SEBU8052-14 (en-us)
March 2019

Operation and Maintenance Manual

321D LCR Excavator

MDT 1-UP (321D LCR)
NAS 1-UP (321D LCR)
PBD 1-UP (321D LCR)
KBZ 1-UP (321D LCR)
MPG 1-UP (321D LCR)
TXA 1-UP (321D LCR)

Language: Original Instructions

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

Important Safety Information

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

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

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

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

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

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

⚠ WARNING

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

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

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

Table of Contents

Foreword

California Proposition 65 Warning

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

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

www.P65Warnings.ca.gov

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

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

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

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

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

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

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

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

Safety

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

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

Operation

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

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

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

Maintenance

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

Maintenance Intervals

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

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

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

Certified Engine Maintenance

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

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

Machine Capacity

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

Product Identification Number

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

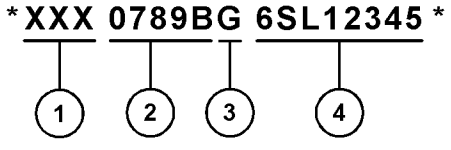

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i03998372

Safety Messages

SMCS Code: 7000; 7405

There are several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please 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 that is replaced, install a safety message on the replacement part. Any Caterpillar dealer can provide new safety messages.

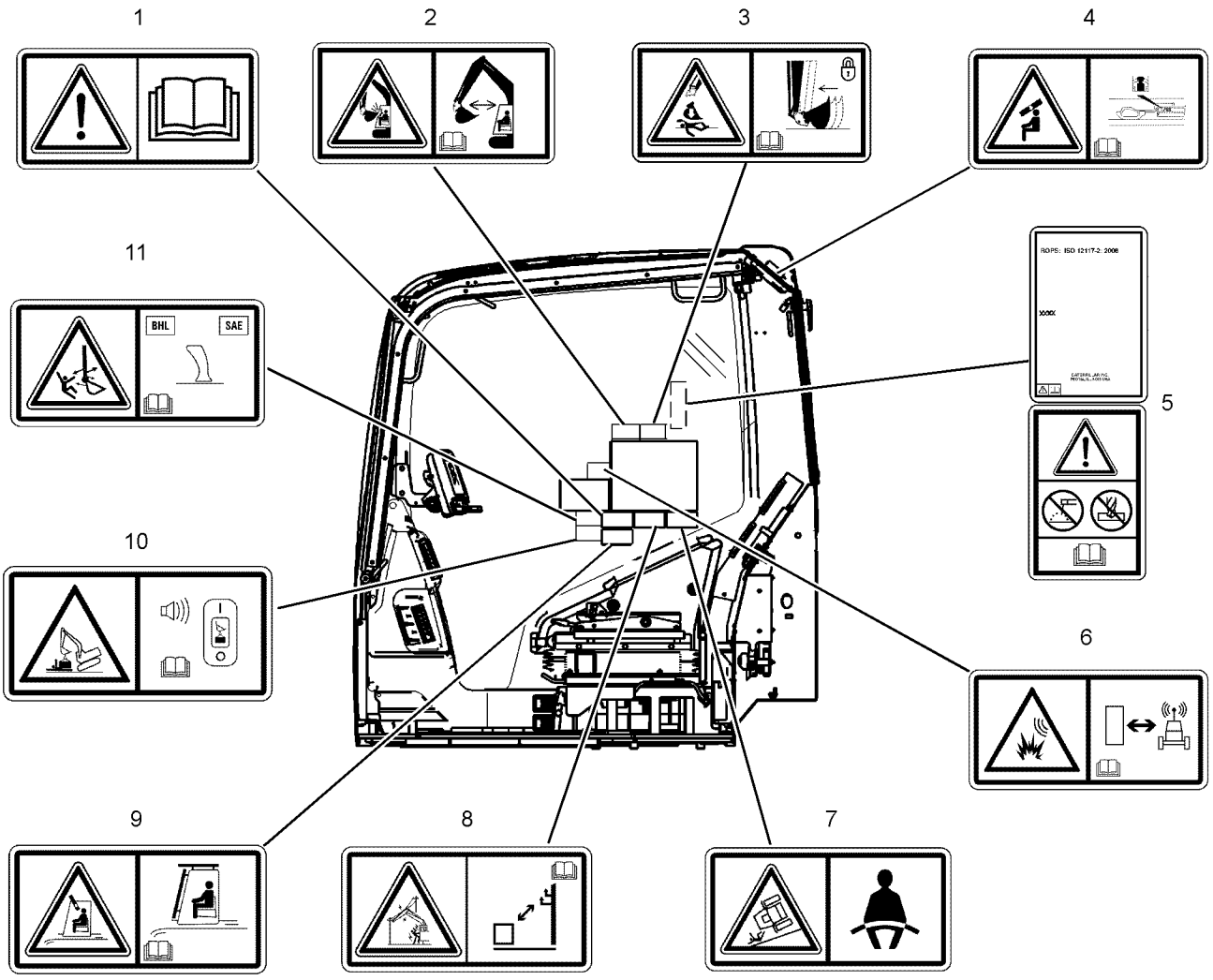

Illustration 2 g02033009

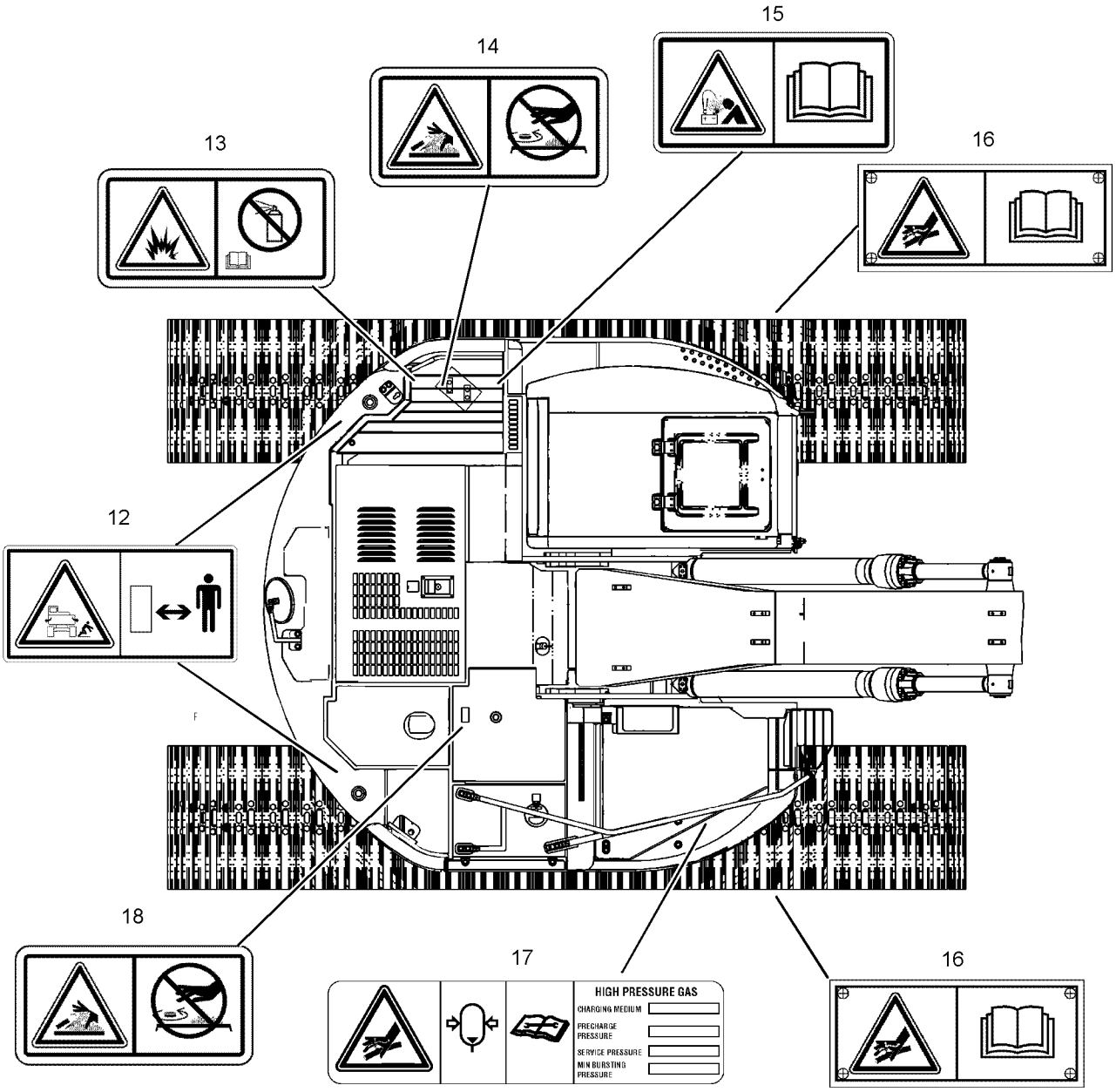

Illustration 3 g02033011

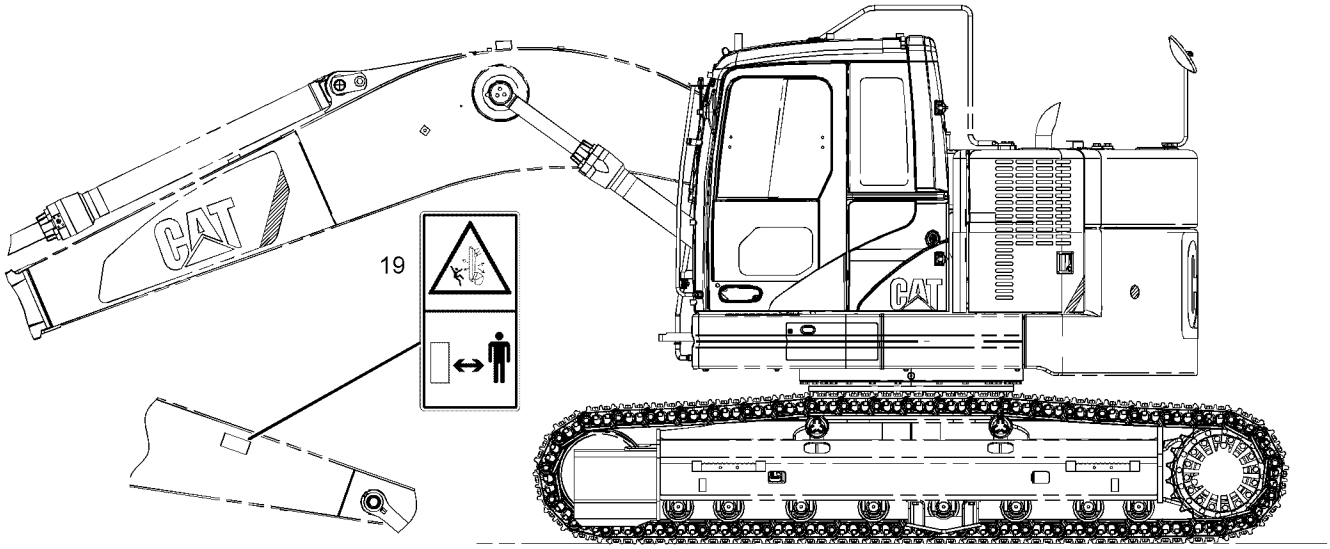

Illustration 4 g02175851

Do Not Operate (1)

This safety message is located in the cab on the right side window.

Illustration 5 g01370904

WARNING

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

Crushing Hazard (2)

This safety message is located in the cab on the right side window.

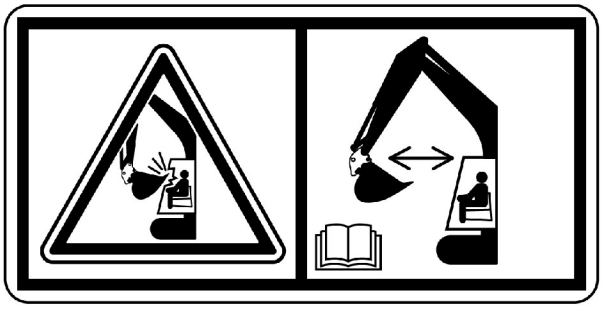

Illustration 6 g01373971

WARNING

Crushing Hazard! Certain machine front linkage combinations (boom, stick, quick coupler, work tool) may require keeping the work tool away from the cab during operation. Personal injury or death may result if the work tool contacts the cab during operation.

Refer to Operation and Maintenance Manual, “Operating Technique Information” for further information.

Crushing Injury (3)

If equipped, this safety message is located in the cab on the right side window.

Illustration 7 g01374035

WARNING

Crush injury. Could cause serious injury or death. Always confirm that the quick coupler is engaged onto the pins. Read the Operator's Manual.

Refer to Operation and Maintenance Manual, “Quick Coupler Operation” for further information.

Crushing Hazard (4)

This safety message is located in the rear of the cab.

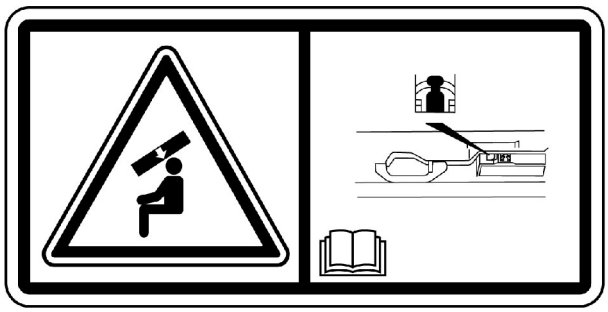

Illustration 8 g01373978

WARNING

Personal injury can result if the window is not latched in the overhead position; ensure the auto lock is engaged.

Refer to Operation and Maintenance Manual, “Window (Front)” for further information.

Do Not Weld or Drill on ROPS (5)

If equipped, this safety message is located on the left side pillar in the cab.

Illustration 9 g01970802

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.

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

Do Not Weld or Drill on ROPS (5A)

This section applies to machines that are equipped with a VA boom.

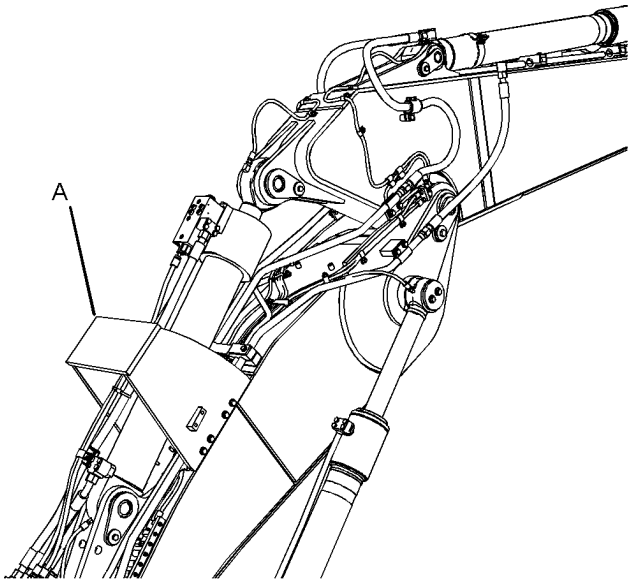

Illustration 10 g02076473

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.

Stopper (A) is bolted on top of the boom. The stopper is a part of the structure of the ROPS. The stopper provides support for the cab if the machine rolls over.

Do not remove the stopper from the VA boom. Do not operate the machine if the stopper is not in place.

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

Product Link (6)

If equipped, this safety message is positioned in the cab on the left side door post.

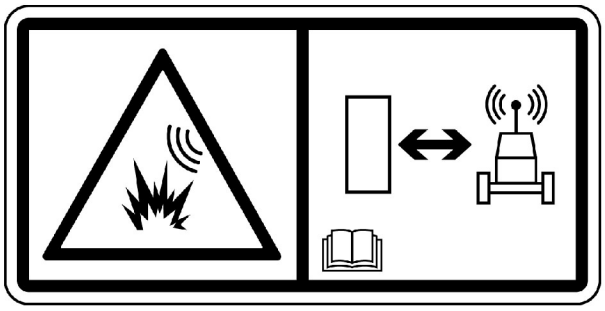

Illustration 11 g01370917

WARNING

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

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

Seat Belt (7)

This safety message is located in the cab on the right side window.

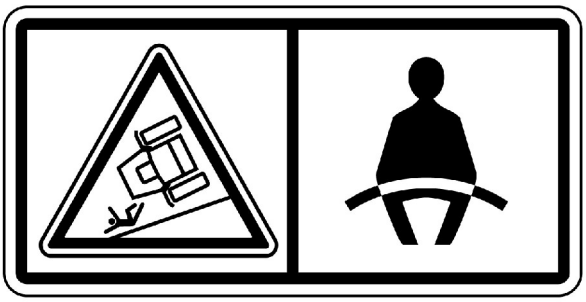

Illustration 12 g01370908

WARNING

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

Electrical Power Lines (8)

This safety message is located in the cab on the right side window.

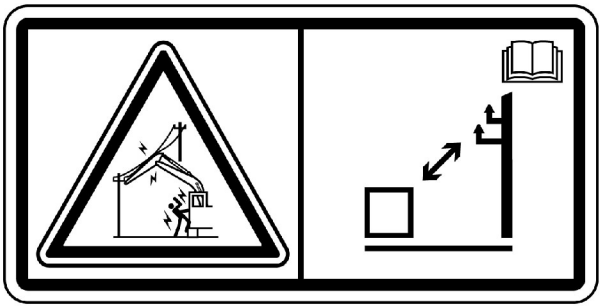

Illustration 13 g01374045

DANGER

Electrocution Hazard! Keep the machine and attachments a safe distance from electrical power. Stay clear 3 m (10 ft) plus twice the line insulator length. Read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions and warnings will cause serious injury or death

Refer to Operation and Maintenance Manual, “Specifications” for further information.

Crushing Hazard (9)

This safety message is located in the cab on the right side window.

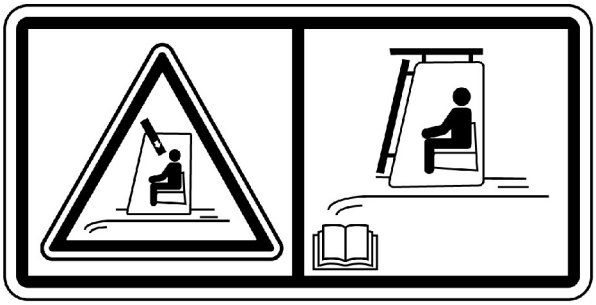

Illustration 14 g01374048

WARNING

The impact from objects that strike the front of the cab or the top of the cab could result in a crushing hazard with the potential for personal injury or death.

The front guard and the top guard should be installed on the cab for applications where the hazard of falling objects exist. Read the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, “Guards” for further information.

Overload Warning Device (10)

If equipped, this safety message is located in the cab on the right side window.

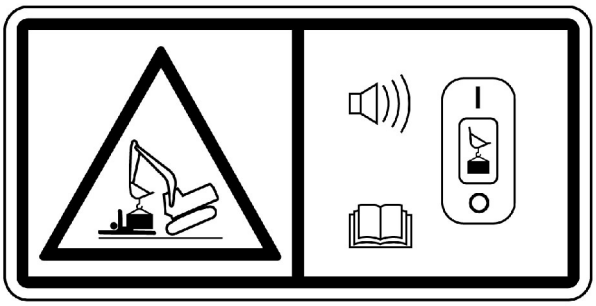

Illustration 15 g01602013

WARNING

Overloading the machine could impact the machine's stability which could result in a tipover hazard. A tipover hazard could result in serious injury or death. Always activate the overload warning device before you handle or lift objects.

Refer to Operation and Maintenance Manual, “Operator Controls” for further information.

Crushing Hazard (11)

If equipped, this safety message is located in the cab on the right side window.

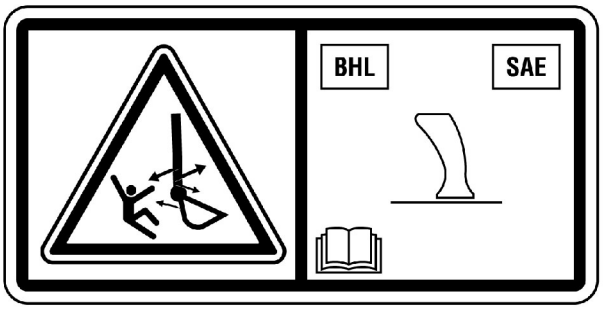

Illustration 16 g01374050

WARNING

Crush Hazard. Improper joystick setting could cause possible unexpected movement of the boom, stick, or worktool which could result in serious injury or death. Confirm that the joystick settings are properly configured before you operate the machine. Read the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, “Joystick Controls Alternate Patterns” for further information.

Crushing Hazard (12)

This safety message is located on the rear of each side of the machine.

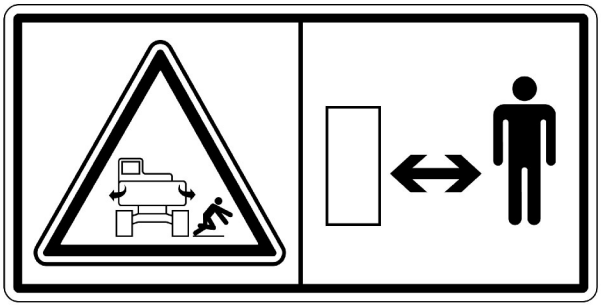

Illustration 17 g01374060

WARNING

Machine swings. Stay back. Crushing hazard could cause serious injury or death.

Aerosol Starting Aid (13)

This safety message is positioned on the housing of the engine air filter.

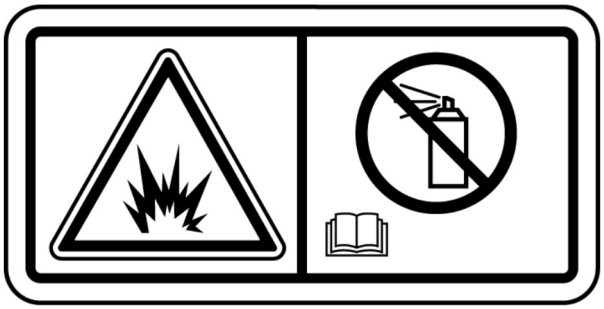

Illustration 18 g01372254

⚠ WARNING

Explosion hazard! Do not use ether! This machine is equipped with an air inlet heater. Using ether can create explosions or fires that can cause personal injury or death. Read and follow the starting procedure in the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, “Engine Starting” for the proper starting procedure.

Pressurized System (14)

This safety message is located inside the engine compartment next to the cooling system filler cap.

Illustration 19 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.

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

Jump Start Cables (15)

This safety message is positioned on the circuit breaker panel.

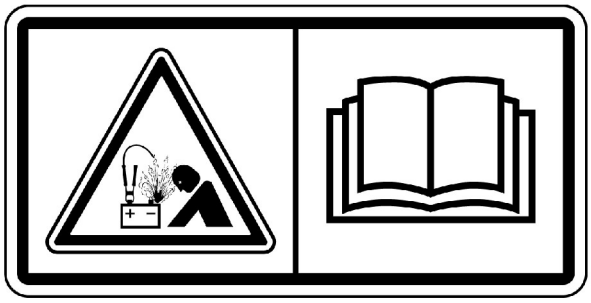

Illustration 20 g01370909

⚠ WARNING

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

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

High Pressure Cylinder (16)

This safety message is positioned on the track adjuster on both sides of the machine.

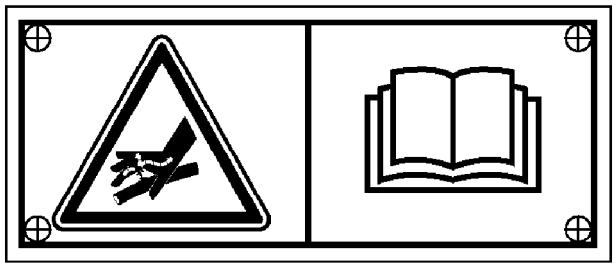

Illustration 21 g01076729

⚠ WARNING

High Pressure Cylinder. Do not remove any parts from the cylinder until all of the pressure has been relieved. This will prevent possible personal injury or death.

Refer to Operation and Maintenance Manual, “Track Adjustment - Adjust” for the adjustment procedure.

High Pressure Gas (17)

This safety message is positioned on the accumulator.

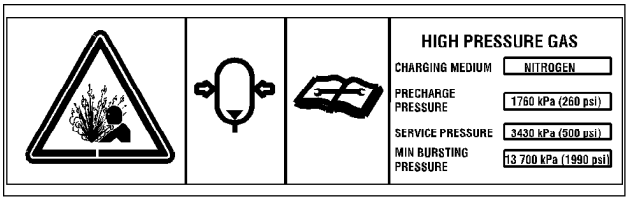

Illustration 22 g01055412

⚠ WARNING

This system contains high pressure gas. Failure to follow the instructions and warnings could cause an explosion, resulting in possible injury or death.

Do not expose to fire. Do not weld. Do not drill. Relieve pressure before discharging.

See Operation and Maintenance Manual for charging and discharging. See your Caterpillar Dealer for tools and detailed information.

Refer to Operation and Maintenance Manual, “Equipment Lowering with Engine Stopped” for further information.

Relieve Hydraulic Tank Pressure (18)

This safety message is located on top of the hydraulic tank.

Illustration 23 g01371640

WARNING

HYDRAULIC TANK

RELIEVE TANK PRESSURE WITH ENGINE OFF BY REMOVING CAP SLOWLY TO PREVENT BURNS FROM HOT OIL.

Crushing Hazard (19)

This safety message is located on both sides of the stick.

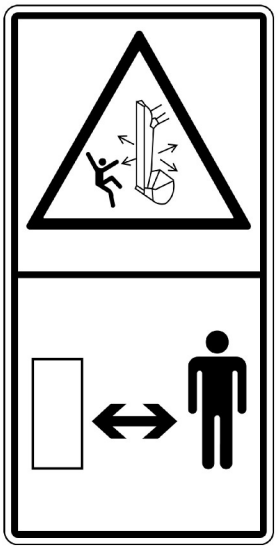

Illustration 24 g01385579

WARNING

A crushing hazard exists when the stick and boom are in motion and when the machine is being used in object handling applications. Failure to stay clear of the stick and boom when the machine is in operation can result in personal injury or death. Stay clear of the stick and boom when the machine is in operation.

i05274438

Additional Messages

SMCS Code: 7000; 7405

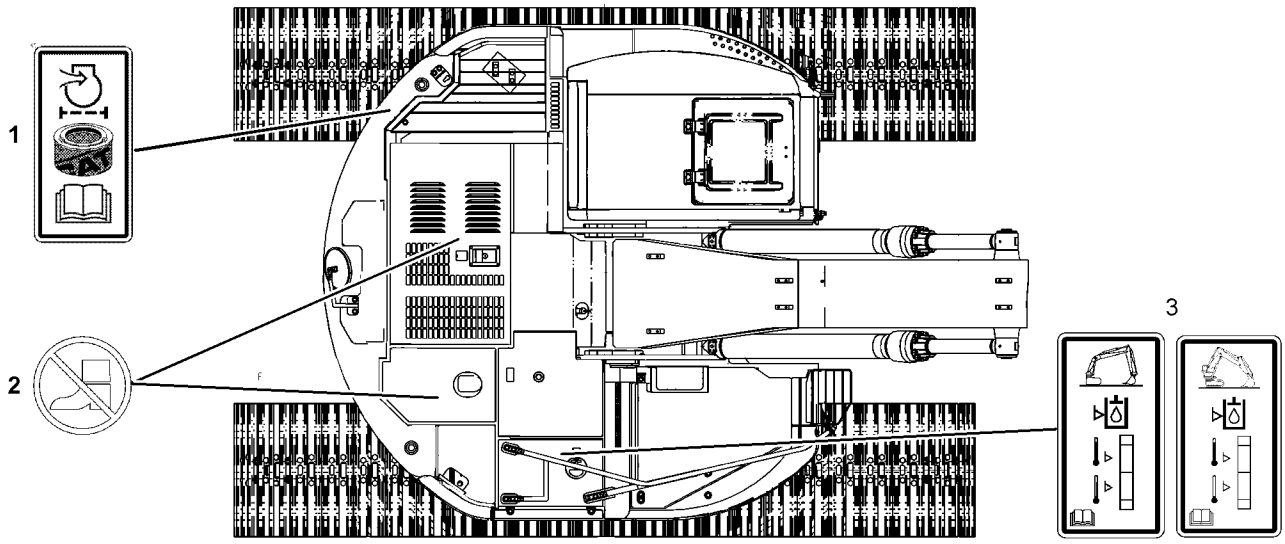

Illustration 25 g03354930

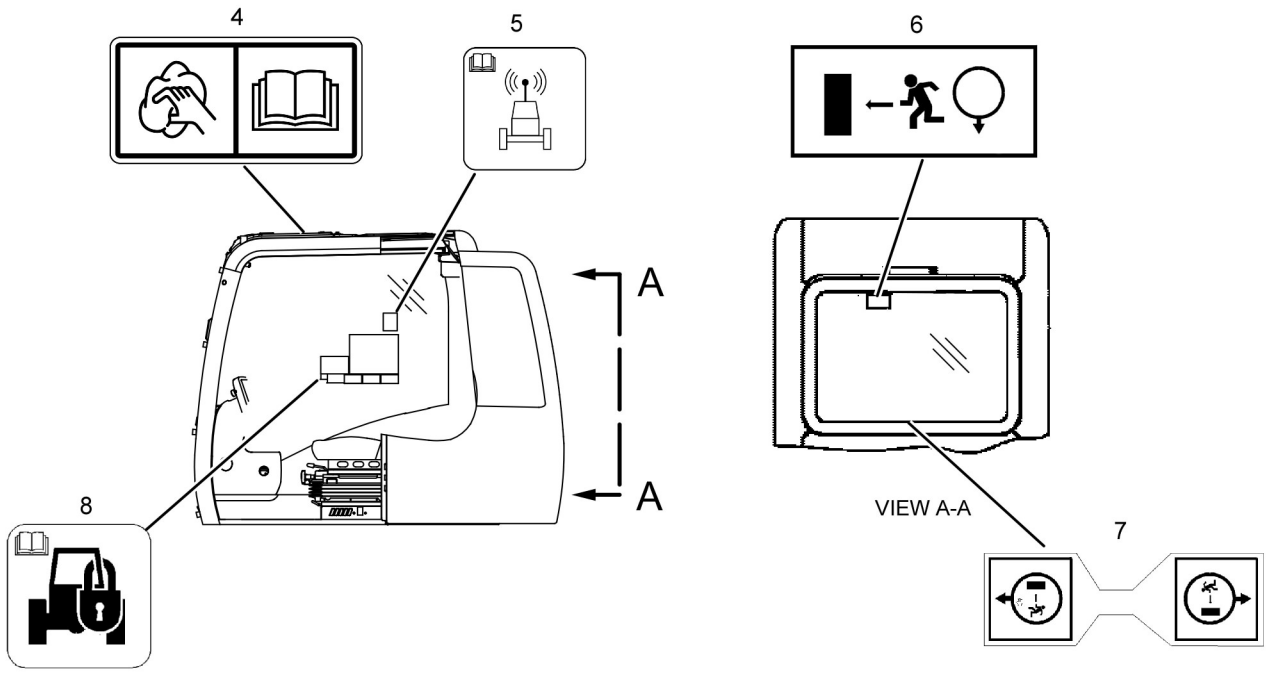

Illustration 26 g03354932

Additional messages inside cab (if equipped)

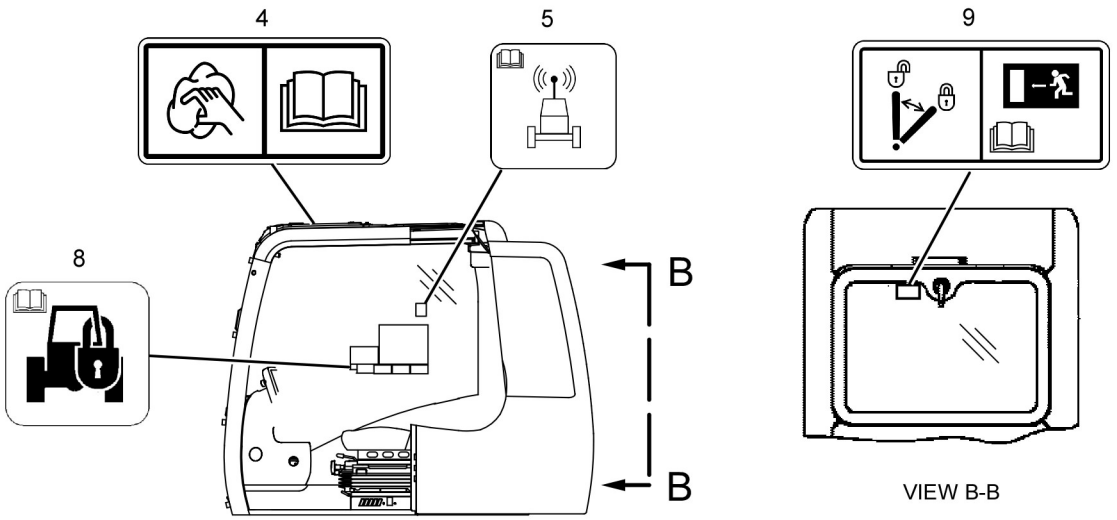

Illustration 27 g03354933

Additional messages inside cab (if equipped)

Radial Air Cleaner (1)

This message is located on the cover of the air cleaner.

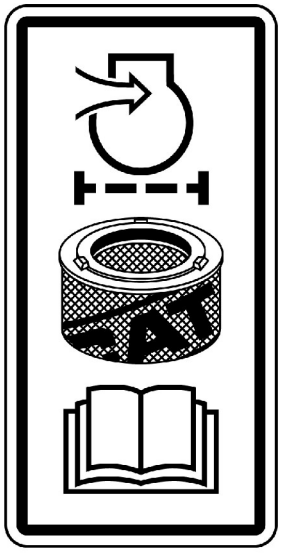

Illustration 28 g01134494

In order to avoid engine damage, replace old filters with radial seal air filters.

The location and design of the gasket for the radial seal air filter is critical to the proper operation of the air cleaner element. Use only Caterpillar replacements.

No Step (2)

This message is located on the engine cover on the top of the machine.

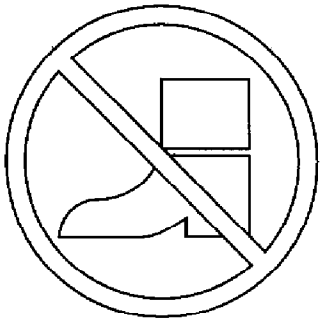

Illustration 29 g00911158

Do not step in this area.

Hydraulic Oil Level Check (3)

One-Piece Boom

This message is located in the right access compartment next to the sight gauge for the hydraulic oil.

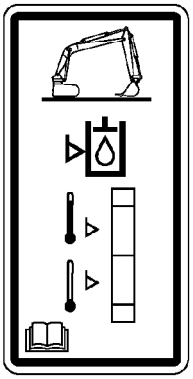

Illustration 30 g01069075

Check hydraulic oil level daily. See Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for details.

VA BOOM

This message is located in the right access compartment next to the sight gauge for the hydraulic oil.

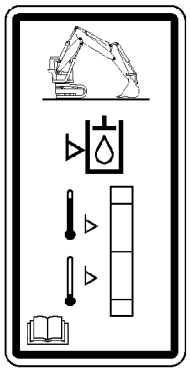

Illustration 31 g01069077

Check hydraulic oil level daily. See Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for details.

Clean Glass (4)

This message is located on the upper window in the cab.

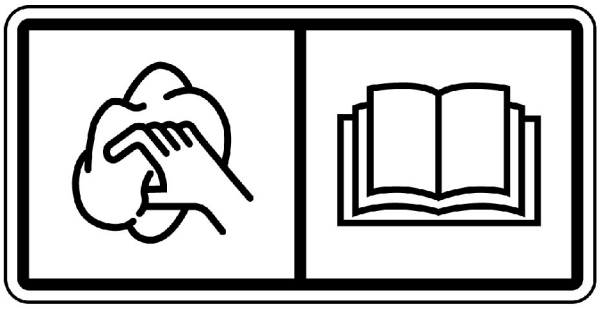

Illustration 32 g01134495

NOTICE
Clean windows with a wet cloth or sponge. Dry cloth or sponge may scratch window material.

Data Privacy (5)

If equipped, this message is located in the upper right corner of the rear window.

Illustration 33 g01418953

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.

This message is located on the window on the right side of the cab.

Alternate Exit (6)

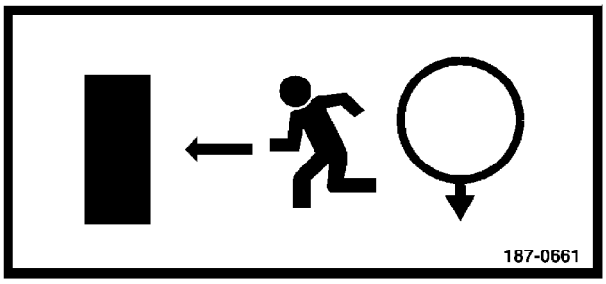

Illustration 34 g00915906

If the Primary exits are blocked, pull the ring in order to open the rear window. Exit the machine through the window opening.

For more information, refer to Operation and Maintenance Manual, “Alternate Exit”.

Ring for the Alternate Exit (7)

If equipped, this message is located on the ring for the alternate exit.

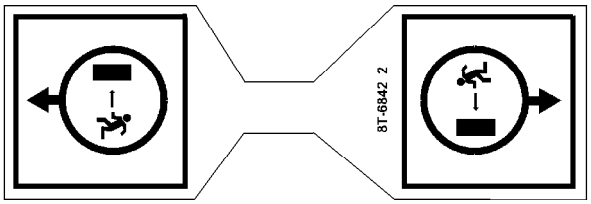

Illustration 35 g00915912

Pull the ring in order to open the alternate exit. Exit the machine through the window opening.

For more information, refer to Operation and Maintenance Manual, “Alternate Exit”.

Machine Security System (8)

This message is located on the window on the right side of the cab.

Illustration 36 g00951606

This machine may be equipped with a security system. Read the Operation and Maintenance Manual before you operate the machine.

Alternate Exit Lock/Unlock (9)

If equipped, this message is located on the rear window in the cab.

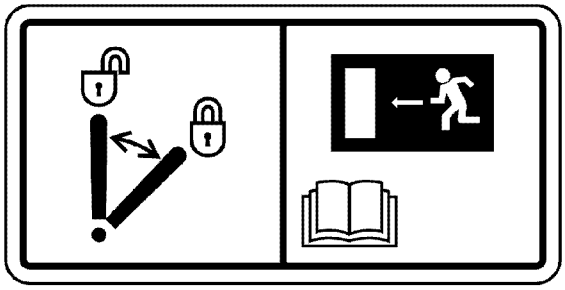

Illustration 37 g01353053

NOTICE
Unlock alternate exit window during machine operations.

Move the lever to the left to the UNLOCK position. Move the lever to the right to the LOCK position. Exit through rear window.

For more information, refer to Operation and Maintenance Manual, “Alternate Exit”.

i07500894

General Hazard Information

SMCS Code: 7000

Illustration 38 g00104545

Typical example

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

⚠ WARNING

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

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

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

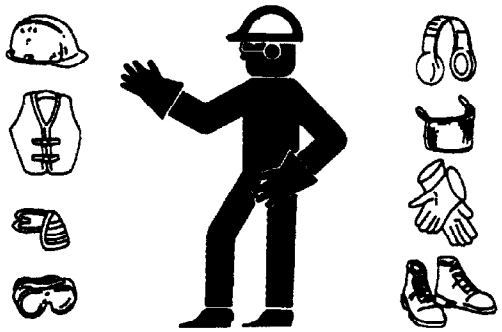

Illustration 39 g00702020

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

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

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

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

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

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

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

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

Obey all local regulations for the disposal of liquids.

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

Do not allow unauthorized personnel on the equipment.

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

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

Pressurized Air and Water

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

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

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

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

Trapped Pressure

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

Fluid Penetration

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

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

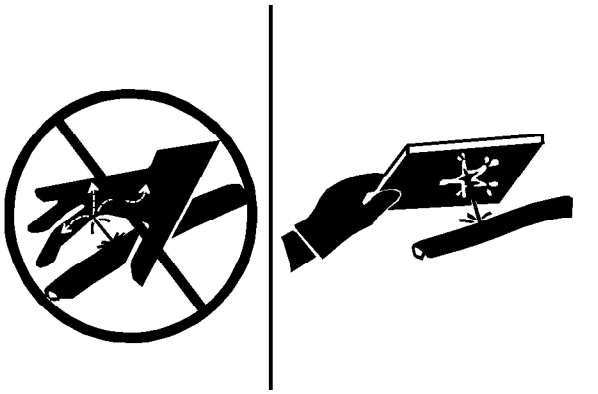

Illustration 40 g00687600

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

Containing Fluid Spillage

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

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

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

Obey all local regulations for the disposal of liquids.

Inhalation

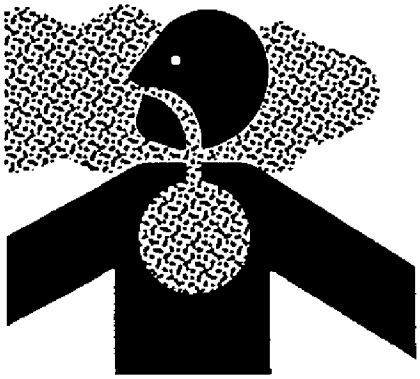

Illustration 41 g02159053

Exhaust

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

Asbestos Information

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

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

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

- Never use compressed air for cleaning.
- Avoid brushing materials that contain asbestos.
- Avoid grinding materials that contain asbestos.
- Use a wet method in order to clean up asbestos materials.
- A vacuum cleaner that is equipped with a high efficiency particulate air filter (HEPA) can also be used.
- Use exhaust ventilation on permanent machining jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place. In the United States, use Occupational Safety and Health Administration (OSHA) requirements. These OSHA requirements can be found in “29 CFR 1910.1001”. In Japan, use the requirements found in the “Ordinance on Prevention of Health Impairment due to Asbestos” in addition to the requirements of the Industrial Safety and Health Act.
- Obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

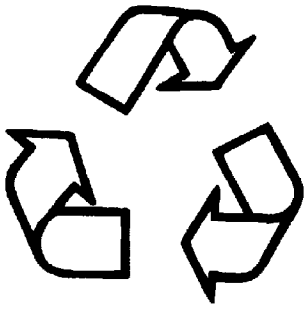

Illustration 42 g00706404

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.

i04760300

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i06180998

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 43 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 44 g03839130

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

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

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

Battery and Battery Cables

Illustration 45 g03839133

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

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

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

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

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

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

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

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

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

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

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

⚠ WARNING

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

Wiring

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

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration

- Cuts on insulation
- Other damage

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

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

Consult your Cat dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

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

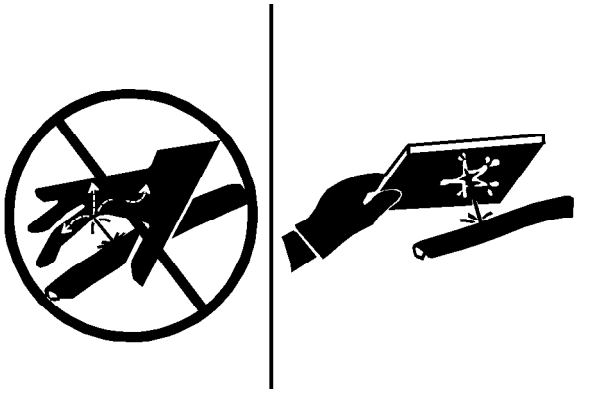

Illustration 46 g00687600

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

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

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

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

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

Ether

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

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

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

i02722208

Fire Extinguisher Location

SMCS Code: 7000; 7419

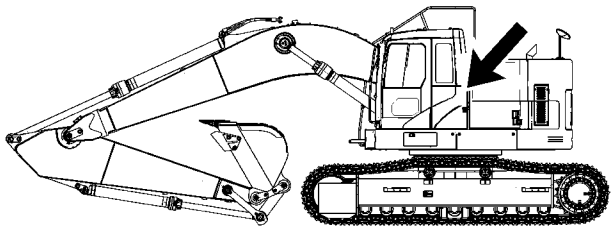

Illustration 47 g01366123

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

i01329108

Track Information

SMCS Code: 4170; 7000

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

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

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

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

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

- Mount the machine.
- Dismount the machine.

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

i00771840

Before Starting Engine

SMCS Code: 1000; 7000

Start the engine only from the operator compartment. Never short across the starter terminals or across the batteries. Shorting could damage the electrical system by bypassing the engine neutral start system.

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

Adjust the seat so that full pedal travel can be achieved with the operator's back 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 machine lights are working properly.

Before you start the engine and before you move the machine, make sure that no one is underneath the machine, around the machine, or on the machine. Make sure that the area is free of personnel.

i03562260

Engine Starting

SMCS Code: 1000; 7000

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

Make sure that you are seated before you start the engine.

Move all hydraulic controls to the HOLD position before you start the engine. Move the hydraulic lockout control to the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Operator Controls”.

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

Briefly sound the horn before you start the engine.

i01340061

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

Clear all obstacles from the machine's path. Beware of hazards (wires, ditches, etc).

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

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

Fasten the seat belt securely.

Warm up the engine and the hydraulic oil before operating the machine.

Before moving the machine, check the position of the undercarriage. The normal travel position is with the idler wheels to the front under the cab and the drive sprockets to the rear. When the undercarriage is in the reversed position, the directional controls must be operated in opposite directions.

i04159629

Work Tools

SMCS Code: 6700

Only use work tools that are recommended by Caterpillar for use on Cat machines.

Use of work tools, including buckets, which are outside of Caterpillar's recommendations or specifications for weight, dimensions, flows, pressures, and so on. may result in less-than-optimal vehicle performance, including but not limited to reductions in production, stability, reliability, and component durability. Caterpillar recommends appropriate work tools for our machines to maximize the value our customers receive from our products. Caterpillar understands that special circumstances may lead a customer to use tools outside of our specifications. In these cases, customers must be aware that such choices can reduce vehicle performance and will affect their ability to claim warranty in the event of what a customer may perceive as a premature failure.

Work tools and work tool control systems, that are compatible with your Cat machine, are required for safe machine operation and/or reliable machine operation. If you are in doubt about the compatibility of a particular work tool with your machine, consult your Cat dealer.

Make sure that all necessary guarding is in place on the host machine and on the work tool.

Keep all windows and doors closed on the host machine. A polycarbonate shield must be used when the host machine is not equipped with windows and when a work tool could throw debris.

Do not exceed the maximum operating weight that is listed on the ROPS certification.

If your machine is equipped with an extendable stick, install the transport pin when you are using the following work tools: hydraulic hammers, augers and compactors

Always wear protective glasses. Always wear the protective equipment that is recommended in the operation manual for the work tool. Wear any other protective equipment that is required for the operating environment.

To prevent personnel from being struck by flying objects, ensure that all personnel are out of the work area.

While you are performing any maintenance, any testing, or any adjustments to the work tool stay clear of the following areas: cutting edges, pinching surfaces and crushing surfaces.

Never use the work tool for a work platform.

i04862936

Visibility Information

SMCS Code: 7000

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

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

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

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

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

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

i07529751

Operation

SMCS Code: 7000

Machine Operating Temperature Range

The machine must function satisfactorily in the anticipated ambient temperature limits that are encountered during operation. The standard machine configuration is intended for use within an ambient temperature range of −18 °C (0 °F) to 43 °C (109 °F). Special configurations for different ambient temperatures may be available. Consult your Cat dealer for additional information on special configurations of your machine.

Limiting Conditions and Criteria

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

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

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

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

Machine Operation

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 of all protective devices while you operate the machine slowly in an open area.

When the machine is moving watch the clearance of the boom. Uneven ground can cause the boom to move in all directions.

Make sure that no personnel will be endangered before you move the machine. Do not allow riders on the machine unless the machine has an additional seat with a seat belt.

Report any machine damage that was noted during machine operation. Make any necessary repairs.

Never use the work tool for a work platform.

Hold attachments approximately 40 cm (15 inches) above ground level while you drive the machine. Do not drive the machine close to an overhang, to the edge of a cliff, or to the edge of an excavation.

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

Be careful to avoid any ground condition which could cause the machine to tip. Tipping can occur when you work on hills, on banks, or on slopes. Tipping can also occur when you cross ditches, ridges, or other unexpected obstructions.

When possible, operate the machine up slopes and down slopes with the final drive sprockets facing down the slope. Avoid operating the machine across the slope. Place the heaviest end of the machine uphill when you are working on an incline.

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

Avoid changing the direction of travel on a slope. Changing the direction of travel on a slope could result in tipping or side slipping of the machine.

Bring the load close to the machine before traveling any distances.

Bring the load close to the machine before swinging the load.

Lifting capacity decreases as the load is moved further from the machine.

Make sure that the towing eyes and the towing devices are adequate for your needs.

Only connect trailing equipment to a drawbar or to a hitch.

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

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

Check the local regulations, state codes, and/or directives of the job site for a specific minimum distance from obstacles.

Before you operate the machine, check with local utilities for the locations of underground pipes and for the locations of buried cables.

Know the maximum dimensions of your machine.

Watch the load at all times.

Do not operate the machine without the counterweight. The machine can tip when the boom is over the side.

The clamshell, the grapple, or the magnet can swing in all directions. Move the joysticks in a continuous motion. Failure to move the joysticks in a continuous motion can cause the clamshell, the grapple, or the magnet to swing into the cab or into a person in the work area. This will result in personal injury.

Certain machine front linkage combinations (boom, stick, quick coupler, work tool) can allow the work tool to contact the machine undercarriage, swing frame, boom, boom hydraulic cylinder and or the cab. Be aware of the position of the work tool while you operate the machine.

Shut down the machine until damaged or non-functioning visibility aid(s) is repaired (if applicable) or until appropriate job site organization is used to minimize hazards that are caused by any resulting restricted visibility.

Machine Operation when the Machine is not Completely Assembled

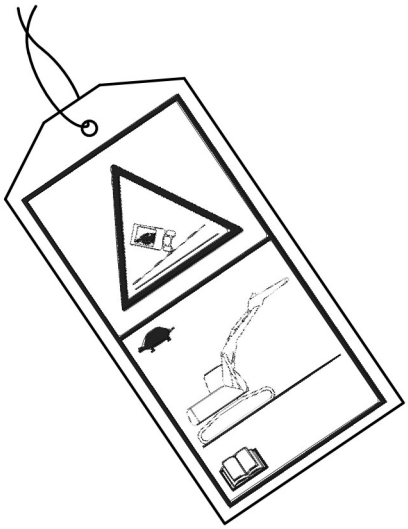

Illustration 48 g02202544

Attach the tag to the controls of the machine. When the tag is attached to the controls, operate the machine as described below.

If the machine needs to be operated without the boom, stick, and/or counterweight being installed, the machine should be operated slowly on flat, stable ground or pavement by qualified operators. Avoid any machine operations which could affect machine stability, including the swing function. The ROPS structural certification depends on the support of the boom, stick, and counterweight in the event of a machine tip over or a machine rollover incident.

i06299648

Engine Stopping

SMCS Code: 1000; 7000

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

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

i07262981

Lifting Objects

SMCS Code: 7000

There may be local regulations and/or government regulations that govern the use of machines which lift heavy objects. Obey all local and government regulations.

If this machine is used to lift objects within an area that is controlled by the European Directive “2006/42/EC”, the machine must be equipped with a boom lowering control valve, a stick lowering control valve, and an overload warning device.

i02720309

Parking

SMCS Code: 7000

The hydraulic system remains pressurized provided that the accumulator is charged. This condition is true even when the engine is not running. This pressure should decrease in a short time (approximately one minute). While the hydraulic system maintains a charge, the hydraulic implements and machine controls remain functional.

Machine movement that is sudden and unexpected will occur if any of the controls are moved. This can cause personal injury or death.

Always move the hydraulic lockout control to the LOCKED position before you shut off the engine or immediately after the engine stops running.

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

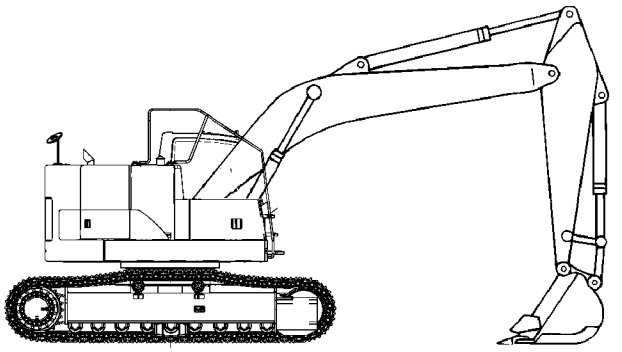

Illustration 49 g01357600

Place the machine in the servicing position.

Note: Make sure that all work tools are in the recommended servicing position before servicing the machine.

Move the hydraulic lockout control to the LOCKED position.

Stop the engine.

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

Turn the battery disconnect switch to the OFF position. Remove the disconnect switch key if you do not operate the machine for an extended period of time. This will prevent drainage of the battery. A battery short circuit, any current draw from certain components, and vandalism can cause drainage of the battery.

i07378239

Slope Operation

SMCS Code: 7000

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

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

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

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

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

Direction of travel – Avoid operating the machine across the slope. When possible, operate the machine up the slopes and operate the machine down the slopes. Place the heaviest end of the machine uphill when you are working on an incline.

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

Nature of surface – Ground that has been newly filled with earth may collapse from the weight of the machine.

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

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

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

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

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

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

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

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

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

i01329161

Equipment Lowering with Engine Stopped

SMCS Code: 7000-II

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.

i03768769

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

Hearing protection may be needed when the machine is operated with an open operator station 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.

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

The average exterior sound pressure level is 102 dB (A) when the “ISO 6395” procedure is used to measure the value for the standard machine.

The interior sound pressure level is 79 dB(A) when “ISO 6396” is used to measure the value for an enclosed cab. 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 Excavator

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 excavators.

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 Excavator	excavating	0,44	0,27	0,30	0,24	0,16	0,17
	hydraulic breaker application	0,53	0,31	0,55	0,30	0,18	0,28
	mining application	0,65	0,42	0,61	0,21	0,15	0,32
	transfer	0,48	0,32	0,79	0,19	0,20	0,23

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

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

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

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

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

a. Tire pressures

b. Brake and steering systems

c. Controls, hydraulic system and linkages

3. Keep the terrain in good condition.

a. Remove any large rocks or obstacles.

b. Fill any ditches and holes.

c. Provide machines and schedule time 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 excavators.

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:

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

b. Adjust the mirrors in order to minimize twisted posture.

c. Provide breaks in order to reduce long periods of sitting.

d. Avoid jumping from the cab.

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

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

Sources

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

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

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

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

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

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

Caterpillar, Inc.
www.cat.com

i07199012

Operator Station

SMCS Code: 7300; 7301; 7325

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.

i07349154

Guards
(Operator Protection)

SMCS Code: 7000; 7150

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

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

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

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

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

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

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

Other Guards (If Equipped)

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

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

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

- Demolition applications
- Rock quarries
- Forestry products

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

Product Information Section

General Information

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Specifications

SMCS Code: 7000

Intended Use

The intended use of this machine is for excavating with a bucket or working with approved work tools. The machine should be operated with the undercarriage in a stationary position since the upper structure is normally capable of 360 degree swing with mounted equipment. This machine can be used in object handling applications that are within the lift capacity of the machine. When this machine is used in object handling applications, ensure that the machine is properly configured and operated properly. Obey any local governmental regulations and regional governmental regulations. Only lift objects from approved lifting points and with approved lifting devices.

Specification Data

Consult your Caterpillar dealer for specifications that are not included in the tables.

Basic machine specifications are listed below.

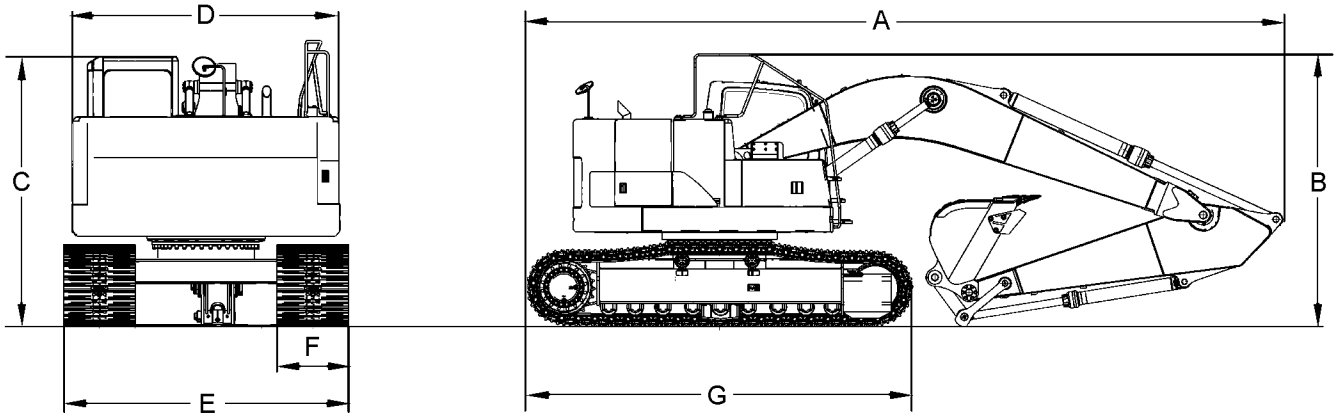

Illustration 50 g01946060

Table 2

321D LCR Excavator[1]	
Overall Length (A)	8870 mm (29 ft 2 inch)
Overall Height (B)	3030 mm (9 ft 11 inch)
Height of Cab (C)	2990 mm (9 ft 9 inch)
Width of Upper Structure (D)	2980 mm (9 ft 9 inch)
Overall Width (E)	3170 mm (10 ft 5 inch)
Track Shoe Width (F)	790 mm (32 inch)
Length of Track (G)	4455 mm (14 ft 7 inch)

(1) These specifications are for a machine that has a 5.7 m (18 ft 8 inch) boom, a 2.92 m (9 ft 7 inch) stick, and a 1.0 m^3 (1.3 yd^3) bucket.

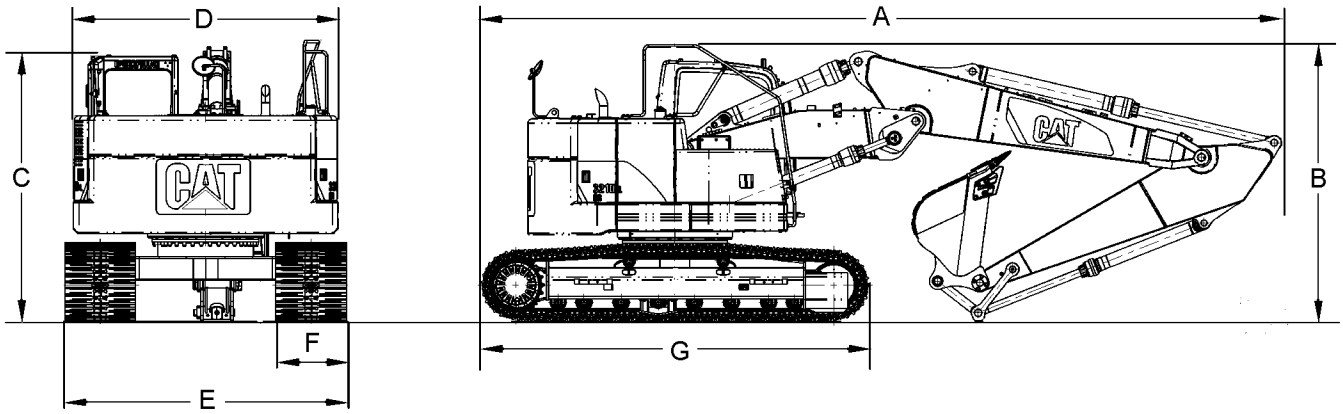

Illustration 51 g01945573

Table 3

321D LCR Excavator[1]	
Overall Length (A)	9180 mm (30 ft 1 inch)
Overall Height (B)	3170 mm (10 ft 5 inch)
Height of Cab (C)	2990 mm (9 ft 9 inch)
Width of Upper Structure (D)	2980 mm (9 ft 9 inch)
Overall Width (E)	3170 mm (10 ft 5 inch)
Track Shoe Width (F)	790 mm (32 inch)
Length of Track (G)	4455 mm (14 ft 7 inch)

(continued)

(Table 3, contd)

(1) These specifications are for a machine that has a VA boom, a 2.92 m (9 ft 7 inch) stick, and a 0.9 m^3 (1.2 yd^3) bucket.

