



Operation and Maintenance Manual

D6K Track-Type Tractor

DHA1-Up (LGP)
NCF1-Up (XL)
FBH1-Up (XL)

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. 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 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 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 or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can 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.

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Foreword

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 Caterpillar 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 they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely 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.

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.

Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

Certified Engine Maintenance

Proper maintenance and repair is 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 render inoperative any emission related device or element of design installed on or in an engine or machine that is in compliance with the regulations (40 CFR Part 89). 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 Caterpillar dealer for further information.

Caterpillar Product Identification Number

Effective First Quarter 2001 the Caterpillar Product Identification Number (PIN) has changed from 8 to 17 characters. In an effort to provide uniform equipment identification, Caterpillar and other 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 Caterpillar machines and generator sets. The PIN plates and frame marking will display the 17 character PIN. The new format will look like the following:

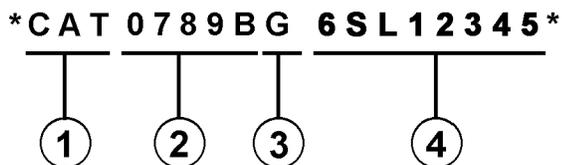


Illustration 1

g00751314

Where:

1. Caterpillar's 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, etc. and work tools will continue to use an 8 character Serial Number (S/N).

Safety Section

i04555661

Safety Messages

SMCS Code: 7000; 7405

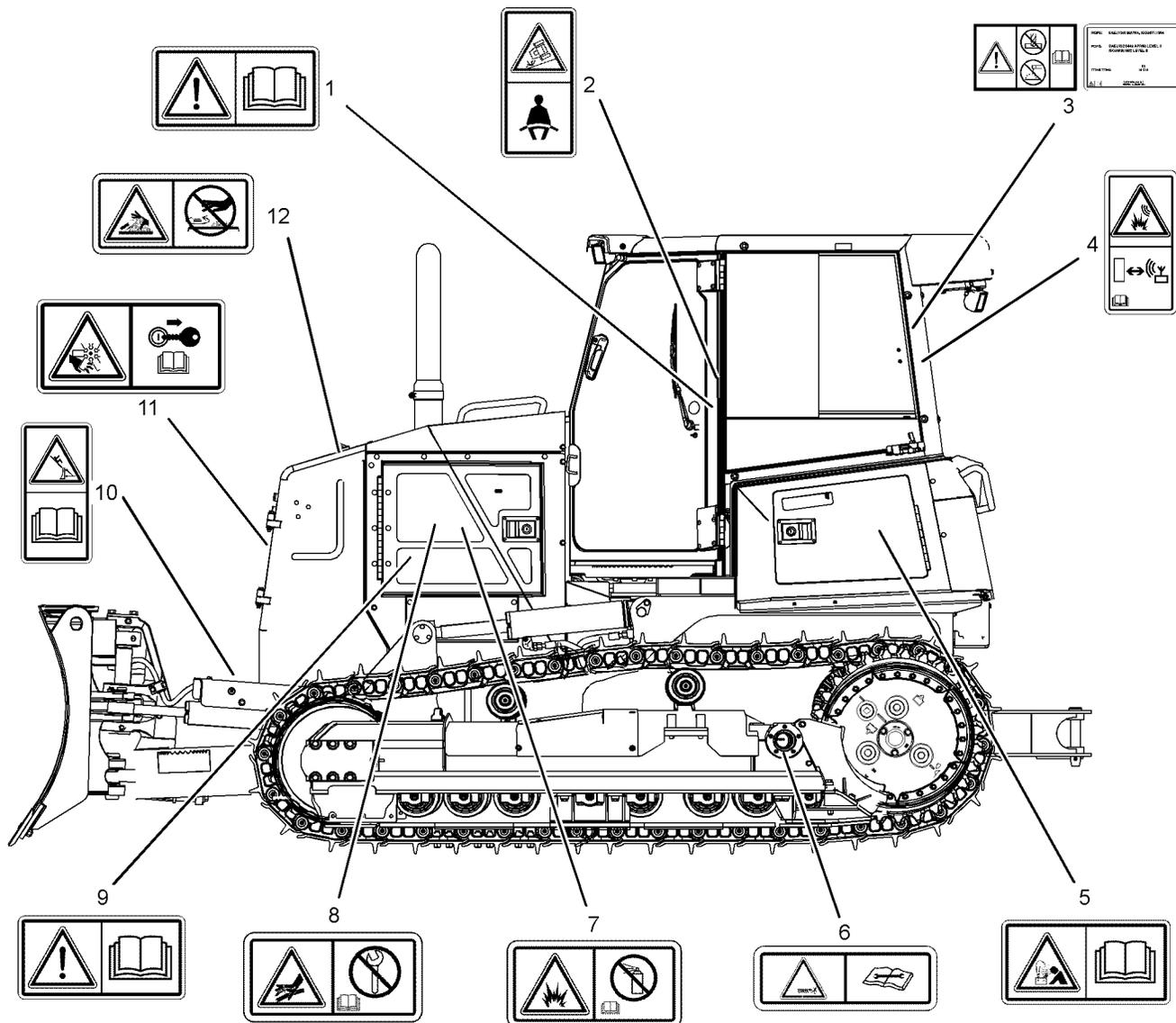


Illustration 2

g02724138

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

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

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

Do Not Operate (1)

Safety message (1) is positioned on the left-hand side of the cab post in view of the operator.



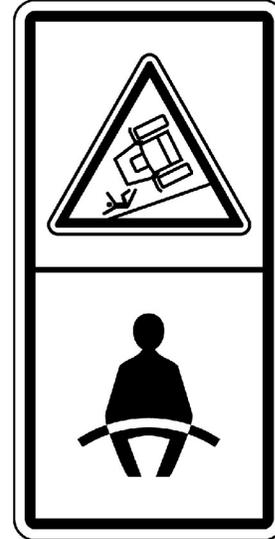
g01370904

WARNING

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

Seat Belt (2)

Safety message (2) is positioned on the left-hand side of the cab post in view of the operator.



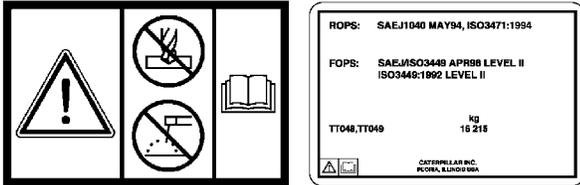
g01371636

WARNING

A seat belt should be worn at all times during machine operation to prevent serious injury or death in the event of an accident or machine overturn. Failure to wear a seat belt during machine operation may result in serious injury or death.

Do Not Weld On the ROPS (3)

Safety message (3) is positioned on the left rear side of the cab post.



g01209448

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 a payload, should not exceed the mass on the certification plate.

Product Link (4) (If Equipped)

Safety message (4) is located in the right side of the cab on the rear support.



g01108685

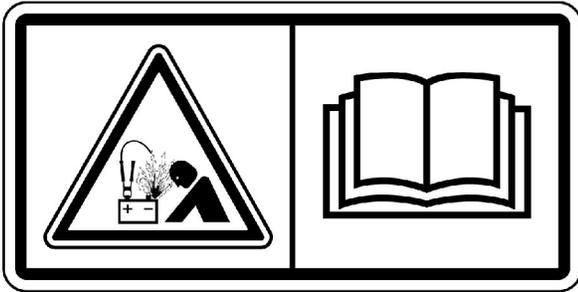
WARNING

This machine is equipped with a Caterpillar Product Link radio communication device which must be deactivated within 6.0 m (20 ft) of a blast zone. Failure to do so could result in serious injury or death.

Refer to Special Instruction, REHS1642, "Operation of the Product Link System" for additional information.

Improper Connections for Jump Start Cables (5)

Safety message (5) is in the battery compartment.



g01370909

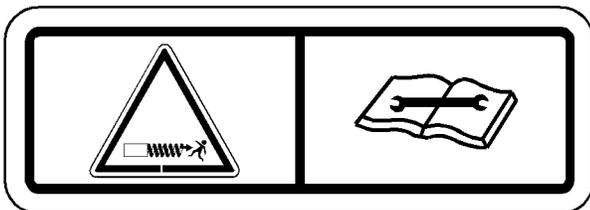
⚠ WARNING

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".

Compressed Recoil Spring (6)

Safety message (6) is located inside the track roller frames.



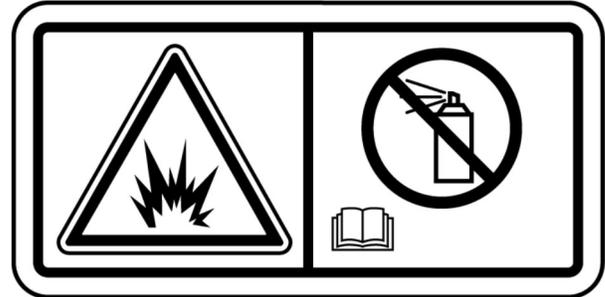
g01065910

⚠ WARNING

Do not attempt to remove spring(s), they are not serviceable. Do not cut, saw, torch or modify this chamber, serious injury or death may result.

Explosion Hazard (7)

Safety message (7) is located near the engine.



g01372254

⚠ WARNING

Explosion Hazard! Spraying uncontrolled ether into the air inlet system can cause explosions or fire that may result in personal injury or death. Read and follow the starting procedures in the Operation and Maintenance Manual.

High Pressure Fuel Lines (8)

Safety message (8) is located near the engine.



g01381180

⚠ 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.

Do Not Operate (9)

Safety message (9) is located inside the engine compartment.



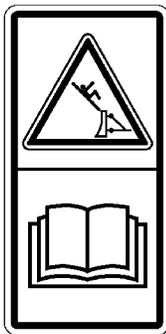
g01370904

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.

Falling Hazard (10) (If Equipped)

Safety message (10) is located on the blade angle cylinders.



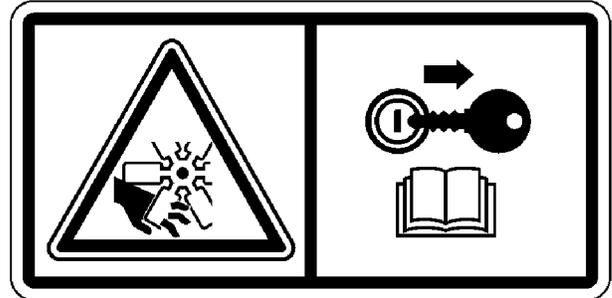
g01108716

WARNING

To prevent possible personal injury during installation and removal of the laser receivers, lower the mast to the minimum height and use an approved access system to reach the mounting locations of the laser receivers at the top of the mast. Do not climb on the blade.

Rotating Fan (11)

Safety message (11) is located on the front of the cooling system fan door.



g02176339

WARNING

Rotating fan blades can result in personal injury or death.

Stop the engine and allow the fan to come to a complete stop before making any test or adjustment.

Before starting the engine, make sure all of the finger guards are installed and the guard door is closed. Do not allow any tools or test equipment to protrude or vibrate into the path of the rotating fan blades.

Hot Fluid Under Pressure (12)

Safety message (12) is located in two places. One location is under the access door to the radiator cap. The other location is outside the access door in the front bottom guard.



g01371640

WARNING

Pressurized system! Hot coolant can cause serious burns, injury or death. 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. Read and understand the Operation and Maintenance Manual before performing any cooling system maintenance.

Laser

If your machine is equipped with the AccuGrade - Laser System, this safety message is located on each leg of the tripod for the laser.



g01282876

WARNING

Movement of the transmitter could cause unexpected blade movement. Death or serious injury could occur. Turn off the transmitter before you move the transmitter or before you adjust the transmitter.

i04556182

Additional Messages

SMCS Code: 7405

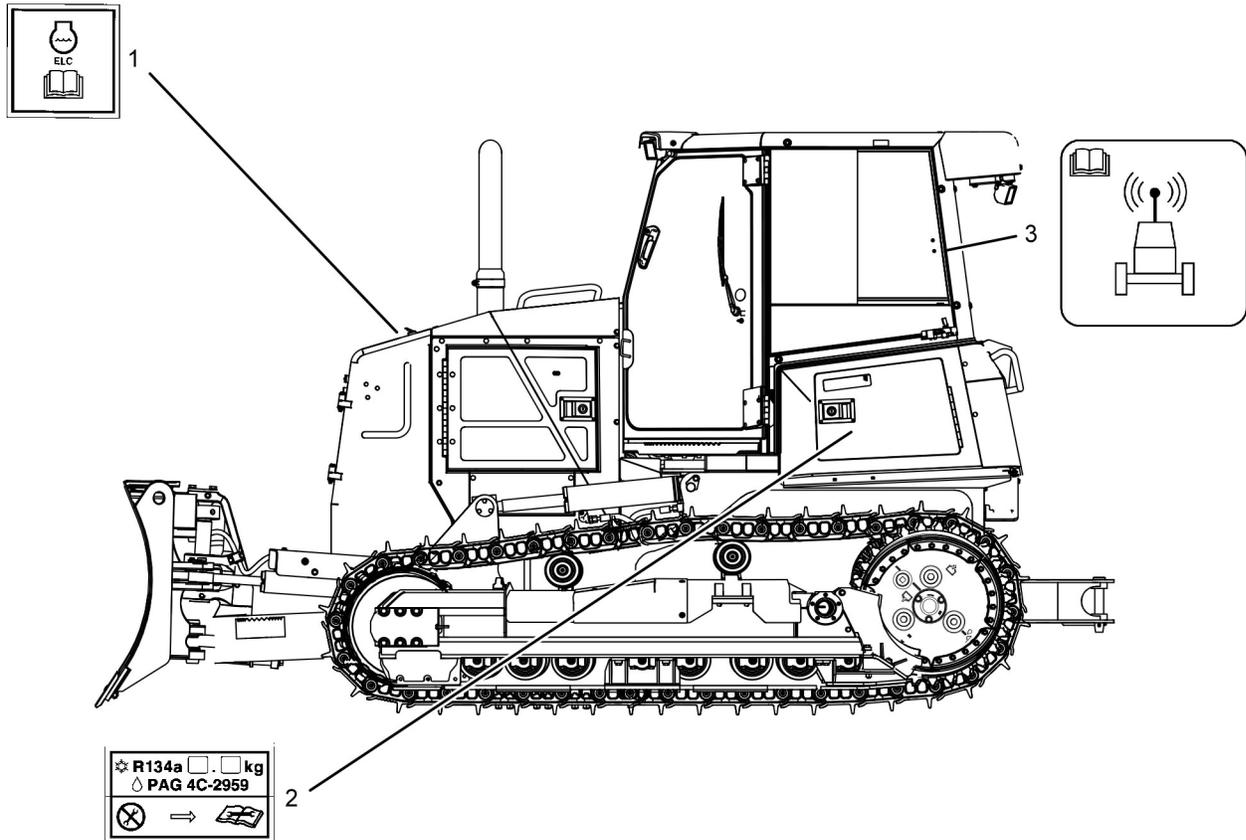


Illustration 3

g02724093

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

Make sure that all of 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 Caterpillar dealer can provide new messages.

ELC (1)

This message is located underneath the access door for the radiator cap.

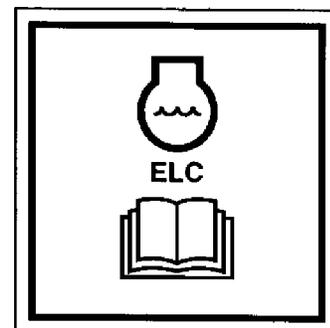


Illustration 4

g01211116

NOTICE

When the steering lever is moved with the transmission in NEUTRAL or in gear, and the engine is running, the machine will turn. Engage the steering control lock by engaging the parking brake in order to prevent machine movement.

Air Conditioner (2)

This message is located on the heater and air conditioner group underneath the left-hand access door.

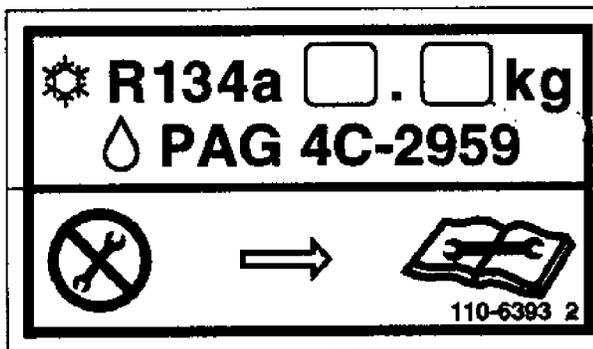


Illustration 5

g00927763

This message for the air conditioner has the appropriate information for the following services: the air conditioner lubricant, the refrigerant charge, and the refrigerant capacity.

Reference: See Operation and Maintenance Manual, "Maintenance Interval Schedule" for all maintenance recommendations.

Follow instruction in order to avoid engine damage.

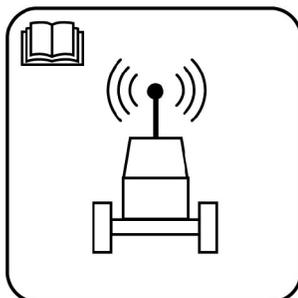
Product Link (3)

Illustration 6

g01418953

If your machine is equipped with the Product Link System, this additional message is located in the cab on the rear left C post.

The Product Link System is a satellite communication device that transmits information regarding the machine back to Caterpillar and Caterpillar 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.

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

i04010649

General Hazard Information

SMCS Code: 7000

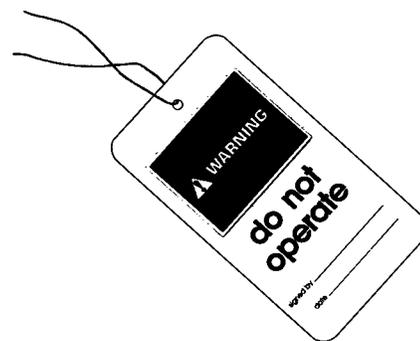


Illustration 7

g00104545

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. These warning tags (Special Instruction, SEHS7332) are available from your Cat dealer.

WARNING

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

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

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

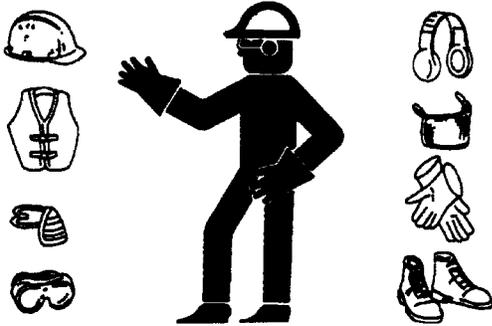


Illustration 8

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).

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 engine 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.

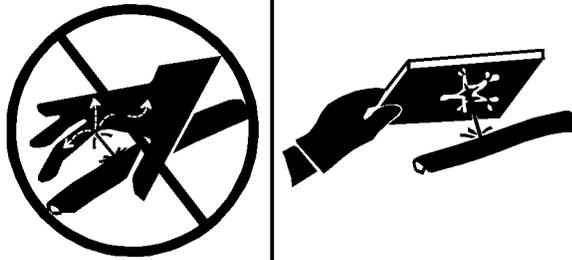


Illustration 9

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, "Caterpillar 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

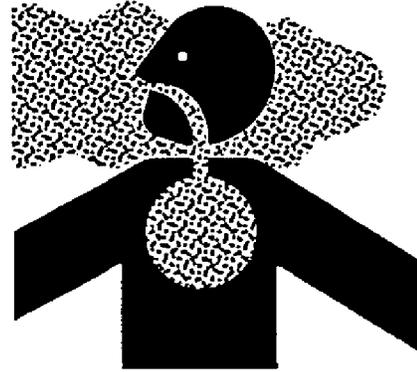


Illustration 10

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”.
- Obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

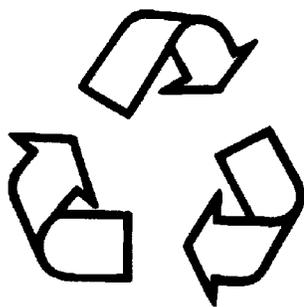


Illustration 11

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.

i01329099

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

Electrolyte is an acid. Electrolyte can cause personal injury. Do not allow electrolyte to contact the skin or the eyes. Always wear protective glasses for servicing batteries. Wash hands after touching the batteries and connectors. Use of gloves is recommended.

i04218233

Fire Prevention and Explosion Prevention

SMCS Code: 7000



Illustration 12

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 13

g00704059

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. Always stop the engine before fueling. Fill the fuel tank outdoors. Properly clean areas of spillage.

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

Battery and Battery Cables



Illustration 14

g02298225

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.

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.

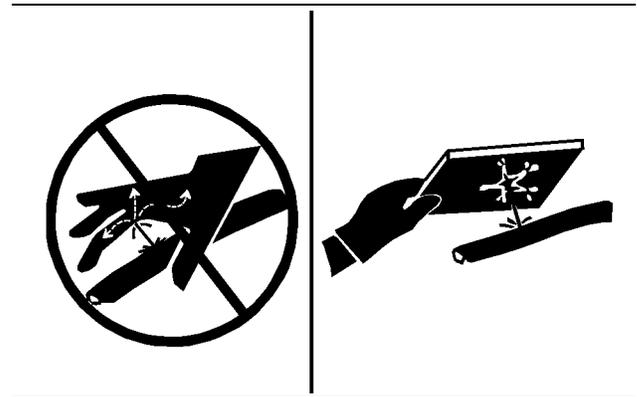


Illustration 15

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.

Follow the correct cold engine starting procedures. Refer to the section in the Operation and Maintenance Manual with the label “Engine Starting”.

Do not spray ether manually into an engine if the machine is equipped with a thermal starting aid for cold weather starting.

Use ether in well ventilated areas. Do not smoke while you are replacing an ether cylinder or while you are using an ether spray.

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.

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Fire Safety

SMCS Code: 7000

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

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

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

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

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

If possible, 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.

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

1. Pull the pin.
2. Aim the extinguisher or nozzle at the base of the fire.
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

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

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

- 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 of the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

i01834364

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.

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

Strap the mounting plate to a leg of the ROPS in order to mount the fire extinguisher, as needed. 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.

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

i01329108

Track Information

SMCS Code: 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.

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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.

i02665037

High Pressure Fuel Lines

SMCS Code: 1274



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.

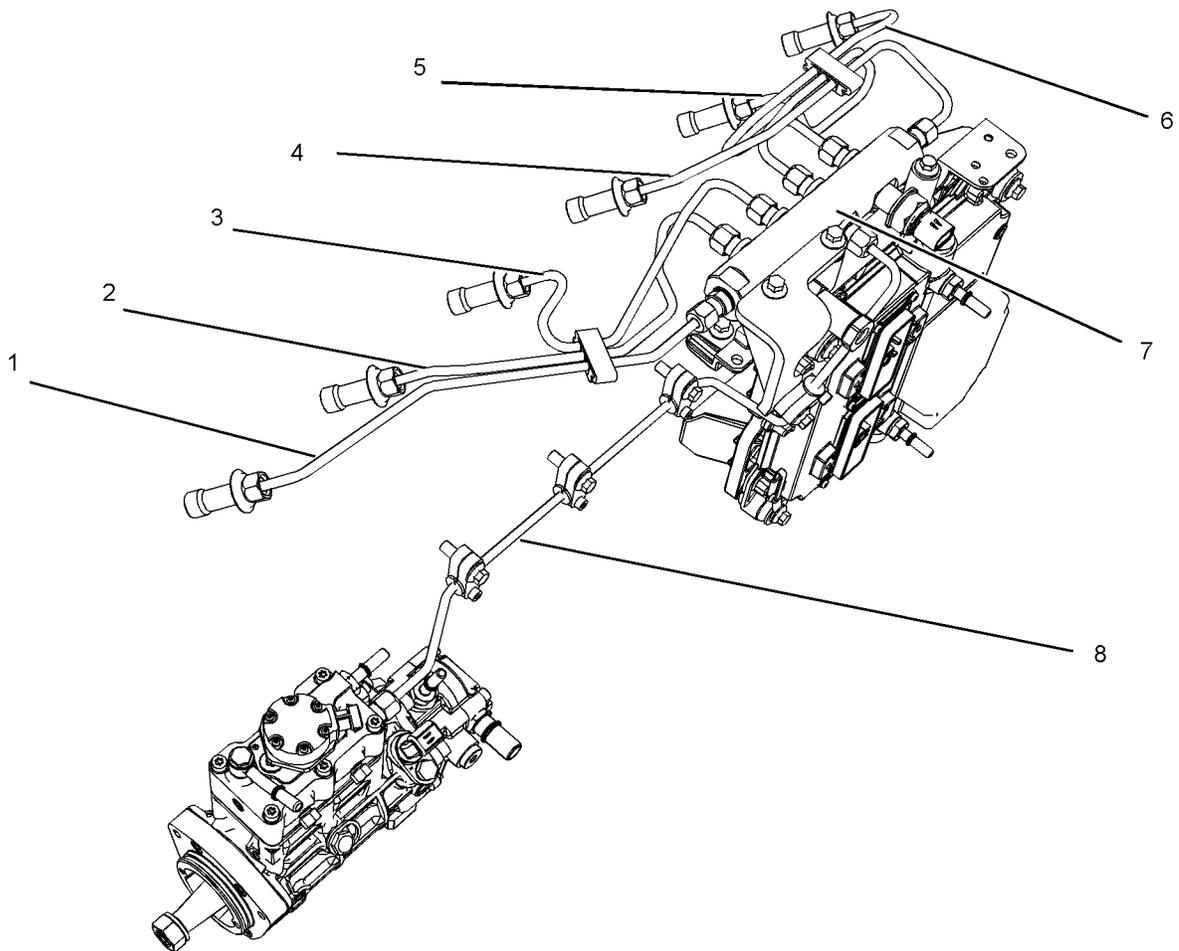


Illustration 16

g01339189

- (1) High pressure line
- (2) High pressure line
- (3) High pressure line

- (4) High pressure line
- (5) High pressure line
- (6) High pressure line

- (7) High pressure fuel manifold (rail)
- (8) High pressure line

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

This is because of the following items:

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

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

Do not check the high pressure fuel lines with the engine or the starting motor in operation. After the engine has stopped allow 60 seconds to pass in order to allow the pressure to be purged before any service or repair is performed on the engine fuel lines.

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

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

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

- Inspect the high pressure fuel lines for damage, deformation, a nick, a cut, a crease, or a dent.
- Do not operate the engine with a fuel leak. If there is a leak do not tighten the connection in order to stop the leak. The connection must only be tightened to the recommended torque. Refer to Disassembly and Assembly, "Fuel injection lines - Remove and Fuel injection lines - Install".
- If the high pressure fuel lines are torqued correctly and the high pressure fuel lines are leaking the high pressure fuel lines must be replaced.
- Ensure that all clips on the high pressure fuel lines are in place. Do not operate the engine with clips that are damaged, missing or loose.
- Do not attach any other item to the high pressure fuel lines.
- Loosened high pressure fuel lines must be replaced. Also removed high pressure fuel lines must be replaced. Refer to Disassembly and assembly manual, " Fuel Injection Lines - Install".

i01896223

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operator's compartment. 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.

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 three 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.

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.

Engine Starting

SMCS Code: 1000; 7000

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

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

Engage the parking brake switch.

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

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.

i01963896

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, "Daily Inspection" in this manual.

Fasten the seat belt securely.

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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".

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 traffic to move when it is safe
- 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.

Operation

SMCS Code: 7000

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of -40 °C (-40 °F) to 50 °C (122 °F). Special configurations for different ambient temperatures may be available. Consult your Caterpillar dealer for additional information on special configurations of your 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.

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

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

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

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

Never use the work tool for a work platform.

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

Carry attachments close to the ground, approximately 40 cm (15 inches) higher than 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.

Be sure that the towing devices are adequate.

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

Know the maximum dimensions of your machine.

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

i03860832

Parking

SMCS Code: 7000

Park on a level surface. If you must park on a grade, use blocks to prevent the machine from rolling.

Apply the service brake in order to stop the machine. Move the transmission control to NEUTRAL position and the speed control to LOW IDLE position.

Engage the parking brake switch.

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

Stop the engine.

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

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

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

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

i02624835

Engine Stopping

SMCS Code: 1000; 7000

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

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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 operator Equivalent Sound Pressure Level (Leq) is 79 dB(A) when "ANSI/SAE J1166 OCT 98" is used to measure the value for an enclosed cab and the engine cooling fan was operating at full speed. This is a work cycle sound exposure level. The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed.

The operator Equivalent Sound Pressure Level (Leq) is 79 dB(A) when "ANSI/SAE J1166 OCT 98" is used to measure the value for a machine with an Open ROPS canopy and the engine cooling fan was operating at full speed. This is a work cycle sound exposure level.

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

The average exterior sound pressure level is 78 dB(A) when the “SAE J88 Feb2006 - Constant Speed Moving Test” procedure is used to measure the value for the standard machine. The measurement was conducted under the following conditions: distance of 15 m (49.2 ft) and “the machine moving forward in an intermediate gear ratio”.

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

The information below applies to only the machine configurations that have the “CE MARK” on the Product Identification Plate.

The dynamic operator sound pressure level is 78 dB(A) when “ISO 6396:2008” is used to measure the value for an enclosed cab and the engine cooling fan was operating at full speed . The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed.

“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

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in Table 1 in order 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 in order to obtain the estimated vibration level. For aggressive operations and severe terrain, add the Scenario Factors to the average vibration level in order to obtain the estimated vibration level.

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

Table 1

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."							
Machine Type	Typical Operating Activity	Vibration Levels			Scenario Factors		
		X axis	Y axis	Z axis	X axis	Y axis	Z axis
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". This 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".

The whole body vibration level of the machine varies. There is a range of values. The low value is 0.5 meter per second squared. The machine meets the short term level for the design of the seat in "ISO 7096". The value is 1.61 meter per second squared for this machine.

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations.
 - a. Tire pressures
 - b. Brake and steering systems
 - c. Controls, hydraulic system and linkages
3. Keep the terrain in good condition.
 - a. Remove any large rocks or obstacles.
 - b. Fill any ditches and holes.
 - c. Provide machines and schedule time in order 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 in order to minimize the vibration level.
 - a. Drive around obstacles and rough terrain.
 - b. Slow down when it is necessary to go over rough terrain.
8. Minimize vibrations for a long work cycle or a long travel distance.
 - a. Use machines that are equipped with suspension systems.
 - b. Use the ride control system on Track-Type Tractors.
 - c. If no ride control system is available, reduce speed in order 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 in order to provide better operator comfort:
- Adjust the seat and adjust the controls in order to achieve a good posture.
 - Adjust the mirrors in order to minimize a twisted posture.
 - Provide breaks in order to reduce long periods of sitting.
 - Avoid jumping from the cab.
 - Minimize repeated handling of loads and lifting of loads.
 - Minimize any shocks and impacts during sports and leisure activities.

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Sources

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

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

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

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

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

Use the following web site in order to find your local dealer:

Caterpillar, Inc.
www.cat.com

Operator Station

SMCS Code: 7000

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

i03656846

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 determines 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 Caterpillar 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. Consult your Caterpillar dealer for additional information.

Product Information Section

General Information

i04556259

Specifications

SMCS Code: 1000; 7000

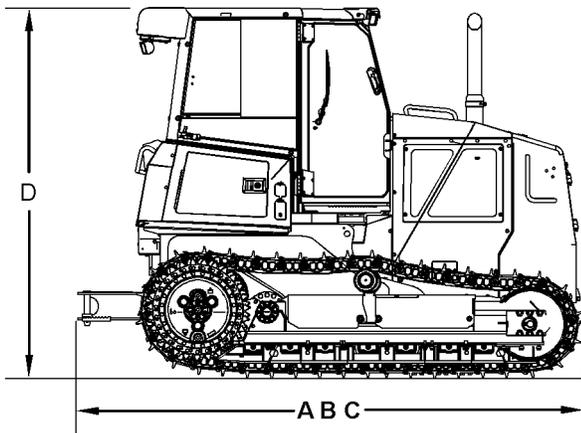


Illustration 17

g01522337

Note: An undercarriage configuration with two carrier rollers and eight track rollers per side is also available for the D6K Track-Type Tractor.

Table 2

D6K HYSTAT XL TRACK-TYPE TRACTOR	
Shipping Weight ⁽¹⁾	12611 kg (27802 lb) 13386 kg (29511 lb) ⁽²⁾
Operating Weight ⁽³⁾	12886 kg (28409 lb) 13661 kg (30117 lb) ⁽²⁾
Operating Weight with Ripper (three teeth)	13706 kg (30217 lb) 14481 kg (31925 lb) ⁽²⁾
Operating Weight with Winch	13686 kg (30172 lb) 14461 kg (31881 lb) ⁽²⁾
Length of Machine (A)	3784 mm (12.4 ft)
Length of Machine with VPAT Bulldozer blade (B)	4980 mm (16.3 ft)
Length of Machine with VPAT Bulldozer blade and Ripper (C)	5823 mm (19.1 ft)
Width of Machine across Tracks	2330 mm (7.6 ft)
Height of Machine with OROPS (canopy) (D)	2958 mm (9.7 ft)
Height of Machine with EROPS (cab) (D)	2958 mm (9.7 ft)

⁽¹⁾ The machine shipping weight includes the cab, the air suspension seat, the VPAT blade, the drawbar, the transmission, the four-valve hydraulic controls, the engine enclosures, the lubricant, the coolant, and 5 % fuel.

⁽²⁾ XL Machine with 2 carrier rollers and 8 track rollers per side.

⁽³⁾ Operating weight includes an operator and full fuel tank.

Table 3

D6K HYSTAT LGP TRACK-TYPE TRACTOR	
Shipping Weight ⁽¹⁾	13192 kg (29083 lb) 13967 kg (30791 lb) ⁽²⁾
Operating Weight ⁽³⁾	13467 kg (29690 lb) 14242 kg (31398 lb) ⁽²⁾
Operating Weight with Ripper (three teeth)	14329 kg (31590 lb) 15104 kg (33298 lb) ⁽²⁾
Operating Weight with Winch	14267 kg (31453 lb) 15042 kg (33161 lb) ⁽²⁾
Length of Machine (A)	3784 mm (12.4 ft)
Length of Machine with VPAT Bulldozer blade (B)	4980 mm (16.3 ft)
Length of Machine with VPAT Bulldozer blade and Ripper (C)	5823 mm (19.1 ft)
Width of Machine across Tracks	2760 mm (9.0 ft)
Height of Machine with OROPS (canopy) (D)	2958 mm (9.7 ft)
Height of Machine with EROPS (cab) (D)	2958 mm (9.7 ft)

⁽¹⁾ The machine shipping weight includes the cab, the air suspension seat, the VPAT blade, the drawbar, the transmission, the four-valve hydraulic controls, the engine enclosures, the lubricant, the coolant, and 5 % fuel.

⁽²⁾ LGP Machine with 2 carrier rollers and 8 track rollers per side.

⁽³⁾ Operating weight includes an operator and full fuel tank

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 for dozing that cuts material. The material is moved or graded through the forward motion of the machine. A mounted attachment can be used to exert a push or a pull force such as a ripper or towing winch.

Restrictions to Application and Configuration

Maximum approved operating weight is 16215 kg (35748 lb).

Maximum towing force of a drawbar is 194 kN (43613 lb).

Maximum vertical load for a drawbar is 98 kN (22031 lb).

The capability of the brake is equal to the ROPS capability of 16215 kg (35748 lb) when the slope is less than 45 degrees.

To obtain the proper lubrication, a maximum slope should not exceed a grade of 100 percent or 45 degrees.

Reference: See "Slope Operation" in this manual for more information.

Do not use the machine in explosive environments.

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

Winch (Applications)

Winch speeds that are standard or slow speed can exert a bare drum line pull force of 222 kN (50000 lb).

Identification Information

i03638063

Plate Locations and Film Locations

SMCS Code: 1000; 7000

Product Identification Plates

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.

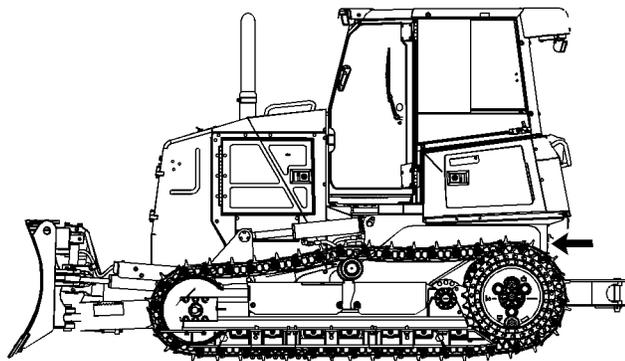


Illustration 18 g01298978

The plate for Machine Pin is located to the left of the case on the rear of the machine.

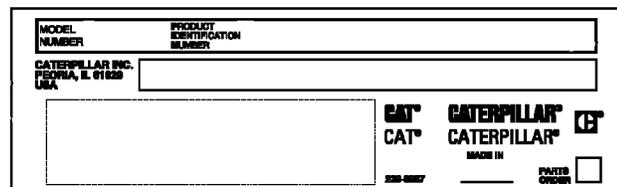


Illustration 19 g01063199

Machine PIN (plate)

Machine PIN _____

The Service Information Number Plate is located inside the cab on the rear left post.

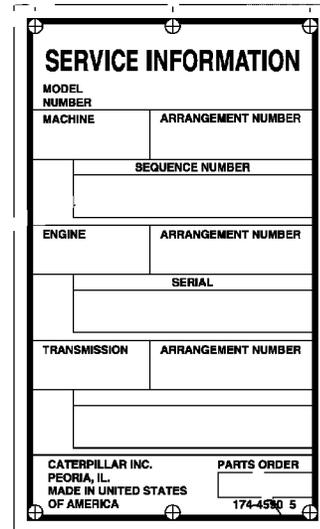


Illustration 20 g01014397

Service Information Number _____

The Information Plate for the engine is on the camshaft cover, as shown.

The Serial Number Plate is located on the left side of the engine block left from the starter.

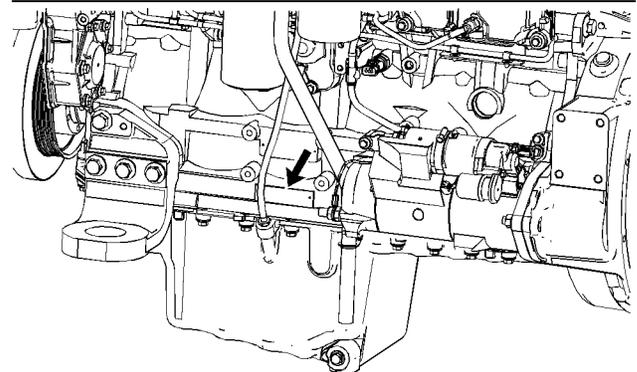


Illustration 21 g01209604



Illustration 22

g01294002

Engine Serial Number _____

The serial number plate of the bulldozer is located on the back of the blade.

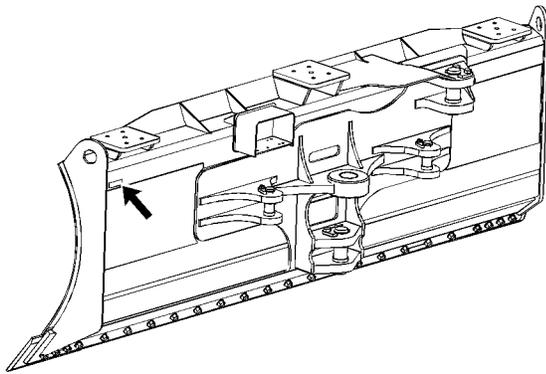


Illustration 23

g01213738

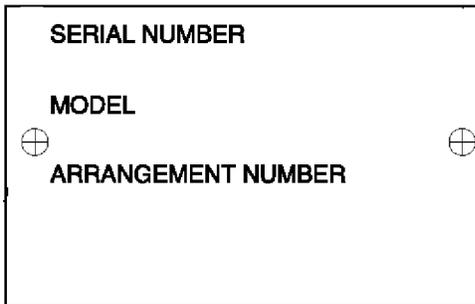


Illustration 24

g01057098

Bulldozer Serial Number _____

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

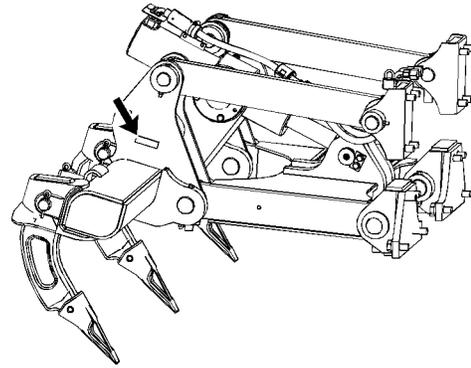


Illustration 25

g01209617

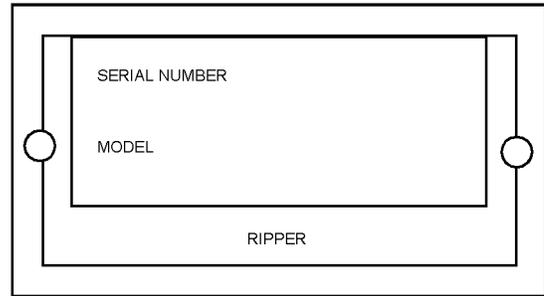


Illustration 26

g01057104

Ripper Serial Number _____

The serial number plate for the winch is located on the side of the winch.

