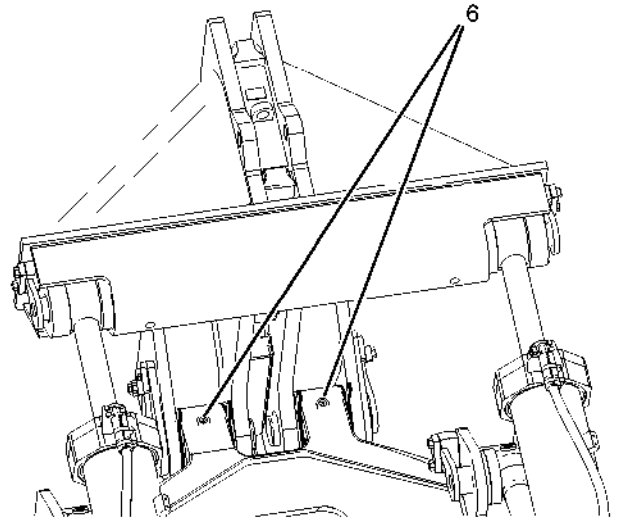

Illustration 293 g01048879

Lubricate the grease fittings for the pins (6).

i05658005

Ripper Tip and Shank Protector - Inspect/Replace
(If Equipped)

SMCS Code: 6808-040; 6808-510; 6812-510; 6812-040

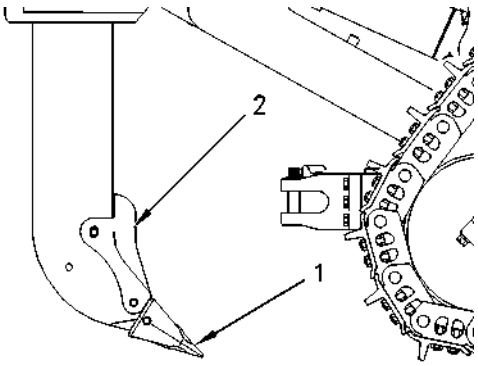

Illustration 294 g00945595

(1) Ripper tip
(2) Shank protector

When the ripper tip is worn close to the shank, replace the ripper tip. When the shank protector is worn close to the shank, replace the shank protector. If the tip is too blunt, the tip will not penetrate properly.

1. Raise the ripper. Place blocking under the ripper. Lower the ripper onto the blocking. The ripper should be high enough so that the ripper tip or the shank protector can be removed. Do not place the ripper too high.

2. If the ripper tip is worn, drive out the pin. Remove the tip and the shank pin retainer.

3. Do not reuse the retainer and the pin that were removed. Properly dispose of these items.

4. Clean the counter-bored hole in the shank for the retainer.

5. Install a new retainer and the new tip.

Note: If labeled, install the proper surface of the retainer to the outside.

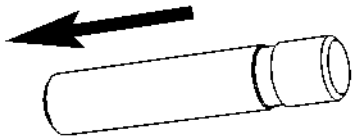

Illustration 295 g03588337

Direction of pin installation

6. Install a new pin from the same side as the retainer is installed in the shank. Drive the pin in the orientation shown in illustration 295 so that the groove in the pin will engage the retainer when properly installed.

Note: The shank provides a stable support for the retainer when the pin is installed from the same side as the retainer.

7. If the shank protector is worn, drive out the pins. Remove the shank protector.

8. Do not reuse the retainers and the pins that were removed. Properly dispose of these items.

9. Clean the counter-bored holes in the shank for the retainers.

10. Install new retainers and the new shank protector.

Note: If labeled, install the proper surface of the retainers to the outside.

11. Install new pins from the same side as the retainers are installed in the shank. Drive the pins in the orientation shown in illustration 295 so that the grooves in the pins will engage the retainers when properly installed.

Note: The shank provides a stable support for the retainers when the pins are installed from the same side as the retainers.

12. Raise the ripper and remove the blocking.

13. Lower the ripper to the ground.

i05257850

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

Note: The ROPS arrangement typically consists of the following components: ROPS assembly (1) (canopy) with upper mounting bolts (A) and ROPS support assembly (2) with lower mounting bolts (B). See Illustration 296 .