Working Ranges

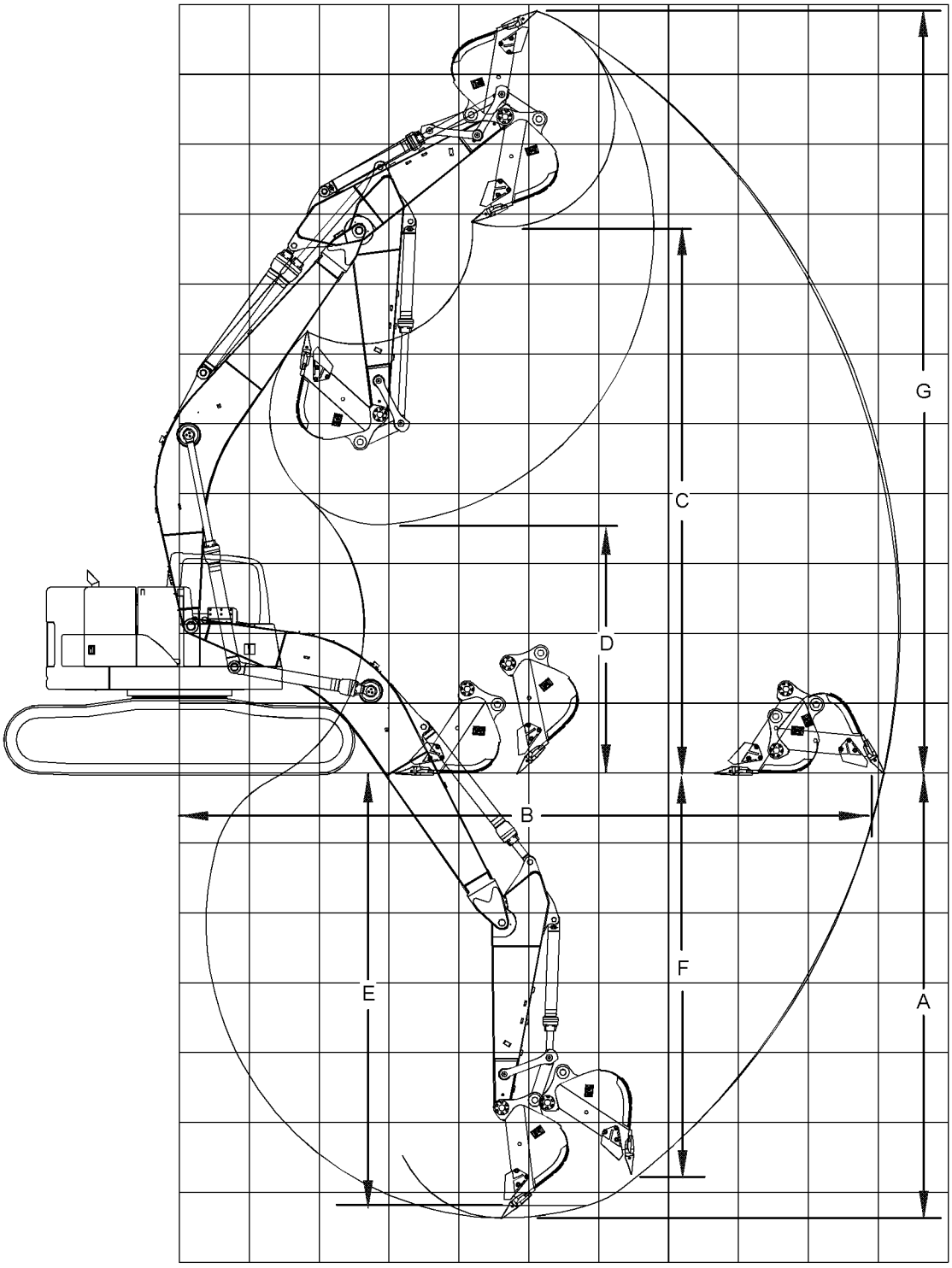

Illustration 52 g01944450

Table 4

321D LCR Excavator		
	568 m (18 ft 7 inch) Reach Boom	
	2.9 m (9 ft 7 inch) Stick	2.5 m (8 ft 2 inch) Stick
Bucket	1.0 m^3 (1.31 yd^3)	
Maximum Digging Depth (A)	6710 mm (22 ft)	6290 mm (20 ft 08 inch)
Maximum Reach at Ground Level (B)	9790 mm (32 ft 1 inch)	9390 mm (30 ft 10 inch)
Maximum Loading Height (C)	7890 mm (25 ft 11 inch)	7600 mm (24 ft 11 inch)
Minimum Loading Height (D)	2960 mm (9 ft 9 inch)	3380 mm (11 ft 1 inch)
Maximum Cut Depth (E)(1)	6280 mm (20 ft 7 inch)	5880 mm (19 ft 3 inch)
Maximum Digging Depth (Vertical Wall) (F)	5890 mm (19 ft 4 inch)	5490 mm (18 ft 0 inch)
Maximum Cutting Height (G)	11010 mm (36 ft 1 inch)	10720 mm (35 ft 2 inch)

(1) 2440 mm (8 ft) level bottom

Table 5

321D LCR Excavator with quick coupler		
	5.68 m (18 ft 7 inch) Reach Boom	
	2.9 m (9 ft 7 inch) Stick	2.5 m (8 ft 2 inch) Stick
Bucket	1.0 m^3 (1.31 yd^3)	
Maximum Digging Depth (A)	6970 mm (22 ft 10 inch)	6550 mm (21 ft 6 inch)
Maximum Reach at Ground Level (B)	10050 mm (33 ft)	9650 mm (31 ft 8 inch)
Maximum Loading Height (C)	7630 mm (25 ft)	7340 mm (24 ft 1 inch)
Minimum Loading Height (D)	2710 mm (8 ft 11 inch)	3120 mm (10 ft 3 inch)
Maximum Cut Depth (E)(1)	6560 mm (21 ft 6 inch)	6140 mm (20 ft 2 inch)
Maximum Digging Depth (Vertical wall) (F)	5200 mm (17 ft 1 inch)	4810 mm (15 ft 9 inch)
Maximum Cutting Height (G)	11260 mm (36 ft 11 inch)	10970 mm (35 ft 0 inch)

(1) 2440 mm (8 ft) level bottom

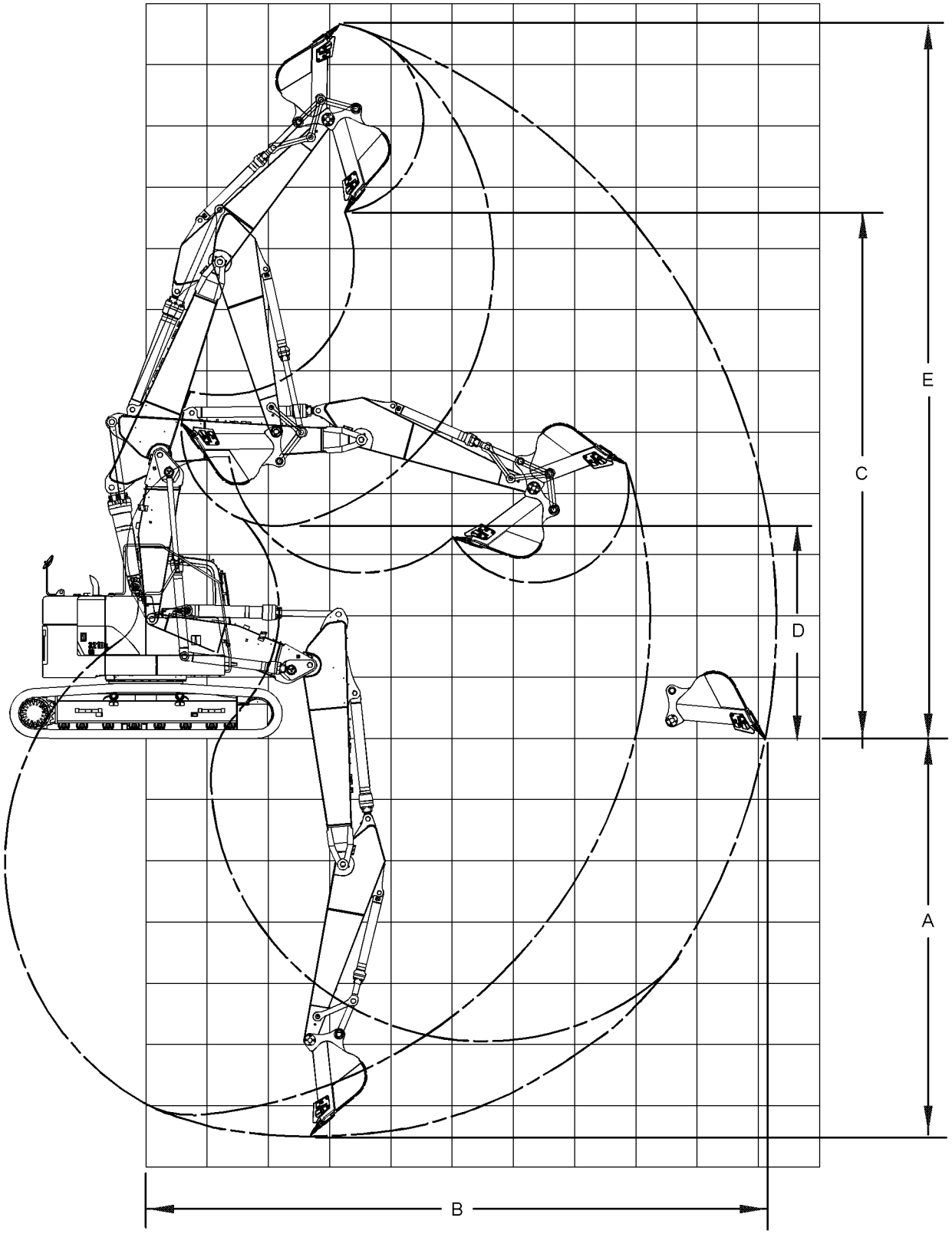

Illustration 53 g01945694

Table 6

321D LCR Excavator	
	VA Boom 2.9 m (9 ft 7 inch) Stick 0.9 m^3 (1.2 yd^3)Bucket
Maximum Digging Depth (A)	6475 mm (21 ft 3 inch)
Maximum Reach at Ground Level (B)	10300 mm (33 ft 10 inch)
Maximum Loading Height (C)	8580 mm (28 ft 2 inch)
Minimum Loading Height (D)	3460 mm (11 ft 4 inch)
Maximum Cutting Height (E)	11650 mm (38 ft 3 inch)

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Boom/Stick/Bucket Combinations

SMCS Code: 6000; 6700

This machine can be equipped with a large variety of boom-stick-bucket combinations in order to meet the needs of various applications.

Buckets are grouped into families according to the capacity of the bucket. Generally, use a bucket with a smaller capacity when you are using a longer stick and/or a longer boom. Conversely, use a bucket with a larger capacity when you are using a shorter stick and/or a shorter boom. This rule ensures better machine stability and protection against structural machine damage.

The following tables show various compatible boom-stick-bucket combinations. Select an optimum combination according to the working conditions and according to the type of work that is being done.

Table 7

321D LCR Excavator						
SAE Capacity of Bucket	**Weight of Bucket**	**Width of Bucket**	**Track Shoe Width**	**Counterweight**	**5.7 m (18 ft 8 inch) Reach Boom**	
					2.9 m (9 ft 6 inch) Stick	**2.5 m (8 ft 2 inch)**
0.82 m^3 (1.05 yd^3)	877 kg (1933 lb)	918 mm (36 inch)	600 mm (24 inch)		(1)	
0.82 m^3 (1.07 yd^3)	887 kg (1956 lb)	918 mm (36 inch)	800 mm (32 inch)		(1)	(1)

(1) 1800 kg/m^3 (3400 lb/yd^3) is the maximum density of material.

For more information, consult your Caterpillar Dealer.

i04927538

Lifting Capacities

SMCS Code: 7000

⚠ WARNING

Failure to comply to the rated load can cause possible personal injury or property damage. Review the rated load of a particular work tool before performing any operation. Make adjustments to the rated load as necessary for non-standard configurations.

Note: Lifting capacities are based upon a standard machine with the following conditions:

- lubricants
- full fuel tank
- Steel track
- cab
- 75 kg (165 lb) operator

Lifting capacities will vary with different work tools and attachments. Consult your Caterpillar dealer regarding the lifting capacities for specific work tools and attachments.

Note: Lifting capacities should be used as a guide. Work tools, uneven ground conditions, soft ground conditions, or poor ground conditions have effects on lifting capacities. The operator is responsible for being aware of these effects.

Special hazards (toxic gases, ground conditions, etc) require special precautions. The operator must determine whether special hazards exist in each application. The operator shall perform the appropriate steps in order to eliminate the hazard. The operator shall perform the appropriate steps in order to reduce the hazard.

For European applications, the lifting capacities are defined by “ISO 10567 2007”. The lifting capacities are defined as the lower value of 75% of the static tipping capacity or 87% of the hydraulic lift capacity.

The lifting capacities were calculated with a machine that was equipped with a standard bucket. The difference between the weight of a work tool attachment and the standard bucket must be subtracted.

This machine may be equipped with a variety of sticks. Lifting capacities may vary between the different sticks. Measure the distance on the stick between the boom hinge pin and the work tool hinge pin. This distance will inform you of the size of the stick that is equipped on the machine.

Note: In European countries, regulations require a load sensing indicator and a boom lowering control device if more than 1000 kg (2200 lb) is lifted during object handling applications. Regulations also require a load sensing indicator and a boom lowering control device if a force that is greater than 40000 N·m (29500 lb ft) is created during object handling applications. Even if the hydraulic lift capacity is capable, do not exceed a load of 1000 kg (2200 lb). Do not exceed a force of 40000 N·m (29500 lb ft) in European object handling applications.

Reach Boom

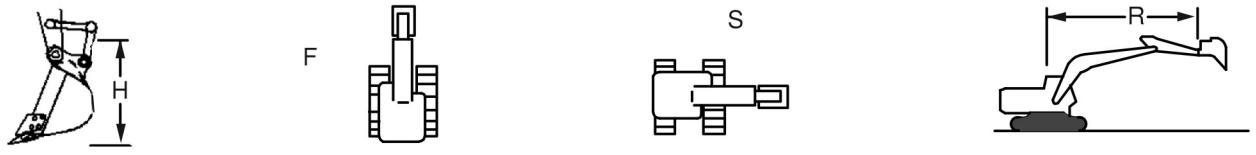


Illustration 54 g03098198

Lift Point : Lifting eye on power link

(H) Lift point Height
(F) Lifting capacity over the front or rear of the machine
(S) Lifting capacity over the side of the machine
(R) Lift point radius

Table 8

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a 0.82 m^3 (1.07 yd^3) bucket, and 600 mm (24 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Standard Mode

H	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft									2100 (2) 4500(2)		5.77 18.3
7.5 m 25.0 ft					3600(2) 7350(2)	3600(2) 7350(2)			2350(2) 5200(2)		7.19 23.31
6.0 m 20.0 ft			4950(2) 10750(2)		4850(2) 10600(2)	4700 10050	3750(2) 7450(2)	3100 6650	2350(2) 5150(2)		8.03 26.21
4.5 m 15.0 ft	6850(2) 14150(2)		6350(2) 13700(2)		5450(2) 11850(2)	4550 9700	5000(2) 10800(2)	3000 6450	2450(2) 5350	2350 5200	8.5 27.84
3.0 m 10.0 ft			8600(2) 18400(2)	6800 14650	6450(2) 13900(2)	4300 9200	5050 10800	2900 6200	2650(2) 5800(2)	2200 4800	8.68 28.47
1.5 m 5.0 ft			10500(2) 22550(2)	6300 13500	7100 15200	4050 8650	4900 10500	2800 5950	2850(2) 6200(2)	2100 4600	8.76 28.75
0 m 0 ft			11150(2) 24000(2)	6050 12950	6900 14800	3850 8250	4800 10300	2700 5750	3150(2) 6900(2)	2150 4650	8.59 28.1
-1.5 m -5.0 ft	9200(2) 21000(2)		10850(2) 23500(2)	6000 12850	6800 14600	3800 8100	4750 10200	2650 5700	3700(2) 8100(2)	2350 5150	8.12 26.6
-3.0 m -10.0 ft	13050(2) 28250(2)	12400 26450	9700(2) 21000(2)	6050 13000	6850 14700	3800 8200			4700(2) 10400(2)	2850 6250	7.29 23.82
-4.5 m -15.0 ft	9650(2) 20600(2)		7400(2) 15700(2)	6250 13450					5050(2) 11050(2)	4050 9100	5.95 19.25

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 9

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a 0.82 m³ (1.07 yd³) bucket, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft									2150[2] 4650[2]		5.77 18.3
7.5 m 25.0 ft					3700[2] 7550[2]				2450[2] 5400[2]		7.19 23.31
6.0 m 20.0 ft			5150[2] 11150[2]		5000[2] 11000[2]	4700 10050	3900[2] 7750[2]	3100 6650	2450[2] 5350[2]		8.03 26.21
4.5 m 15.0 ft	7050[2] 14600[2]		6600[2] 14150[2]		5650[2] 12300[2]	4550 9700	5150[2] 11050[2]	3000 6450	2550[2] 5550	2350 5200	8.5 27.84
3.0 m 10.0 ft			8900[2] 19050[2]	6800 14650	6650[2] 14400[2]	4300 9200	5050 10800	2900 6200	2750[2] 6050[2]	2200 4800	8.68 28.47
1.5 m 5.0 ft			10850[2] 23350[2]	6300 13500	7100 15200	4050 8650	4900 10500	2800 5950	2950[2] 6640[2]	2100 4600	8.76 28.75
0 m 0 ft			11200[2] 24000[2]	6050 12950	6900 14800	3850 8250	4800 10300	2700 5750	3250[2] 7150[2]	2150 4650	8.59 28.1
-1.5 m -5.0 ft	9500[2] 21650[2]		11100 23850	6000 12850	6800 14600	3800 8100	4750 10200	2650 5700	3800[2] 8400[2]	2350 5150	8.12 26.6
-3.0 m -10.0 ft	13500[2] 29300[2]	12400 26450	10050[2] 21750[2]	6050 13000	6850 14700	3800 8200			4850[2] 10750[2]	2850 6250	7.29 23.82
-4.5 m -15.0 ft	10000[2] 21400[2]		7700[2] 16300[2]	6250 13450					5250[2] 11500[2]	4050 9100	5.95 19.25

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 10

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a 0.82 m³ (1.07 yd³) bucket, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft									2050[2] 4400[2]		5.78 18.35
7.5 m 25.0 ft					3500[2] 7200[2]				2350[2] 5150[2]		7.21 23.36

(continued)

(Table 10, contd)

6.0 m 20.0 ft			4950(2) 10750(2)		4850(2) 10550(2)	4800 10300	3750(2) 7450(2)	3200 6850	2350(2) 5100(2)		8.04 26.25
4.5 m 15.0 ft	6680(2) 14150(2)		6350(2) 13650(2)		5450(2) 11800(2)	4650 10000	5000(2) 10750(2)	3100 6650	2450(2) 5300(2)		8.51 27.86
3.0 m 10.0 ft			8550(2) 18350(2)	7000 15050	6400(2) 13850(2)	4400 9450	5200 11100	3000 6400	2650(2) 5800(2)	2250 4950	8.69 28.49
1.5 m 5.0 ft			10450(2) 22550(2)	6450 13900	7300 15650	4150 8900	5050 10850	2900 6150	2850(2) 6200(2)	2150 4750	8.76 28.75
0 m 0 ft			11150(2) 24100(2)	6200 13350	7100 15200	4000 8550	4950 10600	2800 5950	3150(2) 6900(2)	2200 4850	8.59 28.17
-1.5 m -5.0 ft	9150(2) 20900(2)		10850 23500	6150 13200	7000 15050	3900 8400	4900 10550	2750 5850	3700(2) 8100(2)	2400 5300	8.12 26.6
-3.0 m -10.0 ft	13050(2) 28300(2)	12700 27200	9700(2) 21000(2)	6250 13400	7050 15100	3950 8450			4700(2) 10400(2)	2900 6450	7.29 23.82
-4.5 m -15.0 ft	10000(2) 21400(2)		7700(2) 16300(2)	6250 13450					5050(2) 11050(2)	4150 9400	5.95 19.26

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 11

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a 0.82 m^3 (1.07 yd^3) bucket, and 790 mm (31 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft									2100(2) 44550(2)		5.78 18.35
7.5 m 25.0 ft					3600(2) 7400(2)				2450(2) 5350(2)		7.21 23.36
6.0 m 20.0 ft			5100(2) 11100(2)		5000(2) 10950(2)	4800 10300	3900(2) 7750(2)	3200 6850	2400(2) 5300(2)		8.04 26.25
4.5 m 15.0 ft	7000(2) 14600(2)		6600(2) 14150(2)		5650(2) 12250(2)	4650 10000	5200(2) 11150(2)	3100 6650	2500(2) 5500(2)	2450 5350	8.51 27.86
3.0 m 10.0 ft			8850(2) 19000(2)	7000 15050	6650(2) 14350(2)	4400 9450	5200 11100	3000 6400	2750(2) 6000(2)	2250 4950	8.69 28.49
1.5 m 5.0 ft			10850(2) 23350(2)	6450 13900	7300 15650	4150 8900	5050 10850	2900 6150	2950(2) 6450(2)	2150 4750	8.76 28.75
0 m 0 ft			11550(2) 24700(2)	6200 13350	7100 15200	4000 8550	4950 10600	2800 5950	2950(2) 6450(2)	2200 4850	8.59 28.17

(continued)

(Table 11, contd)

-1.5 m -5.0 ft	9450[2] 21550[2]		11250 24350	6150 13200	7000 15050	3900 8400	4900 10550	2750 5850	3800[2] 8400[2]	2400 5300	8.12 26.6
-3.0 m -10.0 ft	13500[2] 29300[2]	12700 27200	10100[2] 21750[2]	6250 13400	7050 15100	3950 8450			4850[2] 10750[2]	2900 6450	7.29 23.82
-4.5 m -15.0 ft	10050[2] 21450[2]		7700[2] 16300[2]	6240 13850					5250[2] 11500[2]	4150 9400	5.95 19.26

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 12

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.5 m (8 ft 2 inch) stick, a 0.82 m³ (1.07 yd³) bucket, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft									2000[2] 4400[2]		5.15
7.5 m 25.0 ft					3100[2] 6800[2]				2350[2] 5150[2]		6.7 21.68
6.0 m 20.0 ft			5500[2] 12050[2]		5250[2] 11450[2]	4750 10200			2800[2] 6150[2]		7.6 24.79
4.5 m 15.0 ft	10050[2] 21050[2]		7000[2] 15050[2]		5850[2] 12650[2]	4600 9850	5250[2] 10450[2]	3050 6550	2950[2] 6450[2]	2650 5850	8.09 26.5
3.0 m 10.0 ft			9200[2] 19750[2]	6850 14700	6750[2] 14550[2]	4350 9300	5150 11050	2950 6350	3250[2] 7100[2]	2450 5400	8.28 27.16
1.5 m 5.0 ft			10850[2] 23350[2]	6350 13650	7250 15550	4100 8800	5050 10800	2850 6100	3450[2] 7850[2]	2350 5150	8.37 27.47
0 m 0 ft			11150[2] 24150[2]	6200 13350	7050 15150	3950 8500	4950 10600	2800 5950	3850[2] 8450[2]	2400 5300	8.19 26.86
-1.5 m -5.0 ft	9350[2] 21650[2]		10550 22900	6200 13250	7000 15050	3900 8400	4950 10600	2750 5850	4550[2] 10000[2]	2650 5850	7.69 25.21
-3.0 m -10.0 ft	11750[2] 25550[2]		9200[2] 19800[2]	6300 13500	6850[2] 14700[2]	4000 8550			5550[2] 12250[2]	3300 7300	6.82 22.24
-4.5 m -15.0 ft			6350[2] 13300[2]						4950[2] 10750[2]		5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 13

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.5 m (8 ft 2 inch) stick, a 0.82 m³ (1.07 yd³) bucket, and 790 mm (31 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft									2050(2) 4450(2)		5.15
7.5 m 25.0 ft					3200(2) 6900(2)				2650(2) 5650(2)		6.7 21.68
6.0 m 20.0 ft			5750(2) 12500(2)		5450(2) 114900(2)	4750 10200			2900(2) 6350(2)		7.6 24.79
4.5 m 15.0 ft	10350(2) 21750(2)		7250(2) 15550(2)		6050(2) 13100(2)	4600 9850	5250(2) 10850(2)	3050 6550	3050(2) 6700(2)	2650 5850	8.09 26.5
3.0 m 10.0 ft			9550(2) 20400(2)	6850 14700	7000(2) 15100(2)	4350 9300	5150 11050	2950 6350	3350(2) 7350(2)	2450 5400	8.28 27.16
1.5 m 5.0 ft			11250(2) 24200(2)	6350 13650	7250 15550	4100 8800	5050 10800	2850 6100	3600(2) 7850(2)	2350 5150	8.37 27.47
0 m 0 ft			11500(2) 24600(2)	6200 13350	7050 15150	3950 8500	4950 10600	2800 5950	4000(2) 8750(2)	2400 5300	8.19 26.86
-1.5 m -5.0 ft	9650(2) 22350(2)		10950 23700	6200 13250	7000 15050	3900 8500	4950 10600	2750 5850	4700(2) 10300(2)	2650 5850	7.69 25.21
-3.0 m -10.0 ft	12200(2) 26450(2)		9500(2) 20550(2)	6300 13500	7100 15250	4000 8550			5800(2) 12700	3300 7300	6.82 22.24
-4.5 m -15.0 ft			6650(2) 13850(2)						5150(2) 11150(2)	5000(2) 11150(2)	5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 14

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Standard Mode

H	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	F	S	m ft

(continued)

(Table 14, contd)

9.0 m 30.0 ft					5750(2) 12700(2)						2650(2) 5750(2)		4.91 15.39
7.5 m 25.0 ft							3200(2) 6750(2)				2850(2) 6250(2)		6.58 21.26
6.0 m 20.0 ft							5000(2) 10950(2)		3050(2) 6700(2)		2700(2) 5950(2)		7.61 24.8
4.5 m 15.0 ft					6300(2) 13600(2)		5600(2) 12200(2)	4950 10600	4800(2) 9850(2)	3450 7350	2700(2) 5950(2)		8.25 26.98
3.0 m 10.0 ft			6650(2) 14900(2)		8250(2) 17700(2)	7250 15600	6500(2) 14100(2)	4650 10500	5500 11750	3300 7050	2850(2) 6250(2)	2650 5800	8.57 28.1
1.5 m 5.0 ft			5300(2)	11650(2)	6850(2) 15400(2)	6700 14400	7450(2) 16100(2)	4400 9450	5350 11450	3150 6750	3150(2) 6850(2)	2550 5550	8.63 28.3
0 m 0 ft	4500(2) 9900(2)		5300(2) 11650(2)		5950(2) 13250(2)		7300 15650	4200 9000	5200 11200	3050 6550	3600(2) 7900(2)	2550 5650	8.41 27.6
-1.5 m -5.0 ft	6600(2) 14300(2)		5300(2) 11600(2)		5800(2) 12950(2)		7150 15400	4100 8800	5150 11050	3000 6400	4450(2) 9750(2)	2800 6100	7.91 25.92
-3.0 m -10.0 ft	5550(2) 12150(2)		5300(2) 11700(2)		6050(2) 13400(2)		7200(2) 14700(2)	4100 8800			5650(2) 12550(2)	3300 7300	7.06 23.05
-4.5 m -15.0 ft	5300(2) 11600(2)		5550(2) 12300(2)		6850(2) 15500(2)	6400 13800					6500(2) 14350(2)	4550 10250	5.7 18.42

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 15

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					5950(2) 12950(2)						2700(2) 5950(2)		4.91 15.39
7.5 m 25.0 ft							3300(2) 7000(2)				2950(2) 6450(2)		6.58 21.26
6.0 m 20.0 ft							5200(2) 11350(2)	5150 11050	3150(2) 6900(2)		2800(2) 6150(2)		7.61 24.8

(continued)

(Table 15, contd)

4.5 m 15.0 ft				6500[2] 14050[2]		56800[2] 12600[2]	4950 10600	4950[2] 10150[2]	3450 7350	2800[2] 6200[2]		8.25 26.98
3.0 m 10.0 ft			6750[2] 15300[2]	82500[2] 18350[2]	7250 15600	6750[2] 14600[2]	4650 10500	5500 11750	3300 7050	2950[2] 6500[2]	2650 5800	8.57 28.1
1.5 m 5.0 ft			5300[2] 11650[2]	7[2] 150[2]	6700 14400	7500[2] 16100[2]	4400 9450	5350 11450	3150 6750	3250[2] 7100[2]	2550 5550	8.63 28.3
0 m 0 ft	4650[2] 10200[2]		5500[2] 12000[2]	6150[2] 13650[2]		7300 15650	4200 9000	5200 11200	3050 6550	3700[2] 8150[2]	2550 5650	8.41 27.6
-1.5 m -5.0 ft	6800[2] 14750[2]		5450[2] 11950[2]	6000[2] 13300[2]		7150 15400	4100 8800	5150 11050	3000 6400	4600[2] 10100[2]	2800 6100	7.91 25.92
-3.0 m -10.0 ft	5750[2] 12550[2]		5450[2] 12000[2]	6200[2] 13850[2]	6200[2] 13400[2]	7200[2] 15450[2]	4100 8800			5650[2] 12550[2]	3300 7300	7.06 23.05
-4.5 m -15.0 ft	5450[2] 11950[2]		5700[2] 12650[2]	7050[2] 15950[2]	6400 13800					6750[2] 14900[2]	4550 10250	5.7 18.42

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 16

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.5 m (8 ft 2 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	**1.5 M 5.0 FT**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
			F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft											2600[2] 5700[2]		4.15 13.62
7.5 m 25.0 ft					3300[2] 7300[2]		2950[2] 6500[2]				2900[2] 7000[2]		6.04 19.44
6.0 m 20.0 ft					5650[2] 12250[2]		4850[2] 10000[2]				3200[2] 6350[2]		7.15 23.28
4.5 m 15.0 ft			8950[2] 19050[2]		6950[2] 14950[2]		6000[2] 13050[2]	4900 10500	4550[2] 8750[2]	3400 7250	3250[2] 7100[2]	3150 7000	7.82 25.58

(continued)

(Table 16, contd)

3.0 m 10.0 ft			5700[2] 12900[2]	8800[2] 18950[2]	7100 15300	6850[2] 14850[2]	4600 9900	5450 11700	3250 7000	3400[2] 7500[2]	2850 6250	8.16 26.77
1.5 m 5.0 ft			5450[2] 11850[2]	6450[2] 14550[2]	6450[2] 14200[2]	7450 16050	4350 9350	5300 11400	3150 6750	3800[2] 8300[2]	2750 6000	8.22 26.98
0 m 0 ft			5500[2] 12000[2]	5800[2] 12950[2]		7250 15600	4200 9000	5200 11200	3050 6550	4450[2] 9750[2]	2800 5300	8.00 26.24
-1.5 m -5.0 ft	7400[2] 15950[2]		5350[2] 11700[2]	5800[2] 12850[2]		7200 15450	4100 8850			5200 11500	3050 6700	7.47 24.46
-3.0 m -10.0 ft	5600[2] 12300[2]		5300[2] 11650[2]	6150[2] 13750[2]	6150[2] 13550[2]	7250 15550	4150 8950			6350[2] 14100	3700 8150	6.56 21.39
-4.5 m -15.0 ft			5650[2] 12600[2]	7500[2] 16450[2]						6800[2] 14900[2]	5500[2] 12450[2]	5.06 16.29

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 17

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.5 m (8 ft 2 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	**1.5 M 5.0 FT**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
			F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft											2700[2] 5950[2]		4.15 13.62
7.5 m 25.0 ft					3400[2] 7500[2]		3050[2] 6650[2]				3000[2] 6550[2]		6.04 19.44
6.0 m 20.0 ft					5800[2] 12650[2]		5000[2] 10300[2]				3300[2] 7250[2]		7.15 23.28
4.5 m 15.0 ft			9250[2] 19650[2]		7150[2] 149554		6200[2] 13500[2]	4900 10500	4700[2] 9050[2]	3400 7250	3350[2] 7300[2]	3150 7000	7.82 25.58
3.0 m 10.0 ft			5900[2] 13300[2]		9100[2] 19650[2]	7100 15300	7100[2] 15400[2]	4600 9900	5450 11700	3250 7000	3550[2] 7750[2]	2850 6250	8.16 26.77

(continued)

(Table 17, contd)

1.5 m 5.0 ft			5450[2] 11850[2]	6450[2] 14550[2]	6450[2] 14200[2]	7450 16050	4350 9350	5300 11400	3150 6175	3900[2] 8550[2]	2750 6000	8.22 26.98
0 m 0 ft			5650[2] 12350[2]	5800[2] 13300[2]		7250 15600	4200 9000	5200 11200	3050 6550	4450[2] 10050[2]	2800 5300	8.00 26.24
-1.5 m -5.0 ft	7600[2] 16400[2]		5500[2] 12050[2]	5950[2] 13250[2]		7200 15450	4100 8850			5200 11500	3050 6700	7.47 24.46
-3.0 m -10.0 ft	5800[2] 12650[2]		5450[2] 12000[2]	6350[2] 14150[2]	6300[2] 13550[2]	7250 15550	4150 8950			6350[2] 14100	3700 8150	6.56 21.39
-4.5 m -15.0 ft			5800[2] 12950[2]	7700[2] 17050[2]	6599 14050					7050[2] 15450[2]	5500[2] 12450[2]	5.06 16.29

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 18

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					3250[2] 7150[2]						3250[2] 7100[2]		4.99 15.65
7.5 m 25.0 ft							3750[2] 8000[2]				3000[2] 6600[2]		6.64 21.45
6.0 m 20.0 ft							5150[2] 11200[2]		3400[2] 6700[2]		2850[2] 6250[2]		7.66 24.97
4.5 m 15.0 ft					6500[2] 14000[2]		5750[2] 12550[2]	5050 10800	5100[2] 10500[2]	3500 7500	2850[2] 6250[2]		8.29 27.13
3.0 m 10.0 ft			8600[2] 19700[2]		8450[2] 18150[2]	7350 15850	6700[2] 14450[2]	4750 10250	5550 11950	3400 7250	2950[2] 6500[2]	2700 5950	8.62 28.25
1.5 m 5.0 ft			6650[2] 14650[2]		9150[2] 20750[2]	6800 14650	7600[2] 16350[2]	4500 9700	54000 11650	3250 6950	3200[2] 7050[2]	2600 5700	8.67 28.45
0 m 0 ft			6600[2] 14500[2]		7800[2] 17450[2]	6500 13950	7400 15900	4300 9250	5300 11400	3150 6750	3650[2] 8000[2]	2650 5800	8.46 27.75
-1.5 m -5.0 ft	7600[2] 16950[2]		6600[2] 14500[2]		7600[2] 16950[2]	6350 13650	7300 15650	4200 9050	5250 11300	3100 6650	4400[2] 9750[2]	2850 6300	7.96 26.08

(continued)

(Table 18, contd)

-3.0 m -10.0 ft	6800[2] 14850[2]	6700[2] 14800[2]	8000[2] 17850[2]	6400 13700	7300[2] 15700[2]	4200 9050			5700[2] 12650[2]	3350 7450	7.11 23.22
-4.5 m -15.0 ft	6600[2] 14600[2]	7200[2] 15950[2]	8650[2] 18450[2]	6550 14100					6450[2] 14150[2]	4600 10350	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 19

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 790 mm (31 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					3300[2] 7300[2]						3350[2] 7350[2]		4.99 15.65
7.5 m 25.0 ft							3900[2] 8250[2]				3100[2] 6800[2]		6.64 21.45
6.0 m 20.0 ft							5350[2] 11650[2]	5200 11200	3500[2] 7700[2]		2950[2] 6240[2]		7.66 24.97
4.5 m 15.0 ft					6700[2] 14500[2]		5950[2] 12950[2]	5050 10800	5250[2] 10850[2]	3500 7500	2950[2] 6450[2]		8.29 27.13
3.0 m 10.0 ft			8850[2] 20250[2]		8700[2] 18750[2]	7350 15850	6900[2] 14950[2]	4750 10250	5550 11950	3400 7250	3050[2] 6700[2]	2700 5950	8.62 28.25
1.5 m 5.0 ft			6850[2] 15100[2]		9450[2] 21350[2]	6800 14650	7600[2] 16350[2]	4500 9700	54000 11650	3250 6950	3300[2] 7300[2]	2600 5700	8.67 28.45
0 m 0 ft			6800[2] 14950[2]		8050[2] 17950[2]	6500 13950	7400 15900	4300 9250	5300 11400	3150 6750	3750[2] 8300[2]	2650 5800	8.46 27.75
-1.5 m -5.0 ft	7850[2] 17450[2]		6800[2] 14950[2]		7800[2] 17450[2]	6350 13650	7300 15650	4200 9050	5250 11300	3100 6650	4550[2] 10050[2]	2850 6300	7.96 26.08

(continued)

(Table 19, contd)

-3.0 m -10.0 ft	7000[2] 15300[2]	6900[2] 15250[2]	8200[2] 18400[2]	6400 13700	7300[2] 15700[2]	4200 9050			5700[2] 12650[2]	3350 7450	7.11 23.22
-4.5 m -15.0 ft	6800[2] 15000[2]	7400[2] 16450[2]	8950[2] 19150[2]	6550 14100					6650[2] 14700[2]	4600 10350	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 20

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 700 mm (28 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					3250[2] 7150[2]						3250[2] 7100[2]		4.99 15.65
7.5 m 25.0 ft							3750[2] 8000[2]				3000[2] 6600[2]		6.64 21.45
6.0 m 20.0 ft							5150[2] 11300[2]		3400[2] 6700[2]		2850[2] 6250[2]		7.66 24.97
4.5 m 15.0 ft					6500[2] 14000[2]		5750[2] 12550[2]	5000 10700	5100[2] 10500[2]	3450 7450	2850[2] 6250[2]		8.29 27.13
3.0 m 10.0 ft			8600[2] 19700[2]		8450[2] 18150[2]	7300 15700	6700[2] 14450[2]	4700 10150	5550 11850	3350 7150	2950[2] 6500[2]	2650 5900	8.62 28.25
1.5 m 5.0 ft			6650[2] 14650[2]		9150[2] 20750[2]	6750 14550	7550[2] 16200[2]	4450 9550	5350 11500	3200 6900	3200[2] 7050[2]	2600 5650	8.67 28.45
0 m 0 ft			6600[2] 14500[2]		7800[2] 17450[2]	6400 13750	7300 15700	4250 9150	5250 11250	3100 6650	3650[2] 8000[2]	2600 5750	8.46 27.75
-1.5 m -5.0 ft	7600[2] 16950[2]		6600[2] 14500[2]		7600[2] 16950[2]	6350 13650	7300 15650	4200 9050	5250 11300	3100 6650	4400[2] 9750[2]	2850 6300	7.96 26.08
-3.0 m -10.0 ft	6800[2] 14850[2]		6700[2] 14800[2]		8000[2] 17850[2]	6300 13550	7200[2] 15500[2]	4150 8950			5650[2] 12500[2]	3300 7350	7.11 23.22
-4.5 m -15.0 ft	6600[2] 14600[2]		7200[2] 15950[2]		8650[2] 18450[2]	6550 14100					6450[2] 14150[2]	4550 10250	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 21

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 700 mm (28 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy Lift Mode													
H	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft					3350[2] 7350[2]						3350[2] 7350[2]		4.99 15.65
7.5 m 25.0 ft							3900[2] 8250[2]				3100[2] 6800[2]		6.64 21.45
6.0 m 20.0 ft							5350[2] 11650[2]	5150 11100	3500[2] 7700[2]		2950[2] 6440[2]		7.66 24.97
4.5 m 15.0 ft					6700[2] 14500[2]		5950[2] 12950[2]	5000 10700	5250[2] 10850[2]	3450 7450	2950[2] 6450[2]		8.29 27.13
3.0 m 10.0 ft			8850[2] 20250[2]		8700[2] 18750[2]	7300 15700	6900[2] 14950[2]	4700 10150	5500 119850	3350 7150	3050[2] 6700[2]	2650 5900	8.62 28.25
1.5 m 5.0 ft			6850[2] 15100[2]		9450[2] 21350[2]	6800 14650	7600[2] 16350[2]	4500 9700	54000 11650	3250 6950	3300[2] 7300[2]	2600 5700	8.67 28.45
0 m 0 ft			6800[2] 14950[2]		8050[2] 17950[2]	6500 13950	7400 15900	4300 9250	5300 11400	3150 6750	3750[2] 8300[2]	2650 5800	8.46 27.75
-1.5 m -5.0 ft	7850[2] 17450[2]		6800[2] 14950[2]		7800[2] 17450[2]	6300 13550	7200 15500	4150 8950	5200 11150	3050 6550	4550[2] 10050[2]	2800 6200	7.96 26.08
-3.0 m -10.0 ft	7000[2] 15300[2]		6900[2] 15250[2]		8200[2] 18400[2]	6300 13550	7200[2] 15500[2]	4150 8950			5650[2] 12500[2]	3300 7350	7.11 23.22
-4.5 m -15.0 ft	6800[2] 15000[2]		7400[2] 16450[2]		8950[2] 19150[2]	6500 13950					6650[2] 14700[2]	4550 10250	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.

(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 22

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Standard Mode

H	1.5 m 5.0 ft		3 .0m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft					3250[2] 7150[2]						3250[2] 7100[2]		4.99 15.65
7.5 m 25.0 ft							3750[2] 8000[2]				3000[2] 6600[2]		6.64 21.45
6.0 m 20.0 ft							5150[2] 11300[2]		3400[2] 6700[2]		2850[2] 6250[2]		7.66 24.97
4.5 m 15.0 ft					6500[2] 14000[2]		5750[2] 12550[2]	4900 10550	5100[2] 10500[2]	340 7300	2850[2] 6250[2]		8.29 27.13
3.0 m 10.0 ft			8600[2] 19700[2]		8450[2] 18150[2]	7150 15700	6700[2] 14450[2]	4700 10150	5550 11850	3350 7150	2950[2] 6500[2]	2650 5900	8.62 28.25
1.5 m 5.0 ft			6650[2] 14650[2]		9150[2] 20750[2]	6600 1425	7400[2] 15900[2]	4350 9400	5250 11500	3150 6750	3200[2] 7050[2]	2550 5550	8.67 28.45
0 m 0 ft			6600[2] 14500[2]		7800[2] 17450[2]	6300 13550	7200 15450	4200 9000	5150 11050	3050 6550	3650[2] 8000[2]	2550 5650	8.46 27.75
-1.5 m -5.0 ft	7600[2] 16950[2]		6600[2] 14500[2]		7600[2] 16950[2]	6150 1320	7100 15200	4100 8750	5100 10950	3000 6450	4400[2] 9750[2]	2750 6100	7.96 26.08
-3.0 m -10.0 ft	6800[2] 14850[2]		6700[2] 14800[2]		8000[2] 17850[2]	6200 13300	7100[2] 15250[2]	4100 8800			5550[2] 12250[2]	3250 7200	7.11 23.22
-4.5 m -15.0 ft	6600[2] 14600[2]		7200[2] 15950[2]		8650[2] 18450[2]	6350 13700					6450[2] 14150[2]	4500 10050	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 23

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom, a 2.9 m (9 ft 6 inch) stick, a quick coupler, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy Lift Mode

H	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F	S	F	S	m ft
9.0 m 30.0 ft					3350[2] 7350[2]						330[2] 7350[2]		4.99 15.65
7.5 m 25.0 ft							3900[2] 8250[2]				3100[2] 6800[2]		6.64 21.45
6.0 m 20.0 ft							5150[2] 11300[2]		3400[2] 6700[2]		2950[2] 6450[2]		7.66 24.97
4.5 m 15.0 ft					6700[2] 14500[2]		5950[2] 12950[2]	4900 10550	5250[2] 10850[2]	3400 7300	2850[2] 6250[2]		8.29 27.13
3.0 m 10.0 ft			8850[2] 20250[2]		8700[2] 18750[2]	7150 15450	6900[2] 14950[2]	4650 9950	5400 11650	3300 7050	3050[2] 6700[2]	2600 5750	8.62 28.25
1.5 m 5.0 ft			6850[2] 15100[2]		9450[2] 21350[2]	6600 14250	7400[2] 15900[2]	4350 9400	5250 11300	3150 6750	3300[2] 7300[2]	2550 5550	8.67 28.45
0 m 0 ft			6800[2] 14950[2]		8050[2] 17950[2]	6300 13550	7200 15450	4200 9000	5150 11050	3050 6550	3750[2] 8300[2]	2550 5650	8.46 27.75
-1.5 m -5.0 ft	7850[2] 17450[2]		6800[2] 14950[2]		7800[2] 17450[2]	6150 1320	7100 15200	4100 8750	5100 10950	3000 6450	4550[2] 10050[2]	2750 6100	7.96 26.08
-3.0 m -10.0 ft	7000[2] 15300[2]		6800[2] 14950[2]		7800[2] 17450[2]	6150 13250	7100[2] 15200[2]	4100 8800			5550[2] 12250[2]	3250 7200	7.11 23.22
-4.5 m -15.0 ft	6800[2] 15000[2]		7400[2] 16450[2]		8650[2] 19150[2]	6350 13700					6650[2] 14700[2]	4500 10050	5.76 18.64

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 24

321D LCR Excavator with a 5.7 m (18 ft 7 inch) va boom 2.9 m (9 ft 6 inch) stick, a quick coupler, and 790 (31 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Standard Mode															
H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**9.0 m 30.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**			**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					330[2] 7250[2]								3250[2] 7100[2]		5.62 17.82
7.5 m 25.0 ft							3250[2] 6400[2]						2950[2] 6550[2]		7.13 23.07
6.0 m 20.0 ft					5600[2] 12250[2]		4700[2] 10000[2]		2850[2] 6200[2]				2800[2] 6150[2]		8.09 26.37
4.5 m 15.0 ft			8450[2] 17450[2]		6500[2] 14050[2]		4600[2] 9850[2]		2950 6500[2]				2800[2] 6100[2]	2600 5700	8.69 28.43
3.0 m 10.0 ft	6700[2] 14350[2]		7600[2] 17250[2]		6300[2] 13550[2]		4000 8650		3200 6850				2850[2] 6300[2]	2300 5200	9.00 29.49
1.5 m 5.0 ft	6050[2] 12750[2]		5150[2] 11800[2]		5250[2] 11350[2]		4050[2] 8750[2]		3800 8050	3050 6550	3100[2] 6800[2]	2300 5000	3050[2] 6750[2]	2250 4950	9.05 29.69
0 m 0 ft	5050[2] 10850[2]		6600[2] 14500[2]		6900[2] 14800[2]	6100 13050	4800 10350	4050 8650[2]	4350[2] 9900	2900 6250			3400[2] 7500[2]	2300 5050	8.84 29.02
-1.5 m -5.0 ft	6650[2] 14550[2]		6600[2] 14500[2]		7300[2] 16200[2]	5950 12800	6000 13450	3900 8400	5000 10700	2850 6150			4000[2] 8800[2]	2450 5450	8.37 27.42
-3.0 m -10.0 ft	6600[2] 14500[2]		6650[2] 14600[2]		6900[2] 14800[2]	6000 12900	5300[2] 11250[2]	3950 8450	3550 7800	2900 6100			3450[2] 7500[2]	2900 6400	7.57 24.73
-4.5 m -15.0 ft	6700[2] 14850[2]				7200[2] 16050[2]		5700[2] 12350[2]						4200[2] 9550[2]	4200 9550	5.84 18.71

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 25

321D LCR Excavator with a 5.7 m (18 ft 7 inch) va boom 2.9 m (9 ft 6 inch) stick, a quick coupler, and 600 mm (24 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Standard Mode															
H	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**9.0 m 30.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**			**S**	**F**	**S**	**m ft**
9.0 m 30.0 ft					3350[2] 7250[2]								3250[2] 7100[2]		5.62 17.82
7.5 m 25.0 ft							3250[2] 6400[2]						2950[2] 6550[2]		7.13 23.07
6.0 m 20.0 ft					5600[2] 12250[2]		4700[2] 10000[2]		2850[2] 6200[2]				2800[2] 6150[2]		8.09 26.37
4.5 m 15.0 ft			8450[2] 17450[2]		6500[2] 14050[2]		4600[2] 9850[2]		2950 6500[2]				2800[2] 6100[2]	2500 5550	8.69 28.43

(continued)

(Table 25, contd)

3.0 m 10.0 ft	6700[2] 14350[2]		7600[2] 17250[2]		6300[2] 13550[2]		4000 8650		3200 6850	3100 6700			2850[2] 6300[2]		2300 5200	9.00 29.49
1.5 m 5.0 ft	6050[2] 12750[2]		5150[2] 11800[2]		5250[2] 11350[2]		4050[2] 8750[2]		3800 8050	2950 6350	3100[2] 6800[2]	2200 4850	3050[2] 6750[2]		2200 4800	9.05 29.69
0 m 0 ft	5050[2] 10850[2]		6600[2] 14500[2]		6900[2] 14800[2]	5900 12650	4800 10350	3900 8350[2]	4350[2] 9900	2850 6050			3400[2] 7500[2]		2200 4850	8.84 29.02
-1.5 m -5.0 ft	6650[2] 14550[2]		6600[2] 14500[2]		7300[2] 16200[2]	5750 12400	6000 13450	3800 8150	4900 10550	2750 5950			4000[2] 8800[2]		2400 5250	8.37 27.42
-3.0 m -10.0 ft	6600[2] 14500[2]		6650[2] 14600[2]		6900[2] 14800[2]	5850 12500	5300[2] 11250[2]	3800 8200	3550 7800	2800 5950			3450[2] 7500[2]		2800 6150	7.57 24.73
-4.5 m -15.0 ft	6700[2] 14850[2]				7200[2] 16050[2]		5700[2] 12350[2]						4200[2] 9550[2]		4150 9450	5.84 18.71

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

With Blade

Table 26

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Blade Up Standard Mode														
H	**1.5 m 5.0 ft**		**3.0m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**			
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**		**F**	**S**	**m ft**	
9.0 m 30.0 ft											4600[2] 10400[2]		4.48 13.92	
7.5 m 25.0 ft					5600[2] 12400[2]		4900[2] 9250[2]				3850[2] 8550[2]		6.28 20.23	
6.0 m 20.0 ft					6050[2] 13150[2]		5750[2] 12650[2]	5500 11850			3600[2] 7950[2]		7.35 23.93	
4.5 m 15.0 ft			9700[2] 20600[2]		7400[2] 15900[2]		6350[2] 13750[2]	5350 11450	5700 11650	3750 8050	3550[2] 7800[2]	3350 7450	8 26.18	
3.0 m 10.0 ft					9250[2] 19900[2]	7700 16650	7200[2] 15550[2]	5100 10950	5600 12050	3650 7850	3650[2] 8000[2]	3100 6800	8.34 27.34	
1.5 m 5.0 ft					10850[2] 23400[2]	7200 15550	7650 16400	4850 10400	5450 11750	3550 7600	3900[2] 8500[2]	3000 6600	8.39 27.54	
0 m 0 ft			6900[2] 15850[2]		11550[2] 25000[2]	6950 14900	7450 16000	4650 10050	5400 11550	3450 7400	4300[2] 9500[2]	3050 6750	8.17 26.82	
-1.5 m -5.0 ft	7250[2] 16150[2]		11600[2] 26300[2]		11350[2] 24550[2]	6850 14750	7350 15850	4600 9900	5350 11550	3450 7400	5100[2] 11300[2]	3350 7350	7.66 25.09	
-3.0 m -10.0 ft	12100[2] 27200[2]		14150[2] 30600[2]	13400 28700	10200[2] 22050[2]	6950 14900	7400 15950	4650 10000			6250 13850	4000 8800	6.77 22.1	
-4.5 m -15.0 ft			10500[2] 22400[2]		7650[2] 16150[2]	7200 15500					6050[2] 13250[2]	5650 12800	5.34 17.22	

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 27

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Blade Up Lift Mode

H	1.5 m 5.0 ft		3.0m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F		F	S	m ft
9.0 m 30.0 ft											4750(2) 10700(2)		4.48 13.92
7.5 m 25.0 ft					5800(2) 12800(2)		5050(2)	9500(2)			3950(2) 8800(2)		6.28 20.23
6.0 m 20.0 ft					6250(2) 13550(2)		5950(2) 13050(2)	5500 11850			3700(2) 8200(2)		7.35 23.93
4.5 m 15.0 ft			10000(2) 21250(2)		7600(2) 16450(2)		6550(2) 14250(2)	5350 11450	5700 12000(2)	3750 8050	3650(2) 8050(2)	3350 7450	8 26.18
3.0 m 10.0 ft					9550(2) 20600(2)	7700 16650	7450(2) 16100(2)	5100 10950	5600 12050	3650 7850	3750(2) 8250(2)	3100 6800	8.34 27.34
1.5 m 5.0 ft					11200(2) 24200(2)	7200 15550	7650 16400	4850 10400	5450 11750	3550 7600	4000(2) 8800(2)	3000 6600	8.39 27.54
0 m 0 ft			7150(2) 16300(2)		11750 25200	6950 14900	7450 16000	4650 10050	5400 11550	3450 7400	4450(2) 9800(2)	3050 6750	8.17 26.82
-1.5 m -5.0 ft	7450(2) 16650(2)		11950(2) 27050(2)		11650(2) 25000(2)	6850 14750	7350 15850	4600 9900	5350 11550	3450 7400	5200(2) 11500(2)	3350 7350	7.66 25.09
-3.0 m -10.0 ft	12450(2) 28000(2)		14650(2) 31700(2)	13400 28700	10600(2) 22850(2)	6950 14900	7400 15950	4650 10000			6250 13850	4000 8800	6.77 22.1
-4.5 m -15.0 ft			10900(2) 23250(2)		7950(2) 16750(2)	7200 15500					6300(2) 13750(2)	5650 12800	5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 28

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Blade Down Standard Mode

H	1.5 m 5.0 ft		3.0m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F		F	S	m ft
9.0 m 30.0 ft											4600(2) 10400(2)		4.48 13.92
7.5 m 25.0 ft					5600(2) 12400(2)		4900(2) 9250(2)				3850(2) 8550(2)		6.28 20.23
6.0 m 20.0 ft					6050(2) 13150(2)		5750(2) 12650(2)	5750 12650			3600(2) 7950(2)		7.35 23.93

(continued)

(Table 28, contd)

4.5 m 15.0 ft			9700(2) 20600(2)		7400(2) 15900(2)		6350(2) 13750(2)	5800 12450	5800(2) 11650(2)	4100 8750	3550(2) 7800(2)		8 26.18
3.0 m 10.0 ft					9250(2) 19900(2)	8450 18250	7200(2) 15550(2)	5550 11900	6200(2) 13450(2)	4000 8550	3650(2) 8000(2)	3400 7450	8.34 27.34
1.5 m 5.0 ft					10850(2) 23400(2)	7950 17100	8000(2) 17300(2)	5300 11400	6550(2) 14200(2)	3850 8300	3900(2) 8500(2)	3300 7200	8.39 27.54
0 m 0 ft			6900(2) 15850(2)		11550(2) 25000(2)	7650 16500	8500(2) 18350(2)	5100 11000	6750(2) 14600(2)	3750 8100	4300(2) 9500(2)	3350 7350	8.17 26.82
-1.5 m -5.0 ft	7250(2) 16150(2)		11600(2) 26300(2)		11350(2) 24550(2)	7600 16300	8450(2) 18250(2)	5050 10850	6450(2) 12000(2)	3750 8100	5100(2) 11300(2)	3650 8050	7.66 25.09
-3.0 m -10.0 ft	12100(2) 27200(2)		14150(2) 30600(2)		10200(2) 22050(2)	7650 16500	7600(2) 16250(2)	5100 10950			6350(2) 13900(2)	4350 9650	6.77 22.1
-4.5 m -15.0 ft			10500(2) 22400(2)		7650(2) 16150(2)						6050(2) 13250(2)		5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 29

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Blade Down Lift Mode

H	**1.5 m 5.0 ft**		**3.0m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**		**F**	**S**	**m ft**
9.0 m 30.0 ft											4750(2) 10700(2)		4.48 13.92
7.5 m 25.0 ft					5800(2) 12800(2)		5050(2) 9500(2)				3950(2) 8800(2)		6.28 20.23
6.0 m 20.0 ft					6250(2) 13550(2)		5950(2) 13050(2)	5950(2) 12850			3700(2) 8200(2)		7.35 23.93
4.5 m 15.0 ft			10000(2) 21250(2)		7600(2) 16450(2)		6550(2) 14250(2)	5800 12450	5950(2) 12000(2)	4100 8750	3650(2) 8050(2)		8 26.18
3.0 m 10.0 ft					9550(2) 20600(2)	8450 18250	7450(2) 16100(2)	5550 11900	6400(2) 13900(2)	4000 8550	3750(2) 8250(2)	3400 7450	8.34 27.34
1.5 m 5.0 ft					11200(2) 24200(2)	7950 17100	8300(2) 17900(2)	5300 11400	6800(2) 14700(2)	3850 8300	4000(2) 8800(2)	3300 7200	8.39 27.54
0 m 0 ft			7150(2) 16300(2)		11950 25850	7650 16500	8800(2) 19000(2)	5100 11000	7000(2) 15100(2)	3750 8100	4450(2) 9800(2)	3350 7350	8.17 26.82
-1.5 m -5.0 ft	7450(2) 16650(2)		11950(2) 27050(2)		11700(2) 25400(2)	7600 16300	8750(2) 18850(2)	5050 10850	6700(2) 12400(2)	3750 8100	5300(2) 11650(2)	3650 8050	7.66 25.09
-3.0 m -10.0 ft	12450(2) 28000(2)		14650(2) 31700(2)		10600(2) 22850(2)	7650 16500	7850(2) 16850(2)	5100 10950			6550 14400	4350 9650	6.77 22.1
-4.5 m -15.0 ft			10900(2) 23250(2)		7950(2) 16750(2)	7900 16750(2)					6300(2) 13750(2)	6250 13750(2)	5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 30

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Standard Mode													
H	1.5 m 5.0 ft		3.0m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F		F	S	m ft
9.0 m 30.0 ft											4600[2] 10400[2]		4.48 13.92
7.5 m 25.0 ft					5600[2] 12400[2]		4900[2] 9250[2]				3850[2] 8550[2]		6.28 20.23
6.0 m 20.0 ft					6050[2] 13150[2]		5750[2] 12650[2]	5200 11100			3600[2] 7950[2]		7.35 23.93
4.5 m 15.0 ft			9700[2] 20600[2]		7400[2] 15900[2]		6350[2] 13750[2]	5000 10750	5700 11650[2]	3500 7500	3550[2] 7800[2]	3150 6950	8 26.18
3.0 m 10.0 ft					9250[2] 19900[2]	7250 15600	7200[2] 15550[2]	4750 10200	5600 120500	3400 7300	3650[2] 8000[2]	2900 6350	8.34 27.34
1.5 m 5.0 ft					10850[2] 23400[2]	6750 14500	7600 16350	4500 9700	5450 11700	3300 7050	3900[2] 8500[2]	2800 6100	8.39 27.54
0 m 0 ft			6900[2] 15850[2]		11550[2] 25000[2]	6450 13900	7400 15950	4350 9300	5350 11500	3200 6850	4300[2] 9500[2]	2850 6250	8.17 26.82
-1.5 m -5.0 ft	7250[2] 16150 [2]		11600[2] 26300[2]		11350[2] 24550[2]	6400 13700	7350 15750	4250 9150	5350 11500	3200 6850	5100[2] 11300[2]	3100 6800	7.66 25.09
-3.0 m -10.0 ft	12100 [2] 27200 [2]		14150[2] 30600[2]	12500 26800	10200[2] 22050[2]	6450 13900	7400 15900	4300 9300			6250 13850	3700 8200	6.77 22.1
-4.5 m -15.0 ft			10500[2] 22400[2]		7650[2] 16150[2]	6700 14450					6050[2] 13250[2]	5300 11950	5.34 17.22

[1] Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
[2] Capacity is limited by hydraulics rather than by a tipping load.