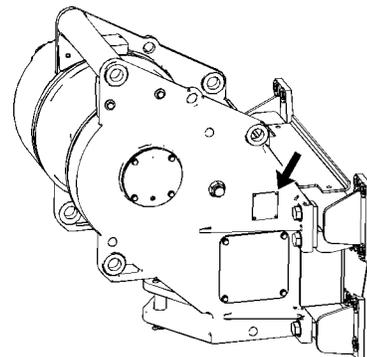


Illustration 27

g01209622

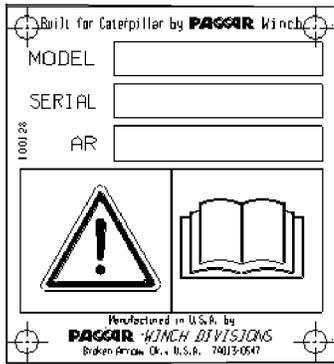


Illustration 28

g01323812

Winch Serial Number _____

Certifications

ROPS/FOPS Plate (5)

The message is positioned on the outside left canopy.

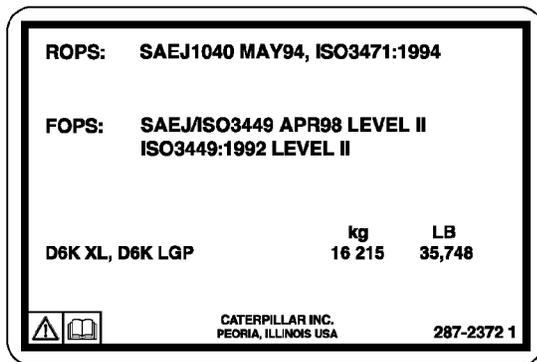


Illustration 29

g01952494



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.

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

Sound Certification

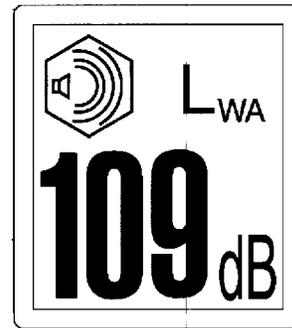


Illustration 30

g00933634

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

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

European Union

This plate is positioned on the bottom left side of the Machine PIN (1).

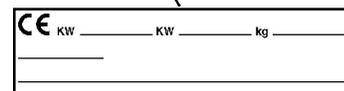
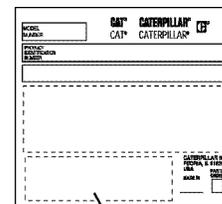


Illustration 31

g01883459

For quick reference, record this information in the spaces that are provided below.

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

- Year of construction _____
- Machine Type _____

For machines that are compliant to “1998/37/EC”, the following information is stamped onto the “CE” plate.

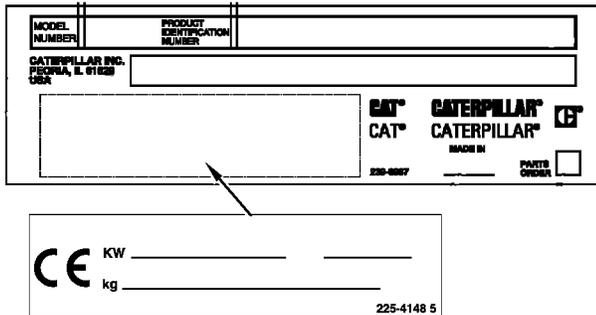


Illustration 32

g01062968

For quick reference, record this information in the spaces that are provided below.

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

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

i04019095

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

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

Consult your Cat dealer for an Emission Control Warranty Statement.

This label is located on the engine.

Operation Section

Before Operation

Mounting and Dismounting

SMCS Code: 7000

i04556265



Illustration 33
Handholds and steps

g01958934

Note: An undercarriage configuration with two carrier rollers and eight track rollers per side is available for the D6K Track-Type Tractor.

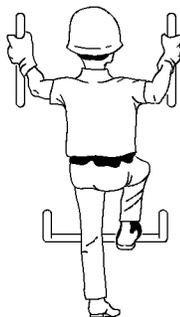


Illustration 34

g00037860

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

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

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

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

i04401029

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.

Note: For maximum service life of the machine, make a thorough daily inspection before you operate the machine. Inspect the machine for leaks. Remove any debris from the engine compartment and the undercarriage. Ensure that all guards, covers, and caps are secured. Inspect all hoses and belts for damage. Inspect all lights and mirrors for damage. Check the condition of the fan drive belt. Make the needed repairs before you operate the machine.

Perform the following procedures on a daily basis.

- Operation and Maintenance Manual, “Backup Alarm - Test”
- Operation and Maintenance Manual, “Brakes, Indicators, and Gauges - Test”
- Operation and Maintenance Manual, “Bulldozer Power Angling Tilt Hinge Pins - Lubricate”
- Operation and Maintenance Manual, “Cab Filter (Fresh Air) - Clean/Inspect/Replace”
- Operation and Maintenance Manual, “Cooling System Coolant Level - Check”
- Operation and Maintenance Manual, “Engine Oil Level - 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, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Winch Fairlead Rollers - Lubricate”

Refer to the Maintenance Section for the detailed procedures. Refer to the Maintenance Interval Schedule for a complete list of scheduled maintenance.

Machine Operation

Alternate Exit

i01930019

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.

Seat

i03172881

SMCS Code: 7312-025; 7324

Note: The operator's seat that is 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 in order to allow full travel of the pedals. Make the seat adjustments when the operator is sitting against the back of the seat.

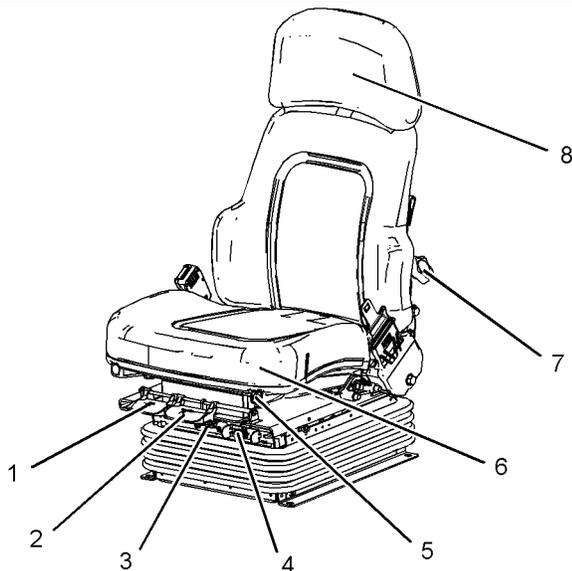


Illustration 35

g01297059



Back Cushion Angle Adjustment (1) – Pull the lever upward. Permit the back cushion 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.



Ride Indicator (3) – Use this indicator in order to determine if the suspension is adjusted too high or the adjustment is too low. When the operator sits in the seat, the white bar should be in the green zone.



Seat Height (4) – Push in the knob in order to raise the seat height. Pull out on the knob in order to lower the seat height.

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



Heated Seat (5) (If equipped) – Press the rocker switch in order to activate the seat heater. A red light will turn ON.



Seat Cushion Tilt (6) – The front of the seat cushion is pinned in a groove. Grasp the seat pan and rotate “forward-up-and-back” into the steep angle position. Grasp the seat pan and rotate “forward-down-and-back” into the nominal angle position.



Lumbar Support (7) – Rotate the knob counterclockwise in order to increase lumbar support. Rotate the knob clockwise in order to decrease lumbar support.



Back Extension (8) – Pull up on back extension in order to remove the back extension.

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

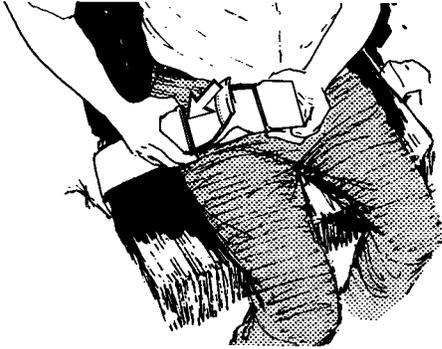


Illustration 36

g00100709

1. Unfasten the seat belt.

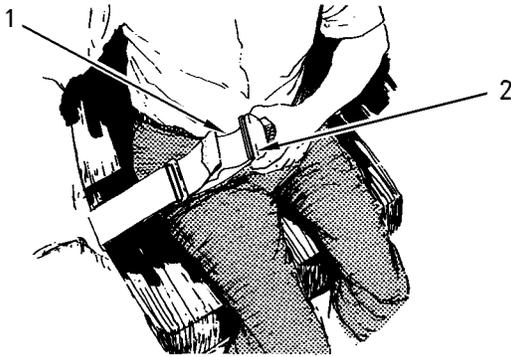


Illustration 37

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

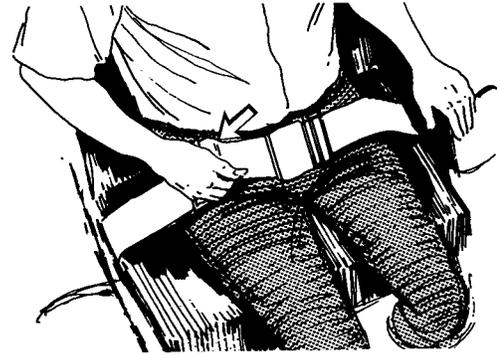


Illustration 38

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

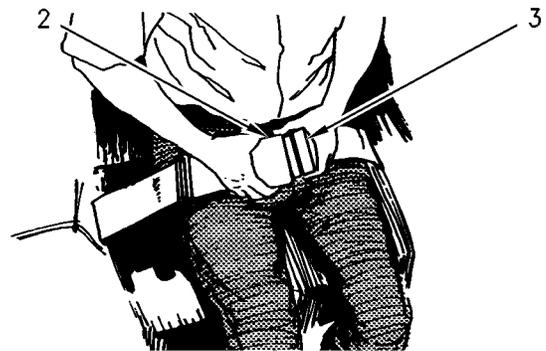


Illustration 39

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 40

g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

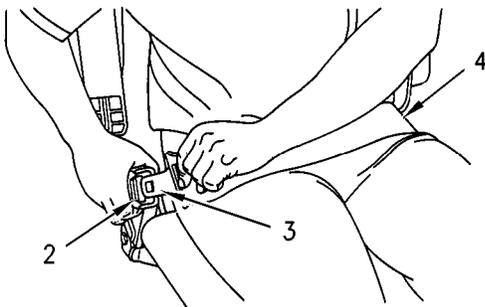


Illustration 41

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

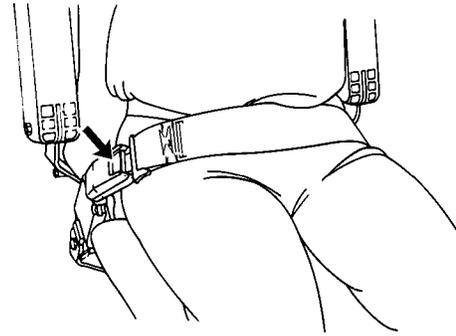


Illustration 42

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.

i04556281

Operator Controls

SMCS Code: 7300; 7301; 7451

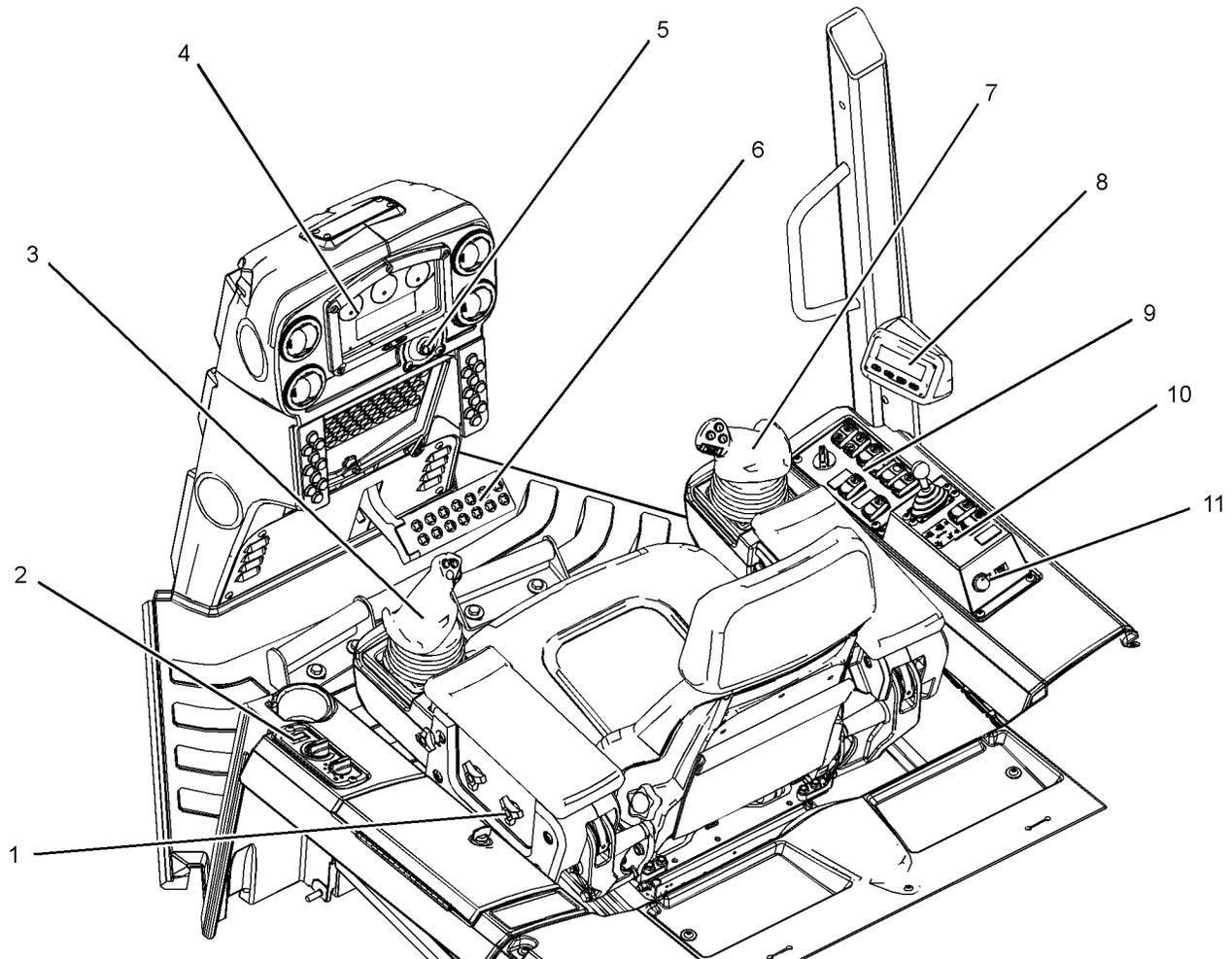


Illustration 43

g01294807

(1) Adjustable Armrest
(2) Air conditioning and heating Controls
(3) Steering and Transmission Control
(4) Gauges and Indicators

(5) Engine Start Switch
(6) Brake Pedal and Deceleration Pedal
(7) Bulldozer Control
(8) Messenger (if equipped)

(9) Switch Panel
(10) Ripper Controls or Winch Controls
(11) Power Receptacle

Adjustable Armrest (1)

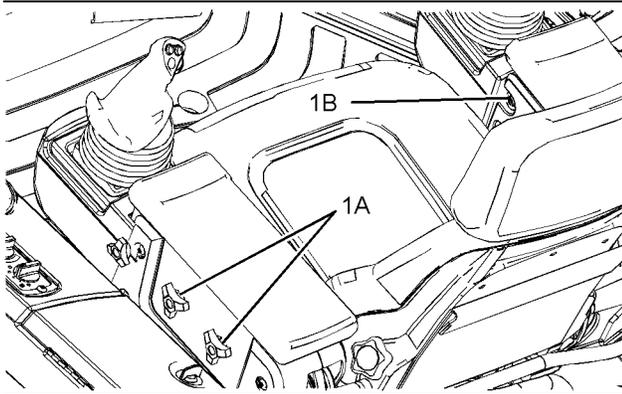


Illustration 44

g01216011

Use the following procedure in order to adjust the left armrest and right armrest (1), if necessary.

1. Loosen the two knobs (1A) on the outside of the armrest.
2. Move the armrest (1) to the desired height.
3. Tighten the knobs.
4. Use the push-button (1B) in order to move the armrest forward or move the armrest backward.

Air Conditioning and Heating Control (2)

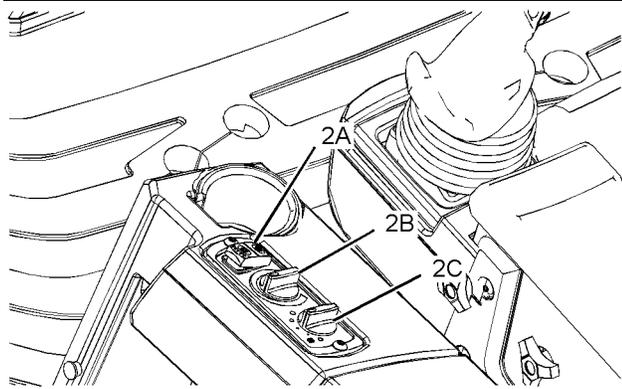


Illustration 45

g01212573

Enclosed ROPS

- (2A) Air conditioner switch and automatic temperature switch
(2B) Temperature control knob
(2C) Fan control knob

Fan Control



Fan Speed Switch (2C) – This knob controls the four-speed blower fan motor.



OFF – Move knob (2C) to this position in order to stop the blower fan motor.



LOW – Move knob (2C) to this position for the lowest fan speed.



MEDIUM LOW – Move knob (2C) to this position for a medium low fan speed.



MEDIUM HIGH – Move knob (2C) to this position for a medium high fan speed.



MAXIMUM – Move knob (2C) to this position for a maximum fan speed.

Temperature Control



Temperature Control Knob (2B) – Turn the knob counterclockwise to COOL. Turn the knob clockwise to WARM.

Air Conditioner Switch



Air Conditioner – Press in the top of switch (2A) in order to turn on the air conditioner. Return the switch to the middle position in order to turn off the air conditioner.

Automatic Temperature Control Switch



Automatic Temperature Control (ATC) – Press the bottom of the switch (2A) in order to turn on the ATC. Return the switch to the middle position in order to turn off the ATC. In order to maintain the desired temperature, the ATC will heat the cab or the ATC will cool the cab.

Note: If the cab temperature is not staying at the desired temperature, then increase the fan speed to the maximum setting.

Heating and Air Conditioning System Operation

The heating and air conditioning system performs five functions:

Heating – Turn knob (2C) to the desired speed (LOW, MEDIUM LOW, MEDIUM HIGH, or MAXIMUM). Adjust knob (2B) in order to obtain the desired temperature.

Cooling – Press switch (2A) in order to turn on the air conditioner. Turn knob (2C) to the desired speed (LOW, MEDIUM LOW, MEDIUM HIGH, or MAXIMUM). Adjust knob (2B) in order to obtain the desired temperature.

Defrosting – Press switch (2A) in order to turn on the air conditioner. Turn knob (2C) to the desired fan speed (LOW, MEDIUM LOW, MEDIUM HIGH, or MAXIMUM). Adjust knob (2B) in order to obtain the desired temperature.

Pressurizing – When heating or cooling is not desired, pressure inside the cab will help keep out dust.

Turn knob (2B) in order to obtain the desired temperature. To produce the volume of air that is necessary to keep out dust, turn knob (2C) to MEDIUM LOW or to MEDIUM HIGH.

Defogging – Press switch (2A) in order to turn on the air conditioner. Turn knob (2C) to the desired speed (LOW, MEDIUM LOW, MEDIUM HIGH, or MAXIMUM). Adjust knob (2B) until the moisture level is lowered and the front window and side windows are free of moisture.

Steering and Transmission Control (3)

Note: Make sure that parking brake switch (9B) is disengaged in order to use steering and transmission control (3). See Illustration 52 for parking brake switch (9B) on switch panel (9).

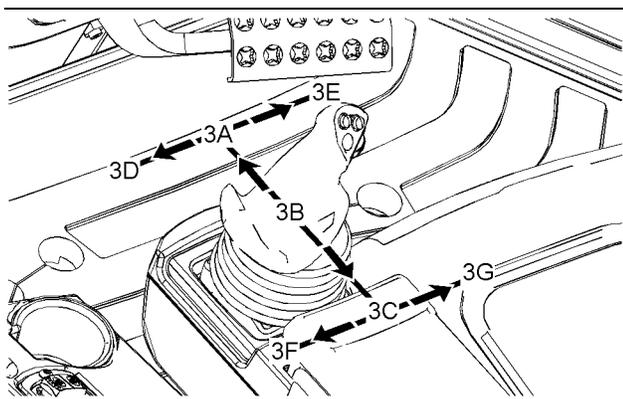


Illustration 46

g01294877

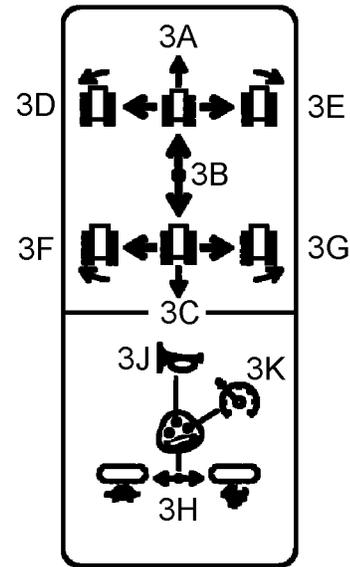


Illustration 47

g01952595

FORWARD (3A) – Move lever (3) past the detent position in order to move the machine forward.

NEUTRAL (3B) – Move lever (3) to the center position in order to put the machine in the NEUTRAL position.

REVERSE (3C) – Move lever (3) past the detent position in order to move the machine backward.

FORWARD LEFT (3D) – Move lever (3) to the left in order to turn the machine to the left. The turning radius for the machine is proportional to the control lever position. In order to turn the machine to the left slightly, move lever (3) slightly to the left. If you want to increase your turn, move lever (3) further to the left. If you want the machine to counterrotate, move lever (3) all the way to the left past the detent position. When the tracks counterrotate, the right side track will rotate forward, while the left track rotates backward.

FORWARD RIGHT (3E) – Move lever (3) to the right in order to turn the machine to the right. The turning radius for the machine is proportional to the control lever position. In order to turn the machine to the right slightly, move lever (3) slightly to the right. If you want to increase your turn, move lever (3) further to the right. If you want the machine to counterrotate, move lever (3) all the way to the right past the detent position. When the tracks counterrotate, the left side track will rotate forward, while the right track rotates backward.

REVERSE LEFT (3F) – Move lever (3) to the left in order to turn the machine to the left. The turning radius for the machine is proportional to the control lever position. In order to turn the machine to the left slightly, move lever (3) slightly to the left. If you want to increase your turn, move lever (3) further to the left. If you want the machine to counterrotate, move lever (3) all the way to the left past the detent position. When the tracks counterrotate, the right side track will rotate backward, while the left track rotates forward.

REVERSE RIGHT (3G) – Move lever (3) to the right in order to turn the machine to the right. The turning radius for the machine is proportional to the control lever position. In order to turn the machine to the right slightly, move lever (3) slightly to the right. If you want to increase your turn, move lever (3) further to the right. If you want the machine to counterrotate, move lever (3) all the way to the right past the detent position. When the tracks counterrotate, the right side track will rotate forward, while the left track rotates backward.

Changing the direction of the machine is performed by first moving lever (3) to the NEUTRAL position. Then move lever (3) in the opposite direction.

Note: In order to turn the machine, lever (3) must be placed in either the forward detent position or in the backward detent position.

Track Speed (3H)



LOW – Roll the wheel (3H) to the left when a lower speed is desired.



HIGH – Roll the wheel (3H) to the right when a higher speed is desired.

The machine is set with the following factory settings.

- Maximum forward speed of 10 km/h (6.2 mph)
- Maximum reverse speed of 10 km/h (6.2 mph)

Note: There is a maximum limit of 10 km/h (6.2 mph) on the forward speed and on the reverse speed. Consult your Caterpillar dealer in order to change the speed settings.

Horn (3J)



Horn – Push down button (3J) in order to activate the horn.

Speed Recall Button (3K)

The Speed Recall Button (3K) will allow you to preset a forward speed and a reverse speed.

1. Ensure that the parking brake is on.
2. Move the steering and transmission control to the FORWARD position.
3. Roll the wheel to the desired speed, while the steering and transmission control is in forward.
4. Move the steering and transmission control to the REVERSE position.
5. Roll the wheel to the desired speed, while the steering and transmission control is in REVERSE.
6. Move the steering and transmission control to NEUTRAL. Hold the Speed Recall Button for 3 seconds.
7. Press the Speed Recall Button (3K) while the machine is moving forward in order to return to the preset speed. Press the Speed Recall Button (3K) while moving reverse and the machine will return to the preset speed.

Gauges and Indicators (4)

Refer to Operations and Maintenance Manual, “Monitoring System” for more information.

Engine Start Switch (5)



OFF – Insert the engine start switch key only from the OFF position and remove the engine start switch key only from the OFF position. In the OFF position, there is no power to most electrical circuits in the cab.

Turn the engine start switch key to the OFF position in order to stop the engine.



ON – Turn the engine start switch key clockwise to the ON position in order to activate all of the cab circuits.



START – Turn the engine start switch key clockwise to the START position in order to crank the engine. Release the engine start switch key after the engine starts and the engine start switch key returns to the ON position.

Note: If the engine fails to start, the engine start switch key must be returned to the OFF position in order to attempt to start the engine again.

Note: In order to start the engine, the parking brake must be engaged.

Deceleration Pedal and Brake Pedal (6)

Push pedal (6) downward in order to reduce the engine speed. Use the pedal in order to reduce the engine speed when you make a directional shift. Use the pedal in order to maneuver in tight locations. Release the pedal in order to increase ground speed.

When pedal (6) is depressed beyond the detent spring, the brake will engage. Use the brake for slowing the machine and for stopping the machine. Use the service brakes on a downgrade in order to prevent overspeed. The service brakes are especially needed when you change directions on a steep slope. Release the pedal in order to increase ground speed.

Bulldozer Control (7)

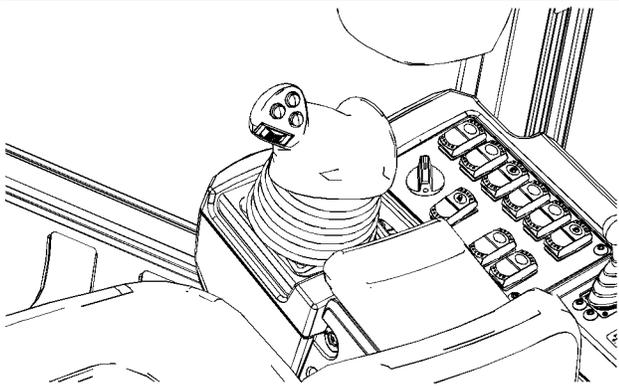


Illustration 48

g01397500

 **FLOAT** – Push the lever all the way past the detent position. This action will move the bulldozer blade into the FLOAT position. In the FLOAT position, the blade moves up and down with the ground contour.

When you release the lever, the lever will return to the HOLD position.

The bulldozer blade will remain in the FLOAT position until the lever is moved outside of the HOLD position.

 **LOWER** – Push the lever forward in order to lower the blade. When you release the lever, the lever will return to the HOLD position.

 **HOLD** – When you release the lever, the lever will return to the HOLD position. The movement of the blade will stop.



RAISE – Pull back on the lever in order to raise the blade. When you release the lever, the lever will return to the HOLD position.



TILT LEFT – Pull the lever to the left in order to lower the left side of the blade. When you release the lever, the lever returns to the HOLD position.



TILT RIGHT – Push the lever to the right in order to lower the right side of the blade. When you release the lever, the lever returns to the HOLD position.

Blade Angle

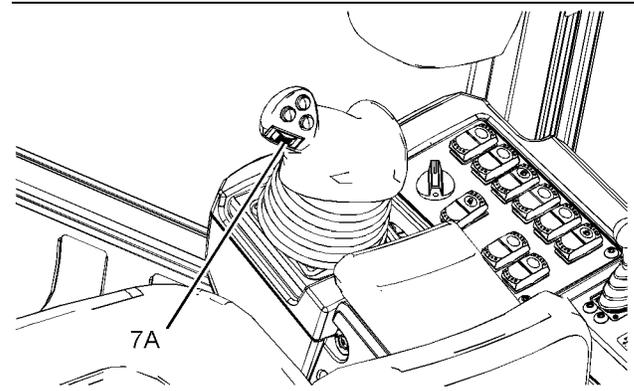


Illustration 49

g01397499



ANGLE LEFT – Roll the wheel (7A) to the right in order to angle the blade to the left.



ANGLE RIGHT – Roll the wheel (7A) to the left in order to angle the blade to the right.

Blade Shake

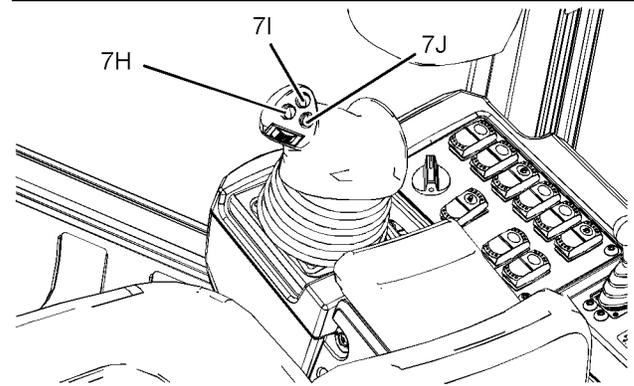


Illustration 50

g01294819

Push the Blade Shake button (7H) in order to shake the blade. The blade will shake until the button is released.

Accugrade Controls

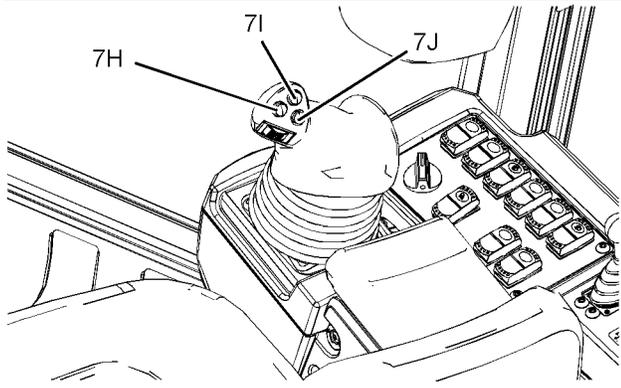


Illustration 51

g01294819

The Blade Shake button (7H) changes the Accugrade control if the Accugrade control is active. Push button (7H) in order to change between automatic blade control and manual blade control. If the Accugrade control is active, press button (7I) in order to increment and press button (7J) in order to decrement.

Messenger (If Equipped) (8)

Reference: Refer to Operation and Maintenance Manual, “Monitoring System” for more information on the Messenger.

Switch Panel (9)

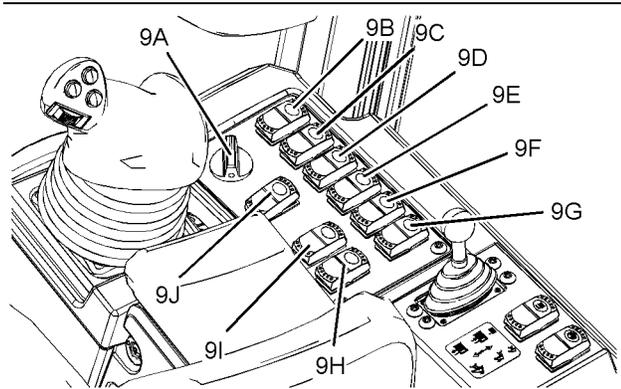


Illustration 52

g01294820

Engine Throttle

The engine throttle (9A) controls the engine speed.



Low Idle – Rotate the engine throttle (9A) counterclockwise in order to lower the idle speed.



High Idle – Rotate the engine throttle (9A) clockwise in order to increase the idle speed.

Table 5

Throttle Position With Messenger	Engine RPM	Machine Speed Percentage
1	750	0.00
2	1000	0.33
3	1200	0.66
4	1400	1.00
5	1600	1.00
6	1700	1.00
7	1800	1.00
8	1900	1.00
9	2000	1.00
10	2100	1.00

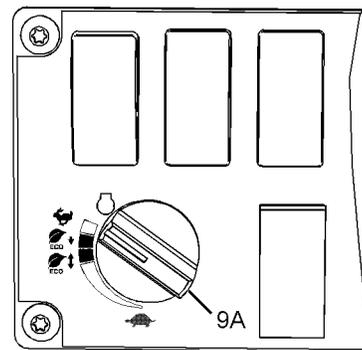


Illustration 53

g02724820

Engine throttle (9A) with Fuel Efficiency Reverse

Table 6

Throttle Position Without Messenger	Engine RPM	Machine Speed Percentage
1	750	0.00
2	1000	0.33
3	1200	0.66
4	1400	1.00
5	1600	1.00
6	1800	1.00
7	1900	1.00
8	2000	1.00
9	2100 ⁽¹⁾	1.00
10	2100	1.00

⁽¹⁾ FER - Fuel Efficiency Reverse. See "Fuel Efficiency Reverse" for engine derating.

Fuel Efficiency Reverse



Fuel Efficiency Reverse (FER) – This ECO mode is designed to reduce fuel consumption and noise. The ECO symbol is illuminated in the display window on the Compact Instrument Cluster when the fuel economy mode is active.

FER with Messenger – Go to the Messenger menu to activate Fuel Efficiency Reverse.

FER without Messenger – At throttle position 9, the machine under a light load will derate to 1600 rpm in REVERSE. Under a heavy load, the machine will derate to 1800 rpm in REVERSE.

Parking Brake Switch



Engaged – Press the top of the switch (9B) in order to engage the parking brake.



Disengaged – Press the bottom of the parking brake switch (9B) in order to disengage the parking brake.

Implement Lockout Switch



Lock – Press the top of the switch (9C) in order to lock the implement controls.



Unlock – Press the bottom of the switch (9C) in order to unlock the implement controls.

Window Wiper Controls

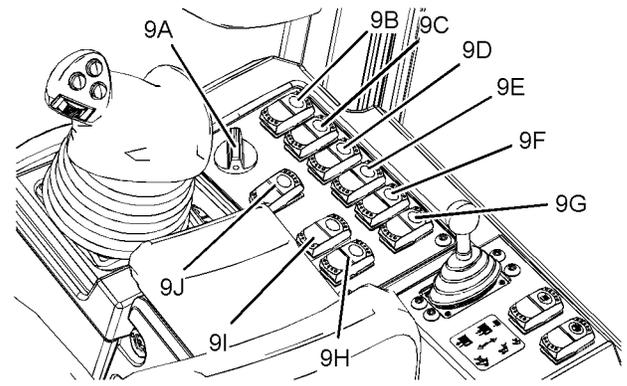


Illustration 54

g01294820



Front Window Wiper Switch (9D) – Press the bottom of switch (9D) in order to activate the window wiper for the front window. Press the top of switch (9D) one time in order to turn off the window wiper for the front window. Press the top of switch (9D) and hold switch (9D) in order to activate the window washer and the window wiper for both the front window and the rear window.



Left Side Window Wiper Switch (9E) – Press the bottom of switch (9E) in order to activate the window wiper for the left window. Press the top of switch (9E) one time in order to turn off the window wiper for the left window. Press the top of switch (9E) and hold switch (9E) in order to activate the window washer and the window wiper for the left window.



Right Side Window Wiper Switch (9F) – Press the bottom of switch (9F) in order to activate the window wiper for the right window. Press the top of switch (9F) one time in order to turn off the window wiper for the right window. Press the top of switch (9F) and hold switch (9F) in order to activate the window washer and the window wiper for the right window.



Rear Window Wiper Switch (9G) – Press the bottom of switch (9G) in order to activate the window wiper for the rear window. Press the top of switch (9G) one time in order to turn off the window wiper for the rear window. Press the top of switch (9G) and hold switch (9G) in order to activate the window washer and the window wiper for both the front window and the rear window.

Note: Make sure that the window is wet before operating window wipers.

Reversing Fan Switch (If Equipped)

Press the switch (9H) in order to activate the reversing fan. The fan will reverse for the programmed purge duration. Also, the fan will reverse automatically. The status of the automatic purge cycle and the purge interval will control the automatic reversing fan.

Switch for the Beacon Light



Beacon Light (9I) – Press the top of the switch in order to turn on the beacon light. Press the bottom of the switch in order to turn off the beacon light.

Work Lights Switch

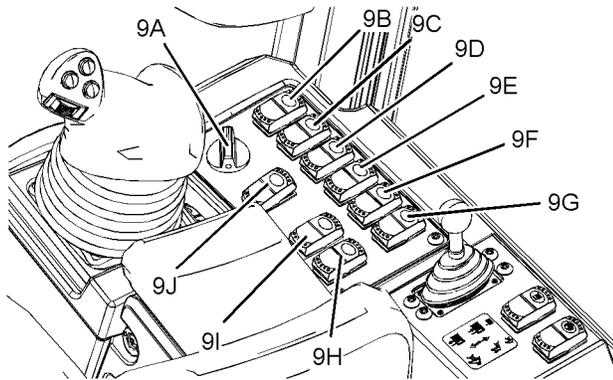


Illustration 55

g01294820

Press the work lights switch (9J) in order to turn on all of the machine lights.

Implement Controls (10)

Winch Controls (If Equipped)

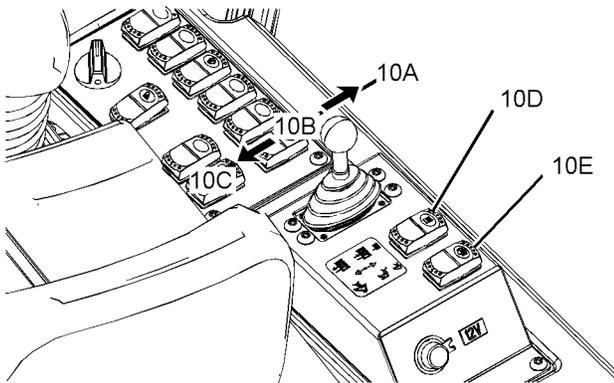


Illustration 56

g01294823

Winch controls can vary in appearance.



REEL OUT (10A) – Move the lever to this position in order to reel out the winch cable. The winch cable reels out under power.

Speed for the winch cable is proportional to the lever position. Release the lever. The Lever will return to the HOLD position.



HOLD (10B) – Move the lever into this position in order to maintain the current position of the winch cable. The winch brake is applied at this time.



REEL IN (10C) – Move the lever to the left in order to reel in the winch cable.

The winch cable should move toward the winch under power. Speed for the winch cable is proportional to the lever position. Release the lever. The Lever will return to the HOLD position.



FREE SPOOL (10D) – Push this switch in order to release the winch cable. No machine or hydraulic assistance is needed.

The winch will remain in the FREE SPOOL position until you press the switch again or until you activate any other function for the winch.



DRIVE AWAY (10E) – Push the DRIVE AWAY switch in order to release the winch brake. This function will also activate the DRIVE AWAY solenoid. The winch brake will be released. The winch clutch will be engaged and hydraulic flow will bypass the winch pump. In order to unwind the winch cable, tie the cable to a permanent object. Then, drive the machine away from the permanent object at a speed that is less than 3 km/h (1.8 mph). The winch will remain in the DRIVE AWAY position until you press the switch again or until you activate any other function for the winch.

Ripper Controls (If Equipped)

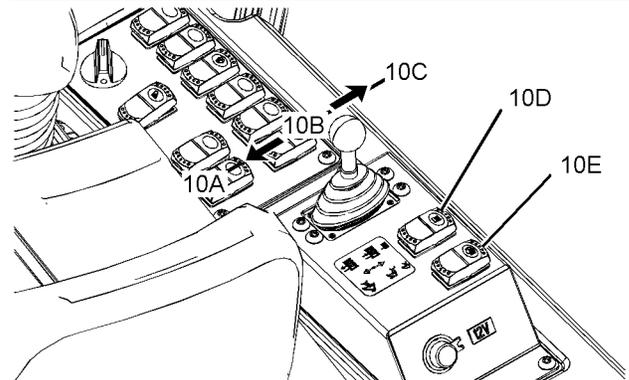


Illustration 57

g01294821

Ripper controls can vary in appearance.



RAISE (10A) – Pull the lever to the left in order to raise the ripper. Release the lever. The lever will return to the HOLD position.



HOLD (10B) – Release the lever. The lever will return to HOLD position. Ripper movement stops.



LOWER (10C) – Push the lever to the right in order to lower the ripper. Release the lever. The lever will return to the HOLD position.

Power Receptacle (11)

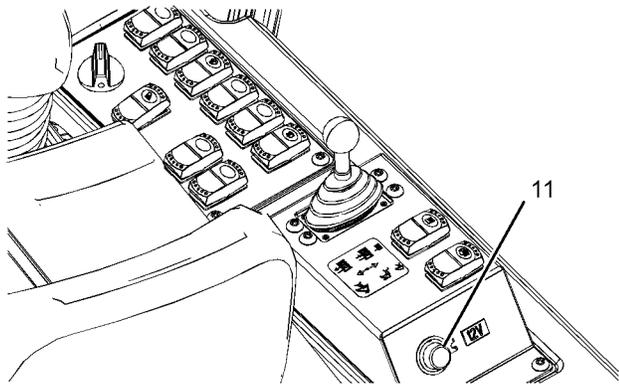


Illustration 58

g01294827

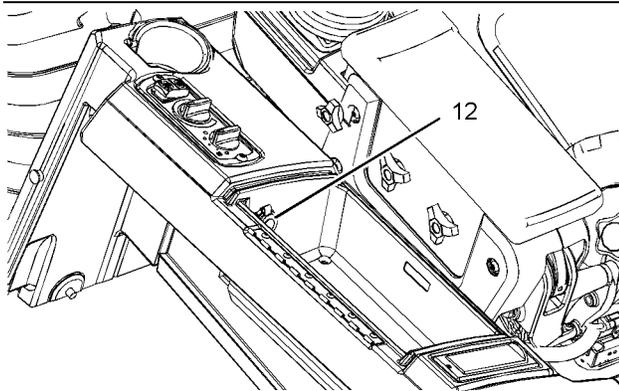


Illustration 59

g01294909

Power Receptacle – A twelve V power receptacle is located on the back panel on the right side of the seat. Power receptacle (11) can be used for powering automotive electrical equipment or accessories. Power receptacle (12) can be used for powering automotive electrical equipment or accessories. Remove the cap before use.