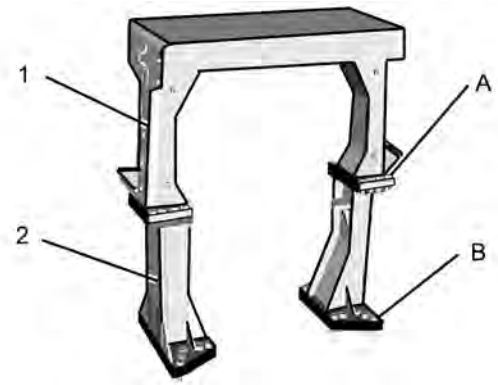

Illustration 296 g01609177

(1) Roll Over Protective Structure (ROPS)

Inspect both sides of the Rollover Protective Structure (ROPS) for bolts that are loose, broken or damaged. If any broken ROPS bolts (A) or (B) are found, replace all of ROPS bolts (A) or (B).

Inspect the Rollover Protective Structure (ROPS) for bolts that are loose or damaged. Replace any damaged bolts and any missing bolts with original replacement parts only.

Do not weld reinforcement plates to the ROPS in order to straighten the ROPS. Do not weld reinforcement plates to the ROPS in order to repair the ROPS.

Note: Notify your Cat dealer if broken bolts are found.

Reference: See “Specifications” in the Service Manual for information on the bolt torque, if necessary.

Consult your Cat dealer for inspection of any potential damage or repair of any damage to any Operator Protective Structure, including ROPS, FOPS, TOPS, OPS, and OPG. Refer to Special Instruction, SEHS6929, “Inspection, Maintenance, and Repair of Operator Protective Structures (OPS) and Attachment Installation Guidelines for All Earthmoving Machinery, If Equipped” for more information.

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 297 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).

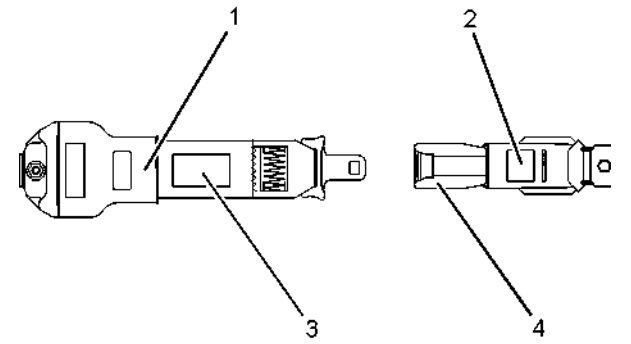

Illustration 298 g01152685

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.

i07331350

Torque Converter Scavenge Screen - Clean

SMCS Code: 3101-070-MGS

⚠ WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

After a major power train component failure, clean the torque converter scavenge screen.

1. Remove the bottom guard in order to gain access to the torque converter.

Note: Drain all fluids into a suitable container.

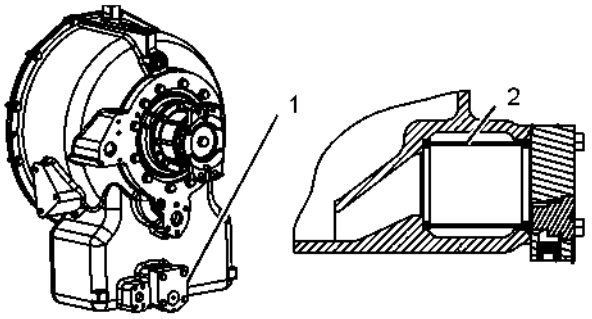

Illustration 299 g01387611

(1) Drain valve body
(2) Scavenge screen

2. Remove the bolts and drain valve body (1) from the torque converter, as shown.

3. Remove torque converter scavenge screen (2) from the torque converter housing.

4. Wash the screen in a clean, nonflammable solvent.

5. Install torque converter scavenge screen (2) in the torque converter housing. Install the bolts and drain valve body (1).

6. Install the bottom guard.

Reference: See Operation and Maintenance Manual, “Power Train System Oil Level - Check” in order to fill with oil.

i06653692

Track - Check/Adjust

SMCS Code: 4170-036

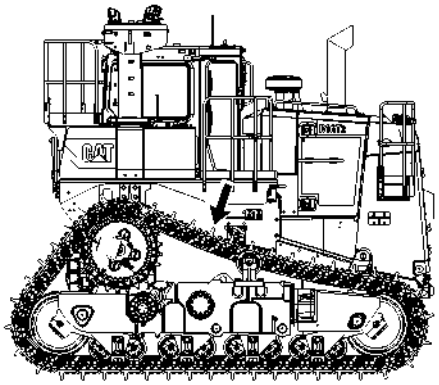

Illustration 300 g03520042

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

⚠ WARNING

Grease is under high pressure.