Table 31

321D LCR Excavator with a 5.7 m (18 ft 7 inch) reach boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Lift Mode													
H	1.5 m 5.0 ft		3.0m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	F	S	F	S	F	S	F	S	F		F	S	m ft
9.0 m 30.0 ft											4750[2] 10700[2]		4.48 13.92
7.5 m 25.0 ft					5800[2] 12800[2]		5050[2] 9500[2]				3950[2] 8800[2]		6.28 20.23

(continued)

(Table 31, contd)

6.0 m 20.0 ft					6250[2] 13550[2]		5950[2] 13050[2]	5200 11100			3700[2] 8200[2]		7.35 23.93
4.5 m 15.0 ft			10000[2] 21250[2]		7600[2] 16450[2]		6550[2] 14250[2]	5000 10750	5700 12000[2]	3500 7500	3650[2] 8050[2]		8 26.18
3.0 m 10.0 ft					9550[2] 20600[2]	7250 15600	7450[2] 16100[2]	4750 10200	5600 12000	3400 7300	3750[2] 8250[2]	2900 6350	8.34 27.34
1.5 m 5.0 ft					11200[2] 24200[2]	6750 14500	7600 16350	4500 9700	5450 11700	3300 7050	4000[2] 8800[2]	2800 6100	8.39 27.54
0 m 0 ft			7150[2] 16300[2]		11700 25100	6450 13900	7400 15950	4350 9300	5350 11500	3200 6850	4450[2] 9800[2]	2850 6250	8.17 26.82
-1.5 m -5.0 ft	7450[2] 16650[2]		11950[2] 27050[2]		11600 24900	6400 13700	7350 15750	4250 9150	5350 11500	3200 6850	5200 11450	3100 6800	7.66 25.09
-3.0 m -10.0 ft	12450[2] 28000[2]		14650[2] 31700[2]	12500 26800	10600[2] 22850[2]	6450 13900	7400 15900	4300 9300			6250 13800	3700 8200	6.77 22.1
-4.5 m -15.0 ft			10900[2] 23250[2]		7950[2] 16750[2]	6700 14450					6300[2] 13750[2]	5300 11950	5.34 17.22

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 32

321D LCR Excavator with a 5.7 m (18 ft 7 inch) Varible boom 2.9 m (9 ft 6 inch) stick, a blade, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Varible Boom

H	**1.5 m 5.0 ft**		**3.0m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**		**7.5 m 25.0 ft**		**Maximum Radius**		
	F	**S**	**F**	**S**	**F**	**S**	**F**	**S**	**F**		**F**	**S**	**m ft**
9.0 m 30.0 ft					4950[2] 10850[2]						4900[2] 11000[2]		5.11 16.07
7.5 m 25.0 ft					6800[2] 15000[2]		4150[2] 9450[2]				4200[2] 9350[2]		6.73 21.75
6.0 m 20.0 ft					6900[2] 15000[2]		4850[2] 10450[2]		4050[2] 8800[2]	3550 7550	4000[2] 8750[2]	3350 7400	7.74 25.23
4.5 m 15.0 ft			10600[2] 23100[2]		6700[2] 14500[2]		4800[2] 10350[2]		4050[2] 9100[2]	3500 7450	3900[2] 8600[2]	2900 6350	8.37 27.37
3.0 m 10.0 ft	15900[2]		9900[2] 22050[2]		6550[2] 14100[2]		4950[2] 10750[2]	4650 10050	4300[2] 9550[2]	3350 7200	4000[2] 8750[2]	2650 5800	8.69 28.48
1.5 m 5.0 ft			6000[2] 13450[2]		7400[2] 15900[2]	6550 14100	5600[2] 12150[2]	4400 9450	4900[2] 11000[2]	3200 6900	4200[2] 9200[2]	2550 5600	8.74 28.68
0 m 0 ft	6800[2] 14500[2]		5700[2] 12300[2]		9550[2] 20550[2]	6250 13500	6500[2] 14100[2]	4200 9050	5300 11450	3100 6700	4450 9750	2600 5750	8.53 27.98
-1.5 m -5.0 ft	9000[2] 20000[2]		9550[2] 21700[2]		10250[2] 22200[2]	6250 13400	7300 15650	4150 8950	5300 11400	3100 6650	4850 10650	2850 6250	8.03 26.33

(continued)

(Table 32, contd)

-3.0 m **-10.0 ft**	14200[2] 31800[2]	11950[2] 25850[2]	8000[2] 17250[2]	6300 13600	6200[2] 13200[2]	4200 9050			4700[2] 10250[2]	3400 7500	7.13
-4.5 m **-15.0 ft**	21250[2] 47250[2]	12150[2] 26350[2]	7900[2] 17100[2]	6600 14300					7200[2] 16300[2]	5850 13550	4.9 15.55

(1) Lift capacities are based on “ISO 10567:2007” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Identification Information

i04195693

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

Product Identification Number (PIN) and CE Plate

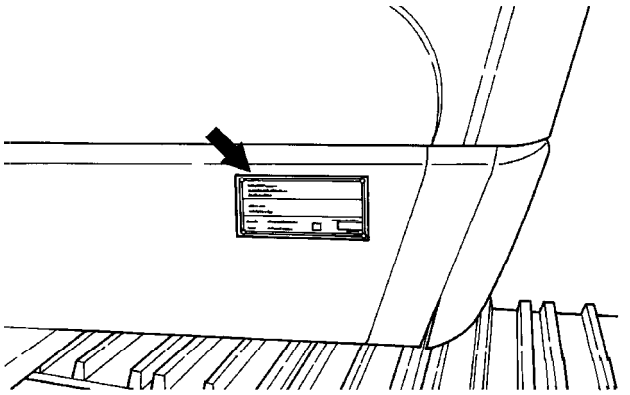


Illustration 55 g00675011

The PIN plate is positioned on the front of the machine, close to the operator compartment.

- Model_____
- PIN_____

Year Of Manufacture (YOM)_____

CE Plate

Note: The CE plate is on machines that are going into the European Union.

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

If the machine is equipped with the plate for the European Union, this plate will be attached to the PIN plate. Several pieces of information are stamped onto the “CE” plate.

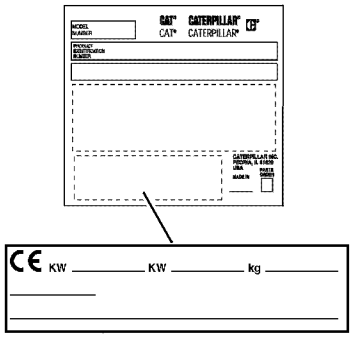


Illustration 56 g01883459

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

- Primary Engine Power (kW)_____
- Additional Engine Power (kW)_____
- Typical Machine Weight (kg)_____
- Year of Construction_____
- Machine Type_____

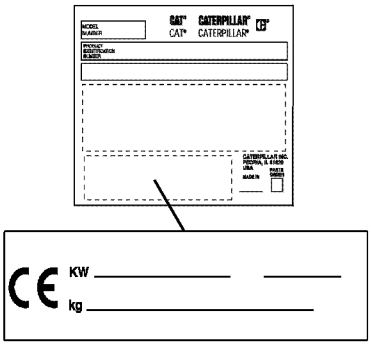


Illustration 57 g01120192

For machines that are compliant to “1998/42/EC”, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

- Primary Engine Power (kW)_____
- Typical Machine Weight (kg)_____
- Year of Construction_____

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

Engine Serial Number

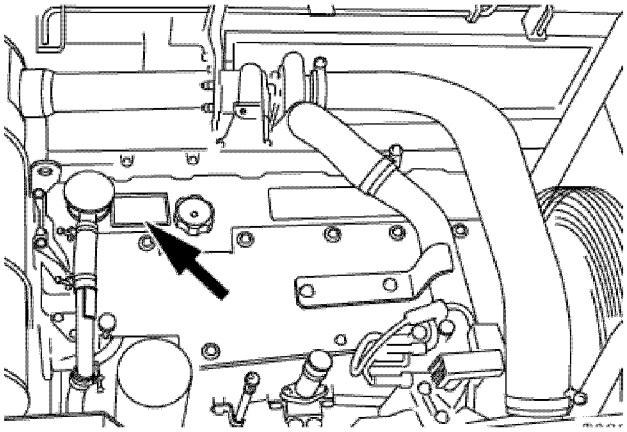


Illustration 58 g01344117

Engine Serial Number _____

Sound Certification Film

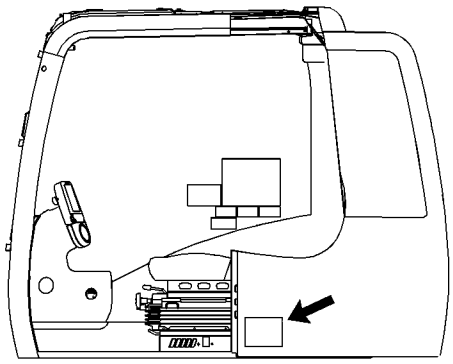


Illustration 59 g01221131

If equipped, this label is located on the inside of the cab door.

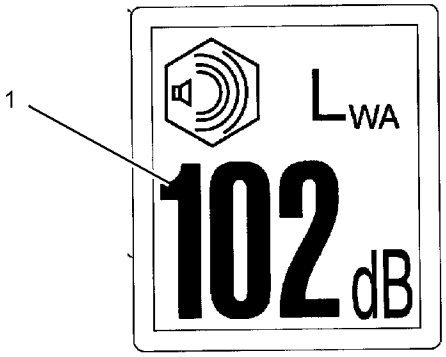


Illustration 60 g01221132

Typical example

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

i04019095

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

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

Consult your Cat dealer for an Emission Control Warranty Statement.

This label is located on the engine.

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: TXA1–Up

S/N: MPG1–Up

S/N: KBZ1–Up

Table 33

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

EC DECLARATION OF CONFORMITY OF MACHINERY

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

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

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

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Hydraulic Excavator
	Model/Type:	321D
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of **November 2009**, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Operation Section

Before Operation

i04021647

Mounting and Dismounting

SMCS Code: 6700; 7000

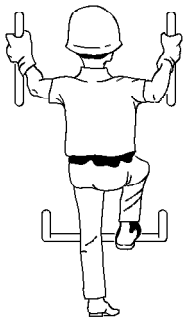


Illustration 61 g00037860
Typical example

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

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

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

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

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

Machine Access System Specifications

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

Alternate Exit

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

i02706111

Daily Inspection

SMCS Code: 1000; 6319; 6700; 7000

NOTICE
Accumulated grease and oil on an engine is a fire hazard.

Remove this debris with steam cleaning or high pressure water each time any significant quantity of oil (or other fluid) is spilled on or near the engine.

Wipe clean all fittings, caps and plugs before servicing.

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

Perform the following procedures on a daily basis.

- Operation and Maintenance Manual, “Boom and Stick Linkage - Lubricate”
- Operation and Maintenance Manual, “Bucket Linkage - Lubricate”
- Operation and Maintenance Manual, “Cooling System Level - Check”
- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Fuel System Water Separator - Drain”
- Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Indicators and Gauges - Test”

- Operation and Maintenance Manual, “Quick Coupler - Lubricate”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Track Adjustment - Inspect”
- Operation and Maintenance Manual, “Track Adjustment - Adjust”
- Operation and Maintenance Manual, “Travel Alarm - Test”
- Operation and Maintenance Manual, “Undercarriage - Check”

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

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

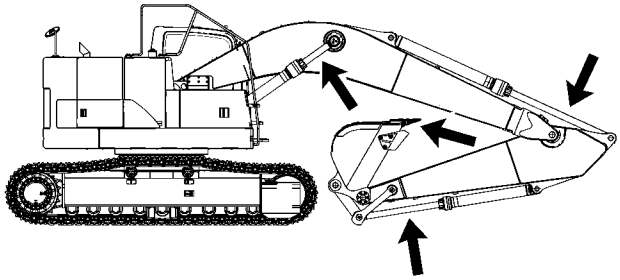


Illustration 62 g01357291

Inspect the attachment control linkage, attachment cylinders, and attachment for damage or excessive wear. Make any necessary repairs.

Inspect the lights for broken bulbs and for broken lenses. Replace any broken bulbs and any broken lenses.

Inspect the engine compartment for any trash buildup. Remove any trash buildup from the engine compartment.

Inspect the cooling system for any leaks, for faulty hoses and for any trash buildup. Correct any leaks. Remove any trash from the radiator.

Inspect all of the belts for the engine attachments. Replace any belts that are worn, frayed, or broken.

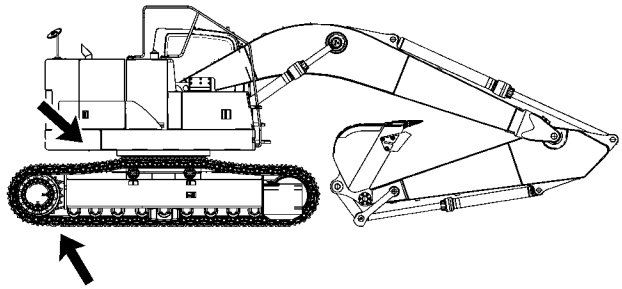


Illustration 63 g01357292

Inspect the hydraulic system for leaks. Inspect the tank, cylinder rod seals, hoses, tubes, plugs, connections, and fittings. Correct any leaks in the hydraulic system.

Inspect the final drives for leaks. Make any necessary repairs.

Inspect the swing drive for leaks.

Make sure that all covers and guards are securely attached. Inspect the covers and the guards for damage.

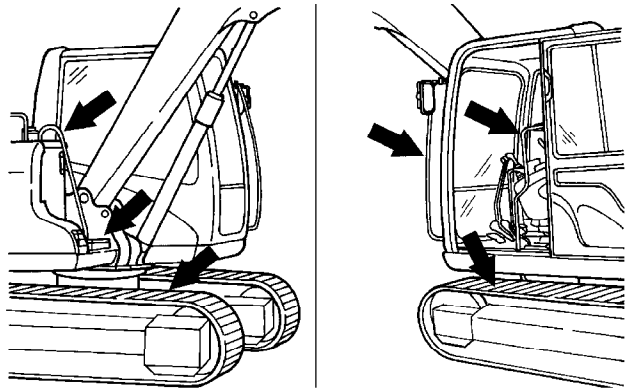


Illustration 64 g00732408

Inspect the steps, the walkways, and the handholds. Clean the steps, the walkways, and the handholds. Make any necessary repairs.

Inspect the operator compartment for trash buildup. Check for trash buildup under the floorplate and on the crankcase guard. Keep these areas clean.

Adjust the mirrors in order to achieve the best visibility.

Machine Operation

i02266971

Alternate Exit

SMCS Code: 7310

Rear Window with Ring Seal (If Equipped)

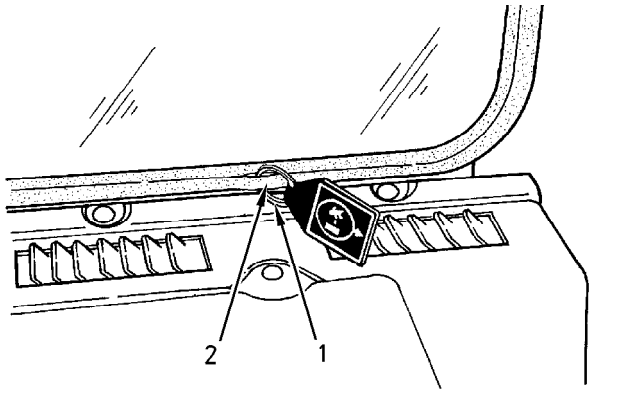


Illustration 65 g00681020

(1) Ring
(2) O-ring seal

The rear window serves as an alternate exit.

To remove the rear window, pull ring (1) and push out the glass.

Completely remove O-ring seal (2) from the seal that supports the glazing support seal. This will provide enough clearance so that the seal can hinge and the glazing can pass outward.

Rear Window with Lever (If Equipped)

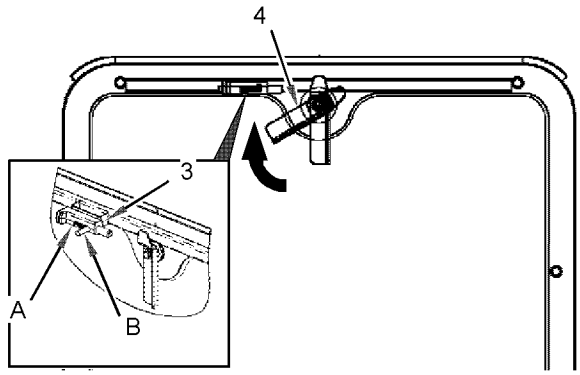


Illustration 66 g01137161

(3) Lock pin
(4) Lever
(A) Unlocked position
(B) Locked position

The rear window serves as an alternate exit. The rear window can be removed from the inside of the cab or from the outside of the cab.

Note: When lock pin (3) is in the locked position (B), the rear window cannot be removed. When you operate the machine, place lock pin (3) in unlocked position (A).

Removing Rear Window from the Inside

1. Place lock pin (3) in unlocked position (A).
2. Grip the lever (4). Fully turn the lever in the direction of the arrow and push the rear window outward.

Removing Rear Window from the Outside

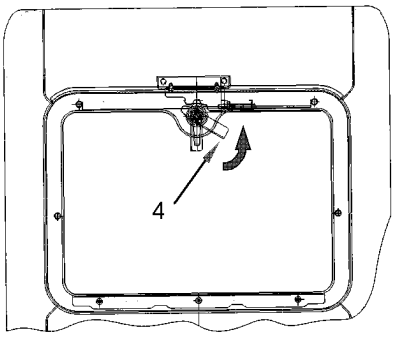


Illustration 67 g01137162

1. Make sure that lock pin (3) is in the unlocked position (A).

2. Grip lever (4). Fully turn the lever in the direction of the arrow and pull backward in order to remove the window.

i03210934

Seat

SMCS Code: 5258-025; 7312-025; 7324; 7327

Early Type

Put the hydraulic lockout control in the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Operator Controls”. Do this procedure before you adjust the seat and the console. This will prevent any possibility of unexpected movement of the machine.

Adjust the seat at the beginning of each work period and adjust the seat when you change operators.

Always use the seat belt when you operate the machine. For further details on this procedure, refer to Operation and Maintenance Manual, “Seat Belt”.

The seat should be adjusted so that full pedal travel is allowed.

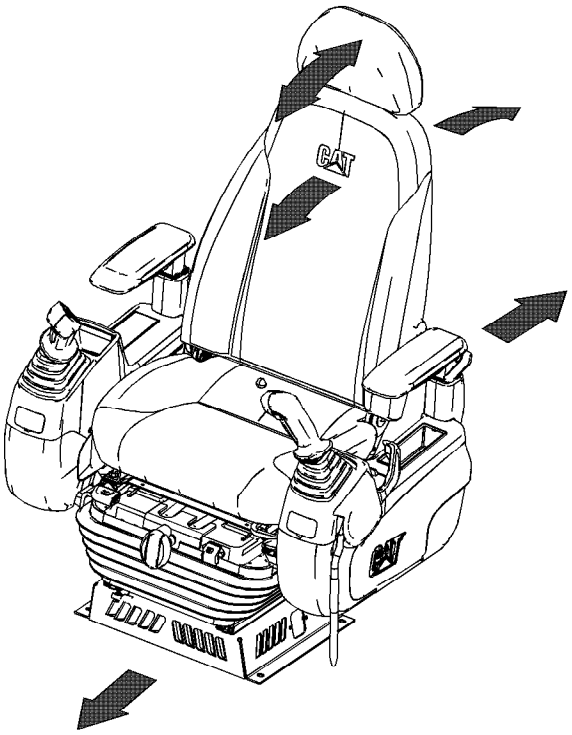


Illustration 68 g01098275

The operator can adjust the seat position forward or backward. The operator may also adjust the seat back tilt. Select the desired position in order to allow full pedal travel and full lever travel.

The seat and the consoles can also slide as one unit.

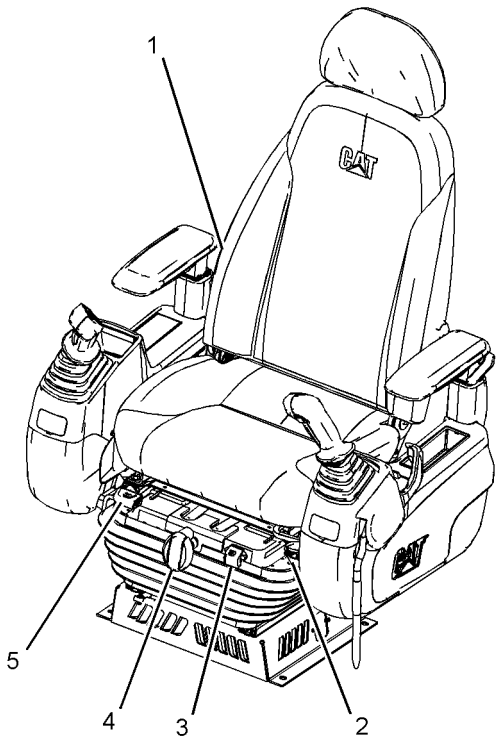


Illustration 69 g01120894

To adjust the seat back tilt, move lever (1) and move the seat back to the desired position.

Pull up lever (2) in order to change the angle of the seat. Hold the seat in the desired position. Release the lever.

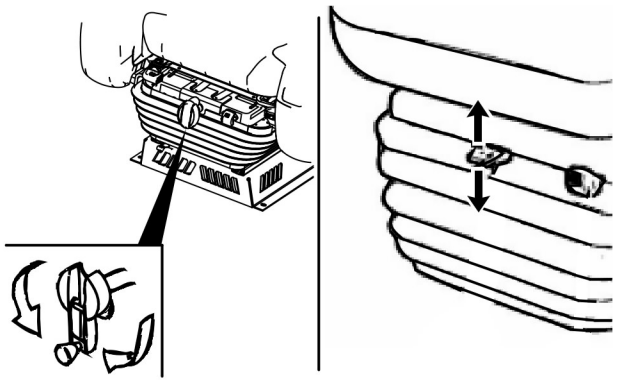


Illustration 70 g01120901

Use handle (4) in order to adjust the height of the seat. Place the handle in the operating position. Turning the handle clockwise increases the height of the seat. Turning the handle counterclockwise decreases the height of the seat. If your machine is equipped with an air ride suspension, the seat will be equipped with a lever. Pull up the lever in order to raise the height of the seat. Push down on the lever in order to lower the seat. If the adjustment is correct, indicator (3) will turn green. If the indicator shows red, further adjustment is required.

To adjust the seat forward or backward, pull up lever (5) and hold the lever. Move the seat to the desired position. To lock the seat in the selected position, release the lever.

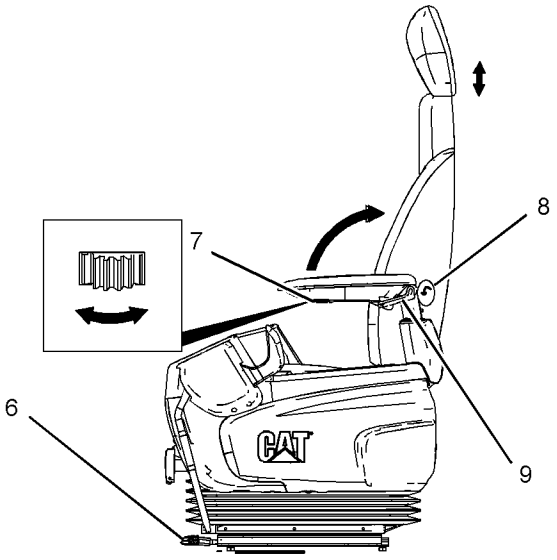


Illustration 71 g01120893

To move the seat, the left console, and the right console forward or backward as one unit, pull up lever (6) and hold the lever. Hold the seat in the desired position. Release the lever in order to lock the seat, the left console, and the right console.

To adjust the angle of the armrest, operate dial (7). A dial is on the bottom of each armrest. Place the armrests in the upright position when you enter the machine or when you exit the machine.

The lumbar support is located in the back of the seat. Turn knob (8) (if equipped) counterclockwise in order to increase the force of the lumbar support. In order to decrease the lumbar support, continue to turn the knob counterclockwise.

The height of the armrest can be adjusted. Squeeze lever (9) in order to adjust the height of the armrest. Move the armrest upward or move the armrest downward. Release the lever when the armrest is in the desired position.

The operator can adjust the height of headrest (if equipped). To adjust the headrest, hold the headrest with both hands. Move the headrest up and down. Release the headrest when the desired position is attained. The headrest will remain in the desired position.

Later Type

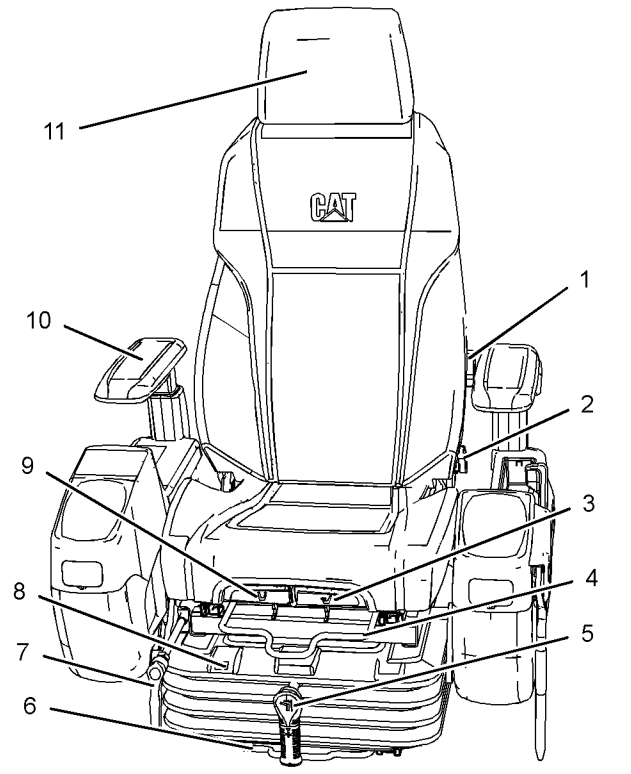


Illustration 72 g01636841

(1) Adjustment lever for the lumbar support
(2) Adjustment lever for reclining the seat
(3) Lever for the seat cushion adjustment
(4) Seat fore and aft adjustment.
(5) Seat height adjustment
(6) Fore and aft seat and console adjustment
(7) Console adjustment
(8) Indicator
(9) Seat angle lever
(10) Armrest
(11) Headrest

The lumbar support is located in the back of the seat. Turn knob (1) (if equipped) counterclockwise in order to increase the force of the lumbar support. In order to decrease the lumbar support, continue to turn the knob counterclockwise.

Pull up lever (2) in order to change the angle of the seat. Hold the seat back in the desired position. Release the lever.

Push in lever (3) in order to adjust the length of the cushion.

To adjust the seat forward or backward, pull up lever (4) and hold the lever. Move the seat to the desired position. To lock the seat in the selected position, release the lever.

Note: Before adjusting the seat forward or backward, make sure that the lever for the seat height adjustment (5) is in the downward position.

Turn lever (5) in order to adjust the seat and the console to the desired height. In order to raise the seat height, pull the grip downward and rotate the grip with the plus sign outward. In order to lower the seat height, pull the grip downward and rotate the grip with the minus sign outward. Release grip in order to return to the original position.

Pull lever (6) in order to adjust the seat and the console forward and backward.

Use handle (7) in order to adjust the height of the console. . When the lever is pulled forward, a gear is released. The operator can rotate the lever freely. Release the lever in order to return to the original position.

Push the lever (9) in order to adjust the tilt angle of the seat.

The operator can adjust the height of headrest (11). To adjust the headrest, hold the headrest with both hands. Move the headrest up and down. Release the headrest when the desired position is attained. The headrest will remain in the desired position.

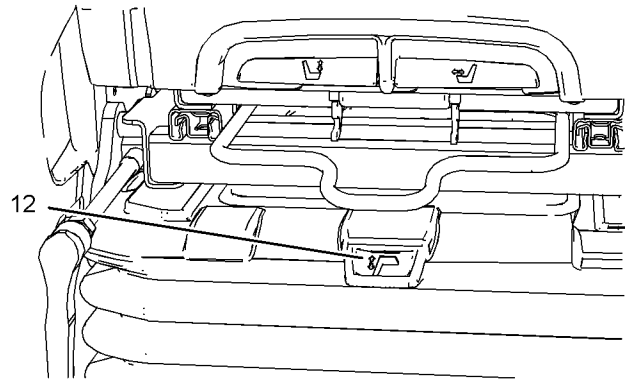


Illustration 73 g01637296

If your machine is equipped with an air ride suspension, the seat will be equipped with a lever (12). Pull up the lever in order to raise the height of the seat. Push down on the lever in order to lower the seat. If the adjustment is correct, indicator (8) will turn green. If the indicator shows red, further adjustment is required.

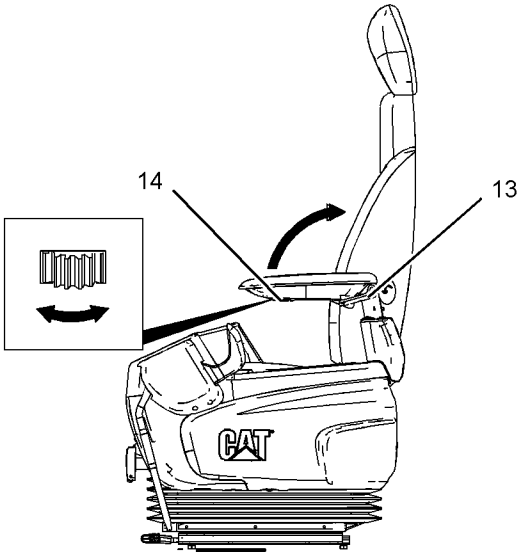


Illustration 74 g01636977

(13) Armrest adjustment knob
(14) Armrest height adjustment

The height of the armrest can be adjusted. Squeeze lever (13) in order to adjust the height of the armrest. Move the armrest upward or move the armrest downward. Release the lever when the armrest is in the desired position.

To adjust the angle of the armrest (10), operate dial (14). A dial is on the bottom of each armrest. Place the armrests in the upright position when you enter the machine or when you exit the machine.

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

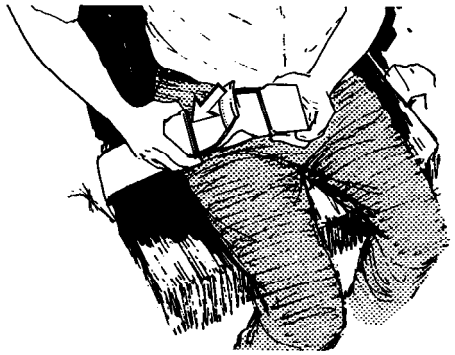


Illustration 75 g00100709

1. Unfasten the seat belt.

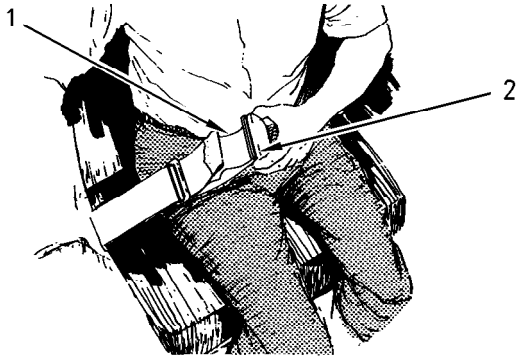


Illustration 76 g00932817

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 77 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

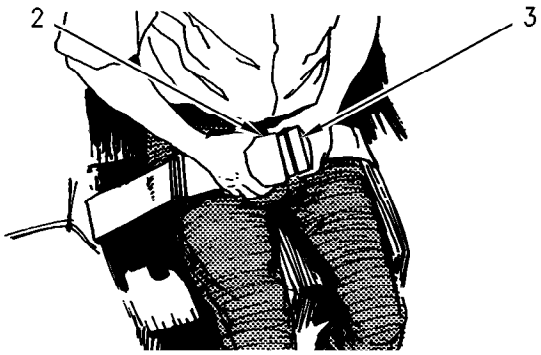


Illustration 78 g00932818

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 79 g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

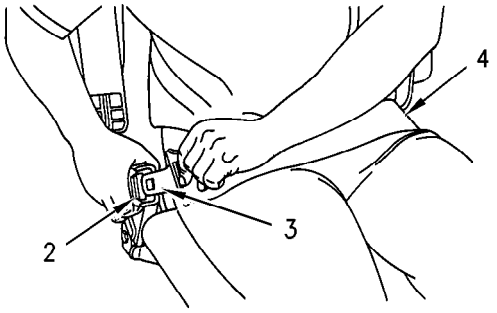


Illustration 80 g00867598

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

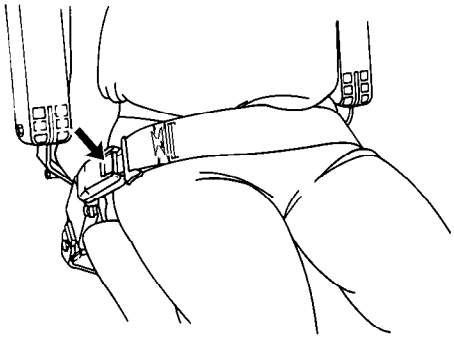


Illustration 81 g00039113

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.

i05242454

Operator Controls

SMCS Code: 7300; 7301; 7451

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

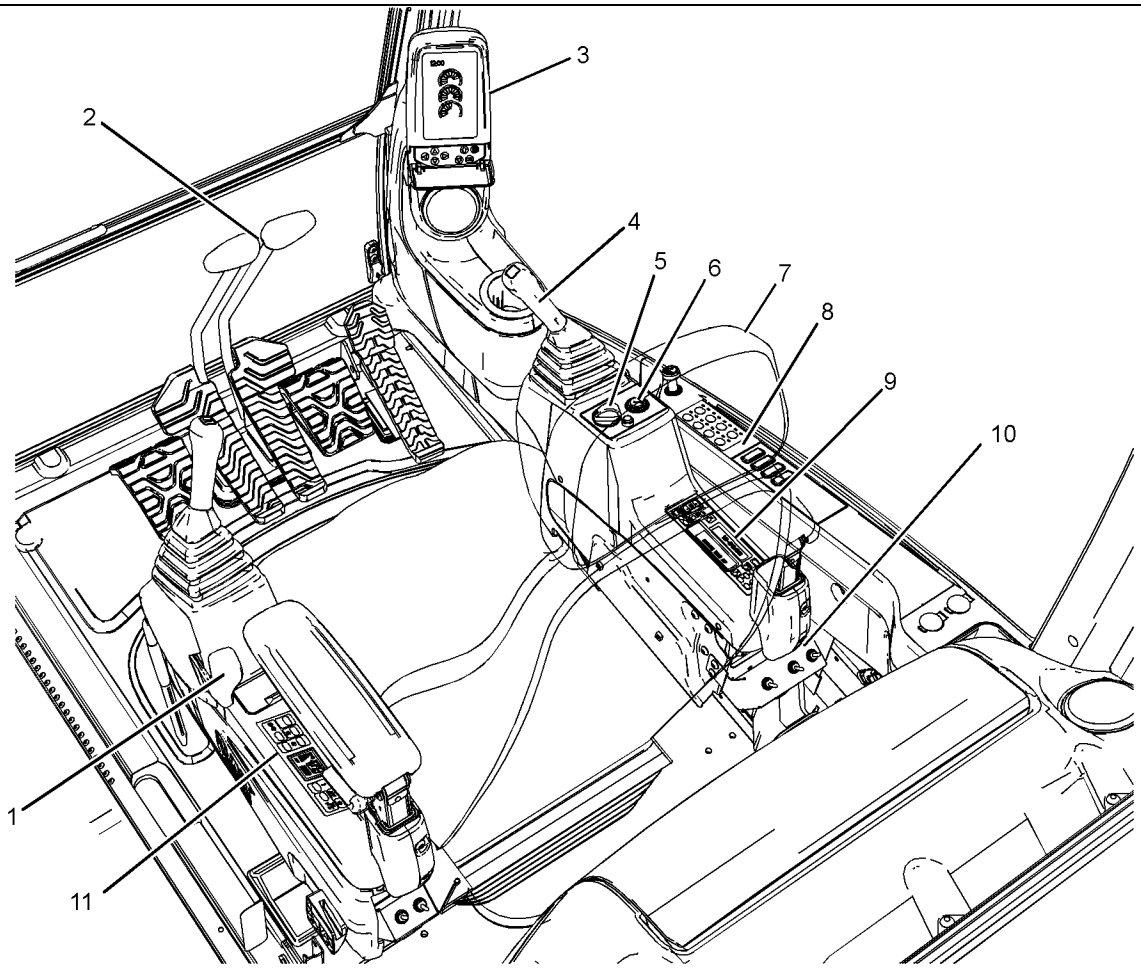


Illustration 82 g01258706

(1) Hydraulic Lockout Control
(2) Travel Controls
(3) Monitor
(4) Joystick Controls
(5) Engine Speed Control
(6) Engine Start Switch
(7) Operator's Seat
(8) Right Side Control Panel
(9) Radio
(10) Backup Controls (If Equipped)
(11) Air Conditioning and Heating Control

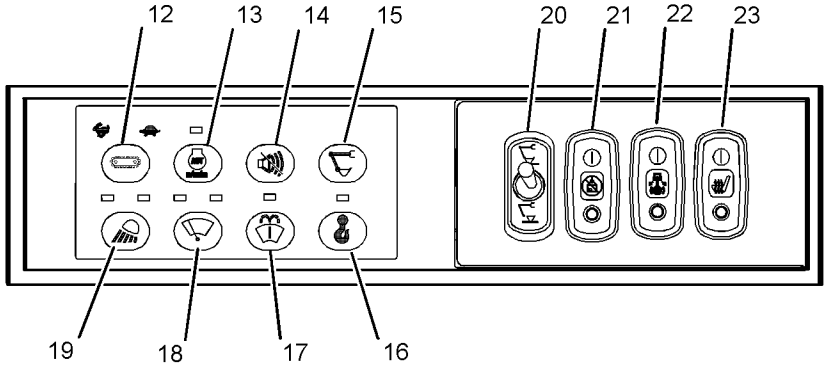


Illustration 83 g01350099

(12) Travel Speed Control
(13) Automatic Engine Speed Control (AEC)
(14) Travel Alarm Switch
(15) Work Tool Control
(16) Lift Control
(17) Window Washer
(18) Window Wiper
(19) Light Switch
(20) Quick Coupler
(21) Overload Warning Device
(22) Fine Swing Control
(23) Seat Heater (if equipped)

Hydraulic Lockout Control (1)

The lever for the hydraulic lockout control is located at the left side of the left console.

Locked – Move the travel levers/pedals and move the joysticks to the HOLD (center) position. Move the lever for the hydraulic lockout control backward to the LOCKED position. This makes all of the factory installed hydraulic controls inoperable.

Note: Make sure that the lever for the hydraulic lockout control is in the LOCKED position before attempting to start the engine. If the lever is in the UNLOCKED position, the engine start switch will not function.

Unlocked – Move the lever for the hydraulic lockout control forward to the UNLOCKED position. This makes all of the factory installed hydraulic controls operable.

Travel Control (2)

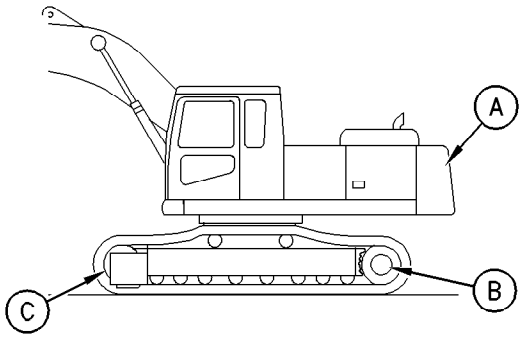


Illustration 84 g00753277

Position for normal travel

(A) Rear of machine
(B) Final drive
(C) Idler

When you travel, make sure that final drive sprockets (B) are under the rear of the machine.

Stop – Release the travel levers/pedals in order to stop the machine. When you release the travel levers/pedals from any position, the travel levers/

pedals will return to the CENTER position. This applies the travel brakes.

Move both of the travel levers or both of the travel pedals equally in the same direction in order to travel straight.

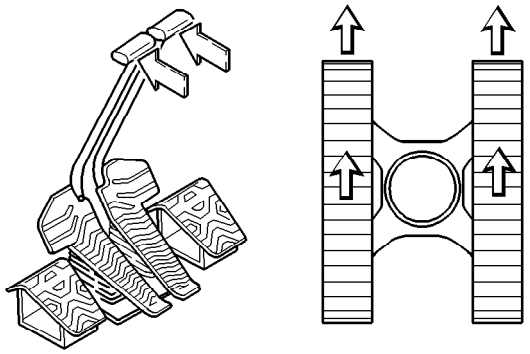


Illustration 85 g00731542

Forward Travel

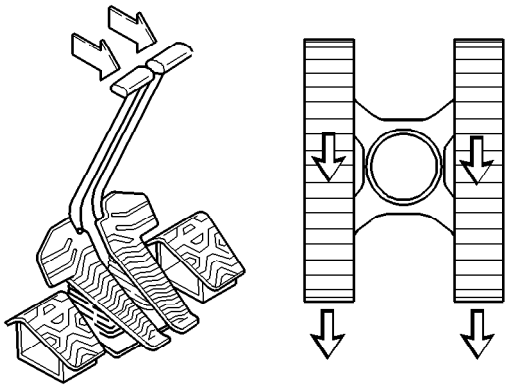


Illustration 86 g00731543

Reverse Travel

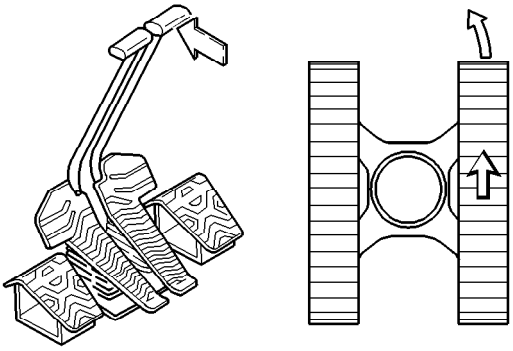


Illustration 87 g00731472

Pivot Left Turn (Forward)

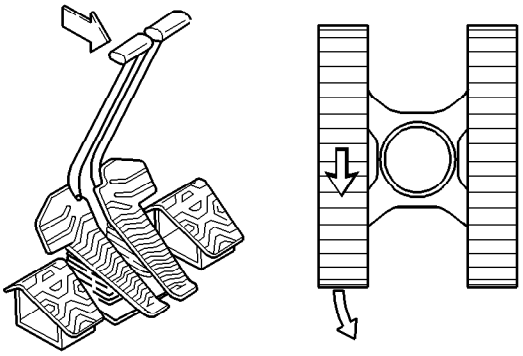


Illustration 88 g00731478

Pivot Left Turn (Reverse)

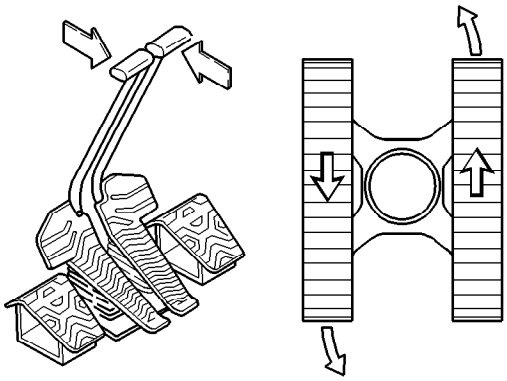


Illustration 89 g00731476

Counterrotate Turn (Left)

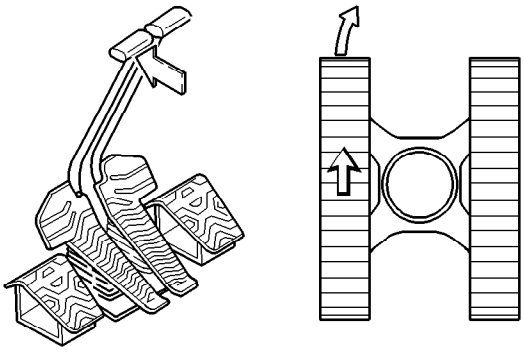


Illustration 90 g00731471

Pivot Right Turn (Forward)

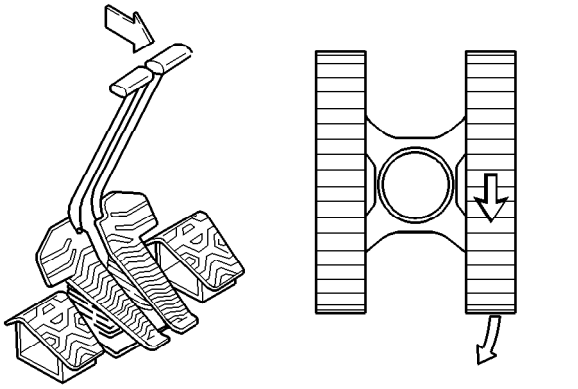


Illustration 91 g00731479
Pivot Right Turn (Reverse)

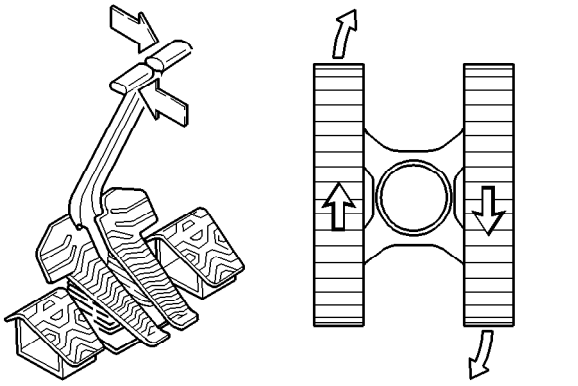


Illustration 92 g00731477
Counterrotate Turn (Right)

Monitor (3)

The monitor is used in order to display various operating information of the machine. For more information on the operation of the monitor, refer to Operation and Maintenance Manual, “Monitoring System”.

Joystick Controls (4)

The joystick control is used to control the functions of the machine implements. For more information on the individual functions of the joysticks, refer to Operation and Maintenance Manual, “Joystick Controls”.

Engine Speed Control (5)

Engine Speed – Turn the engine speed dial in order to control the engine speed (engine rpm). Select the desired position from the ten available positions. The selected position of the engine speed dial is indicated on the electronic monitor panel.

Decrease – Turn the engine speed dial counterclockwise in order to decrease the engine speed (engine rpm).

Increase – Turn the engine speed dial clockwise in order to increase the engine speed (engine rpm).

Back up Method for Controlling Engine Speed

If the control system does not work due to a malfunction and the engine speed cannot be adjusted by the engine speed dial, the following method will allow you to adjust the engine speed temporarily. Make repairs as soon as possible.

Check the message display for any error messages. If the error message “ECM ERROR” is displayed, there is a problem in the electronic controller. See “Backup Controls (10) (If Equipped)”.

If the engine speed cannot be adjusted by the engine speed dial and the indicator for the electronic controller does not come on, see “Backup Controls (10) (If Equipped)”.

Note: Even if you cannot control the engine speed, you can turn the engine on and off with the engine start switch.

Engine Start Switch (6)

NOTICE
The engine start switch must be in the ON position and the engine must be running in order to maintain electrical functions and hydraulic functions. This procedure must be followed in order to prevent serious machine damage.

OFF – Insert the engine start switch key only while the start switch is in the OFF position. Remove the engine start switch key only while the engine start switch is in the OFF position. Turn the engine start switch to the OFF position before you attempt to restart the engine. Turn the engine start switch to the OFF position in order to stop the engine.

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

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

Note: If the engine does not start after 30 seconds, return the engine start switch to the OFF position. Wait for 2 minutes before you return the engine start switch to the START position .

To start the engine, the battery disconnect switch must be on and the hydraulic lockout control must be in the locked position. For details, see the Operation and Maintenance Manual, “Engine Starting”.

Operator's Seat (7)

The operator's seat and the console has various adjustments in order to meet a wide range of operators. For more information, refer to Operation and Maintenance Manual, “Seat”.

Radio (9)

This machine may be equipped with a radio. For more information, refer to Operation and Maintenance Manual, “Radio”.

Backup Controls (10) (If Equipped)

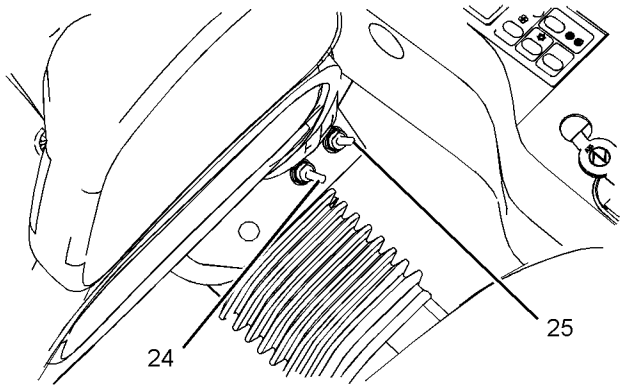


Illustration 93 g01203640

The backup switches are located under the right armrest.

Engine Speed Control – By utilizing these switches, the engine speed can be controlled manually by the operator or the engine speed can be controlled automatically by the electronic controller.

Automatic – When the electronic control system is functioning properly, backup switch (24) should be in this position.

Manual – If a problem occurs in the electronic control system, move backup switch (24) to this position in order to disconnect the controller circuit of the electronic controller system. In this condition, the machine can be operated at a reduced ratio of pump output on a temporary basis. “BACK UP SWITCH ON” will appear on the message display.

Fast Engine Speed – Move backup switch (25) to this position in order to increase the engine speed. This backup switch will not operate if backup switch (24) is not in the MANUAL position. When the switch is released the switch returns to the NEUTRAL position and the machine will maintain the engine speed. This switch overrides the function of the engine speed dial.

Slow Engine Speed – Move backup switch (25) to this position in order to decrease the engine speed. This backup switch will not operate if backup switch (24) is not in the MANUAL position. When the switch is released the switch returns to the NEUTRAL position and the machine will maintain the engine speed. This switch overrides the function of the engine speed dial.

Air Conditioning and Heating Control (11)

The heater/air conditioner provides comfort for the operator that is working under various temperature conditions. For more information on the air conditioning and heater controls, refer to Operation and Maintenance Manual, “Air Conditioning and Heating Control”.

Travel Speed Control (12)

⚠ WARNING

Do not change the setting of the travel speed control switch while you travel. Machine stability may be adversely affected.

Personal injury can result from sudden changes in machine stability.

Travel Speed Control Switch – Press the travel speed control switch in order to select automatic travel speed or low travel speed. When the engine start switch is on, the travel speed control switch is always set at the LOW SPEED position. Whenever the travel speed control switch is pressed, the travel speed changes.

LOW SPEED – Select the LOW SPEED position if you travel on rough surfaces or on soft surfaces or if you require a great drawbar pull. Also, select the LOW SPEED position if you are loading a machine onto a trailer or you are unloading a machine from a trailer.

AUTOMATIC – If you travel on a hard, level surface at a fast speed, select the AUTO position.

Continuous driving at high speed should be limited to 2 hours. If you need to continue driving at high speed for more than 2 hours, stop the machine for 10 minutes. This will cool down the travel drives before you resume driving.

Automatic Engine Speed Control (13)

The Automatic Engine Speed Control (AEC) automatically reduces engine speed when the machine is inactive. The AEC system is designed to reduce fuel consumption and noise. Lower engine speeds can also increase engine life.

The AEC system will be inoperable while the backup switch of the electronic controller system is in the MAN position.

The engine rpm will recover automatically to the setting of the engine speed dial when any hydraulic function is activated. The AEC system operates in three modes. Refer to Table 34 for a description of each mode.

Automatic Engine Speed Control (AEC) – The Automatic Engine Speed Control switch is activated when the engine start switch is turned to the ON position. The indicator lamp will turn on. When you press the AEC switch, the function of the AEC switch changes from ON to OFF, and vice versa. The operator can choose from three possible modes for automatic engine speed control. Refer to Table 34 for more details.

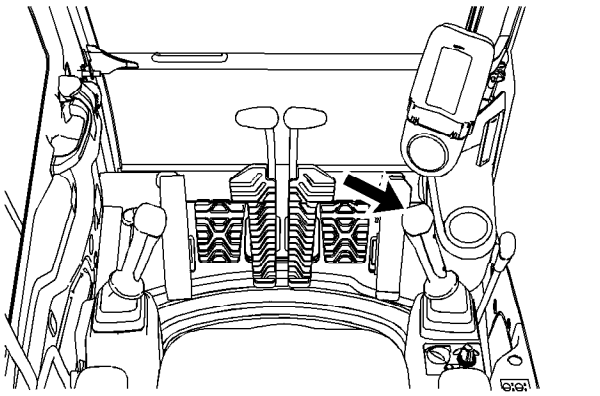


Illustration 94 g01077282

The switch for manual low idle is on the right joystick.

Manual Low Idle – Activate the manual low idle in order to reduce the engine speed to approximately 1020 rpm. Pressing the switch again will allow the engine speed to return to the original setting of the engine speed dial.

The manual low idle allows the operator to easily reduce the rpm without touching the engine speed dial. This is useful when the operator wants to reduce the engine speed in order to talk to someone or while the operator is waiting for a truck.

Operation of the automatic engine speed control depends on the position of the AEC switch and of the switch for manual low idle. The engine rpm will recover automatically to the setting of the engine speed dial when any hydraulic function is activated.

Table 34

AEC Mode	Position of AEC Switch	Setting of Engine Speed Dial	Position of Manual Low Idle Switch	Description of Mode
First stage	OFF	5 to 10	OFF	The electronic controller automatically reduces engine speed by 100 rpm after there has been no hydraulic demand for approximately 3 seconds.
Second stage	ON	5 to 10	OFF	The AEC system in the electronic controller will automatically reduce the engine rpm to approximately 1300 rpm after there has been no hydraulic demand for approximately 3 seconds.
Manual low Idle	ON or OFF	3 to 10	ON	The engine speed is reduced to approximately 1020 rpm.

Travel Alarm Cancel Switch (14)

Travel Alarm Cancel Switch – This switch is used to stop the travel alarm from sounding. Press the switch in order to stop the alarm. The indicator lamp will turn on.

Note: The travel alarm is located under the hydraulic tank. The travel alarm will sound when the travel lever or the travel pedal is activated.

Work Tool Control (15)

Work Tool Control (Switch) – Press this switch in order to display the selected work tool on the monitor display. Press the switch repeatedly in order to change the selected work tool.

Lift Control (16)

Push this button in order to activate lift mode. Also push this button in order to deactivate lift mode.

Lift Mode – This work mode increases the relief pressure in the hydraulic circuit, which increases the hydraulic force that is available for lifting operations. The cylinder speed is slower when this mode is selected.

Note: During normal excavation work, the lift control must be in the OFF position.

NOTICE
If this machine is used to lift objects within an area that is controlled by the European Directive “2006/42/EC”, the machine must be equipped with a boom lowering control valve, a stick lowering control valve, and an overload warning device.

Window Wiper and Window Washer (17-18)

Window Washer (17) – Push the switch in order to activate the window washer. While the switch is depressed, the indicator light will come on and washer fluid will spray from the nozzle. The window wiper will also operate while the switch is depressed. After the switch is released for approximately 3 seconds, the window wiper will stop.

Window Wiper (18) – Push the switch in order to activate the window wiper. Whenever the switch is depressed, the mode of the window wiper will change according to the indicator light that is illuminated.

Six Second Delay – When the window wiper switch is depressed one time, the first indicator light will turn on. The window wiper will operate intermittently at six second intervals.

Three Second Delay – When the window wiper switch is depressed two times, the second indicator light will turn on. The window wiper will operate intermittently at three second intervals.

Continuous Operation – When the window wiper switch is depressed three times, the first indicator light and the second indicator light will turn on. The window wiper will operate continuously.

OFF – When the window wiper switch is depressed four times, the indicator lights will turn off. The window wiper stops.

NOTICE
If the wiper does not operate with the switch in the ON position, turn the switch off immediately. Check the cause. If the switch remains on, motor failure can result.

NOTICE
If the washer is used continuously for more than 20 seconds or used when no washer solution comes out, motor failure can result.

Light Switch (19)

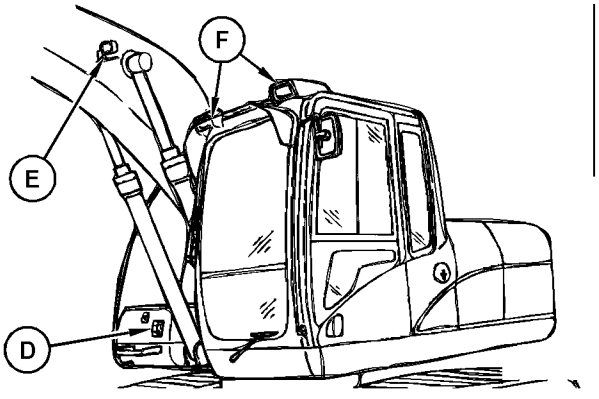


Illustration 95 g01172131

Light Switch – Push the switch in order to turn on the work lights.

Whenever you push the switch, you change the pattern of the work lights that are turned on. The indicator lights in the cab indicate the pattern of the work lights.

Pattern 1 – When you press the light switch once, the first indicator light turns on. When the first indicator light is on, the following work lights are turned on: work light (D), which is mounted on the

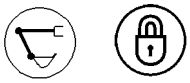
chassis, and work lights (F), which are mounted on the cab.

Pattern 2 – When you press the light switch twice, the first indicator light and the second indicator light turn on. When the first indicator light and the second indicator lights are on, the following work lights are turned on: work light (D), which is mounted on the chassis,, work lights (F), which are mounted on the cab, and work lights (E), which are mounted on the boom.

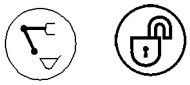
OFF – When both of the indicator lights are off, all of the work lights are off.

Note: Your machine may be equipped with a lighting system that has a time delay. When this system is installed, cab lights (F) will not turn off for a predetermined amount of time after the engine start key has been turned to the OFF position. The time delay can vary from 0 seconds to 90 seconds. For further details, consult your Caterpillar dealer.

Quick Coupler Control (20)



LOCK – Move the switch to this position in order to retract the wedge. The wedge must be retracted in order to lock the work tool in place.



UNLOCKED – Move the switch to this position in order to extend the wedge. The wedge must be extended in order to release the work tool.