Note: Do not use the power supply as a lighter for a cigarette.

Control Panel for the AccuGrade - Laser System and GPS

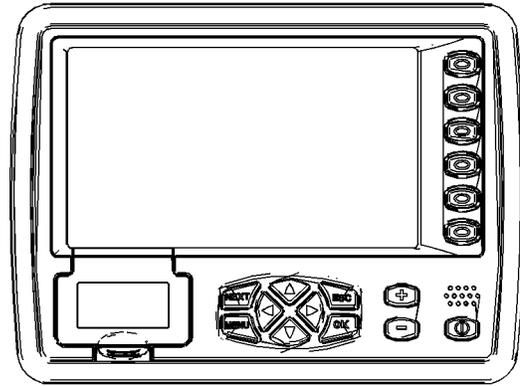


Illustration 60

g01287613

If equipped, the control panel for the AccuGrade - Laser System is mounted on the right front ROPS post. For more information regarding the operation of the control panel for the AccuGrade - Laser System, refer to Operation and Maintenance Manual, SEBU7803, "AccuGrade - Laser System".

i03653580

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.

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 visibility hazards. See Operation and Maintenance Manual, "Visibility Information" for more 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.

Rear View Mirror

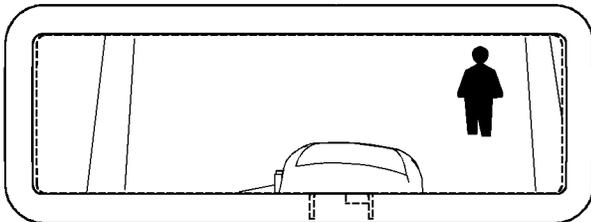


Illustration 61

g01960634

Rear view of interior mirror

The interior mirror can be adjusted to a position in order to allow the operator to see preferred areas at the rear of the machine during operations such as backing up, reversing the machine, or moving backward.

Rear Mirror

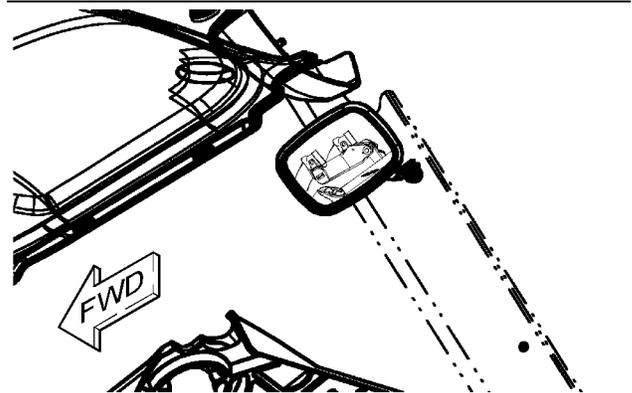


Illustration 62

g01960592

If equipped, adjust the rear mirror so that an area of at least 1 m (3.3 ft) from the rear of the machine can be seen from the operator seat.

103997833

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 starts 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 3 seconds long.

The monitoring panel will then return to the normal operating mode. If a switch is grounded, the monitoring system will display the modes.

Alert Indicators

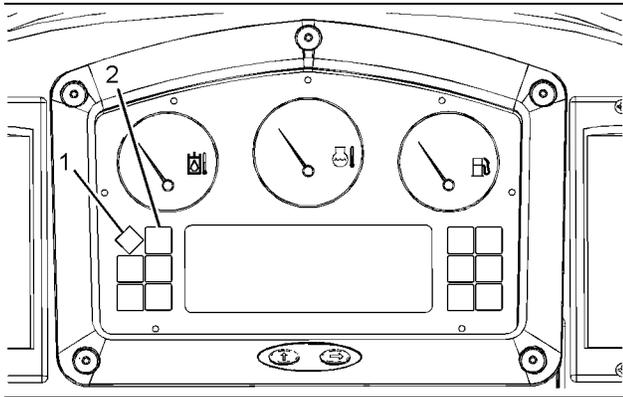


Illustration 63

g01211250



Action Lamp (1) – The action lamp is on the Gauge cluster.



Electrical System (2) – This indicator indicates a malfunction in the electrical system. If this alert indicator flashes, the system voltage is too high or 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 is overloaded.

Modify the operating cycle. This action will prevent the electrical system from overloading. This action will also 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.

Indicators

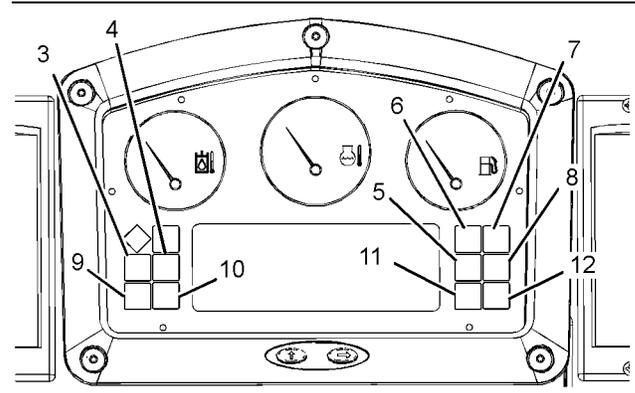


Illustration 64

g01211269



Parking Brake (3) – This indicator indicates that the parking brake is engaged. If this indicator flashes, return the machine to the NEUTRAL position. Then, engage the parking brake.



Engine Oil (4) – This indicator is illuminated when engine oil pressure is low.



Engine Air Filter (5) – This indicator is illuminated when the filter is clogged or when the filter is dirty.



Hydraulic Oil Filter (6) – This indicator is illuminated when the filter is clogged or when the filter is dirty.



Electrical Preheat (7) – This indicator is illuminated when ether is injected into the engine.



Operator Presence (8) – This indicator is illuminated when the operator is not present.



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



Machine Security System (10) – The indicator will illuminate when the machine security system is activated and an attempt to start the machine is made.



Fuel System Service (11) – The indicator will illuminate when the fuel/water separator must be drained, or when the primary fuel filter or the secondary fuel filter is plugged.



Implement Lockout (12) – This indicator is illuminated when the implement lockout is activated.

Gauges

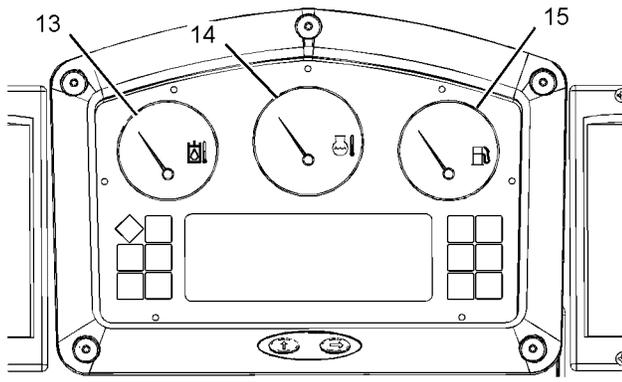


Illustration 65

g01396247



Hydraulic Oil Temperature (13) – The gauge indicates the temperature of the hydraulic oil in the hydraulic oil sump for the steering and implement circuits. If the gauge needle enters the red zone the hydraulic oil temperature is excessive. The Messenger Panel will display a warning. If necessary, reduce the load that is on the machine until the hydraulic oil temperature decreases.



Engine Coolant Temperature (14) – The water temperature regulator regulates the coolant temperatures. If the gauge needle enters the red zone, the coolant temperature is excessive. Increased temperatures will sound the warning alarm. Continued operation of the machine during the sounding of the warning alarm or the gauge needle in the red zone may damage the engine. Stop the machine in a safe place and investigate the cause.



Fuel Level (15) – 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.

NOTICE

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

Digital Display Window

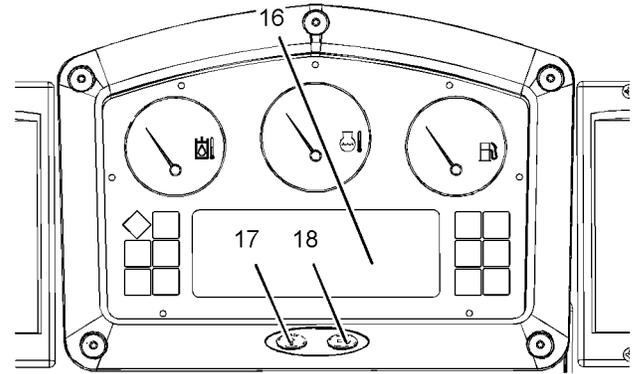


Illustration 66

g01396248

- (16) Digital display window
- (17) Mode button
- (18) Scroll button

The digital display window (16) provides readouts that show the following items:

- Operational hours (service hours)
- Selected forward speed and selected reverse speed

The parameters will scroll across the digital display window.

Service Hour Meter

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.

Operator Modes

In order to toggle between the Operator Mode and the Service Mode, press the mode button (17) and the scroll button (18) simultaneously. Hold the buttons for 3 seconds.

Note: Operator modes are not saved with this option. Save the operator mode in the Messenger (if equipped).

The following modes are available on the “Operator Modes” menu:

- “Default”
- “Steering Modulation Settings”
- “Implement Modulation Settings”
- “Brake/Decel Pedal Settings”

“Default” Menu

The following options are available via the “Default” menu:

- Maximum forward speed
- Maximum reverse speed
- Engine oil pressure
- Engine speed
- System voltage
- Service hour meter

“Steering Modulation Settings” Menu

Within the “Steering Modulation Settings” menu, the operator can choose from three levels of modulation:

- Fine
- Medium
- Coarse

“Implement Modulation Settings” Menu

Within the “Implement Modulation Settings” menu, the operator can choose from three levels of modulation:

- Fine
- Standard
- Fast

“Brake/Decel Pedal Settings” Menu

Within the “Brake/Decel Pedal Settings” menu, the operator can choose one of the following two settings:

- Brake only
- Brake and decelerate.

Warning Categories

Warning Category 1

In category 1, the action light flashes amber. This category alerts the operator that the machine system needs attention.

Warning Category 2

In this category, the action light flashes red. The warning category requires you to change the machine operation. Changing the machine operation will reduce the excessive temperature in one of the systems or in more than one of the systems. Also, changing the machine operation will reduce the excessive engine speed.

If the alert indicator continues to flash, do not operate the machine. If the action light continues to flash, do not operate the machine.

Warning Category 3

In this category, the action lamp is red. Also, the action alarm will sound. This category requires immediate shutdown of the operation in order to prevent severe damage to the system and/or to the machine.

Do not operate the machine until the cause has been corrected.

Messenger Display (If Equipped)

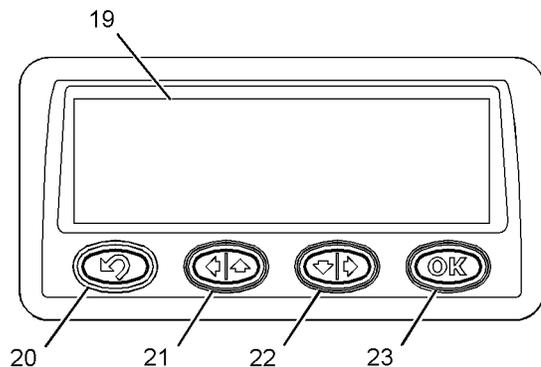


Illustration 67

g01397245

Digital Display Area (19) – This Messenger system shows information on digital display area (19).

Note: Do not operate the machine if the information that is shown on the digital display area cannot be understood.

PREVIOUS Button (20) – Use this button to return to information that was previously shown on the digital display area.

Scroll Up/Left Button (21) – This button is used to scroll up through information that is shown on the digital display area. The button can also be used to scroll to the left through information that is shown on the digital display area.

Scroll Down/Right Button (22) – This button is used to scroll down through information that is shown on the digital display area. The button can also be used to scroll to the right through information that is shown on the digital display area.

OK Button (23) – After you have made selections with the scroll up/left button (21) and with the scroll down/right button (22), use this button in order to confirm those selections.

When the engine start switch key is turned to the ON position, Messenger will return to the previous operator profile.

There are two ways to activate the previously used operator profile. If the OK button (23) is pressed within 10 seconds of turning the engine start switch key to the ON position, the previous operator profile will be restored. If none of the buttons are pressed, the previous operator profile will be restored after 10 seconds.

If the PREVIOUS button (20) is pressed within 10 seconds of turning the engine start switch key to the ON position, the operator can choose from a list of operator profiles. If the PREVIOUS button is pressed again, the operator can create a new profile.

Default Screen

Time		Date	
Main Menu	Mach Settings	Oper _1_	Job _2_

Illustration 68

g01302343

Use buttons (21) and (22) in order to scroll through the four options. Press button (23) when the desired option is selected.

Four options are available from the default screen:

“Main Menu” – All submenus are accessible via this option.

“Mach Settings” – This option is a shortcut to the “Machine Settings” menu.

“Oper 1” – This option is a shortcut to the “Operator Profile” menu.

“Job 2” – This option is a shortcut to the “Job” menu.

Main Menu

The following menus are accessible via the Main Menu:

- “Performance”
- “Machine Settings”
- “Totals”
- “Operator Profile”
- “Job Profile”
- “Service Configuration”
- “Service”
- “Service Mode Password”

“PERFORMANCE” Menu

The following options are available via the “PERFORMANCE” menu:

- Actual engine speed
- Hydraulic oil temperature
- Fuel level
- Engine coolant temperature
- Engine oil pressure
- System voltage
- Left drive motor speed
- Right drive motor speed
- Operation time for the fuel level

“MACHINE SETTINGS” Menu

The following options are accessible via the “MACHINE SETTINGS” menu:

- Implement modulation
- Enable the kickout.
- Machine acceleration and deceleration rate
- Steering response rate
- Steering modulation

- Backlight
- Contrast
- Language
- Units
- Clock hours (12 hour or 24 hour)
- Save settings.

Within the “IMPLEMENT MODULATION” option, the operator can adjust the implement modulation. The operator can choose from three levels of modulation: fine, standard, and fast.

Within the “KICKOUT ENABLE/DISABLE” option, the operator can enable the following functions: lift, lower, rack back, dump, and float. The operator can also disable these functions from this menu.

Within the “MACHINE ACCELERATION/ DECELERATION RATE” option, the operator can adjust the response rate for the hystat controls. The operator can choose from three levels of response rate: low, medium, and high.

Within the “STEERING RESPONSE RATE” option, the operator can adjust the steering response rate. The steering response rate changes the response to a steering command. The operator can choose from three levels of modulation: low, medium, and high. For example, a low response rate would be preferred in rough ground conditions in order to avoid accidental input due to vibration of the machine.

The “STEERING MODULATION” option changes the amount of pedal travel that is required to adjust the turning angle. The operator can also choose from three levels of response rate: low, medium, and high. For example, fine modulation would be preferred when less turning speed is required.

Within the “SAVE SETTINGS” option, the operator can save changes that are made in the “MACHINE SETTINGS” menu to the active operator profile.

“TOTALS” Menu

The following options are accessible via the “Totals” menu:

Operator

- Total operating hours
- Total fuel that was used
- Total forward distance

- Total reverse distance
- Total distance
- Fuel consumption rate
- Total idle fuel
- Total idle time

Job

- Total operating hours
- Total fuel that was used
- Total forward travel distance
- Total reverse travel distance
- Total travel distance
- Fuel consumption rate
- Total idle fuel
- Total idle time

Lifetime

- Total operating hours
- Total fuel that was used
- Total forward travel distance
- Total reverse travel distance
- Total travel distance
- Fuel consumption rate
- Total idle fuel
- Total idle time

“OPERATOR PROFILE” Menu

The following options are accessible via the “OPERATOR PROFILE” menu:

- Create a profile.
- Select a profile.
- Save a profile.
- Recall default settings.
- View the current profile or Save the current profile.

- Reset totals
- Delete a profile.

“JOB PROFILE” Menu

The following options are accessible via the “JOB PROFILE” menu:

- Select a profile.
- Reset job profile

“SERVICE CONFIGURATION” Menu

This menu is protected with a password. Consult your Caterpillar dealer for more information.

“SERVICE” Menu

Within this menu, the operator can view the diagnostics for the machine. All other options in the “SERVICE” menu are protected with a password. Consult your Caterpillar dealer for more information.

“SERVICE MODE PASSWORD” Menu

Within this menu, the operator can enter the password that is used for the service menus. Consult your Caterpillar dealer for more information.

i04535874

Product Link

SMCS Code: 7606

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

The Product Link 121SR system utilizes satellite technology to communicate machine information. The Product Link 522/523 is a cellular based communication device that transmits machine information. This information is communicated to Caterpillar, Cat dealers, and Caterpillar customers. Both Product Link systems contain Global Positioning System (GPS) satellite receivers.

The capability of two-way communication between the machine and a remote user is available with the Product Link 121SR and 522/523 system. The remote user can be a dealer or a customer. At any time, a user can request updated information from a machine such as hours of use or the location of the machine. Also, the system parameters for Product Link 121SR system and the Product Link 522/523 system can be changed.

Data Broadcasts

Data concerning this machine, the condition of the machine, and the operation of the machine is being transmitted by Product Link to Caterpillar and/or Cat dealers. The data is used to serve the customer better and to improve upon Caterpillar 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 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 Caterpillar 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 of 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

If the machine is required to work within 12 m (40 ft) of a blast site, then Product Link 121SR system or the Product Link 522/523 system should be disabled in compliance with applicable legal requirements. One of the following are suggested methods in order to disable the Product Link 121SR system or the Product Link 522/523 system: (a) Install a Product Link disconnect switch in the machine cab that will allow the Product Link 121SR system or the Product Link 522/523 system module to be shut off. Refer to Special Instruction, REHS2365, "An Installation Guide for the Product Link PL121SR and for the PL300" and Special Instruction, REHS2368, "Installation Procedure For Product Link PL522/523 (Cellular)" for more details and installation instructions. Or, (b) Disconnect the Product Link 121SR system or the Product Link 522/523 module from the main power source by disconnecting the wiring harness at the Product Link module.

The following Product Link 121SR system and the Product Link 522/523 system specifications are provided in order to aid in conducting any related hazard assessment and to ensure compliance with all local regulations:

- The transmit power rating for the Product Link 121SR transmitter is 5 to 10 W.
- The operating frequency range for the Product Link 121SR system is 148 to 150 MHz
- The transmit power rating for the Product Link 522/523 transmitter is approximately 1 W.
- The operating frequency range for the Product Link 522/523 system is 824 to 849 MHz, 880 to 915 MHz, 1710 to 1785 MHz, and 1850 to 1910 MHz.

Consult your Cat dealer if there are any questions.

Information for the initial installation of the Product Link 121SR system is available in Special Instruction, REHS2365, "An Installation Guide for the Product Link PL121SR and for the PL300". Information for the initial installation of the Product Link 522/523 system is available in Special Instruction, REHS2368, "Installation Procedure For Product Link PL522/523 (Cellular)".

Operation, configuration, and troubleshooting information for the Product Link 121SR system can be found in the Systems Operation, Troubleshooting, Testing and Adjusting, RENR7911, "Product Link 121/321".

Operation, configuration, and troubleshooting information for the Product Link 522/523 system can be found in the Systems Operation, Troubleshooting, Testing and Adjusting, RENR8143, "Product Link - PL522/523".

Machine Security



Machine Lock Icon

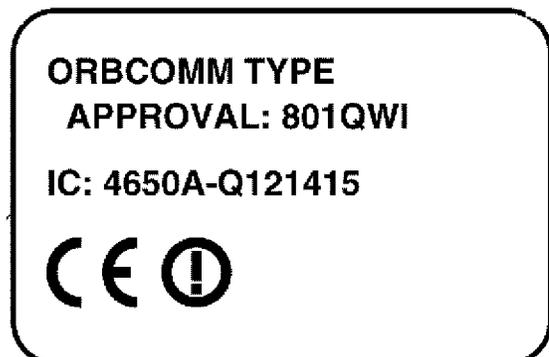
De-rate – Some machines can have the machine engine de-rated remotely by the owner of the machine. The action causes the machine to operate much slower than normal.

A warning is given before this action occurs on the display with the machine lock icon and "Security Pending". When engine de-rate has happened, the machine display shows the machine lock icon and "Security Enabled". The operator should move the machine to a safe location, apply the parking brake, power the machine down, notify the site supervisor, and contact your local Caterpillar dealer.

Disable – Some machines can be prevented from starting remotely by the owner of the machine. When disabling has happened, the machine display shows the machine lock icon and "Security Enabled". The operator should notify the site supervisor.

Tampering – Tampering with the Product Link system to disable the Product Link can also result in engine de-rating or disabling of the machine. To avoid de-rating or disabling, prevent tampering with the Product Link. If machine diagnostics occur due to Product Link notify your site supervisor immediately to prevent derating or disabling. An example of this situation is an antenna becoming damaged.

Regulatory Compliance



NOTICE

Transmission of information using Product Link is subject to legal requirements that may vary from location to location, including, but not limited to, radio frequency use authorization. The use of Product Link must be limited to those locations where all legal requirements for the use of the Product Link communication network have been satisfied.

In the event that a machine outfitted with Product Link is located in or relocated to a location where (i) legal requirements are not satisfied or (ii) transmitting or processing of such information across multiple locations would not be legal, Caterpillar disclaims any liability related to such failure to comply and Caterpillar may discontinue the transmission of information from that machine.

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

EC DECLARATION OF CONFORMITY OF MACHINERY

Manufacturer: **CATERPILLAR INC., 100 N.E. ADAMS STREET, PEORIA, IL 61626, U.S.A.**

Person authorised to compile the **Technical File** and to communicate relevant part(s) of the **Technical File** to the Authorities of **European Union Member States** on request:
Standards & Regulations Manager, Caterpillar France S.A.S 40, Avenue
Leon-Blum B.P.55 F38041, Grenoble Cedex 9

I, the undersigned, Michael R Verheyen, hereby certify that the construction equipment specified hereunder

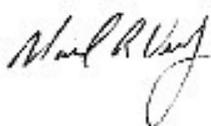
Description: Generic Denomination: **Earth-moving Equipment**
 Function: Asset Management
 Model/Type: **PL121SR**
 Commercial Name: **Product Link**

Fulfils all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2004/108/EC N/A	PL121SR-PEO101
1999/5/EC N/A	PL121SR-PEO101

Harmonised Standards Taken Into Consideration: **EN 13309, EN 301 389-1, EN 301 489-02, EN 55022, EN 60950-1, EN 301 721**

Done at
CATERPILLAR INC.
100 **N.E.** Adams Street
AB 5410
Peoria, **IL** 61629 U.S.A.
Date
2010-06-10

Signature

Name / Position
Michael R Verheyen / Product
Manager

产品中有毒有害物质或元素的名称及含量						
CAT 522 						
部件名称 (Part Name)	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
内部接线 (Internal Cables)	○	○	○	○	○	○
电路板 (Printed Circuit Assembly)	X	○	○	○	○	○
金属封入物 (Metal Enclosure)	○	○	○	○	○	○
所有硬件 (Hardware)	○	○	○	○	○	○
SIM卡 (SIM Card)	○	○	○	○	○	○
螺母, 螺栓, 螺丝, 垫片, 紧固件 (Nuts, bolts, screws, washers, Fasteners)	○	○	○	○	○	○
密封垫 (Gaskets)	○	○	○	○	○	○
标签(Labels)	○	○	○	○	○	○
<p>○: 该部品所有均质材料的有毒有害物质含有量, 不可超过SJ/T11363-2006标准所规定的限量要求。</p> <p>X: 该部品中最少有一项均质材料的有毒有害物质含有量, 超过SJ/T11363-2006标准所规定的限量要求。</p>						
制造业日期代码信息 (Manufacturing Date Code Information)						
产品序列号格式: <i>XXXYZAAABB</i>						
<i>XXXX</i> = 产品制造儒略历的日期						
<i>Y</i> = 此年产品生产的年的最后一个数字						
例如: 24219005RN						
242= 8月30日						
<i>I</i> =200 <i>I</i> 年						

Illustration 71



Trimble Navigation Limited
935 Stewart Drive
Post Office Box 3642
Sunnyvale, CA 94085

Industry Canada Declaration of Conformity

Trimble Navigation Limited declares, under sole responsibility, that the following products conform to Class B digital apparatus complies with Canadian ICES-003.

Product Name: Trimble MTS523, Caterpillar 523, Trimble MTS522, Caterpillar 522, Trimble MTS521

Product Description: Telematics with M2M cell and GPS Receiver

Antenna used in MTS500 family of telematics has overall antenna gain which complies with limits per Cinterion requirements for GSM antennas in Canada.

$$S = 850 / (150 * 10) 0.56667 \text{ mW/cm}^2$$

$$R = 20 \text{ cm}$$

$$P = 1771 \text{ mW}$$

$$\text{Maximum Gain} = 2.06 \text{ dBi}$$

Laird antenna: TRP GSM strongest measurements: Frequency 848.8 Mhz, Antenna Port Power 33 dBm, Maximum Gain 0.255211 dBi, Maximum Power / Peak EIRP 33.2552 dBm

Mobile Mark Antenna: CVS-900/1900 uses CVS RG-174 cable:
Antenna transmission gains up to 2.5dB, based on data based on Azimuth plot. However, cable loss of 0.34dB/ft and data sheet specify 8 foot cable, resulting in $2.5 - (8 * 0.34) = -0.22 \text{ db}$ maximum gain.

Both product antennas comply with FCC requirements.

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

This document is maintained under Trimble part number 78356-00-DC, and the technical file is maintained under Trimble part number 78356-00-CE at:

Manufacturer: Trimble Navigation Limited, 935 Stewart Drive
Post Office Box 3642, Sunnyvale, CA 94085-3642, USA

Declaration Approved:


Signature


Date

Name: Chuck Maniscalco
Title: Director of Engineering
Trimble Navigation Limited
935 Stewart Drive, Post Office Box 3642, Sunnyvale, CA 94085-3642, USA
Telephone: (408) 481-8000

FCC DoC Rev A



Trimble Navigation Limited
935 Stewart Drive
Post Office Box 3642
Sunnyvale, CA 94085

FCC Declaration of Conformity

Trimble Navigation Limited declares, under sole responsibility, that the following product(s) conforms to FCC Part 15 Subpart B Section 15.109:

Product Name: Trimble MTS523, Caterpillar 523, Trimble MTS522, Caterpillar 522, Trimble MTS521

Product Description: Telematics with M2M cell and GPS Receiver

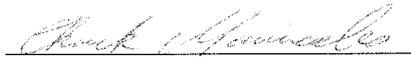
This device complies with Part 15 class B of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This document is maintained under Trimble part number 78356-00-DC, and the technical file is maintained under Trimble part number 78356-00-CE at:

Manufacturer: Trimble Navigation Limited, 935 Stewart Drive
Post Office Box 3642, Sunnyvale, CA 94085-3642, USA

Declaration Approved:


Signature


Date

Name: Chuck Maniscalco
Title: Director of Engineering
Trimble Navigation Limited
935 Stewart Drive, Post Office Box 3642, Sunnyvale, CA 94085-3642, USA
Telephone: (408) 481-8000

Trimble MTS500 FCC DoC Rev A



Trimble Navigation Limited
935 Stewart Drive, Post Office Box 3642, Sunnyvale, CA 94085-3642

CE Declaration of Conformity

Trimble Navigation Limited declares, under sole responsibility, that the following product(s):

Product Name: Trimble MTS523, Trimble MTS522, Trimble MTS521, Caterpillar 523, Caterpillar 522

Product Description: Telematics

Complies with the essential requirements of the R&TTE Directive 1999/5/EC, as described in Article 10, using the following particular standards in full or in part:

Article 3.1a - EMC:	EN 55022 : 2006 +A1:2007
Article 3.1b - EMC:	EN 55024 : 1998 +A1 :2001 +A2 :2003
	ISO 7637-2 : 2004
	EN 301 489-1 v1.8.1
	EN 301 489-3 v.1.4.1
	EN 301 489-7 v1.3.1
Article 3.2 - R&TTE:	TS 51.010-1 v8.3.0 [3GPP]
	EN 300 440-2 V1.2.1 [GPS]
	EN 301 511 V9.0.2 [GSM/GPRS]
Article 3.1a - Safety:	EN 60950-1 : 2006
	EN 62311 : 2008

Mark First Applied: 2009

This document is maintained under Trimble part number 78356-00-DC, and the technical file is maintained under Trimble part number 78356-00-CE at:

Manufacturer: Trimble Navigation Limited, 935 Stewart Drive
Post Office Box 3642, Sunnyvale, CA 94085-3642, USA

Declaration Approved:



Signature



Date

Name: Chuck Maniscalco
Title: Director of Engineering
Trimble Navigation Limited
935 Stewart Drive, Post Office Box 3642, Sunnyvale, CA 94085-3642, USA
Telephone: (408) 481-8000

MTS500 series CE DoC Rev A

i02595459

i02161716

Backup Alarm

SMCS Code: 7406

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

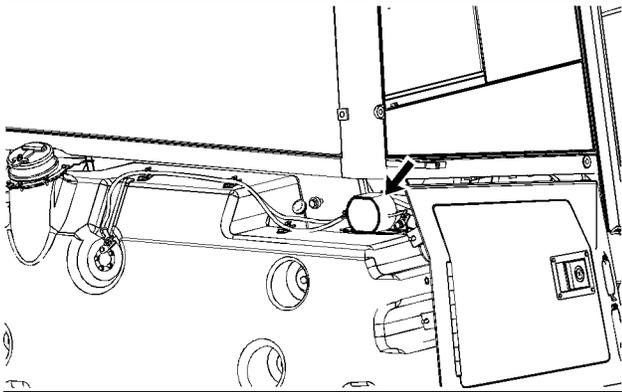


Illustration 75

g01228286

Backup alarm – The alarm will sound when the lever for the steering and transmission control is in the REVERSE position. The alarm is used to alert people behind the machine that the machine is backing up.

Prestart Checks

SMCS Code: 7000

Before the start of each operational shift, or every 10 hours of operation, perform the checks and tests. The checks and tests are in the Maintenance Interval Schedule.

- Test the backup alarm.
- Test the brakes.
- Check the indicators and gauges.
- Inspect the cab filter (fresh air).
- Clean the cab filter (fresh air) or replace the cab filter (fresh air).
- Check the cooling system level.
- Check the engine oil level.
- Drain the water separator at the fuel filter.
- Drain the water and sediment from the fuel tank.
- Check the hydraulic system oil level.
- Inspect the seat belt.
- Check the transmission oil level.
- Perform the walk around inspection.

i04521322

Operation Information

SMCS Code: 7000

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

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

Select the necessary travel speed before you start downhill.

When you go downhill, use the same speed that would be used to go uphill.

Do not allow the engine to overspeed when you go downhill. Use the following controls in order to slow down the travel speed of the machine: decelerator control pedal and buttons for speed control.

When the load will be pushing the machine, push the speed selector to LOW speed before you start downhill.

1. Adjust the operators seat.
2. Fasten the seat belt.
3. Raise all lowered attachments in order to negotiate any obstacles.

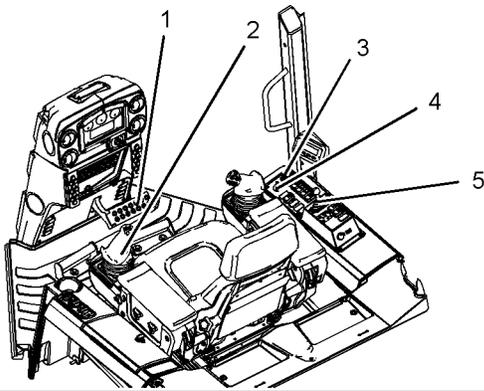


Illustration 76

g01299062

- (1) Brake pedal and deceleration pedal
- (2) Steering and transmission control (lever)
- (3) Parking brake switch
- (4) Engine Throttle Knob
- (5) Winch control lever

4. Push down on pedal (1) in order to prevent the machine from moving.
5. Move switch (3) downward to the DISENGAGED position.
6. Turn knob (4) in order to set the desired engine speed.

Note: During machine operation, the brake pedal can be depressed in order to reduce engine speed temporarily.

7. Release pedal (1).
8. Move lever (2) for the desired direction.
9. Roll the wheel for the ground speed control in order to set the desired ground speed. The wheel for the ground speed control is located on lever (2).
10. Drive the machine forward for best visibility and for best control.

Extended Idle

When idling the engine for extended periods, set the engine to a minimum of 1250 RPM. Elevated idle ensures proper lubrication of engine components.

Hydrostatic Drive Operating Principle

This machine has a hydrostatic drive system which transfers power from the engine to the tracks. The hydrostatic drive system eliminates the conventional type of transmission. The hydrostatic drive system does not use a bevel gear and a drive line. The hydrostatic drive system also eliminates the steering clutch and brake arrangement.

In the simplest form, a hydrostatic drive system is a system which contains the following components: a hydraulic pump with a control system, a hydraulic motor, and high-pressure lines that carry oil between the components. The pump converts mechanical power to hydraulic power in the form of oil flow and oil pressure.

To meet requirements, the machine must be able to move forward and rearward. The machine must also be able to turn. The pumps are designed to deliver varying flows of oil to either the forward side or the reverse side of the hydraulic motors.

The track can be driven at varying speeds in either a forward direction or in a reverse direction.

Since there are two tracks, there are two hydraulic pumps, two sets of hydraulic lines, and two hydraulic motors.

For the forward modes or the reverse modes, the pumps and the motors work with each other. The pumps can produce flow to either the forward side of the motors or to the reverse side of the motors. The pumps can vary the amount of flow in either direction in order to produce infinitely variable speed capabilities. To turn the machine, each pump is capable of reducing flow independently. Independent flow allows one track to be driven at a slower speed in order to cause the machine to turn.

Slowing the machine or stopping the machine is done by reducing the flow of oil to the drive motors or by stopping the flow of oil to the drive motors. Braking of the machine is caused by hydrostatic braking of the tracks.

The parking brakes are engaged while the brake pedal (1) is fully depressed. The parking brakes are engaged while switch (3) is in the ENGAGED position or while the engine is off.

The parking brakes are attached to the final drives. The parking brake is spring-engaged and oil pressure released. The engine must be running in order to release the parking brakes.

The parking brakes disengage when switch (3) is moved from ENGAGED position. The parking brakes also disengage when brake pedal (1) is released.

General Operational Safety Tips

The seat belt must be fastened at all times.

For a prompt stop, quickly depress service brake pedal (1) or quickly move lever (2) to the NEUTRAL position. Either movement causes an immediate stop.

For all turns that are on level ground or on side hill operations, move lever (2) toward the RIGHT position for right turns. Move lever (2) toward the LEFT position for left turns.

Brakes are applied under the following conditions.

- Pedal (1) is fully depressed.
- Switch (3) is in the ENGAGED position.
- The engine is off.

Operating Principle for the Winch

The winch for the Caterpillar, and D6K HYSTAT Track-Type Tractors is a hydraulically driven winch that utilizes a dedicated piston pump for power input. The winch includes both planetary gears and standard spur gears. The winch brake is applied by spring pressure. This will secure the load while control lever (5) is in the HOLD position. The winch brake is released hydraulically. The winch case is designed to bolt directly to the rear of the machine.

When the winch is operated in either the REEL IN or the REEL OUT direction, a hydraulic motor drives the gear train. The control lever supplies oil to the winch motor by the hydrostatic control system. The control lever for the winch is a proportionate control. The amount of hydraulic oil that will be sent to the winch motor will increase as lever (5) is moved. The speed of the winch cable increases as the amount of hydraulic oil to the winch motor increases. The winch brake will be released by pilot pressure when lever (5) is moved into either the REEL IN or the REEL OUT directions.

The mechanism for the free spool for the winch is a splined gear. The mechanism for the free spool is spring-engaged and hydraulically released. Once the FREE SPOOL switch is pressed, hydraulic oil is ported through the logic valve for the winch. This will release the winch brake. The hydraulic oil flows from the logic valve for the winch into a cylinder. This will force the piston against the coil spring. This will disengage the splined connection. This allows the winch cable to be pulled off the winch drum by hand.

The DRIVE AWAY position allows the operator to drive the tractor away from a load while the winch cable is attached to the load. When lever (5) is moved into the DRIVE AWAY position, the flow control valve for the winch motor limits the flow of hydraulic oil through the winch motor and the winch brake. This will provide a controlled release of the winch cable. This will also provide a maximum ground speed for the tractor of 3.0 km/h (1.8 mph).

An optional three roller fairlead assembly or four roller fairlead assembly is available. The optional fairlead assemblies would be used when slight side directional pulls are routinely encountered. The use of the optional fairlead assemblies will help to maximize the life of the winch case and the life of the winch cable by eliminating wear.

Warm-Up Procedure for the Winch

Note: Warm up the winch at each start-up.

1. Warm up the hydraulic system for the machine. For more information, refer to Operation and Maintenance Manual, "Engine and Machine Warm-Up".
2. Use the reel-in and reel-out function to operate the winch. This will allow the hydraulic oil to circulate throughout the winch.

Note: The winch should be operated under a no-load condition during warm-up.

WARNING

The warm-up procedure is recommended at each start-up and is mandatory when temperatures are below 4 °C (40 °F).

Using the Winch

Attaching the Winch Cable

WARNING

Personal injury or death can result from unexpected movement of objects. Be sure all persons are clear of cable and objects before a machine is winched or moved. A safe distance of at least one and a half times the working length of the cable should be maintained. The tail end of a moving object can throw debris at bystanders.

A minimum of five complete wraps of cable must be maintained on the winch drum. Do not handle a load with a winch drum that has less than five wraps.

WARNING

Do not operate the winch under loads that exceed the maximum rated bare drum line pull. If excessive loads are encountered, use a multi-part line and sheave blocks. Any attempt to exceed the capacity of one winch is extremely hazardous. Never try to couple two or more tractors together.

NOTICE

If at all possible, always line up the rear end of the machine with the logs, so that the logs can be winched in a straight path. This avoids unnecessary strain and wear on the side rollers. It also helps to wind the cable onto the winch drum in level layers.

NOTICE

The winches described in this manual are neither designed nor intended for use or application used in the lifting or moving of persons.

1. If you are working on a hill, maneuver the machine to the top of the hill and turn the machine. Drive the machine downhill to the object.

You could drive to the bottom of the hill instead. Then, back up into position.

2. If you are working on a level surface, align the rear of the machine with the object.

WARNING

Wear leather gloves when handling the winch cable.

NOTICE

When winding the winch cable on the drum, never attempt to maintain tension by allowing the winch cable to slip through the hands. Always use hand-over-hand technique, being very careful to keep hands and clothing away from the winch drum and rollers.

3. Press the FREE SPOOL switch. Pull out the cable and attach the cable to the object.

Note: Never operate the winch when there is less than five wraps of the winch cable around the load drum. Use red paint in order to paint the last five complete wraps of the winch cable for a visual warning.

Note: Make sure that there is enough clearance between the object and the machine so that the machine can turn.

Note: Make sure that the ground is stable before winching in a load.

4. To tighten the main cable, make sure that the drum is not rotating and move lever (5) to the REEL IN position.

Note: Avoid sudden shock of a load or jerking of a load. This type of operation may cause heavy loads in excess of the rated capacity, which may result in failure of the cable or the winch.

Unhooking the Winch Cable

WARNING

Personal injury or death can result from persons too close to the machine.

When reeling in the cable, make sure that all persons are clear from rolling objects or cable whiplash.

1. Reel out the winch cable in order to release tension.
2. With the winch in FREE SPOOL mode, pull out enough cable in order to unfasten the cables or the chokers.
3. Slowly reel in the cable until the cable is completely wound. Keep tension on the cable so that the cable is wound evenly.

i03653042

Battery Disconnect Switch

SMCS Code: 1411

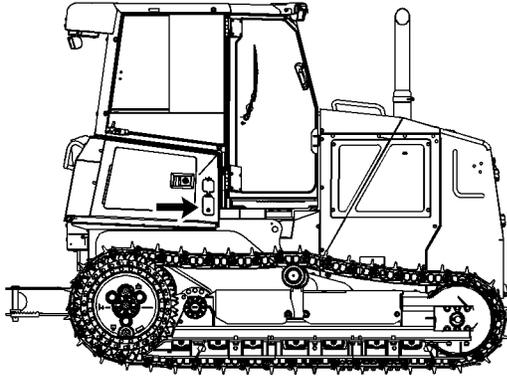


Illustration 77

g01959061

The battery disconnect switch is on the right side of the machine inside the access door in front of the battery box.



On – Insert the key, and turn the key clockwise in order to activate the electrical system. The switch must be ON before you start the engine.



Off – Turn the key counterclockwise in order to shut off the entire electrical system.

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

NOTICE

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

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 in order 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 Caterpillar dealer.

Engine Starting

i03172902

Engine Starting

SMCS Code: 1000; 7000

1. Move the battery disconnect switch to the ON position.
2. Lower any raised attachments to the ground and move the controls to the HOLD position.