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

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

Loosen the relief valve only one turn.

1. Move the machine forward. Allow the machine to coast to a stop without the use of the service brakes. Adjust the tracks while you are in the typical operating conditions for the machine . If packing conditions prevail on the workplace, the tracks should be adjusted with packing material.

2. To measure the sag in the track, stretch a string over the grousers that are between the sprocket and the front idler. Take the measurement from the string to the top of the grouser at the maximum measurement. Dimension (2) is the maximum distance between the string and the grouser.

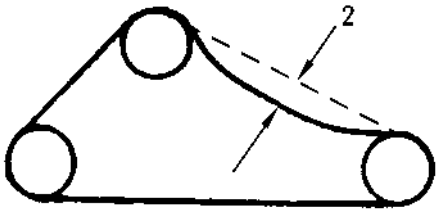

Illustration 301 g00512026

Track adjustment without carrier rollers

If a machine does not have carrier rollers, the sag in the track is measured between the sprocket and the front idler. The correct adjustment of dimension (2) is 155 ± 10 mm (6.1 ± .40 inch).

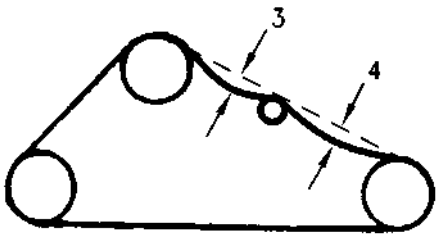

Illustration 302 g00511982

Track adjustment with carrier rollers

If the machine is equipped with a carrier roller, the correct adjustment of dimension (3) and dimension (4) is 75 ± 10 mm (3 ± 0.40 inch).

Loose Track Adjustment

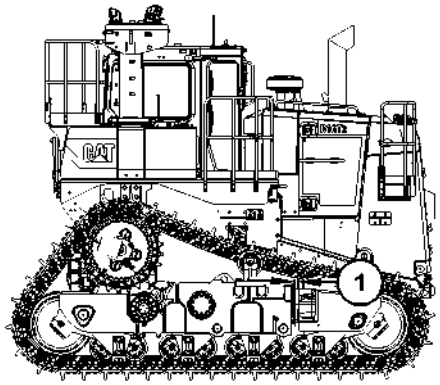

Illustration 303 g03520106

Location of dimension (1)

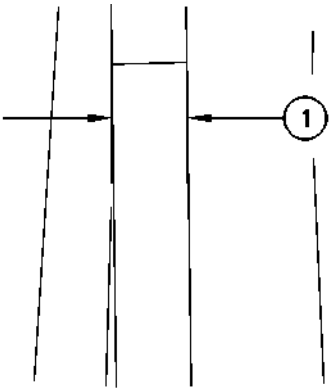

Illustration 304 g00945710

Dimension (1)

NOTICE

Do not attempt to tighten track when dimension (1) is 193 mm (7.6 inch) or more.

Contact your Caterpillar dealer for track service or instructions.

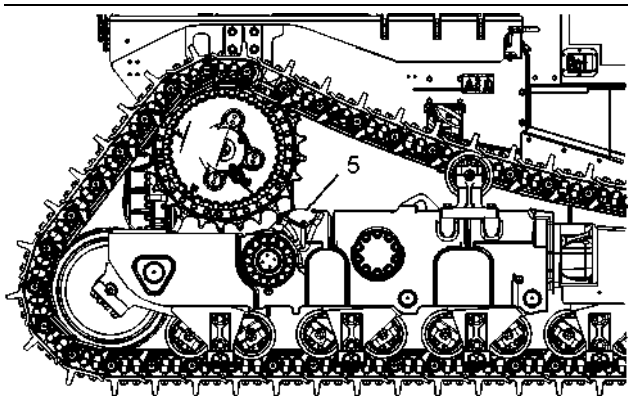

Illustration 305 g03520136

1. Remove access cover (5).

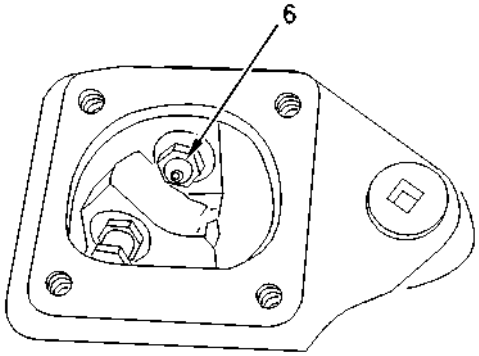

Illustration 306 g00945711

2. Add multipurpose grease (MPGM) through track adjustment valve (6). Add the MPGM until dimension (2) is correct.

3. Operate the machine back and forth to equalize the pressure. Allow the machine to coast to a complete stop. Do not use the brakes.