Note: An alarm will sound whenever the switch is in the UNLOCKED position.

For further details, see Operation and Maintenance Manual, “Quick Coupler Operation”.

Overload Warning Device (21)

The rocker switch that activates the alarm for the overload warning device is located on the right side instrument panel.

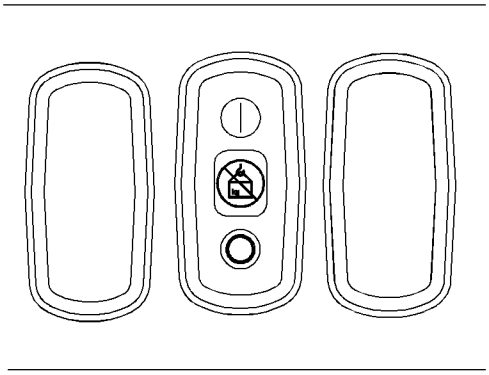


Illustration 96 g01615354
Early Type

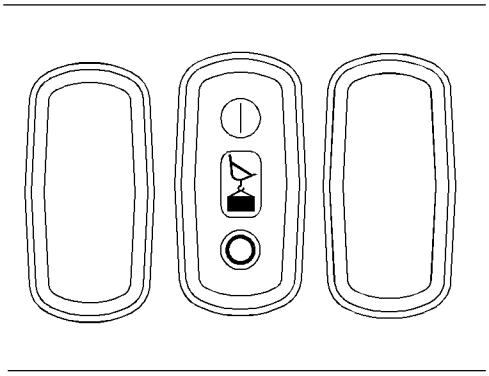
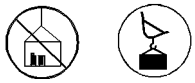


Illustration 97 g01615363
Later Type



Overload Warning Device – In lifting applications, the overload warning device activates a buzzer when there is an unstable load condition. When this occurs, the bucket load should be reduced or the stick should be moved inward.

ON – Push the right side of the switch in order to activate the overload warning device.

OFF – Push the left side of the switch in order to deactivate the overload warning device.

Fine Swing Control (22) (If Equipped)

⚠ WARNING

The Fine Swing Control delays the engagement of the swing parking brake.

If the machine is operating on a slope with the Fine Swing Control in the ON position, the swing motion may become uncontrollable which could result in property damage, personal injury or death.

Turn the Fine Swing Control to the OFF position when the machine is operating on a slope.

Fine Swing Control – Push down on the top of the switch in order to activate the fine swing control. This improves swing control during deceleration of a swing.

Push down on the bottom of the switch in order to turn off the fine swing control. Operate the machine with the switch in the OFF position when great swing forces are required. For example, digging on a sidewall requires great swing force. Operate the machine with the switch in the OFF position in order to control the motion with the swing brake.

Seat Heater (23) (if equipped)

⚠ WARNING

Preexisting skin conditions can be aggravated by continued use of the seat heater. If skin condition worsens, discontinue use of the seat heater.

Seat Heater – In cold weather, the seat heater can be activated in order to improve operator comfort.

ON – Push down on the top of the seat heater switch in order to activate the seat heater.

OFF – Push down on the bottom of the seat heater switch in order to deactivate the seat heater.

NOTICE
Do not leave any heavy item or object with a sharp point on the seat.

Do not cover the seat or seat back with a blanket, seat cushion or any other similar covering. The seat heater can be over heated. Be sure to remove any spills on the seat and thoroughly dry the spill.

Note: The thermostat in the seat heater deactivates when the temperature in the cab is above 10°C (50°F). The seat heater will not operate when the thermostat is deactivated.

Service Port

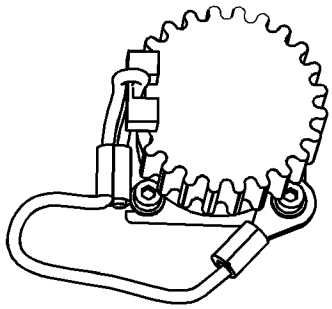


Illustration 98 g03320855
Electronic Technician service port

An Electronic Technician (ET) service port is located inside the cab behind the seat. This service port allows service personnel to connect a laptop computer that is equipped with Electronic Technician. Service personnel can use electronic technician in order to diagnose machine and engine systems.

Contact your Cat dealer for additional information.

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Battery Disconnect Switch

SMCS Code: 1411-B11

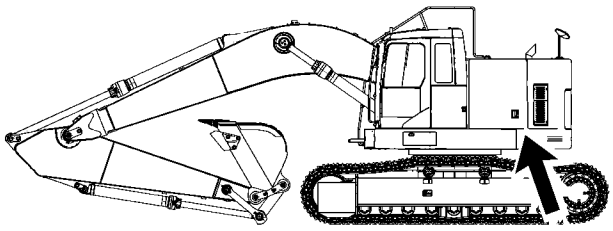


Illustration 99 g01365581

The battery disconnect switch is on the left side of the machine behind the rear access door.

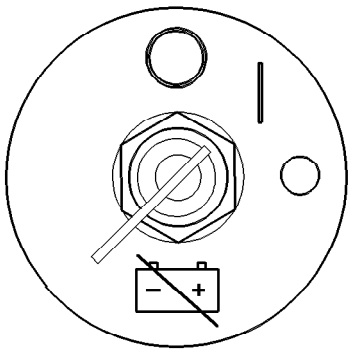


Illustration 100 g00406959

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

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

The battery disconnect switch operates differently than the engine start switch. When the battery disconnect switch is in the OFF position, the electrical system is disabled. When the engine start switch is turned to the OFF position and the battery disconnect switch is turned to the ON position, the battery remains connected to the entire electrical system.

Turn the battery disconnect switch to the OFF position and remove the disconnect switch key when you service the electrical system or other components on the machine.

Turn the battery disconnect switch to the OFF position and remove the disconnect switch key if you do not operate the machine for an extended period of a month or more. This will prevent drainage of the battery.

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

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

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

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

i07592588

Product Link

SMCS Code: 7490; 7606

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

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

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

Data Broadcasts

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

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

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

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

Operation in a Blast Site for Product Link Radios

⚠ WARNING

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

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

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

- Operation and Maintenance Manual, SEBU8142, “Product Link - 121SR/321SR/420/421/522/523”
- Operation and Maintenance Manual, SEBU8832, “Product Link PLE601, PL641, PL631, PL542, PL240, PL241, PL141, PL131, PL161, and G0100 Systems”
- Operation and Maintenance Manual, M0088349, “Product Link PL042 and PLE702 Systems”

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

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

- Special Instruction, “Installation Procedure for the Product Link PL131, PL141, and PL161 Systems”SEHS0377
- Special Instruction, “Installation Procedure for the Pro Product Link PL641 and PL631 Systems”REHS9111

i02509498

Power Receptacle
(If Equipped)

SMCS Code: 1436; 7451

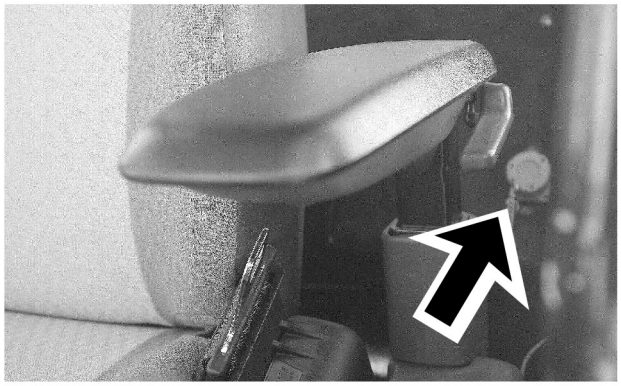


Illustration 101 g01258948

Power Receptacle – This machine has a twelve volt five ampere electrical outlet receptacle. The outlet is located behind the operator's seat. This outlet supplies power for auxiliary uses. Remove the cap before you use the outlet.

i07037877

Machine Security System
(If Equipped)

SMCS Code: 7631

Operation Section

NOTICE
This machine is equipped with a Caterpillar Machine Security System (MSS) and may not start under certain conditions. Read the following information and know your machine's settings. Your Caterpillar dealer can identify your machine settings.

Machine Security System (MSS) – Machines that are equipped with a Caterpillar Machine Security System (MSS) can be identified by a decal in the operator station. The MSS is a theft deterrent and will prevent the unauthorized operation of the machine.

Basic Operation

MSS may be programmed to use a standard Caterpillar key or an electronic key. The electronic key contains an electronic chip within the plastic housing for the key. Each key emits a unique signal to the MSS. The keys can be identified by a gray housing or a yellow housing. MSS may have programmed settings that require an electronic key for starting during certain periods of time. The MSS may also have programmed settings that allow a standard Caterpillar key to start the machine during certain periods of time.

Note: Ensure that you have only one electronic key near the engine start switch when you are attempting to start the machine. If there is more than one electronic key near the engine start switch the MSS may not be able to read the key in the engine start switch and the machine will not start.

When the engine start switch is turned to the ON position, the ECM will read the unique ID that is stored in the electronic key. The ECM will then compare this ID to the list of authorized keys. The status of the key will be displayed on the monitor. If the key is not authorized for the machine, “UNAUTHORIZED KEY” will be displayed on the monitor.

Note: MSS will not shut down the machine after the machine has started.

Security Management

MSS allows you to program the system to automatically activate at different time periods with different keys. The MSS can also be programmed to reject a specific electronic key after a selected date and time. When you turn the key to the OFF position and the MSS is active, you have a 30 second interval to restart the machine. Also if the machine stalls, there is a 30 second interval for restarting the machine. This 30 second interval is counted from the time of turning the key to the OFF position.

Note: Know your machine's settings because the use of an electronic key is no guarantee that the machine can be restarted.

An expiration date can be set for each electronic key that is contained in the list of keys for the machine. The key will no longer start the machine when the internal clock in the security system passes the expiration date. Each entry in the list of keys can have a different expiration date.

Spare keys are available from your dealer. Before a key can operate the machine, the MSS must be set to accept that particular key. Contact your Caterpillar dealer for information on additional features of the MSS.

Regulatory Compliance Section

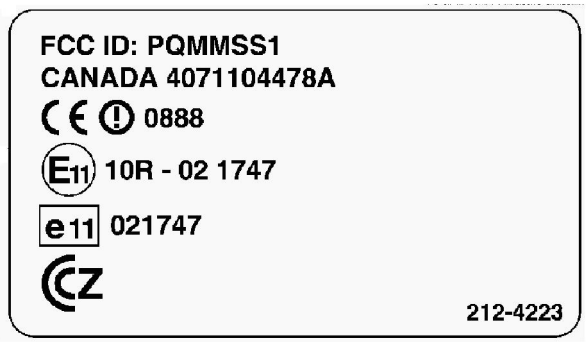
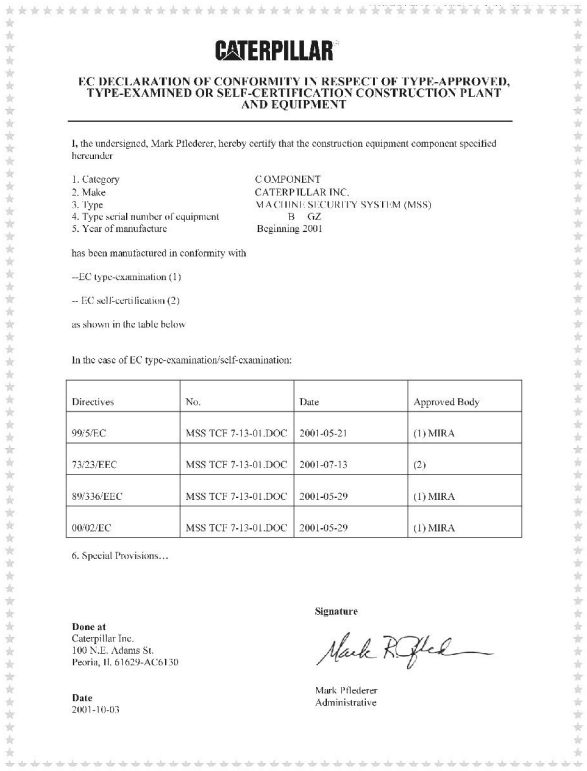


Illustration 102 g00832427

Consult your Caterpillar Dealer with any questions that concern the operation of the MSS in a specific country.



CATERPILLAR

EC DECLARATION OF CONFORMITY IN RESPECT OF TYPE-APPROVED, TYPE-EXAMINED OR SELF-CERTIFICATION CONSTRUCTION PLANT AND EQUIPMENT

I, the undersigned, Mark Pflederer, hereby certify that the construction equipment component specified hereunder

1. Category — COMPONENT
2. Make — CATERPILLAR INC.
3. Type — MACHINE SECURITY SYSTEM (MSS)
4. Type serial number of equipment — B GZ
5. Year of manufacture — Beginning 2001

has been manufactured in conformity with

-- EC type-examination (1)

-- EC self-certification (2)

as shown in the table below

In the case of EC type-examination/self-examination:

Directives	No.	Date	Approved Body
99/5/EC	MSS TCF 7-13-01.DOC	2001-05-21	(1) MIRA
73/23/EEC	MSS TCF 7-13-01.DOC	2001-07-13	(2)
89/336/EEC	MSS TCF 7-13-01.DOC	2001-05-29	(1) MIRA
00/02/EC	MSS TCF 7-13-01.DOC	2001-05-29	(1) MIRA

6. Special Provisions…

Done at
Caterpillar Inc.
100 N.E. Adams St.
Peoria, IL 61629-AC6130

Date
2001-10-03

Signature

Mark Pflederer
Administrative

Illustration 103 g00822256

i06584083

Camera

SMCS Code: 7347; 7348

Rear View Camera (If Equipped)

The rear view camera system consists of a camera that is located in the middle of the top of the counterweight and a “VIDEO MODE SETTING” menu on the monitor.

Note: The rear view camera system has been set up by the factory or by a Cat dealer to provide views which comply with specified guidelines. Consult your Cat dealer before any adjustments are made to the system.

For more information refer to Operation and Maintenance Manual, “Monitoring System”.

i06733387

Monitoring System

SMCS Code: 7451; 7490

NOTICE
When the monitor provides a warning, immediately check the monitor and perform the required action or maintenance as indicated by the monitor.

The monitor indicator does not guarantee that the machine is in a good condition. Do not use the monitor panel as the only method of inspection. Maintenance and inspection of the machine must be performed on a regular basis. See the Maintenance Section of this Operation and Maintenance Manual.

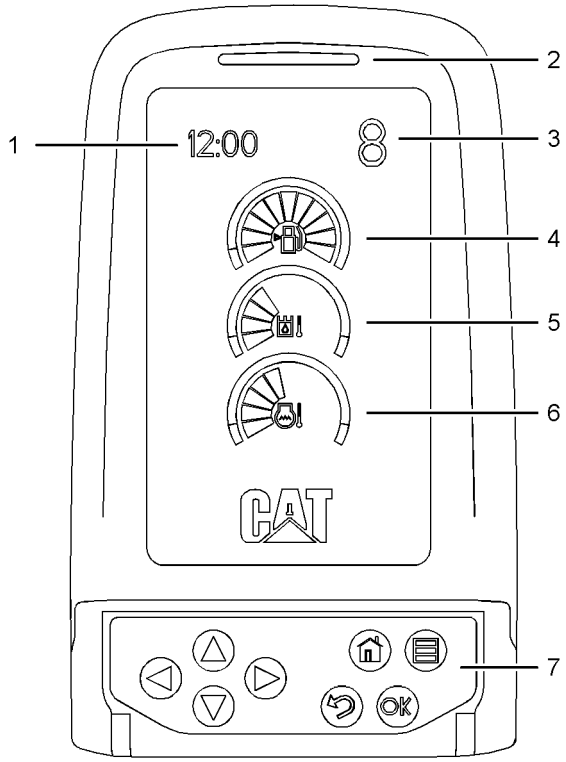


Illustration 104 g01105763

(1) Clock
(2) Alert indicator
(3) Engine speed dial indicator
(4) Fuel level
(5) Hydraulic oil temperature
(6) Engine coolant temperature
(7) Keypad

Engine Speed Dial Indicator – This digital display indicates the current position of the engine speed dial. For more information on the engine speed dial, refer to Operation and Maintenance Manual, “Operator Controls”.

Fuel Level – This gauge indicates the amount of fuel that is remaining in the fuel tank. When the fuel gauge indicates that the fuel level is in the red range, add fuel immediately.

Hydraulic Oil Temperature – This gauge indicates the temperature of the hydraulic oil. The normal operating range is the green range. If the gauge reaches the red range, reduce the load on the system. If the gauge stays in the red range, stop the machine and investigate the cause of the problem.

Engine Coolant Temperature – This gauge indicates the temperature of the engine coolant. The normal operating range is the green range. If the gauge reaches the red range, stop the machine and investigate the cause of the problem.

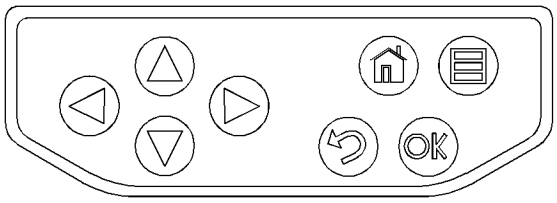


Illustration 105 g01105768

Keypad

The keypad has eight keys that are used to input information into the electronic monitoring system.

Up Key – Press the up key to move the cursor upward. Also press the up key to increase values.

Down Key – Press the down key to move the cursor downward. Also press the down key to decrease values.

Left Key – Press the left key to move the cursor to the left. Also press the left key to decrease values.

Right Key – Press the right key to move the cursor to the right. Also press the right key to increase values.

Home Key – Press the home key to return to the default display at any time.

Menu Key – Press the menu key to access the main menu. For more information, refer to “Main Menu”.

OK Key – Press the OK key to select a menu option. Also press the OK key to set values.

Back Key – Press the back key to reject a menu option or a setting value. Also, press the back key to return to the previous display.

Prestart Monitoring Function

Turn the engine start switch to the ON position.

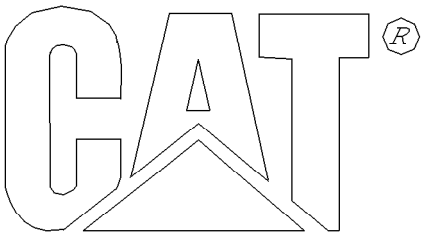


Illustration 106 g00928810

After approximately one second, Illustration 106 appears in the display and the alert indicator turns on.

The coolant temperature, the hydraulic oil temperature, the fuel level, and the position of the engine speed dial are now indicated.

The monitoring system checks the level of the engine coolant, the engine oil, and the hydraulic oil before the engine starts.

If the fluid level check detects a low fluid level, the appropriate message will be displayed and a pictograph will be shown to indicate the fluid level that is low.

Note: If more than one fluid level is low, the symbols for the right key and the left key are indicated in the bottom right area of warning message. Press the right key or the left key to check the other warning message. The low fluid level indicators will disappear within 5 seconds after the engine is started.

Note: The machine cannot perform an accurate fluid level check when the machine is on a slope. Perform the fluid level check on level ground.

If the engine is started during the fluid level check, the monitor will cancel these checks.

The service hours for the filters are checked first. Then, the service hours for the fluids are checked. If a filter or a fluid is over the recommended change interval, “CHECK FLTR/FLUID INFO” appears on the display. Refer to “Main Menu” for more information. This message will disappear after 5 seconds.

Machine Warnings

The monitoring system provides three warning categories.

- The first warning category requires only operator awareness. This type of warning will be indicated by a message on the display screen.
- The second warning category requires a change to the machine operation or a change to the maintenance of the machine. This type of warning will be indicated by a message on the display screen and by a blinking of the Alert Indicator.
- The third warning category requires immediate shutdown of the engine. This type of warning will be indicated by a message on the display screen, by a blinking of the Alert Indicator, and by a buzzer.

If multiple warnings are present in the system, the most important problem is shown first. Press the right key or press the left key to view all of the warnings that are present in the machine. If no keys are pressed within 5 seconds, the display will return to the most important problem.

Note: The menu is still functional by pressing the menu key.

Warning Category 1

In this category, only a warning will be shown in the display screen. This category alerts the operator that the machine system needs attention. Failure of these systems will not endanger the operator. Failure of these systems will not cause serious damage to the machine components.

“UNAUTHORIZED KEY” – This machine is equipped with a Machine Security System. The key that is currently in the ignition switch is not an authorized key. Remove the key and insert an authorized key.

“BATTERY VOLTAGE IRREGULAR” – The electrical charging system is malfunctioning. Check the electrical components of the charging circuit immediately. Perform any necessary repairs.

"HYD RETURN FLTR PLUGGED" – The hydraulic return filter is restricted. This will cause hydraulic components to malfunction. Turn the engine start switch to the OFF position and then turn the engine start switch to the ON position. If the warning disappears, the filter is good. Operate the machine on flat ground for at least 10 minutes. If the warning reappears, replace the return filter cartridge. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter (Return) - Replace".

Note: The warning for the restricted hydraulic return filter will disappear from the display after 3 minutes.

"ATT FLTR PLUGGED" – The hydraulic filter is restricted. This will cause hydraulic components to malfunction. Turn the engine start switch to the OFF position and then turn the engine start switch to the ON position. If the warning disappears, the filter is good. Operate the machine on flat ground for at least 10 minutes. If the warning reappears, replace the filter.

"INTAKE AIR FLTR PLUGGED" – The air filter is restricted. Engine output will be decreased. Immediately inspect the air filter. Clean the air filter. Inspect the condition of the air filter. Replace the air filter, if necessary. Perform any necessary repairs. Refer to Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace".

"FUEL FLTR PLUGGED" – The fuel filter is restricted. Engine output will be decreased. Immediately inspect the fuel filter. Replace the fuel filter, if necessary. Perform any necessary repairs. Refer to Operation and Maintenance Manual, "Fuel System Primary Filter (Water Separator) Element - Replace".

"WATER SEPARATOR FULL" – The water separator is full. Drain the water from the water separator as soon as possible. Refer to Operation and Maintenance Manual, "Fuel System Water Separator - Drain".

"FUEL LEVEL LOW" – The fuel in the tank is low on fuel. Refill the fuel tank.

"LUBE LEVEL LOW" – The reservoir for the automatic lubrication system is low on grease. Refill the reservoir.

"AUTOLUBE ERROR" – The automatic lubrication system is malfunctioning. Stop using the system and check the system for the cause of the malfunction.

Warning Category 2

"INLET AIR TEMP HIGH" – The inlet air temperature is too high. Stop the machine and investigate the cause of the fault.

"COOLANT TEMP HIGH" – The coolant temperature is too high. Stop operating the machine and run the engine at low idle until the coolant temperature decreases to the correct level. If the warning stays on during low idle, stop the engine. Check the coolant level and check the radiator for debris. Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check". Check the fan drive belts for the water pump. Refer to Operation and Maintenance Manual, "Belts - Inspect/Adjust/ Replace". Make any necessary repairs.

"ENGINE SHUTDOWN ACTIVATING" – An error has occurred with the engine and the engine is shutting down. Contact your Caterpillar Dealer.

"ENG OVERSPEED WARNING" – The engine speed is too fast. Change the operating technique. If the situation continues, contact your Caterpillar Dealer.

"HYD OIL TEMP HIGH" – The hydraulic oil temperature is too high. Stop operating the machine and run the engine at low idle until the hydraulic oil temperature decreases to the correct level. If the warning stays on during low idle, stop the engine. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

"HYD OIL TEMP HIGH (TOOL)" – The hydraulic oil temperature is too high. Stop operating the machine and run the engine at low idle until the hydraulic oil temperature decreases to the correct level. If the warning stays on during low idle, stop the engine. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

"FUEL PRESS HIGH" – The fuel pressure is too high. Contact your Caterpillar Dealer.

"ECM ERROR" – The ECM has malfunctioned. Contact your Caterpillar Dealer.

"ENGINE ECM ERROR" – The engine ECM has malfunctioned. Contact your Caterpillar Dealer.

“MONITOR ERROR” – The monitor has malfunctioned. Contact your Caterpillar Dealer.

“SERVICE REQUIRED” – The machine has detected a malfunction. Contact your Caterpillar Dealer.

“TOOL CONTROL MALFUNCTION” – The work tool has malfunctioned. Stop the machine and inspect the work tool.

Warning Category 3

“LIFT OVERLOAD WARNING” – The load on the machine is too heavy. The machine is in danger of tipping. Reduce the load immediately. Refer to Operation and Maintenance Manual, “Lifting Capacities” for more information.

“ENG OIL PRESS LOW” – The engine oil pressure is too low. Stop the machine immediately. Stop the engine and investigate the cause of the problem. Do not operate the machine until the cause of the problem has been corrected.

Other Messages

Prestart

CHECK SERVICE PARTS INFORMATION – One of the machines filters has exceeded the recommended change interval. Replace the filter and reset the hours for the filter.

“COOLANT LEVEL LOW” – The coolant level is too low. Stop the machine immediately. Stop the engine and investigate the cause of the fault.

“ENG OIL LEVEL LOW” – The engine oil level is too low. Stop the machine immediately. Stop the engine and investigate the cause of the fault.

“HYD OIL LEVEL LOW” – The hydraulic oil level is too low. Stop the machine immediately. Stop the engine and investigate the cause of the fault.

“CHECK FILTER FLUID INFO” – One of the machine's filters has exceeded the recommended change interval. Replace the filter and reset the hours for the filter.

Miscellaneous

“LUBE STARTING” – The automatic lubrication system is lubricating the machine's bearings.

“LEVER IS NOT NEUTRAL” – The lever is not in the NEUTRAL position. Move the lever to the NEUTRAL position.

“COUNTERWEIGHT REMOVAL” – The counterweight has been removed. Do not operate the machine until the counterweight has been reinstalled.

“NOT CONFIGURED” – This is a general warning that indicates that a machine component needs to be configured.

“NOT CALIBRATED” – This is a general warning that indicates that a machine component needs to be calibrated.

“CYCLE THE LOCK LEVER” – An error has occurred with the lock lever. Cycle the lock lever.

AIR INLET HEATER (If Equipped) – If the engine coolant temperature is too low, the air inlet heater will be activated. This indicator will appear in the message display when the engine start switch is in the ON position. The engine can be started after the indicator disappears from the message display.

Adjusting the Monitor

Follow this procedure to adjust the position of the monitor.

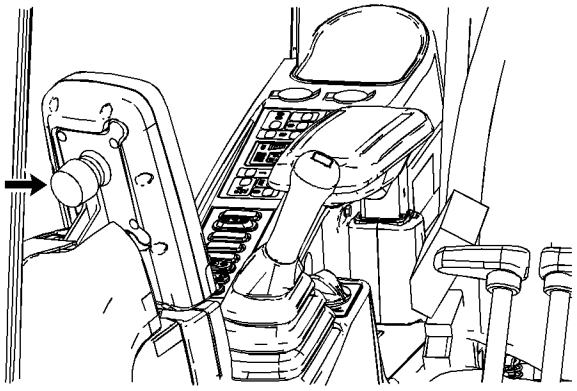


Illustration 107 g01105770

1. Loosen the knob that is on the back of the monitor.

2. Adjust the monitor to the desired position.

3. Tighten the knob.

Main Menu

The “MAIN MENU” allows the operator to view information concerning the machine. This menu also allows the operator to change information concerning the machine.

1. Push the menu key when the default display is active.

Table 35

“MAIN MENU”
“SETTING”

2. The “MAIN MENU” will be displayed with four new menu options: setting, maintenance information, performance, and service. For more information on these menus, refer to the respective descriptions below.

3. Press the right key or the left key to highlight the desired menu. Press the OK key to open the desired menu.

Note: Press the back key or the home key to exit this menu and return to the default display.

Setting

The “SETTING” menu allows the operator to change the various machine settings.

1. Press the menu key.

Table 36

“MAIN MENU”
“SETTING”

2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 37

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”

3. The “SETTING” menu will be displayed with two new menu options. For more information on these menus, refer to the respective descriptions below.

4. Press the up key or the down key to highlight the desired menu. Press the OK key to open the desired menu.

Note: Press the home key to return to the default display.

Maintenance Information

The “MAINTENANCE INFO” menu allows the operator to view the current hours of use and the recommended change intervals for various system components.

1. Press the menu key.

Table 38

“MAIN MENU”
“MAINTENANCE INFO”

2. Press the right key or the left key to highlight the “MAINTENANCE INFO” menu. Press the OK key.

Table 39

“MAINTENANCE INFO”

(continued)

(Table 39, contd)

“COOLANT”
“100 / 12000 [HR]”
“HYD OIL”
“100 / 2000 [HR]”
“ENGINE OIL”
“100 / 500 [HR]”

3. A list of system components will be displayed. Press the up key or the down key to scroll through the list. For each of the system components, the current hours of use will be displayed. If the component has a recommended change interval, the recommended interval will be displayed to the right of the current hours of use.

Note: Press the home key to return to the default display.

Performance

The “PERFORMANCE” menu allows the operator to view measurements of various system components. The following components are a few examples of the components that can be viewed through the “PERFORMANCE” menu: battery voltage, engine speed, and pump pressure.

1. Press the menu key.

Table 40

“MAIN MENU”
“PERFORMANCE”


2. Press the right key or the left key to highlight the “PERFORMANCE” menu. Press the OK key.

Table 41

“PERFORMANCE”
“BATTERY VOLTAGE”
“26.0 [V]”

(continued)

(Table 41, contd)

“ENGINE SPEED”
“1300 [RPM]”
“COOLANT TEMP”
“20 [°C]”

3. The “PERFORMANCE” menu will be displayed with a list of system components and measurements. Press the up key or the down key to scroll through the list.

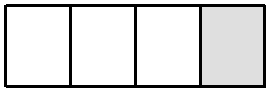
Note: Press the home key to return to the default display.

Service

The “SERVICE” menu allows the operator to change the password and the accumulated hours for the machine's filters and fluids.

1. Press the menu key.

Table 42

“MAIN MENU”
“SERVICE”


2. Press the right key or the left key to highlight the “SERVICE” menu. Press the OK key.

Note: You will be prompted to enter a password. Refer to “Password Entry” for information on entering a password.

Table 43

SERVICE
“MAINTENANCE”
“PASSWORD CHANGE”

3. After the password has been entered successfully, the “SERVICE” menu will be displayed with two new menu options. For more information on these menus, refer to the respective descriptions below.

Note: Press the home key to return to the default display.

Password Entry

When you try to access certain menus, you will be prompted to enter a password. Follow this procedure to enter the password.

Table 44

“PASSWORD”
“ENTER PASSWORD”
_ _ _ _
“< B C D E F 0 1 2 3 4 5 >”

1. Press the right key or the left key to select the desired character.

Note: The password is alphanumeric. You may choose from “0” to “9” . You may also choose from “A” to “F” .

Note: When the machine leaves the factory, the password is initially set as 0001.

2. Press the OK key to enter the character.

Note: Press the back key to delete the last character that was entered.

3. After you enter four characters, the monitoring system checks the password. If the password is correct, you will have access to the menu.

Table 45

“PASSWORD”
“ENTER PASSWORD”
* * * *
“INVALID PASSWORD”

4. If the password is incorrect, “INVALID PASSWORD” will be displayed. Press the OK key to retry the password or press the back key to return to the previous menu.

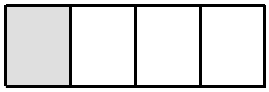
Note: Consult your Caterpillar dealer if you forget your password.

Display Setup

The “DISPLAY SETUP” menu allows the operator to change the various display settings of the monitor.

1. Press the menu key.

Table 46

“MAIN MENU”
“SETTING”


2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 47

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”

3. Press the up key or the down key to highlight the “DISPLAY SETUP” menu. Press the OK key.

Table 48

“DISPLAY SETUP”
“CLOCK ADJUST”
“LANGUAGE SELECT”
“INDICATED ITEM”

(continued)

(Table 48, contd)

“CONTRAST”
“BRIGHTNESS”
“BRIGHTNESS”

4. The “DISPLAY SETUP” menu will be displayed with various options for the monitor. For more information on these menus, refer to the respective descriptions below.

5. Press the up key or the down key to highlight the desired menu. Press the OK key to open the desired menu.

Note: Press the home key to return to the default display.

Selecting the Work Tool

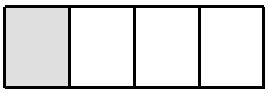
The “WORK TOOL SELECT” menu allows the operator to change the settings for the work tool.

Note: Make sure that the hydraulic lockout control is in the LOCKED position before you change the settings for the work tool.

Note: If a bucket is installed on the machine, or no work tool is installed, select “Bucket/No Tool” in the menu.

1. Press the menu key.

Table 49

“MAIN MENU”
“SETTING”


2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 50

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”

(continued)

(Table 50, contd)

3. Press the up key or the down key to highlight the “WORK TOOL SELECT” menu. Press the OK key.

Table 51

“WORK TOOL SELECT”
“BUCKET/NO TOOL”
“TOOL #01”
“TOOL #02”
“TOOL #03”
“TOOL #04”

Note: If the work tools have been configured through the Electronic Technician (ET), the names of the work tools will be displayed instead of the numbers.

4. The “WORK TOOL SELECT” menu will be displayed with the current options for work tools. Press the up key or the down key to highlight the desired work tool. Press the OK key to select the new work tool.

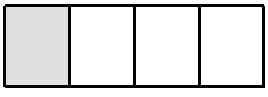
Note: Press the home key to return to the default display.

Adjusting the Clock

The “CLOCK ADJUST” menu allows the operator to change the time on the clock.

1. Press the menu key.

Table 52

“MAIN MENU”
“SETTING”


2. Press the right key or press the left key to highlight the “SETTING” menu. Press the OK key.

Table 53

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”

3. Press the up key or press the down key to highlight the “DISPLAY SETUP” menu. Press the OK key.

Table 54

“DISPLAY SETUP”
“CLOCK ADJUST”
“LANGUAGE SELECT”
“INDICATED ITEM”
“CONTRAST”
“BRIGHTNESS”
“BRIGHTNESS”

4. Press the up key or press the down key to highlight the “CLOCK ADJUST” menu. Press the OK key.

Table 55

“CLOCK ADJUST”
“12 : 00”

5. The “CLOCK ADJUST” menu will be displayed with the current time. Press the left key or the right key to select the hour or the minute. Press the up key to increase the value. Press the down key to decrease the value.

6. When the clock is set to the desired time, press the OK key to save the new time in memory.

Note: Press the back key to return to the previous display without saving.

Note: Press the home key to return to the default display.

Language Selection

The “LANGUAGE SELECT” menu allows the operator to change the language settings.

1. Press the menu key.

Table 56

“MAIN MENU”
“SETTING”

2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 57

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”

3. Press the up key or the down key to highlight the “DISPLAY SETUP” menu. Press the OK key.

Table 58

“DISPLAY SETUP”
“CLOCK ADJUST”
“LANGUAGE SELECT”
“INDICATED ITEM”
“CONTRAST”
“BRIGHTNESS”
“BRIGHTNESS”

4. Press the up key or the down key to highlight the "LANGUAGE SELECT" menu. Press the OK key.

Table 59

"LANGUAGE SELECT"
"ENGLISH"
"DANISH"
"FINNISH"
"ICELANDIC"
"NORWEGIAN"
"SWEDISH"

5. The "LANGUAGE SELECT" menu will be displayed with a list of available languages. Press the up key or the down key to scroll through the available languages. Press the set key to select the desired language.

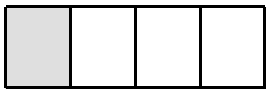
Note: Press the home key to return to the default display.

Indicated Item

The "INDICATED ITEM" menu allows the operator to display the name of the current work tool and/or the service hours for the machine on the default display. This procedure is also used to remove these items from the default display.

1. Press the menu key.

Table 60

"MAIN MENU"
"SETTING"


2. Press the right key or the left key to highlight the "SETTING" menu. Press the OK key.

Table 61

"SETTING"
"DISPLAY SETUP"

(continued)

(Table 61, contd)

"WORK TOOL SELECT"

3. Press the up key or the down key to highlight the "DISPLAY SETUP" menu. Press the OK key.

Table 62

"DISPLAY SETUP"
"CLOCK ADJUST"
"LANGUAGE SELECT"
"INDICATED ITEM"
"CONTRAST"
"BRIGHTNESS"
"BRIGHTNESS"

4. Press the up key or the down key to highlight the "INDICATED ITEM" menu. Press the OK key.

Note: You will be prompted to enter a password. Refer to "Password Entry" for information on entering a password.

Table 63

"INDICATED ITEM"
"TOOL NAME"
"SERVICE HR METER"

5. The "INDICATED ITEM" menu will be displayed with two items. Press the up key or the down key to highlight the desired item. Press the OK key to enable the item. Also, press the OK key to disable the item. By choosing to enable the item, that item will be shown on the default display. By choosing to disable the item, that item will be removed from the default display.

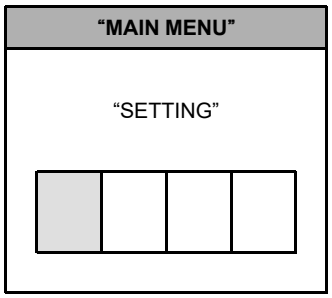
Note: Press the home key to return to the default display.

Adjusting the Contrast

The “CONTRAST” menu allows the operator to change the contrast of the monitor.

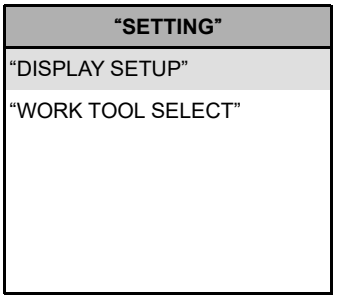
1. Press the menu key.

Table 64



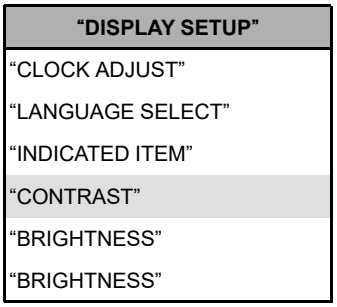
2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 65



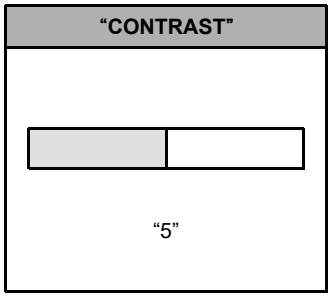
3. Press the up key or the down key to highlight the “DISPLAY SETUP” menu. Press the OK key.

Table 66



4. Press the up key or the down key to highlight the “CONTRAST” menu. Press the OK key.

Table 67



5. The contrast can be set between 1 and 10. Press the right key to increase the contrast. Press the left key to decrease the contrast.

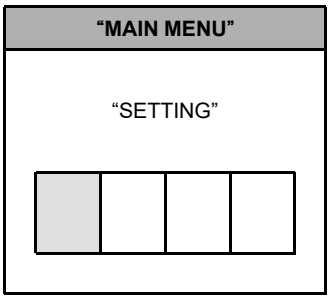
Note: Press the home key to return to the default display.

Adjusting the Brightness

The “BRIGHTNESS” menu allows the operator to change the brightness of the monitor.

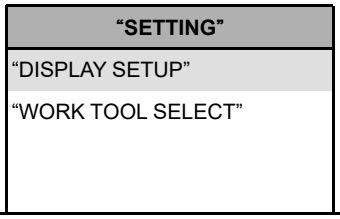
1. Press the menu key.

Table 68



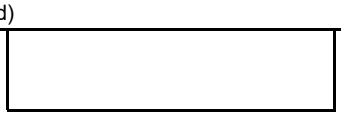
2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 69



(continued)

(Table 69, contd)



3. Press the up key or the down key to highlight the “DISPLAY SETUP” menu. Press the OK key.

Table 70

“DISPLAY SETUP”
“CLOCK ADJUST”
“LANGUAGE SELECT”
“INDICATED ITEM”
“CONTRAST”
“BRIGHTNESS”
“BRIGHTNESS”

4. Press the up key or the down key to highlight the desired “BRIGHTNESS” menu. Press the OK key.

Note: There are two “BRIGHTNESS” menus. The first menu is used for machine operation during the day. The second menu is used for machine operation at night.

Table 71

“BRIGHTNESS”
“5”

5. The brightness can be set between 1 and 10. Press the right key to increase the brightness. Press the left key to decrease the brightness.

Note: Press the home key to return to the default display.

Maintenance

The “MAINTENANCE” menu allows the operator to change the accumulated hours for the machine's filters and fluids.

1. Press the menu key.

Table 72

“MAIN MENU”
“SERVICE”

2. Press the right key or the left key to highlight the “SERVICE” menu. Press the OK key.

Note: You will be prompted to enter a password. Refer to “Password Entry” for information on entering a password.

Table 73

SERVICE
“MAINTENANCE”
“PASSWORD CHANGE”

3. After the password has been entered successfully, press the up key or the down key to highlight the “MAINTENANCE” menu. Press the OK key.

Table 74

“MAINTENANCE”
“FLTR/FLUID INFO”

4. The “MAINTENANCE” menu will be displayed with two new menu options. For more information on these menus, refer to the respective descriptions below.

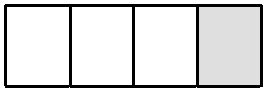
Note: Press the home key to return to the default display.

Changing the Password

The “PASSWORD CHANGE” menu allows the operator to change the password.

1. Press the menu key.

Table 75

“MAIN MENU”
“SERVICE”


2. Press the right key or the left key to highlight the “SERVICE” menu. Press the OK key.

Note: You will be prompted to enter a password. Refer to “Password Entry” for information on entering a password.

Table 76

“SERVICE”
“MAINTENANCE”
“PASSWORD CHANGE”

3. After the password has been entered successfully, press the up key or the down key to highlight the “PASSWORD CHANGE” menu. Press the OK key.

Table 77

“PASSWORD CHANGE”
“ENTER NEW PASSWORD”
“_ _ _ _”

(continued)

(Table 77, contd)

“< B C D E F 0 1 2 3 4 5 >”

4. Press the right key or the left key to select the desired character.

Note: The password is alphanumeric. You may choose from “0” to “9” . You may also choose from “A” to “F” .

Note: When the machine leaves the factory, the password is initially set as 0001.

5. Press the OK key to enter the character.

Note: Press the back key to delete the last character that was entered.

Table 78

“PASSWORD CHANGE”
“ENTER NEW PASSWORD”
“* * * *”
“ARE YOU SURE?”

6. After you enter 4 characters, you will be asked to confirm your selection. Press the OK key to save the password in memory and return to the “SERVICE” menu. Press the back key to return to the “SERVICE” menu without saving the password.

Note: Press the home key to return to the default display.

Filter and Fluid Information

The “FLTR/FLUID INFO” menu allows the operator to change the accumulated hours for the machine's filters and fluids.

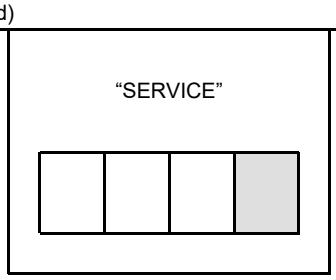
1. Press the menu key.

Table 79

“MAIN MENU”

(continued)

(Table 79, contd)



2. Press the right key or press the left key to highlight the “SERVICE” menu. Press the OK key.

Note: You will be prompted to enter a password. Refer to “Password Entry” for information on entering a password.

Table 80

“SERVICE”
“MAINTENANCE”
“PASSWORD CHANGE”

3. After the password has been entered successfully, press the up key or the down key to highlight the “MAINTENANCE” menu. Press the OK key.

Table 81

“MAINTENANCE”
“FLTR/FLUID INFO”

4. Press the up key or the down key to highlight the “FLTR/FLUID INFO” menu. Press the OK key.

Table 82

“FLTR/FLUID INFO”

(continued)

(Table 82, contd)

“ENGINE OIL FILTER”
“00000 / 00000 [HR]”
“HYD OIL RET FILTER”
“00000 / 00000 [HR]”
“PILOT OIL FILTER”
“00000 / 00000 [HR]”

5. A list of filters and fluids will be displayed. For each item, the current hours of use will be displayed on the left. The recommended change interval will be displayed on the right. Press the up key or the down key to highlight the desired filter or fluid. Press the OK key.

6. Press the left key to reset the accumulated hours for the selected item.

7. Press the OK key to save the new hours in memory.

Note: Press the back key to return to the previous display without saving the value.

Note: Press the home key to return to the default display.

Economy Mode Select (If Equipped)

Table 83

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”
“ECONO MODE SELECT”
“POWER MODE SELECT”
“VIDEO MODE SETTING”

From the “SETTING” menu, press the up key or press the down key to highlight the “ECONOMY MODE SELECT” menu. Then press the “OK” key.

Press the up key or the down key to highlight “ECONO MODE ON” or highlight “ECONO MODE OFF” . Press the “OK” key to confirm the desired selection.

When “ECONO MODE ON” is selected, the symbol for economy mode will appear at the top of the screen on the monitor.

Note: If “STD HYD POWER” is selected from the “MAIN MENU/SETTING/POWER MODE SELECT” menu, then the standard power mode symbol will appear at the top of the screen on the monitor and “ECONO MODE SELECT” will not be available.

Note: If “ECONOMY MODE FIX” is selected from the “MAIN MENU/SETTING/DISPLAY SETUP/ INDICATED ITEM” menu, then “ECONO MODE SELECT” will not be available.

Note: When the “ECONOMY MODE ON” is selected, a work tool cannot be used. Once a work tool is enabled, economy mode is temporarily disabled and the “ECONOMY MODE” symbol will not appear on the monitor display. When the “BUCKET NO TOOL” option is selected again, the “ECONOMY MODE” will appear. Economy mode will automatically resume.

Note: The machine may be set to “ECONOMY MODE ON” as a default setting and “ECONOMY MODE” reset function. Once you turn off the key at “STD HYD POWER ON” mode or “HIGH HYD POWER ON” mode and then turn on the key, the mode should be reset to “ECONOMY MODE ON” . Consult your local CAT dealer if disabling these functions.

Power Mode Select(If Equipped)

Table 84

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”
“ECONO MODE SELECT”
“POWER MODE SELECT”
“VIDEO MODE SETTING”

From the “SETTING” menu, press the up key or press the down key to highlight the “POWER MODE SELECT” menu. Then press the “OK” key .

Press the up key or the down key to highlight “STD HYD POWER” or highlight “HIGH HYD POWER” . Press the “OK” key to confirm the desired selection.

Note: When “STD HYD POWER” is selected, the symbol for standard power mode will appear at the top of the screen on the monitor.

Note: The machine may be set to “ECONOMY MODE ON” as a default setting and “ECONOMY MODE” reset function. Once you turn off the key at “STD HYD POWER ON” mode or “HIGH HYD POWER ON” mode and then turn on the key, the mode should be reset to “ECONOMY MODE ON” . Consult your local CAT dealer if disabling these functions.

Rear View Camera System (If Equipped)

The rear view camera system consists of a camera that is located in the middle of the top of the counterweight and a “VIDEO MODE SETTING” menu on the monitor.

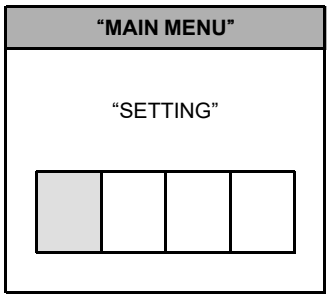
Note: The rear view camera system has been set up by the factory or by a Caterpillar dealer to provide views which comply with specified guidelines. Consult your Caterpillar dealer before any adjustments are made to the system.

Video Mode Setting

The “VIDEO MODE SETTING” menu allows the operator to change the various settings for the rear view camera.

1. Push the menu key.

Table 85



2. Press the right key or the left key to highlight the “SETTING” menu. Press the OK key.

Table 86

“SETTING”
“DISPLAY SETUP”
“WORK TOOL SELECT”
“VIDEO MODE SETTING”

(continued)

(Table 86, contd)

3. Press the up key or the down key to highlight the “VIDEO MODE SETTING” menu. Press the OK key.

Table 87

“VIDEO MODE SETTING”
“VIDEO MODE”
“ON”
“SIGNAL TYPE”
“NTSC”
“VERTICAL DIRECTION”
“NORMAL”

4. The “VIDEO MODE SETTING” menu will be displayed with a list of settings for the rear view camera. Press the up key or the down key to scroll through the list.

Note: Press the home key to return to the default display.

Note: The image from the rear view camera can be viewed from the “VIDEO MODE SETTING” menu by holding the left key. Press the up key or the down key to change the setting while the image in the rear view camera is being viewed.

The following options are available within the “VIDEO MODE SETTING” menu:

Video Mode

The “VIDEO MODE” menu allows the operator to activate the rear view camera. The rear view camera is only available when “ON” is selected.

Table 88

“VIDEO MODE SETTING”
“VIDEO MODE”
“ON”
“SIGNAL TYPE”
“NTSC”
“VERTICAL DIRECTION”
“NORMAL”

1. Press the up key or the down key to highlight the “VIDEO MODE” menu. Press the OK key.

Table 89

“VIDEO MODE SETTING”
“VIDEO MODE”
“ON”
“SIGNAL TYPE”
“NTSC”
“VERTICAL DIRECTION”
“NORMAL”

2. Press the up key or the down key to select “ON” or “OFF” .

3. Press the OK key.

Signal Type

The “SIGNAL TYPE” menu allows the operator to select the signal type for the rear view camera.

Table 90

“VIDEO MODE SETTING”
“VIDEO MODE”
“ON”
“SIGNAL TYPE”
“NTSC”
“VERTICAL DIRECTION”
“NORMAL”

1. Press the up key or the down key to highlight the “SIGNAL TYPE” menu. Press the OK key.

Table 91

“VIDEO MODE SETTING”
“VIDEO MODE”
“ON”
“SIGNAL TYPE”
“NTSC”
“VERTICAL DIRECTION”
“NORMAL”

2. Press the up key or the down key to select either “NTSC” or “PAL” as the signal type for the rear view camera.

3. Press the OK key.

Vertical Direction

The “VERTICAL DIRECTION” menu allows the operator to reverse up and down of the image that is shown by the rear view camera.

Table 92

“VIDEO MODE SETTING”	
“VIDEO MODE”	
	“ON”
“SIGNAL TYPE”	
	“NTSC”
“VERTICAL DIRECTION”	
	“NORMAL”

1. Press the up key or the down key to highlight the “VERTICAL DIRECTION” menu. Press the OK key.

Table 93

“VIDEO MODE SETTING”	
“VIDEO MODE”	
	“ON”
“SIGNAL TYPE”	
	“NTSC”
“VERTICAL DIRECTION”	
	“NORMAL”

2. Press the up key or the down key to select either “NORMAL” or “REVERSE” for the image that is shown by the rear view camera.

3. Press the OK key.

Horizontal Direct

The “HORIZONTAL DIRECT” menu allows the operator to reverse right and left of the image that is shown by the rear view camera.

Table 94

“VIDEO MODE SETTING”	
“HORIZONTAL DIRECT”	
	“NORMAL”
“TINT”	
	“7”
“COLOR”	
	“7”

1. Press the up key or the down key to highlight the “HORIZONTAL DIRECT” menu. Press the OK key.

Table 95

“VIDEO MODE SETTING”	
“HORIZONTAL DIRECT”	
	“NORMAL”
“TINT”	
	“7”
“COLOR”	
	“7”

2. Press the up key or the down key to select either “NORMAL” or “REVERSE” for the image that is shown by the rear view camera.

NORMAL – When “NORMAL” is selected in the “HORIZONTAL DIRECT” menu, the right side of the monitor display is the left side of the machine and the left side of the monitor display is the right side of the machine.

REVERSE – When “REVERSE” is selected in the “HORIZONTAL DIRECT” menu, the right side of the monitor display is the right side of the machine and the left side of the monitor display is the left side of the machine.

3. Press the OK key.

Tint

The “TINT” menu allows the operator to adjust the tint of the image that is shown by the rear view camera.

Table 96

“VIDEO MODE SETTING”

(continued)

(Table 96, contd)

“HORIZONTAL DIRECT”
“NORMAL”
“TINT”
“7”
“COLOR”
“7”

1. Press the up key or the down key to highlight the “TINT” menu. Press the OK key.

Table 97

“VIDEO MODE SETTING”
“HORIZONTAL DIRECT”
“NORMAL”
“TINT”
“7”
“COLOR”
“7”

2. Press the up key or the down key to set the tint of the image that is shown by the rear view camera between “0” and “15” .

3. Press the OK key.

Color

The “COLOR” menu allows the operator to adjust the color of the image that is shown by the rear view camera.

Table 98

“VIDEO MODE SETTING”
“HORIZONTAL DIRECT”
“NORMAL”
“TINT”
“7”
“COLOR”
“7”

1. Press the up key or the down key to highlight the “COLOR” menu. Press the OK key.

Table 99

“VIDEO MODE SETTING”
“HORIZONTAL DIRECT”
“NORMAL”
“TINT”
“7”
“COLOR”
“7”

2. Press the up key or the down key to set the color of the image that is shown by the rear view camera between “0” and “15” .

3. Press the OK key.

Brightness

The “BRIGHTNESS” menu allows the operator to adjust the brightness of the image that is shown by the rear view camera.

Table 100

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

1. Press the up key or the down key to highlight the “BRIGHTNESS” menu. Press the OK key.

Table 101

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

2. Press the up key or the down key to set the brightness of the image that is shown by the rear view camera between “0” and “22” .

3. Press the OK key.

“Brightness (Night)”

The “BRIGHTNESS (NIGHT)” menu allows the operator to adjust the brightness of the image that is shown by the rear view camera for viewing at night.

Table 102

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

1. Press the up key or the down key to highlight the “BRIGHTNESS (NIGHT)” menu. Press the OK key.

Table 103

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

2. Press the up key or the down key to set the brightness of the image that is shown by the rear view camera for viewing at night between “0” and “22” .

3. Press the OK key.

Contrast

The “CONTRAST” menu allows the operator to adjust the contrast of the image that is shown by the rear view camera.

Table 104

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

1. Press the up key or the down key to highlight the “CONTRAST” menu. Press the OK key.

Table 105

“VIDEO MODE SETTING”
“BRIGHTNESS”
“22”
“BRIGHTNESS (NIGHT)”
“22”
“CONTRAST”
“7”

2. Press the up key or the down key to set the contrast of the image that is shown by the rear view camera between “0” and “15” .

3. Press the OK key.

Monitor Starting, Switching, and Termination

Monitor Starting

If “VIDEO MODE” is set to “ON” the image that is shown by the rear view camera is displayed when the engine starts.

Note: If a warning is detected, the image that is shown by the rear view camera will not be displayed when the engine starts.

Monitor Switching From the Rear View Camera Image to the Default Screen

Press any key to return to the default display from the image that is shown by the rear view camera.

If any of the following conditions are found, the monitor will return to the default display automatically:

- New warning is found.
- The engine coolant temperature gauge reaches level 10.
- The hydraulic oil temperature gauge reaches level 10.
- The fuel level gauge reaches level 10.

Note: When the crane system is active the image that is shown by the rear view camera cannot be displayed continuously. Press the OK key to display the image from the rear view camera.

Monitor Switching From the Default Screen to the Rear View Camera Image

To display the image from the rear view camera from the default display, press the OK key.

Note: This operation is only valid when the default screen is displayed.

Monitor Termination

If the rear view camera is displayed and the engine start switch is turned to the “OFF” position, the monitor will terminate after the default display is shown for 3 seconds.

If the default display is shown and the engine start switch is turned to the “OFF” position, the monitor will terminate immediately.

i02713241

Service Hour Meter

SMCS Code: 7480

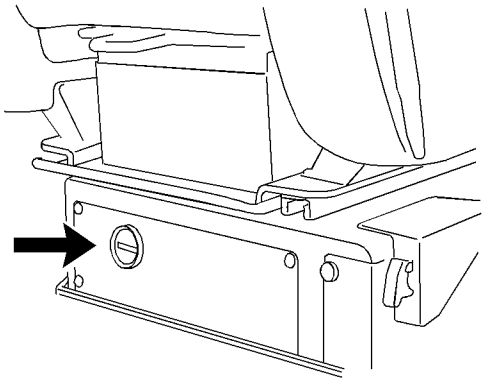


Illustration 108 g01362760

The service hour meter is located on the front of the seat support.

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

i05192538

Storage and Literature Compartment
(If Equipped)

SMCS Code: 7268

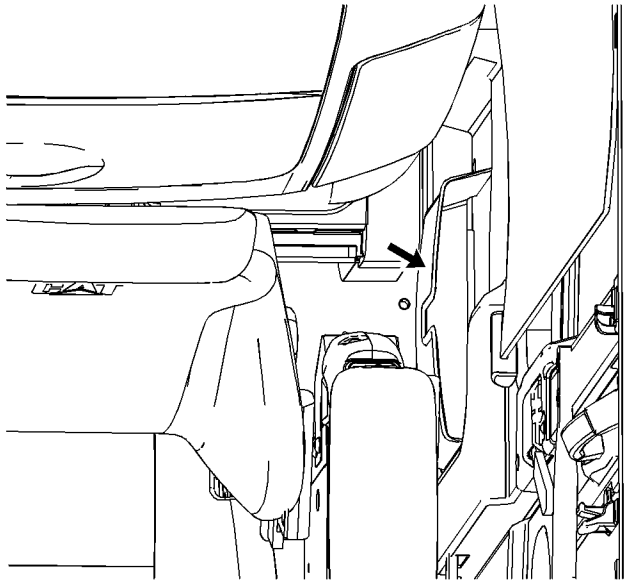


Illustration 109 g01160959

A storage compartment is located inside the cab on the left side. Use the compartment to store the literature for the machine.

Note: Do not store tools in the storage compartment. Tools stored in the compartment could damage the compartment.

i03911690

Radio
(If Equipped)

SMCS Code: 7338

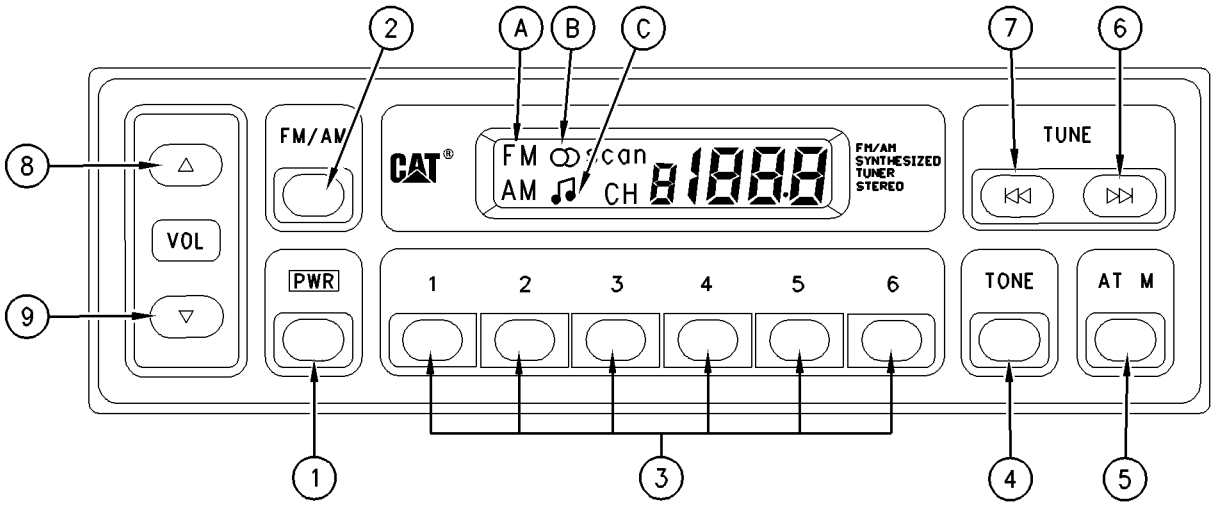


Illustration 110 g00729076

(A) Display panel
(B) Display (Stereo)
(C) Display (Music)
(1) Power switch
(2) AM/FM band selector
(3) Preset buttons
(4) “Tone” control
(5) Button for scan and auto memory function
(6) “Tune” button
(7) “Tune” button
(8) Volume control
(9) Volume control

Note: When the machine is in operation, turn down the volume of the radio.