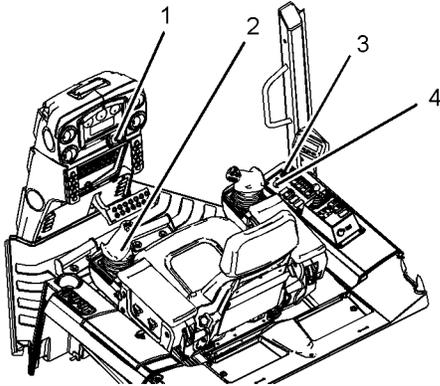


Illustration 78

g01299148

- (1) Engine start switch
- (2) Steering and transmission control (lever)
- (3) Parking brake switch
- (4) Governor control knob

3. Move the steering and transmission control (lever) into the NEUTRAL position.
4. Move the parking brake switch to the ENGAGED position.

Note: The engine will not start unless the switch is in the ENGAGED position.

5. Turn the governor control knob to LOW IDLE before you start the engine.
6. Turn the engine start switch to the START position.
7. Release the engine start switch key after the engine starts.

NOTICE

After every 30 seconds of engine cranking, allow two minutes for the starting motor to cool before cranking again.

8. Allow the engine to warm up at LOW IDLE. Refer to Operation and Maintenance Manual, "Engine and Machine Warm-up".

i02583196

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE

Keep the engine speed slow until the indicator light for the engine oil pressure goes out.

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

1. Allow the engine to warm up at low idle. Engage the implement controls and disengage the implement controls. This will speed up the warm-up of the hydraulic components.
2. Look at the indicators and the gauges frequently during operation.

Note: During extreme cold conditions, the alert indicator for the hydraulic oil filter bypass may come on. As the hydraulic oil warms up, the alert indicator should go out.

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

When you idle the machine for warm-up, observe the following recommendations:

- If the temperature is greater than 0°C (32°F), warm up the engine for approximately 5 minutes.
- If the temperature is less than 0°C (32°F), warm up the engine for approximately 20 minutes.
- If the temperature is less than - 18°C (0°F) or if hydraulic functions are sluggish, additional time may be required.

Adjustments

i03179106

Bulldozer Blade Tip

SMCS Code: 6060; 7000

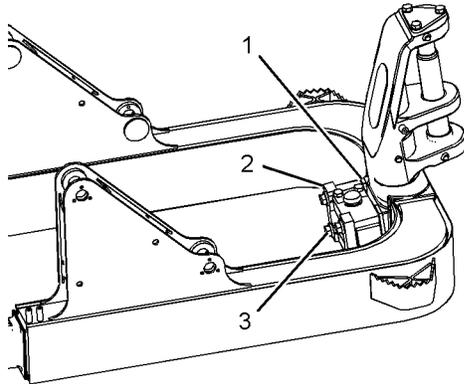


Illustration 79

g01420259

Install the shims in position (1) or in position (2) in order to obtain the desired angle for the cutting edge. Refer to the table.

Table 7

Angle of Cutting Edge	Shims (Position (1))	Shims (Position (2))
61 degrees	35 mm (1.4 inch) 12 mm (0.5 inch)	0
59.5 degrees	35 mm (1.4 inch)	12 mm (0.5 inch)
57 degrees	12 mm (0.5 inch)	35 mm (1.4 inch)
55 degrees	0	35 mm (1.4 inch) 12 mm (0.5 inch)

1. Lower the bulldozer blade to the ground.
2. Loosen four bolts (3).
3. Move the machine forward in order to obtain the clearance for the removal of the shims (1). Move the machine rearward in order to obtain the clearance for the removal of the shims (2). Move the machine forward in order to obtain the clearance for the assembly of the shims (1). Move the machine rearward in order to obtain the clearance for the assembly of the shims (2).
4. Remove the shims and change the shims in order to obtain the desired pitch.
5. Tighten four bolts (3).
 - Tighten all four bolts until the shims and the mounting block faces are secure.

- Turn four bolts by 90 degrees.
- Turn four bolts by an additional 90 degrees.

This procedure will give the four bolts the proper mounting torque.

i02466137

Ripper Tip and Shank Protector

SMCS Code: 6808; 6810; 6812

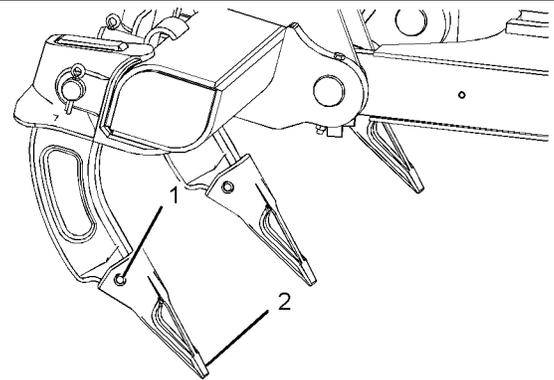


Illustration 80

g01230086

Replace ripper tip (2) and drive out pin (1) before wear occurs on the shank. Follow the replacement procedures in the Operation and Maintenance Manual, "Ripper - Inspect/Replace".

i03204695

Cutting Edges and End Bits

SMCS Code: 6801; 6804

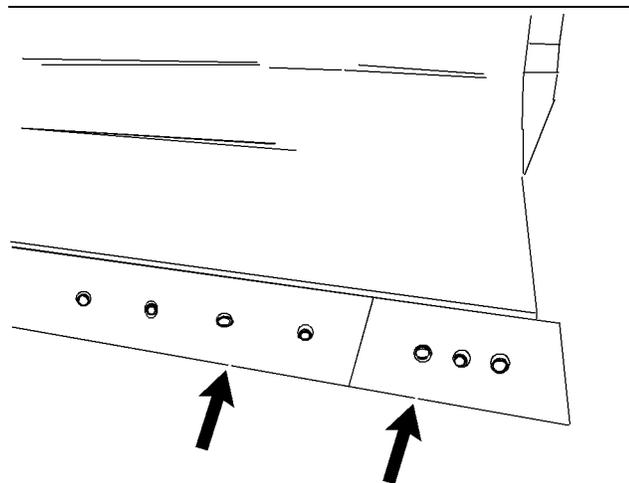


Illustration 81

g01097854

Replace the cutting edges or reverse the cutting edges. Replace the end bits or reverse the end bits. These processes must be performed before wear occurs on the blade base. For the replacement procedures, see the Operation and Maintenance Manual, "Cutting Edges and End Bits - Inspect/Replace".

Parking

i02429573

Stopping the Machine

i02595583

SMCS Code: 7000**NOTICE**

Park on a level surface. If it is necessary to park on a grade, chock the tracks securely.

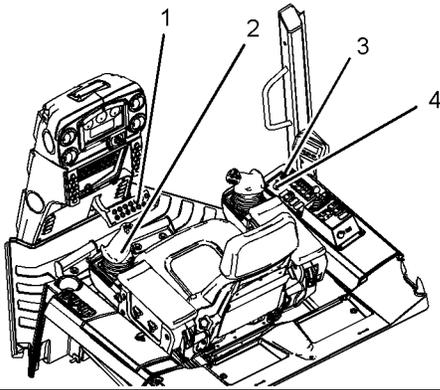


Illustration 82

g01299153

1. Move the lever for steering and transmission control (2) to the NEUTRAL position in order to stop the machine.
2. Apply service brake (1) in order to hold the machine in position.
3. Turn the engine throttle knob (4) to the LOW IDLE position.
4. Move parking brake switch (3) upward to the ENGAGED position.
5. Release pedal (1).
6. Lower all attachments to the ground and apply slight downward pressure.
7. Move all attachment controls to the NEUTRAL position.

Stopping the Engine

SMCS Code: 1000; 7000**NOTICE**

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

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

1. Operate the engine for five minutes at low idle with no load.

This allows hot areas in the engine to cool gradually. This will extend the engine life.

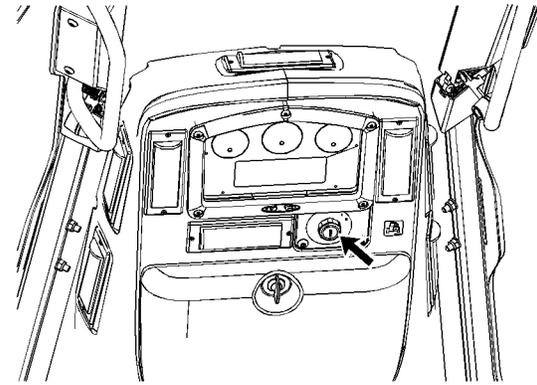


Illustration 83

g01213952

2. Turn the engine start switch key to the OFF position in order to stop the engine.
3. Move all hydraulic control levers back and forth in order to relieve hydraulic pressure.
4. Move all control levers into the HOLD position.

i03998245

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

Rear Engine Shutdown Switch (If Equipped)

Turn the engine start switch key to OFF. If the engine does not stop, perform the following procedure.

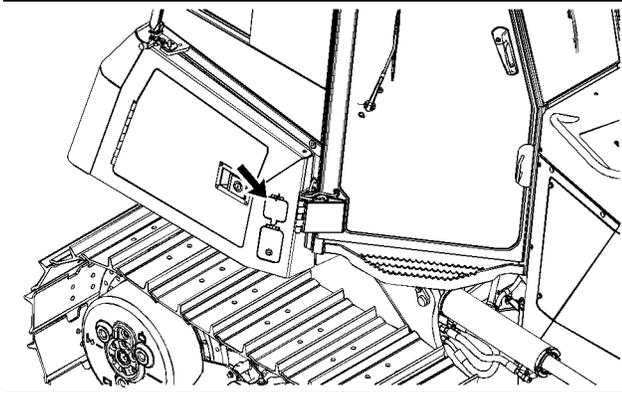


Illustration 84

g01229598

1. Open the access panel for the engine shut off switch that is located on the right side of the machine.
2. Press this button in order to turn off the machine.

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

No Rear Engine Shutdown Switch

If there is no Rear Engine Shutdown Switch, perform the following procedure. If turning the engine start switch to the OFF position does not stop the engine, perform the following procedure.

1. Apply the parking brake.
2. Lower all attachments to the ground.

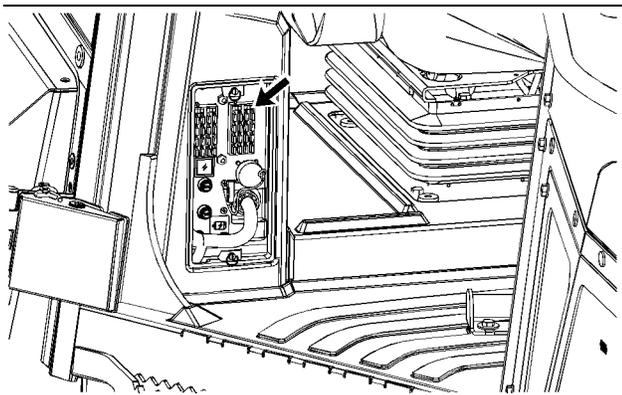


Illustration 85

g02175770

3. Remove the fuse cover from the fuse block positioned behind the access door on the right side of the seat inside the cab

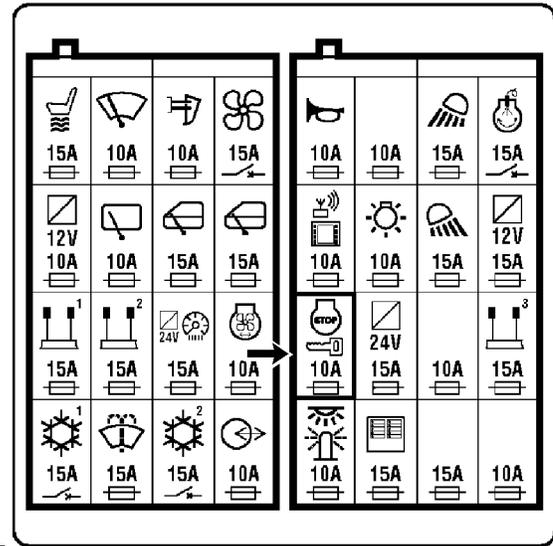


Illustration 86

g02175775

4. Remove the fuse for engine control in order to stop the engine, as shown.

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

5. Once the malfunction has been corrected, install the fuse for engine control and close the access door.

i03649640

Equipment Lowering with Engine Stopped

SMCS Code: 7000

⚠ WARNING

Personal injury or death can result from a bulldozer blade falling.

Keep personnel away from the front of the machine when lowering the bulldozer blade.

Lowering the Bulldozer Blade

If there is a loss of hydraulic power, perform the following procedure in order to lower the blade to the ground.

The Accumulator is Pressurized

1. Place the hydraulic lockout switch in the UNLOCK position.

2. Turn the engine start switch key to the ON position.
3. Leave the key in the ON position.
4. Slowly move the joystick control for the bulldozer blade into the LOWER position in order to lower the blade to the ground.

The Accumulator has no Pressure

Engine Starts

1. Place the hydraulic lockout switch in the UNLOCK position.
2. Turn the engine start switch key to the START position until the engine starts.
3. Leave the key in the ON position.
4. Slowly move the joystick control for the ripper into the LOWER position in order to lower the ripper to the ground.

The Engine Does Not Start

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

After the engine has been stopped for a short period of time the control levers will not lower the implements to the ground.

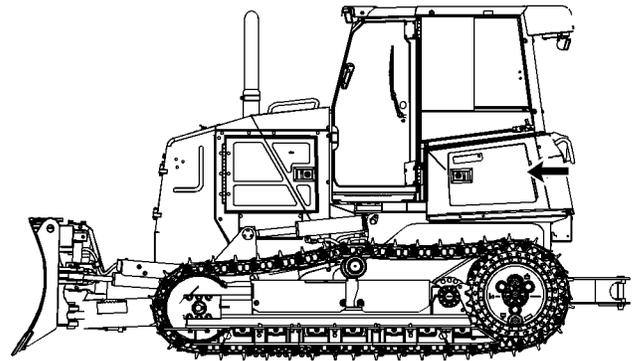


Illustration 87

g01297381

1. Open the rear access cover on the left side of the machine.

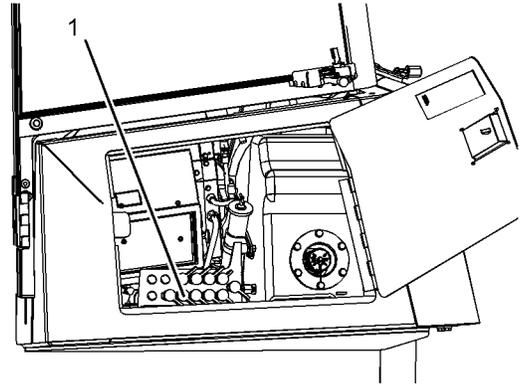


Illustration 88

g01297382

Note: There are two mechanical methods that can be used to lower the attachments.

2. Remove the protective cap from pressure tap (1). This pressure tap is for the remote pilot supply.

The first method is explained in steps 2.a through 2.e.

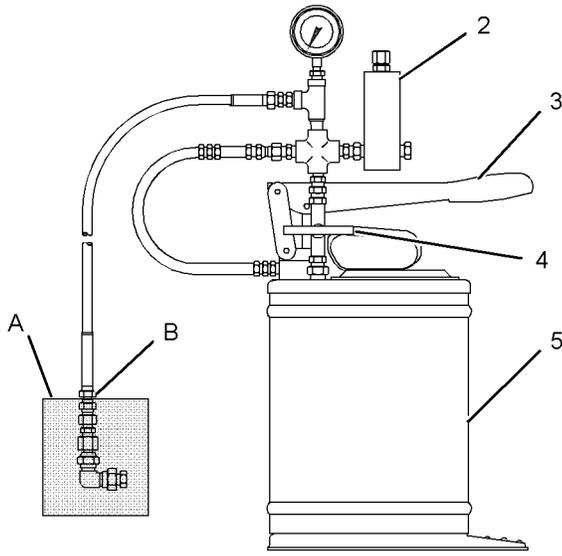


Illustration 89

g01059993

- (A) Changed components location
- (B) 3P - 2233 Coupler assembly (not shown)
- (2) Relief valve
- (3) Handle
- (4) Bypass valve
- (5) Brake release pump

- a. Use a FT1845 Brake Release Pump and 3P - 2233 Coupler assembly to control oil pressure to the accumulator.
 - b. Remove the components that are indicated by the shaded area. Plug the pressure hose at the connection "3/8 - 18 NPT".
 - c. Turn the handle of the bypass valve to the closed position.
 - d. While you are pumping the handle, observe the opening pressure of the relief valve.
 - e. Adjust the opening pressure of the relief valve. Set the pressure to 3030 ± 70 kPa (440 ± 10 psi).
3. The second method is explained in steps 3.a through 3.e.
- a. Charge the pilot hydraulic system at the pressure tap for remote pilot supply (1) in order to lower the implements.
 - b. Connect 3P - 2233 Coupler assembly to 9J - 6190 Adapter Union on the pump pressure hose .
 - c. Turn the bypass valve handle to the CLOSED position.

- d. Initially, rapidly move the pump handle. This will produce a large volume of oil flow.
- e. The quick connector 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.

Note: The hydraulic system can now be pressurized.

1. Close the access door.
2. Place the hydraulic lockout switch in the UNLOCK position.
3. Turn the engine start switch key to the ON position.
4. Leave the key in the ON position.
5. Slowly move the joystick control for the bulldozer blade in the LOWER position in order to lower the blade to the ground.

Manual Lowering of the Bulldozer Blade

If there is no electrical power or the accumulator could not be charged, the bulldozer blade can not be lowered with the joystick control. The blade must be lowered manually.

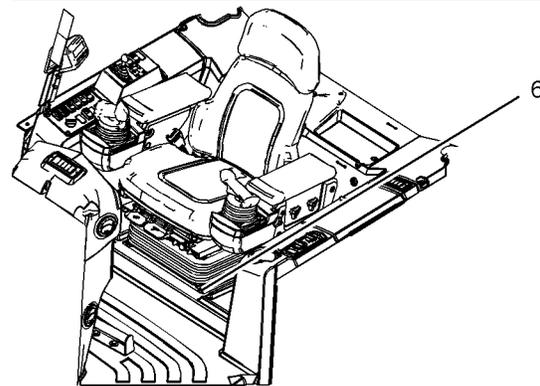


Illustration 90

g01297492

1. The control valve for the bulldozer blade is located underneath the cab floor. Remove the four bolts for the seat (6) and remove the seat.

Note: Two persons are required in order to perform the lowering operation. One person turns the screw on the valve in order to lower the dozer blade. The other person visually ensures that no one is endangered before lowering the implement.

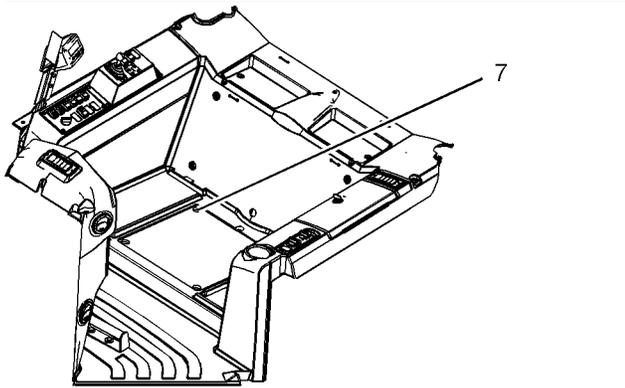


Illustration 91

g01297494

2. Remove the four bolts for the floorplate (7) and remove the floorplate.

Note: Place the second person (observer) in a safe area in order to watch the lowering procedure. The observer alerts the first person that is lowering the dozer blade to stop the procedure, if necessary.

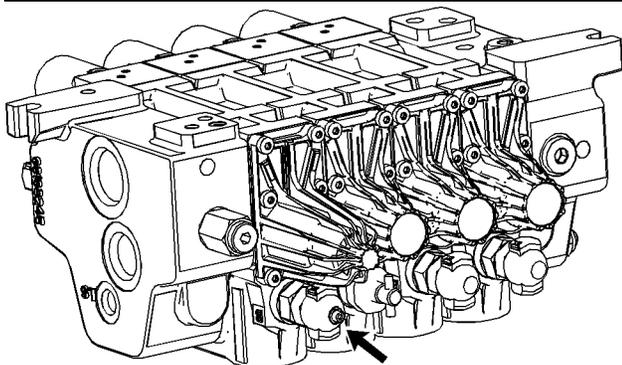


Illustration 92

g01297495

3. Slowly turn the screw on the relief valve in a counterclockwise direction. The blade will lower to the ground.
4. Slowly turn the screw on the relief valve in a clockwise direction. Turn the screw until the stem bottoms out in the hole. Tighten the screw in order to lock down the screw. This procedure may change the setting for the relief valve. Consult your Caterpillar dealer for more information on checking the setting for the relief valve.
5. Make any necessary repairs before you operate the machine.
6. Install the floorplate.
7. Install the seat.

Lowering the Ripper (If equipped)

The Accumulator is Pressurized

If there is a loss of hydraulic power, perform the following procedure in order to lower the ripper to the ground.

1. Place the hydraulic lockout switch in the UNLOCK position.
2. Turn the engine start switch key to the ON position.
3. Leave the key in the ON position.
4. Slowly move the joystick control for the ripper into the LOWER position in order to lower the ripper to the ground.

The Accumulator has no Pressure

The Engine Starts

1. Place the hydraulic lockout switch in the UNLOCK position.
2. Turn the engine start switch key to the START position until the engine starts.
3. Leave the key in the ON position.
4. Slowly move the joystick control for the ripper into the LOWER position in order to lower the ripper to the ground.

The Engine Does Not Start

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

After the engine has been stopped for a short period of time the control levers will not lower the implements to the ground.

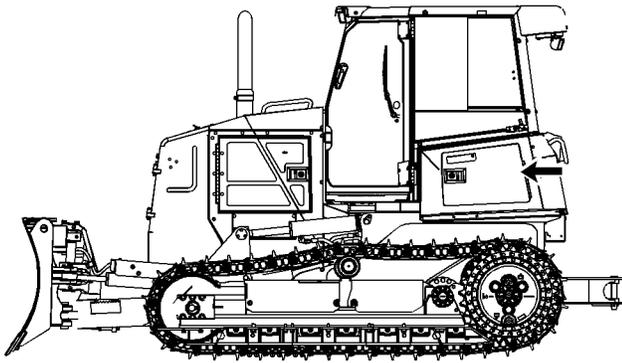


Illustration 93

g01297381

1. Open the rear access cover on the left side of the machine.

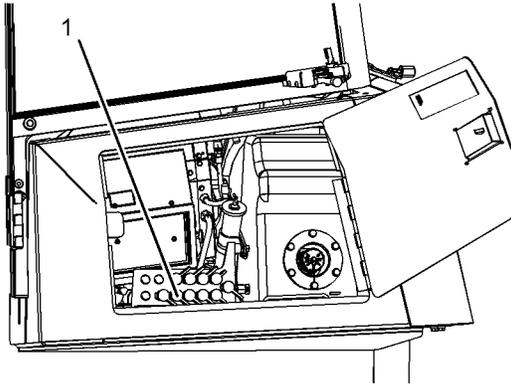


Illustration 94

g01297382

Note: There are two mechanical methods that can be used to lower the attachments.

2. Remove the protective cap from pressure tap (1). This pressure tap is for the remote pilot supply.

The first method is explained in steps 2.a through 2.e.

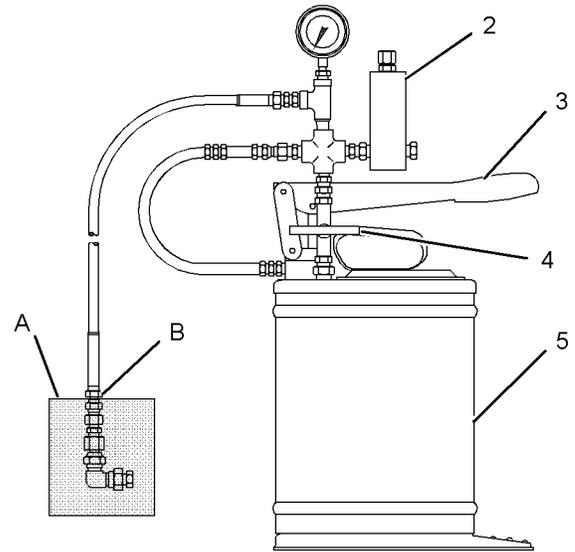


Illustration 95

g01059993

- (A) Changed components location
 - (B) 3P - 2233 Coupler assembly (not shown)
 - (2) Relief valve
 - (3) Handle
 - (4) Bypass valve
 - (5) Brake release pump
- a. Use a FT1845 Brake Release Pump and 3P - 2233 Coupler assembly to control oil pressure to the accumulator.
 - b. Remove the components that are indicated by the shaded area. Plug the pressure hose at the connection "3/8 - 18 NPT".
 - c. Turn the handle of the bypass valve to the closed position.
 - d. While you are pumping the handle, observe the opening pressure of the relief valve.
 - e. Adjust the opening pressure of the relief valve. Set the pressure to 3030 ± 70 kPa (440 ± 10 psi).
3. The second method is explained in steps 3.a through 3.e.
 - a. Charge the pilot hydraulic system at the pressure tap for remote pilot supply (1) in order to lower the implements.
 - b. Connect 3P - 2233 Coupler assembly to 9J - 6190 Adapter Union on the pump pressure hose .
 - c. Turn the bypass valve handle to the CLOSED position.

- d. Initially, rapidly move the pump handle. This will produce a large volume of oil flow.
- e. The quick connector 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.

Note: The hydraulic system can now be pressurized.

1. Close the access door.
2. Place the hydraulic lockout switch in the UNLOCK position.
3. Turn the engine start switch key to the ON position.
4. Leave the key in the ON position.
5. Slowly move the joystick control for the ripper in the LOWER position in order to lower the ripper to the ground.

Manual Lowering of the Ripper

If there is no electrical power or the accumulator could not be charged, the ripper can not be lowered with the joystick control. The ripper must be lowered manually.

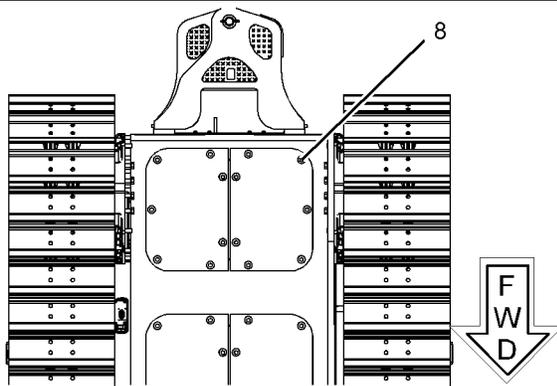


Illustration 96

g01297502

1. The control valve for the ripper is accessible from the underside of the machine. Remove the seven bolts for the right side access plate (8) and remove the access plate.

Note: Two persons are required in order to perform the lowering operation. One person turns the screw on the valve in order to lower the ripper. The other person visually ensures that no one is endangered before lowering the implement.

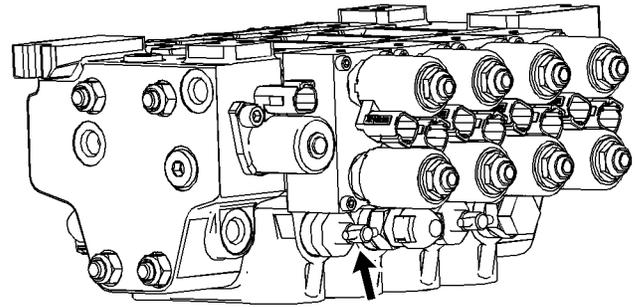


Illustration 97

g01297585

2. Slowly turn the valve counterclockwise until the ripper is lowered to the ground.

Note: Place the second person (observer) in a safe area in order to watch the lowering procedure. The observer alerts the first person that is lowering the ripper to stop the procedure, if necessary.

3. Once the ripper is resting on the ground, turn the valve clockwise until the valve stops.
4. Consult your Caterpillar dealer for more information on checking the hydraulic circuit for the ripper.
5. Install the access plate and install the seven bolts.

i02595301

Leaving the Machine

SMCS Code: 7000

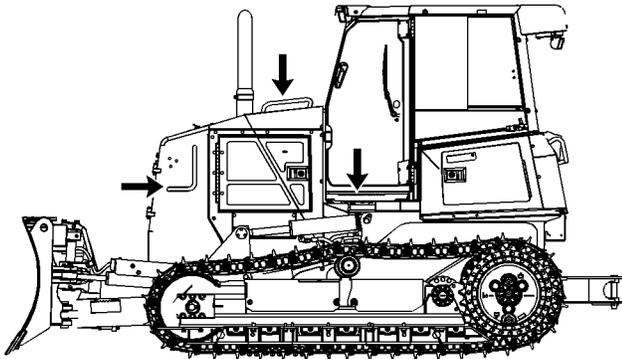


Illustration 98

g01298992

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

Note: Do not use the angle cylinders as a step.

2. Inspect the engine compartment for debris. Clean out any debris and any paper in order to avoid a fire.
3. Remove all flammable debris from the front bottom guard through the access panels in order to reduce a fire hazard. Dispose of the debris properly.
4. Turn the key for the battery disconnect switch to the OFF position. This will help to prevent a battery short circuit and the current draw that is made by certain components. When the machine is not operated for an extended period, remove the key from the battery disconnect switch. Removing the key will help to protect the machine from vandalism.
5. Install all vandalism protection locks and vandalism covers. Lock the doors.

Transportation Information

Shipping the Machine

i00052187

SMCS Code: 7000; 7500

Investigate the travel route for overpass clearances. Make sure that there is adequate clearance for the machine that is being transported. This is especially true for machines that are equipped with a ROPS/FOPS structure, a cab, or a canopy.

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

NOTICE

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

Observe all regulations governing wide loads.

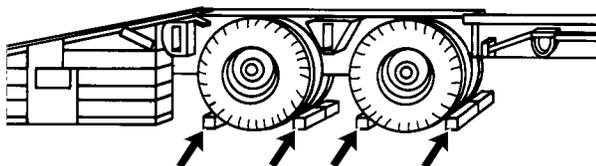


Illustration 99

g00040011

1. Place blocks under the trailer wheels or under the rail car wheels before loading, as shown.
2. Lower all attachments to the floor of the transport machine. Move the transmission control lever to the NEUTRAL position.
3. Engage the parking brake switch.
4. Stop the engine.
5. Turn the start switch key to the OFF position. Lock the parking brake switch. Remove the key.
6. Turn the battery disconnect switch to the OFF position. Remove the key.

7. Lock the door and lock the access covers. Attach any vandalism protection.
8. Install the tie-downs at several locations and block the tracks in the front and in the rear.
9. Cover the opening for the engine exhaust. Rotation of the turbocharger without engine operation can result in damage to the turbocharger.

Consult your Caterpillar dealer for shipping instructions for your machine.

i02997466

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.

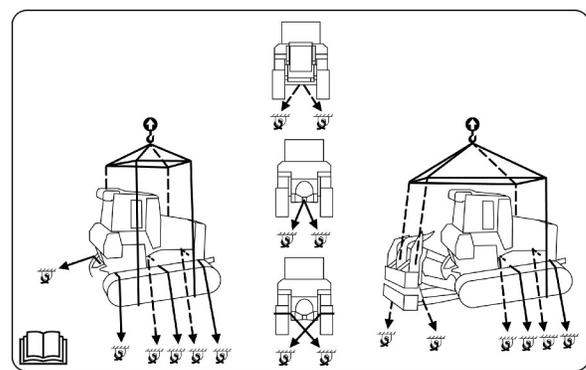


Illustration 100

g01519807

NOTICE

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

Note: Do not use handles or steps in order to lift or tie down the machine.

Reference: Refer to the Operation and Maintenance Manual, “Specifications” for the approximate shipping weights.

Note: The shipping weight that is listed is the weight of the most common configuration of the machine. If attachments have been installed on your machine, the weight of your machine and the center of gravity of your machine may vary.

The instructions that are listed below describe units that are manufactured by Caterpillar Inc..

1. Engage the parking brake.
2. Use properly rated cables and properly rated slings for lifting. For a machine with a blade, position the slings beneath the front of the track and beneath the rear of the track. Also for a machine without a blade, position the slings beneath the front of the track and beneath the rear of the track. For a machine with a ripper, raise the ripper to the upper position, and position the slings beneath the front of the track and beneath the ripper.
3. 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.
4. There are specific locations for tying down the machine.

Front tie-down – Use the eye of the front tie-down.

Side tie-downs – Use the inside edge of the track shoe.

Rear tie-downs – Use the rear boss. Use the outer edge of the track shoe.

Check the state laws that govern the following load characteristics.

- Weight
- Width
- Length
- Height

Check the local laws that govern the following load characteristics.

- Weight
- Width

- Length
- Height

Consult your Caterpillar dealer for shipping instructions for your machine.

Towing Information

i02460799

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 final drives are disengaged. The machine can roll free if it is not blocked. With final drives disengaged, the machine cannot be stopped or steered.

Follow the recommendations below, to properly perform the towing procedure.

Relieve the hydraulic tank and line pressure before any disassembly.

Even after the machine has been turned off, the hydraulic oil can still be hot enough to burn. Allow the hydraulic oil to cool before draining.

NOTICE

To tow the machine, both final drives must be disengaged.

Do not operate the travel motors with the final drives disengaged. Damage could result.

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.

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

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

Do not allow any person on the disabled machine except the operator. Only allow the operator on the disabled machine if the operator can control the steering and/or braking.

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

Attach the cable to the towing eye on the front of the machine if you are towing the machine forward. Attach the cable to the drawbar pin on the rear of the machine if you are towing the machine backward.

Do not use a chain for pulling a disabled machine. A chain link can break. This may cause personal injury. Use a wire cable with ends that have loops or rings. Put an observer in a safe position in order to watch the pulling procedure. The observer can stop the procedure if the wire cable starts to break. Stop pulling whenever the towing machine moves without moving the towed machine.

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

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

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

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

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

Do not tow a loaded machine.

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 driveline failure is suspected, remove the final drive sun gear.

For further information, refer to "Removal of the Final Drive Sun Gear".

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.

Removal of the Final Drive Sun Gear

Table 8

Required Tools			
Tooling	Part Number	Description	Quantity
A	1P-0074	Slide Hammer Puller Gp	1
	4C-5660	Adapter	1

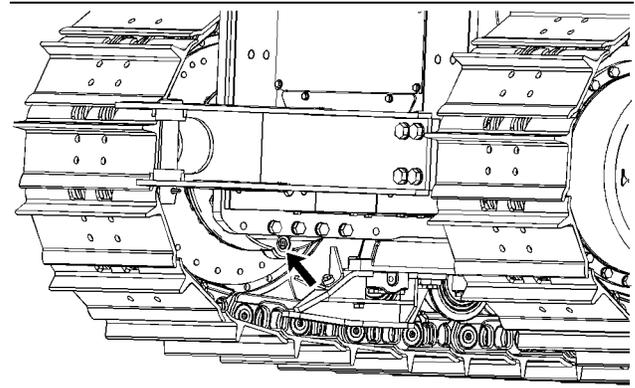


Illustration 101

g01228202

1. Remove the drain plug and allow the oil to drain into a suitable container. Refer to the Operation and Maintenance Manual, "Capacities (Refill)" for the amount of fluid that will be in the housing of the final drive.
2. Clean the drain plug and replace the drain plug after all of the fluid is drained.

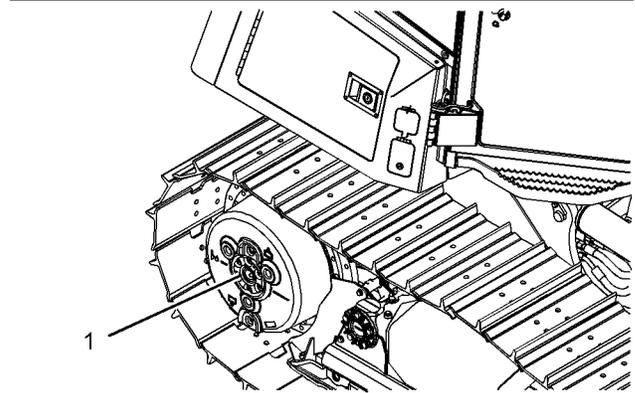


Illustration 102

g01228186

3. Remove cover (1).
4. Install Tooling (A) onto the shaft of the sun gear.
5. Remove the sun gear from the final drive housing.
6. Replace cover (1) in order to prevent dirt from entering the final drive housing.
7. Repeat Step 1 through Step 6 for the other final drive assembly.
8. Tow the machine.

Note: Do not operate the machine when there is no oil in the final drive housing.

Engine Starting (Alternate Methods)

i02407539

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.

WARNING

Do not attempt to charge a battery that has ice in any of the cells.

Charging a battery in this condition can cause an explosion that may result in personal injury or death.

Always let the ice melt before attempting to charge.

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.

This machine has a 24 volt starting system. Use only the same voltage for jump starting. Use of a higher voltage damages the electrical system.

Use of Jump Start Cables

1. Place the transmission control on the stalled machine in the NEUTRAL position. Engage the parking brake. Lower all attachments to the ground. Move all controls to the HOLD position.
2. On the stalled machine, turn the engine start switch to the OFF position. Turn off the accessories.
3. On the stalled machine, turn the battery disconnect switch to the ON position.
4. Move the machine or the auxiliary power source close to the stalled machine so that the cables can reach. **DO NOT ALLOW THE MACHINE OR THE AUXILIARY POWER SOURCE TO CONTACT THE STALLED MACHINE.**
5. Stop the engine on the machine that is the electrical source. (If you are using an auxiliary power source, turn off the charging system.)
6. Check the battery caps for correct placement and for correct tightness. Make these checks on both machines. Make sure that the batteries in the stalled machine are not frozen. Check the batteries for low electrolyte.
7. Connect the positive jump start cable to the positive cable terminal of the discharged battery.

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

Note: Batteries in series may be in separate compartments. Use the terminal that is connected to the starter solenoid. This battery is normally on the same side of the machine as the starter.

8. Connect the positive jump start cable to the positive terminal of the electrical source. Use the procedure from Step 7 in order to determine the correct terminal.
9. Connect one end of the negative jump start cable to the negative terminal of the electrical source.
10. Make the final connection. Connect the negative cable to the frame of the stalled machine. Make this connection away from the battery, away from the fuel, away from the hydraulic lines, and away from all moving parts.
11. Start the engine of the machine that is the electrical source. (If you are using an auxiliary power source, energize the charging system on the auxiliary power source.)
12. Allow the electrical source to charge the batteries for two minutes.
13. Attempt to start the stalled engine.

Reference: For more information, refer to Operation and Maintenance Manual, "Engine Starting".
14. Immediately after the stalled engine starts, disconnect the jump start cables in reverse order.

Maintenance Section

Lubricant Viscosities and Refill Capacities

i04562323

Lubricant Viscosities

SMCS Code: 7581

This machine can also have an undercarriage with 2 carrier rollers and 8 track roller configuration.

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 for all Caterpillar Machines". This publication is available from your Cat dealer.

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold Weather DTO is recommended.

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

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

Selecting the Viscosity

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

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

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

NOTICE

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

Engine Oil

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

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

Table 9

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 Cat DEO Cat DEO-ULS SYN Cat DEO SYN Cat Cold Weather DEO-ULS Cat ECF-1-a, Cat ECF-2, Cat ECF-3	SAE 0W-40	-40	40	-40	104
		SAE 5W-30	-30	30	-22	86
		SAE 0W-30	-40	30	-40	86
		SAE 5W-40	-30	50	-22	122
		SAE 10W-30	-18	40	0	104
		SAE 10W-40	-18	50	0	122
		SAE 15W-40	-9.5	50	15	122

All Cat Machine Hydraulic Systems and Machine Hydrostatic Transmissions

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

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

Cat HYDO Advanced 10 SAE 10W, Cat HYDO Advanced 30 SAE 30W, or Cat BIO HYDO Advanced are the preferred oils for use in most Caterpillar machine hydraulic and hydrostatic transmission systems. **Cat HYDO Advanced fluids have a 50% increase in the standard oil drain interval** for machine hydraulic systems (3000 hours versus 2000 hours) over second and third choice oils - when following the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. 6000 hour oil drain intervals are possible when using S-O-S Services oil analysis. Consult your Caterpillar dealer for details. In order to gain the most benefit from the improved performance designed into Cat HYDO Advanced fluids, when switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are Cat MTO, Cat DEO, Cat DEO-ULS, Cat TDTO, Cat Cold Weather TDTO, Cat TDTO-TMS, Cat DEO-ULS SYN, Cat DEO SYN, Cat Cold Weather DEO-ULS. **Third choice** oils are commercial oils that meet Cat ECF-1-a, Cat ECF-2, Cat ECF-3, Cat TO-4, or the Cat TO-4M performance requirements, and that have a minimum zinc additive level of 0.09 percent (900 ppm). Commercial biodegradable hydraulic oil must meet the Cat BF-2 specification. Refer to the machine Operation and Maintenance Manual and/or consult your local Caterpillar dealer before using commercial oils that meet Cat BF-2 in Cat Hydraulic Excavators.