4. Remeasure dimension (2).

5. Install access cover (5).

Tight Track Adjustment

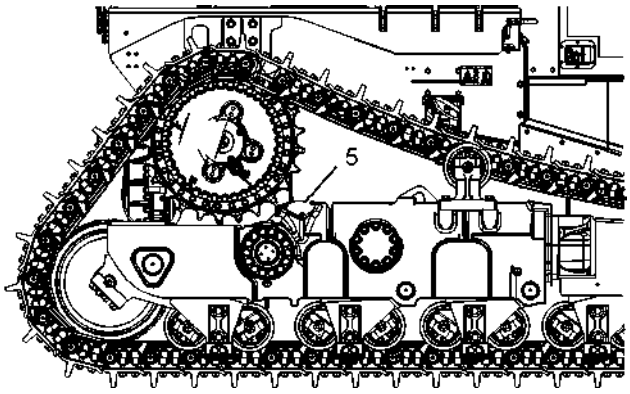

Illustration 307 g03520136

1. Remove access cover (5).

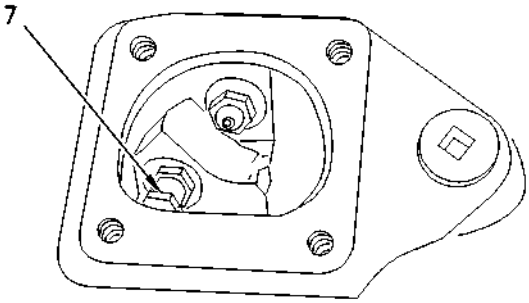

Illustration 308 g00945714

2. Loosen relief valve (7) by one turn of 360 degrees. Allow the grease to escape.

3. Close the relief valve.

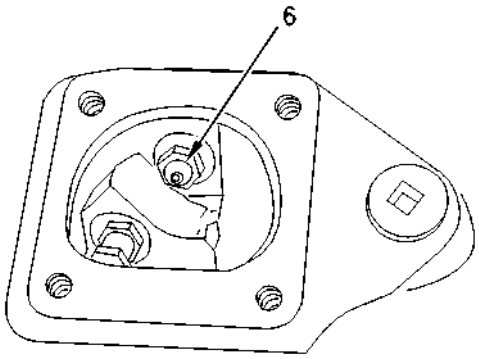

Illustration 309 g00945711

4. Add MPGM through track adjustment valve (6). Add grease until dimension (2) is correct.

5. Install access cover (5).

Bolt Torque for Track Shoes

The torque requirement for track shoe bolts is dependent upon which type of track link the track shoe is attached to. There are two different master link designs for this machine with a different bolt torque for each of the two master link design types. Bolt torque for track links that are not master links are different than the bolt torque for either type of master track link.

Track Shoes (Five Tooth Master Link)

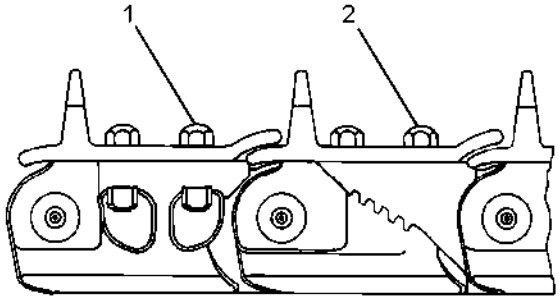

Illustration 310 g03332203

Five tooth master link

(1) Track link bolt
(2) Track master link bolt (1-1/8-12 fine thread)

Torque track link bolts (1) to 870 ± 90 N·m (642 ± 66 lb ft). Then, tighten the bolts by an additional turn of 120 ± 5 degrees.

Torque master link track bolts (2) to 870 ± 90 N·m (642 ± 66 lb ft) . Then, tighten the bolts by an additional turn of 120 ± 5 degrees.