Note: The radio can be used only when the battery disconnect switch and the engine start switch are in the ON position.

Note: When a button is pushed, a beep will occur.

(1) Power Switch – Push the power switch in order to turn on the radio. Push the power switch again in order to turn off the radio.

(2) AM/FM Band Selector – After you push the AM/FM band selector, the selected radio band appears on display panel (A).

(3) Preset Buttons – The circuitry in the memory system allows you to preset six radio stations. To preset any of the “preset” buttons, follow the “Later Type” procedure.

(4) Tone Control – Music is optimized by pressing the tone control so that display (C) will show “MUSIC” .

(5) Scan and Auto Memory – Press button (5) for less than 0.5 seconds in order to listen to 5 seconds of each preset radio station. Press button (5) at least 1.5 seconds in order to store the radio stations with the six strongest signals.

(6) and (7) “Tune” Buttons – Push the “tune” buttons in order to select a radio station. Pressing “tune” button (7) will decrease the frequency. Pressing “tune” button (6) will increase the frequency. Pressing the “tune” button for less than 0.5 seconds changes the radio station one at a time. Pressing the “tune” buttons for more than 0.5 seconds will change the frequency automatically until a radio station is found.

(8) and (9) Volume Control – Push the volume control in order to control the volume. Push the upper volume control in order to increase the sound level and push the lower volume control in order to decrease the sound level.

Presetting Radio Stations

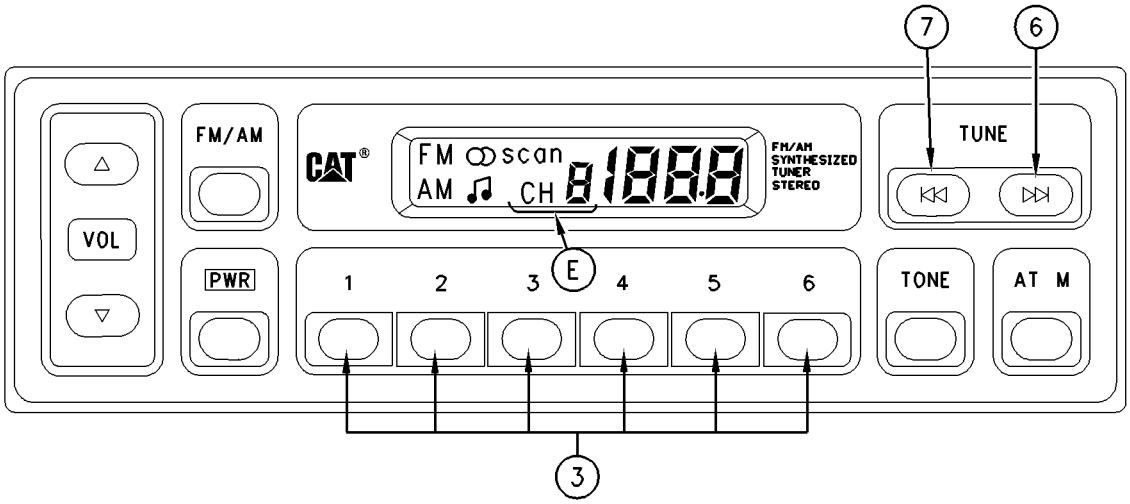


Illustration 111 g00729101

(E) Display
(3) Preset buttons
(6) “Tune” button
(7) “Tune” button

1. Turn on the radio. Select the AM band or the FM band.

2. Select the first radio station by using tuning switch (6) or tuning switch (7).

3. Depress one of preset buttons (3) for more than 1.5 seconds. The radio station is stored on display (E).

4. Push preset button (3) in order to tune in the radio station.

5. Repeat the same procedure for the remaining preset switches.

Note: When the preset station is faint, use the “tune” buttons to locate a stronger signal.

Scan and Auto Memory

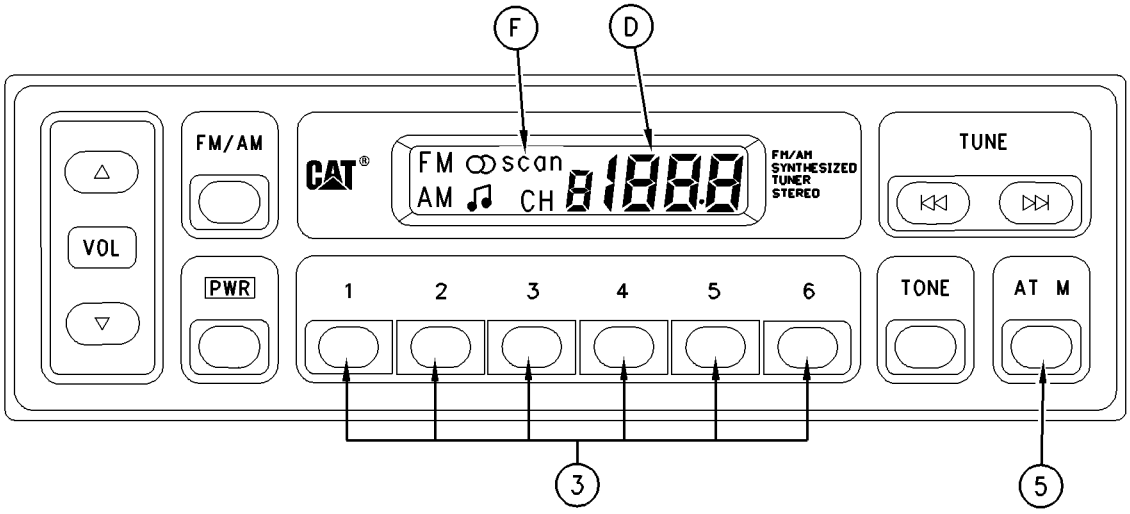


Illustration 112 g00729102

(D) Display (Frequency)
(F) Display (Scan)
(3) Preset buttons
(5) Button for scan and auto memory function

Scan – Press button (5) for less than 0.5 seconds in order to listen for 5 seconds to each of the preset radio stations. Press button (5) again in order to stop scanning through the preset stations and keep listening to the current station. When this function is used, “SCAN” is shown on the display. The frequency of the radio station is also shown on the display.

Auto Memory – Press button (5) for more than 1.5 seconds in order to store the radio stations that have the strongest signal. The radio stations are stored in the six presets (3). Stations that are already stored in the memory will be erased.

Loss of Memory

The memory system is erased after a few days if the battery is disconnected.

Radio Reception

The area of reception can be set two different ways. Use the method that corresponds to the radio that is installed in your machine.

Early Type

Move the “area switch” according to the following table:

Table 106

	Switch Position	
AREA	**1**	**2**
North America		X
Central and South America		X
European Union	X	
Asia / Oceania	X	

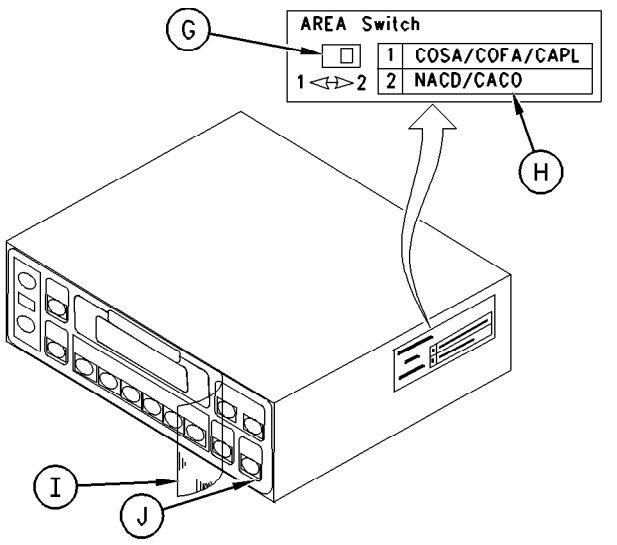


Illustration 113 g00729104

(G) “Area switch”
(H) Selection table
(I) Protective film
(J) Control panel

Note: Remove the film from the radio. Remove the vinyl from the operator seat. The film and vinyl may cause noise interference in the radio.

Later Type

Note: The radio must be connected to a power source in order to set the area of reception.

Set the area of reception according to the following table:

Table 107

	Display Setting	
AREA	**EU**	**US**
North America		X
Central and South America		X
European Union	X	
Asia / Oceania	X	

Use the following procedure in order to set the desired area.

1. Turn off the radio.

2. Press preset button “1” , preset button “4” and button (5) at the same time. Hold until “EU” or “US” is displayed on the display panel.

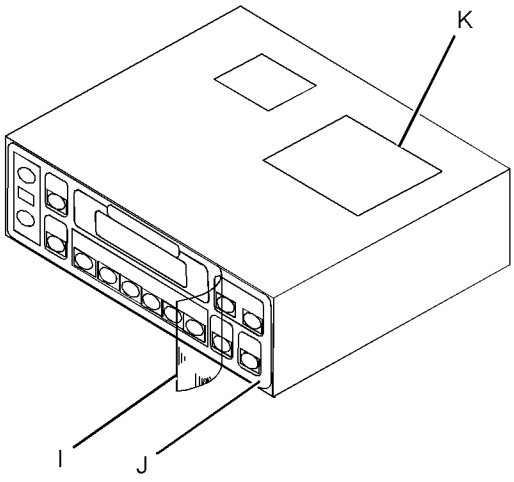


Illustration 114 g01566514

(I) Protective film
(J) Control panel
(K) Method of selection

Note: Remove the film from the radio. Remove the vinyl from the operator seat. The film and vinyl may cause noise interference in the radio.

i01914984

Air Conditioning and Heating Control
(If Equipped)

SMCS Code: 7304; 7320; 7337

The automatic temperature control unit automatically adjusts the temperature inside the cab. This control unit is located under the operator seat.

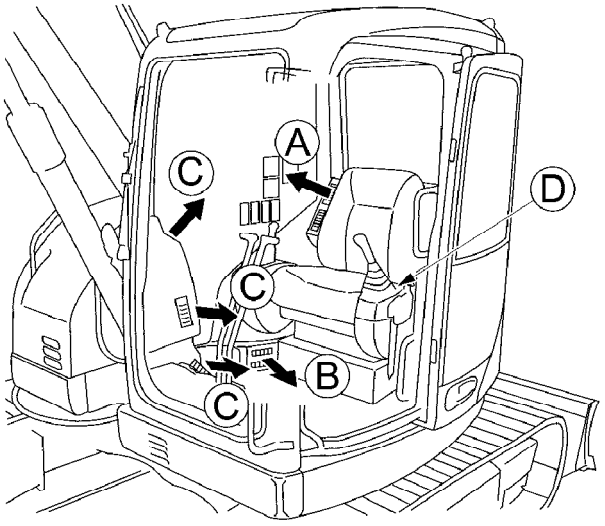


Illustration 115 g00841502

(A) Vent for the Upper body
(B) Floor Vent
(C) Defroster vent
(D) Control panel

The air conditioning and heating controls are on control panel (D). When the switches are pushed the operating mode will change.

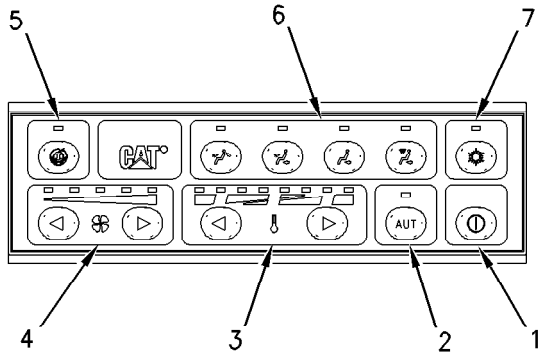


Illustration 116 g00997538

(1) Main power On/Off switch
(2) Automatic control switch
(3) Temperature control switch
(4) Blower fan switch
(5) Air inlet selection switch
(6) Air outlet selection switch
(7) Air Conditioning On/Off switch

Main Power ON/OFF Switch (1) – If the heating and air conditioning system is off, pushing the switch will turn on the heating and air conditioning system. If the heating and air conditioning system is on, pushing the switch will turn off the heating and air conditioning system.

Note: If the air conditioner switch is in the off position, the air conditioner will not activate.

Automatic Switch (2) – This switch will start the climate control system. In order to enter automatic mode, push this switch. The speed of the fan and the temperature of the air are controlled automatically. The selectable range is from 21°C (70°F) to 29°C (85°F). The climate control system will restart in the previous state of operation.

- The preset temperature is an approximate value.
- Automatic control of the fan can be overridden.
- This switch will start the automatic control system only.

Temperature Setpoint (3) – Push the switch with the right arrow in order to increase the temperature setpoint. Push the switch with the left arrow in order to decrease the temperature setpoint. The display will have one indicator or two indicators illuminated. Refer to Table 108 for additional information.

Blower Fan Switches (4) – The switches directly control the blower fan speed. If the climate control system is in the automatic mode, pushing either of the switches will override the automatically selected fan speed. The right arrow will increase the fan speed. The left arrow will decrease the fan speed. The blower fan has four speeds. The indicators on the control panel will display the current speed setting. Pushing the right arrow with the fan in the off position will set the fan speed on the fastest speed setting.

Air Inlet Selection Switch (5) – Selecting this switch will change the positions of the door of the fresh air inlet. When the fresh air inlet is in the open position fresh air will circulate into the cab and the indicator light will illuminate.

Air Outlet Selection Switches (6) – Depress one of the four switches in order to change the selection of the air outlet.

Louvers (A) and (C) – Selecting this switch will open the air outlet for the upper body and the air outlets for the defroster.

Louvers (A), (B) and (C) – Selecting this switch will open the air outlets for the upper body, the air outlets for the floor and the air outlets for the defroster.

Louver (B) – Selecting this switch will open the air outlets for the floor.

Louver (C) – Selecting this position will open the air outlets for the defroster.

Air Conditioning Switch (7) – Push this switch in order to activate the air conditioner. Push the switch again in order to switch off the air conditioner.

- Maximum cooling is selected when both indicators on the left side of the display are illuminated. Continue to push the switch with the left arrow until maximum cooling is selected. Refer to Table 108 for additional information.
- Maximum heating is selected when both indicators on the right side of the display are illuminated. Continue to push the switch with the right arrow until maximum heating is selected. Refer to Table 108 for additional information.
- When either switch is pushed quickly, the temperature setpoint will change by 1.0 °C (1.8 °F).
- When either switch is depressed continuously, the temperature setpoint will change 1.0 °C (1.8 °F) per 0.3 second.
-

Table 108

Set Temperature	Indicators for the Temperature Setting[1]							
Maximum Cooling	x	x						
21	x							
22		x						
23			x					
24				x				
25				x	x			
26					x			
27						x		
28							x	
29								x
Maximum Heat							x	x

(1) X indicates that the Led is illuminated.

In cool weather, operate the compressor weekly in order to prevent leakage of the refrigerant gas. This will also help to maintain the compressor in optimum working order.

Consult with your Caterpillar dealer for periodic maintenance of the heating and air conditioning system.

i03547400

Window (Front)

SMCS Code: 7310-FR

To provide full ventilation inside the cab, the upper window and the lower window can be fully opened.

⚠ WARNING

When opening or closing the windows, be extra careful to prevent any personal injury. The hydraulic lockout control must be in the LOCKED position in order to prevent any possibility of sudden movement of the machine due to inadvertent contact with the hydraulic control(s).

Do not change the position of the window until the following items have been done:

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position.
- Stop the engine.

Perform Step 1 through Step 3 in order to open the upper window.

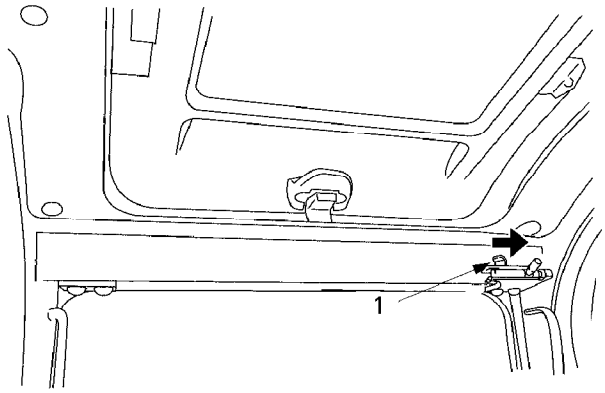


Illustration 117 g00846489

(1) Auto-lock latch

1. Release the auto-lock latch by moving lever (1) to the right.

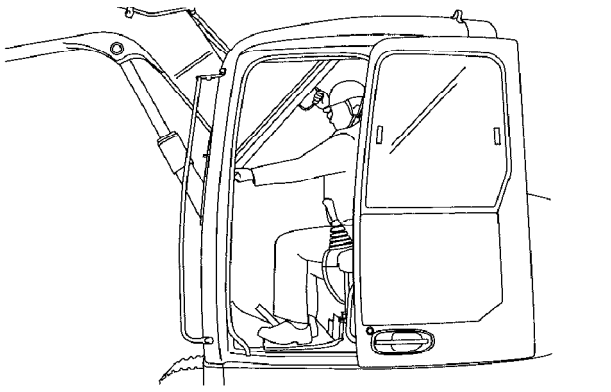


Illustration 118 g00846484

2. Hold both grips that are located at the bottom of the window frame and at the top of the auto-lock latch. Push the window upward.

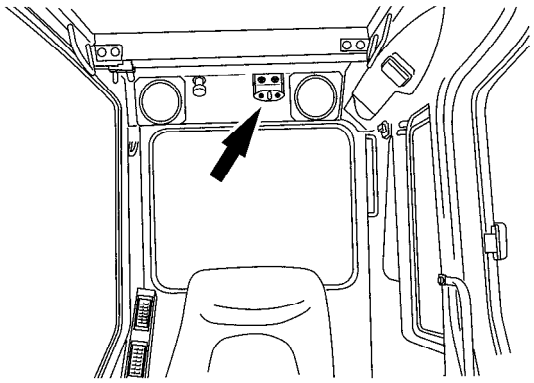


Illustration 119 g00858930

3. Move the window into the STORAGE position until the auto-lock latch is engaged.

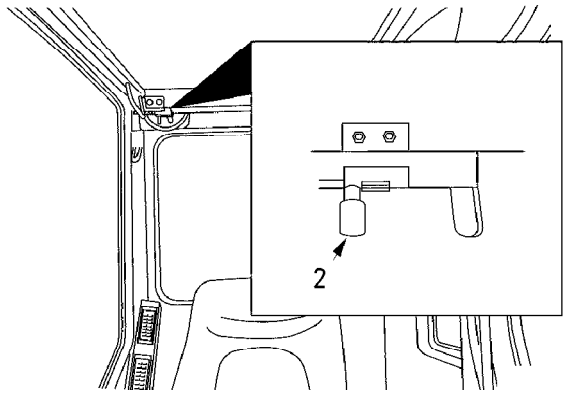


Illustration 120 g00846490

(2) Manual lock (latch)

4. Slide the manual lock in order to lock the window in the storage position.

Note: Perform the steps that follow in order to close the upper window.

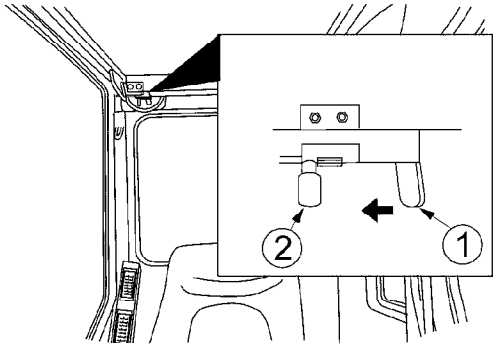


Illustration 121 g00858944

(1) Auto-lock latch
(2) Manual lock pin

5. Release manual lock pin (2).

6. Release auto-lock latch (1).

7. Close the upper window.

8. Perform Steps 9 through 11 in order to open the lower window and close the lower window.

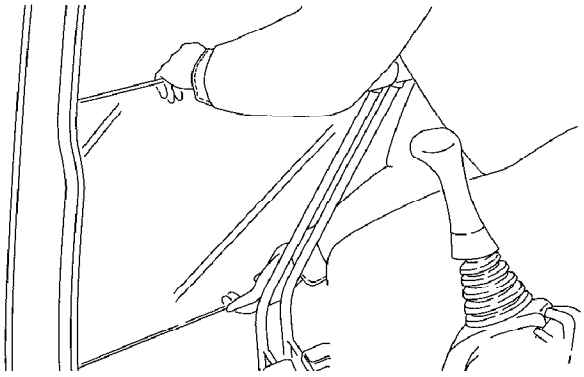


Illustration 122 g00846493

9. Raise the lower window out of the window frame.

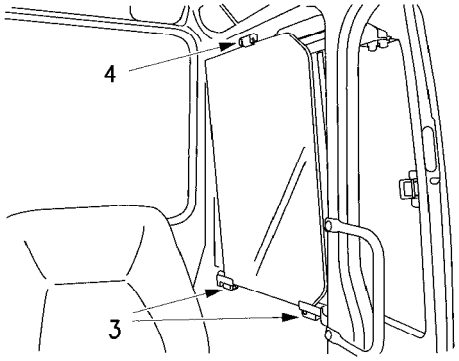


Illustration 123 g00846494

(3) Brackets
(4) Catch

10. Store the lower window in the holder that is located in the rear of the left side cab frame. To store the lower window, locate one end of the lower window into brackets (3). Secure the opposite end of the lower window with catch (4).

11. To close the lower window, reverse the procedure that is used for opening the lower window.

Note: The lower window is curved. The lower window can only be positioned one way in the holders.

i03190322

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 machines access systems when adjusting the mirrors. If the mirrors cannot be reached using the machine access systems follow the instructions found within the Operation and Maintenance Manual, "Mirror" in order to access the mirrors.

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

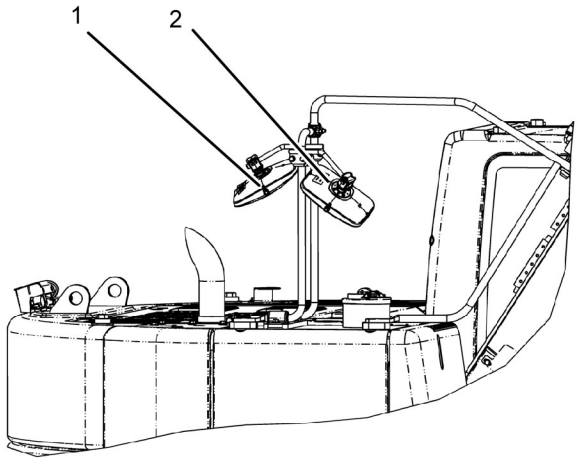


Illustration 124 g01626947

(1) Rear Mirror on the Tank
(2) Front Mirror on the Tank

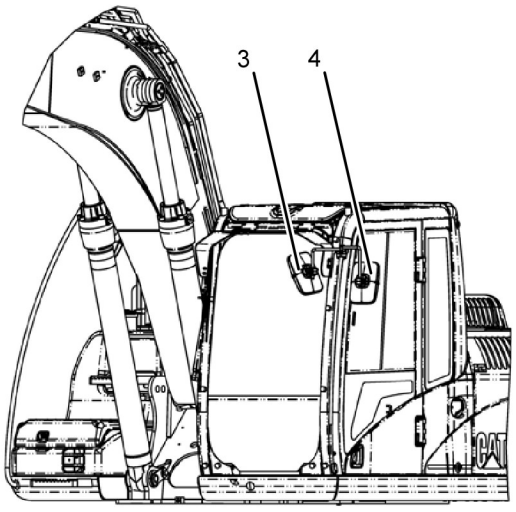


Illustration 125 g01624808

(3) Front Mirror on the Cab
(4) Left Mirror on the Cab

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.

Appropriate job site organization is also recommended in order to minimize visibility hazards. For more information refer to this Operation and Maintenance Manual, "Visibility Information".

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

Mirror Adjustment

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Operator Controls”
- Stop the engine.
- Adjust rear view mirrors in order to provide visibility behind the machine at a maximum distance of 30 m (98 ft) from the rear corners of the machine.

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

Rear Mirror on the Tank (1)

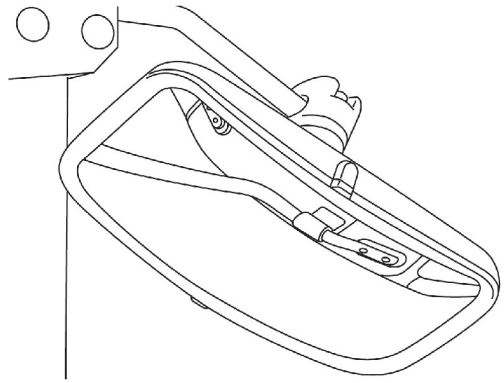


Illustration 126 g01626958

If equipped, adjust the rear mirror on the tank, so the right side of fuel tank can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat.

Front Mirror on the Tank (2)

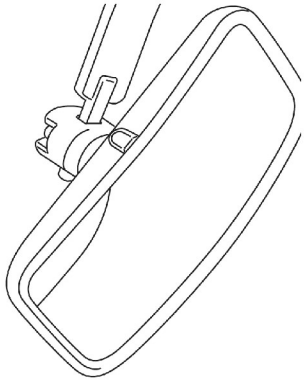


Illustration 127 g01626959

If equipped, adjust the front mirror on the tank (2) so the right side of the fuel tank can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat. Additionally, provide as much visibility to the rear as possible.

Front Mirror on the Cab (3)

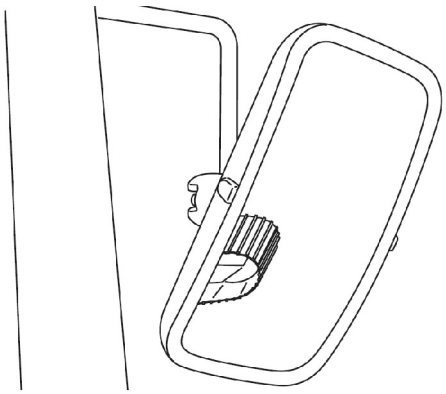


Illustration 128 g01626960

If equipped, adjust the front mirror on the cab (1) so the front of the right track can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the right front of the machine should be seen from the operator seat.

Left Mirror on the Cab (4)

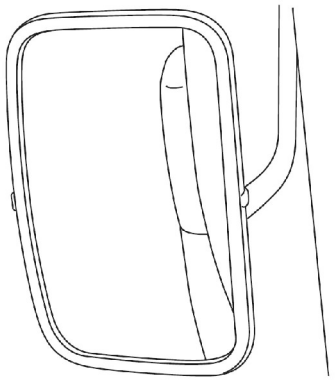


Illustration 129 g01626961

If equipped, adjust the left mirror on the cab (4) so the left side of the cab, access door and rear of left track can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat. Additionally, provide as much visibility to the rear as possible.

i01463761

Cab Visor
(If Equipped)

SMCS Code: 7301-ZZ

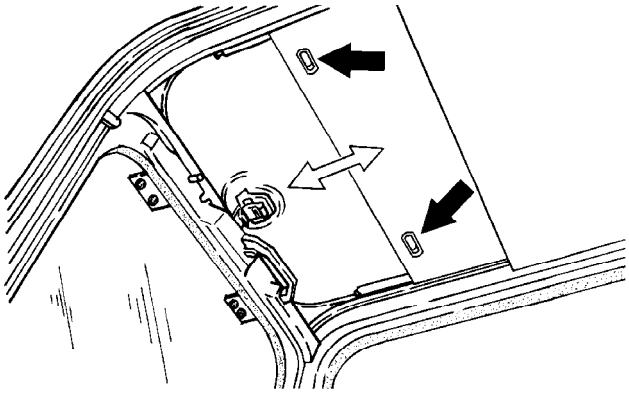


Illustration 130 g00681058

Use the cab visor to control the amount of sunlight through the roof hatch.

Insert your fingers into the openings that are located in the cab visor in order to slide the cab visor into the desired position.

i02500596

Sun Screen
(If Equipped)

SMCS Code: 7165-ZZ

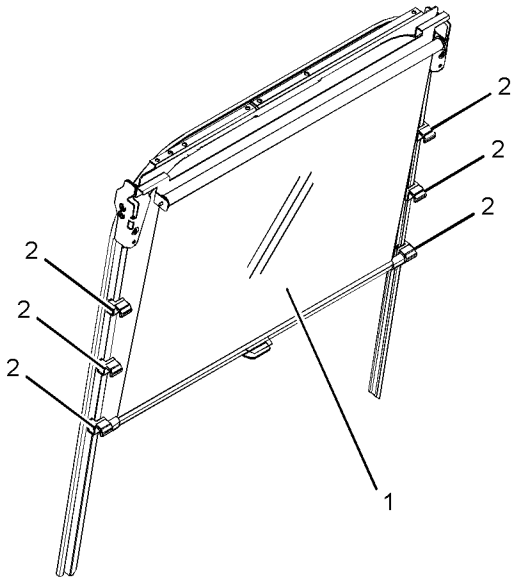


Illustration 131 g01250563

Pull out the sun screen (1). Hook the sun screen to the bracket (2). The sun screen may be positioned in 3 different places.

i01463742

Roof Hatch

SMCS Code: 7303

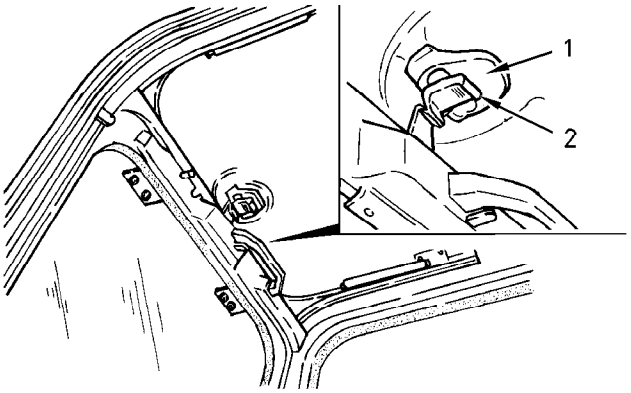


Illustration 132 g00681034

(1) Grip
(2) Lock

In order to open the roof hatch, release lock (2). Hold grip (1) and push the roof hatch backward.

To close the roof hatch, hold grip (1) and pull the roof hatch forward. Engage lock (2) securely.

i01636325

Cab Door

SMCS Code: 7308

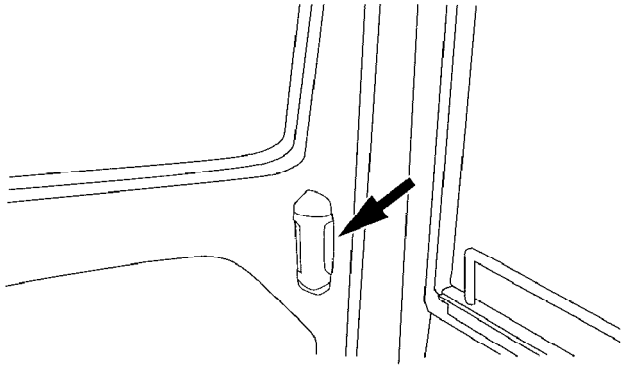


Illustration 133 g00847058

Unlock in order to open the cab door. For additional ventilation, open the cab door all the way and secure the cab door to the catch on the wall of the cab.

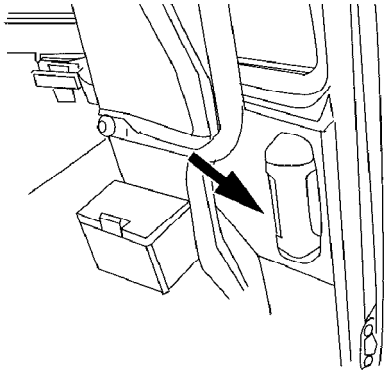


Illustration 134 g00847061

Push the handle to the front in order to open the cab door.

Side Window

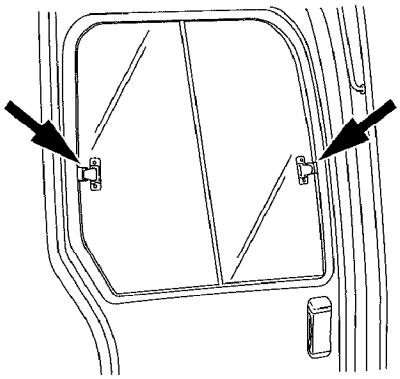


Illustration 135 g00847063

Release the latch and slide the side window to the desired position in order to open the side window. To close the side window, reverse the procedure that is used for opening the side window.

i01447292

Travel Control
(Straight Travel Pedal (If Equipped))

SMCS Code: 5462

⚠ WARNING

With certain attachment combinations, the third pedal can have different functions. Always check for third pedal function before using the third pedal. Improper operation of the third pedal could result in serious injury or death.

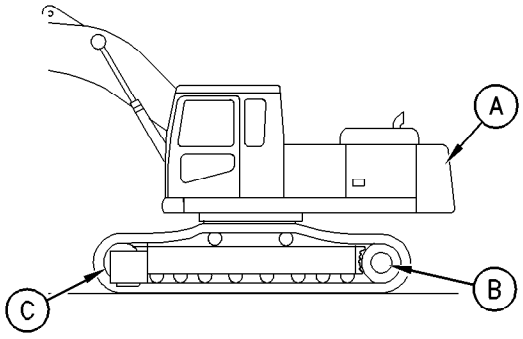


Illustration 136 g00753277

Position for normal travel

(A) Rear of machine
(B) Final drive
(C) Idler

When you travel, make sure that final drive sprockets (B) are under the rear of the machine.

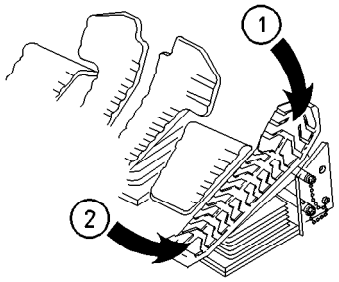


Illustration 137 g00757775

(1) Forward Travel
(2) Reverse Travel

The third pedal is to the right of the right travel pedal. The third pedal controls the forward and backward movement of the machine.

Note: If the third pedal is depressed and a travel pedal or a travel lever is operated, the machine will turn accordingly.

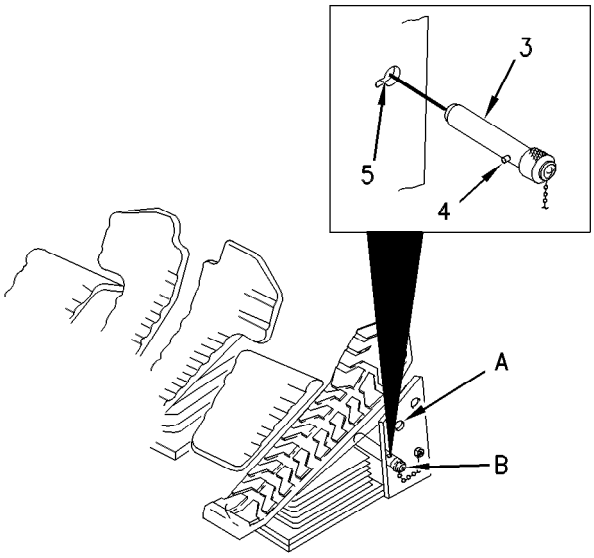


Illustration 138 g00555934

(3) Lock pin
(4) Pin
(5) Notch
(A) LOCKED position
(B) UNLOCKED position (STORAGE position)

When the machine is not operated with the third pedal, install lock pin (3) at the LOCKED position in order to prevent accidental operation.

Note: To prevent lock pin (3) from being pulled out, insert pin (4) through notch (5) and turn lock pin (3) counterclockwise by 1/4 turn.

i03764090

Joystick Controls
(Medium Pressure (If Equipped))

SMCS Code: 5705

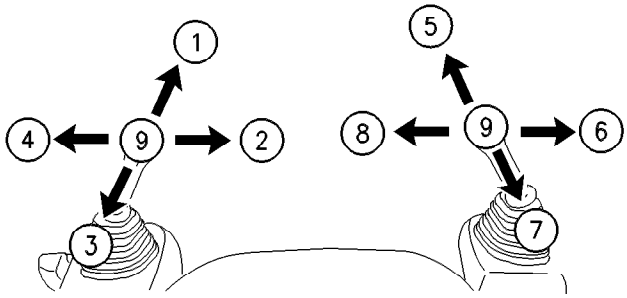


Illustration 139 g00559405

(1) STICK OUT
(2) SWING RIGHT
(3) STICK IN
(4) SWING LEFT
(5) BOOM LOWER
(6) TOOL OPEN
(7) BOOM RAISE
(8) TOOL CLOSE
(9) HOLD

⚠ WARNING

The Fine Swing Control delays the engagement of the swing parking brake.

If the machine is operating on a slope with the Fine Swing Control in the ON position, the swing motion may become uncontrollable which could result in property damage, personal injury or death.

Turn the Fine Swing Control to the OFF position when the machine is operating on a slope.

When you release the joysticks from any position, the joysticks will return to HOLD position (9). Movement of the upper structure will stop unless the fine swing control (if equipped) is ON. When the fine swing control is ON, the swing parking brake will not activate until 6.5 seconds after the joystick control for the swing function returns to the HOLD position.

The machine control pattern is initially set at the factory to the SAE system, as shown. The pattern on the left pertains to the left joystick and the pattern on the right pertains to the right joystick.

The machine control pattern can be varied. Refer to Operation and Maintenance Manual, “Joystick Controls Alternate Patterns” for more information.

Two functions may be performed at the same time by moving a joystick diagonally.

Rotating Tool Control

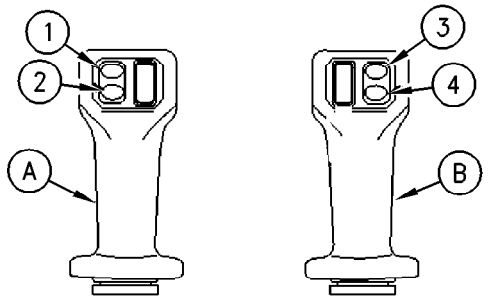


Illustration 140 g00875108

(A) Left joystick
(B) Right joystick
(1) Medium pressure switch
(2) Horn switch
(3) Medium pressure switch
(4) AEC switch

Rotate Clockwise – Press the medium pressure switch (1) on the left joystick in order to rotate the tool clockwise.

Horn – Press the horn switch (2) on the left joystick in order to activate the horn.

Rotate Counterclockwise – Press the medium pressure switch (3) on the right joystick in order to rotate the tool counterclockwise.

AEC Switch – Press the AEC switch (4) on the right joystick in order to activate low engine speed. Press the switch again in order to activate high engine speed.

i04036189

Joystick Controls

SMCS Code: 5705

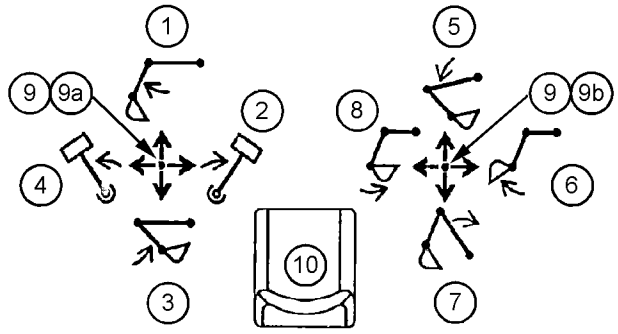


Illustration 141 g02233473

(1) STICK OUT
(2) SWING RIGHT
(3) STICK IN
(4) SWING LEFT
(5) BOOM LOWER
(6) BUCKET DUMP
(7) BOOM RAISE
(8) BUCKET CLOSE
(9) HOLD
(9a) HORN (IF EQUIPPED)
(9b) AUTOMATIC ENGINE SPEED CONTROL SWITCH (IF EQUIPPED)
(10) Seat

⚠ WARNING

The Fine Swing Control delays the engagement of the swing parking brake.

If the machine is operating on a slope with the Fine Swing Control in the ON position, the swing motion may become uncontrollable which could result in property damage, personal injury or death.

Turn the Fine Swing Control to the OFF position when the machine is operating on a slope.

When you release the joysticks from any position, the joysticks will return to HOLD position (9). Movement of the upper structure will stop unless the fine swing control (if equipped) is ON. When the fine swing control is ON, the swing parking brake will not activate until 6.5 seconds after the joystick control for the swing function returns to the HOLD position.

Two functions may be performed at the same time by moving a joystick diagonally.

The machine control pattern is initially set at the factory to the SAE system, as shown. The pattern on the left pertains to the left joystick and the pattern on the right pertains to the right joystick.

The machine control pattern can be varied. Refer to Operation and Maintenance Manual, “Joystick Controls Alternate Patterns” for more information.

i04560362

VA Boom Controls
(If Equipped)

SMCS Code: 5461-VAR

S/N: TXA1–Up

S/N: PBD1–Up

S/N: MPG1–Up

S/N: KBZ1–Up

WARNING

With certain attachment combinations, the third pedal can have different functions. Always check for third pedal function before using the third pedal. Improper operation of the third pedal could result in serious injury or death.

The VA boom extends the working range of the machine by hydraulically increasing or reducing the angle of the boom. The VA boom is equipped with a hydraulic check valve to prevent the boom from falling in case a hydraulic line breaks.

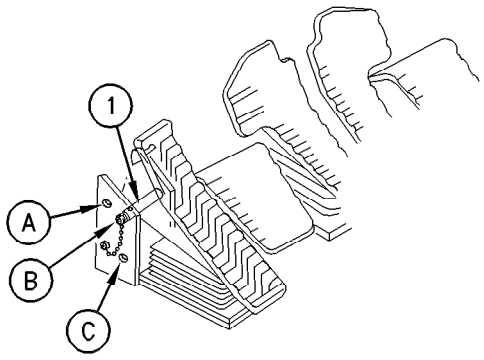


Illustration 142 g00575819

(1) Lock pin
(A) This position is not used.
(B) LOCKED position
(C) VA BOOM position

The VA boom pedal can be located on the left side or the right side of the travel pedals.

VA Boom EXTEND – Push down on the front of the pedal in order to extend the VA boom.

VA Boom RETRACT – Push down on the rear of the pedal in order to retract the VA boom.

i04477973

Work Tool Control (One-Way Flow)
(If Equipped)

SMCS Code: 6700

The following information pertains to work tools that require hydraulic oil flow in one direction. Hydraulic hammers are an example of work tools that require hydraulic oil flow in one direction.

Note: For information that pertains to work tools that require hydraulic oil flow in two directions, refer to Operation and Maintenance Manual, “Work Tool Control (Two-Way Flow)”.

Joystick

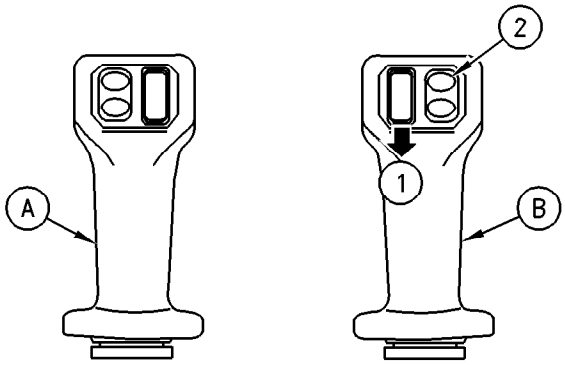


Illustration 143 g00769298

(A) Left joystick
(B) Right joystick

(1) Variable Speed – Move the thumb wheel downward in order to activate the work tool. Move the thumb wheel further in order to increase the speed of the work tool.

(2) On/Off – Push this switch in order to activate the work tool at a constant rate. Push this switch again in order to turn off the work tool.

Work Tool Pedal

WARNING

With certain attachment combinations, the work tool pedal can have different functions. Always check for work tool pedal function before using the work tool pedal. Improper operation of the work tool pedal could result in serious injury or death.

The work tool pedal can be located on either side of the travel pedals. The work tool pedal allows the operator to modulate the speed of the work tool.

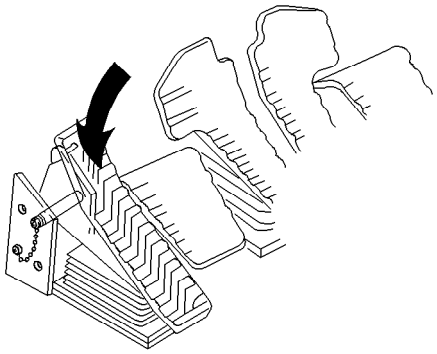


Illustration 144 g00756717

Variable Speed – Push down on the front of the pedal in order to activate the work tool. Move the pedal further in order to increase the speed of the work tool. Release the pedal in order to turn off the work tool.

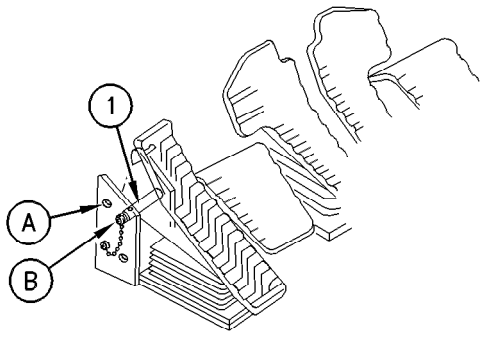


Illustration 145 g00291764

(1) Lock pin
(A) UNLOCKED position
(B) LOCKED position

When you are not using the work tool, put the lock pin (1) in LOCKED position (B). This will lock the work tool pedal in order to prevent any unexpected operation of the work tool.

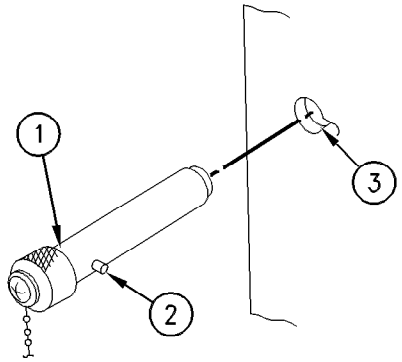


Illustration 146 g00291805

(1) Lock pin
(2) Pin
(3) Notch

Note: To prevent lock pin (1) from being accidentally pulled out, insert pin (2) through notch (3) and turn lock pin (1) counterclockwise by 1/4 turn.

Foot Switch

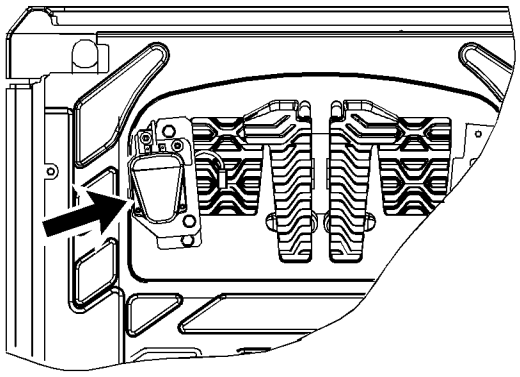


Illustration 147 g02368316

Hydraulic Hammer ON – Push down on the foot switch in order to activate the hydraulic hammer.

Hydraulic Hammer OFF – Release the switch in order to deactivate the hydraulic hammer.

i04477990

Work Tool Control (Two-Way Flow)
(If Equipped)

SMCS Code: 6700

The following information pertains to work tools that require hydraulic oil flow in two directions. These work tools can also be equipped with a rotate circuit. Hydraulic shears, pulverizers, crushers, and grapples are examples of work tools that require hydraulic oil flow in two directions.

Note: For information that pertains to hydraulic hammers, refer to Operation and Maintenance Manual, “Work Tool Control (One-Way)”.

Joystick

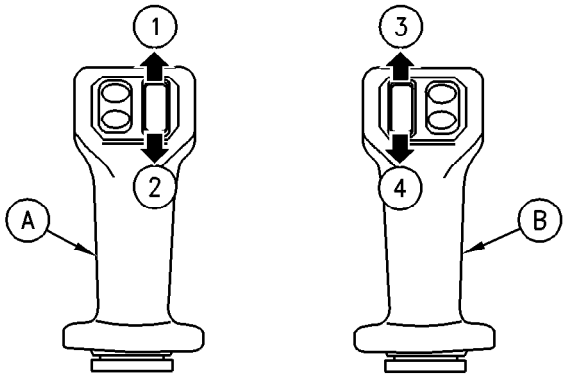


Illustration 148 g00731659

(A) Left joystick
(B) Right joystick

(1) ROTATE CLOCKWISE – Move the thumb wheel upward in order to rotate the work tool clockwise.

(2) ROTATE COUNTERCLOCKWISE – Move the thumb wheel downward in order to rotate the work tool counterclockwise.

(3) CLOSE – Move the thumb wheel upward in order to close the work tool.

(4) OPEN – Move the thumb wheel downward in order to open the work tool.

Work Tool Pedal

WARNING

With certain attachment combinations, the work tool pedal can have different functions. Always check for work tool pedal function before using the work tool pedal. Improper operation of the work tool pedal could result in serious injury or death.

The work tool pedal can be located on either side of the travel pedals. The work tool pedal allows the operator to vary the speed of the work tool.

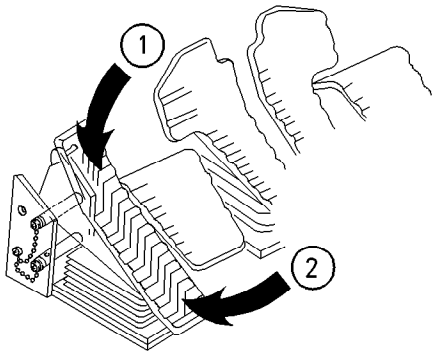


Illustration 149 g00756810

(1) CLOSE – Push down on the front of the pedal in order to close the work tool.

(2) OPEN – Push down on the rear of the pedal in order to open the work tool.

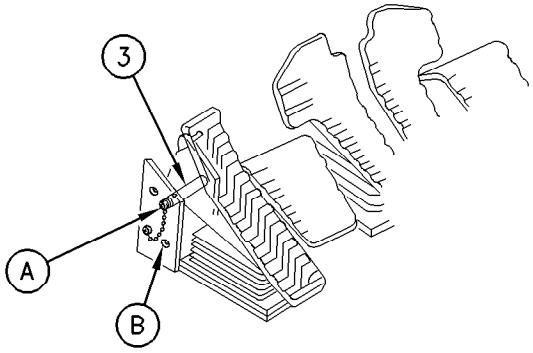


Illustration 150 g00756813

(3) Lock pin
(A) LOCKED position
(B) UNLOCKED position

When you are not using the work tool, put the lock pin (3) in LOCKED position (A). This will lock the work tool pedal in order to prevent any unexpected operation of the work tool.

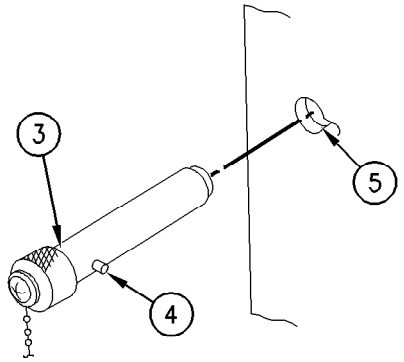


Illustration 151 g00756811

(3) Lock pin
(4) Pin
(5) Notch

Note: To prevent lock pin (3) from being accidentally pulled out, insert pin (4) through notch (5) and turn lock pin (3) by 1/4 turn.

i02624589

Blade Control
(If Equipped)

SMCS Code: 5115

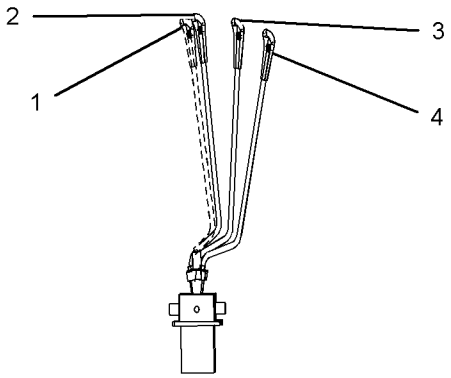


Illustration 152 g01315328

NOTICE
Avoid hitting or moving rocks using the blade. Blade and cylinder damage could occur.

When using the blade as outrigger, be sure to support the machine with the edge of the blade against the ground. When curling the front attachment, do not allow the bucket to hit the blade.

During digging operation, do not allow the boom cylinder to contact the blade edge. When no blade operation is needed, operate with the bucket on the opposite side of the machine from the blade.

Do not swing the upper structure with cab door and/or upper structure covers opened. An opened door and/or cover can hit the blade when the blade is in the raised position while the machine is swinging.

Float (1) – Push the lever forward to the DETENT position. The blade will lower to the ground. The blade will float with the contour of the ground. The lever will remain in the FLOAT until the lever is released from the DETENT position. After the lever is released, the lever will return to the HOLD position.

Lower (2) – Push the lever forward in order to lower the blade. The lever will return to the HOLD position when you release the lever. The blade will remain in the selected position.

Hold (3) – The lever will return to the HOLD position, when you release the lever from the RAISE position or from the LOWER position. The blade will remain in the selected position.

Raise (4) – Pull the lever backward in order to raise the blade. The lever will return to the HOLD position when you release the lever. The blade will remain in the selected position.

i05227586

Joystick Controls Alternate Patterns

SMCS Code: 5059; 5137

Changing Machine Control Pattern By Four-Way Valve (If Equipped)

⚠ WARNING

Whenever a change is made to the machine control pattern, also exchange the pattern card in the cab to match the new pattern.

Check the machine control pattern for conformance to the pattern on the card in the cab. If the pattern does not match, change the card to match the machine control pattern before you operate the machine. Failure to do so could result in personal injury.

If the machine is equipped with a four-way valve, the machine control pattern can easily be changed. The machine control pattern can be changed to the SAE system, MHI system, KOB system or the former SCM system by changing the four-way valve position. To change the four-way valve position, use the following procedure.

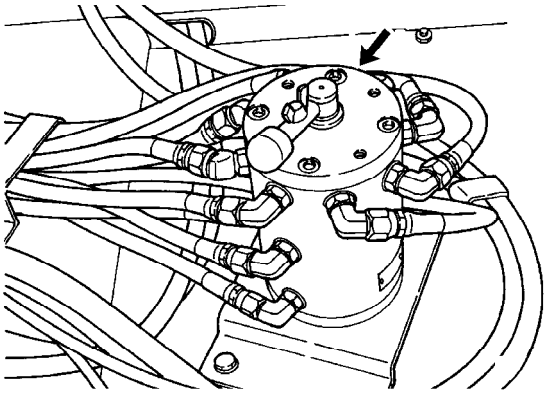


Illustration 153 g00682736

The four-way valve (if equipped) is located under the cab floor.

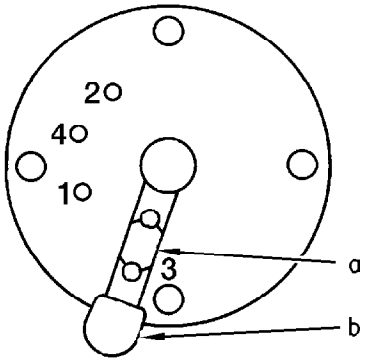


Illustration 154 g00682737

(a) Bolt
(b) Lever
(1) MHI machine control pattern
(2) KOB machine control pattern
(3) SAE machine control pattern
(4) Former SCM machine control pattern

1. Loosen bolt (a) and move lever (b) to the desired position. The lever can be moved to position (1), (2), (3), or (4).

   Position (1) will change the machine control pattern to the MHI system. Position (2) will change the machine control pattern to the KOB system. Position (3) will change the machine control pattern to the SAE pattern. Position (4) will change the machine control pattern to the former SCM pattern.

2. After the pattern is set, tighten the bolt in order to secure the lever.

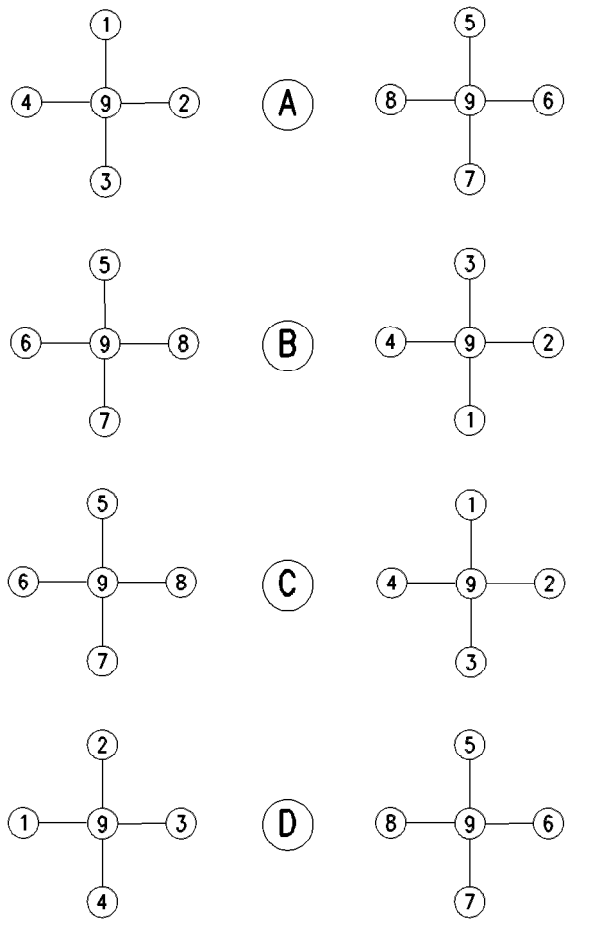


Illustration 155 g00102959

(A) SAE machine control pattern
(B) MHI machine control pattern
(C) KOB machine control pattern
(D) Former SCM machine control pattern

The patterns on the left side of the illustration show the possible configurations for the left control lever. The patterns on the right side of the illustration show the possible configurations for the right control lever.

STICK OUT (1) – Move the control lever to this position in order to move the stick outward.

SWING RIGHT (2) – Move the control lever to this position in order to swing the upper structure to the right.

STICK IN (3) – Move the control lever to this position in order to move the stick inward.

SWING LEFT (4) – Move the control lever to this position in order to swing the upper structure to the left.

BOOM LOWER (5) – Move the control lever to this position in order to lower the boom.

BUCKET DUMP (6) – Move the control lever to this position in order to dump the bucket.

BOOM RAISE (7) – Move the control lever to this position in order to raise the boom.

BUCKET CLOSE (8) – Move the control lever to this position in order to close the bucket.

HOLD (9) – When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the upper structure will stop.

Two functions may be performed at the same time by moving a control lever diagonally.

If the machine is equipped with a hydraulic hammer, the function of position (6) and of position (8) is different.

HYDRAULIC HAMMER RAISE (6) – Move the control lever to this position in order to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position in order to lower the hydraulic hammer.

Changing Machine Control Pattern by Two-Way Valve (If Equipped)

⚠ WARNING

Whenever a change is made to the machine control pattern, also exchange the pattern card in the cab to match the new pattern.

Check the machine control pattern for conformance to the pattern on the card in the cab. If the pattern does not match, change the card to match the machine control pattern before you operate the machine. Failure to do so could result in personal injury.

The machine control pattern can easily be changed to the SAE system or to the standard backhoe loader hydraulic system (BHL) by changing the position of the two-way valve (if equipped). Use the following procedure to change the position of the two-way valve.

The two-way valve (if equipped) is located under the cab floor.