Table 10

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Hydraulic System and Hydrostatic Transmissions	Cat HYDO Advanced 10 Cat HYDO Advanced 30 Cat BIO HYDO Advanced Cat MTO Cat DEO-ULS Cat DEO Cat DEO-ULS SYN Cat DEO SYN Cat TDTO Cat TDTO-TMS Cat Cold Weather DEO-ULS Cat Cold Weather TDTO Cat ECF-1-a, Cat ECF-2, Cat ECF-3, Cat TO-4, Cat TO-4M, Cat BF-2	SAE 0W-20	-40	40	-40	104
		SAE 0W-40	-40	40	-40	104
		SAE 0W-30	-40	40	-40	104
		SAE 5W-40	-30	40	-22	104
		SAE 10W	-20	50	-4	122
		SAE 30	10	50	50	122
		BIO HYDO Advanced	-40	40	-40	104
		SAE10W-30	-20	40	-4	104
		SAE15W-40	-15	50	5	122
		Cat MTO	-20	40	-4	104
		Cat TDTO-TMS	-15	50	5	122

Transmission and Axles

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

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

Table 11

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 TDTO Cat TDTO-TMS Cat Cold Weather TDTO Cat TO-4, Cat TO-4M	SAE 0W-20	-40	10	-40	50
			SAE 10W	-20	10	-4	50
			SAE 30	0	35	32	95
			SAE 50	10	50	50	122
			Cat TDTO-TMS	-20	43	-4	110
Final Drive	Moderate Usage or Intermittent Operation	Cat FDAO Cat FDAO SYN Cat TDTO Cat TDTO-TMS Cat FD-1, Cat TO-4, Cat TO-4M	SAE 60	-7	50	19	122
			SAE 50	-15	32	5	90
			SAE 30	-25	15	-13	59
			Cat TDTO-TMS	-35	15	-31	59
			Cat FDAO SYN	-15	50	5	122
	Severe Usage or Continuous Operation (Multiple Shifts)	Cat FDAO Cat FDAO SYN Cat TDTO Cat TDTO-TMS Cat FD-1, Cat TO-4, Cat TO-4M	SAE 60	-25	50	-13	122
			SAE 50	-33	14	-27	58
			SAE 30	-40	0	-40	32
			Cat TDTO-TMS	-40	0	-40	32
			Cat FDAO SYN	-33	50	-27	122

Track Type Tractors Special Applications

Table 12

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 GO (Gear Oil) Cat Synthetic GO API GL-5 gear oil	SAE 75W-90	-30	40	-22	104
			SAE 75W-140	-30	45	-22	113
			SAE 80W-90	-20	40	-4	104
			SAE 85W-140	-10	50	14	122
Winches (hydraulic drive)	Normal	Cat TDTO Cat TDTO-TMS Cat TO-4, Cat TO-4M	SAE 90	0	40	32	104
			SAE 0W-20	-40	10	-40	50
			SAE 10W	-20	10	-4	50
			SAE 30	0	43	32	110
			Cat TDTO-TMS	-10	35	14	95
Track Roller Frame Recoil Spring Pivot Shaft Bearings	Normal	Cat TDTO Cat TDTO-TMS Cat Cold Weather TDTO Cat TO-4, Cat TO-4M	SAE 0W-20	-40	0	v40	32
			SAE 5W-20	-35	0	-31	32
			SAE 10W	-30	0	-22	32
			SAE 30	-20	25	-4	77
			SAE 40	-10	40	14	104
			SAE 50	0	50	32	122
			Cat TDTO-TMS	-25	25	-13	77
Track Idlers and Track Rollers	Normal	Cat DEO (single grade) Cat DEO SYN Cat DEO-ULS SYN Cat ECF-1-a Cat ECF-2 Cat ECF-3 API CF	SAE 30	-20	25	-4	77
			SAE 5W-40	-35	40	-31	104
			SAE 0W40	-40	40	-40	104

Special Lubricants

Grease

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

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

Table 13

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

Diesel Fuel Recommendations

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

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

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

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

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

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

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

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

Fuel Additives

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

Biodiesel

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

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

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

Note: Up to B20 biodiesel blend level is acceptable for use in Medium 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.

i03649760

Capacities (Refill)

SMCS Code: 7560

Table 14

APPROXIMATE REFILL CAPACITIES			
Compartment or System	Liters	US Gal	Imp Gal
Engine Crankcase and Filter	15.5	4.1	3.4
Each Final Drive (D6K XL)	15	4.0	3.3
Each Final Drive (D6K LGP)	23	6.1	5.1
Hydraulic Tank	58	15.3	12.8
Hydraulic System	80	21.1	17.6
Fuel Tank (D6K XL, and D6K LGP)	295	77.9	64.9
Radiator for the Cooling System	7.5	2.0	1.6
Cooling System	25	6.6	5.5
Gear Case for the Winch	4.7	1.2	1.0

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.

i04311449

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.

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

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

i03636245

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 6700; 7000

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

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

1. Turn off the engine. Place the engine start switch in the OFF position.
2. If equipped, turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

NOTICE

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

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure in order to reduce the possibility of damage to the following components:
 - Bearings of the drive train
 - Hydraulic components
 - Electrical components
 - Other components of the machine
4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.

Maintenance Access

i02623389

Access Doors and Covers

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

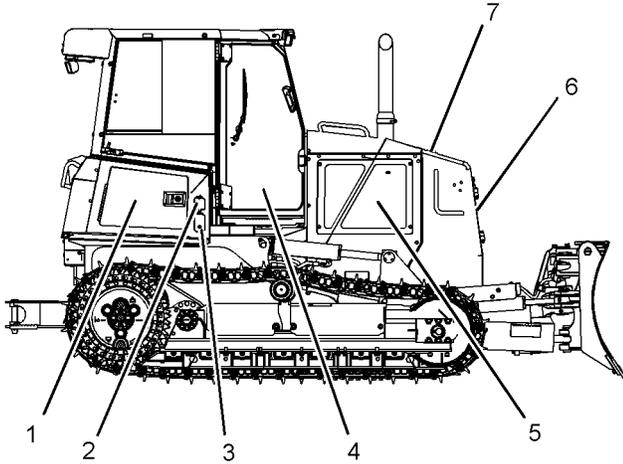


Illustration 103

g01295201

Opening access door (1) will allow access to the following items:

- The battery
- The windshield washer reservoir
- Hydraulic Oil Filters

Opening access door (2) will allow access to the following items:

- The secondary shut off switch for the engine

Opening access door (3) will allow access to the following items:

- The battery disconnect switch

Opening access door (4) will allow access to the following items:

- The circuit breakers

Opening access panel (5) will allow access to the following items:

- The water temperature regulator

- The belt for the air conditioner compressor, fan drive, alternator and water pump

Opening access door (6) will allow access to the following items:

- The engine fan
- The radiator

Opening access door (7) will allow access to the following items:

- The radiator pressure cap

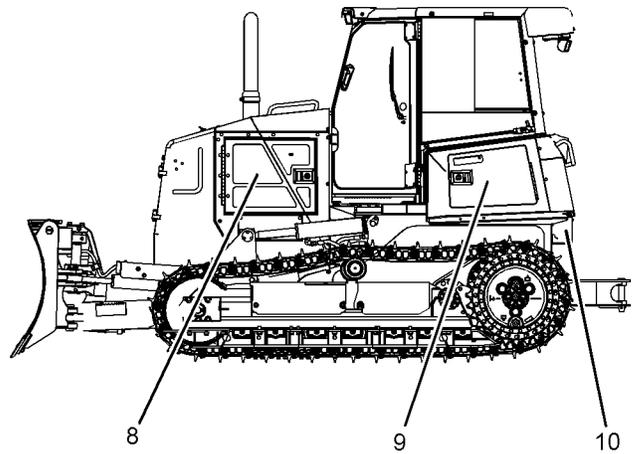


Illustration 104

g01295203

Opening access door (8) will allow access to the following items:

- The engine oil filter
- The ether starting aid cylinder (if equipped)
- The fuel system priming pump and primary fuel filter
- The secondary filter for the fuel system
- The engine air filter primary element
- The secondary air filter element
- The engine oil dipstick
- The engine oil filler cap
- The water separator element for the fuel system
- The shutoff valve for the fuel system

- The sampling port for the engine oil

Opening access door (9) will allow access to the following items:

- The sampling port for the hydraulic oil
- The fresh air filter for the cab
- The hydraulic oil filler cap
- Remote pressure taps

Opening access door (10) will allow access to the following items:

- The drain valve for the water and sediment for the fuel tank

i04535981

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, including all adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance.

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

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 extend the oil change even longer. Consult your Cat dealer for details.

When Required

Battery - Recycle	102
Battery or Battery Cable - Inspect/Replace	102
Belt - Replace	104
Circuit Breakers - Reset	107
Condenser (Refrigerant) - Clean	107
Cutting Edges and End Bits - Inspect/Replace	113
Engine Air Filter Primary Element - Clean/ Replace	114
Engine Air Filter Secondary Element - Replace ..	116
Engine Air Precleaner - Clean	116
Ether Starting Aid Cylinder - Replace	120
Free Spool Drag - Adjust	124
Front Idler Position - Check	124
Fuel System - Prime	127
Fuel System Primary Filter - Replace	128
Fuel System Secondary Filter - Replace	131
Fuel System Third Filter - Replace	132
Fuses and Circuit Breakers - Replace/Reset	134
Oil Filter - Inspect	142
Radiator Core - Clean	143
Radiator Pressure Cap - Clean/Replace	143
Ripper - Inspect/Replace	143
Winch Cable - Inspect	149
Winch Cable - Replace	149
Window Washer Reservoir - Fill	151

Window Wipers - Inspect/Replace	152
Windows - Clean	152

Every 10 Service Hours or Daily

Backup Alarm - Test	102
Brakes, Indicators and Gauges - Test	104
Bulldozer Power Angling Tilt Hinge Pins - Lubricate	106
Cab Filter (Fresh Air) - Clean/Inspect/Replace ...	106
Cooling System Level - Check	112
Engine Oil Level - Check	117
Fuel System Primary Filter/Water Separator - Drain	130
Fuel Tank Water and Sediment - Drain	134
Hydraulic System Oil Level - Check	140
Seat Belt - Inspect	145
Winch Fairlead Rollers - Lubricate	150

Every 50 Service Hours or Weekly

Cab Filter (Recirculation) - Clean/Inspect/ Replace	107
Equalizer Bar Center Pin - Lubricate	119
Front Idler Position - Check/Adjust	125
Ripper Linkage and Cylinder Bearings - Lubricate	144
Track Pins - Inspect	148

Initial 250 Service Hours

Engine Oil and Filter - Change	118
--------------------------------------	-----

Every 250 Service Hours

Engine Oil Sample - Obtain	118
----------------------------------	-----

Every 250 Service Hours or Monthly

Belt - Inspect/Replace	103
Equalizer Bar Pins and Recoil Bearings - Lubricate	120
Final Drive Oil Level - Check	122
Final Drive Oil Level - Check	123
Pivot Shaft Oil Level - Check	142
Track Roller Frame - Inspect	148
Winch Oil Level - Check	150

Initial 500 Service Hours

Engine Valve Lash - Check	119
---------------------------------	-----

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

Cooling System Coolant Sample (Level 2) - Obtain	110
---	-----

Every 500 Service Hours

Cooling System Coolant Sample (Level 1) - Obtain	108
---	-----

Engine Air Filter Primary Element - Clean/ Replace	114
Engine Air Precleaner - Clean	116
Final Drive Oil Sample - Obtain	123
Final Drive Oil Sample - Obtain	123
Fuel System Primary Filter - Replace	128
Fuel System Secondary Filter - Replace	131
Fuel System Third Filter - Replace	132
Hydraulic System Oil Sample - Obtain	140
Winch Oil Sample - Obtain	151

Every 500 Service Hours or 3 Months

Engine Oil and Filter - Change	118
Fuel Tank Cap Filter and Strainer - Replace/Clean	133

Every 500 Service Hours or 1 Year

Track - Check/Adjust	146
Winch Drum Bearing - Lubricate	149

Every 1000 Service Hours

Engine Valve Lash - Check	119
---------------------------------	-----

Every 1000 Service Hours or 6 Months

Battery - Inspect	102
Hydraulic System Oil Filter - Replace	138
Hydraulic System Oil Filter - Replace	138
Rollover Protective Structure (ROPS) - Inspect ..	144

Every 2000 Service Hours or 1 Year

Final Drive Oil - Change	121
Final Drive Oil - Change	122
Hydraulic System Oil - Change	136
Idler Guide Wear Plates - Inspect	140
Idler Guide Wear Plates - Inspect	141
Winch Oil - Change	150
Winch Vent Plug - Clean	151

Every Year

Cooling System Coolant Sample (Level 2) - Obtain	110
---	-----

Every 3000 Service Hours or 2 Years

Cooling System Water Temperature Regulator - Clean/Replace	112
---	-----

Every 3 Years

Seat Belt - Replace	145
---------------------------	-----

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

Seat Belt - Replace	145
---------------------------	-----

Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add ..	108
--	-----

Every 12 000 Service Hours or 6 Years

Cooling System Extended Life Coolant - Change	111
--	-----

i02461056

i01989120

Backup Alarm - Test

SMCS Code: 7406-081

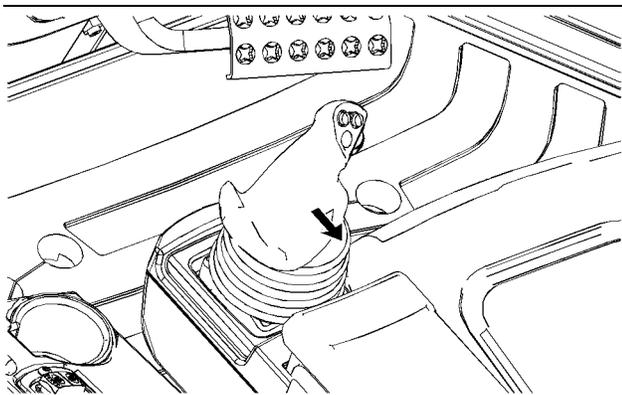


Illustration 105

g01217394

Turn the engine start switch to the ON position in order to perform the test.

Apply the service brakes. Disengage the parking brake switch. Move the transmission control lever to the REVERSE position.

The backup alarm should sound immediately. The alarm alerts the people behind the machine that the machine is backing up. The backup alarm should continue to sound until the transmission control lever is moved to the NEUTRAL position or to the FORWARD position.

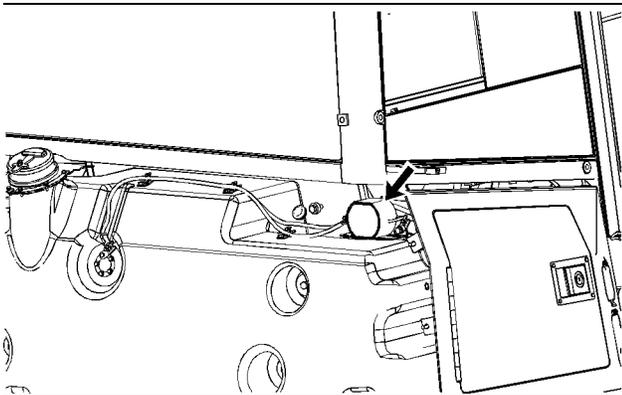


Illustration 106

g01228286

The backup alarm is on the rear of the machine.

The nonadjustable backup alarm is set at the appropriate sound level when the machine is shipped from the factory.

Battery - Inspect

SMCS Code: 1401-040

Tighten the battery retainers on all batteries at every 1000 hour interval.

1. Open the battery access cover.
2. Clean the top of the batteries with a clean cloth. Keep the terminals clean and coated with petroleum jelly. Install the terminal covers after you coat the terminals.
3. Close the battery access cover.

i00993589

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i03657099

Battery or Battery Cable - Inspect/Replace

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

WARNING

Personal injury may occur from failure to properly service the batteries.

Batteries give off flammable fumes that can explode. Electrolyte is an acid and can cause personal injury if it contacts the skin or eyes.

Prevent sparks near the batteries. Sparks could cause vapors to explode. Do not allow jumper cable ends to contact each other or the engine. Improper jumper cable connections can cause an explosion.

Always wear protective glasses when working with batteries.

1. Turn the engine start switch key OFF. Turn all of the switches OFF.
2. Turn the battery disconnect switch OFF. Remove the key.
3. Disconnect the negative battery cable from the disconnect switch.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Disconnect the negative battery cable at the battery.
5. Disconnect the positive battery cable at the battery.
6. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
7. Make any necessary repairs. If necessary, replace the battery cables or the battery.
8. Connect the positive battery cable at the battery.
9. Connect the negative battery cable at the battery.
10. Connect the battery cable at the battery disconnect switch.
11. Install the key and turn the battery disconnect switch ON.

Recycle the Battery

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

i03649728

Belt - Inspect/Replace

SMCS Code: 1357-040; 1357-510; 1397-040;
1397-510

Your engine is equipped with a serpentine belt that drives the alternator and the a/c compressor, if equipped.

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. Open the left engine access door.

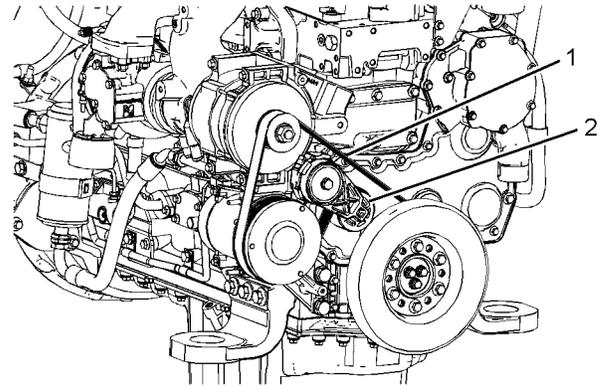


Illustration 107

g01209762

3. Inspect the condition of serpentine belt (1) visually.

Note: This machine is equipped with one belt tensioner (2). The belt tensioner automatically adjusts the belt to the correct position.

4. Close the left engine access door.

Replace the Belt

Note: Replace a belt that is in poor condition, when a new belt is required.

Reference: See "Belt - Replace" for the proper procedure.

i03649733

Belt - Replace

SMCS Code: 1397-510

WARNING

Accidental machine starting can cause injury or death to personnel working on the machine.

To avoid accidental machine starting, turn the battery disconnect switch to the OFF position and remove the key. If the machine is not equipped with a battery disconnect switch, disconnect the battery cables from the battery and tape the battery clamps.

Place a do not operate tag at the battery disconnect switch location to inform personnel that the machine is being worked on.

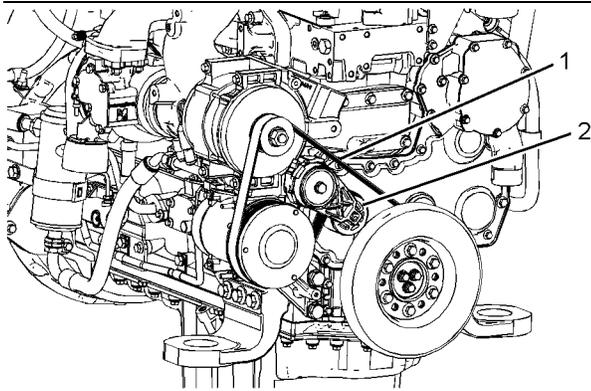


Illustration 108

g01209762

Belt (1) drives the fan, the water pump, the alternator, and the air conditioner.

1. Park the machine on level ground. Move the transmission control to the NEUTRAL position and engage the parking brake. Shut off the engine.
2. Remove the right engine compartment cover.

Replace

1. Replace the belt if any of the following conditions exist:
 - excessive cracking
 - excessive wear
 - excessive damage
2. Turn the battery disconnect switch to the OFF position.

3. Release the tension on serpentine belt (1). Insert a 12.7 mm (0.50 inch) ratchet into the square hole in the belt tightener (2) and pry the belt tightener in a counterclockwise direction.
4. Remove the belt from the pulleys.
5. Install the new belt around the pulleys.
6. When you release the tension off the belt tensioner the belt tensioner will automatically adjust the belt to the correct position. Recheck the belt tension.
7. Turn the battery disconnect switch to the ON position.
8. Close the right engine compartment cover.

Note:

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

i02583201

Brakes, Indicators and Gauges - Test

SMCS Code: 4100-081; 7000-081; 7450-081

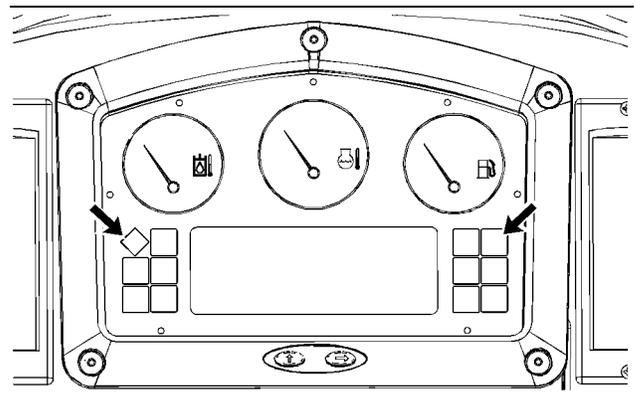


Illustration 109

g01213312

Check the operation of the Caterpillar 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.

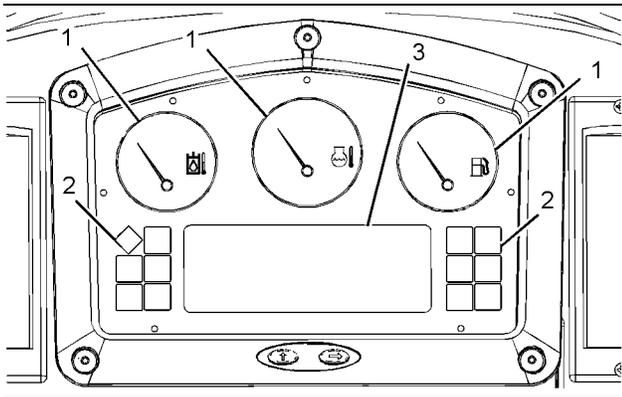


Illustration 110

g01213323

The operator must observe whether gauges (1), indicators (2), and displays (3) are operating properly. The self test lasts for approximately three seconds.

During the self test, all alert indicators flash.

The digital display shows the following readouts:

- All indicators of units (Deg C, kPa, rpm, and liters)
- "X10" readout
- Symbol for the hour meter
- "8.8.8.X.8.8" readout

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 speed/direction readout shows "** *".
- The speed readout shows "188", "MPH", and "km/h".
- 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.

Move the machine forward and test the service brakes.

Braking System (Test)

⚠ WARNING

If the machine moves during the test, reduce the engine speed immediately, and engage the parking brake.

If the machine moved while testing the brakes, consult your Caterpillar dealer for brake inspection and repair. Damaged brakes must be repaired before returning the machine to operation.

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.

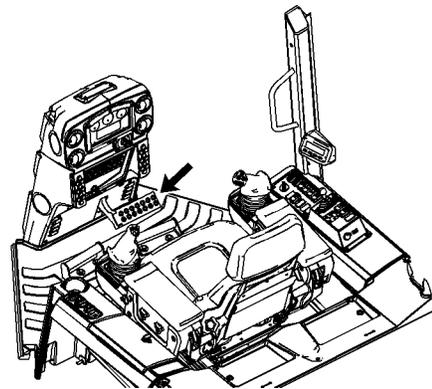


Illustration 111

g01299158

1. Start the engine.
2. Raise all attachments.
3. Use the ET service tool in order to perform the Transmission Stall Test. Refer to the Testing and Adjusting manual for your machine for more information.
4. Reduce the engine speed to LOW IDLE. Engage the parking brake. Lower all attachments to the ground. Apply a slight down pressure. Stop the engine.
5. Make any necessary repairs before you operate the machine.

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.

i03175657

Bulldozer Power Angling Tilt Hinge Pins - Lubricate

SMCS Code: 6050-086-PN

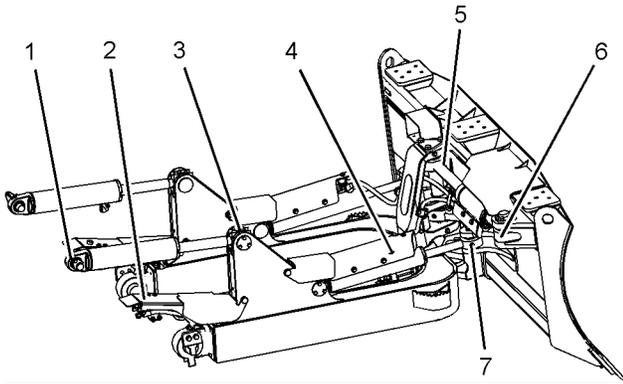


Illustration 112

g01296899

Apply lubricant to the grease fittings for the head end of the lift cylinder (1) and the rod end of the lift cylinder (3). Be sure to lubricate the left and right side lift cylinders.

Apply lubricant to the remote grease fitting for the pivot pin on the main C-frame (2). Be sure to lubricate the left and right side pivot pins.

Apply lubricant to the remote grease fitting for the head end of the angle cylinder (4). Also apply lubricant to the grease fitting for the rod end of the angle cylinder (7). Be sure to lubricate the left and right side angle cylinders.

Apply lubricant to the grease fittings for the rod end of the tilt cylinder (5) and the head end of the tilt cylinder (6).

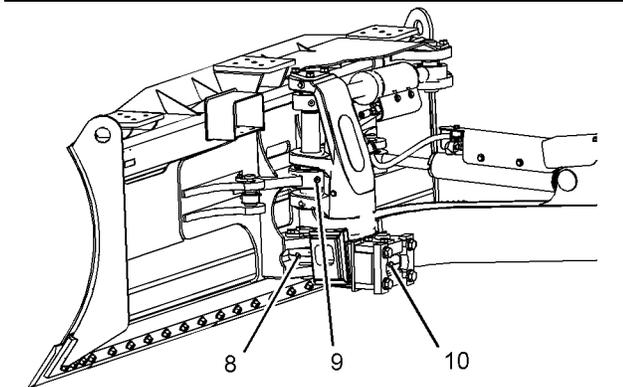


Illustration 113

g01296901

Apply lubricant to the grease fittings on both sides of the link for the blade (8) and (10).

Apply lubricant to the two grease fittings on the bearing for the blade (9).

i02588654

Cab Filter (Fresh Air) - Clean/Inspect/Replace

SMCS Code: 7342-040; 7342-070; 7342-510

Note: Clean the filter element more often in dusty conditions. If there is a noticeable reduction in the air flow from the air vents, check the filter element.

1. Open the access cover for the filter.

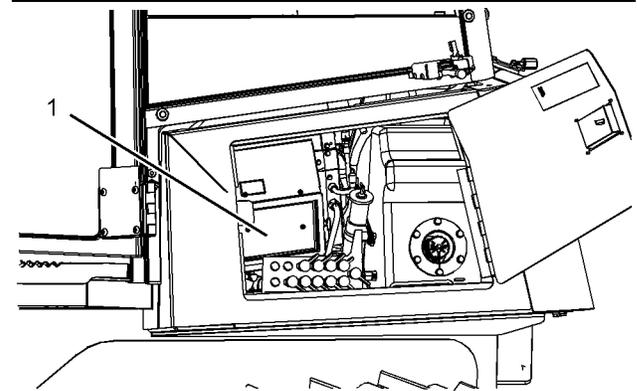


Illustration 114

g01296215

2. Remove filter element (1). Clean the filter element with compressed air.

Note: Do not wash the filter elements while the filter elements are installed on the machine.

Note: You can wash the filter element with a solution of warm water and of a nonsudsing household detergent. Rinse the filter element in clean water.

Note: The filter must be thoroughly dried before you install the filter.

3. Install the filter element and close the access cover.
4. Replace any filter element that is worn or damaged.
5. Face the seal toward the filter cover when you install the filter element.

i02801612

Cab Filter (Recirculation) - Clean/Inspect/Replace

SMCS Code: 7342-040; 7342-070; 7342-510

Note: Clean the filter element more often in dusty conditions. If there is a noticeable reduction in the air flow from the air vents, check the filter element.

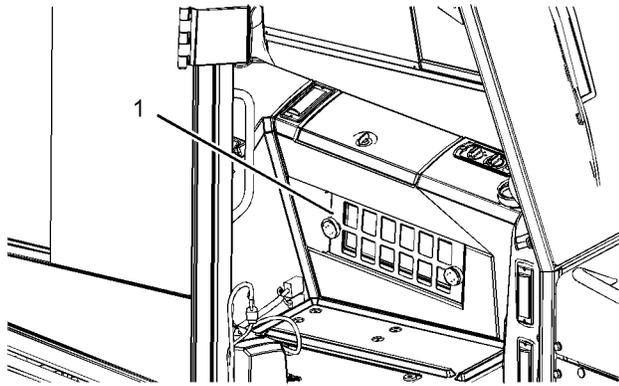


Illustration 115

g01213198

1. Remove filter element (1). The filter element is located next to the seat on the left side. Clean the filter element with compressed air.

Note: Do not clean the filter element while the filter element is installed on the machine.

Note: Do not use water in order to clean the filter element.

Note: The filter must be thoroughly dried before you install the filter.

2. Replace any filter element that is worn or damaged.
3. Install the filter element and replace the filter cover.

Note: Install the filter element with the filter media toward the inside of the cavity.

i03997967

Circuit Breakers - Reset

SMCS Code: 1417-529; 1420-529

The circuit breakers are located behind the fuse cover on the right side of the seat inside the cab.

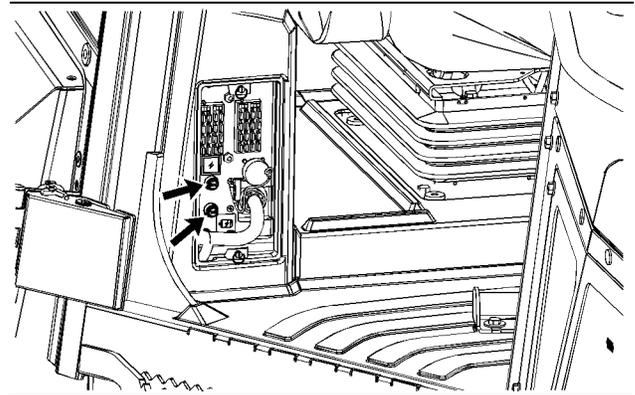


Illustration 116

g01214503

Main Circuit Breaker – This button is a 105 Amp circuit breaker.

Alternator Circuit Breaker (if equipped) – This button is a 105 Amp circuit breaker.

i02588721

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

NOTICE

If excessively dirty, clean condenser with a brush. To prevent damage or bending of the fins, do not use a stiff brush.

Repair the fins if found defective.

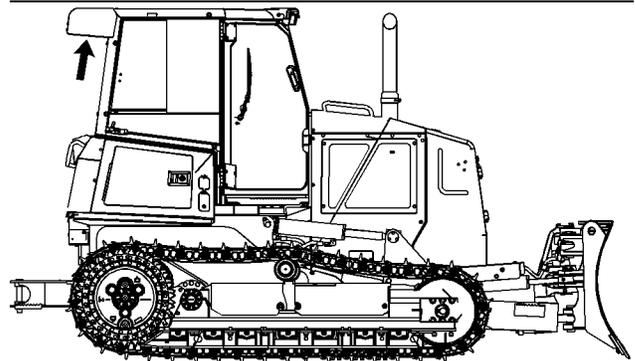


Illustration 117

g01296253

1. Remove the cover for the condenser.
2. Inspect the condenser for debris. Clean the condenser, if necessary.
3. Use clean water to wash all of the dust and dirt from the condenser.

4. Install the cover for the condenser.

i02336986

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-538; 1395-538

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.

Do not attempt to tighten hose connections when the coolant is hot, the hose can come off causing burns.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

When Caterpillar Extended Life Coolant (ELC) is used, an extender must be added to the cooling system. See Operation and Maintenance Manual, "Maintenance Interval Schedule" for the proper service interval. The amount of extender is determined by the cooling system capacity.

Table 15

Amount of Caterpillar Extender (ELC)	
Cooling System Capacity	Recommended Amount of Caterpillar Extender
22 to 30 L (6 to 8 US gal)	0.57 L (20 oz)
31 to 38 L (8 to 10 US gal)	0.71 L (24 oz)
39 to 49 L (10 to 13 US gal)	0.95 L (32 oz)
50 to 64 L (13 to 17 US gal)	1.18 L (40 oz)
65 to 83 L (17 to 22 US gal)	1.60 L (54 oz)
84 to 114 L (22 to 30 US gal)	2.15 L (72 oz)
115 to 163 L (30 to 43 US gal)	3.00 L (100 oz)
164 to 242 L (43 to 64 US gal)	4.40 L (148 oz)

Note: For cooling systems with larger capacities, use the formula in Table 16 in order to determine the correct amount of extender.

Table 16

Calculation of ELC Extender
$V^{(1)} \times 0.02 = X^{(2)}$

(1) V is the total volume of the cooling system.

(2) X is the amount of ELC Extender that is required.

For additional information about adding an extender, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "Extended Life Coolant (ELC)" or consult your Caterpillar dealer.

i03998316

Cooling System Coolant Sample (Level 1) - Obtain

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

Note: Obtaining a Coolant Sample (Level 1) is not necessary if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

Note: Obtain a Coolant Sample (Level 1) if the cooling system is filled with any other coolant instead of Cat ELC. This sampling includes the following types of coolants.

- Commercial long life coolants that meet the Caterpillar Engine Coolant Specification -1 (Caterpillar "EC-1")
- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty antifreeze/coolant

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.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, establishing a consistent trend of data is necessary. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat dealer.

Note: Level 1 results may indicate a need for Level 2 Analysis.

Obtain Sample From Coolant Sampling Valve (If Equipped)

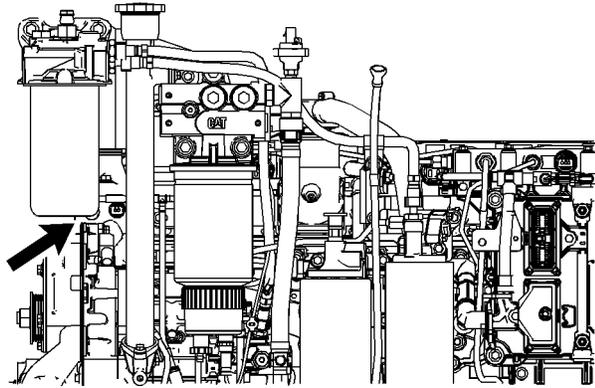


Illustration 118

g01305935

1. Open the engine access door on the left side of the machine.
2. The sampling valve for the cooling system is located behind the bottom end of the secondary fuel filter toward the front of the engine.

Note: Always discard drained fluids according to local regulations.

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.
 - 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.
3. Replace the cap to the sampling valve.
 4. Close the engine access door.

Submit the sample for Level 1 analysis.

Obtain Sample From the Coolant Tank

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.

Obtain the sample of the coolant from surge tank as close as possible to the recommended sampling interval. In order to receive the full effect of S-O-S analysis, establishing a consistent trend of data is necessary. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat dealer.

1. Shut off the engine. Make sure that the engine fan blades stop rotating.

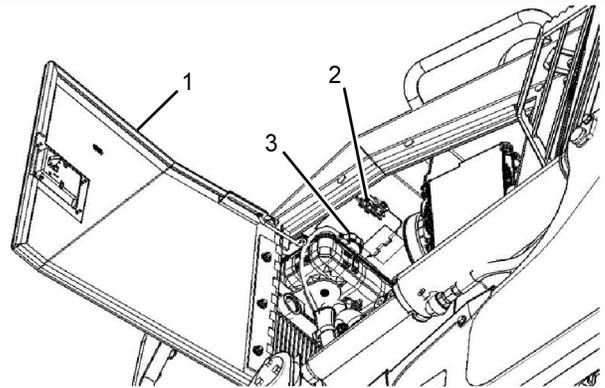


Illustration 119

g02175826

2. Open left engine compartment door (1). Unlock top access door (2) that is inside the engine compartment. Remove filler cap (3) to take the coolant sample.
3. Use the following guidelines for proper sampling of the coolant:
 - Complete the information on the label for the sampling bottle before you begin to take the samples.
 - Keep the unused sampling bottles stored in plastic bags.
 - Keep the lids on empty sampling bottles until you are ready to collect the sample.

- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from the drain for a system.

4. Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Cat dealer.

i04002081

Cooling System Coolant Sample (Level 2) - Obtain

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

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, establishing a consistent trend of data is necessary. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat dealer.

Obtain Sample From Coolant Sampling Valve (If Equipped)

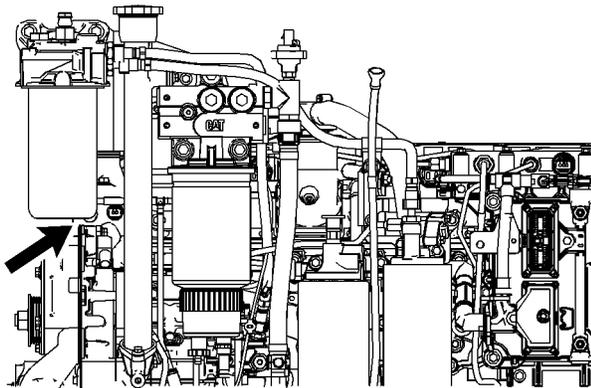


Illustration 120

g01305935

1. Open the engine access door on the left side of the machine.

2. The sampling valve for the cooling system is located behind the bottom end of the secondary fuel filter toward the front of the engine.

Note: Always discard drained fluids according to local regulations.

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

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.
 - 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.
3. Replace the cap to the sampling valve.
 4. Close the engine access door.

Submit the sample for Level 2 analysis.

Obtain Sample From the Coolant Tank

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.

Obtain the sample of the coolant from surge tank as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, establishing a consistent trend of data is necessary. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat dealer.

i03108468

1. Shut off the engine. Make sure that the engine fan blades stop rotating.

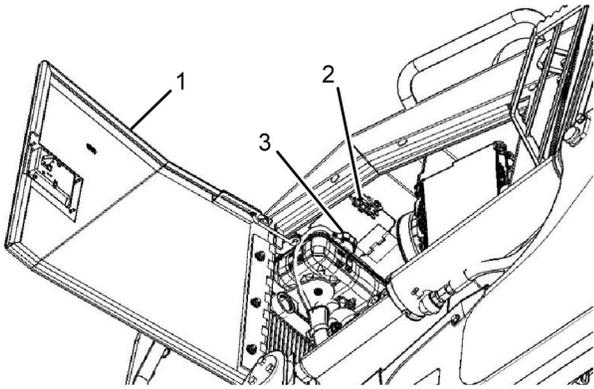


Illustration 121

g02175826

2. Open left engine compartment door (1). Unlock top access door (2) that is inside the engine compartment. Remove filler cap (3) to take the coolant sample.
3. Use the following guidelines for proper sampling of the coolant:
 - Complete the information on the label for the sampling bottle before you begin to take the samples.
 - Keep the unused sampling bottles stored in plastic bags.
 - Keep the lids on empty sampling bottles until you are ready to collect the sample.
 - Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
 - Never collect samples from the drain for a system.
4. Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

Cooling System Extended Life Coolant - Change

SMCS Code: 1350-044; 1395-044

NOTICE

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

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

Dispose of all fluids according to local regulations and mandates.

Reference: For information about adding an extender to your cooling system, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "Extended Life Coolant (ELC) Cooling System Maintenance" or consult your Caterpillar dealer.

Flushing the ELC from the Cooling System

Some engines use Extended Life Coolant (ELC). If an ELC was previously used, flush the cooling system with clean water. No other cleaning agents are required.

Flushing a Standard Coolant from the Cooling System

If you change to an ELC from another type of coolant, use a Caterpillar cleaning agent to flush the cooling system. After you drain the cooling system, thoroughly flush the cooling system with clean water. **All of the cleaning agent must be removed from the cooling system.**

Draining and Flushing Procedure

Drain the coolant whenever the coolant is dirty or whenever foaming is observed.

The radiator cap is positioned under the access door in the top of the hood.

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

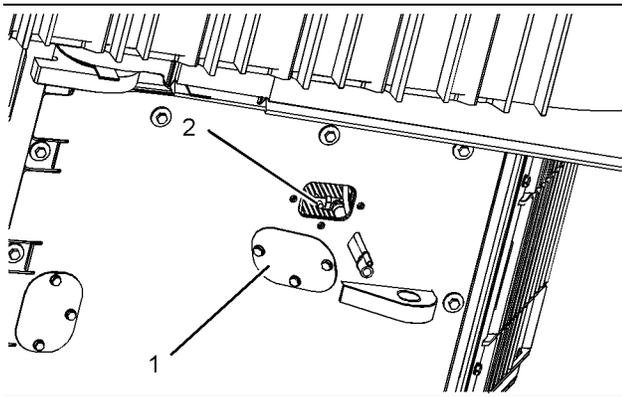


Illustration 122

g01588341

2. Locate the cover (1) on the bottom of the guard. Remove the cover (1) in order to gain access to the drain valve (2).
3. Open the drain valve (2). Allow the coolant to drain into a suitable container.
4. Close the drain valve. If you drained a standard coolant from the system proceed to Step 5. If you drained ELC from the system proceed to Step 7.
5. Fill the system with a solution which consists of clean water and of cooling system cleaner. The concentration of the cooling system cleaner should be 6 to 10 percent.
6. Start the engine. Run the engine for 90 minutes. Stop the engine. Drain the cleaning solution into a suitable container.
7. While the engine is stopped, flush the system with water. Flush the system until the draining water is clear.
8. Close the drain valve (2).
9. Replace the cover (1) for the drain valve (2).
10. Add the coolant solution.

Reference: For coolant information, refer to Special Publication, SEBD0518, "Know Your Cooling System" and Operation and Maintenance Manual, "Capacities (Refill)".

11. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.
12. Check the coolant level. Make necessary adjustments to the coolant level.
13. If the gasket is damaged, replace the radiator cap. Install the radiator cap.