Track Shoes (Single Tooth Master Link)

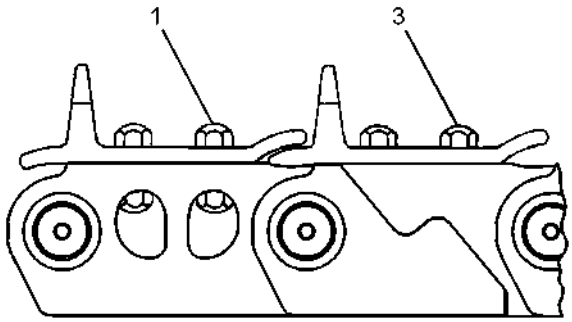

Illustration 311 g03332274

Single tooth master link

(1) Track link bolt
(3) Track master link bolt (1 1/8 -7 coarse thread)

Torque track link bolts (1) to 870 ± 90 N·m (642 ± 66 lb ft) . Then, tighten the bolts by an additional turn of 120 ± 5 degrees.

Torque master link track bolts (3) to 700 ± 70 N·m (515 ± 50 lb ft). Then, tighten the bolts by an additional turn of 90 ± 5 degrees.

i02039746

Track Pins - Inspect

SMCS Code: 4175-040-PN

WARNING

Fingers can be burned from hot pins and bushings.

The pins and bushings in a dry joint can become very hot. It is possible to burn the fingers if there is more than brief contact with these components.

Use the recommendations in order to extend the life of the undercarriage. Use the recommendations in order to avoid excessive downtime.

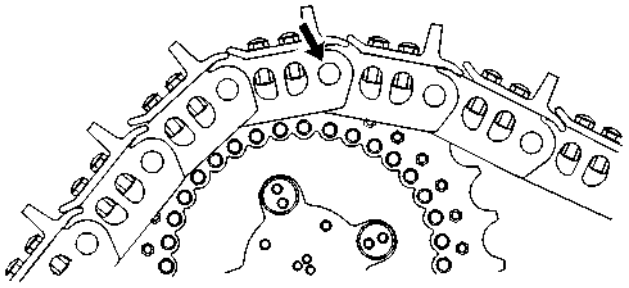

Illustration 312 g01048998

1. During the machine operation, listen for unusual squeaking and for unusual squealing. This can indicate a dry joint.

2. Check the machine for dry joints weekly. Check for dry joints immediately after machine operation. After machine operation, lightly touch the end of each track pin or bushing. Touch the track pin or the track bushing with the back of your hand. Make a mark on any dry track pin joint that is very hot to the touch.

3. Do not hit the ends of the track pins with a sledge hammer in order to loosen the track joints.

NOTICE
Striking the end of a track pin introduces a significant amount of end play into the track joint and can result in early failures.

Consult your Caterpillar dealer's Custom Track Service expert if you detect dry joints or leaks. Your Caterpillar dealer's Custom Track Service expert can perform track inspection.

i05556154

Track Roller Frame - Inspect

SMCS Code: 4151-040

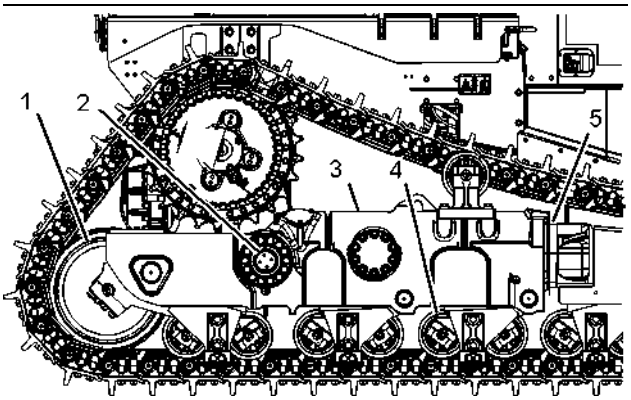

Illustration 313 g03520320

Inspect the track roller frame (3) for leaks. Check the seal for the pivot shaft (2) for oil leaks. Check the idlers (1) and track rollers (4) for leaks. Inspect the seal for the recoil spring (5) for oil leaks.

i05556194

Track Roller Frame Guides - Inspect

SMCS Code: 4177-040

Measure the rotational movement of the front roller frame relative to the rear roller frame.