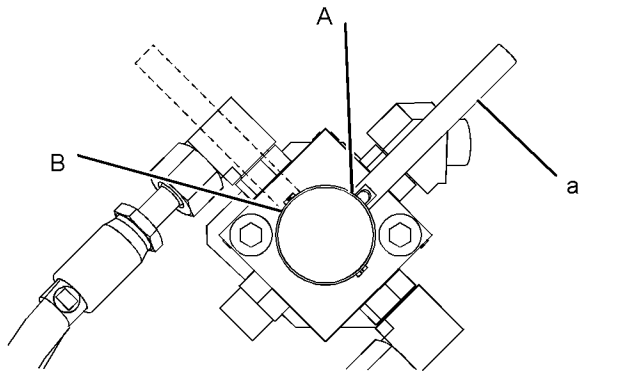


Illustration 156 g02042557

(a) Lever
(A) SAE machine control pattern
(B) BHL machine control pattern

1. Pull up on lever (a) and turn the lever to the SAE position or to the BHL position.

Note: Illustration 156 shows that the two-way valve is in the SAE position.

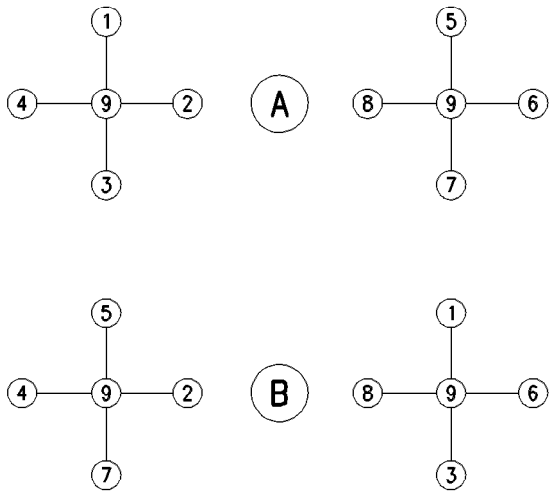


Illustration 157 g00102966

(A) SAE machine control pattern
(B) BHL machine control pattern for standard backhoe

The patterns on the left side of the illustration show the possible configurations for the left control lever. The patterns on the right side of the illustration show the possible configurations for the right control lever.

STICK OUT (1) – Move the control lever to this position in order to move the stick outward.

SWING RIGHT (2) – Move the control lever to this position in order to swing the upper structure to the right.

STICK IN (3) – Move the control lever to this position in order to move the stick inward.

SWING LEFT (4) – Move the control lever to this position in order to swing the upper structure to the left.

BOOM LOWER (5) – Move the control lever to this position in order to lower the boom.

BUCKET DUMP (6) – Move the control lever to this position in order to dump the bucket.

BOOM RAISE (7) – Move the control lever to this position in order to raise the boom.

BUCKET CLOSE (8) – Move the control lever to this position in order to close the bucket.

HOLD (9) – When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the upper structure will stop.

Two functions may be performed at the same time by moving a control lever diagonally.

If the machine is equipped with a hydraulic hammer, the function of position (6) and of position (8) is different.

HYDRAULIC HAMMER RAISE (6) – Move the control lever to this position in order to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position in order to lower the hydraulic hammer.

i02718118

Fuel Tank Shutoff and Drain Control

SMCS Code: 1273

The fuel tank drain valve is located under the main hydraulic pump. The fuel shutoff valve is located underneath the fuel tank.

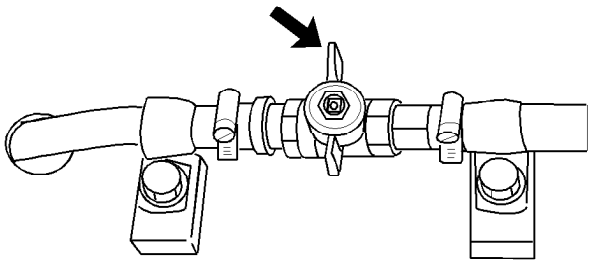


Illustration 158 g01043694

Fuel tank drain valve

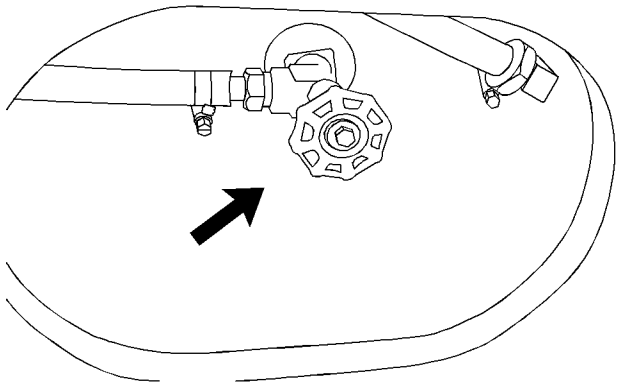


Illustration 159 g01364405

Fuel shutoff valve

Fuel Tank Drain Valve – To drain the water and sediment from the fuel tank, turn the fuel drain valve counterclockwise. To close the fuel tank drain valve, turn the drain valve clockwise.

Fuel Shutoff Valve – To shut off the fuel supply, turn the fuel shutoff valve clockwise. To turn on the fuel supply, turn the fuel shutoff valve counterclockwise.

Note: For more detailed information that pertains to draining the water and sediment from the fuel tank, refer to Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”.

Engine Starting

i04947338

Engine Starting

SMCS Code: 1000; 1090; 1456; 7000

⚠ WARNING

Explosion hazard! This machine is equipped with an air inlet heater. Do not spray aerosol starting aids such as ether manually into the intake. The use of ether without an ether attachment could result in an explosion or fires that could cause personal injury or death.

NOTICE
The engine start switch must be in the ON position and the engine must be running in order to maintain electrical functions and hydraulic functions. This procedure must be followed in order to prevent serious machine damage.

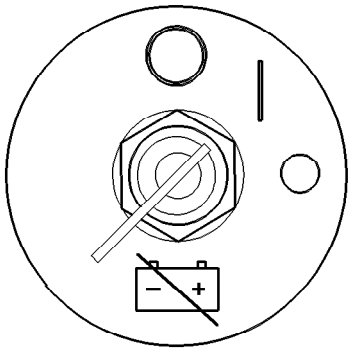


Illustration 160 g00406959

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

2. Make sure that the reset button for the circuit breaker remains depressed. Refer to Operation and Maintenance Manual, “Circuit Breakers - Reset”.

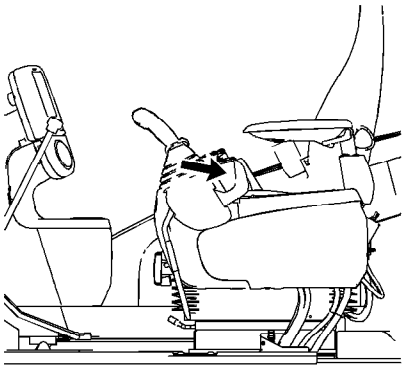


Illustration 161 g01075262

3. Move the hydraulic lockout control to the LOCKED position.

This machine is equipped with an engine neutral start system. The system only allows the engine to start when the lever for the hydraulic lockout control is in the LOCKED position.

4. Move the joysticks to the HOLD position.

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

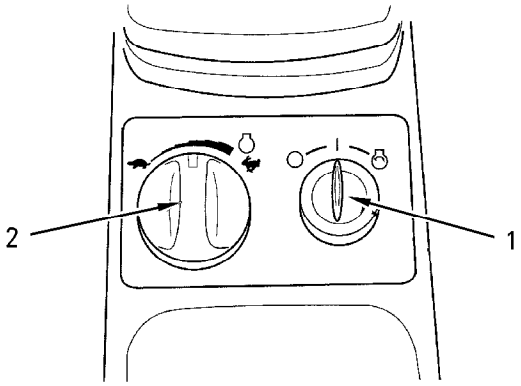


Illustration 162 g00682776

(1) Engine start switch
(2) Engine speed dial

6. Turn engine start switch (1) to the ON position.

7. The monitoring system starts.

Note: For more information on the monitoring system, refer to Operation and Maintenance Manual, “Monitoring System”.

8. If the engine start switch is held in the ON position for two seconds or more, the prestart check of the monitoring system will be activated. If any fluid levels are low, the low fluid level will be shown on the message display. Refer to Operation and Maintenance Manual, “Monitoring System” for more information on the prestart monitoring function.

If the fluid level is too low, add the corresponding fluid to the specified level. Add the fluid before you start the engine.

9. Make sure that “INTAKE AIR HEATER ON” is not shown on the message display. If this message is shown on the message display, the temperature of the engine coolant is too low, and the engine cannot start correctly. **If “INTAKE AIR HEATER ON” is shown on the message display, the intake air heater has activated. While the intake air heater is being activated, wait until the message “INTAKE AIR HEATER ON” is no longer visible on the message display.**

Note: Do not start the engine at this time.

10. Turn engine speed dial (2) to speed position “1” .

NOTICE
Do not crank the engine for more than 30 seconds. If the engine does not start, allow the starter to cool for two minutes before cranking again. The engine start switch must be turned to the OFF position before trying to restart.

11. Turn engine start switch (1) to the START position.

12. Release the engine start switch key after the engine starts.

This machine's engine with standard specifications can start in areas that have temperatures as low as −18°C (0°F). For areas that are cooler, a starting kit for cold weather is available.

i05288209

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE
Keep engine speed low until the engine oil pressure registers on the gauge or the engine oil pressure indicator light goes out. If it does not register or the light does not go out within ten seconds, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

NOTICE
Always run the engine at low idle for at least ten minutes before performing any other operations in cold conditions in order to protect your engine and hydraulic components.

NOTICE
When you operate the machine in ambient temperatures below 4° C (40° F), cooler covers are recommended to maintain normal hydraulic operating temperatures. When the ambient temperature is above 4° C (40° F), the cooler covers are not required.

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

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

Hydraulic System

⚠ WARNING

When you cycle the machine controls, the machine can move suddenly. Contact between the machine and external objects or ground personnel can result in serious injury or death. Before you cycle the machine controls, the machine should be located in an unobstructed, hazard-free work area that is away from external objects and ground personnel.

1. Make sure that the area is clear of personnel and equipment.

Note: The hydraulic lockout control must be in the UNLOCKED position before the hydraulic controls will function.

2. Allow the engine to warm up at low idle for at least 5 minutes. Engage the work tool controls and disengage the work tool controls in order to speed up the warm-up of the hydraulic components.

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 15 minutes.
- If the temperature is less than 0°C (32°F), warm up the engine for approximately 30 minutes.

- If the temperature is less than − 18°C (0°F) or if hydraulic functions are sluggish, additional time may be required.

3. To warm up the hydraulic oil, turn the engine speed dial to the medium engine speed. Run the engine for approximately 5 minutes and move the joystick intermittently from the BUCKET DUMP position to the HOLD position. Do not hold the joystick in the BUCKET DUMP position with the bucket cylinder fully extended for more than 10 seconds.

4. Turn the engine speed dial to the maximum engine speed and repeat Step 3.

This allows the oil to attain relief pressure, which causes the oil to warm up more rapidly.

5. Cycle all controls in order to circulate warm oil through all hydraulic cylinders and all hydraulic lines, and through the swing motor and travel motors.

6. Observe the gauges and the indicators frequently during the operation.

Operation

i03933151

Operation Information

SMCS Code: 7000

Note: Operating Temperature Range for the Machine The machine must function satisfactorily in the anticipated ambient temperature limits that are encountered during operation. The standard machine configuration is intended for use within an ambient temperature range of −18 °C (0 °F) to 43 °C (109 °F). Special configurations for different ambient temperatures may be available. Consult your Caterpillar dealer for additional information on special configurations of your machine.

Make sure that no personnel are on the machine or near the machine in order to prevent any personal injury. Keep the machine under control at all times in order to prevent injury.

Reduce the engine speed when you maneuver the machine in tight quarters and when you drive over an incline.

Select the necessary travel speed range before you drive downgrade. Do not change the travel speed range while you drive downhill.

Use the same travel speed on a downgrade and on an upgrade.

When you travel for any distance, keep the stick inward and carry the boom in a low position.

When you drive up a steep grade, keep the boom as close to the ground as possible.

When you travel uphill or you travel downhill, keep the boom on the uphill side of the machine.

1. Adjust the operator seat.

2. Fasten the seat belt.

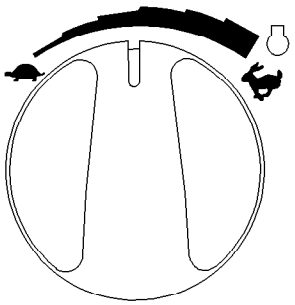


Illustration 163 g00732198

3. Turn the engine speed dial to the operating range.

4. Move the hydraulic lockout control to the UNLOCKED position.

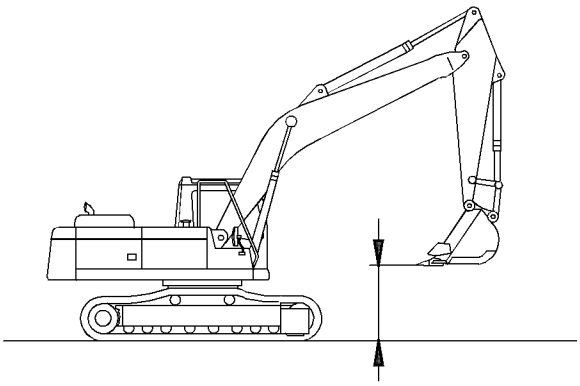


Illustration 164 g02154513

5. Raise the boom enough in order to provide sufficient ground clearance.

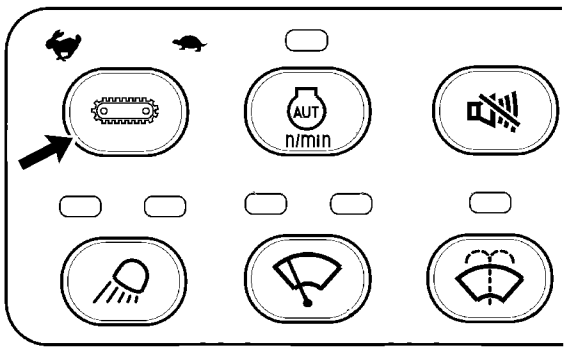


Illustration 165 g01113024

6. Select the desired travel speed by operating the travel speed control switch.

7. Make sure that the position of the upper structure and of the undercarriage is known before you move the machine. The drive sprockets should be at the rear of the machine.

Note: The directional steering controls will operate normally if the drive sprockets are at the rear of the machine. The idlers should be at the front of the machine and under the cab. When the sprockets are under the cab, the travel controls will operate backward.

8. Turn the engine speed dial in order to increase the engine speed (rpm) to the desired speed.

9. Push both travel levers forward at the same time in order to travel forward. If both travel levers are pushed farther, the travel speed at the selected engine speed (rpm) will be faster.

Note: If the machine does not operate or if the machine does not travel in a straight line, consult your Caterpillar dealer.

10. See Operation and Maintenance Manual, "Operator Controls" for information about spot turning and about pivot turns.

11. When you make turns in soft material, travel in a forward direction occasionally in order to clear the tracks.

12. Slowly move both of the travel levers or both of the travel pedals to the CENTER position in order to stop the machine.

Lifting Objects

If the machine is equipped with the CE plate per requirements for the European Union, used to lift objects, then the machine must be equipped with the optional boom lowering control valve and an overload warning device.

A fit for purpose test was completed in order to confirm that a properly equipped machine meets the requirements of the European Union Machinery Directive "2006/42/EC" for lifting objects.

The overload warning device (if equipped) must be adjusted for the bucket linkage and bucket size that is installed on the machine. Adjust the overload warning device for proper operation.

The setting for the overload warning device (if equipped) should be checked by an authorized dealer.

i00059294

Frozen Ground Conditions

SMCS Code: 7000

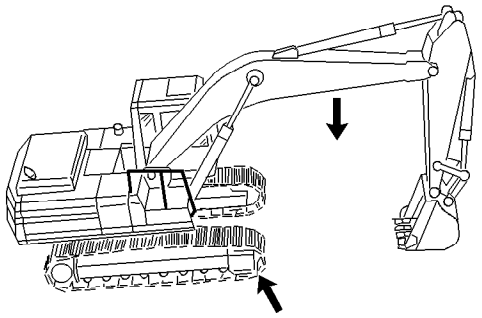


Illustration 166 g00101468

To free the tracks from frozen ground, swing the boom to the front of the machine. Use boom down pressure to free the idler end of the machine.

Swing the boom to the rear of the machine. Use boom down pressure to free the sprocket end of the machine.

i02703801

Equipment Lowering with Engine Stopped

SMCS Code: 7000

To lower the boom, place the hydraulic lockout lever in the UNLOCKED position. Move the joystick to the BOOM LOWER position. If the accumulator is still charged, the boom will lower.

If the boom does not lower, the accumulator is empty. Use one of the following methods to lower the boom.

Machine without a Boom Lowering Control Valve

⚠ WARNING

Be sure no one is under or near the work tools before manually lowering the boom. Keep all personnel away from the boom drop area when lowering the boom with the engine stopped in order to avoid possible personal injury.

When you must manually lower the boom due to engine shutdown, use the following procedure.

Note: Keep all personnel away from the boom when you are lowering the boom.

Relieve the pressure in the hydraulic system before manually lowering the boom. Move the hydraulic lockout lever to the UNLOCKED position. Move the travel levers/pedals forward and backward in order to relieve the pressure.

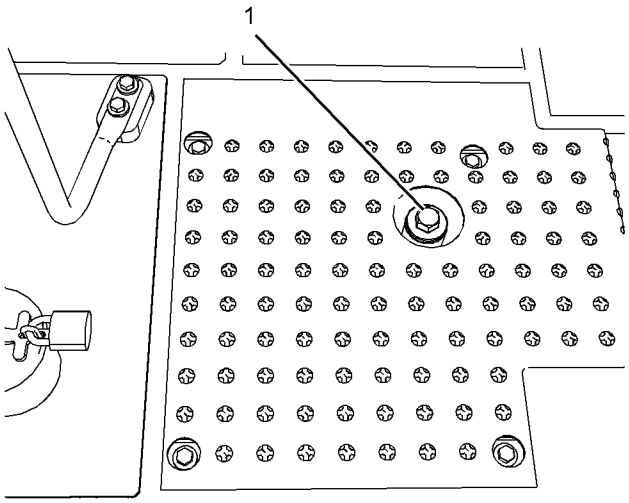


Illustration 167 g01356459

(1) Fill/vent plug

1. Slowly loosen fill/vent plug (1) on the top of the hydraulic tank until internal pressure in the hydraulic tank has been completely relieved. Remove fill/vent plug (1).

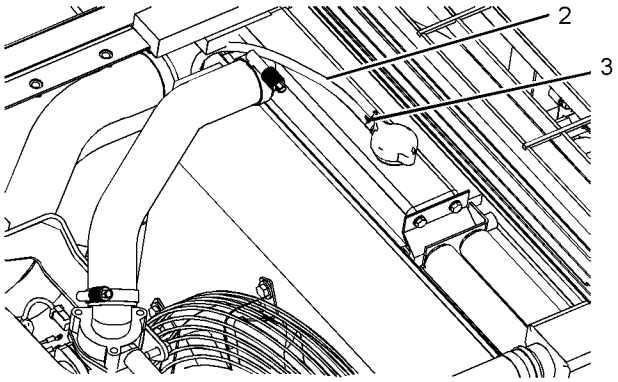


Illustration 168 g01220929

(2) Hose
(3) Clamp

2. Open the engine hood. Loosen clamp (3) and disconnect hose (2) from the radiator.

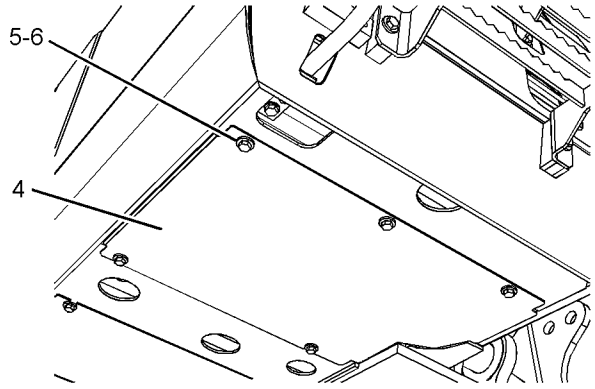


Illustration 169 g01221303

(4) Cover
(5) Bolts
(6) Washers

3. Remove cover (4), bolts (5) and washers (6).

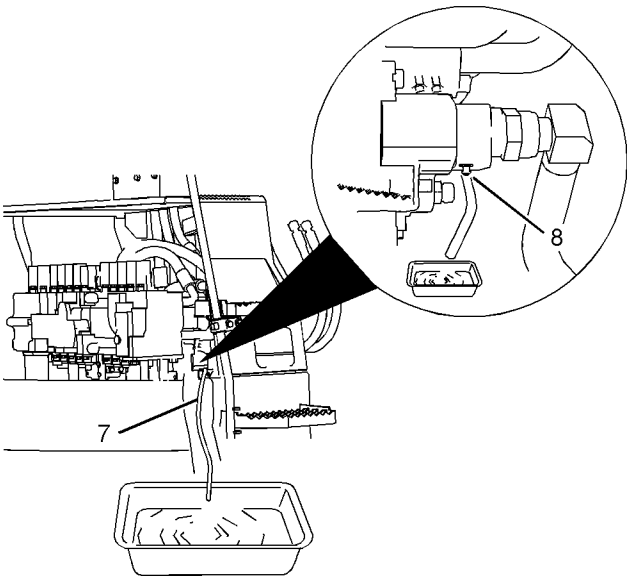


Illustration 170 g01362818

(7) Hose
(8) Screw

4. Put the other end of hose into a suitable container.

5. Slowly loosen screw (4) by a maximum of 1/2 turn. This allows the hydraulic oil in the boom circuit to drain into the container. The boom will now start to lower.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

6. Make sure that the work tool has lowered all the way to the ground.

7. Connect hose (2) to the original position on the hydraulic tank and install the fill/vent plug securely.

8. Close the engine hood.

After completion of the manual boom lowering, make necessary repairs before you operate the machine again.

Note: For additional information, consult your Caterpillar dealer.

Machine with a Boom Lowering Control Valve

⚠ WARNING

Boom load may cause cylinder oil pressure to reach relief pressure of the boom lowering control device when the boom is supported by one cylinder. Boom can lower suddenly, causing possible injury or death.

To avoid possible injury or death, be sure no one is under or near the work tool before manually lowering the boom.

Keep all personnel away from the boom drop area when lowering the boom with the engine stopped.

If the engine is shut down or the hydraulic system is disabled, the operator can still lower the boom. Use the following procedure if the machine is equipped with a boom lowering control valve.

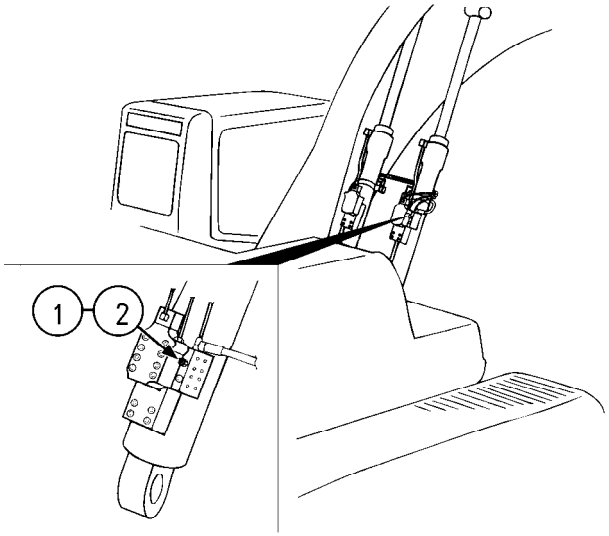


Illustration 171 g00754172

(1) Locknut
(2) Check valve

The boom lowering control valve (if equipped) is installed on each of the boom cylinders. The boom lowering control valve allows the operator to manually lower the boom if the engine is stopped. The boom lowering control valve also prevents the sudden descent of the boom if there is an oil leak in the hydraulic line of the boom.

1. Loosen locknut (1) of the boom lowering check valve.

2. Slowly turn check valve (2) counterclockwise until the check valve stops. The boom will lower to the ground.

3. Make sure that the work tool has been completely lowered onto the ground. Tighten check valve (2).

4. Tighten locknut (1) to a torque of 2.25 ± 0.25 N·m (1.66 ± 0.18 lb ft).

5. Before operating the machine, make any necessary repairs.

For additional information, consult your Caterpillar dealer.

Pressure Release of Auxiliary Lines

⚠ WARNING

Personal injury can result from hot oil spray and raised work tools.

Make sure all the work tools have been lowered, the oil is cool and the pressure has been released from the hydraulic system before removing any components or lines.

Do not allow hot oil or components to contact skin.

Note: Refer to Operation and Maintenance , “General Hazard Information” for information on containing fluid spillage.

Refer to the procedure below before any of the following conditions.

- The work tool is changed.
- The position of the ball valve is changed.

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

2. Place the hydraulic lockout lever to ON position.

3. Release the pressure in the auxiliary lines by pressing the auxiliary control buttons or the auxiliary control pedal three times.

4. Place the hydraulic lockout lever in the OFF position.

5. Change the work tool.

Note: There should be movement in the auxiliary hydraulic lines as the pressure is released. If there is no movement in the auxiliary hydraulic lines, start the engine and run the engine for 20 seconds. Repeat steps 1 to 5.

For additional information, consult your Caterpillar dealer.

i04639609

Equipment Lowering with Engine Stopped

SMCS Code: 7000

Blade (If Equipped)

In order to lower the blade, place the hydraulic lockout control in the UNLOCKED position. Move the blade control lever to the BLADE LOWER position. If the accumulator is still charged, the blade will lower.

If the blade does not lower, the accumulator is empty. The blade will need to be blocked in the raised position until the engine can be started again.

Additional instructions can be found in the service manual and/or consult your Cat dealer.

Operating Techniques

i05125989

Operating Technique Information

SMCS Code: 7000

⚠ WARNING

Know the maximum height and the maximum reach of your machine. Serious injury or death by electrocution can occur if the machine or the work tools are not kept a safe distance from electrical power lines. Keep a distance of at least 3000 mm (118 inch) plus an additional 10 mm (0.4 inch) for each 1000 volts over 50000 volts.

For safety, one of the following may require a greater distance:

- Local codes
- State codes
- Requirements of the job site

NOTICE
When swinging into a ditch, do not use the ditch to stop the swinging motion. Inspect the machine for damage if the boom is swung into a bank or an object.

Repeated stopping by an object can cause structural damage if the boom is swung into a bank or an object.

With certain boom-stick-bucket combinations, the bucket or worktool can hit the cab and/or the front structure of the machine. Always check for interference when first operating a new bucket or a new work tool. Keep the bucket or work tool away from the cab and away from the front structure during operation.

Whenever the tracks of the machine raise off the ground while digging, lower the machine back to the ground smoothly. DO NOT DROP OR CATCH IT WITH THE HYDRAULICS. Damage to the machine can result.

With certain combinations of work tools, the third pedal can have different functions. Always check the function of the third pedal before you use the third pedal.

Know the location of any buried cables. Mark the locations clearly before you dig.

Consult your Caterpillar dealer for special work tool tips that are available for use in severe applications.

Move the machine whenever the position for operating the machine is not efficient. The machine can be moved forward or backward during the operating cycle.

When you operate the machine in close places, utilize the bucket or the other work tool in order to perform the following functions:

- Pushing the machine
- Pulling the machine
- Lifting the tracks

Use a comfortable travel speed while you operate the machine.

Operating efficiency can be increased by using more than one machine control to perform a task.

Never swing a load over a truck cab or workers.

Position the truck so that material can be loaded from the rear of the truck or from the side of the truck. Load the truck evenly so that the rear axles are not overloaded.

An oversize bucket or a bucket that is equipped with side cutters should not be used in rocky material. These types of buckets slow down the cycle. Damage to the bucket and to other machine components could result.

Restricted Operation

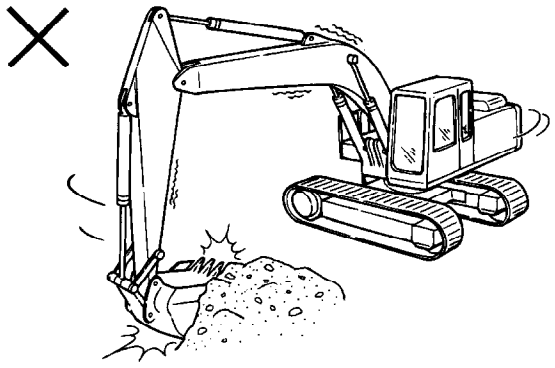


Illustration 172 g00529436

Do not use the swing force to perform the following operations:

- Soil compaction
- Ground breaking
- Demolition

Do not swing the machine while the bucket tips are in the soil.

These operations will damage the boom, the stick, and the work tool and the operations will reduce the life of the equipment.

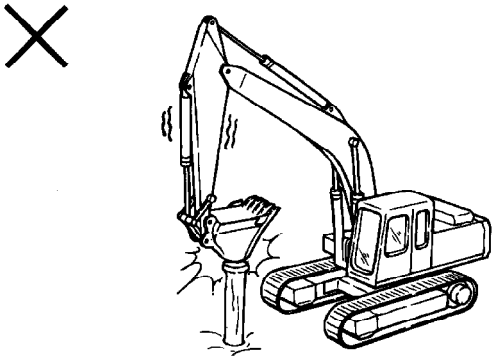


Illustration 173 g00529457

Do not use the dropping force of the bucket or work tool as a hammer. This will bring excessive force on the rear of the machine. Possible damage to the machine could result.

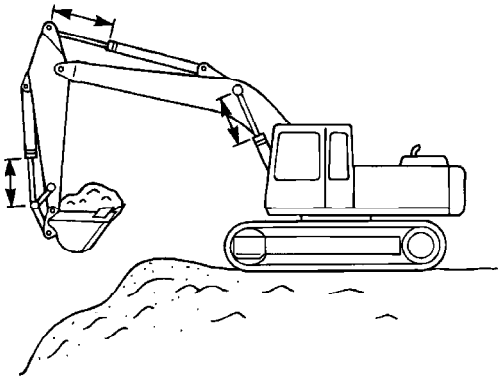


Illustration 174 g00529458

If the cylinder is operated at the end of the stroke during operations, excessive force will occur on the stopper on the inside of the cylinder. This will reduce the life of the cylinder and structures. To avoid this problem, always leave a small margin of play when the cylinder is operated.

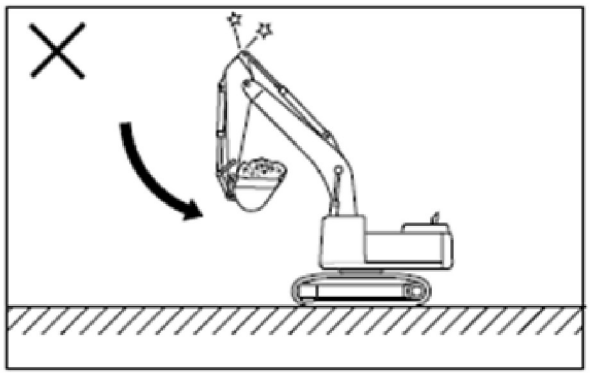


Illustration 175 g03286378

If the stick IN function is operated at full speed with a fully loaded bucket or heavy work tool attachment to the end of the cylinder stroke, excessive force will occur inside the stick cylinder. This action will reduce the life of the stick cylinder. To avoid this problem, always operate a stick IN function with moderate speed towards the end of cylinder stroke.

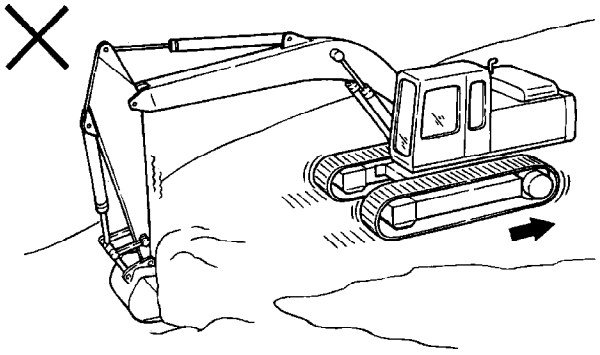


Illustration 176 g00529459

While the bucket is in the ground, do not use the travel force for any excavation. This operation will cause excessive force on the rear of the machine.

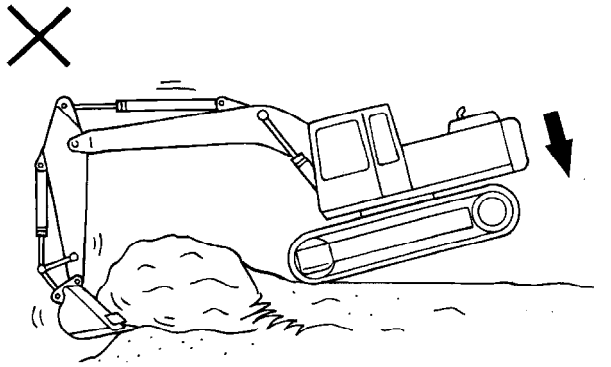


Illustration 177 g00529460

Do not use the dropping force of the rear of the machine for excavation. This operation will damage the machine.

Operating Precaution

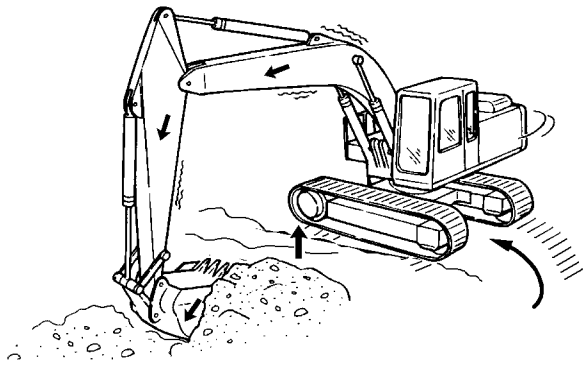


Illustration 178 g01250228

NOTICE
Do not allow the machine to swing from the force of traveling when you use the bucket , the stick, or the boom to assist in travel. If the force from traveling causes the machine to swing, damage may occur to the swing motor and to the swing drive.

Do not use the force of the bucket, the stick, or the boom to assist in turning the machine while the machine is traveling. This technique is referred to as “jump steering”. This technique will damage the swing motor and the swing brake.

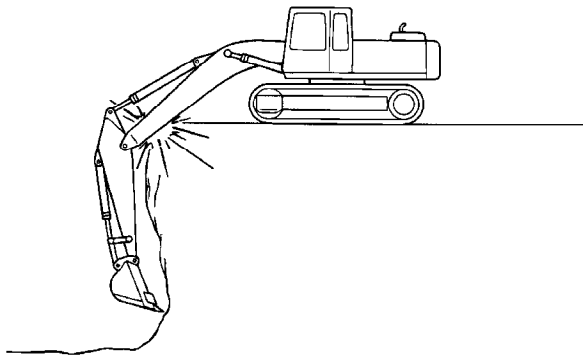


Illustration 179 g00529462

When deep holes are dug, do not lower the boom so that the bottom side of the boom touches the ground.

When deep holes are dug, do not allow the boom to interfere with the tracks.

i05032265

Travel in Water and Mud

SMCS Code: 7000-V6

NOTICE
When working in or around any body of water, around a stream or river, or in conditions of heavy mud, be careful that the swing bearing, the swing drive gear, and the swivel joint do not dip into water, mud, sand, or gravel. If the swing bearing dips into water, mud, sand, or gravel, immediately grease the swing bearing until the used grease leaks from the outer circle of the swing bearing. Failure to carry out this procedure may cause premature wear in the swing bearing.

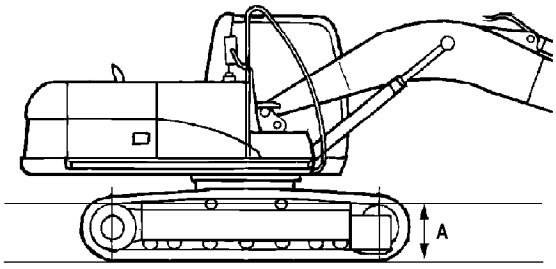


Illustration 180 g00807842

Depth of water to the center of the track carrier roller

The following guidelines pertain to travel across water and travel through mud, sand, or gravel.

The machine can travel across a river only under the following conditions:

- The bed of the river is flat.
- The flow of the river is slow.
- The machine dips into the water only to the center of the track carrier roller (dimension A).

NOTICE
Do not allow the fan on the engine to contact the water while the machine travels through the water. Do not allow the fan on the engine to contact the water during a swing while the machine is in the water. Damage to the fan may occur if the fan contacts the water.

While you cross the river, carefully confirm the depth of the water with the bucket. Do not move the machine into an area that has a water depth that is greater than Dimension A.

The machine may sink gradually on soft ground. Therefore, you should frequently check the height of the undercarriage from ground level and the depth of water on the ground.

Check the swing gear by looking through the port for inspection that is on the upper frame. If there is water in the swing gear, contact your Cat dealer for the required maintenance on the swing gear.

After you travel through water, carefully clean the machine in order to remove any salt, sand, or other foreign matter.

Procedure for Removing the Machine from Water or Mud

NOTICE
Do not allow the machine to swing from the force of traveling when you use the bucket , the stick, or the boom to assist in travel. If the force from traveling causes the machine to swing, damage may occur to the swing motor and to the swing drive.

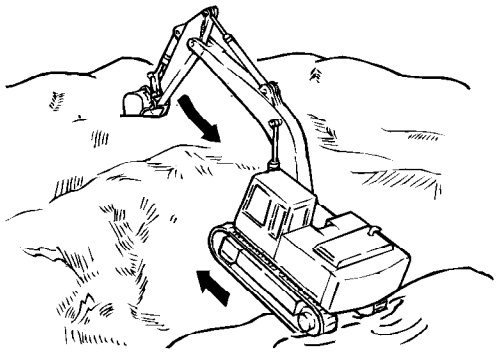


Illustration 181 g00808148

1. You may not be able to move the machine by using the travel controls only. In this case use both the travel control levers/pedals and the stick to pull the machine out of the water or ground.

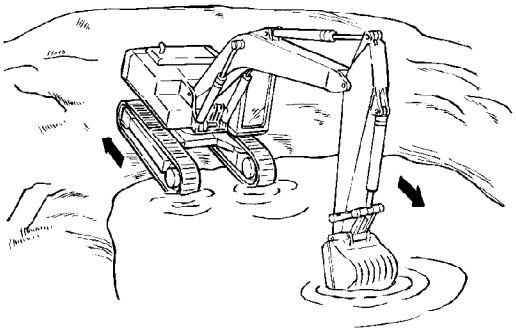


Illustration 182 g00808151

2. The machine may slip because of a steep slope. The procedure in Step 1 may not work. In this case, first rotate the upper structure by 180°. Then use both the travel control levers/pedals and the stick to move the machine up the slope.

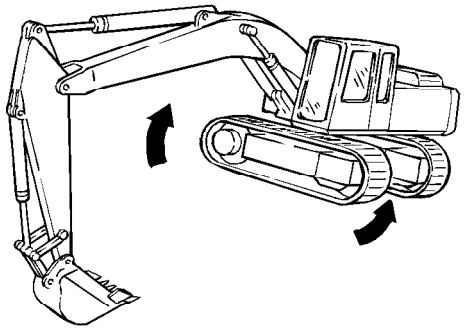


Illustration 183 g00808152

3. It may be impossible to travel because the bottom of the frame comes into contact with the ground or the undercarriage is clogged with mud or gravel. In this case, operate the boom and the stick together. Raise the track and rotate the track forward and backward in order to remove the mud and the gravel.

i05150572

Boom, Stick and Bucket Operation

SMCS Code: 7000

Digging

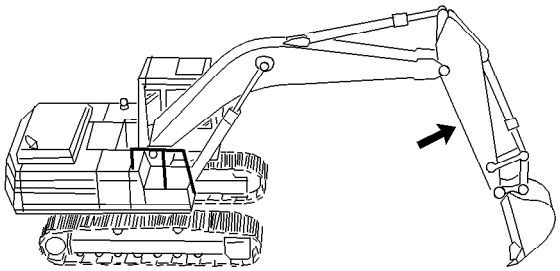


Illustration 184 g00101523

1. Position the stick at a 70 degree angle to the ground.

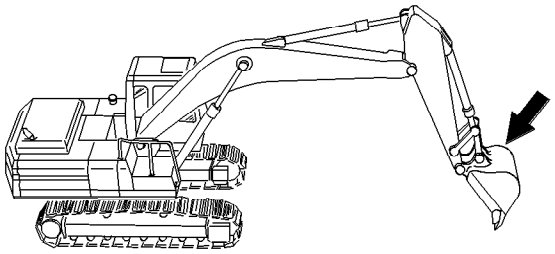


Illustration 185 g00101525

2. Position the bucket cutting edge at a 120 degree angle to the ground. Maximum breakout force can now be exerted with the bucket.

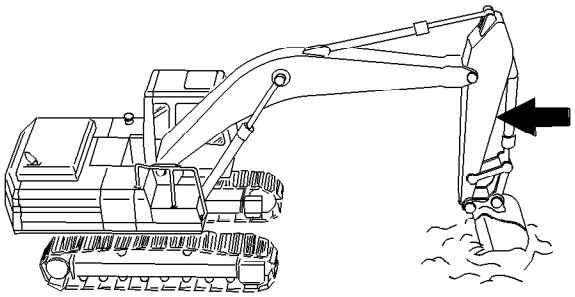


Illustration 186 g00101526

3. Move the stick toward the cab and keep the bucket parallel to the ground.

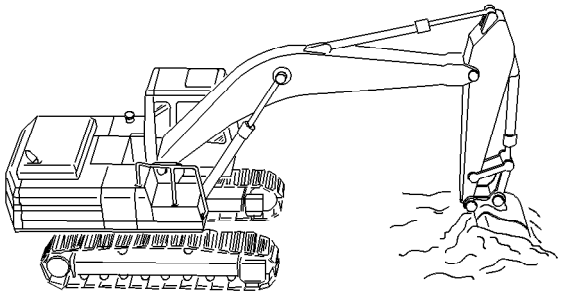


Illustration 187 g00101527

4. If the stick stops due to the load, raise the boom and/or perform a curl in order to adjust the depth of the cut.

5. To apply the greatest force at the cutting edge, decrease the down pressure as you move the stick toward the cab.

6. Maintain a bucket attitude that ensures a continuous flow of material into the bucket.

7. Continue the pass in a horizontal direction so that material peels into the bucket.

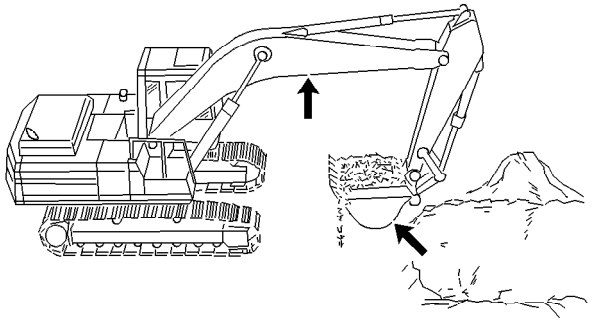


Illustration 188 g00101528

8. Close the bucket and raise the boom when the pass has been completed.

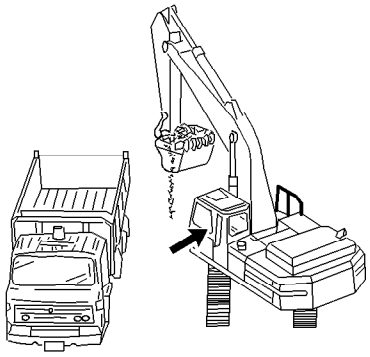


Illustration 189 g00101529

9. Engage the swing control when the bucket is clear of the excavation.

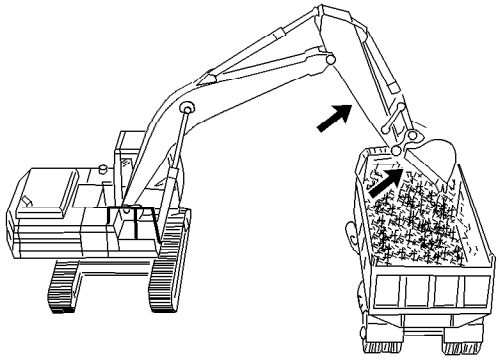


Illustration 190 g00101530

10. To dump a load, move the stick outward and open the bucket in a smooth motion.

Lifting Objects

⚠ WARNING

To prevent injury, do not exceed the rated load capacity of the machine. If the machine is not on level ground, load capacities will vary.

NOTICE
Damage to bucket cylinder, bucket or linkage could result if slings are placed incorrectly.

There may be local regulations and/or government regulations that govern the use of machines which lift heavy objects. Obey all local and government regulations.

If this machine is used to lift objects within an area that is controlled by the European Directive “2006/42/EC”, the machine must be equipped with a boom lowering control valve, a stick lowering control valve, and an overload warning device.

Japan regulations require some machines to use a shovel crane configuration in order to lift ceratin objects.

Contact your Cat dealer for additional information.

Short slings will prevent excessive load swing.

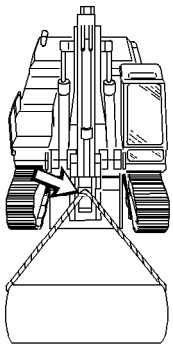


Illustration 191 g00101531

Use the lifting eye that is provided on the linkage to lift objects.

If the lifting eye is used, the connection must be made with a sling or with a shackle.

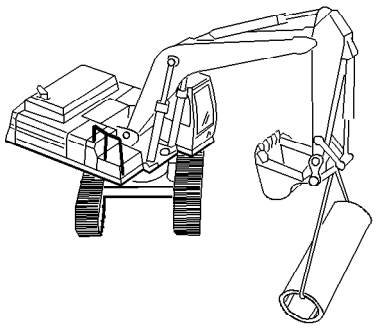


Illustration 192 g00101532

An unstable condition can exist if a load exceeds the machine load rating or if a heavy load is swung over an end or over a side.

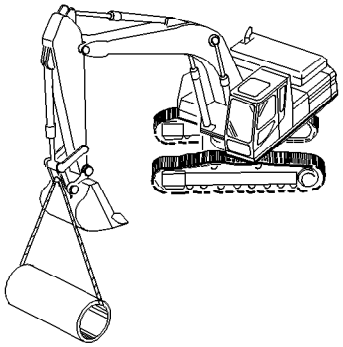


Illustration 193 g00101533

The most stable lifting position is over a corner of the machine.

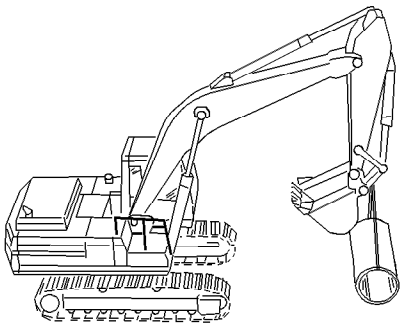


Illustration 194 g00101534

For the best stability, carry a load close to the machine and to the ground.

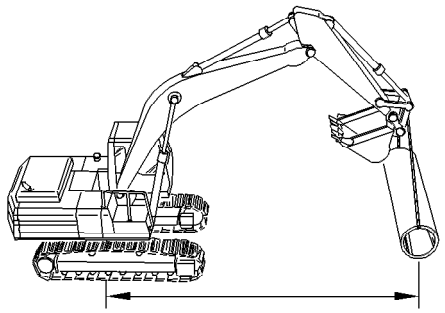


Illustration 195 g00101535

Lift capacity decreases as the distance from the swing centerline is increased.

Machines that are Equipped with a Long Reach Configuration

Machines with a long reach configuration require larger swing drift than standard machines when stopping, because inertial force in time of swing is large. Taking this into account, adjustments are made in timing for applying the swing brakes and speed of swinging.

Machines with a long reach configuration could be damaged and stability of the machine would be adversely affected if a control was suddenly operated, because inertial force of work tool is large.

i07175212

Quick Coupler Operation (Hydraulic Pin Grabber Quick Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

NOTICE
The Caterpillar Quick Coupler (Hydraulic Pin Grabber) is not designed to be used in applications where there is long exposure to excessive vibration. The vibration caused by extensive use of a hydraulic hammer as well as the added weight of certain demolition tools such as shears, crushers, and pulverizers may cause premature wear and decreased service life of the coupler.

Be sure to carefully inspect the coupler daily for cracks, bent components, wear, distressed welds, etc. when operating with any of the above work tools.

General Operation

The quick coupler is used to quickly change work tools while the operator remains in the cab. The quick coupler can be used with a broad range of buckets and work tools. Each work tool must have a set of pins in order for the quick coupler to work properly.

The work tools are held onto the quick coupler by hydraulic pressure. If pressure is lost, a check valve in the hydraulic cylinder traps oil in the cylinder. In addition to the check valve, a blocking bar locks the work tools to the quick coupler. Ensure that the hydraulic system and the blocking bar are working properly before using the quick coupler.

A lifting eye is included on the quick coupler. Release the work tool from the quick coupler to use the lifting eye to pick up loads. To lift a load with the lifting eye, extend the bucket cylinder until the quick coupler is in a VERTICAL position. Do not exceed the rated load for the machine.

NOTICE
Once the work tool has been properly attached to the coupler, no loosening of the work tool should occur. Refer to the “Quick Coupler Installation and Removal” section of the quick coupler Operation and Maintenance Manual for additional information. If at any point after the proper attachment and back drag testing of the work tool, should the work tool then become loose or if the rear pin of the work tool detaches from the movable hook, stop work immediately and safely ground and detach the work tool. Consult your Cat dealer to inspect the coupler prior to putting the coupler back into service. This situation could indicate potential coupler damage that may not be readily visible to the customer or operator of the machine and coupler.

NOTICE
Inspection of the Center-Lock coupler is required after a failure of the primary engaging system or a miscoupling of the tool, causing the work tool to swing by the secondary lock. Contact your Cat dealer.

Refer to Special Instruction, REHS5676, “The Inspection Procedure for the Center-Lock Coupler” for the proper procedure.

Note: Machines operating hydromechanical work tools equipped with a Center-Lock Pin Grabber Coupler, the addition of a Hydromechanical Conversion Kit may also be required. Refer to the Operation and Maintenance Manual for the quick coupler for more information or consult your Cat dealer.

Quick Coupler Operation

Description of the Instruction Film

An instruction film is included with the quick coupler. The instruction film illustrates the operation of the quick coupler.

Note: For detailed instructions on the operation of the quick coupler, refer to “Coupling the Work Tool” and “Uncoupling the Work Tool”.

The instruction film should be legible at all times. Clean the film or replace the film if the film is not legible. When you clean the film, use a cloth, water, and soap. Do not use solvent, gasoline, or harsh chemicals to clean the film. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the film. Loose adhesive will allow the film to fall. If the film is damaged or the film is missing, replace the film. For more information, consult your Cat dealer.

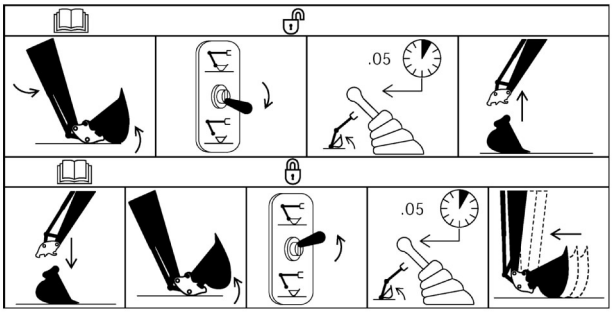


Illustration 196 g01231702

Instruction film

Description of the Top Frame on the Film (Uncoupling the Work Tool)

1. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.
2. Move the electric switch to the UNLOCK position.
3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked.
4. Place the work tool in the storage position close to the ground. Retract the bucket cylinder until the tool is disengaged from the quick coupler.

Description of the Bottom Frame on the Film (Coupling the Work Tool)

1. Engage the quick coupler onto the work tool.
2. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.
3. Move the electric switch to the LOCK position.
4. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked.
5. Make sure that the quick coupler pins are engaged. Retract the bucket cylinder and drag the attachment on the ground. This method will ensure that the quick coupler pins are engaged.
6. Visually confirm positive indication of the ISO Engagement Indicator, if equipped.

⚠ WARNING

Crush injury. Could cause serious injury or death. Always confirm that the quick coupler is engaged onto the pins. Read the Operator's Manual.

NOTICE

Back drag the work tool on the ground to ensure the quick coupler is properly locked.

Do Not strike the work tool on the ground to ensure the quick coupler is properly locked. Striking the work tool on the ground will result in damage to the coupler cylinder.

Electric Switch Operation

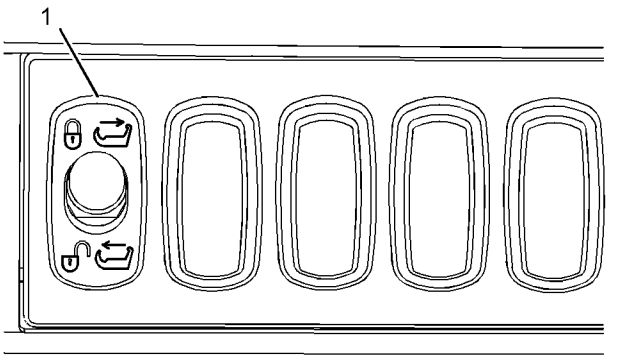


Illustration 197 g01354191
Early type

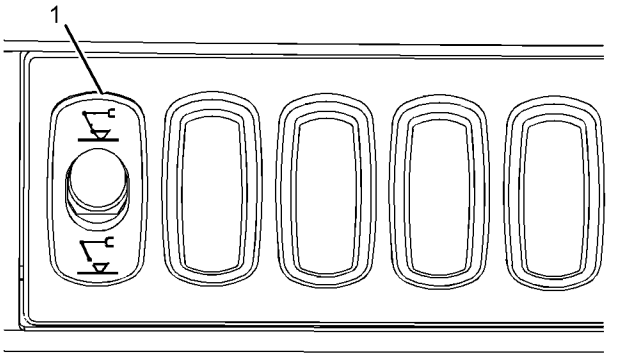


Illustration 198 g01354192
Later type

The electric switch (1) is located inside the cab. The electric switch has two positions that are used for coupling the work tool and uncoupling the work tool. Examples of the early switch type and the later switch type have been shown above. Refer to this Operation and Maintenance Manual, “Operator Controls” for the location of the electric switch.


UNLOCK – To unlock the coupler, extend the stick cylinder and extend the bucket cylinder until the bucket is fully curled under the stick. Pull the switch outward and move the switch toward the UNLOCK position. A buzzer will sound. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked. The switch must remain in the UNLOCK position until another work tool is attached. The switch must remain in the UNLOCK position to prevent the blocking bar from jamming.


LOCK – To lock the coupler, engage the quick coupler onto the work tool. Extend the stick cylinder and extend the bucket cylinder until the bucket is fully curled under the stick. Pull the switch outward and move the switch toward the LOCK position. The buzzer will not sound when the switch is in the LOCK position. The buzzer does not sound when the switch is in the LOCK position. This does not indicate that the coupler is engaged. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked. Make sure that the quick coupler is engaged onto the pins. Retract the bucket cylinder and drag the attachment on the ground. This method will ensure that the quick coupler is engaged onto the pins. Visually confirm positive indication of the ISO Engagement Indicator, if equipped.

Coupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before engaging the quick coupler. Ensure that the work tool or bucket is not carrying a load.

Serious injury or death may result from engaging the work tool or bucket when it is in an unstable position or carrying a load.

⚠ WARNING

Inspect the quick coupler engagement before operating the machine.

Serious injury or death may result from improperly engaged coupler.

⚠ WARNING

Crush injury. Could cause serious injury or death. Always confirm that the quick coupler is engaged onto the pins. Read the Operator's Manual.

NOTICE
The buzzer will not sound when the switch is in the lock position. The position of the switch does not confirm that the quick coupler locking system is properly engaged with the attachment pins. Visually confirm positive indication of the ISO Engagement Indicator, if equipped. A physical test is required by dragging the work tool on the ground to confirm that the coupler pins are engaged.

NOTICE
Always confirm that the buzzer sounds when the switch is in the unlock position. If no sound is heard while in this condition, ensure that the work tool is placed in a stable and safe position. Turn off the engine. Consult your Cat dealer.

NOTICE
With certain work tool combinations, including quick couplers, the work tool can hit the cab or the front of the machine. Always check for interference when first operating a new work tool.

1. Position the bucket or the work tool on a level surface.

2. Make sure that the pins are in the bucket or the work tool. Make sure that the pin keepers are installed correctly.

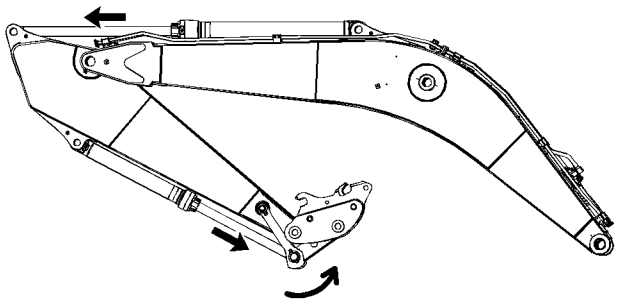


Illustration 199 g01231266

3. To prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the LOCK position to the UNLOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

4. Pull the switch outward and move the switch to the UNLOCK position. A buzzer will sound.

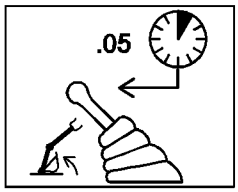


Illustration 200 g01231447

5. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked. The switch must remain in the UNLOCK position until the work tool is attached to prevent the blocking bar from jamming. The buzzer will continue to sound until the switch is moved to the LOCK position.

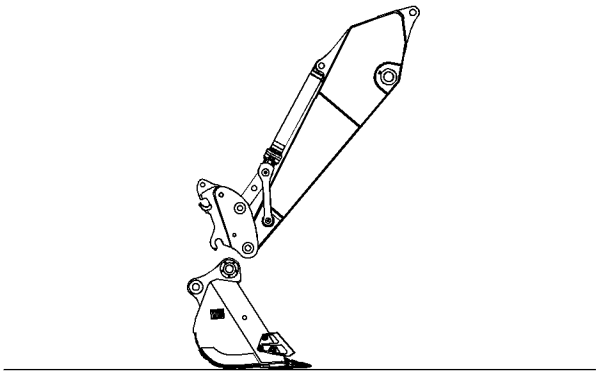


Illustration 201 g01231316

6. Align the quick coupler with the work tool.

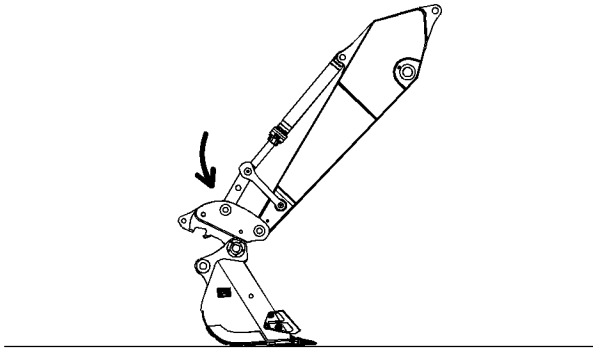


Illustration 202 g01231317

7. Rotate the quick coupler to grab the top pin.

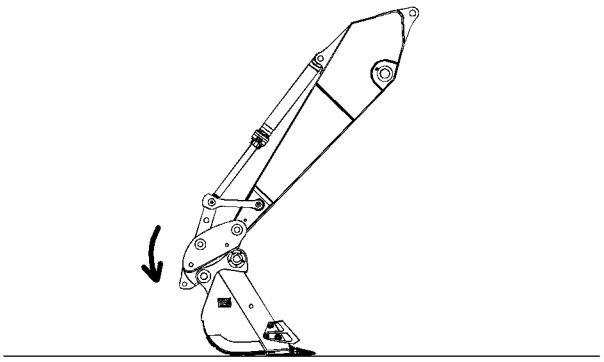


Illustration 203 g01231320

8. Rotate the quick coupler downward to grab the bottom pin.

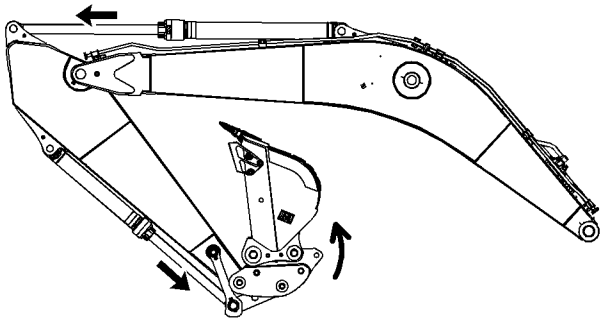


Illustration 204 g01231322

9. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position. This must be performed before you move the switch from the UNLOCK position to the LOCK position.