14. Stop the engine.

i02595307

Cooling System Level - Check

SMCS Code: 1353-535-FLV; 1395-535-FLV

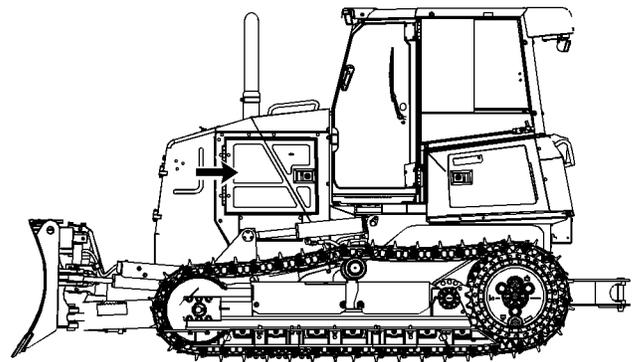


Illustration 123

g01299000

1. Open the access door on the left hand side.
2. Ensure that there is enough coolant in the reservoir. Maintain the coolant level between the "ADD" mark and the "FULL" mark. If it is necessary to add coolant daily, check the system for leaks.
3. Close the access door on the left hand side.

i01000516

Cooling System Water Temperature Regulator - Clean/Replace

SMCS Code: 1355-070; 1355-510; 1393

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system.

A new thermostat should be installed after the cooling system has been cleaned. Install the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

NOTICE

Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

Note: If you are only installing a new thermostat, drain the cooling system coolant to a level that is below the thermostat housing.

i02588731

1. Loosen the hose clamp and remove the hose from the elbow. Disconnect the hose assembly from the thermostat housing assembly.
2. Remove the bolts from the elbow. Remove the elbow and the thermostat housing assembly.
3. Remove the gasket, the thermostat, and the seal from the thermostat housing.

NOTICE

A used thermostat can be installed if the thermostat conforms to test specifications, and the thermostat is not damaged. Do not install a used thermostat that has excessive buildup or deposits.

NOTICE

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

Depending on load, failure to operate with a thermostat could result in either an overheating or an over-cooling condition.

NOTICE

If the thermostat is installed incorrectly, it will cause the engine to overheat.

4. Install a new seal in the thermostat housing. Install a new thermostat and a new gasket. Install the thermostat housing on the engine cylinder head.
5. Install the elbow and the hose. Tighten the hose clamp.

Cutting Edges and End Bits - Inspect/Replace

SMCS Code: 6801-040; 6801-510; 6804-040; 6804-510

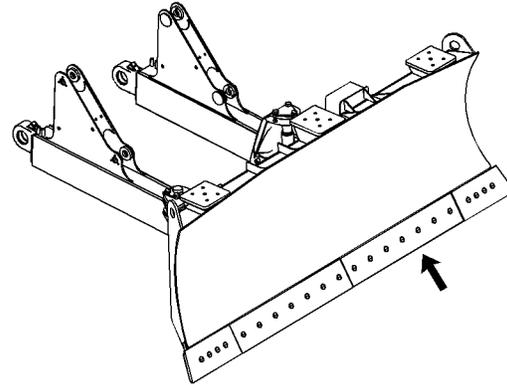


Illustration 124

g01296262

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.
 3. Remove the cutting edge and the end bits.
 4. Thoroughly clean all contact surfaces.
 5. 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 downward and install the cutting edge.
 6. If both sides of the cutting edge are worn, install a new cutting edge.
 7. Repeat Steps 5 and 6 for the end bits.
 8. Install all bolts and tighten the bolts to the specified torque.
- Reference:** For more information, refer to Specifications, SENR3130, "Torque Specifications".
9. Raise the bulldozer blade and remove the blocking. Lower the bulldozer blade to the ground.
 10. After you operate the machine for a few hours, check all bolts for the proper torque.

i02588736

Engine Air Filter Primary Element - Clean/Replace

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

NOTICE

Caterpillar recommends certified air filter cleaning services that are available at Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

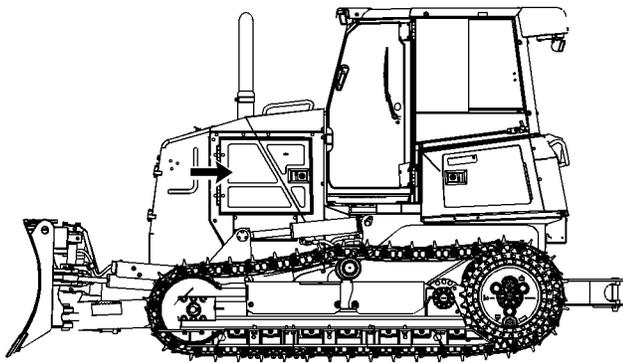


Illustration 125

g01296270

1. Open the engine access door on the left side of the machine.

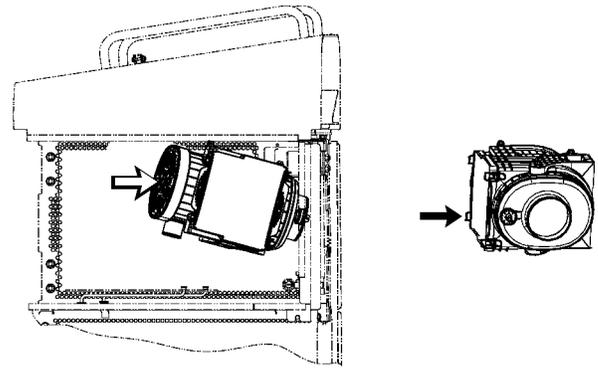


Illustration 126

g01192366

2. Loosen the four cover latches and remove the air cleaner cover.

Note: The latches for the air cleaner housing may snap open when you release the latches.

3. Remove the primary filter element from the air cleaner housing. In order to remove the engine air filter primary element, slide the element outward. While you pull the element outward, rock the element.

NOTICE

Do not use a filter if the media, the gaskets or the seals are damaged.

4. Install a clean primary filter element over the engine air filter secondary element. Apply firm pressure to the end of the primary element as you gently rock the filter element. This seats the primary element.
5. Clean the cover and install the cover.
6. Close the access door.

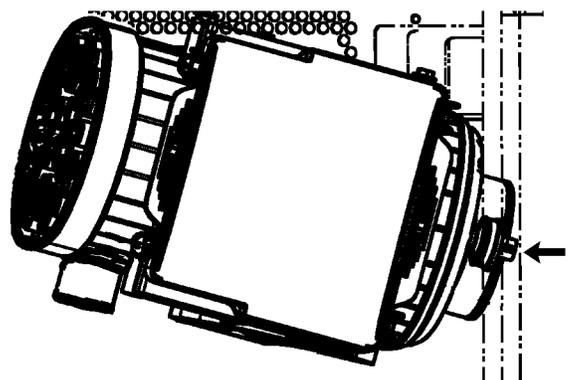


Illustration 127

g01192466

The filter element indicator is located on the air cleaner group in the left engine compartment.

7. Start the engine. The indicator on the gauge cluster will illuminate when the filter needs attention.

Cleaning Primary Air Filter Elements

The primary air filter element can be used up to six times if the element is properly cleaned and properly inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per two year period. This replacement should be performed regardless of the number of cleanings.

NOTICE

Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

Pressurized air is the best method to clean primary air filter elements.

Pressurized Air

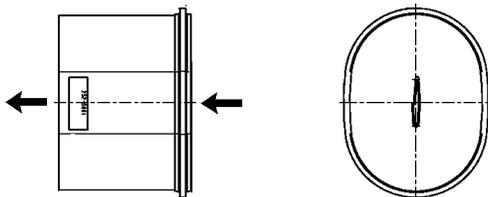


Illustration 128

g01205120

Direction of air flow

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

Note: When the primary air filter element is cleaned, always blow the air from the clean side in order to force dirt particles toward the dirty side. This helps prevent damage to the paper pleats.

Do not touch the tip of the air gun to the primary air filter element. Dirt could be forced further into the pleats.

Before you reuse the primary air filter element, check for any damage to the seals, the gaskets, and the bellows. Discard any damaged air filter elements.

Inspecting the Primary Air Filter Elements

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

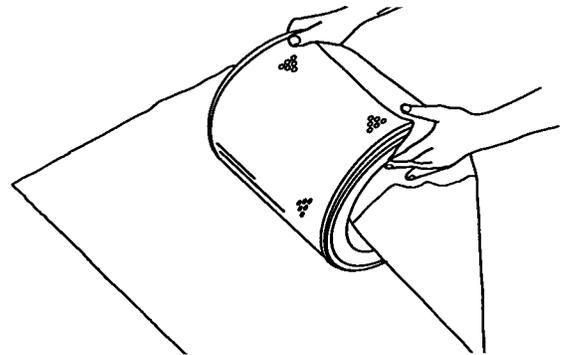


Illustration 129

g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An air flow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i02588748

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the secondary filter element when you service the primary element for the third time. If a clean primary element has been installed and the filter element indicator still enters the red zone, replace the secondary filter element. Also if the exhaust smoke remains black and a clean primary filter element has been installed, replace the secondary filter element.

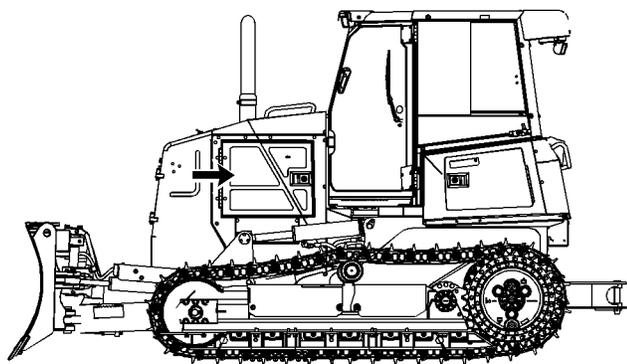


Illustration 130

g01296270

1. Open the left engine access door.
2. Remove the housing cover to the precleaner body assembly.

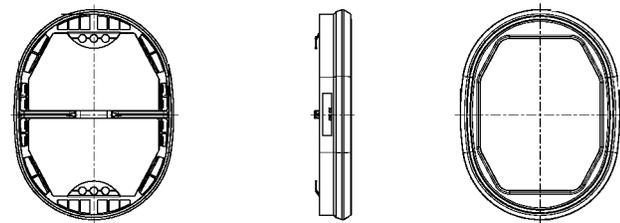


Illustration 131

g01192559

Secondary air cleaner element

3. Remove the secondary element. The secondary element is on the end of the air cleaner group toward the cab.
4. Cover the air inlet opening. Clean the inside of the air cleaner housing.
5. Inspect the gasket between the air inlet and the housing. If the gasket is damaged, replace the element.
6. Uncover the air inlet opening. Install a new secondary element.
7. Install the air cleaner housing cover.
8. Close the engine access door.

i02588756

Engine Air Precleaner - Clean

SMCS Code: 1055-070

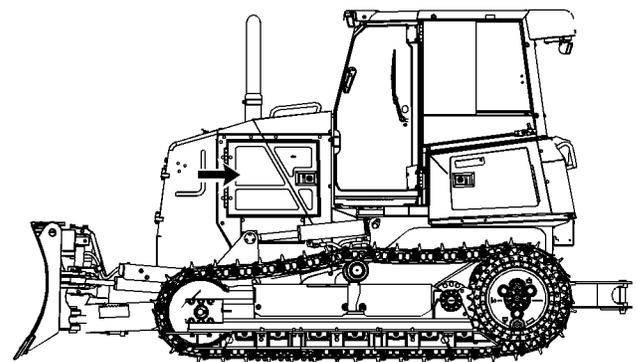


Illustration 132

g01296270

1. Open the left engine access cover.

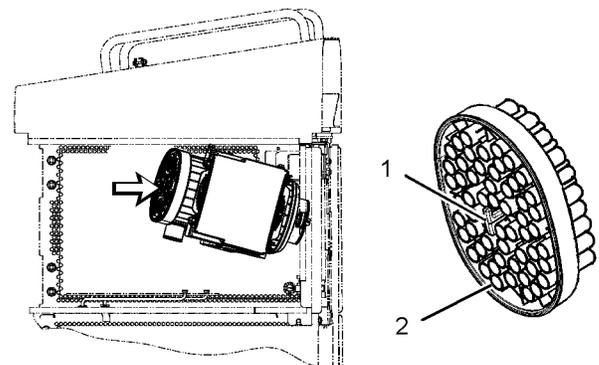


Illustration 133

g01205111

2. Inspect the engine air pre-cleaner for dirt and for trash.

3. Unscrew T-bolt (1) in order to remove the integrated precleaner body (2) completely.
4. Use pressurized air to clean the tubes. Put the tubes on a flat surface. Direct the pressurized air into the tubes from the top. This loosens up the dirt.
 - a. Loosen hard deposits of dust on the precleaner body by soaking in an appropriate cleaning agent. Then, wash the precleaner body with a spray of water.
 - b. Blow dry the precleaner body completely.
5. Install precleaner body (2) into the engine air precleaner. Latch the precleaner body in place.
6. Install T-bolt (1). Hand tighten the T-bolt only.
7. Close the left engine access door.

NOTICE

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

i02588760

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.

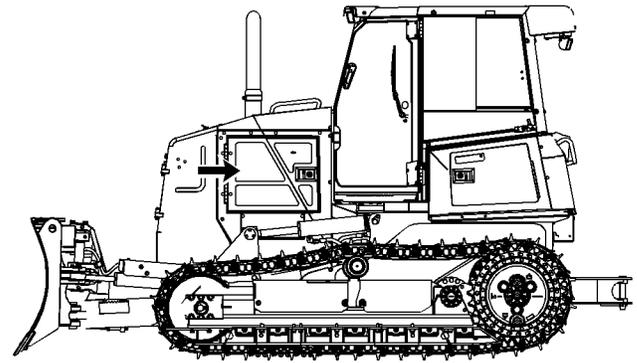


Illustration 134

g01296270

1. Open the engine access door on the left side of the machine.

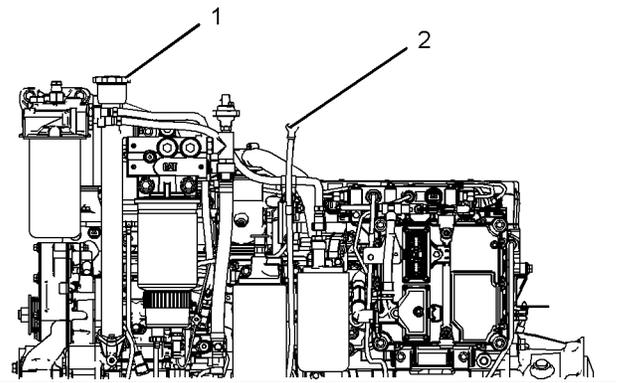


Illustration 135

g01305967

2. Check the dipstick (2) while the engine is stopped. Maintain the oil level between the "LOW" mark and the "FULL" mark.

Note: When you operate the machine on severe slopes, the oil level in the engine crankcase must be at the "FULL" mark on the dipstick.

3. Remove oil filler cap (1). If necessary, add oil.
4. Clean the oil filler cap and install the oil filler cap.
5. Close the access door.

Note: For the best results, check the engine oil level after the engine has been off for two hours or more. This will allow all of the oil to drain back into the engine crankcase.

i02588770

i03175780

Engine Oil Sample - Obtain

SMCS Code: 1348-554-SM; 1348; 7542

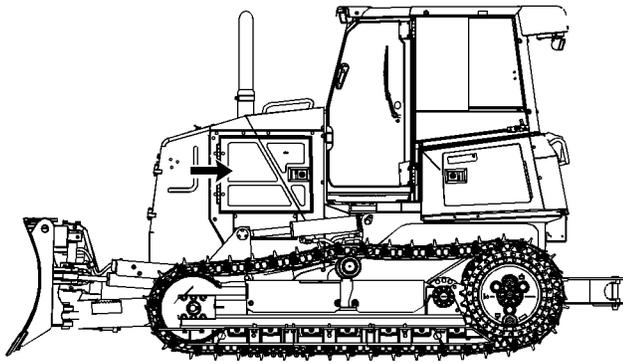


Illustration 136

g01296270

1. Open the engine access door on left side of the machine. Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

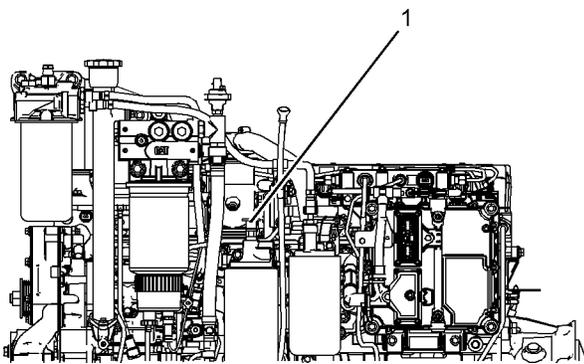


Illustration 137

g01305971

2. Obtain the regularly scheduled oil sample.
 - a. Use the oil sampling valve (1). Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample".
3. Close the access door.

Reference: See Special Publication, SEBU6250, "Caterpillar Fluids and Recommendations", "S-O-S Oil Analysis" and "Sampling Interval and Location of Sampling Valve" for more information.

Engine Oil and Filter - Change

SMCS Code: 1308; 1318-510

WARNING

Hot oil and components can cause personal injury.

Do not allow hot oil or components to contact skin.

NOTICE

A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S-O-S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

Obtain Engine Oil Sample

1. Open the engine access door on the left side of the machine.
 - a. Obtain the regularly scheduled oil sample, if necessary.

See Operation and Maintenance Manual, "Engine Oil Sample - Obtain" for the proper procedure.

Engine Oil and Filter (Change)

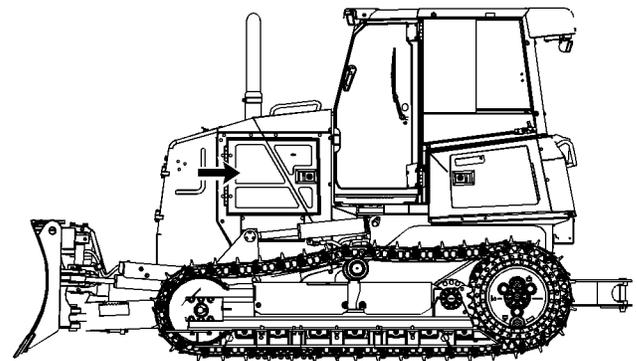


Illustration 138

g01296270

2. Remove the crankcase drain access cover, which is in the crankcase guard.

3. Open the crankcase drain valve. Allow the oil to drain into a suitable container.

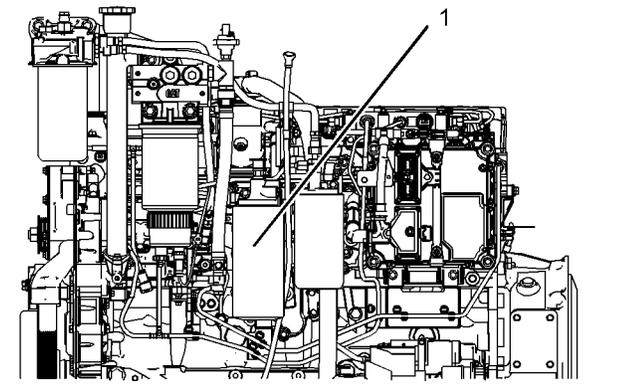


Illustration 139

g01306020

4. Remove the engine oil filter element (1) and discard the engine oil filter element properly. Make sure that all of the old filter seal is removed from the filter base.

5. Apply a thin coat of clean engine oil to the seal on the new filter. Install the new engine oil filter element hand tight until the seal of the engine oil filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the engine oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the engine oil filter, use the rotation index marks as a guide.

6. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

7. Close the crankcase drain valve. Replace the crankcase guard.

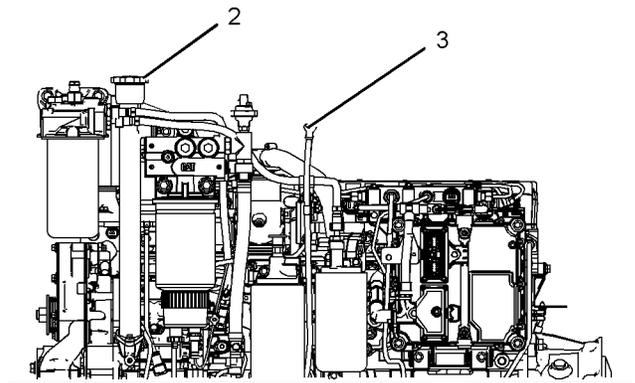


Illustration 140

g01306022

8. Remove the oil filler cap (2). Fill the crankcase with new oil. See Operation and Maintenance Manual, "Capacities (Refill)". Clean the oil filler cap and install the oil filler cap.
9. Always measure the oil level with dipstick (3) in order to ensure that the correct amount of oil was added.
10. On the dipstick, maintain the oil level between the "ADD" mark and the "FULL" mark.
11. Close the engine access door on the left side of the machine.

i02389104

Engine Valve Lash - Check

SMCS Code: 1102; 1209-535

For the correct procedure, refer to the appropriate Service Manual module for your machine's engine or consult your Caterpillar dealer.

Note: A qualified mechanic should adjust the engine valve lash because special tools and training are required.

i02588773

Equalizer Bar Center Pin - Lubricate

SMCS Code: 7206-086-PN; 7207-086-PN

NOTICE

Apply lubricant to the fittings with a hand operated grease gun only. Use of pressure operated lubricating equipment damages the seals.

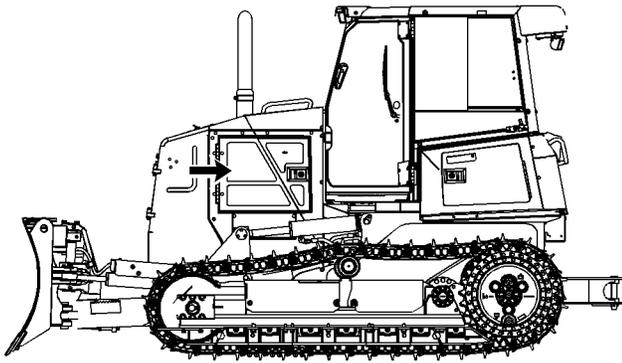


Illustration 141

g01296270

Lubricate the equalizer bar center pin through the remote fitting. The fitting is located inside the engine access door on the left side of the machine below the engine crankcase breather. The fitting is mounted on the inside of the engine cover.

i02619788

Equalizer Bar Pins and Recoil Bearings - Lubricate

SMCS Code: 7206-086-PN

NOTICE

Apply lubricant to the fittings with a hand operated grease gun only. Use of pressure operated lubricating equipment damages the seals.

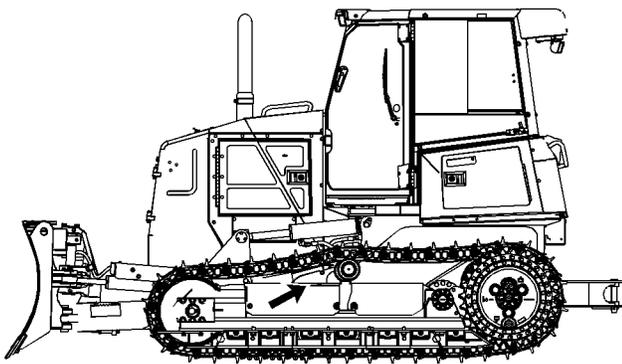


Illustration 142

g01296488

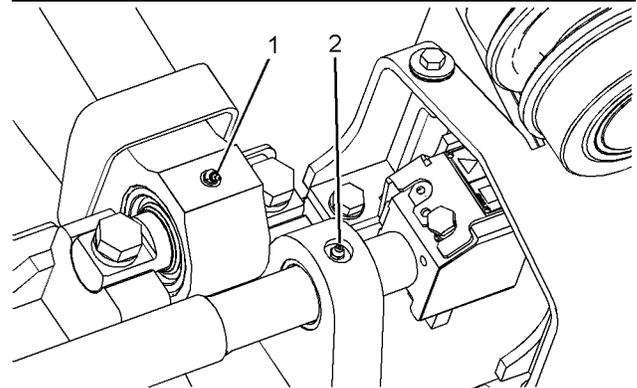


Illustration 143

g01296484

1. Remove the cover.
2. Lubricate fitting (1) and fitting (2).
3. Install the cover. Repeat this procedure on the other side of the machine.

i02589562

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

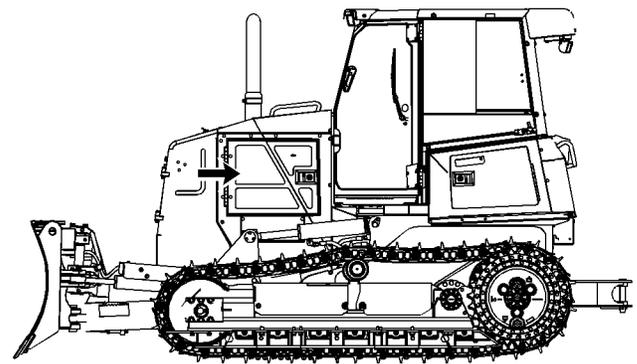


Illustration 144

g01296270

1. The ether starting aid cylinder is located above the engine. Open the engine access door on the left side of the machine.

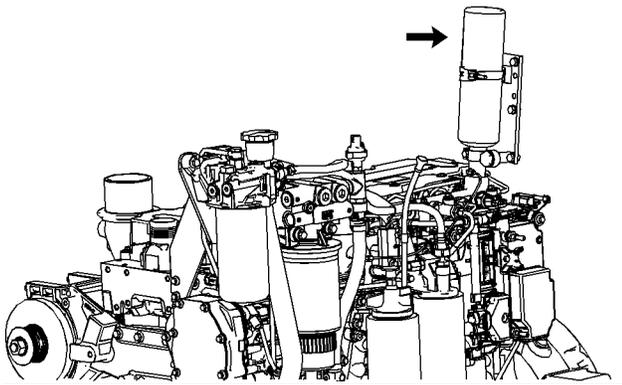


Illustration 145

g01306045

2. Loosen the cylinder retaining clamp. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.
3. Remove the used gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
4. Install the new ether starting aid cylinder. Tighten the ether starting aid cylinder hand tight. Tighten the cylinder retaining clamp securely.
5. Replace the engine access panel.

i04562175

Final Drive Oil - Change (Undercarriage with Two Carrier Rollers and Eight Track Rollers)

SMCS Code: 4050-044-FLV

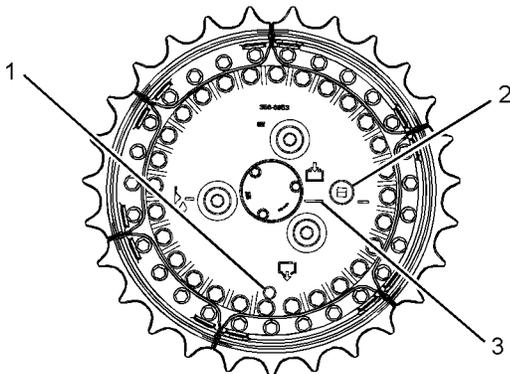


Illustration 146

g02641936

1. Move the machine so that final drive oil level mark (3) is horizontal to the flat ground. The final drive drain plug (1) will be located at the bottom of the final drive.

2. Remove final drive drain plug (1) and allow the oil to drain into a suitable container.
3. Clean drain plug (1) and replace the plug. Tighten the drain plug to a torque of 60 ± 6 N·m (44 ± 4 lb ft).

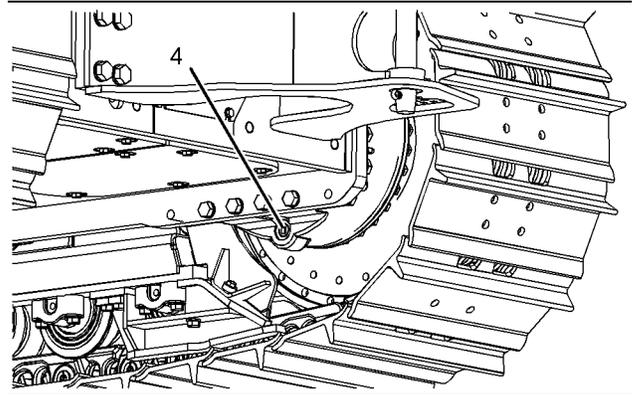


Illustration 147

g02642279

4. Remove drain plug (4) and allow the oil to drain into a suitable container.
5. Clean plug (4) and replace plug (4). Tighten plug (4) to a torque of 75 ± 7 N·m (55 ± 5 lb ft)
6. Remove check plug (2). Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".
7. Clean check plug (2) and install the plug. Tighten the check plug to a torque of 105 ± 10 N·m (77 ± 7 lb ft).
8. Repeat this procedure for the other final drive.

i03668731

i04562213

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

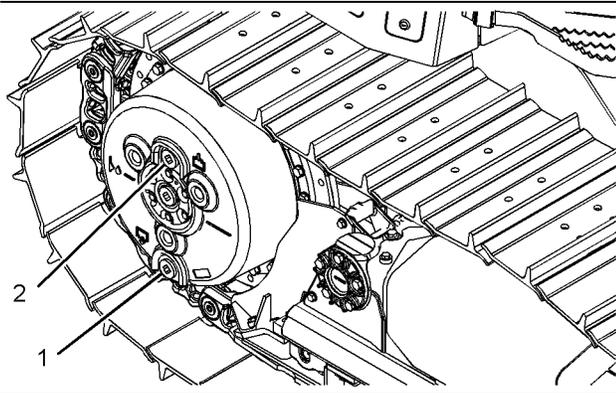


Illustration 148

g01969135

1. Move the machine so that drain plug (1) is at the bottom of the final drive.
2. Remove plug (1) and allow the oil to drain into a suitable container.
3. Clean plug (1) and replace plug (1).

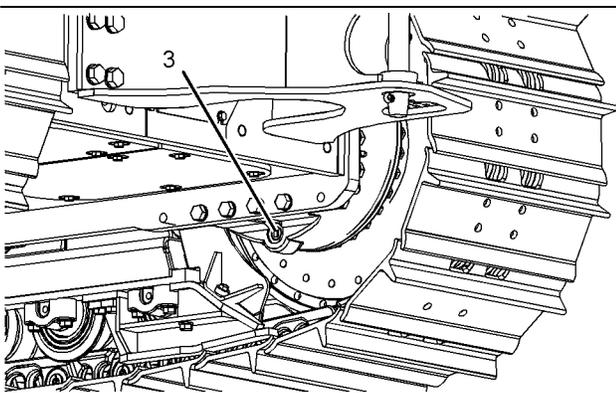


Illustration 149

g01223371

4. Remove drain plug (3) and allow the oil to drain into a suitable container.
5. Clean plug (3) and replace plug (3). Tighten plug (3) to 180 ± 15 N·m (133 ± 11 lb ft).
6. Remove oil filler plug (2). Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".
7. Clean plug (2) and install plug (2).
8. Repeat this procedure for the other final drive.

Final Drive Oil Level - Check (2 Carrier Rollers and 8 Track Rollers)

SMCS Code: 4050-535-FLV

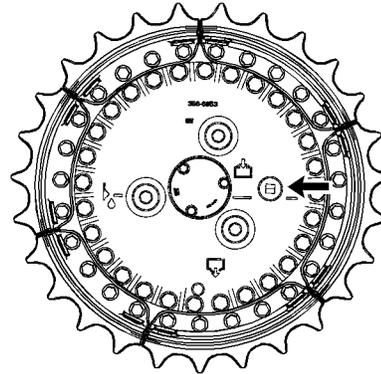


Illustration 150

g02642377



Oil – See "Lubricant Viscosities" in this manual for the proper final drive oils.



Final Drive Oil Level Mark – Fill the final drive with oil until the oil is level with this horizontal mark.

1. Position the final drive oil level mark at a horizontal position in order to check the oil level, as shown.
2. Remove the check plug in order to check the oil level.
3. The oil should be level with the bottom of the plug threads.
4. Clean the plug and install the plug. Tighten the oil filler plug to a torque of 105 ± 10 N·m (77 ± 7 lb ft).
5. Repeat the procedure for the other final drive.

i03884989

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

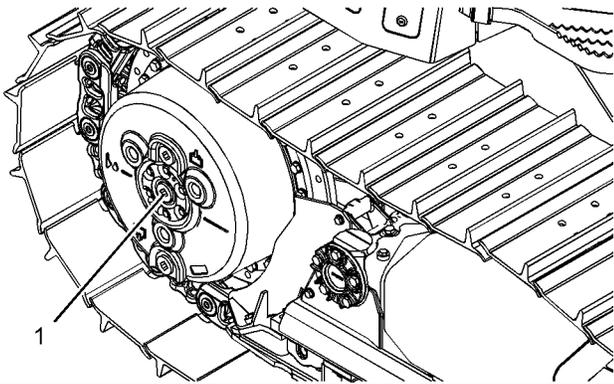


Illustration 151

g02130113

1. Position the oil filler plug at a horizontal position in order to check the oil level.
2. Remove plug (1) in order to check the oil level.
3. The oil should be level with the bottom of the plug threads.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i03884952

Final Drive Oil Sample - Obtain

SMCS Code: 3258-008; 4011-008; 4050-008;
4050-SM; 4070-008; 4070-554-SM; 7542-008

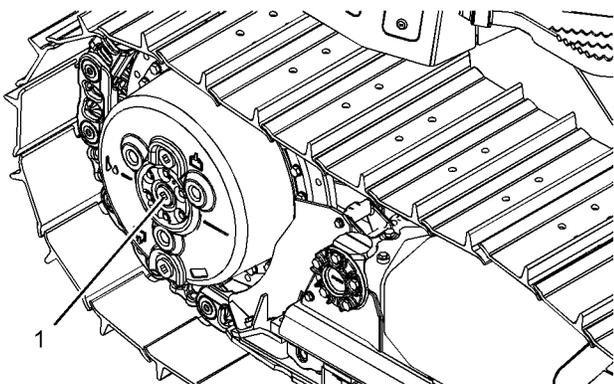


Illustration 152

g02130113

Remove plug (1) for the final drive. Obtain a sample of the final drive oil by pulling a sample through the opening of plug (1).

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the final drive oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the final drive oil.

i04562218

Final Drive Oil Sample - Obtain (2 Carrier Rollers and 8 Track Rollers)

SMCS Code: 3258-008; 4011-008; 4050-008;
4050-SM; 4070-008; 4070-554-SM; 7542-008

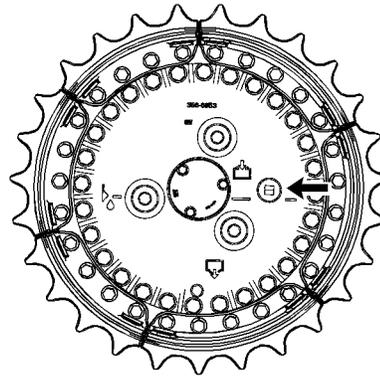


Illustration 153

g02642377

Remove the check plug for the final drive. Obtain a sample of the final drive oil by pulling a sample through the filler plug opening.

When the oil sample is completed, clean the plug and install the plug. Tighten the check plug to a torque of $105 \pm 10 \text{ N}\cdot\text{m}$ ($77 \pm 7 \text{ lb ft}$).

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the final drive oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the final drive oil.

i01942475

Free Spool Drag - Adjust

SMCS Code: 5163-025

Adjust the free spool drag to the operator's preference. For the correct procedure to adjust the free spool drag, refer to Specifications, Systems Operation, Testing and Adjusting, Disassembly and Assembly, "Free Spool - Test" for the winch hydrostatic systems.

i03149044

Front Idler Position - Check

SMCS Code: 4159-535

SystemOne Undercarriage

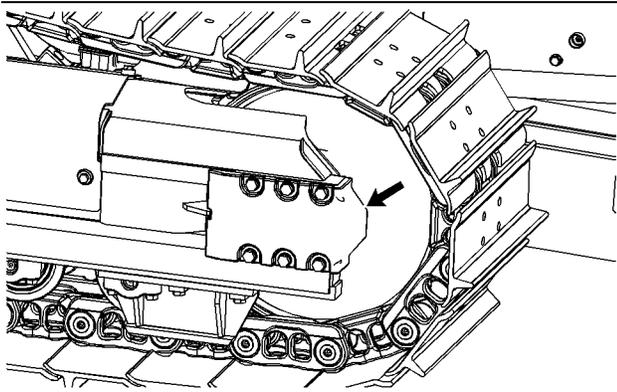


Illustration 154

g01226879

1. Remove the outer cover for the right side track roller frame.
2. Park the machine on a hard, flat surface. Make sure that the bottom track is tight and that the measured grouser lies directly below the track idler shaft.

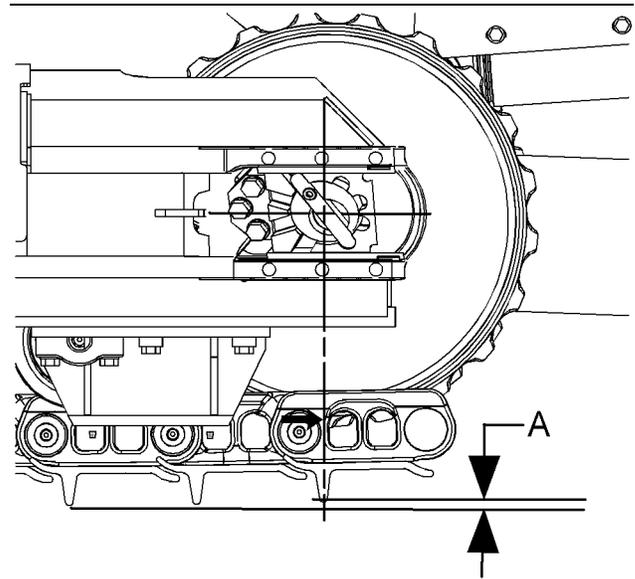


Illustration 155

g01619619

Elevated undercarriage system

3. Measure the height (A) from the flat ground surface to the grouser tip that is centered below the track idler shaft.
 - a. Height (A) must be maintained between the following dimensions.
 - Minimum** – 5 mm (0.2 inch)
 - Maximum** – 16 mm (0.6 inch)

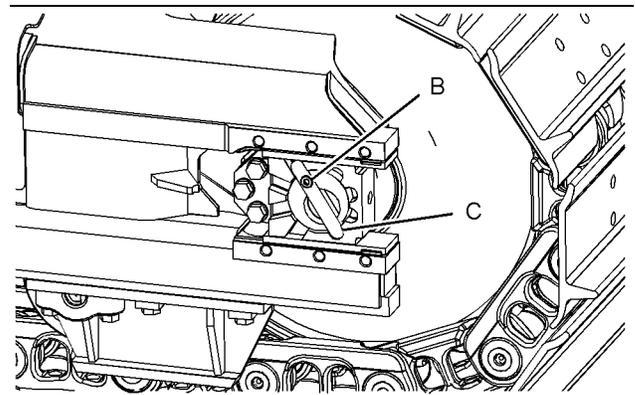


Illustration 156

g01619622

4. Remove bolt (B) that blocks the key (C). Remove the key and install the spanner wrench.

Note: Use 305-3015 Spanner Wrench.

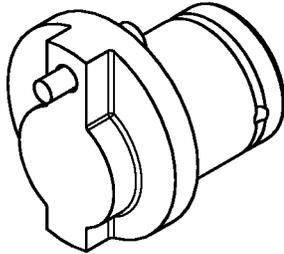


Illustration 157

g01455435

305-3015 Spanner Wrench.

5. Use the spanner wrench in order to rotate the eccentric system. This moves the position of the idler.

Note: Remove the inner cover from the right side track roller frame in order to help the rotating of the eccentric system, if necessary.

Note: Move the spanner wrench to the next counterclockwise position. Dimension (A) will increase when the eccentric system is rotated counterclockwise. Each position increases the distance by 6 mm (0.2 inch).

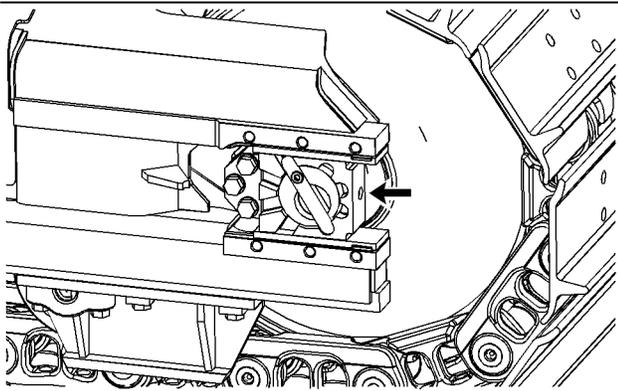


Illustration 158

g01619633

6. Add MPGM to the grease fitting on the sliding block on both of the inner side and the outer sides.

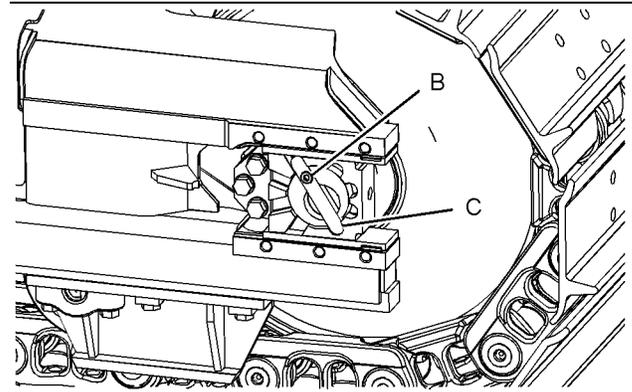


Illustration 159

g01619622

7. Remove the spanner wrench. Install key (C) and bolt (B).
8. Repeat step 3 in order to check that height (A) is acceptable.
9. Install the inner cover and the outer cover on the right track roller frame.
10. Repeat steps 1 through 9 for the left track roller frame.

Consult your Caterpillar dealer for detailed information about adjustments to the center tread idler.