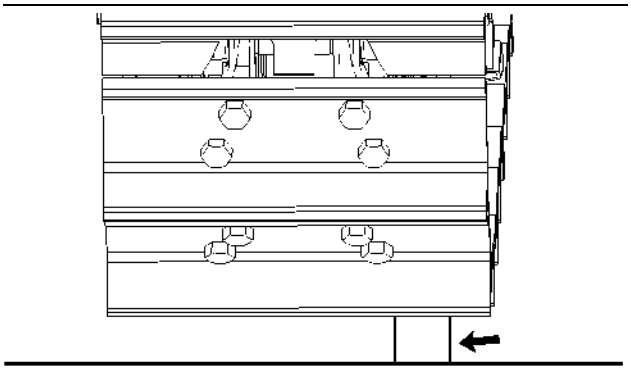

Illustration 314 g01049094

1. Raise the front of the machine with the hydraulics of the dozer. Place a 100 mm (4 inch) block under the outside edge of a track shoe. Place the block near the track idler. Lower the machine onto the block.

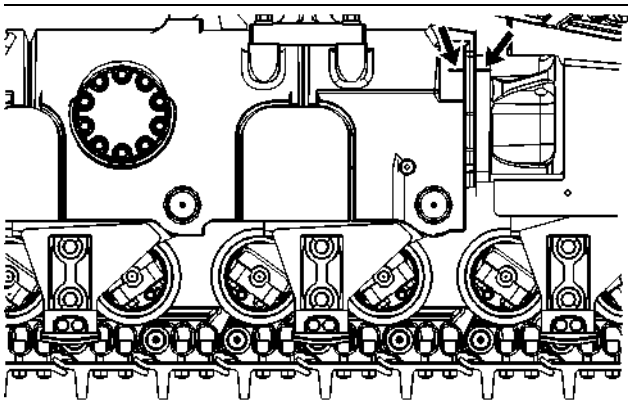

Illustration 315 g03520337

2. Use a grease pencil to make a mark on the tubular section of the front roller frame. Make a mark on the rear of the roller frame. This mark should correspond with the mark that is on the tubular section.

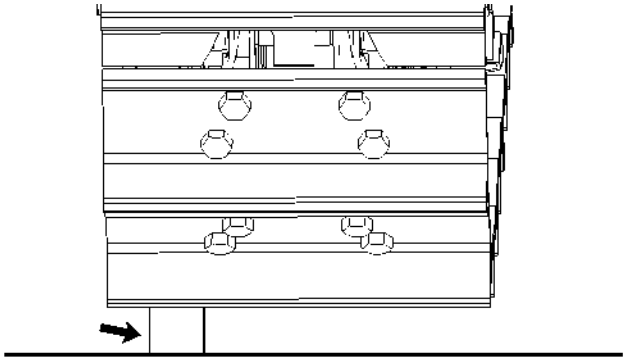

Illustration 316 g01049226

3. Raise the front of the machine with the hydraulics of the dozer. Place the block under the inside edge of the same track shoe. Lower the machine onto the block.

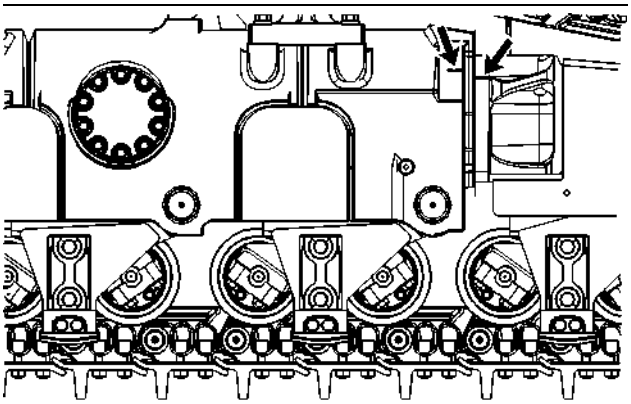

Illustration 317 g03520371

4. Measure the distance between the two marks on the front roller frame. If the distance between the two marks is greater than 4.5 mm (0.18 inch), inspect the track roller frame guides for wear.

Repeat the entire procedure for the other side of the machine.

NOTICE
Never build up the track roller frame guides with hard-face welding. This will cause serious wear damage to the guide slots in the front track roller frame.

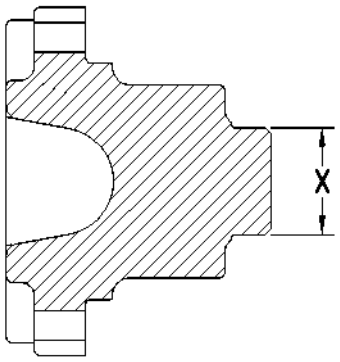

Illustration 318 g00781090
Track Roller Frame Guide

If dimension (X) is less than 45.3 mm (1.78 inch), replace the track roller frame guides.