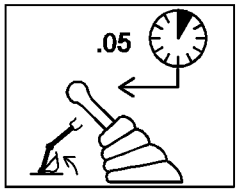


Illustration 205 g01231447

NOTICE
Hold the bucket cylinder control lever in the EXTEND position while the switch is moved into the LOCK position. Failure to do so may result in unwanted movement of the worktool.

10. Move the switch to the LOCK position. The buzzer will no longer sound. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to lock the hook.

⚠ WARNING

Crush injury. Could cause serious injury or death. Always confirm that the quick coupler is engaged onto the pins. Read the Operator's Manual.

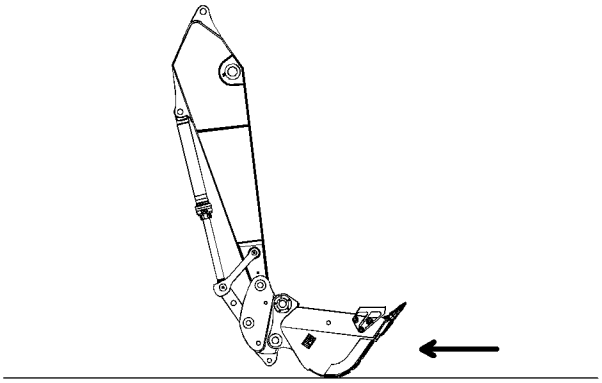


Illustration 206 g01231327

⚠ WARNING

Inspect the quick coupler engagement before operating the machine.

Verify that the quick coupler is engaged per the procedure in the Operation and Maintenance Manual. Verify prior to operating the machine, after every engine start, and after an extended time of inactivity.

Serious injury or death may result from improperly engaged coupler.

11. Verify that the quick coupler and the work tool are locked together.

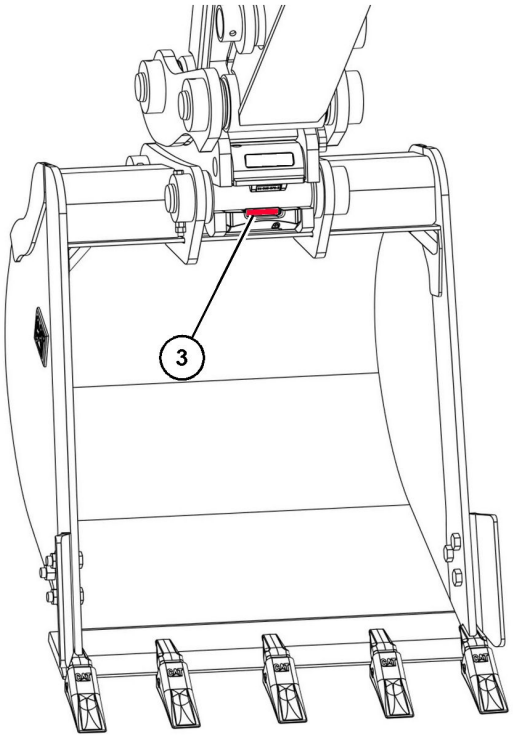


Illustration 207 g06222081

a. Visually confirm the engagement of the work tool. Ensure that both the front and rear pin locking mechanisms for the work tool are locked and secure the work tool to the quick coupler.

b. Visually confirm positive indication of the ISO Engagement Indicator (3), if equipped.

c. Retract the bucket cylinder and drag the work tool on the ground.

d. Visually confirm that there is no movement between the work tool and the quick coupler.

NOTICE
Back drag the work tool on the ground to ensure the quick coupler is properly locked.

Do Not strike the work tool on the ground to ensure the quick coupler is properly locked. Striking the work tool on the ground will result in damage to the coupler cylinder.

Uncoupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

NOTICE
Auxiliary hoses for work tools must be disconnected before the Hydraulic Quick Coupler is disengaged.

Pulling the work tool with the auxiliary hoses could result in damage to the host machine or the work tool.

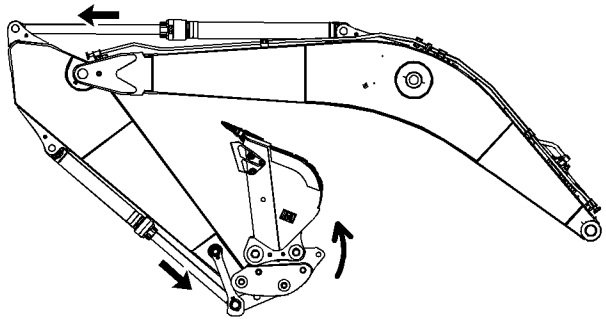


Illustration 208 g01231322

1. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position. This must be performed before you move the switch from the LOCK position to the UNLOCK position.

2. Pull the switch outward and move the switch to the UNLOCK position.

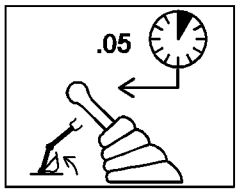


Illustration 209 g01231447

3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to unlock the hook. A buzzer will sound until the switch is moved to the LOCK position. To lift objects with the lifting eye of the quick coupler, refer to “Coupler Lifting Eye Operation without Bucket”.

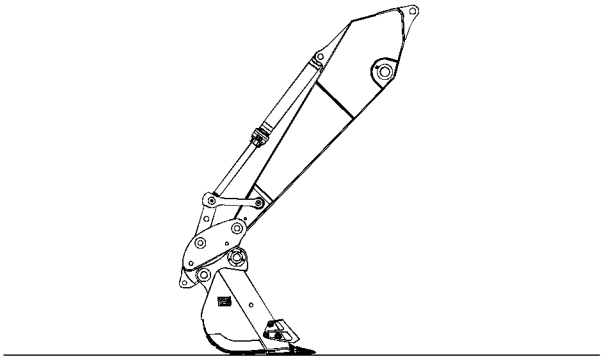


Illustration 210 g01231426

4. Move the boom and the stick until the tool or the bucket is in the storage position. Keep the tool close to the ground.

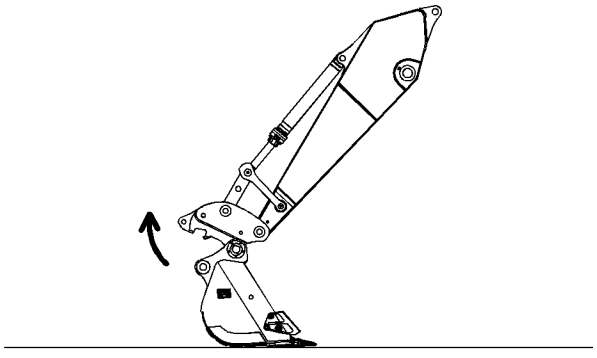


Illustration 211 g01231430

5. Rotate the quick coupler upward to release the bottom pin.

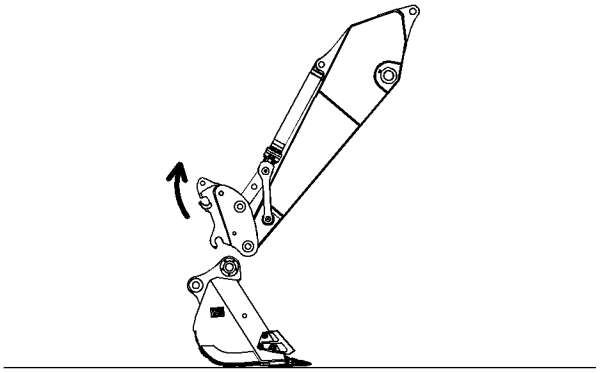


Illustration 212 g01231432

6. Continue to rotate the quick coupler upward to release the top pin and completely release the work tool from the quick coupler.

7. Move the stick to a position that is clear of the work tool.

Note: To lift objects with the lifting eye of the quick coupler, refer to “Coupler Lifting Eye Operation without Bucket”.

Coupling a Bucket that is Reversed

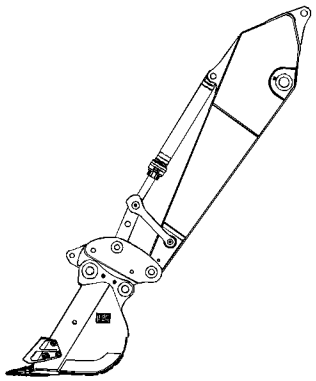


Illustration 213 g01231682

1. When you use a hydraulic pin grabber quick coupler, you can connect to a bucket that is in a reversed position. Refer to Illustration 213 for an example of connecting to a bucket that is in a reversed position.

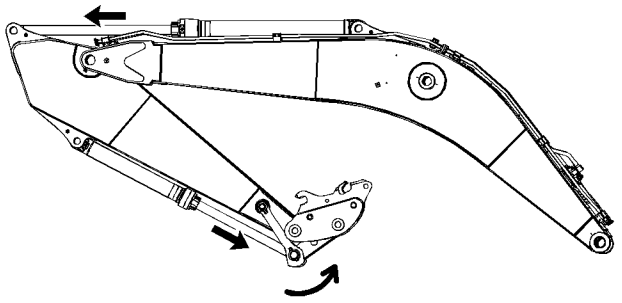


Illustration 214 g01231266

2. To prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the LOCK position to the UNLOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

3. Follow the same steps for coupling the work tool to couple the host machine to a bucket that is reversed. Refer to “Coupling the Work Tool” for the proper procedure.

NOTICE
When some Caterpillar buckets are used in the reverse position, it can be more difficult to couple the bucket and uncouple the bucket than in the normal position.

Care must be taken to ensure that the position of the boom, stick, and bucket are aligned to ensure smooth coupling. The coupler must be in position between the bucket bosses.

If the bucket is not fully engaged in the jaw of the coupler, the quick coupler can become snagged on the bucket bosses. The full weight of the bucket is then carried by the quick coupler sideplates, which can cause damage to the quick coupler.

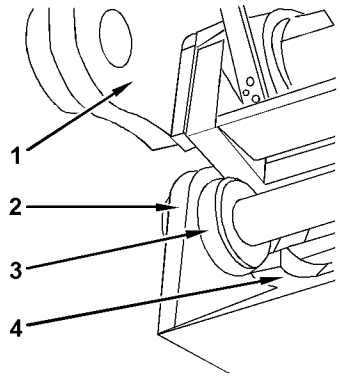


Illustration 215 g01231689

(1) Quick coupler
(2) Bucket
(3) Boss
(4) Hook

Coupler Lifting Eye Operation without Bucket

1. Remove the work tool. Refer to “Uncoupling the Work Tool” for the proper procedure.

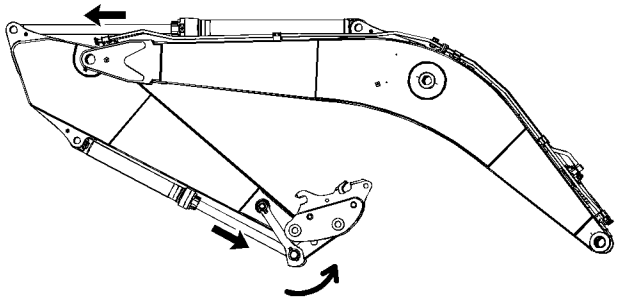


Illustration 216 g01231266

2. To prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the UNLOCK position to the LOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

3. Pull the switch outward and move the switch to the LOCK position. The buzzer will no longer sound.

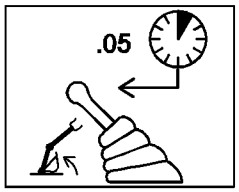


Illustration 217 g01231447

4. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked.

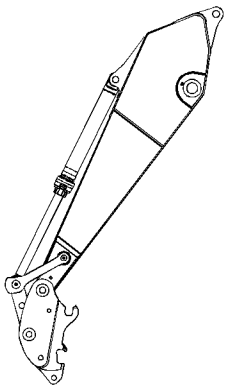


Illustration 218 g01231666

5. Rotate the quick coupler downward and move the stick to a position that is clear of the work tool.

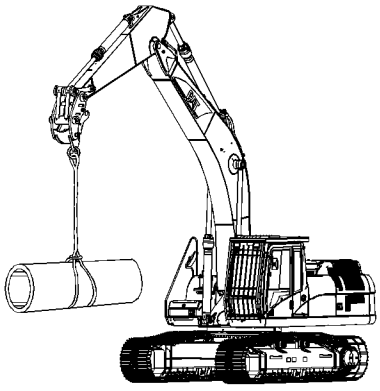


Illustration 219 g01187716

6. Use the lifting eye of the quick coupler, as needed.

7. To reinstall the bucket or the work tool, refer to "Coupling the Work Tool" for the proper procedure.

i06139647

Bucket - Remove and Install

SMCS Code: 6001-011; 6001-012; 6001; 6101; 6102; 6523

Captured Flag

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

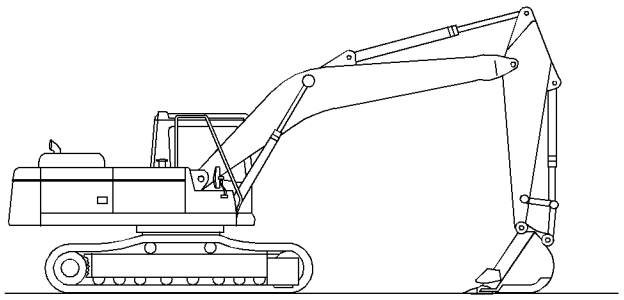


Illustration 220 g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

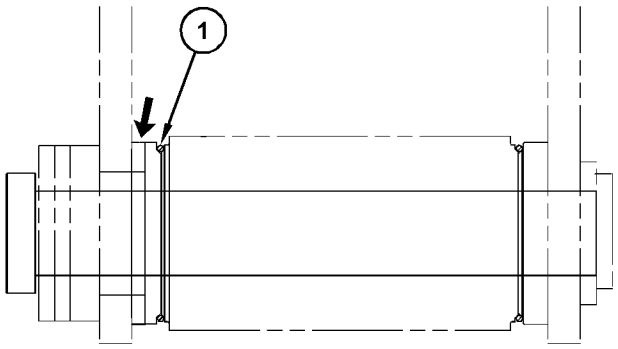


Illustration 221 g03822729

2. Slide O-ring seals (1) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

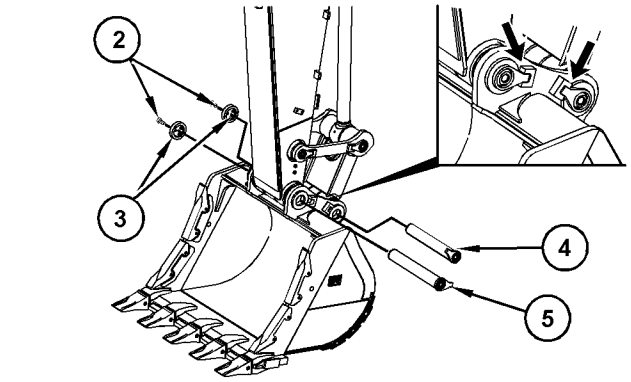


Illustration 222 g03822731

3. Remove bolts (2) and retaining plates (3). Then remove support pin (4) and support pin (5).

4. Start the engine and raise the stick out of the bucket.

5. Remove the O-ring seals (1) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

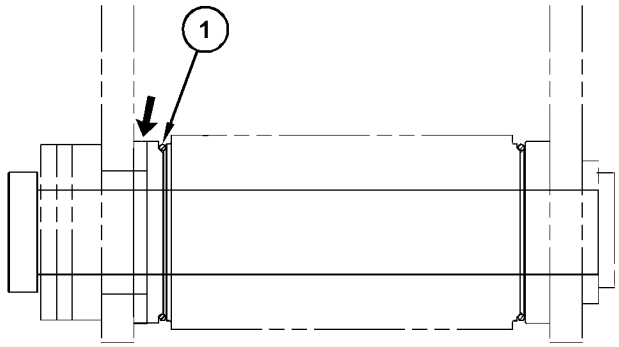


Illustration 223 g03822729

2. Position the O-ring seals (1) onto the flanges of the bucket.

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

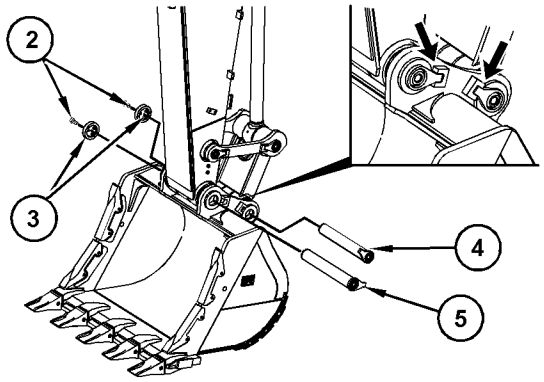


Illustration 224 g03822731

4. Insert support pin (5) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.

5. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

6. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.

7. Slide O-ring seals (1) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Insert support pin (4) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.

10. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.

11. Slide the O-ring seals (1) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

Bolted Flag

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

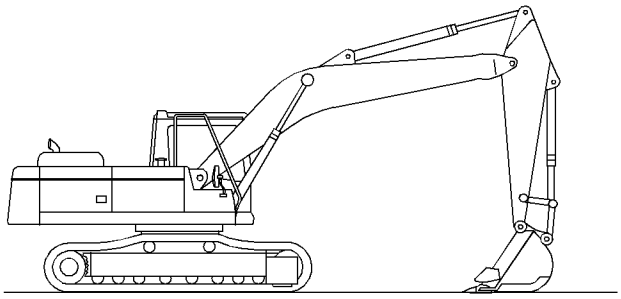


Illustration 225 g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

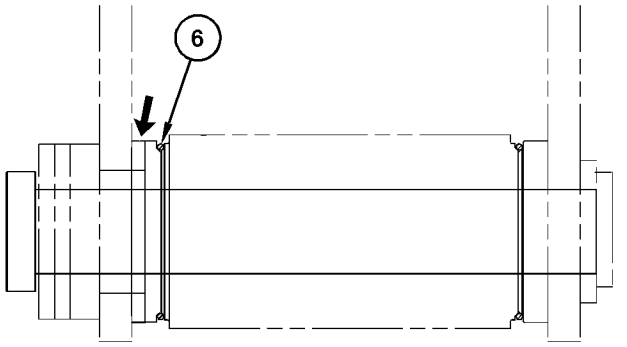


Illustration 226 g03822734

2. Slide O-ring seals (6) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

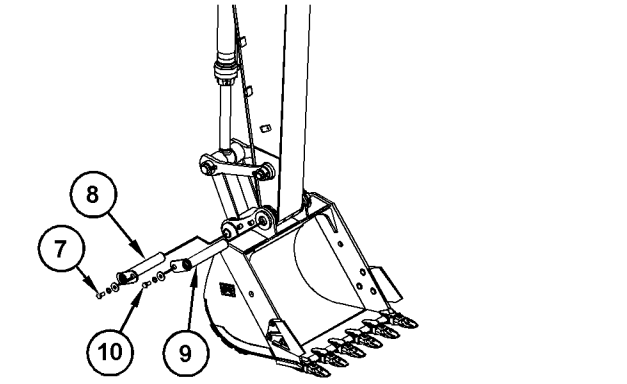


Illustration 227 g03822736

3. Remove bolt (7). Remove support pin (8).

4. Remove bolt (10). Remove support pin (9).

5. Start the engine and raise the stick out of the bucket.

6. Remove the O-ring seals (6) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

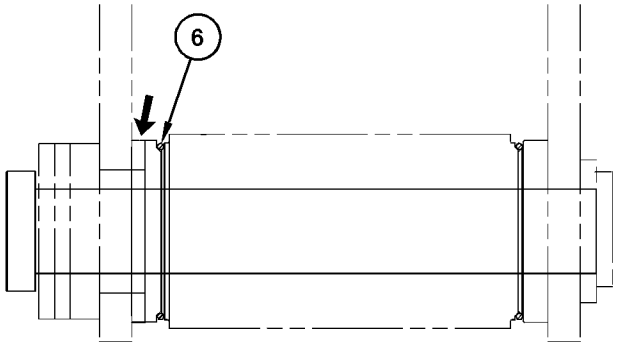


Illustration 228 g03822734

2. Position the O-ring seals (6) onto the flanges of the bucket.

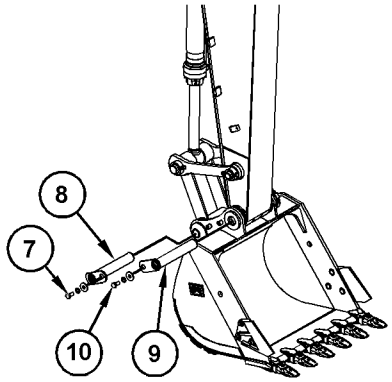


Illustration 229 g03822736

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

4. Install support pin (9) into the pin bore.

5. Install bolt (10).

6. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

7. Slide O-ring seals (6) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Install support pin (8) into the pin bore.

10. Install Bolt (7).

11. Slide the O-ring seals (6) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

Crossbolt

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

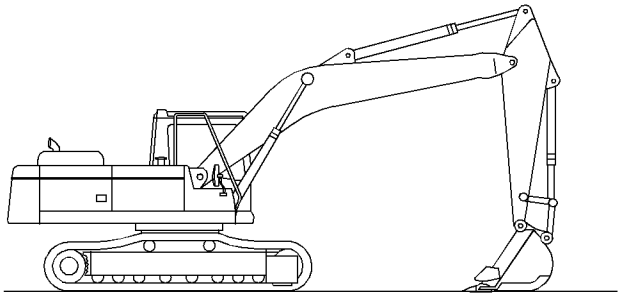


Illustration 230 g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

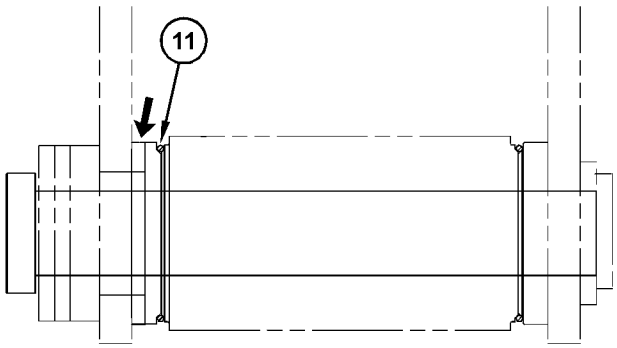


Illustration 231 g03822738

2. Slide O-ring seals (11) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

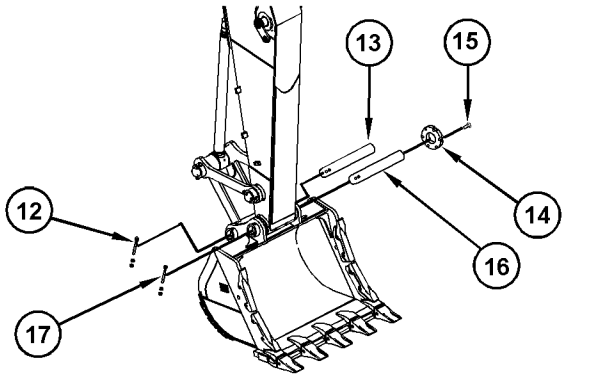


Illustration 232 g03822739

3. Remove nuts and retaining bolt (12) from support pin (13). Remove support pin (13).

4. Remove bolts (15) and adapter plate (14). Remove the shims.

5. Remove nuts and retaining bolt (17) from support pin (16). Remove support pin (16).

6. Start the engine and raise the stick out of the bucket.

7. Remove the O-ring seals (11) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

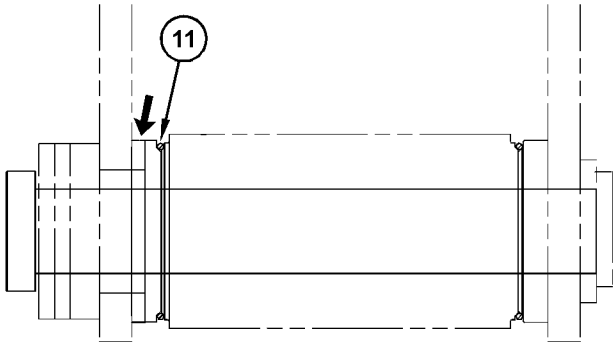


Illustration 233 g03822738

2. Position the O-ring seals (11) onto the flanges of the bucket.

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

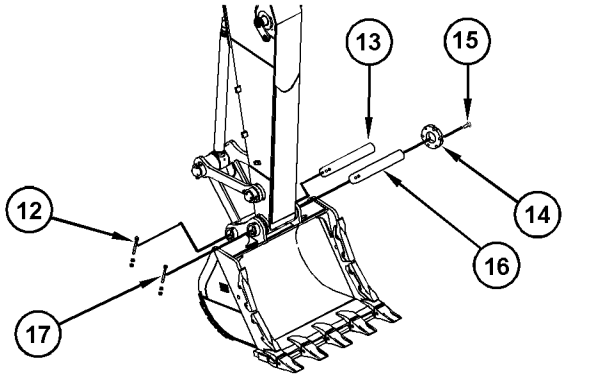


Illustration 234 g03822739

4. Install support pin (16). Put the retaining bolt hole that is in support pin (16) in alignment with the retaining bolt hole that is in the bucket.

5. Install the retaining bolt and nuts (17). Install adapter plate (14) without the shims, and without bolts (15) that hold adapter plate (14).

6. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

7. Slide O-ring seals (11) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Install support pin (13). Put the retaining bolt hole that is in the bucket pin in alignment with the retaining bolt hole that is in the bucket.

10. Install the retaining bolt and nuts (12).

11. Slide the O-ring seals (11) over the pin joints between the bucket and the link assembly.

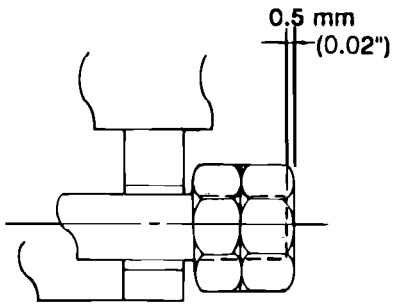


Illustration 235 g00510030

12. Tighten retaining nuts (12) and (17). Position the outside nut even with the end of the retaining bolt or 0.5 mm (0.02 inch) beyond the end of the retaining bolt. Tighten the inside nut against the outside nut.

13. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

i03548680

Hammer Operation
(If Equipped)

SMCS Code: 5705-WTL

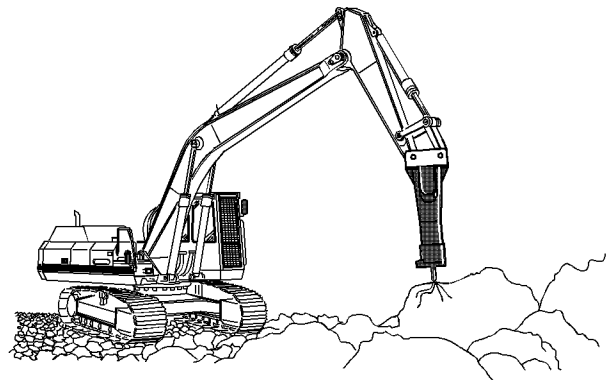


Illustration 236 g01876560

NOTICE
Use only a hydraulic hammer that is recommended byCaterpillar. The use of a hydraulic hammer that is not recommended by Caterpillar could damage your machine. Consult your Caterpillar dealer for information on recommended hydraulic hammers.

Only use the hydraulic hammer to break rocks, concrete, and other hard objects. Before you start hydraulic hammer operation, place the machine on a level, stable surface.

Before you start hydraulic hammer operation, close the front window. Caterpillar recommends the installation of a window guard on the front window for protection from flying debris.

NOTICE
In order to avoid structural damage to the host machine or the hydraulic hammer, comply with the following:

Do not attempt to break rocks or concrete by burying the hammer tool completely into the rocks or concrete.

Do not apply a prying force to the hammer tool in order to remove the hammer tool from the material.

Do not allow the hydraulic hammer to continuously operate at one location and for more than 15 seconds. Change the location of the hydraulic hammer and repeat the procedure. Failure to change the location of the hydraulic hammer could cause the hydraulic oil to overheat. Overheated hydraulic oil could cause damage to the accumulator.

Stop the hydraulic hammer immediately if the jumper lines are pulsating violently. This indicates that the accumulator nitrogen charge is lost. Consult your Caterpillar dealer for the necessary repair.

NOTICE
Do not use the dropping force of the hydraulic hammer to break rocks or other hard objects. This could cause structural damage to the machine.

Do not use the sides or back of the hydraulic hammer to move rocks or other hard objects. Doing this could cause damage not only to the hammer but to stick or boom cylinder.

Do not operate the hydraulic hammer with any of the cylinders fully retracted or extended. Doing this could cause structural damage to the machine, resulting in reduced machine life.

Do not use the hydraulic hammer to lift an object.

Do not operate the hydraulic hammer while the stick is vertical to the ground. This could allow the stick cylinder to vibrate excessively.

Operate the attachment control levers carefully in order to keep the hydraulic hammer's tool from hitting the boom.

Do not operate the hydraulic hammer under water unless the hydraulic hammer is properly equipped. Operating the hydraulic hammer under water could cause serious damage to the machine hydraulic system. Consult your Caterpillar dealer for information on underwater operation.

Do not operate the hydraulic hammer with the upper structure sideways to the undercarriage. Before you start hydraulic hammer operation, place the upper structure in the recommended positions that are shown in illustration 237 . Any other operating positions could make the machine unstable. Any other operating positions could place excessive loads on the undercarriage.

Refer to the following for any additional questions about the operation and care of your Caterpillar hydraulic hammer: Operation and Maintenance Manual, SEBU7346, “Hydraulic Hammers”, Operation and Maintenance Manual, HEPU9000, “Hydraulic Hammers” and Decal, SMEU7397, “Hammer Operation/Maintenance”.

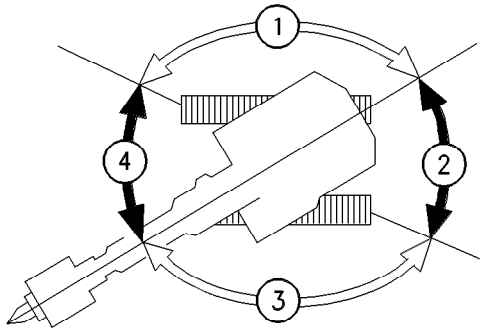


Illustration 237 g00101503

(1) Incorrect working position
(2) Correct working position
(3) Incorrect working position
(4) Correct working position

i03578566

Shear Operation
(If Equipped)

SMCS Code: 5705-WTL

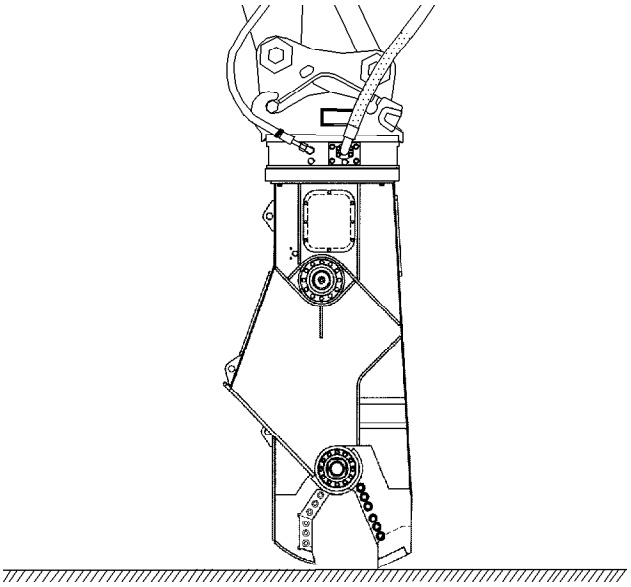


Illustration 238 g00763823

⚠ WARNING

Do not operate or work on this work tool unless you have read and understand the instructions and warnings in the Operation And Maintenance Manual for both the work tool and the host machine.

Failure to follow the instructions or heed the warnings could result in injury or death.

Contact your Caterpillar dealer for replacement manuals. Proper care is your responsibility.

NOTICE

Selection of a hydraulic shear must be done with extra care.

Use of a hydraulic shear not recommended by Caterpillar could result in structural damage to the machine.

Consult your Caterpillar dealer for hydraulic shear information.

Be sure that no one is near the work tool in order to prevent injury. Keep the work tool under control at all times in order to prevent injury. When a demolition tool is used, all personnel should maintain a minimum distance of 10 m (33 ft).

Close all windows. Make sure that all required guards are in place. Wear all required protective equipment. Follow the instructions in the Operation and Maintenance Manual for the work tool.

⚠ WARNING

Serious injury or death could occur from the demolition of pipes, vessels, tanks or other containers that may contain gas, flammable materials or hazardous chemicals.

Do not perform any demolition work on these items until all of their contents have been removed.

Follow all regulations for the removal and disposal of these materials.

NOTICE
Using the demolition tool to level the work site or push over standing structures may damage the machine or the demolition tool. Use appropriate equipment to do site preparation or maintenance operations.

NOTICE
To avoid structural damage to the machine, do not break road surfaces by placing the cutting edge of the hydraulic shear on the ground and moving the machine.

i00793291

Blade Operation
(If Equipped)

SMCS Code: 6060

NOTICE
Avoid hitting or moving rocks using the blade. Blade and cylinder damage could occur.

When using the blade as outrigger, be sure to support the machine with the edge of the blade against the ground. When curling the front attachment, do not allow the bucket to hit the blade.

During digging operation, do not allow the boom cylinder to contact the blade edge. When no blade operation is needed, operate with the bucket on the opposite side of the machine from the blade.

Do not swing the upper structure with cab door and/or upper structure covers opened. An opened door and/or cover can hit the blade when the blade is in the raised position while the machine is swinging.

Parking

i04176310

Stopping the Machine

SMCS Code: 7000

⚠ WARNING

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

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

Park on a level surface. If the machine must be parked on a grade, chock the tracks securely.

Note: The swing parking brake is automatically applied when the machine is stopped. The swing parking brake is released when the engine is running and the joystick is activated.

1. Turn the engine speed dial counterclockwise in order to reduce engine speed.

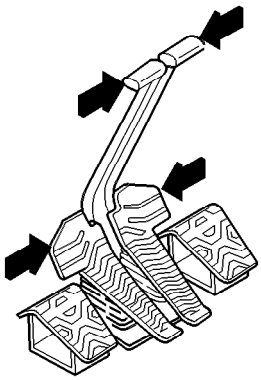


Illustration 239 g00560313

2. Release the travel levers/pedals in order to stop the machine.

3. Lower the work tool to the ground. Apply a slight downward pressure.

4. Move the hydraulic lockout control to the LOCKED position.

i01871055

Freezing Conditions

SMCS Code: 7000

If freezing temperatures are expected, remove the mud and the dirt from each track roller frame. Park the machine on wood planks. Use the following procedure to clean each track roller frame.

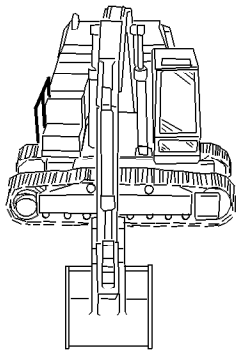


Illustration 240 g00101644

1. Position the boom over one side of the machine.

2. Use boom down pressure in order to lift the track on one side off the ground. Operate the track in the forward direction. Then operate the track in reverse. Continue this procedure until the maximum amount of material is thrown off the track.

3. Lower the track onto the wood planks.

4. Repeat the procedure for the other track.

5. Clean the area around the carrier rollers and around the track rollers.

6. Lower the work tool onto a wood plank in order to prevent the work tool from touching the ground.

i02718402

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 engine components.

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

1. Stop the machine and run the engine at low idle for five minutes.

NOTICE
Never turn the battery disconnect switch to the OFF position while the engine is running. Serious damage to the electrical system may result.

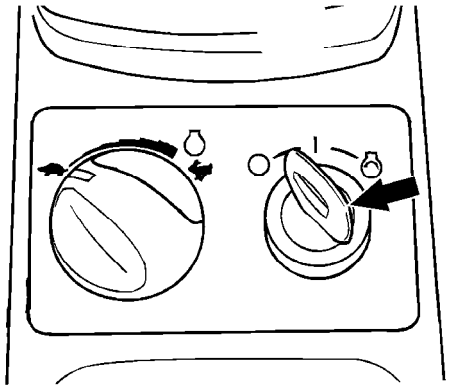


Illustration 241 g00683306

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

Engine Stop Control

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

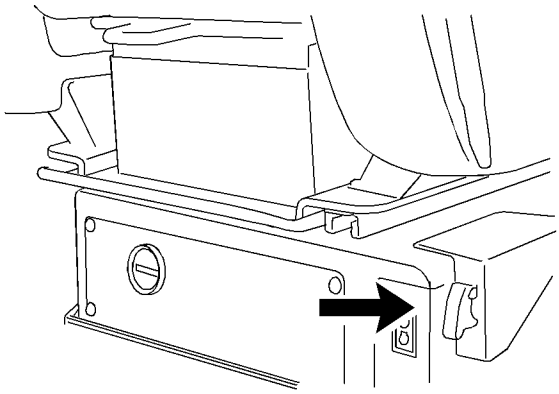


Illustration 242 g01364629

1. The switch is located below the left side of the operator seat.

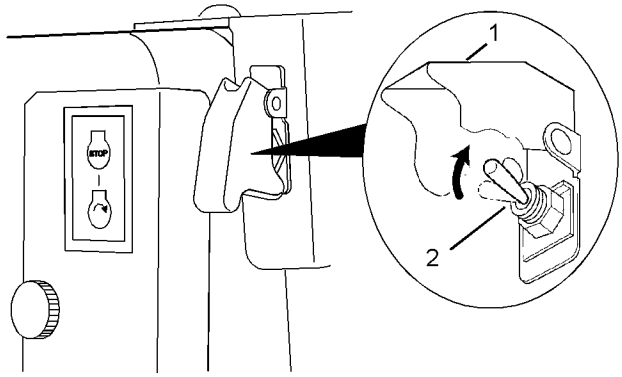


Illustration 243 g01364630

2. Lift cover (1).

3. Push switch (2) upward. This should stop the engine.

Note: Use the engine start switch to stop the engine first. Use the engine stop control as an alternate method to stop the engine.

4. Return the switch to the original position. The engine will be enabled to start.

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

5. Use the method that follows if the previous steps do not stop the engine.

Stop the Engine if an Electrical Malfunction Occurs

Turn the engine start switch to the OFF position. If the engine does not stop, perform the procedure that follows.

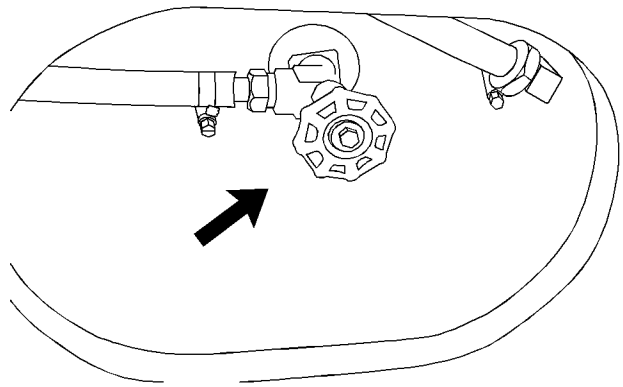


Illustration 244 g01364405

The fuel shutoff valve is located under the fuel tank.

Shut off the fuel supply by turning the fuel shutoff valve clockwise. The engine will stop after consuming the fuel in the fuel line. The engine may continue to run for a few minutes.

Repair the engine before you restart the engine. The fuel system may need to be primed. See Operation and Maintenance Manual, “Fuel System - Prime” for instructions.

i02706855

Leaving the Machine

SMCS Code: 7000

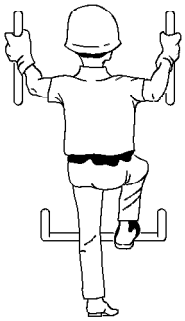


Illustration 245 g00037860

1. Use the steps and the handholds when you dismount. When you dismount, face the machine and use both hands.

2. Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire hazard.

3. Remove all flammable debris from the front bottom guard through the access doors in order to reduce a fire hazard. Discard the debris properly.

4. Turn the key for the battery disconnect switch to the OFF position. When the machine is left for an extended period of one month or longer, you should remove the key. This will help to prevent a battery short circuit. Removing the key will also help to protect the battery from vandalism and from the current draw that is made by certain components.

5. Lock all vandalism covers and all compartments.

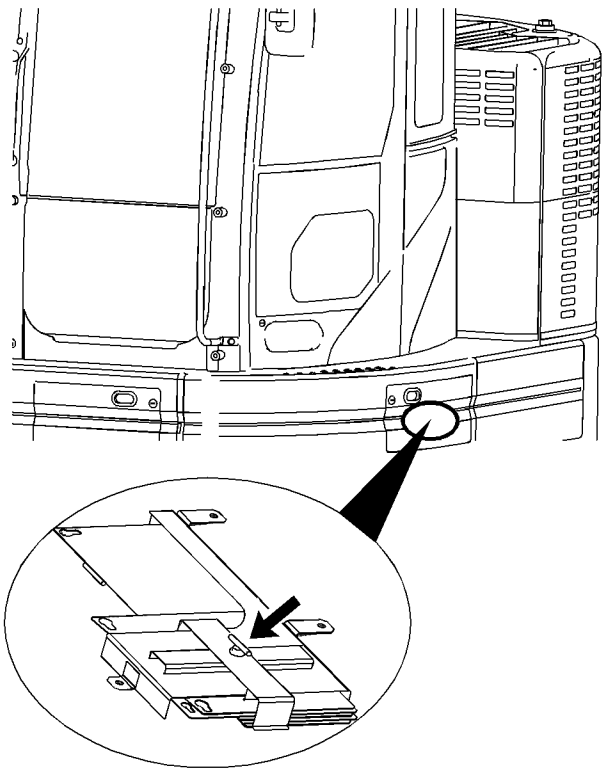


Illustration 246 g01357816

6. Open the door of the compartment that contains the vandalism guards. Remove the bolt that holds the vandalism guards in place. Remove the vandalism guards from the storage area.

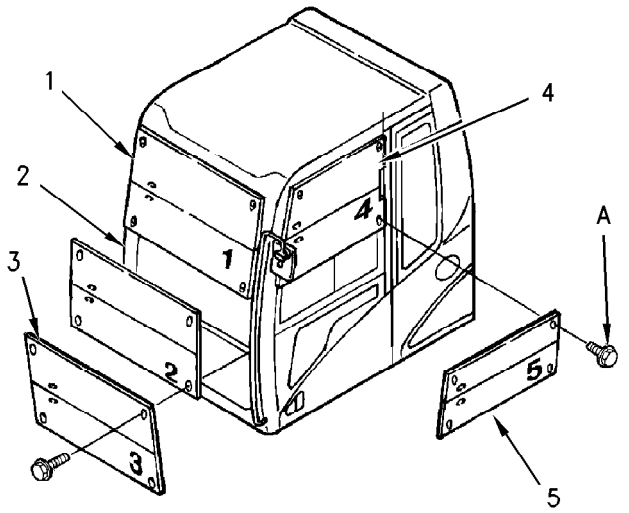


Illustration 247 g00683466

7. Install the vandalism guards on the front window and on the cab door. An identification number is stamped on each of the vandalism guards. Install the vandalism guards in the correct sequence. Use bolts (A) only for vandalism guard (3) and for vandalism guard (5).

Note: When you are storing the vandalism guards, make sure that you place the guards in the storage area in sequential order. The vandalism guards will only fit in the storage area in this manner.

Transportation Information

i07200040

Shipping the Machine

SMCS Code: 7000; 7500

⚠ WARNING

Automatic Engine Speed Control (AEC) will increase engine speed automatically when you operate the control levers and/or travel pedals with AEC switch on.

When loading and unloading the machine from the truck or working in close quarters always turn AEC switch off to prevent any possibility of sudden movement of machine, which could result in serious injury or death.

Set the travel speed control switch to LOW before loading the machine. Never operate this switch when loading the machine on a trailer.

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance for the machine.

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

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

Choose the flattest ground when you load the machine or when you unload the machine.

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

2. When you use loading ramps, make sure that the loading ramps have adequate length, adequate width, adequate strength, and an adequate slope.

3. Maintain the slope of the loading ramps within 15 degrees of the ground.

4. Position the machine so that the machine can drive straight up the loading ramps. The final drives should be toward the rear of the machine. Do not operate the control levers while the machine is on the loading ramps.

5. When you drive over the loading ramp joint areas, maintain the balance point of the machine.

6. Lower the work tool to the bed or to the floor of the transport machine.

7. To prevent rolling of the machine or sudden movement of the machine, perform the following items:

- Chock both tracks.
- Install sufficient tie-downs at several locations.
- Fasten wire cables.

NOTICE
Do not allow the chrome surface of the bucket cylinder rod to touch any part of the trailer. Damage to the rod can occur from impact with the trailer during transport.

Note: Refer to Operation and Maintenance Manual, “Specifications”.

Shipping a Machine that is not Completely Assembled

If the machine must be shipped when the boom, stick, or counterweight is not assembled on the machine, follow the instructions in Operation and Maintenance Manual, “Operation”.

⚠ WARNING

The ROPS structural certification depends on the support of the boom, stick, and counterweight in the event of a machine tip over or a machine rollover incident.

When the machine needs to be moved without the boom, stick, or counterweight being installed, avoid any machine operations which could affect machine stability as a machine tip over or a machine rollover incident could result in serious injury or death.

The machine should be operated slowly on flat, stable ground or pavement by qualified operators.

i04006155

Securing the Machine

SMCS Code: 7000

Comply with any laws that govern the characteristics of a load (length, width, height, and weight).

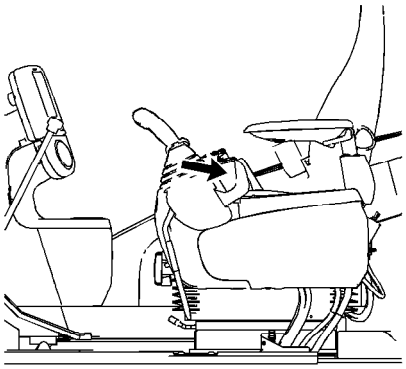


Illustration 248 g01075262

1. Move the hydraulic lockout control to the LOCKED position.

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

3. Turn the battery disconnect switch to OFF and remove the disconnect switch key.

4. Remove the ether starting aid cylinder. See Operation and Maintenance Manual, “Ether Starting Aid Cylinder - Replace” for the removal procedure.

5. Lock the door and the access covers. Attach any vandalism protection.

6. The Product Link antenna (if equipped) may be repositioned in order to meet the regulations regarding height of some locations. The Product Link antenna is located on top of the cab. Perform the following procedure in order to move the Product Link antenna to the transport position.

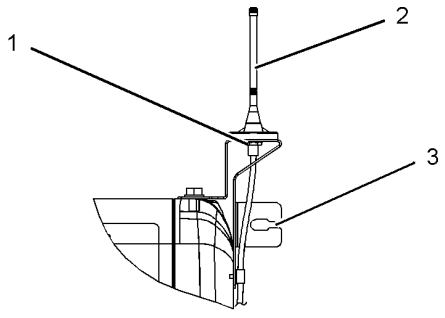


Illustration 249 g01438598

a. Loosen nut (1).

b. Remove antenna (2) and place the antenna in hole (3).

c. Tighten nut (1).

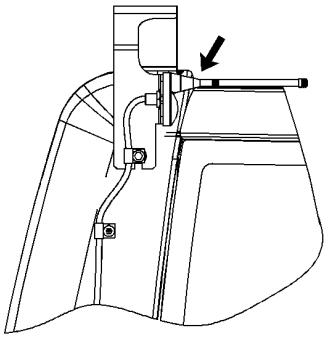


Illustration 250 g01438821

Antenna for Product Link in transport position

d. Return the antenna to the operational position before operating the machine.

7. The AccuGrade antenna (if equipped) must be repositioned for transport. The AccuGrade antenna is located on top of the cab. Perform the following procedure in order to move the AccuGrade antenna to the transport position.

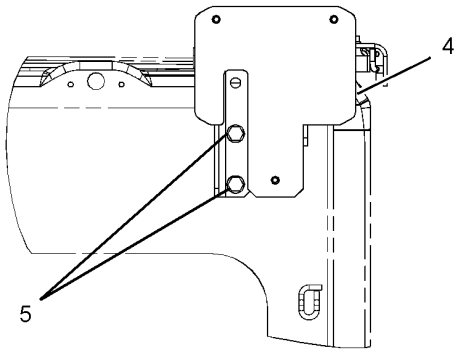


Illustration 251 g02177286

Bracket in position for operation

a. Remove bolts (5) from bracket (4).

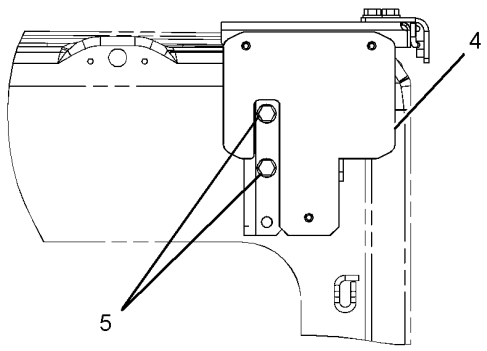


Illustration 252 g02177305

Bracket in position for transport

b. Reinstall bracket (4) with bolts (5) located in the top two holes of the bracket. Refer to Illustration 252 .

Note: The bracket for the AccuGrade antenna must be place back into the normal operating position before the machine can be placed back into service.

8. Cover the exhaust opening.

NOTICE
Do not allow the turbocharger to rotate while the engine is not operating. Damage to the turbocharger can result.

Note: Before you remove the excavator from the transport machine, remove the protective covering from the exhaust opening.

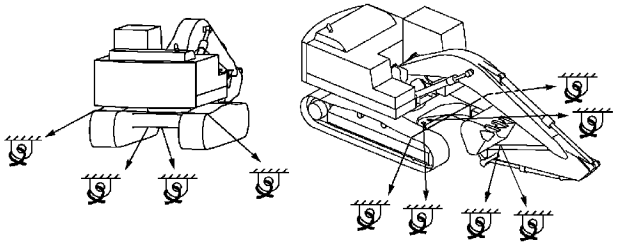


Illustration 253 g02180154

9. Chock the tracks and secure the machine with tie-downs. Make sure that you use the proper rated wire cable.

Use the front towing eyes and the rear towing eyes on the lower frame, and the rear towing eye on the upper frame.

Securely fasten all loose parts and all removed parts to the trailer or to the rail car.

When the engine is stopped, the swing parking brake is automatically applied. This action prevents the upper structure from swinging.

NOTICE
In freezing weather, protect the cooling system with antifreeze, to the lowest outside expected temperature on the travel route. Or, drain the cooling system completely.

i02843546

Mirror Installation

SMCS Code: 7319

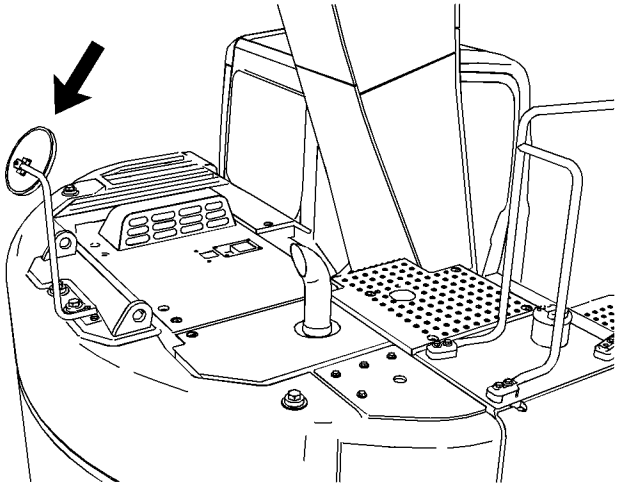


Illustration 254 g01366130

Typical example

The mirror is used to help the operator view the rear of the machine.

Install the mirror on the counterweight. Tighten the bolts until the mirror is secure. Do not overtighten the bolts.

Adjust the mirror before you operate the excavator. Use the step behind the counterweight in order to adjust the mirror. Maintain three points of contact with the step while you adjust the mirror.

i03999946

Lifting and Tying Down the Machine
(Spreader Bar)

SMCS Code: 7000; 7500

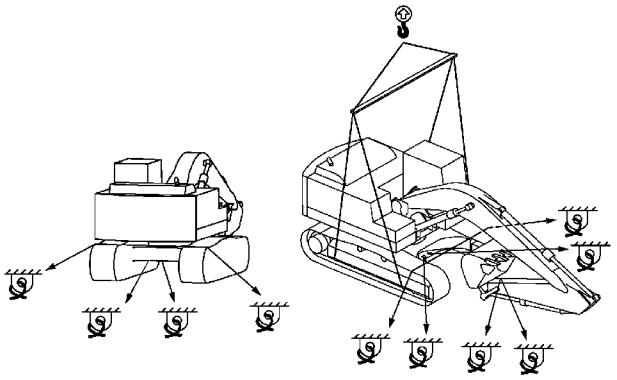


Illustration 255 g02176425

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

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.

Refer to the Operation and Maintenance Manual, “Specifications” for specific weight information.

1. Use correctly rated cables and slings for lifting. The crane should be positioned so that the machine is lifted parallel to the ground.

2. To prevent contact with the machine, lifting cables should have sufficient length.

3. The width of the spreader bar and the strength of the spreader bar should be sufficient to prevent contact with the machine.

When the wire cables are lifted, the wire cables should slide to front track rollers and to the rear track rollers.

4. Move the lever for the hydraulic lockout control to the LOCKED position.

Note: Never use the step when the machine is lifted.

Lifting the Machine Segments

Bucket

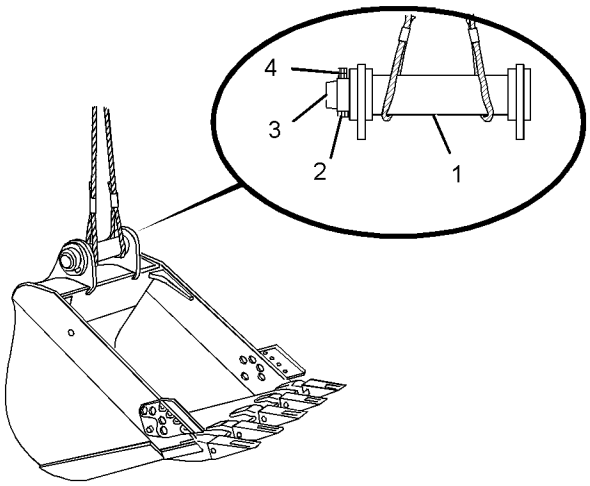


Illustration 256 g01577714

(1) Sleeve
(2) Bolts
(3) Pin
(4) Nuts

Install pin (3) and install sleeve (1) in the brackets of the bucket. The previous illustration indicates the method to secure pin (3) with bolts (2) and nuts (4). Fasten two proper rated wire cables to pin (3).

Towing Information

i05662590

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.

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 an operator to be on the machine that is being towed.

Before you tow the machine, make sure that the tow line or the tow bar is in good condition. Do not use a wire rope that is kinked, twisted, or damaged. 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 towed machine. This requirement is for a disabled machine that is stuck in the mud and for being towed on a grade.

Do not use a chain for pulling a disabled machine. A chain link can break. This may cause personal injury. Use a wire rope 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 rope starts to break. Stop pulling whenever the towing machine moves without moving the towed machine.

During towing, do not allow anyone to step between the towing and the towed machines.

Do not allow the wire rope to be straddled while the machine is being towed.

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

Avoid towing the machine on a slope.

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.

Prior to releasing the brake of the final drive, firmly lock both tracks in order to prevent the machine from moving suddenly. When the machine is ready to be towed, release the brake of the final drive. Refer to Operation and Maintenance Manual, “Final Drive Ring Gear Removal”.

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. Maximum towing machine capacity is required on an incline or on a surface that is in poor condition.

Do not tow a loaded machine.

Consult your Cat dealer for the equipment that is necessary for towing a disabled machine.

Retrieval and Towing of Machine

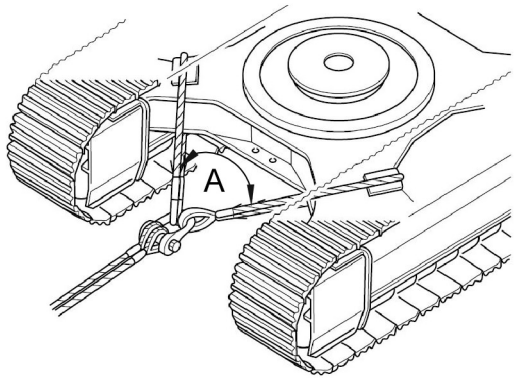


Illustration 257 g02533437

Note: Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. The permissible force for the lower frame is 100 percent of the gross weight of the towed machine.

Note: In order to prevent damage to the wire rope or the lower frame of the machines, use protective sleeves on the corners of the lower frame.

Retrieve the disabled machine carefully. The applied load for each wire rope should be equal. The angle (A) between each wire rope should be 60 degree maximum. Operate the machine at a low speed.

Lightweight Towing

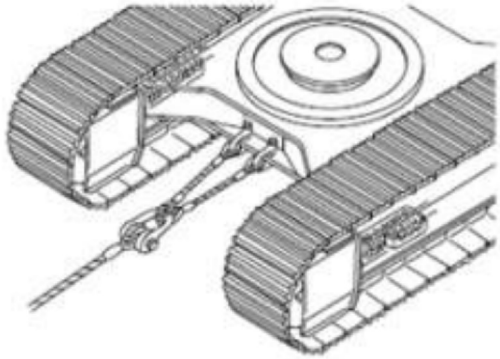


Illustration 258 g03589894

The maximum load for lightweight towing is 57000 N·m (42041 lb ft).

Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. Operate the machine at a low speed.

i06139738

Final Drive Ring Gear Removal

SMCS Code: 4050

⚠ WARNING

Without the ring gear in place, the brakes are ineffective. Personal injury or death could result. Provide other means to hold or stop the machine.

Table 109

Suggested Tools			
Item	Part Number	Description	Qty
A	128-5049	Guide Stud	2
B	1P-0074	Slide Hammer Puller Gp	1
	4C-5655	Adapter	1

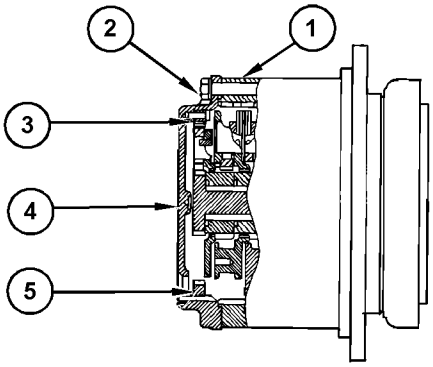


Illustration 259 g03822829

(1) Ring gear
(2) Cover bolts
(3) Bolts
(4) Final drive cover
(5) Ring gear

1. Thoroughly clean the area around the final drive. Make sure that you also clean the track shoes that are positioned above the final drive.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

2. Drain the final drive oil into a suitable container. See Operation and Maintenance Manual, “Final Drive Oil - Change” for the procedure.