See Operation and Maintenance Manual, "Track - Check/Adjust" for information on needed track adjustments.

Reference: See Operation and Maintenance Manual, "Reference Material" for publications and Special Instructions on removal and installation of SystemOne Track, as needed.

i04562230

Front Idler Position - Check/Adjust (2 Carrier Rollers and 8 Track Rollers)

SMCS Code: 4159-036

SystemOne Undercarriage

The following check and adjustment procedure is for both the Caterpillar SystemOne undercarriages that have the center tread idler.

Check

The SystemOne undercarriage requires shim adjustment when the wear on the link and the roller system is at 25%, 50%, and 75%.

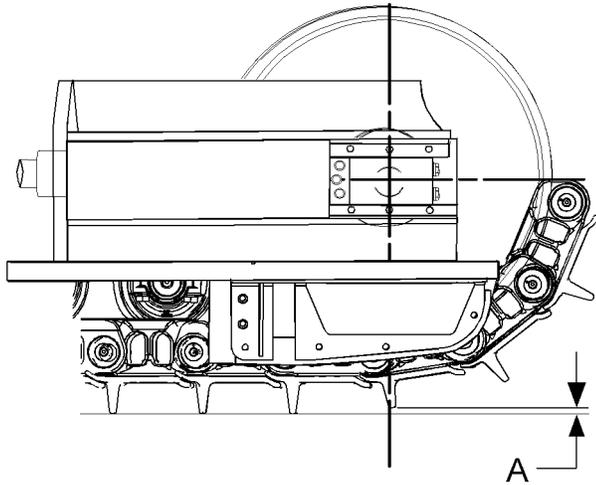


Illustration 160

g02647556

Some components are removed for clarity.

1. Park the machine on a hard, flat surface.

Note: Parking the machine properly is important. Make sure the surface that the machine is on is level and flat.

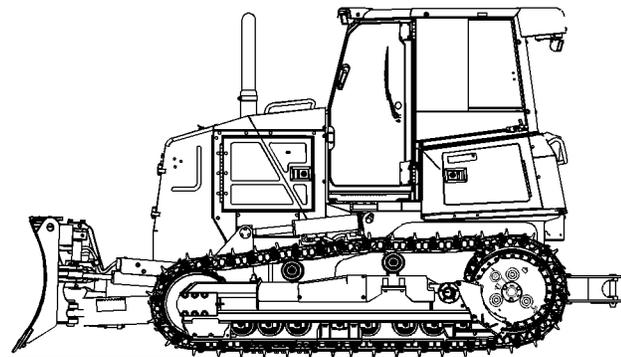


Illustration 161

g02727858

2. Raise the blade to 3 inches off the ground.

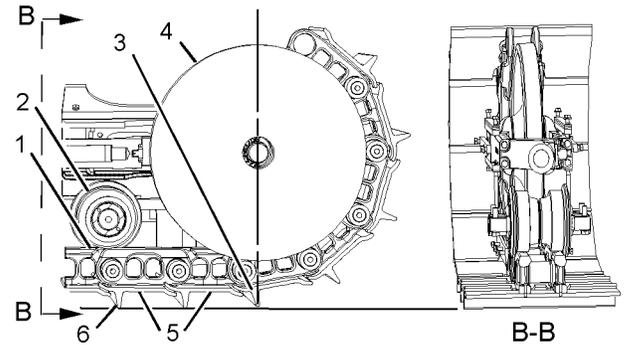


Illustration 162

g02589156

Some components are removed for clarity. Make sure that the following conditions are met when measuring dimension (A).

Rails (1) must contact all of rollers (2) the length of the machine. Grouser (3) must be directly under the center of front idler (4) before measuring the grouser raise height (A). Track (5) must be smooth and level between the front idler and the front bottom roller. Grousers (6) under bottom rollers must contact the smooth and level floor.

Note: Before measuring grouser raise height (A), make sure that all lower grouser tips are contacting the surface AND all bottom rollers are contacting undercarriage rails.

3. Move the machine in reverse until a track shoe grouser is directly below the center of the front idler shaft.

Note: Moving the machine in reverse before measuring the grouser raise height is important. This action prevents undercarriage back bending between the idler and front bottom roller.

4. Measure grouser height (A) from the flat ground surface to the grouser tip that is centered below the track idler shaft.
5. Maintain the grouser height (rise) to the following dimensions.

- a. Grouser height (A) at the front Idlers

Minimum – 4 mm (0.160 inch)

Maximum – 6 mm (0.24 inch)

Adjust

6. If the grouser height is not acceptable, add shims or remove shims above and below the idler bearing block.

- a. Replacement wear strip 16 mm (0.63 inch)

- b. Adjustment shim 4.5 mm (0.18 inch)

- c. Adjustment shim 2.3 mm (0.09 inch)
7. Add shims to provide a total gap between the idler bearing and the bearing block is no more than 2 mm (0.080 inch).
 - a. Make sure that the total gap side to side is no greater than 2 mm (0.080 inch).
 - b. Make sure the total gap up and down is no greater than 2 mm (0.080 inch).

Note: The shims around each idler must be balanced so that the idler is centered without much freeplay. A total of 2 mm (0.08 inch) movement of the idler side to side and no more 2 mm (0.08 inch) than up and down is allowed. This action allows the idler to remain centered in the track roller frame. Shimming of the right idler and the left idler is done independently.

Fine Tuning the Idler Height

If the machine performance remains unacceptable after the shim adjustments, try the following steps.

1. If the ride is unsatisfactory, a situation associated with a short 152 mm (6 inch) chop of the blade may have occurred. Then, the idler should be adjusted UPWARD by 2.3 mm (0.090 inch). Move shim from top shim pack to bottom to increase the grouser raise height.
2. If the ride is unsatisfactory, a situation associated with a longer 1524 mm (5 feet) dip of the blade may have occurred. Then, the idler should be adjusted DOWNWARD by 2.3 mm (0.090 inch). Move the appropriate shim from the bottom shim pack to the top to decrease the grouser raise height.

Moving the Top Shims

1. Remove the track shoe directly in front of the top shim pack.
2. Remove the rock guards from the front track idler.
3. Raise the machine so the idler is off the ground.
4. Lower the machine so the first track roller or the second roller rests on a block and the idler remains in the air.
5. Unscrew the bolts that hold the top shims.
6. Remove a shim or add a shim.
7. Replace the bolts that hold the shims. Torque the M12 bolts to 100 ± 20 N·m (75 ± 15 lb ft).

Moving the Bottom Shims

1. Remove the track shoe directly in front of the bottom shim pack.
2. Raise the machine so the idler is off the ground.
3. Lower the machine so the idler rests on a block.
4. Unscrew the bolts that hold the bottom shims.
5. Remove a shim or add a shim.
6. Replace the bolts that hold the shims. Torque the M12 bolts to 100 ± 20 N·m (75 ± 15 lb ft).

Reassembly

1. Replace the idler guards. Torque the M12 bolts to 100 ± 20 N·m (75 ± 15 lb ft).
2. Replace the track shoes. Torque the track shoe bolts.

Reference: See Power Train Disassembly and Assembly, "Track - Connect" in the Service Manual for additional information on torquing the track bolts.

Adjust the Track

See Operation and Maintenance Manual, "Track - Check/Adjust" for information on needed track adjustment procedures.

i02639774

Fuel System - Prime

SMCS Code: 1250-548; 1258

WARNING

Personal injury or death may result from failure to adhere to the following procedures.

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

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

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

Dispose of all fluids according to local regulations and mandates.

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.

Electric Fuel Priming Pump

This machine is equipped with an electric fuel priming pump.

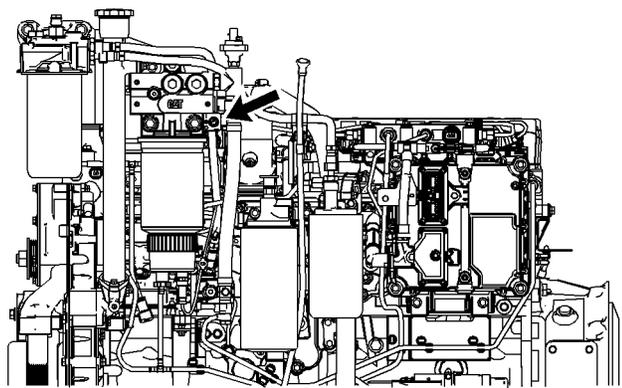


Illustration 163

g01297155

Note: You can only use the priming pump when the engine start switch key is OFF.

1. Move the switch for the electric fuel priming pump to the ON position. Allow the pump to run for several seconds.
2. Return the switch for the electric fuel priming pump to the OFF position.
3. Start the engine. If the engine does not start, or if the engine continues to misfire or smoke, additional priming may be necessary. The electric fuel priming pump will only operate if the engine start switch key is in the OFF position. Shut off the engine before additional priming.

4. Run the engine at the LOW IDLE position until the engine runs smoothly.

i03896258

Fuel System Primary Filter - Replace

SMCS Code: 1260-510

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 pre-fill the fuel filter with fuel before you install the fuel filter. Contaminated fuel **WILL DAMAGE** the fuel system components.

NOTICE

Caterpillar **STRONGLY** recommends the use of high efficiency fuel filters. High efficiency fuel filters are designed in order to better protect diesel engines that have higher injection pressures and closer tolerances. Use of fuel filters that are **NOT** high efficiency fuel filters will result in shortened fuel system component life. Caterpillar high efficiency fuel filters are the preferred filters for Caterpillar engines.

In order to keep the engine in optimum condition, it is important to keep the fuel free from contamination. As fuel system contamination usually occurs during refueling, the following points should be observed:

- Only use clean fuel of the correct grade from a reliable source.
- Do not refuel from contaminated containers or containers that are not suitable for fuel storage.
- Do not use contaminated equipment.
- Regularly clean the outside of the fuel filler cap and the area around the fuel filler cap.
- Only use Caterpillar approved fuel filters. The use of Caterpillar filters is essential in order to protect the fuel system.
- Do not service the fuel filters ahead of the suggested maintenance interval, unless you are instructed by the monitoring system. This will increase the risk of contamination in the fuel system.

Note: If equipped, the service indicator for "Water in Fuel" will be illuminated if the sediment bowl needs to be emptied.

Note: The service indicator on the dash will be illuminated if the fuel filters need to be changed. All machines have a sensor on the second filter in order to detect plugging. Certain machines have an additional sensor on the primary filter in order to detect plugging. Both sensors will illuminate the service indicator on the dash. If the service indicator is active, change all three fuel filters.

Note: In order to reduce the risk of contamination in the system, do not remove the fuel filters simultaneously. Perform these operations separately.

Note: After the engine has stopped, you must wait for 60 seconds in order to allow the fuel pressure to be purged from the high pressure fuel lines before any service or repair is performed on the engine fuel lines.

1. Open the engine access door on the left side of the machine. The fuel filter element is located toward the front of the engine.
2. Turn the fuel supply valve (if equipped) to the OFF position before performing this maintenance.
3. Place a suitable container under the water separator in order to catch any fuel that might spill. Clean up any spilled fuel. Clean the outside of the water separator and the fuel filter.

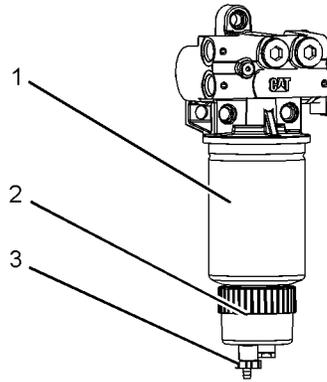


Illustration 164

g01306245

4. Open the drain (3). Allow the fluid to drain into the container. Remove the tube.
5. Tighten the drain by hand pressure only.
6. If equipped, remove the wiring harness from the sensor on the bottom of the glass bowl (2).
7. Remove the glass bowl from the filter (1).
8. Use a Caterpillar strap wrench in order to remove the filter. Discard the old seals and the canister in a safe place.
9. Clean the glass bowl.
10. Install a new filter.

Note: Do not fill the fuel filter before you install the fuel filter.

- a. Install a new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

- b. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide.

11. Install the glass bowl on the filter. Ensure that the sensor (if equipped) is in the correct position.
12. If equipped, install the wiring harness to the sensor.
13. Replace the secondary fuel filter immediately after you change the primary fuel filter. Refer to Operation and Maintenance Manual, "Fuel System Secondary Filter - Replace" for more information.
14. Replace the third fuel filter immediately after you change the secondary fuel filter. Refer to Operation and Maintenance Manual, "Fuel System Third Filter - Replace" for more information.
15. Dispose of all fluids in accordance with local regulations.
16. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime" for more information.
17. Close the access door.

i02612390

Fuel System Primary Filter/Water Separator - Drain

SMCS Code: 1260-543; 1263-543

WARNING

Personal injury or death may result from failure to adhere to the following procedures.

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

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

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

Dispose of all fluids according to local regulations and mandates.

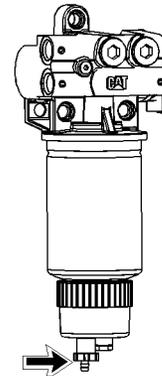


Illustration 165

g01307432

1. Place a suitable container directly underneath the drain valve. The Drain is located under the primary fuel filter/water separator.
2. Open drain . Allow the fluid to drain into the container.
3. After the separator is completely drained, close drain by hand pressure only. Dispose of the drained fluid in a safe place.

i03896387

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 pre-fill the fuel filter with fuel before you install the fuel filter. Contaminated fuel **WILL DAMAGE** the fuel system components.

NOTICE

Caterpillar **STRONGLY** recommends the use of high efficiency fuel filters. High efficiency fuel filters are designed in order to better protect diesel engines that have higher injection pressures and closer tolerances. Use of fuel filters that are NOT high efficiency fuel filters will result in shortened fuel system component life. Caterpillar high efficiency fuel filters are the preferred filters for Caterpillar engines.

In order to keep the engine in optimum condition, it is important to keep the fuel free from contamination. As fuel system contamination usually occurs during refueling, the following points should be observed:

- **Only use clean fuel of the correct grade from a reliable source.**
- **Do not refuel from contaminated containers or containers that are not suitable for fuel storage.**
- **Do not use contaminated equipment.**
- **Regularly clean the outside of the fuel filler cap and the area around the fuel filler cap.**
- **Only use fuel filters that are approved by Caterpillar. The use of Caterpillar filters is essential in order to protect the fuel system.**
- **Do not service the fuel filters prior to the suggested maintenance interval. This may increase the risk of contamination in the fuel system.**

Note: The service indicator on the dash will be illuminated if the fuel filters need to be changed. All machines have a sensor on the second filter in order to detect plugging. Certain machines have an additional sensor on the primary filter in order to detect plugging. Both sensors will illuminate the service indicator on the dash. If the service indicator is active, change all three fuel filters.

Note: In order to reduce the risk of contamination in the system, do not remove the fuel filters simultaneously. Perform these operations separately.

Note: After the engine has stopped, you must wait for 60 seconds in order to allow the fuel pressure to be purged from the high pressure fuel lines before any service or repair is performed on the engine fuel lines.

1. The secondary fuel filter is located on the front of the engine on the left side.
2. Ensure that the fuel supply valve (if equipped) is in the OFF position. Place a suitable container under the fuel filter in order to catch any fuel that might spill. Clean up any spilled fuel.

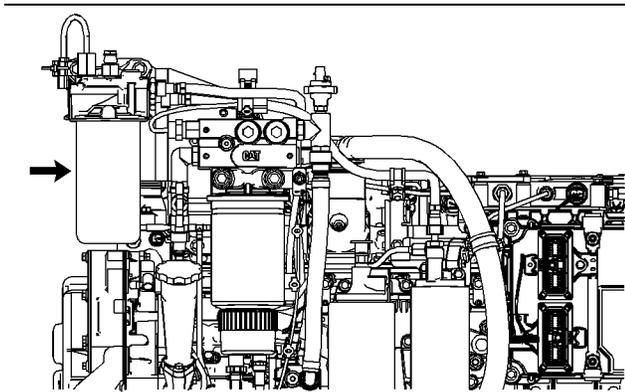


Illustration 166

g01350028

3. Clean the outside of the fuel filter. Use a Caterpillar strap wrench in order to remove the filter from the engine and dispose of the filter in a safe place.

4. Install a new filter.

Note: Do not fill the filter before you install the new filter.

- a. Install a new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

- b. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide.

i02959820

Fuel System Third Filter - Replace

SMCS Code: 1261-510

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 pre-fill the fuel filter with fuel before you install the fuel filter. Contaminated fuel **WILL DAMAGE** the fuel system components.

NOTICE

Caterpillar **STRONGLY** recommends the use of high efficiency fuel filters. High efficiency fuel filters are designed in order to better protect diesel engines that have higher injection pressures and closer tolerances. Use of fuel filters that are **NOT** high efficiency fuel filters will result in shortened fuel system component life. Caterpillar high efficiency fuel filters are the preferred filters for Caterpillar engines.

Note: This fuel filter is the **LAST** filter before the high pressure fuel system. Replace the filter **QUICKLY** in order to avoid contamination. **DO NOT REMOVE** the fuel filter from the packaging until the filter is ready to be replaced.

In order to keep the engine in optimum condition, it is important to keep the fuel free from contamination. As fuel system contamination usually occurs during refueling, the following points should be observed:

- Only use clean fuel of the correct grade from a reliable source.
- Do not refuel from contaminated containers or containers that are not suitable for fuel storage.
- Do not use contaminated equipment.

- Regularly clean the outside of the fuel filler cap and the area around the fuel filler cap.
- Only use Caterpillar approved fuel filters. The use of Caterpillar filters is essential in order to protect the fuel system.
- Do not service the fuel filters prior to the suggested maintenance interval. This may increase the risk of contamination in the fuel system.

Note: In order to reduce the risk of contamination in the system, do not remove the fuel filters simultaneously. Perform these operations separately.

Note: After the engine has stopped, you must wait for 60 seconds in order to allow the fuel pressure to be purged from the high pressure fuel lines before any service or repair is performed on the engine fuel lines.

1. The third fuel filter is located on the front of the engine on the left side.
2. Ensure that the fuel supply valve (if equipped) is in the OFF position. Place a suitable container under the fuel filter in order to catch any fuel that might spill. Clean up any spilled fuel.

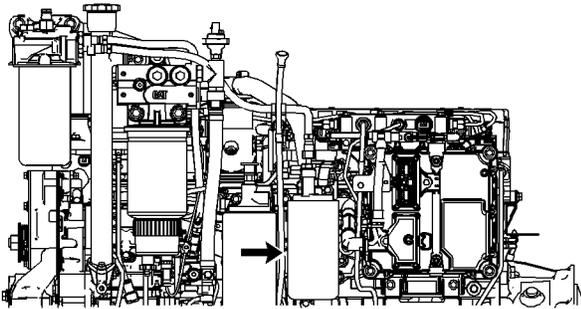


Illustration 167

g01310215

3. Clean the outside of the fuel filter. Use a Caterpillar strap wrench in order to remove the filter from the engine and dispose of the filter in a safe place.
4. Install a new filter.

Note: Do not fill the filter before you install the new filter.

- a. Install a new filter hand tight until the seal of the filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the filter that are 90 degrees or 1/4 of a turn away from each other. When you tighten the filter, use the rotation index marks as a guide.

- b. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide.

i02593539

Fuel Tank Cap Filter and Strainer - Replace/Clean

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

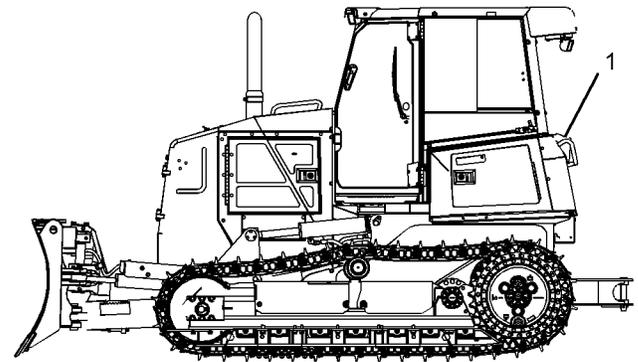


Illustration 168

g01297937

1. Remove the fuel tank cap (1).
2. Disassemble the fuel tank cap.
3. Inspect the seal on the fuel cap for damage. If the seal is damaged, replace the seal. Lubricate the seal on the fuel tank cap.
4. Inspect the debris boot on the fuel tank cap for damage. If the debris boot is damaged, replace the boot.
5. Replace the filter elements on the fuel tank cap.
6. Remove the strainer from the filler opening.
7. Wash the strainer from the filler opening.
8. Install the strainer.
9. Install the fuel tank cap.

i04563963

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

WARNING

Personal injury or death may result from failure to adhere to the following procedures.

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.

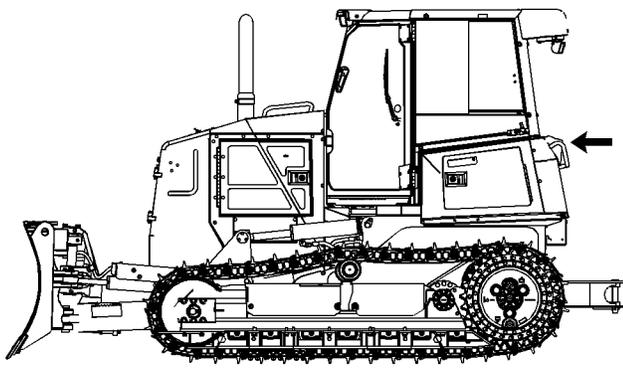


Illustration 169

g01297934

1. Slowly, remove fuel tank cap (1) in order to relieve pressure.

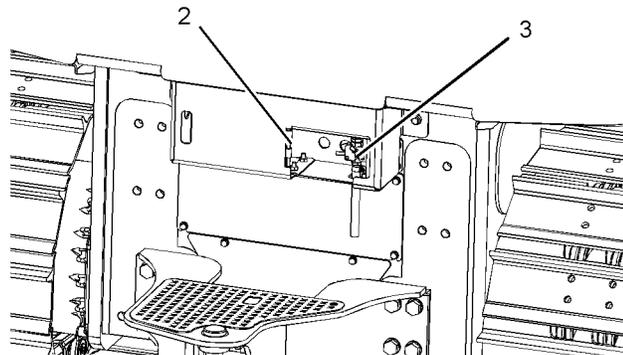


Illustration 170

g01228622

2. Remove plate (2). The drain valve for the fuel tank is located on the right side of the machine underneath the fuel tank.

3. Open drain valve (3). Allow the water and the sediment to drain into a suitable container. Close drain valve (3). Install plate (2).

i04416790

Fuses and Circuit Breakers - Replace/Reset

SMCS Code: 1417-510; 1420-529; 1420

Circuit Breaker/Reset – Push in the button in order to reset the circuit breaker. If the electrical system is working properly, the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.

Main Circuit Breaker – 105 Amp



Alternator Reset (Amperes) – 105 Amp
(if equipped)

Remove the Fuse Cover

The fuse block is positioned behind the access door on the right side of the seat inside the cab.

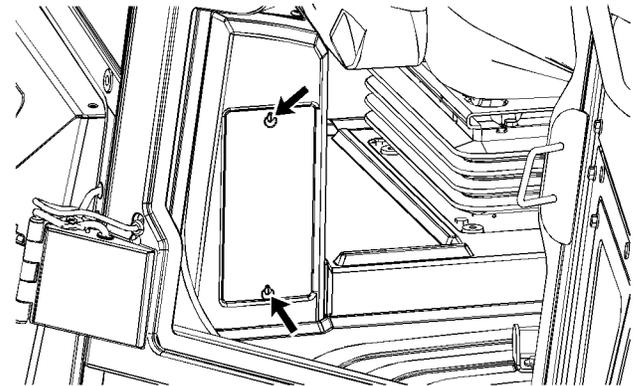


Illustration 171

g01210228

1. Remove the two screws that are on the fuse cover.

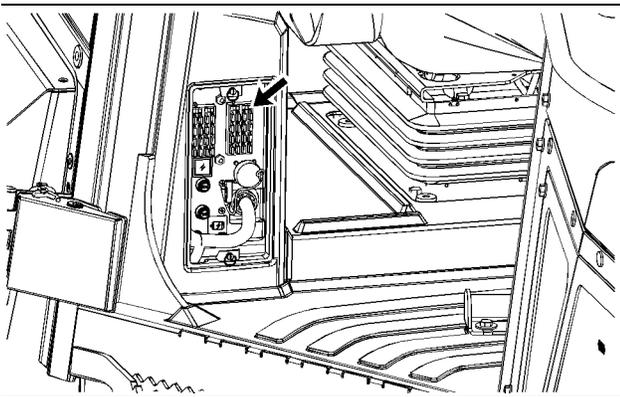


Illustration 172

g01210281

2. Remove the fuse cover.

Replace 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.

The fuse panel is positioned behind the fuse cover on the right side of the seat inside the cab.

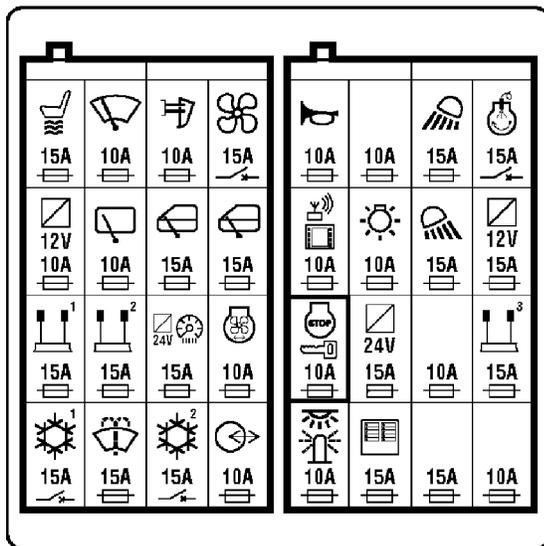


Illustration 173

g02175839

4. 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.

Fuse Block 1

- Air Suspension Seat – 15 Amp**
- Window Wiper – 10 Amp**
- Ripper – 10 Amp**
- Fan – 15 Amp Breaker**
- 12V Converter – 10 Amp**
- Rear Window Wiper – 10 Amp**
- Side Window Wiper – 10 Amp**
- Dozer Blade – 15 Amp**
- 24V Converter, Panel Lights – 15 Amp**
- Reversible Fan – 10 Amp**
- Condenser 1 and Condenser 2 – 15 Amp Breaker**
- Window Washer Fluid – 15 Amp**



Diagnostic/Service Connector – 10 Amp

Fuse Block 2



Horn – 10 Amp



Spare



Front Work Lights – 15 Amp



Electronic Engine Fuel Injection – 15 Amp Breaker



Product Link, Monitoring Display – 10 Amp



Master Lighting Switch – 10 Amp



Rear Work Lights – 15 Amp



12V Converter – 10 Amp



Engine Stop, Ignition Key – 10 Amp



24V Converter – 15 Amp



Dozer Blade – 15 Amp



Dome Lamp – 10 Amp



Machine ECM – 15 Amp

i02433745

Hydraulic System Oil - Change

SMCS Code: 5050-044

Note: S·O·S oil analysis must be performed at every 500 service hours or 3 months in order to extend the hydraulic oil change interval. The normal hydraulic oil change interval is every 2000 service hours or 1 year. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 service hours or 2 years. If S·O·S oil analysis is not available, the hydraulic oil change interval must remain at every 2000 service hours or 1 year.

Operate the machine for a few minutes in order to warm the hydraulic system oil.

Park the machine on level ground. Lower all attachment to the ground. Move the parking brake switch to the ENGAGED position. Stop the engine.

Note: The Hystat transmission and the hydraulic system use a common tank.

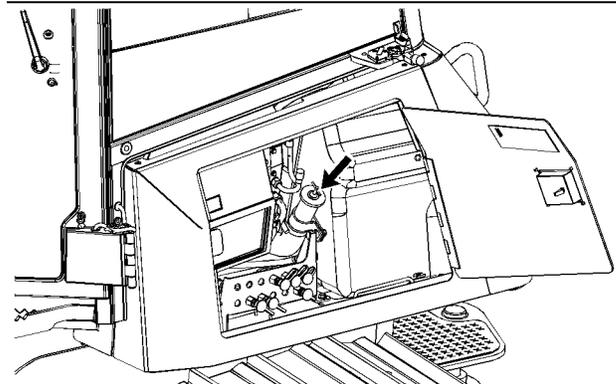


Illustration 174

g01215747

1. Open the rear access door on the left hand side of the machine.
2. Remove hydraulic tank filler cap.

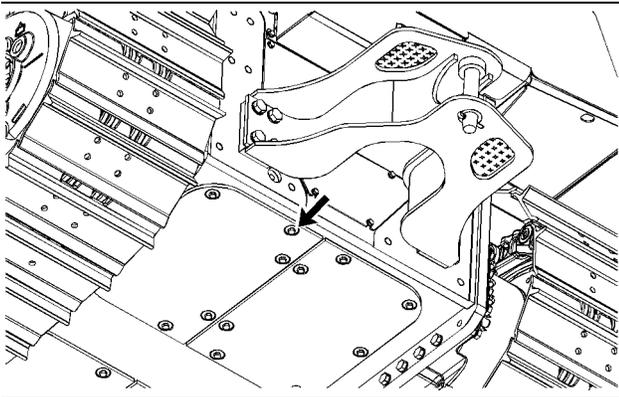


Illustration 175

g01215762

3. Remove the rear cover plate.

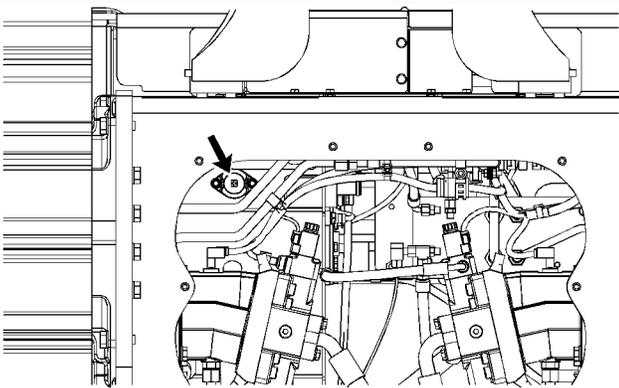


Illustration 176

g01215859

4. Hook a hose up to the drain valve of the hydraulic tank and drain the hydraulic oil into a suitable container.

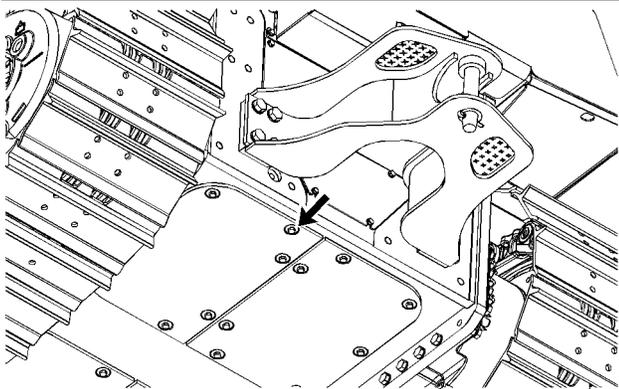


Illustration 177

g01215762

5. Install the rear cover plate .
6. Change the hydraulic system filters. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace".

7. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".

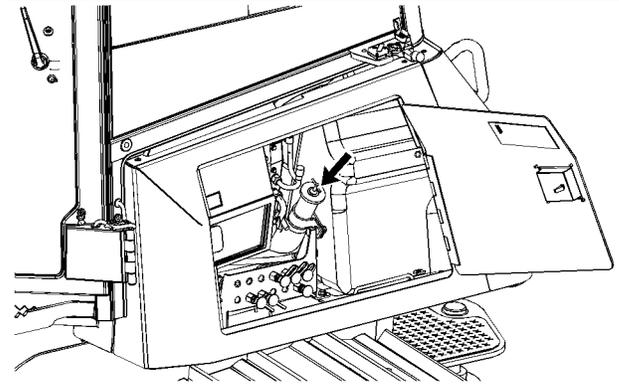


Illustration 178

g01215747

8. Install the hydraulic cap.
9. Start the engine and run the engine for a few minutes.

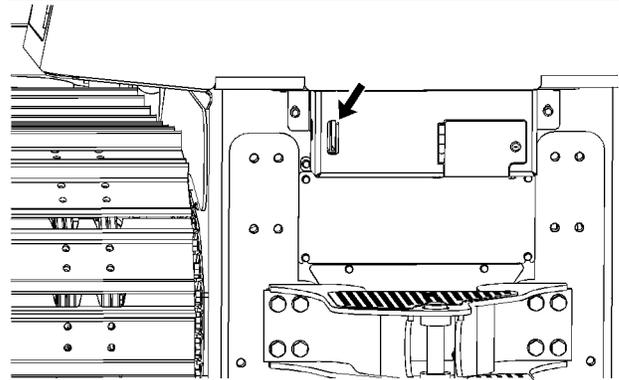


Illustration 179

g01215867

10. Maintain the hydraulic oil level above the "ADD" mark on the sight gauge . Add oil, if necessary.

Note: The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and the hose clamps.

11. Stop the engine.
12. If necessary, tighten any loose clamps and any loose connections. Replace any damaged hoses.

i02453517

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

Note: The Hystat transmission and the hydraulic system use a common tank.

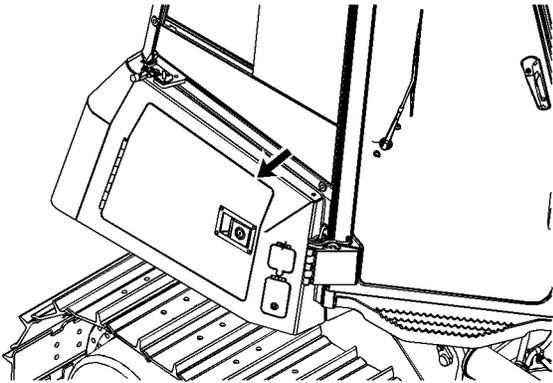


Illustration 180

g01224442

1. Two hydraulic filters are located on the right side of the machine. Open the access door on the right side of the machine.

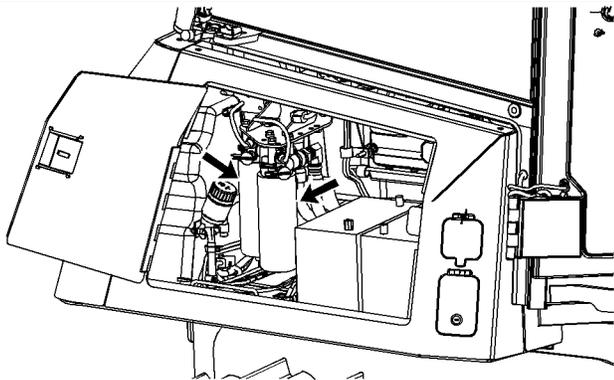


Illustration 181

g01224449

2. Remove both filter elements with a strap type wrench.
3. Clean the filter element mounting bases. Remove any part of the filter element gasket that remains on the filter element mounting bases.
4. Apply a light coat of oil to the gasket of the new filter elements.
5. Install the new filter elements by hand. When the gasket contacts the filter element mounting base, tighten the filter element for an additional three quarters of a turn.

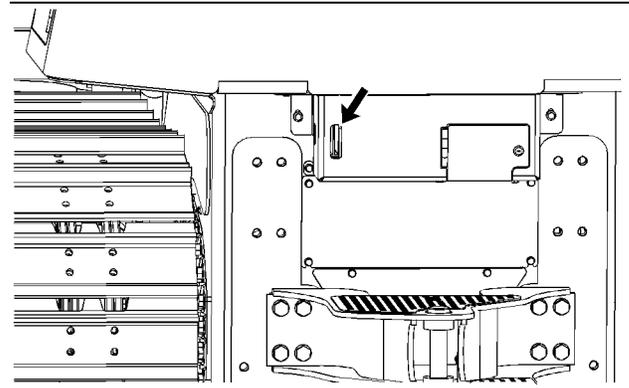


Illustration 182

g01215867

6. Maintain the hydraulic oil level so the oil is visible in the sight gauge. Add oil, if necessary.

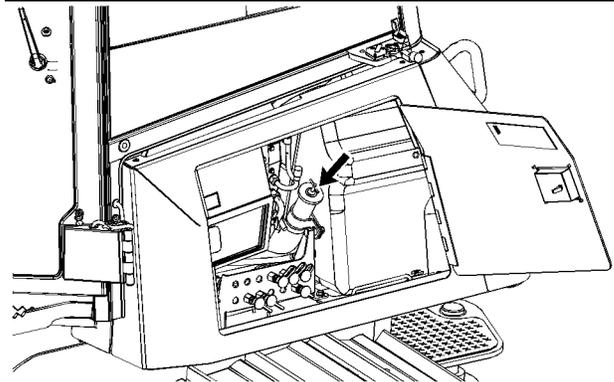


Illustration 183

g01215747

7. Inspect the gasket on the cap for damage. Replace the gasket, if necessary.
8. Install the cap.
9. Close the access door.

i02461885

Hydraulic System Oil Filter - Replace (Winch (If Equipped))

SMCS Code: 5068-510

Note: The Hystat transmission and the hydraulic system use a common tank.

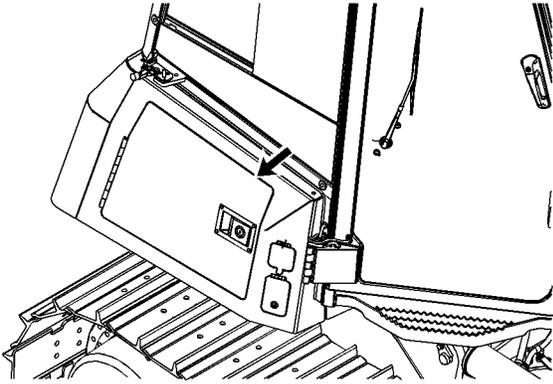


Illustration 184

g01224442

1. Three hydraulic filters are located on the right side of the machine. Open the access door on the right side of the machine.

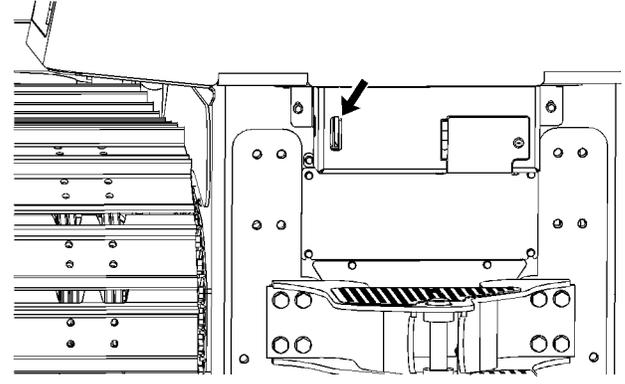


Illustration 186

g01215867

7. Maintain the hydraulic oil level so the oil is visible in the sight gauge. Add oil, if necessary.

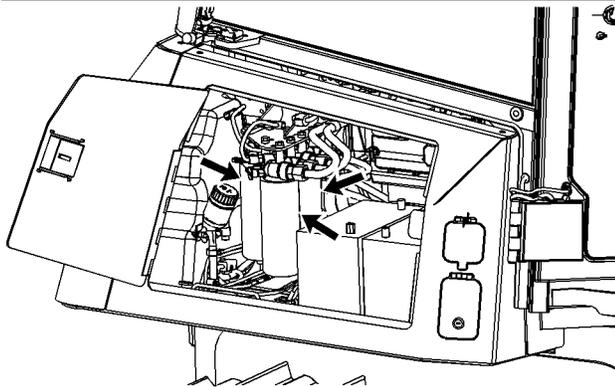


Illustration 185

g01224460

2. Remove the filter element with a strap type wrench.
3. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
4. Apply a light coat of oil to the gasket of the new filter element.
5. Install the new filter element by hand. When the gasket contacts the filter element mounting base, tighten the filter element for an additional three quarters of a turn.
6. Close the access door.

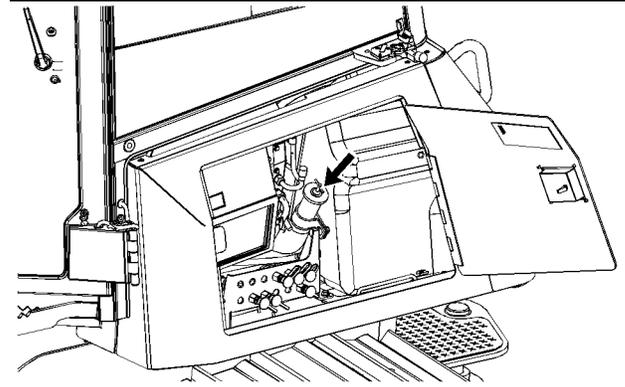


Illustration 187

g01215747

8. Inspect the gasket on the cap for damage. Replace the gasket, if necessary.
9. Install cap (1).
10. Close the access door.

i02438635

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV; 7479

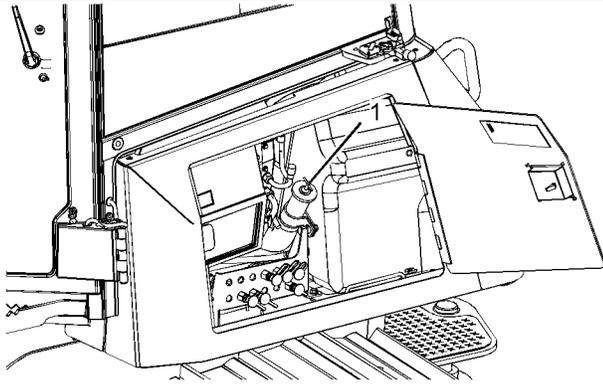


Illustration 188

g01218555

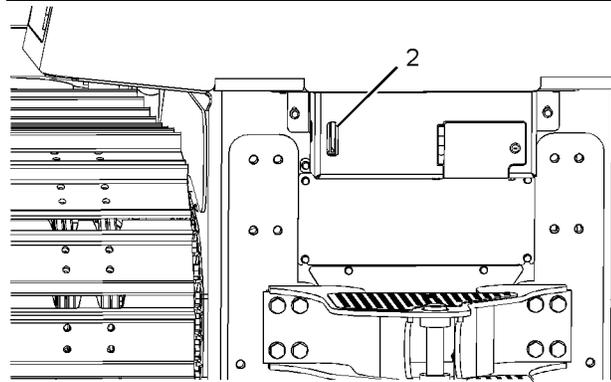


Illustration 189

g01218551

Note: The Hystat transmission and the hydraulic system use a common tank.