Reference: Refer to Disassembly and Assembly, “Front Track Roller Frame - Remove” and refer to Disassembly and Assembly, “Front Track Roller Frame - Install” in the Service Manual for your machine. Also, consult your Caterpillar dealer for more information or for service.

i07347307

Undercarriage - Clean

SMCS Code: 4150-070

Daily clean-out reduces undercarriage wear and increases the service life of seals and components. Clean-out is intended to keep excess material from building up and solidifying.

At the end of every work shift, use a shovel to remove excess dirt, mud, trash, or debris from the final drive hub & spindle, equalizer bar ends, pivot shaft, top of track roller frame, bogie suspension system, track idlers, and rollers.

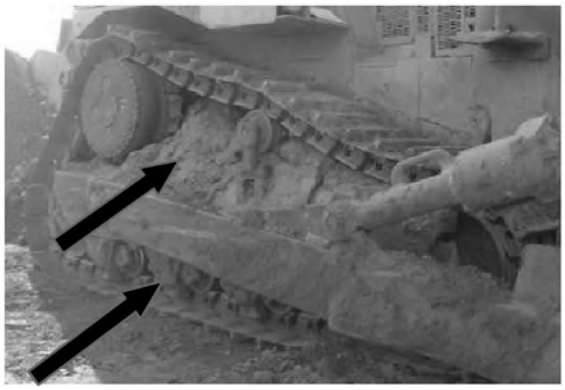

Illustration 319 g06280594
Undercarriage before clean-out

Illustration 320 g06280595
Undercarriage after clean-out

In Heavy Mud of Debris Packing Environments

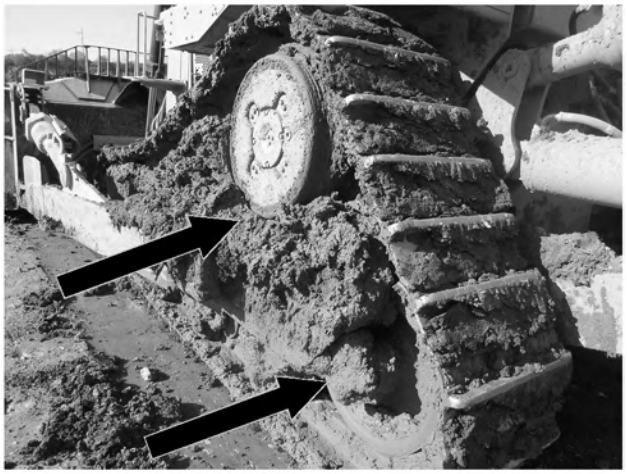

Illustration 321 g06280596
Heavy Mud Packing

1. Thoroughly clean-out the undercarriage with a shovel using the procedure described above.
2. In addition, the undercarriage can be washed with water to aid cleaning. Keep high-pressure spray nozzle away from track pin plugs and seal areas to prevent seal damage and leakage.

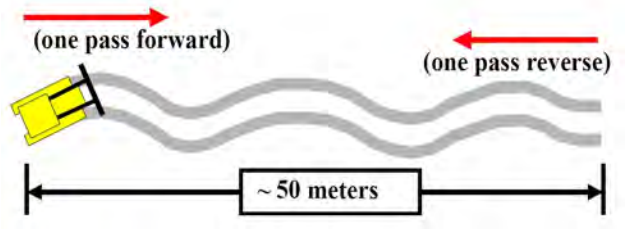

Illustration 322 g06115726

3. On firm ground, operate the machine in 2F for approximately 50m, using a moderate S-shaped pattern (see illustration above). Then, operate the machine in 2R in the same pattern. This helps further remove loose material and equalize pressure on duo-cone seals.