1. Park the machine on a level surface before you check the hydraulic system oil level.
2. Maintain the hydraulic oil level above the "ADD" mark on sight gauge (2).
3. Remove hydraulic tank filler cap (1) and add hydraulic oil, if necessary.
4. Clean cap (1). Install cap (1).

i02453679

Hydraulic System Oil Sample - Obtain

SMCS Code: 5095-008

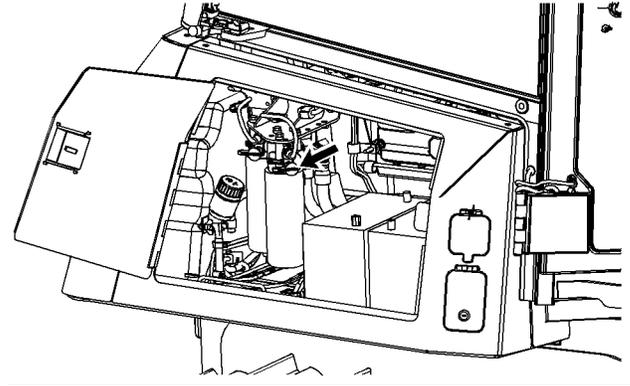


Illustration 190

g01224470

Note: The Hystat transmission and the hydraulic system use a common tank.

The sampling valve for the hydraulic system oil is located on the filter base of the oil filter for the hydraulic system.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the hydraulic oil.

i04562250

Idler Guide Wear Plates - Inspect (2 Carrier Rollers and 8 Track Rollers)

SMCS Code: 4160-040

Controlling the thickness of the wear plates is necessary. Excessive wear of the wear plates can create noise and excessive wear can create vibration. The idler will not adjust properly if the wear plates are worn.

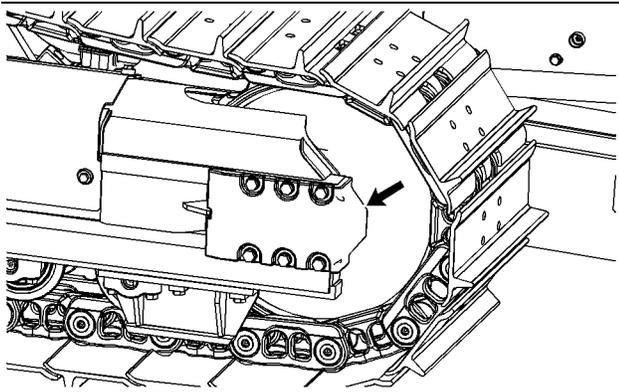


Illustration 191

g01226879

1. Remove the cover plate.

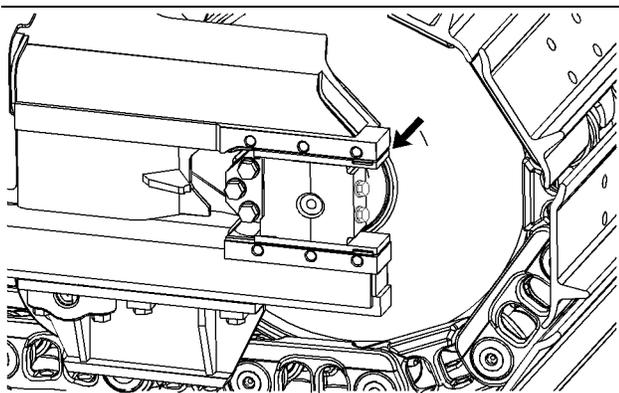


Illustration 192

g02647265

2. Remove the top wear plate. Measure the thickness of the wear plate. The minimum thickness for the wear plate is 4 mm (0.16 inch).

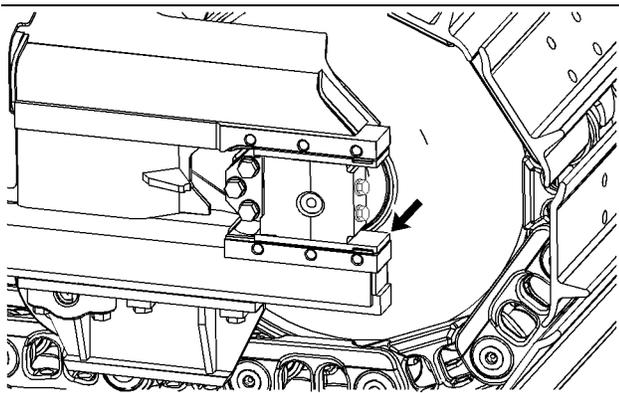


Illustration 193

g02647280

3. Move the idler in order to remove the bottom wear plate. Measure the thickness of the wear plate. The minimum thickness for the wear plate is 4 mm (0.16 inch).

4. Install the new wear plates, if necessary. Install the old wear plates if the plates are thicker than the minimal requirement.

Note: Reposition the idler to install the wear plates, if needed.

5. Install the cover plate.

i02458548

Idler Guide Wear Plates - Inspect

SMCS Code: 4160-040

The thickness of the wear plates need to be controlled. Excessive wear of the wear plates can create noise and excessive wear can create vibration. The idler will not adjust properly if the wear plates are worn.

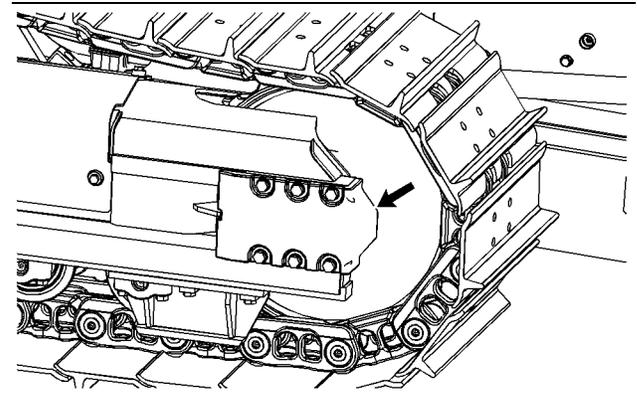


Illustration 194

g01226879

1. Remove the cover plate.

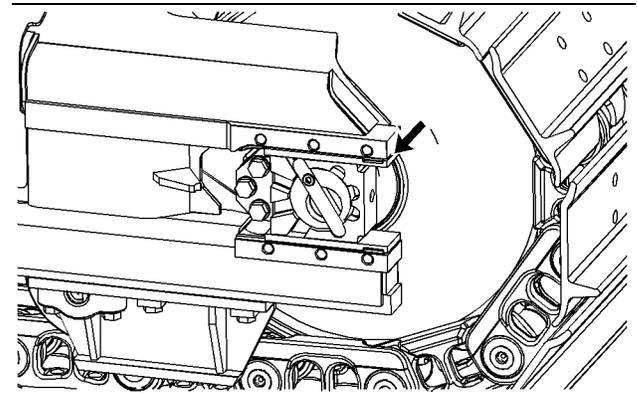


Illustration 195

g01226895

2. Remove the top wear plate. Measure the thickness of the wear plate. The minimum thickness for the wear plate is 4 mm (0.16 inch).

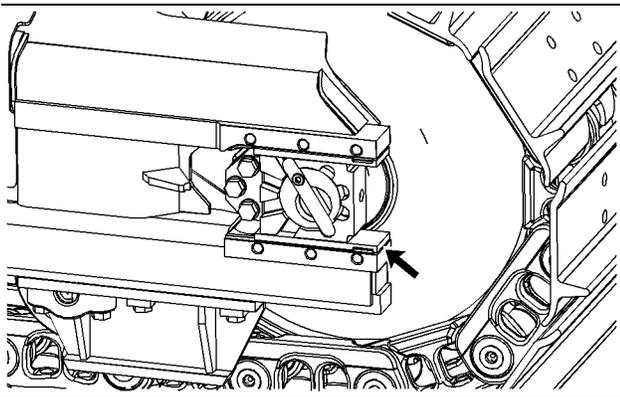


Illustration 196

g01226888

3. Move the idler in order to remove the bottom wear plate. Measure the thickness of the wear plate. The minimum thickness for the wear plate is 4 mm (0.16 inch).
4. Install the new wear plates, if necessary. Install the old wear plates if the plates are thicker than the minimal requirement.

Note: The idler may need to be repositioned in order to install the wear plates.

5. Install the cover plate.

i02106227

Oil Filter - Inspect

SMCS Code: 1318-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

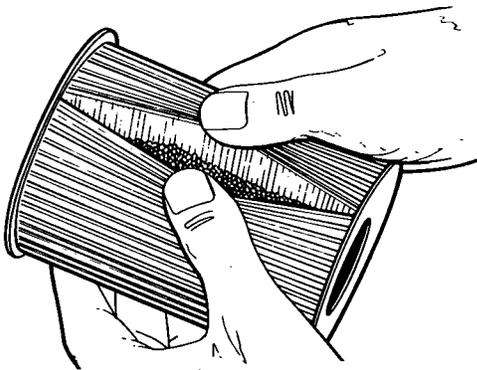


Illustration 197

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.

i02589738

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.

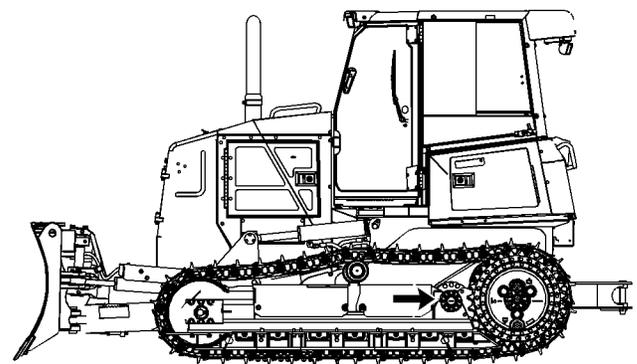


Illustration 198

g01296549

1. Remove the oil plug on one side of the machine.
2. Check the pivot shaft oil level. The oil level should be at the bottom of the threaded hole.

3. If necessary, add oil in order to bring the oil level up to the bottom of the threaded hole.
4. Repeat the procedure on the other side of the machine.

i02589751

Radiator Core - Clean

SMCS Code: 1353-070; 1805-070; 1810-070

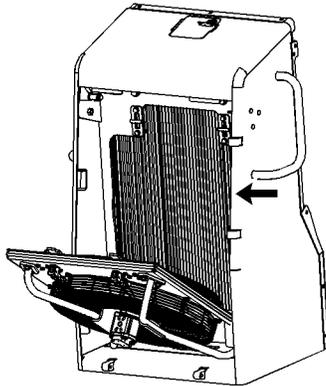


Illustration 199

g01296615

The radiator is accessible via the access door on the front of the engine hood.

You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator core. However, the use of compressed air is preferred.

See Special Publication, SEBD0518, "Know Your Cooling System" for the complete procedure for cleaning the radiator core.

i02595618

Radiator Pressure Cap - Clean/Replace

SMCS Code: 1353-070-Z2; 1353-510-Z2

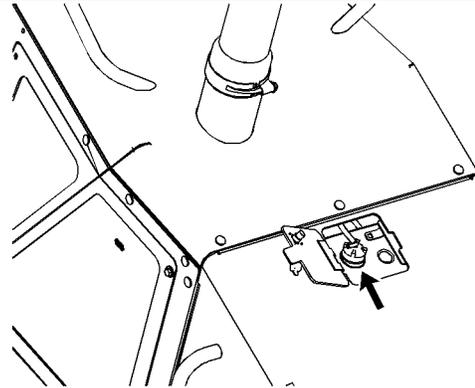


Illustration 200

g01299182

1. Slowly remove the radiator cap in order 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.

i02466275

Ripper - Inspect/Replace

SMCS Code: 6310-040; 6310-510

Tips

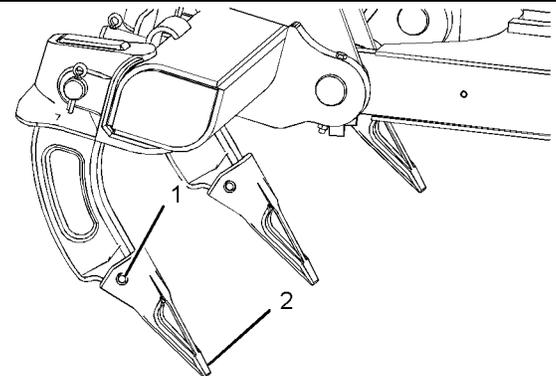


Illustration 201

g01230086

When the ripper tip is worn close to the shank, replace the ripper tip. 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 can be removed. Do not place the ripper too high.
2. If the ripper tip is worn, drive out pin (1). Remove tip (2) and the shank pin retainer.
3. Clean the shank pin retainer and the pin.
4. Install the new tip and the retainer.
5. Install pin (1) from the opposite side of the retainer.
6. Raise the ripper and remove the blocking.
7. Lower the ripper to the ground.

Shank

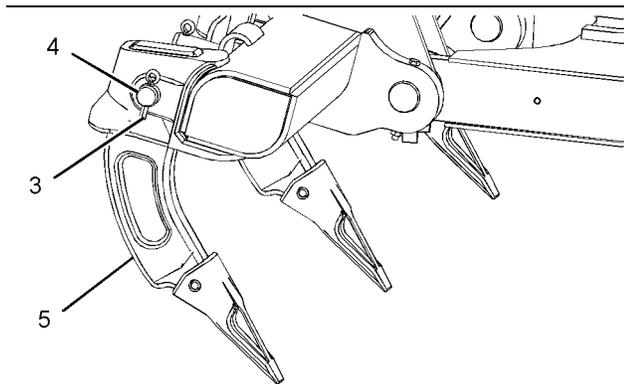


Illustration 202

g01230095

When the ripper shank is worn or damaged, replace the ripper shank.

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 shank can be removed. Do not place the ripper too high.
2. If the shank is worn or damaged, remove cotter pin (3). Then drive out pin (4). Remove shank (5).
3. Install the new shank and pin (4).
4. Install cotter pin (3).
5. Raise the ripper and remove the blocking.
6. Lower the ripper to the ground.

i03998379

Ripper Linkage and Cylinder Bearings - Lubricate

SMCS Code: 6313-086-BD, L4

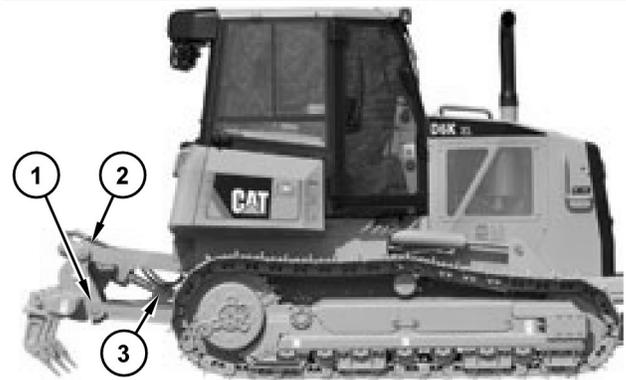


Illustration 203

g02175863

1. Lubricate the eight fittings (1) for the link pin on each side of the ripper.
2. Lubricate two fittings (2) at the top of the cylinder. Lubricate one fitting (3) at the bottom of the cylinder.

i02427444

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

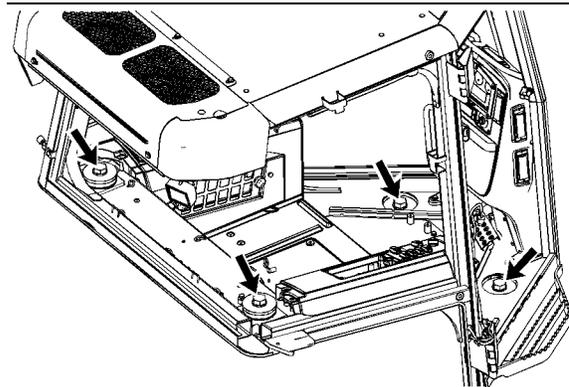


Illustration 204

g01213227

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.

If the ROPS has any cracks in the welds, in the castings, or in any metal section, consult your Caterpillar dealer for repairs.

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

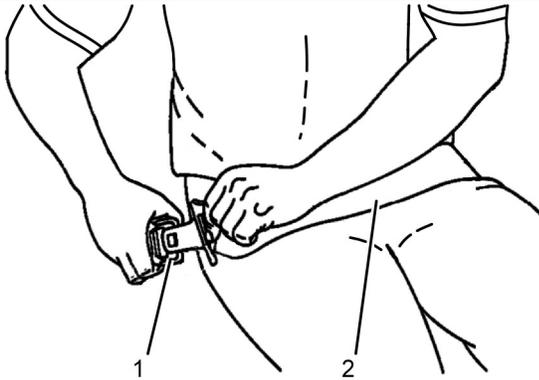


Illustration 205

g02620101

Typical example

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

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

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

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

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

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

i04421974

Seat Belt - Replace

SMCS Code: 7327-510

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

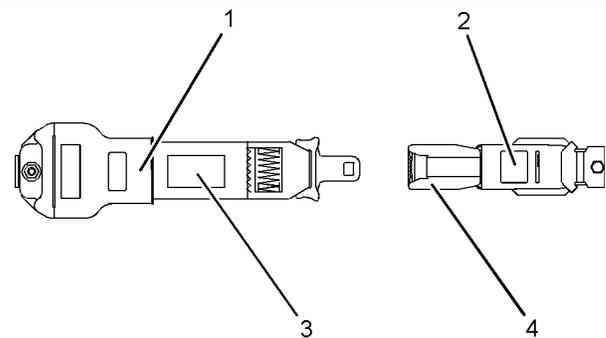


Illustration 206

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.

i04562255

Track - Check/Adjust

SMCS Code: 4170-036

Check

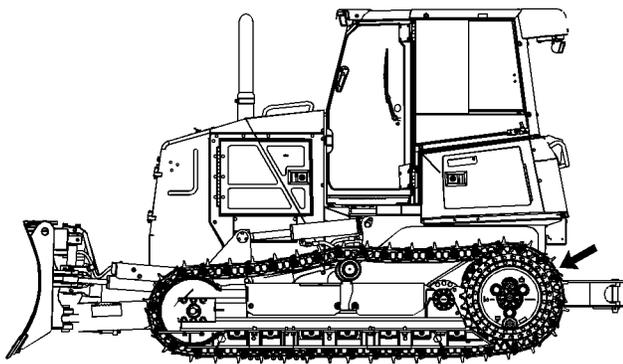


Illustration 207

g01296562

Check the track adjustment. Check for wear and for excessive dirt buildup.

If tracks are too tight, wear of the components will accelerate. If tracks are too loose, wear of the components will accelerate. If the track appears to be too tight or too loose, proceed to the "Track Adjustment" sections.

Move the machine forward for a distance of two times the length of the machine. Allow the machine to stop without the use of the service brake. Shut off the engine.

One Carrier Roller

WARNING

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 maintenance guide for track adjustment procedure.

1. Stand on the track between the front idler and the track carrier roller in order to produce as much track sag as possible.

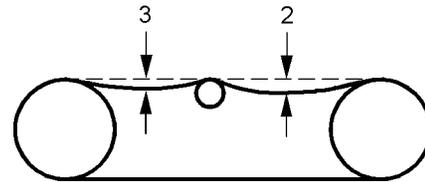


Illustration 208

g01226575

Dimension (1) is the average of dimension (2) and (3).

Dimension (1) is 35 ± 6 mm (1.4 ± 0.24 inch).

2. Measure the track sag in two places on each track.
 - a. Place a tight string or a straight edge on top of the grousers between the carrier roller and front idler. Measure the distance from the straight edge to the grouser tip at the lowest point of sag.
 - b. Place a tight string or a straight edge on top of the grousers between the carrier roller and sprocket. Measure the distance from the straight edge to the grouser tip at the lowest point of sag.
3. Total the two measurements. Refer to Illustration 208 in order to determine the correct sag.
4. If this dimension is not correct, adjust the track.

Two Carrier Rollers

1. Move the machine forward for a distance of two times the length of the machine. Slowly reduce the machine to zero speed with the travel control pedal. Shut off the engine.
2. Stand on the track between the front idler and the track carrier roller in order to produce as much track sag as possible.

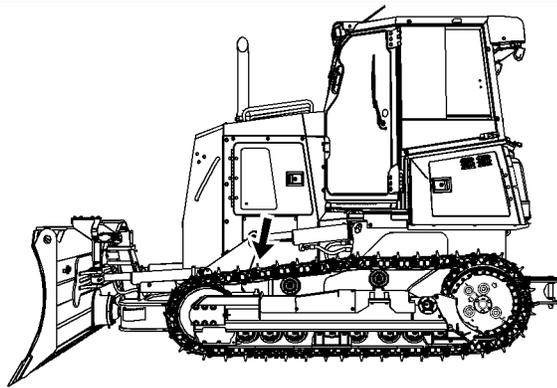


Illustration 209

g02658477

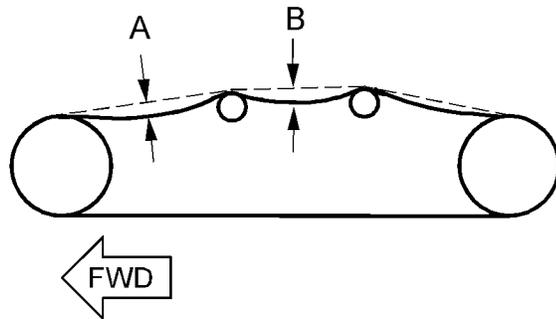


Illustration 210

g01872513

3. Measure the track sag in two places on each track.
 - a. Place a tight string or a straight edge on top of the grousers between the carrier roller and front idler. Measure distance (A) from the straight edge to the grouser tip at the lowest point of sag.
 - b. Place a tight string or a straight edge on top of the grousers between the two carrier rollers. Measure distance (B) from the straight edge to the grouser tip at the lowest point of sag.
4. Total the two measurements. The total correct adjustment of the dimensions is 50 mm (2.0 inch) to 65 mm (2.60 inch).
5. Refer to Table 17 or Table 17 in order to determine the correct sag.

Table 17

D6K Track Sag (Range)		
Location	D6K	D6K LGP
Front (A)	35 mm (1.4 inch) to 45 mm (1.8 inch)	25 mm (1.0 inch) to 30 mm (1.2 inch)
Center (B)	15 mm (0.6 inch) to 20 mm (0.8 inch)	25 mm (1.0 inch) to 35 mm (1.4 inch)
Total (A + B)	50 mm (2.0 inch) to 65 mm (2.6 inch)	50 mm (2.0 inch) to 65 mm (2.6 inch)

If the track appears to be too tight or too loose, proceed to the "Track Adjustment" sections.

Loose Track Adjustment

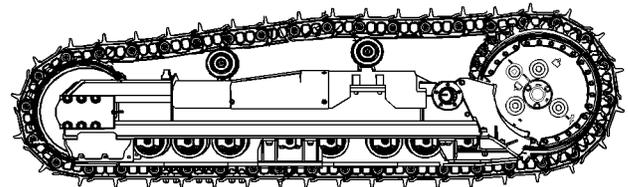


Illustration 211

g02657663

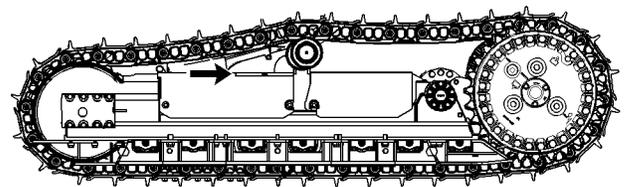


Illustration 212

g02646100

1. Open the Valve cover.

i04397253

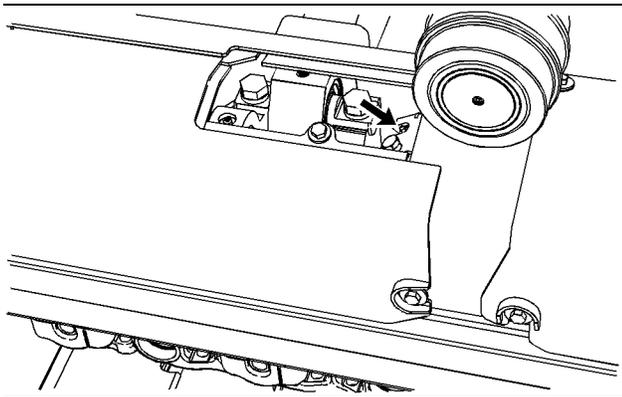


Illustration 213

g02646192

2. Add MPGM through the track adjustment valve. Add MPGM until dimension (1) is correct.
3. Operate the machine back and forth in order to equalize the pressure. Allow the machine to coast to a complete stop. do not use the brake.
4. Remeasure dimension (1) or dimension (A) and dimension (B), as needed.

Reference: See Operation and Maintenance Manual, "Front Idler Position - Check" for additional information on System One undercarriage.

Tight Track Adjustment

1. Open the Valve cover.

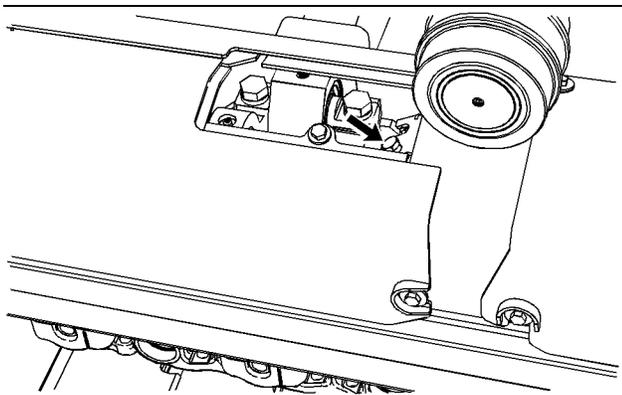


Illustration 214

g02646232

2. Rotate the valve counterclockwise in order to allow the grease to escape.
3. Close the relief valve when dimension (1) or dimension (A) and dimension (B) is correct.

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.

1. During the machine operation, listen for unusual squeaking and for unusual squealing. This noise 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 hot to the touch.

Consult the Custom Track Service expert at any Cat dealer if you detect dry joints or leaks. The Custom Track Service expert at the Cat dealer can perform track inspection.

i02589743

Track Roller Frame - Inspect

SMCS Code: 4151-040

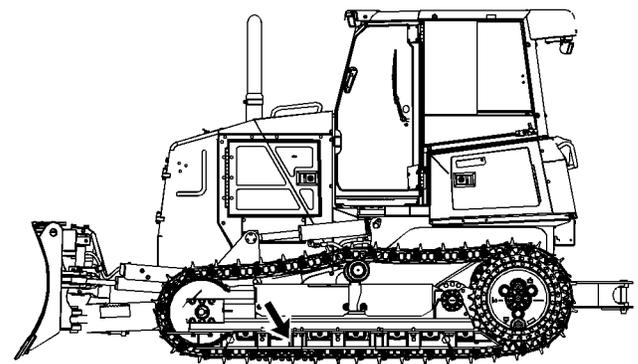


Illustration 215

g01296555

Inspect the track roller frame for cracks.

i02583266

Winch Cable - Inspect

SMCS Code: 5163-040

WARNING

Wear leather gloves when handling the winch cable.

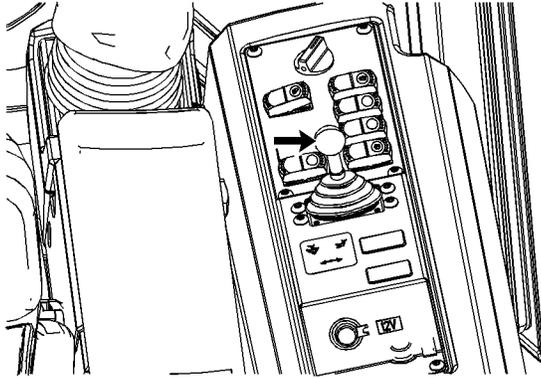


Illustration 216

g01223226

1. Press the FREE SPOOL switch.
2. Unreel the winch cable by manually pulling the winch cable.
3. Inspect the entire cable for fraying or kinking. If fraying or kinking is present, replace the winch cable.

i03649655

Winch Cable - Replace

SMCS Code: 5163-510

WARNING

Wear leather gloves when handling the winch cable.

NOTICE

Unroll the wire rope cable from the spool. Never lift the wire rope off the spool in coils.

NOTICE

Use the correct size ferrule for the winch cable in order to attach the winch cable to the load drum. Never use a knot in order to secure the winch cable to the load drum.

Table 18

Line Load		
Wire Rope	Diameter	Load Drum ⁽¹⁾
Recommended	19 mm (0.75 inch)	91 m (299 ft)
Optional	22 mm (0.875 inch)	66 m (216 ft)

⁽¹⁾ Capacity

Table 19

Winch Capacity		
PA 50 Winch	Bare Drum	Full Drum
Maximum Line Pull	22680 kg (50000 lb)	12247 kg (27000 lb)
Maximum Line Speed	38 m/min (124 ft/min) ⁽²⁾	70 m/min (230 ft/min) ⁽²⁾

⁽²⁾ Maximum line speed is the no-load speed at the maximum line pull.

For the correct procedure to replace the winch cable, refer to Specifications, Systems Operation, Testing and Adjusting, Disassembly and Assembly, "Cable - Remove and Install" for the winch hydrostatic systems.

i01941201

Winch Drum Bearing - Lubricate

SMCS Code: 5159-086-BD

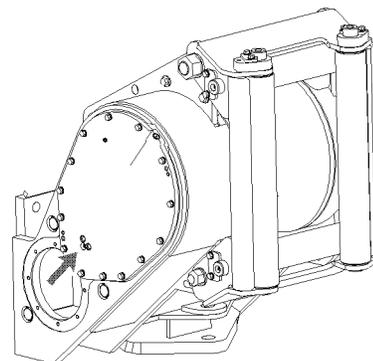


Illustration 217

g01010198

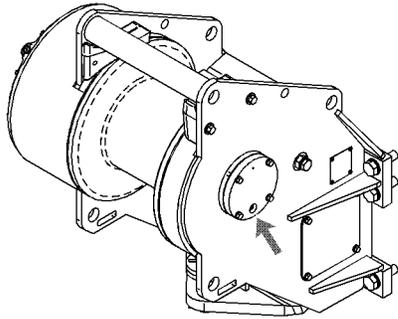


Illustration 218

g01010176

Apply lubricant to the fittings for the winch drum.

i04461002

Winch Fairlead Rollers - Lubricate

SMCS Code: 5163-086

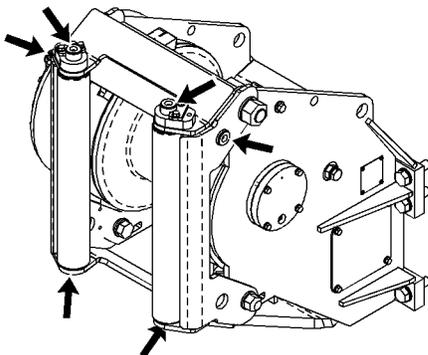


Illustration 219

g02646588

Apply lubricant to all six of the fairlead grease fittings.

i03188188

Winch Oil - Change

SMCS Code: 5163-044

1. Park the machine on level ground.

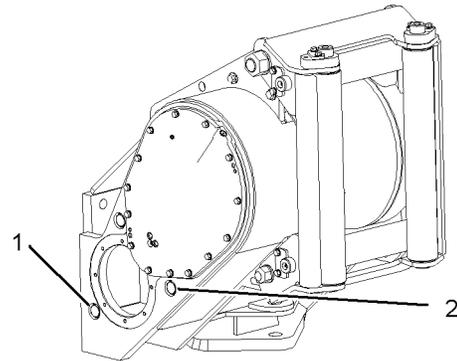


Illustration 220

g01626970

(1) Oil drain plug
(2) Oil filler plug

2. Remove drain plug (1) and allow the oil to drain in a suitable container.

Note: To help drain the oil, remove oil filler plug (2).

3. Install plug (1) after all of the oil has been drained. Tighten plug (1) to a torque of 175 ± 15 N·m (130 ± 10 lb ft).

4. Refill the winch to the proper level. Install plug (2).

i03188221

Winch Oil Level - Check

SMCS Code: 5163-535-FLV

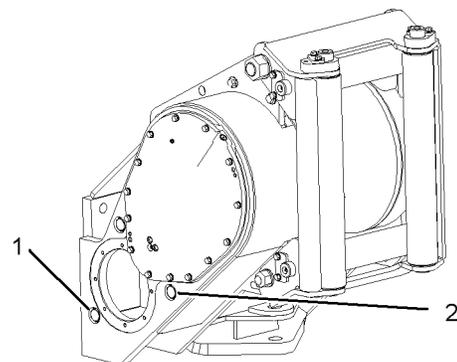


Illustration 221

g01626970

(1) Drain plug
(2) Oil filler plug and oil level check

1. Position the machine on a flat, level surface.

2. Inspect the winch for leaks. Repair any leaks.

3. Remove oil level check plug (2) for a quick check of the oil level.

Note: The oil must be filled to the bottom of the port of the oil level check plug.

4. Fill the winch case with oil until the oil is at the proper level.
5. Install plug (2). Tighten to a torque of $175 \pm 15 \text{ N}\cdot\text{m}$ ($130 \pm 10 \text{ lb}\cdot\text{ft}$).

i04461018

Winch Oil Sample - Obtain

SMCS Code: 5163-008; 7542

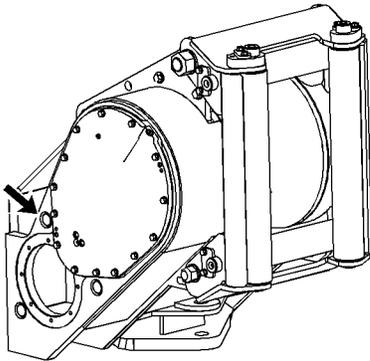


Illustration 222

g02646610

Remove the filler plug for the winch. Obtain a sample of the winch oil by pulling a sample through the filler plug opening.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the winch oil. Refer to Special Publication, PEHP6001, "How To Take A Good Oil Sample" for more information about obtaining a sample of the winch oil.

i04461095

Winch Vent Plug - Clean

SMCS Code: 5163-070-VN

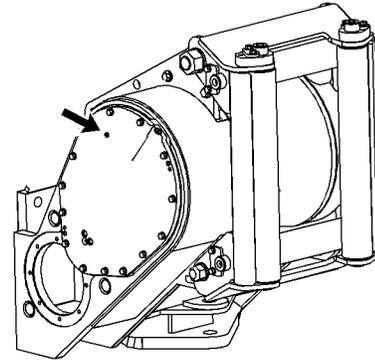


Illustration 223

g02646681

1. Remove the vent plug.
2. Clean the vent plug in a suitable solvent.
3. Install the vent plug.

Note: Do not replace the vent plug with a solid plug. Damage to the winch will occur.

i02421776

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE

When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

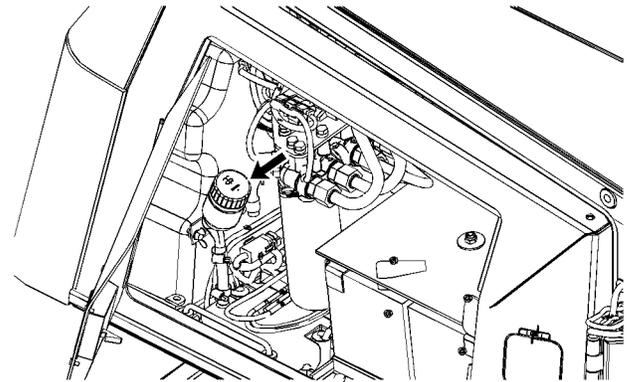


Illustration 224

g01210068



Window Washer – The washer fluid bottle is on the left side of the machine. Open the access door. Remove the fluid bottle cap in order to fill the washer fluid bottle.

i02421301

Window Wipers - Inspect/Replace

SMCS Code: 7305-040; 7305-510

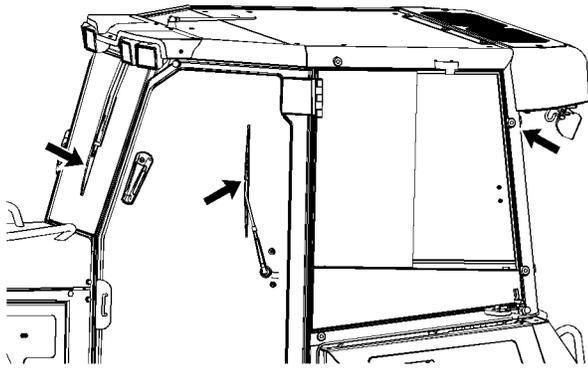


Illustration 225

g01209798

Inspect the front window wiper blade, the right window wiper blade, the left window wiper blade, and the rear window wiper blade. Replace any wiper blades that are damaged or worn. Replace any wiper blades that streak the window.

i01411798

Windows - Clean

SMCS Code: 7310-070; 7340-070

Use commercially available window cleaning solutions to clean the windows.

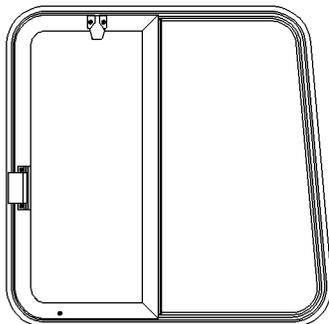


Illustration 226

g00743092

Reference Information Section

Reference Materials

i04562267

Reference Material

SMCS Code: 1000; 7000

The following literature can be obtained from any Cat dealer:

- Special Publication, SEBD0518, "Know Your Cooling System"
- Special Publication, SEBD0970, "Coolant and Your Engine"
- Service Magazine, SEBD1587, 28 October 1985, "What ROPS/FOPS Certification Means"
- Special Instruction, SEHS6929, "Inspection, Maintenance, and Repair of Rollover Protective Structures (ROPS) and Attachment Installation Guidelines"
- Special Publication, SEBD0717, "Diesel Fuels and Your Engine"
- Special Instruction, SEHS7392, "Storage of Diesel Engines"
- Special Instruction, SEHS7633, "Battery Test Procedure"
- Special Instruction, SEHS7633, "6V-2150 Starting/Charging Analyzer Group"
- Special Instruction, SEHS9031, "Storage Procedure for Caterpillar Products"
- Special Publication, SEBU5898, "Cold Weather Recommendations for all Caterpillar Machines"
- Special Publication, SEBD0640, "Oil and Your Engine"
- Special Publication, SEBU6250, "Caterpillar Machine Lubricant Recommendations"
- Special Publication, SEBU7803, "Grade Control System"
- Special Publication, SEBU6981, "Emissions Control Warranty Information"
- Operation and Maintenance Manual, SEBU8257, "The European Union Physical Agents (Vibration) Directive 2002/44/EC"
- Operation and Maintenance Manual, SEBU7048, "Operation and Preventive Maintenance Manual Winch Model PA56 Series"
- Specifications, SENR3130, "Torque Specifications"
- Service Manual, KENR6323, "D6K Track-Type Tractor Monitoring System"
- Troubleshooting, KENR6324, "PL61 and D6K Track-Type Tractor"
- Parts Manual, SEBP4416, (S/N: DHA1-UP; FBH1-Up; NCF1-Up)

Operation and Maintenance Manuals are available in other languages. Consult your Cat dealer for information about obtaining these Operation and Maintenance Manuals.

Additional Reference Material

ASTM D2896, "TBN Measurements" This reference can normally be obtained from your local technological society, from your local library, or from your local college.

SAE J313, "Diesel Fuels" This reference can be found in the SAE handbook. Also, this publication can be obtained from your local technological society, from your local library, or from your local college.

SAE J754, "Nomenclature" This reference can normally be found in the SAE handbook.

SAE J183, "Classification" This reference can normally be found in the SAE handbook.

Engine Manufacturers Association Lubricating Oils Data Book

Engine Manufacturers Association
Two North LaSalle Street, Suite 2200
Chicago, Illinois, USA 60602
E-mail: ema@enginemanufacturers.org
(312) 644-6610
Facsimile: (312) 827-8737

The "Society of Automotive Engineers (SAE) Specifications" can be found in your SAE handbook. This publication can also be obtained from the following locations: local technological society, local library, and local college. If necessary, consult SAE at the following address:

SAE International
400 Commonwealth Drive
Warrendale, PA, USA 15096-0001
Telephone: (724) 776-4841

The International Organization for Standardization (ISO) offers information and customer service regarding international standards and standardizing activities. ISO can also supply information on the following subjects that are not controlled by ISO: national standards, regional standards, regulations, certification, and related activities. Consult the member of ISO in your country.

International Organization for Standardization (ISO)
1, rue de Varembé
Case postale 56
CH-1211 Genève 20
Switzerland
Telephone: +41 22 749 01 11
Facsimile: +41 22 733 34 30
E-mail: central@iso.ch
web site: <http://www.iso.ch>

i03989612

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations. Consult the nearest Cat dealer for additional information.

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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: _____