4. At the start of the next work shift, keep the machine in motion for 10-15 minutes without stopping. This can allow seals to work out loose material and equalize seal pressure. Moving only a short distance and stopping the machine can allow seals to leak.

i05556311

Window Washer Reservoir - Fill

SMCS Code: 7306-544

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

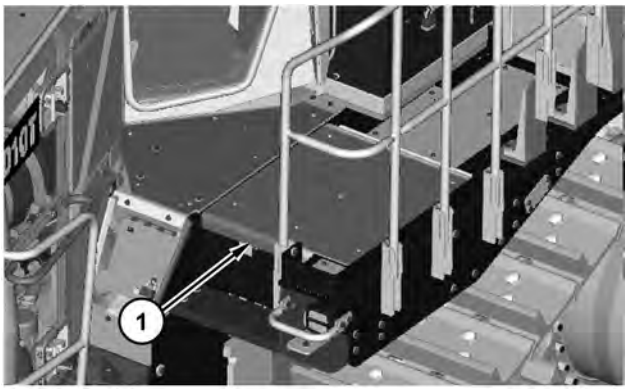

Illustration 323 g03521159

The washer fluid bottle is on the left side of the machine inside battery box cover (1) behind the batteries.

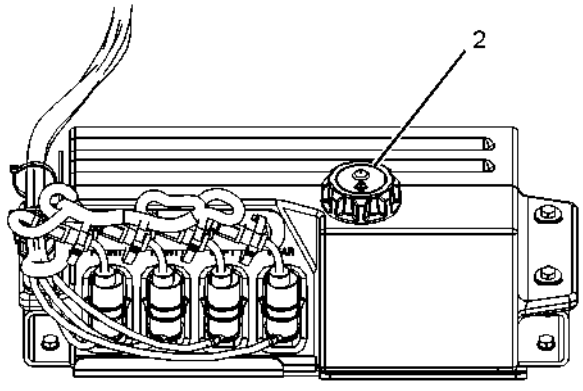

Illustration 324 g03521176

Remove fluid bottle cap (2) to fill the washer fluid bottle.

i05558733

Window Wipers - Inspect/ Replace

SMCS Code: 7305-040; 7305-510

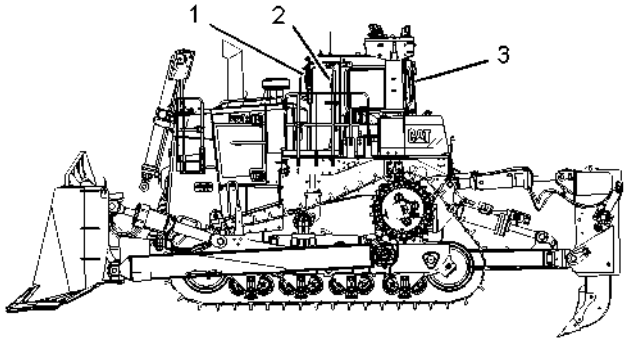

Illustration 325 g03521253

(1) Front window wiper
(2) Side window wiper
(3) Rear window wiper

Inspect the front window wiper blade, the side window wiper blades and the rear window wiper blade. Replace any wiper blades that are damaged or worn. Replace any wiper blades that streak the window.

i05558749

Windows - Clean

SMCS Code: 7310-070; 7340-070

If equipped:

Use commercially available window cleaning solutions to clean the windows.

Cleaning From Ground Level

Note: Use the following method in order to clean a solid rear window.

Use commercially available window cleaning solutions in order to clean the windows. Clean the outside of the windows from the ground or with the use of a man lift, unless appropriate handholds are available.

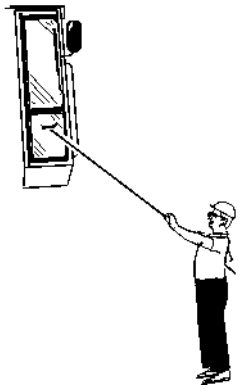

Illustration 326 g00566124

Typical example

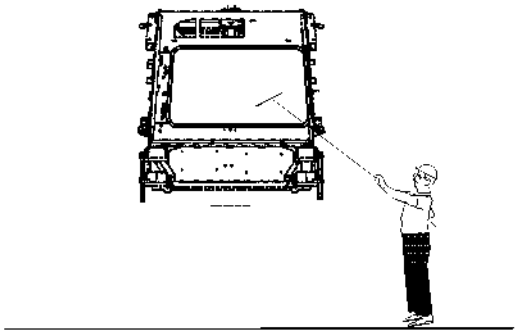

Illustration 327 g01964774

Rear window

Use a pole with a squeegee in order to reach the high areas of the window.

Warranty Section

Warranty Information

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).

b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i07422648

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting publications.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

publications.cat.com

i07743978

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

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

Utilize appropriate personal protective equipment when decommissioning and disposing product.

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

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____