3. Remove one track shoe in order to allow access to the face between final drive cover (4) and ring gear (1).

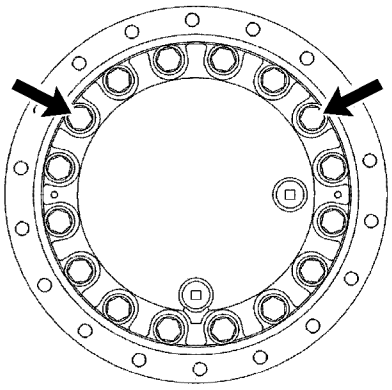


Illustration 260 g01846274

4. Remove two bolts (2). Attach Items (A). This is necessary in order to support ring gear (1) while you remove the final drive cover.

Note: If Item (A) is unavailable, you may use alignment dowels. Make sure that the alignment dowels are able to support the ring gear (1) while you remove the final drive cover.

5. Remove the remaining bolts (2) from the final drive cover.

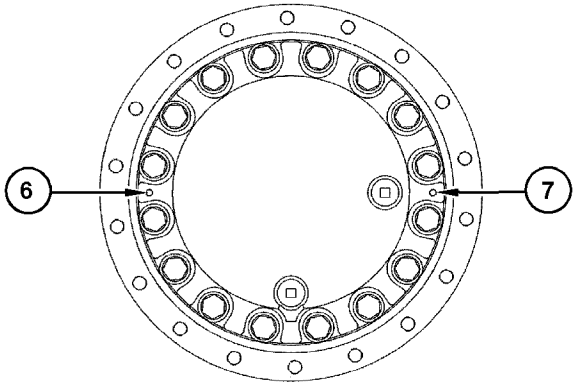


Illustration 261 g03822834

6. Install Item (B) into the final drive cover (1) at location (6) or (7). Use Item (B) in order to separate final drive cover (4) and ring gear (1). Make sure that ring gear (1) stays in place.

Note: If Item (B) is unavailable, you may use a hammer and a wedge in order to separate the final drive cover and the ring gear.

7. Remove twelve bolts (3) and ring gear (5) from final drive cover (4).

8. Apply Gasket Sealant to the mating surface of cover (4) and the housing.

9. Install final drive cover (4) and all cover bolts (2).

10. Fill the final drive with new oil. See Operation and Maintenance Manual, “Final Drive Oil - Change” for the procedure.

11. Repeat this procedure for the other final drive.

12. Refer to the Service Manual for information on the installation of the final drive ring gear.

Engine Starting (Alternate Methods)

i05974849

Engine Starting with Jump Start Cables
(If Equipped)

SMCS Code: 1000; 7000

⚠ WARNING

Failure to properly service the batteries may cause peronal injury.

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

Do not smoke when checking battery electrolyte levels.

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

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

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

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

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

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

NOTICE
To prevent damage to engine bearings and to electrical circuits when you jump-start a machine, do not allow the stalled machine to touch the machine that is used as the electrical source.

Turn on (close) the battery disconnect switch prior to the boost connection to prevent damage to electrical components on the stalled machine.

Use only equal voltage for starting. Check the battery and starter voltage rating of your machine. Use only the same voltage for jump starting. Use of a welder or higher voltage will damage the electrical system.

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.

Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for complete testing and charging information. This publication is available from your Cat dealer.

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

1. Lower the equipment to the ground. Move all controls to the HOLD position. Move the hydraulic lockout control to the LOCKED position.
2. Turn the start switch on the stalled machine to the OFF position. Turn off all accessories.
3. Turn the battery disconnect switch on the stalled machine to the ON position.
4. Move the machine that is being used as an electrical source near the stalled machine so that the jump-start cables reach the stalled machine. **Do not allow the machines to contact each other.**
5. Stop the engine of the machine that is being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.
6. Ensure that battery caps on both machines are tight and correctly placed. Ensure that batteries in the stalled machine are not frozen. Make sure that the batteries have enough electrolyte.

Note: The positive terminal of the 24 V system of the source and the negative terminal of the 24 V system of the source must be identified correctly before the jumper cables are connected. The positive terminal of the 24 V system of the discharged battery must be identified correctly before the jumper cables are connected.

7. The positive ends of the jump-start cable are red. Connect one positive end of the jump-start cable to the positive cable terminal of the discharged battery. Some machines have battery sets.

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

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

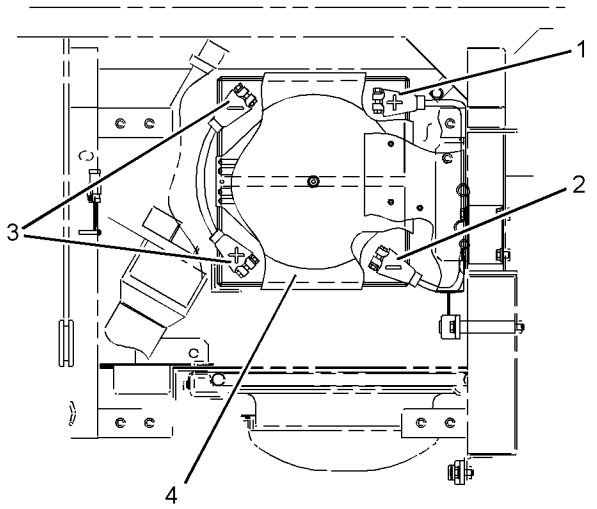


Illustration 262 g01226420

Typical example of the location of the batteries in an excavator

(1) Red positive post to starter
(2) The black negative post connects to the battery disconnect switch.
(3) Do not use these two connections for jump starting. The red positive post is connected in series to the black negative post.
(4) Cover

8. Connect the other positive end of the jump-start cable to the positive cable terminal of the electrical source.

9. Connect one negative end of the jump-start cable to the negative cable terminal of the electrical source.

10. Finally, connect the other negative end of the jump-start cable to the frame of the stalled machine. Do not connect the jump-start cable to the battery post. Do not allow the jump-start cables to contact the battery cables, the fuel lines, the hydraulic lines, or any moving parts.

11. Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.

12. Wait at least two minutes before you attempt to start the stalled machine. This will allow the batteries in the stalled machine to partially charge.

13. Attempt to start the stalled engine. See Operation and Maintenance Manual, “Engine Starting” for the correct starting procedure.

14. Immediately after you start the stalled engine, disconnect the jump-start cables in reverse order.

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Engine Starting with Auxiliary Start Receptacle
(If Equipped)

SMCS Code: 1000; 7000

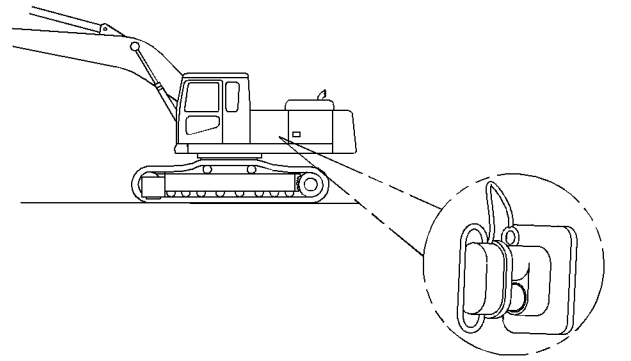

Illustration 263 g01122769

Typical location

Some Caterpillar products may be equipped with an auxiliary start receptacle as a standard part. If your machine is not equipped with an auxiliary start receptacle, the machine can be equipped with an auxiliary start receptacle from parts service. This will ensure that a permanent receptacle is always available to jump-start the machine.

There are two cable assemblies that can be used to jump-start the stalled machine. You can jump-start the stalled machine from another machine that is equipped with an auxiliary start receptacle or with an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

1. Determine the reason that the engine will not start.

Reference: Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for more information.

2. Ensure that the travel control levers on the stalled machine are in theCENTER position. Engage the hydraulic lockout control. Lower all work tools to the ground. Move all controls to HOLD.

3. Turn the engine start switch key on the stalled machine to the OFF position. Turn off all accessories.

4. Turn the battery disconnect switch on the stalled machine to ON.

5. Move the machine that is being used as a power source close to the stalled machine. The jump-start cables should reach the batteries on both machines. **DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.**

6. Stop the engine on the machine that is being used as a power source. If you use an auxiliary power source, turn off the charging system.

7. Connect the appropriate jump-start cable to the auxiliary start receptacle on the stalled machine.

8. Connect the other end of the jump-start cable to the auxiliary start receptacle of the machine that is being used as a power source.

9. Start the engine on the machine that is being used as a power source or energize the charging system on the auxiliary power source.

10. Wait for a minimum of 2 minutes while the batteries in the stalled machine partially charge.

11. Attempt to start the stalled engine.

12. Immediately after the stalled engine starts, disconnect the jump-start cable from the power source.

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

14. Conclude the failure analysis on the starting charging system of the stalled machine, as required. Check the machine while the engine is running and the charging system is in operation.

Maintenance Section

Maintenance Access

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Access Door and Cover Locations

SMCS Code: 726A-CH

Engine Access Cover

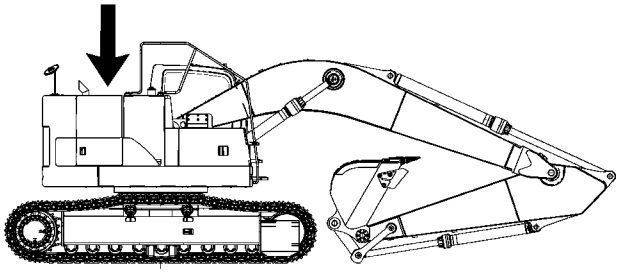

Illustration 264 g01365895

Left Access Door

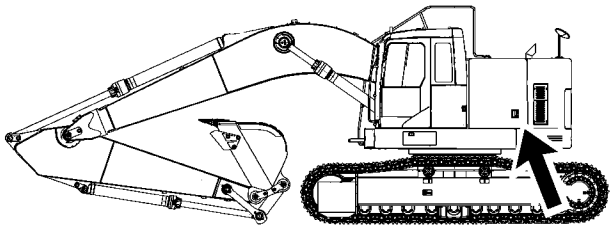

Illustration 265 g01365896

Right Access Door

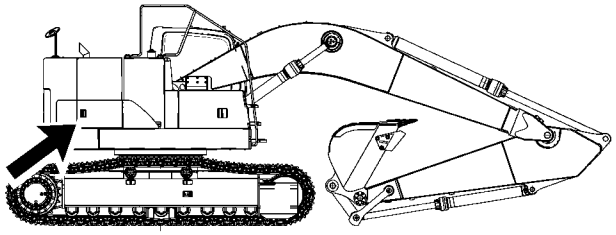

Illustration 266 g01365898

Lubricant Viscosities and Refill Capacities

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Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 7581

General Information for Lubricants

When you are operating the machine in temperatures below −20°C (−4°F), refer to Special Publication, SEBU5898, “Cold Weather Recommendations”. This publication is available from your Cat dealer.

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

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

Selecting the Viscosity

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

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

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

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

Engine Oil

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

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

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

Table 110

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Engine Crankcase	Cat DEO-ULS Cold Weather	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS SYN Cat DEO SYN	SAE 5W-40	−30	50	−22	122
	Cat DEO-ULS Cat DEO	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS Cat DEO	SAE 15W-40	−9.5	50	15	122
Pump Coupling (If Equipped)	Cat DEO-ULS Cat DEO	SAE 10W-30	−18	40	0	104

Note: API engine oil categories are backwards compatible. Cat DEO-ULS (API CK-4) oil can be used in all engines with some restrictions related to fuel sulfur level. Cat DEO (API CI-4/API CI-4 PLUS) can be used in engines that are Tier 3 emissions certified and prior, and in engines that do not use aftertreatment devices.

Hydraulic Systems

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

The following are the preferred oils for use in most Cat machine hydraulic systems:

- Cat HYDO Advanced 10 SAE 10W
- Cat HYDO Advanced 30 SAE 30W
- Cat BIO HYDO Advanced

Cat HYDO Advanced oils allow 6000 hours or higher oil drain intervals for most applications. S·O·S Services oil analysis is recommended when the oil drain interval is increased to 6000 hours or higher. In comparison, non-Cat commercial hydraulic oils (second choice oils) allow 2000 hours oil drain interval. Itis recommended to followthe maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. Consult your Cat dealer for details. When switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are listed below.

- Cat MTO
- Cat DEO
- Cat DEO-ULS
- Cat TDTO
- Cat TDTO Cold Weather
- Cat TDTO-TMS
- Cat DEO-ULS SYN
- Cat DEO SYN
- Cat DEO-ULS Cold Weather

Note: Oil drain intervals of the oils listed above are less than those of Cat HYDO Advanced oils. The oil drain interval of these oils is typically 2000 hours and up to a maximum of 4000 hours. An exception is Cat TDTO Cold Weather oil which allows 6000 hours or higher oil drain interval. S·O·S Services oil analysis is required when the oils listed above are used in Cat hydraulic system components and hydrostatic transmissions.

Table 111

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Hydraulic System	**Cat HYDO Advanced 10** Cat TDTO	SAE 10W	−20	40	−4	104
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	10	50	50	122
	Cat BIO HYDO Advanced	“ISO 46” Multi-Grade	−30	50	−22	122
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	−20	40	−4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	−15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−15	50	5	122
	Cat DEO-ULS SYN Cat DEO SYN	SAE 5W-40	−30	40	−22	104
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

Other Fluid Applications

Table 112

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosity Grade**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Final Drives and Swing Drives	**Cat TDTO Cat TDTO-TMS Cat TDTO SYN Cold Weather commercial TO-4**	SAE 0W-20	-40	0	-40	32
		SAE 0W-30	-40	10	-40	50
		SAE 5W-30	-30	10	-22	50
		SAE 10W	−30	0	-22	32
		SAE 30	−25	25	−13	77
		SAE 50	-15	50	5	122
		Cat TDTO-TMS	−30	25	-22	77
Track Roller Frame Recoil Spring and Pivot Shaft Bearings	**Cat TDTO Cat TDTO-TMS Cat TDTO SYN Cold Weather commercial TO-4**	SAE 0W-20	−40	0	−40	32
		SAE 0W-30	−40	10	−40	50
		SAE 5W-30	−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

(continued)

(Table 112, contd)

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
Track Idlers and Track Rollers	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

Table 113

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
Variable Pitch Flexxaire Fan (If Equipped)	Cat Full Synthetic Multigrade DEO commercial Full Synthetic Multigrade Diesel Engine Oil meeting either Cat ECF-1 or API CG-4	SAE 0W40(1)	-40	50	-40	122
		SAE 5W40(1)	-40	50	-40	122
	Caterpillar Non-Synthetic TO-4	SAE 30(2)	-15	25	-5	77
		SAE 50(2)	−10	50	14	122

(1) This is the first choice. Full synthetic oils are recommended. Synthetic oils may provide longer service life for the fan. Synthetic oils allow for increased service intervals over non-synthetic oils.
(2) This is the second choice. Caterpillar TDTO is acceptable. Commercial oils that meet the TO-4 specification are also acceptable.TDTO is non-synthetic. Commercial TO-4 oils are typically non-synthetic.

Special Lubricants

Grease

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

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

Table 114

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
External Lubrication Points	Cat Prime Application Grease	NLGI Grade 2	−20	140	−4	284
	Cat Extreme Application Grease	NLGI Grade 1	−20	140	−4	284
		NLGI Grade 2	−15	140	+5	284

(continued)

(Table 114, contd)

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
	Cat Extreme Application Grease-Artic	NLGI Grade 0.5	-50	130	-58	266
	Cat Extreme Application Grease-Desert	NLGI Grade 2	−10	140	+14	284
	Cat Utility Grease	NLGI Grade 2	−20	140	−4	284
	Cat Ball Bearing Grease	NLGI Grade 2	−20	160	−4	320

Grease for the Autolube System (if Equipped)

The grease used with the automatic lubrication system must not contain any graphite or PTFE.

Note: Pumpability is based on “US Steel Mobility and Lincoln Ventmeter Tests”. Performance may vary depending on lubrication equipment and the length of the lines.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for additional information about grease. This manual may be found on the web at Safety.Cat.com.

Table 115

Recommended Grease for the Autolube System						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
Cat Autolube System	Cat Extreme Application Grease	NLGI Grade 1	−35	40	-31	104
		NLGI Grade 2	−30	50	-22	122

Diesel Fuel Recommendations

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

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

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

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

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

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, 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. To use any of these oils or fats as fuel, the oils or fats are chemically processed (esterified). The water and contaminants are removed.

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

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

When biodiesel fuel is used, certain guidelines must be followed. Biodiesel fuel can influence the engine oil, aftertreatment devices, non-metallic, fuel system components, and others. Biodiesel fuel has limited storage life and has limited oxidation stability. Follow the guidelines and requirements for engines that are seasonally operated and for standby power generation engines.

To reduce the risks associated with the use of biodiesel, the final biodiesel blend and the biodiesel fuel used must meet specific blending requirements.

Capacities (Refill)

SMCS Code: 1000; 7000

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.

i02237331

Table 116

Approximate Refill Capacities				
Component or System	**Liters**	**US gal**	**Imp gal**	**Recommended Type**
Cooling System	32	8.5	7	Caterpillar Extended Life Coolant (ELC)
Coolant Reservoir	1.5	0.4	0.3	
Fuel Tank	330	87	72.6	No. 1 Diesel Fuel or No. 2 Diesel Fuel
Engine Crankcase with Filter	30	8	6.6	Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
Hydraulic System(1)	154	40.7	33.9	
Swing Drive	8	2.1	1.8	
Each Final Drive	10	2.6	2.2	
Swing Gear	21.6	5.7	4.8	

(1) The amount of hydraulic fluid that is needed to refill the hydraulic system after performing Operation and Maintenance Manual, “Hydraulic System Oil - Change”

i07445339

S·O·S Information

SMCS Code: 1000; 1348; 3080; 4050; 5050; 7000; 7542-008

S·O·S Services is a highly recommended process for Cat customers to use in order to minimize owning and operating cost. Customers provide oil samples, coolant samples, and other machine information. The dealer uses the data in order to provide the customer with recommendations for management of the equipment. In addition, S·O·S Services can help determine the cause of an existing product problem.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluid Recommendations” for detailed information concerning S·O·S Services.

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

Refer to the Operation and Maintenance Manual, “Maintenance Interval Schedule” for a specific sampling location and a service hour maintenance interval.

Consult your Cat dealer for complete information and assistance in establishing an S·O·S program for your equipment.

Maintenance Support

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System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

⚠ WARNING

Personal injury or death can result from sudden machine movement.

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

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

Coolant System

⚠ WARNING

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

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

Hydraulic System

The release of hydraulic pressure in a hydraulic circuit is required before service is performed to that hydraulic circuit. Release the pressure in the following hydraulic circuits before any service associated with that hydraulic circuit is performed.

- Boom hydraulic circuit
- Stick hydraulic circuit
- Bucket hydraulic circuit
- Swing hydraulic circuit
- Travel hydraulic circuit
- Attachment hydraulic circuits (if equipped)
- Pilot hydraulic circuit
- Return hydraulic circuit

Note: Refer to the Disassembly and Assembly Manual for additional information concerning service of the components of specific hydraulic circuits.

Release of Hydraulic Pressure from the Main Hydraulic System

⚠ WARNING

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

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

Make sure all of the work tools have been lowered to the ground, and the oil is cool before performing any service. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

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

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

Perform the following steps to release the hydraulic system pressure from the main hydraulic system. For information on any fluids and capacities, refer to this Operation and Maintenance Manual, "Lubricant Viscosities" and "Capacities (Refill)" for more information.

Note: For additional safety, wrap hydraulic joint with material that could absorb/reduce any residual pressure of oil when released. Loosen the joint slowly, pause, and carefully check hydraulic joint for tensions indicating presence of pressure or spring force in lines or components.

1. Position the machine on level ground.

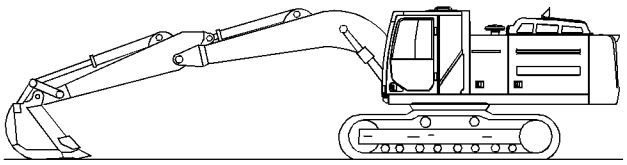

Illustration 267 g02137969

2. Fully retract the stick cylinder rod. Adjust the position of the linkage so that the work tool is parallel to the ground. Lower the boom until the work tool is flat on the ground. Refer to Illustration 267 .

3. Release the system pressure from the implement and swing hydraulic circuits.

a. Shut off the engine.

Note: Perform Step 3b through Step 3d immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

b. Turn the engine start switch to the ON position without starting the engine.

c. Place the hydraulic activation control lever in the UNLOCKED position.

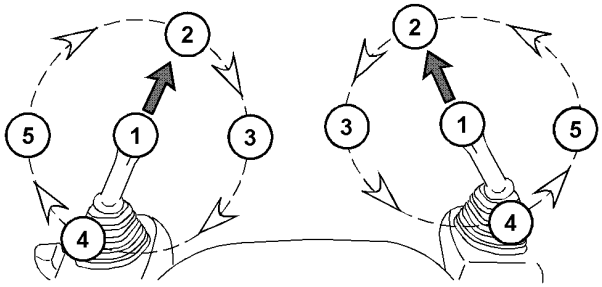

Illustration 268 g03315377

d. Move both joysticks in a circular motion to the FULL STROKE positions multiple times until the pilot accumulator has been exhausted.

Note: Pilot pressure is required to relieve hydraulic system pressure.

e. Place the hydraulic activation control lever in the LOCKED position.

f. Start the engine to recharge pilot accumulator.

Note: Do not activate any levers when recharging pilot accumulator.

g. Shut off the engine.

h. Repeat Step 3b through Step 3g until the high-pressure lines have been released.

Each time the accumulator is recharged, start the joysticks at different positions or rotate in the reverse direction. Doing so will ensure that the same circuit is not being relieved each time.

Note: To release pressure in a single circuit, move the joysticks or pedals of the hydraulic circuit that requires service to the full stroke positions after moving joysticks in a circular motion. Moving the joysticks or pedals to the full stroke position will release the high pressure only in that single hydraulic circuit. Moving the joysticks or pedals to the full stroke position will also release any pressure that might be present in the pilot hydraulic circuit.

4. Release hydraulic system pressure in the attachment circuits, if equipped.

a. Start the engine to charge pilot accumulator.

b. Shut off the engine.

Note: Perform Step 4c through Step 4e immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

c. Turn the engine start switch to the ON position without starting the engine.

d. Place the hydraulic activation control lever in the UNLOCKED position.

e. Activate the switch or pedal for the attachment circuit.

f. Place the hydraulic activation control lever in the LOCKED position.

g. Start the engine to recharge pilot accumulator.

Note: Do not activate any pedals or switches when recharging pilot accumulator.

h. Shut off the engine.

i. Repeat Step 4a through Step 4h for each attachment circuit.

5. After releasing the hydraulic pressure in each of the desired hydraulic circuits, place the hydraulic activation control lever in the LOCKED position.

6. Turn the engine start switch to the OFF position.

7. Slowly loosen the filler plug on the hydraulic tank and release the pressure from the hydraulic tank. Leave the filler plug loose for a minimum of 45 seconds. This will release the pressure that may be present in the return hydraulic circuit.

8. Tighten the filler plug on the hydraulic tank to the specified torque.

Note: The travel hydraulic circuit is open to the hydraulic tank. Pressure from the travel circuit is released by releasing pressure from the return circuit.

9. Release the pressure that may be present in the boom circuit to remove the risk of residual pressure in the line. Make sure that the engine start switch is in the OFF position and the pressure in the hydraulic tank has been released.

For machines equipped with a boom lowering control valve, there is a manual valve located near the base of the boom or a valve on the load control valve on the boom cylinder. Refer to Operation and Maintenance Manual, Equipment Lowering with Engine StoppedMachine with a Boom Lowering Control Valve for more information.

For machines **NOT** equipped with a boom lowering control valve, refer to Operation and Maintenance Manual, Equipment Lowering with Engine StoppedMachine without a Boom Lowering Control Valve for more information.

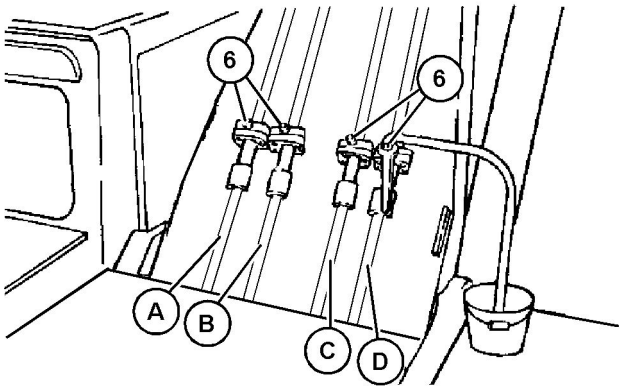

Illustration 269 g06234927

Stick and Bucket circuit locations

(6) Purge Screws (If Equipped)
(A) Circuit A
(B) Circuit B
(C) Circuit C
(D) Circuit D

10. If the purge screws are equipped, perform the following pressure release procedure for each Stick and Bucket circuit. Refer to Illustration 269 and Table 117 for the stick and bucket circuit locations.

Table 117

Stick and Bucket Circuit Locations				
Sales Model	**Circuits**			
	A	**B**	**C**	**D**
326 / 329 / 330	Stick In	None	Stick Out	None
336 / 340	Bucket Close	Stick In	Stick Out	Bucket Open
349 / 352	Stick Out	Stick In	Bucket Close	Bucket Open

a. Connect one end of a drain hose to purge screw (6). Insert the other end of the drain hose into an empty container.

b. Loosen purge screw (6) by 1/2 turn. Hydraulic oil will be drained from the drain hose to the container.

Note: Dispose of drained fluid according to local regulations.

c. Tighten purge screw (6) to a torque of 13 +/- 2 Nm (9 +/- 1 lb ft) after all the hydraulic oil has been drained from the line.

d. Repeat Steps 10a through 10c for all circuits.

e. Remove the drain hose and install hydraulic tank fill cap.

11. The pressure in the multiple hydraulic circuits that require service is now released and lines and components can be disconnected or removed from those hydraulic circuits.

i07539955

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

2. If equipped, turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

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

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure in order to reduce the possibility of damage to the following components:

- Bearings of the drive train
- Hydraulic components
- Electrical components
- Other components of the machine

4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.

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

i07700566

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, 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 hydraulic oil is used, the hydraulic oil change interval is 6000 service hours. S·O·S services after 3000 service hours is strongly recommended.

If Cat HYDO Advanced hydraulic oil is not used, the normal interval of 6000 hours is decreased to 2000 service hours or 1 year.

Consult your Cat dealer for details.

When Required

Every 10 Service Hours or Daily for First 100 Hours

Every 10 Service Hours or Daily

Every 10 Service Hours or Daily for Machines Used in Severe Applications

Every 100 Service Hours or 2 Weeks

Every 100 Service Hours or 2 Weeks for Machines Used in Severe Applications

Every 100 Service Hours of Continuous Hammer Use

Initial 250 Service Hours

Every 250 Service Hours

Every 250 Service Hours for Machines Used in Severe Applications

Every 250 Service Hours or Monthly

Every 250 Service Hours of Partial Hammer Use (50% of Service Hours)

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

Every 500 Service Hours

Every 500 Service Hours or 3 Months

Every 600 Service Hours of Continuous Hammer Use

Every 1000 Service Hours or 6 Months

Every 1000 Service Hours of Partial Hammer Use (50% of Service Hours)

Every 2000 Service Hours or 1 Year

Every Year

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

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i04006052

Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/ Replace

SMCS Code: 1054-040-A/C; 1054-510-A/C

NOTICE
An air recirculation filter element plugged with dust will result in decreased performance and service life to the air conditioner or cab heater.

To prevent decreased performance, clean the filter element, as required.

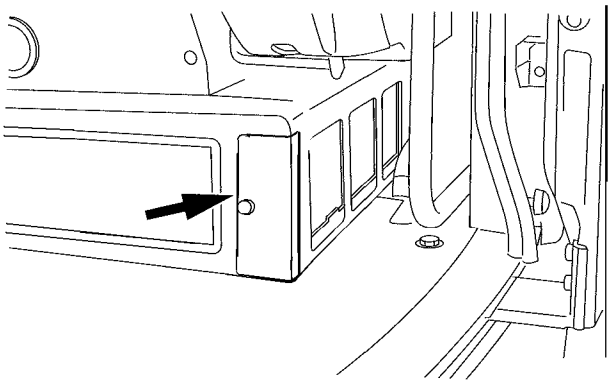

Illustration 270 g01352626

The recirculation filter is on the left side of the operator seat.

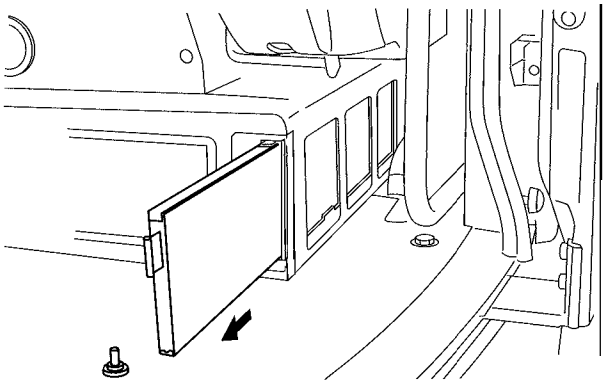

Illustration 271 g01352627

1. To remove the filter element, remove the cover screw and the filter cover.
2. To remove the filter, pull the filter away from the operator seat.
3. Refer to Operation and Maintenance Manual, “General Hazard Information” before using pressure air to clean the air filter element.
4. Clean the filter element with a maximum of 200 kPa (30 psi) pressure air.
5. After you clean the filter element, inspect the filter element. If the filter element is damaged or badly contaminated, use a new filter element. Make sure that the filter element is dry.

NOTICE
Failure to reinstall the filter element for the air conditioning system will contaminate and damage the system components.

i00934864

Battery - Clean

SMCS Code: 1401-070

Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the terminal post with petroleum jelly.

i06543763

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

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

i00934872

Battery Hold-Down - Tighten

SMCS Code: 7257

Tighten the hold-downs for the battery in order to prevent the batteries from moving during machine operation.

i04064489

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-510; 1401; 1401-561; 1401-040; 1402-040; 1402-510

⚠ WARNING

Personal injury can result from battery fumes or explosion.

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 all of the switches to the OFF position. Turn the engine start switch key to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.
3. Disconnect the negative battery cable at the battery.
4. Disconnect the positive battery cable at the battery.
5. Disconnect the battery cables at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.
6. Make necessary repairs or replace the battery.
7. Connect the battery cable at the battery disconnect switch.
8. Connect the positive battery cable of the battery.
9. Connect the negative battery cable of the battery.
10. Install the key and turn the battery disconnect switch to the ON position.

i07161672

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-040; 1357-025; 1357-510; 1397-040; 1397-510; 1397-025

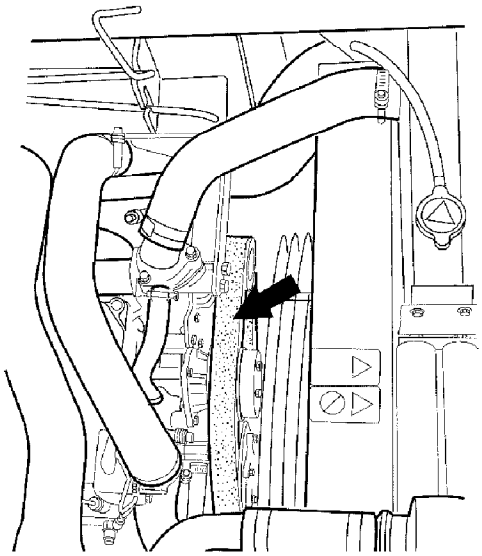

Illustration 272 g00937676

Your engine is equipped with a water pump, with a fan drive, and with an alternator. Your engine can also be equipped with an air conditioner belt. For maximum engine performance and maximum utilization of your engine, inspect the belts for wear and for cracking. Check the belt tension. Adjust the belt tension in order to minimize belt slippage. Belt slippage will decrease the belt life. Belt slippage will also cause poor performance of the alternator and of any driven equipment.

If new belts are installed, recheck the belt adjustment after 30 minutes of operation. If two belts or more are required for an application, replace the belts in belt sets. If only one belt of a matched set is replaced, the new belt will carry more load. This is due to the fact that the older belts are stretched. The additional load on the new belt could cause the new belt to break.

Water Pump Belt, Fan Drive Belt, and Alternator Belt

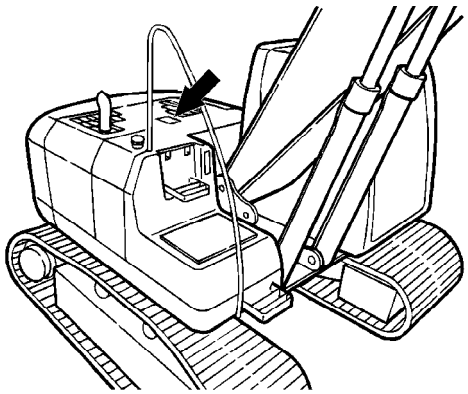

Illustration 273 g00686313

1. Open the engine hood.

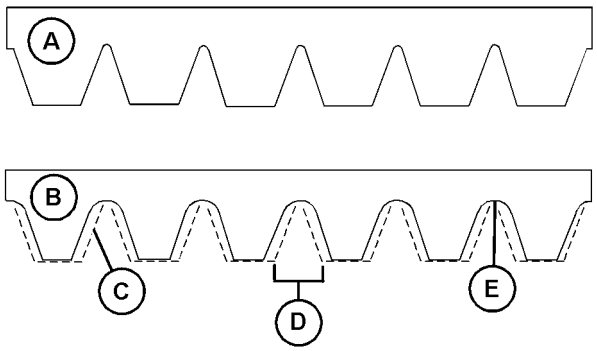

Illustration 274 g06114636

(A) New belt
(B) Worn belt

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

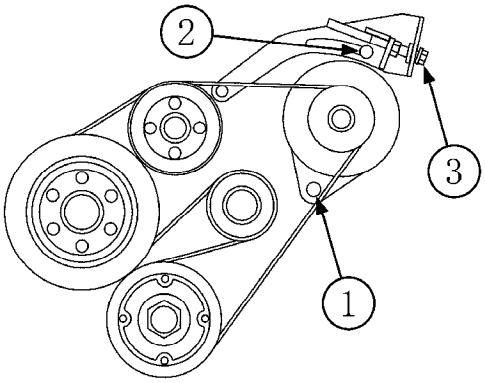

Illustration 275 g00937677

3. Apply approximately 98 N (22 lb) force midway between the pulleys.

4. Measure the deflection of the belt. The belt should deflect 10 to 12 mm (0.4 to 0.5 inch).

5. If the deflection is not correct, loosen alternator mounting bolt (1) and bracket bolt (2). Turn adjusting bolt (3) in order to adjust the belt tension.

6. When the adjustment is correct, tighten bolt (1) and bolt (2).

7. Check the deflection of the belt again.

8. If a new belt is installed, run the engine at rated speed for thirty minutes. Check the belt adjustment. Readjust the belt, if necessary.

Air Conditioner Belt (If Equipped)

NOTICE
The V-belt must be tensioned correctly. Failure to tension the belt properly could cause damage to the belt and/or to the air conditioner compressor.

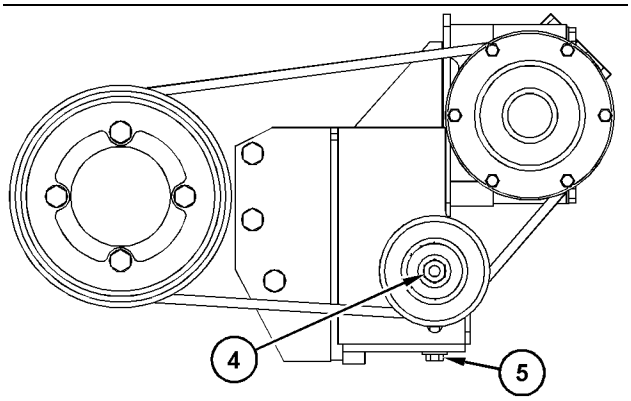

Illustration 276 g01162234

(4) Nut
(5) Adjusting Bolt

1. Apply approximately 100 N (22 lb) force midway between the pulleys.

2. Measure the deflection of the belt. The belt should deflect 7 to 10 mm (0.3 to 0.4 inch).

3. If the deflection is not correct, loosen nut (4). Turn adjusting bolt (5) in order to adjust the belt tension.

4. When the adjustment is correct, tighten nut (4) to a torque of 38 ± 7 N·m (28 ± 5 lb ft).

5. Check the deflection again.

Note: If a new belt is installed, check the belt adjustment again after 30 minutes of engine operation at the rated engine speed.

6. Close the engine hood.

i01862795

Blade Cutting Edges - Inspect/ Replace
(If Equipped)

SMCS Code: 6801

⚠ WARNING

Personal injury or death can result from a falling blade.

Block the blade before changing the cutting edges and the end bits.

Check the cutting edge of the blade and the end bits of the blade for wear. If any of the parts have signs of unusual wear or damage, replace the part.

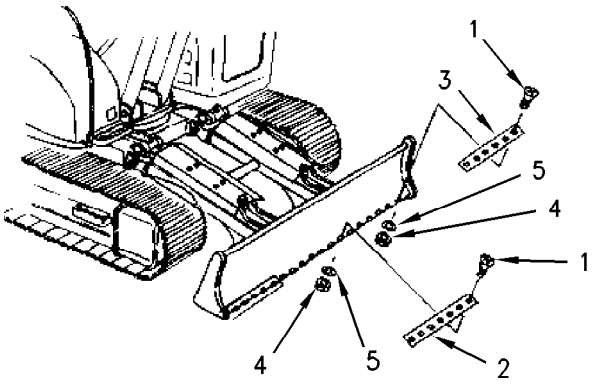

Illustration 277 g00904210

(1) Bolt
(2) Cutting edge
(3) End bit
(4) Nut
(5) Washer

1. Raise the blade and place blocking underneath the blade.

2. Lower the blade onto the blocking.

3. Remove bolts (1), washers (4) and nuts (5).

4. Remove cutting edge (2) and end bits (3).

5. Clean the surface between the cutting edge and the end bits.

6. Turn the cutting edge and/or the end bits upside-down if those edges are not worn.

7. If both sides of the cutting edge and the end bits are worn, replace the parts with new parts.

8. Install the new parts or the rotated parts with bolts (1). Tighten the bolts to a torque of 270 ± 40 N·m (200 ± 30 lb ft).

9. Raise the blade and remove the blocking.

10. Lower the blade to the ground.

11. After a few hours of operation, tighten bolts (1) to the torque that is specified in Step 8.

i02055565

Blade Linkage - Lubricate

SMCS Code: 6060-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the blade linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Wipe all fittings before you apply lubricant.

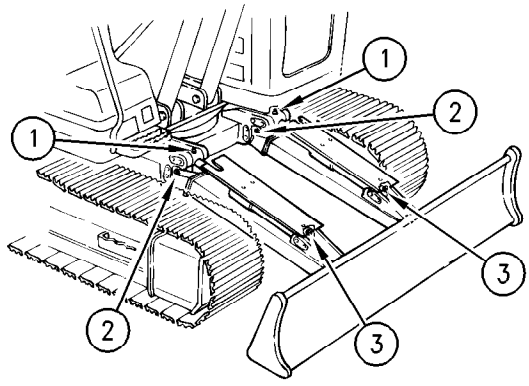

Illustration 278 g00759018

1. Apply lubricant through fittings (1). These fittings are located on the rod end of the blade cylinder.

2. Apply lubricant through fittings (2). These fittings are located on the bar that supports the blade.

3. Apply lubricant through fittings (3). These fittings are located on the head end of the blade cylinder.

i01933858

Boom and Stick Linkage - Lubricate

SMCS Code: 6501-086; 6502-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom, stick and bucket control linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Apply lubricant through all fittings after operation under water.

Wipe all fittings before you apply lubricant.

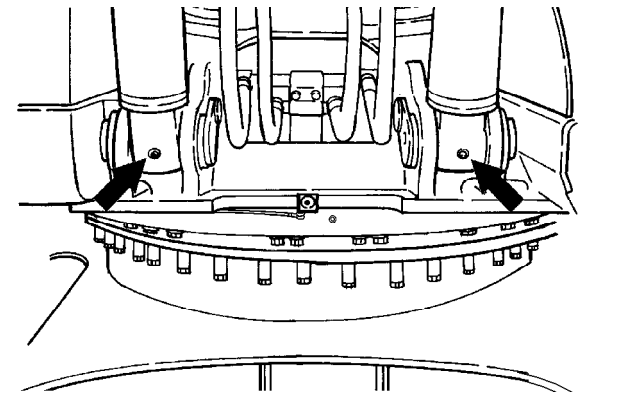

Illustration 279 g00685797

1. Apply lubricant through the fitting at the base of each boom cylinder.

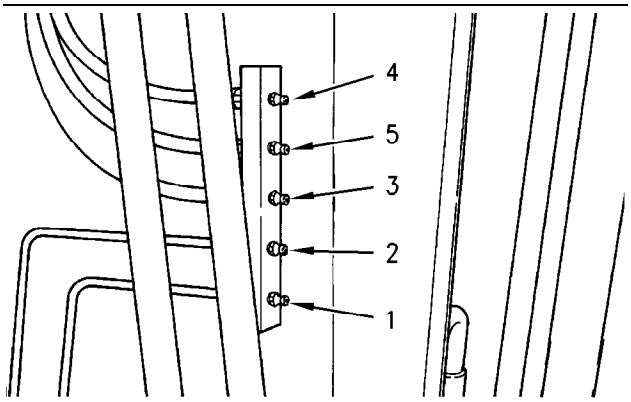

Illustration 280 g00685798

2. The fittings are at the base of the boom. The fittings can be serviced from the platform on top of the storage box. To lubricate the lower boom bearings, apply lubricant through fittings (1) and (2).

3. Apply lubricant through fittings (3) and (4) for the boom cylinder rod.

4. Apply lubricant through fitting (5) for the stick cylinder head.

Note: To ensure proper lubrication of the lower boom bearings and of the boom cylinder rod end bearings, lubricant should be applied through fittings (1), (2), (3), and (4). Apply lubricant first when the boom is raised and any attachment is suspended. Then apply lubricant when the boom is lowered and the attachment is rested on the ground with a slight downward pressure.

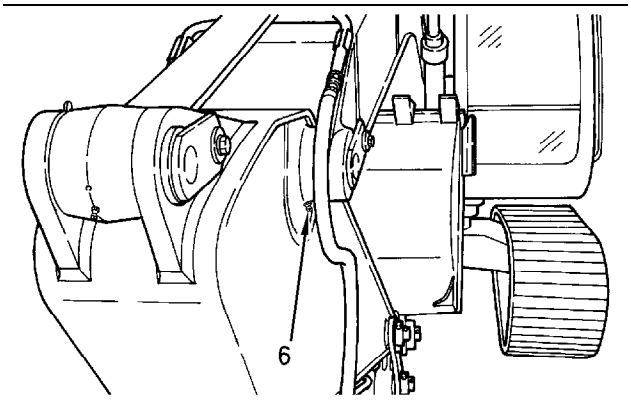

Illustration 281 g00685799

5. Apply lubricant through fitting (6). Fitting (6) is at the connection point of the boom and of the stick.

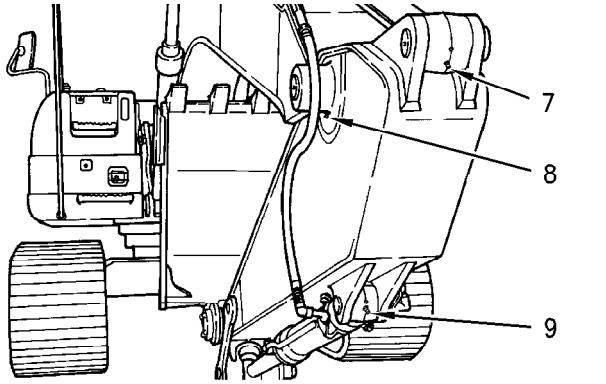

Illustration 282 g00685800

6. Apply lubricant through fitting (7) on the stick cylinder rod, fitting (8) at the connection point of the boom and of the stick, and fitting (9) at the bucket cylinder head end.

i05037672

Boom and Stick Linkage - Lubricate

(VA Boom (If Equipped))

SMCS Code: 6501-086; 6502-086

S/N: TXA1–Up

S/N: PBD1–Up

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom, and stick linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

Apply lubricant through all fittings after operation under water.

Wipe all fittings before you apply lubricant.

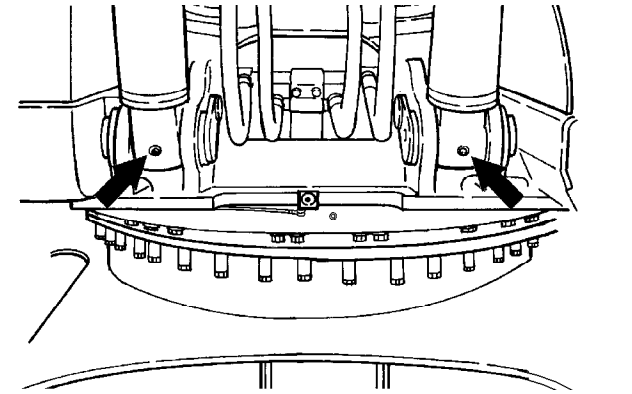

Illustration 283 g00685797

1. Apply lubricant through the fitting at the base of each boom cylinder.

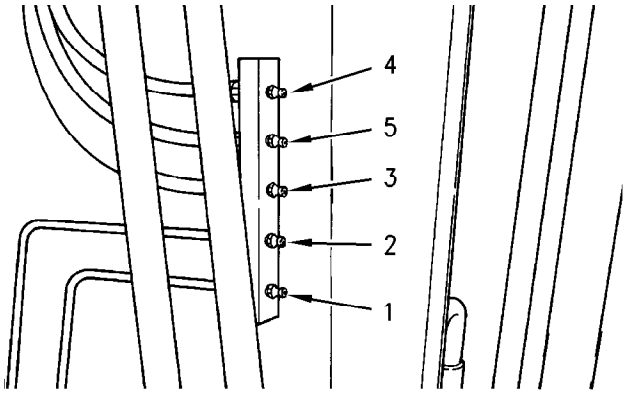

Illustration 284 g00685798

Note: Your machine may have the fittings mounted in a vertical position as shown in the illustration above, or your machine may have the fittings mounted in a horizontal position.

2. The fittings are at the base of the boom. The fittings can be serviced from the platform on top of the storage box. To lubricate the lower boom bearings, apply lubricant through fittings (1) and (2).

3. Apply lubricant through fitting (3) for the head end of the VA boom cylinder.

4. Apply lubricant through fittings (4) and (5) for the boom cylinder rod.

Note: To ensure proper lubrication of the lower boom bearings and of the boom cylinder rod end bearings, lubricant should be applied through fittings (1), (2), (4), and (5). Apply lubricant first when the boom is raised and any attachment is suspended. Then apply lubricant when the boom is lowered and the attachment is rested on the ground with a slight downward pressure.

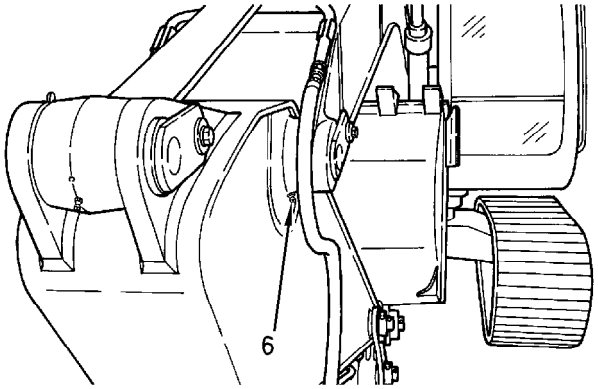

Illustration 285 g00685799

5. Apply lubricant through fitting (6). Fitting (6) is at the connection point of the boom and of the stick.

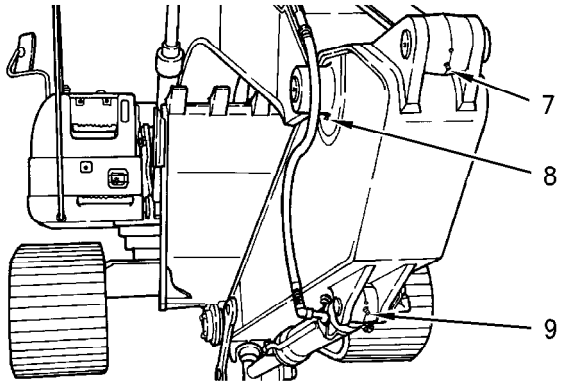

Illustration 286 g00685800

6. Apply lubricant through fitting (7) on the stick cylinder rod, fitting (8) at the connection point of the boom and of the stick, and fitting (9) at the bucket cylinder head end.

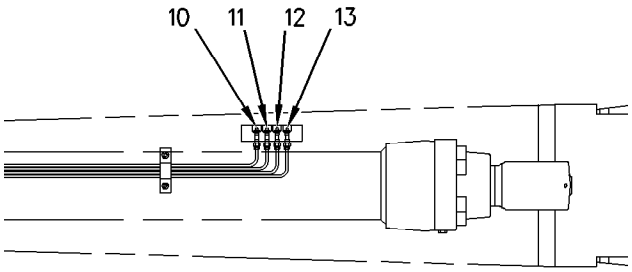

Illustration 287 g00754421

End of fore boom

7. Apply lubricant through fitting (10) and fitting (13) in order to lubricate the connection point between the stub boom and the fore boom.

8. Apply lubricant through fitting (11) in order to lubricate the stick cylinder head end.

9. Apply lubricant through fitting (12) in order to lubricate the rod end of the VA boom cylinder.

i02706136

Bucket Linkage - Inspect/ Adjust

SMCS Code: 6513-040; 6513-025

⚠ WARNING

Unexpected machine movement can cause injury or death.

To avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, "Do Not Operate" or similar warning tag to the hydraulic lockout control.

NOTICE
Improperly adjusted bucket clearance could cause galling on the contact surfaces of the bucket and stick, resulting in excessive noise and/or damaged O-ring seals.

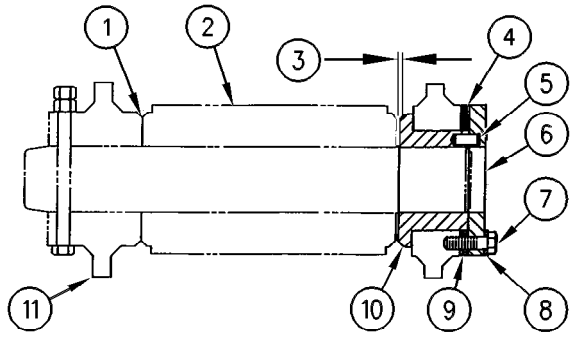

Illustration 288 g00101687

(1) No gap
(2) Stick boss
(3) Bucket clearance
(4) Shims
(5) Pin
(6) Plate
(7) Bolts
(8) Washers
(9) Location
(10) Flange
(11) Bucket boss

The clearance of the bucket control linkage on this machine can be adjusted by shimming. If the gap between the bucket and the stick becomes excessive, adjust bucket clearance (3) to 0.5 to 1 mm (.02 to .04 inch).

Two shims of different thickness are used at location (9). The thicknesses of the shims are 0.5 mm (0.02 inch) and 1.0 mm (0.04 inch).

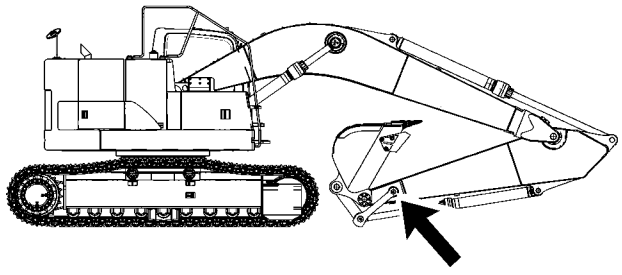

Illustration 289 g01357307

Area for linkage adjustment

1. Position the machine on a level surface and lower the bucket to the ground.
2. Slowly operate the swing control lever until stick boss (2) and the bucket boss (11) are in full face contact at no gap (1). This will help to determine the total clearance of the connection point of the stick and of the bucket.
3. Place the hydraulic lockout control in the LOCKED position and stop the engine.
4. Measure bucket clearance (3), which is the existing total clearance.
5. Determine the number of shims that need to be removed from shims (4) by using the following calculation:

   Subtract 0.5 mm (0.02 inch) or 1.0 mm (0.04 inch) from bucket clearance (3).
6. Remove the appropriate number of shims at location (9) in order to meet the above thickness. Make sure that you use a minimum of three 0.5 mm (0.02 inch) shims. To remove the shims, remove bolts (7), washers (8), and plate (6).
7. After the correct number of shims has been removed and pin (5) is aligned with the pin hole, install plate (6), washers (8), and bolts (7). Tighten bolts (7) to a torque of 240 ± 40 N·m (175 ± 30 lb ft).
8. After installation, make sure that bucket clearance (3) is still correct.

i01942324

Bucket Linkage - Lubricate

SMCS Code: 6513-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the bucket linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on grease.

Wipe all fittings before you apply lubricant.

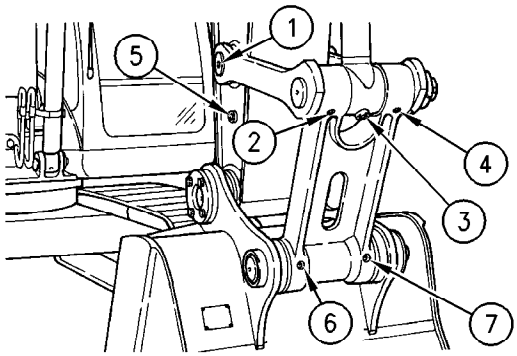

Illustration 290 g00682908

Note: Completely fill all cavities of the bucket control linkage with grease when you initially install a bucket.

1. Apply lubricant through fittings for the linkages (1), (2), (3), and (4).

2. Apply lubricant through fittings for the bucket (5), (6), and (7).

Note: Service the above fittings after you operate the bucket under water.

i03450548

Bucket Tips - Inspect/Replace (Drive-through System)

SMCS Code: 6805-040; 6805-510

⚠ WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket tips or side cutters.

Bucket Tips

Note: In order to maximize the life of the bucket tip and the penetration of the bucket tip, the bucket tip can be rotated.

Illustration 291 g01055179

Acceptable wear

Illustration 292 g01055196

Replace this bucket tip.

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal Procedure

⚠ WARNING

Retainer pin, when struck with force, can fly out and cause injury to nearby people.

Make sure the area is clear of people when driving retainer pins.

To avoid injury to your eyes, wear protective glasses when striking a retainer pin.

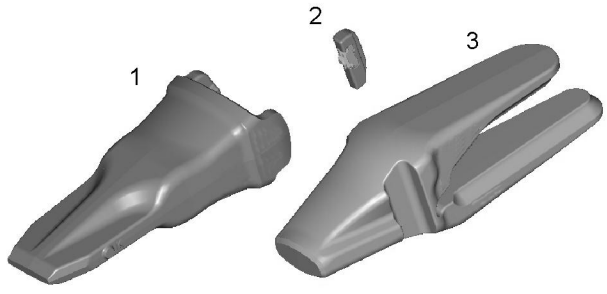

Illustration 293 g01053737

(1) Bucket tip
(2) Retainer
(3) Adapter

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

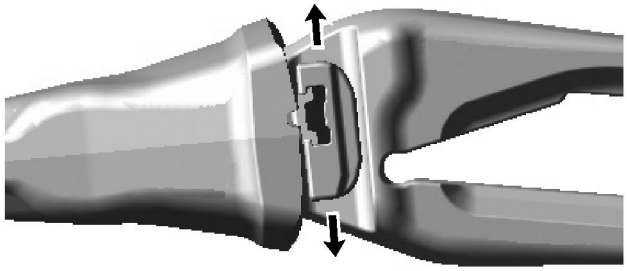

Illustration 294 g01054386

Internal view

1. Use a hammer and a punch in order to drive out the retainer. The retainer can be removed from the top of the bucket tip or from the bottom of the bucket tip.

2. Remove the bucket tip from the adapter with a slight counterclockwise rotation.

Installation Procedure

1. Clean the adapter, if necessary.

2. Install the new bucket tip or the rotated bucket tip onto the adapter with a slight clockwise rotation.

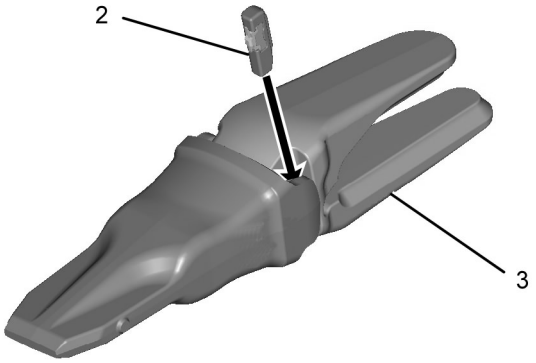

Illustration 295 g01498093

Proper location for installing the retainer

3. The retainer can be installed from the top of the bucket tip or from the bottom of the bucket tip. Use a hammer and a 1 inch X 1 inch X 8 inch steel bar stock in order to drive retainer (2) into adapter (3).

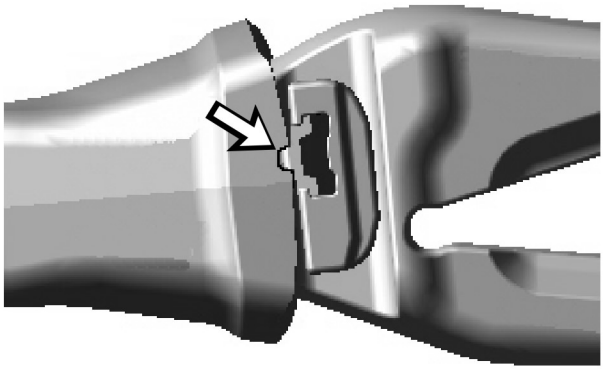

Illustration 296 g01492733

Internal View

The latch of the retainer is properly seated in the recess of the bucket tip.

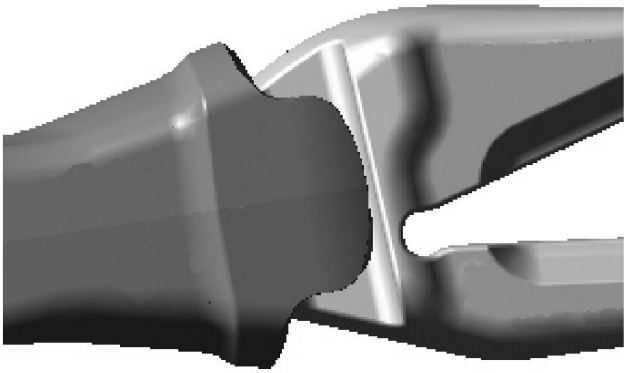

Illustration 297 g01054753

A properly installed retainer does not extend beyond the ear of the bucket tip.

4. The retainer is properly seated if the retainer can be moved slightly by the technician's hand. If the retainer cannot be moved, adjust the retainer, as needed. The ends of the retainer should not extend beyond the ear of the bucket tip.

Side Cutters (If Equipped)

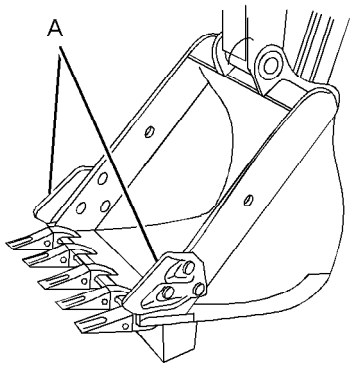

Illustration 298 g01092808

Bucket with side cutters

(A) Side cutters

1. Remove the mounting bolts and the side cutters.

2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

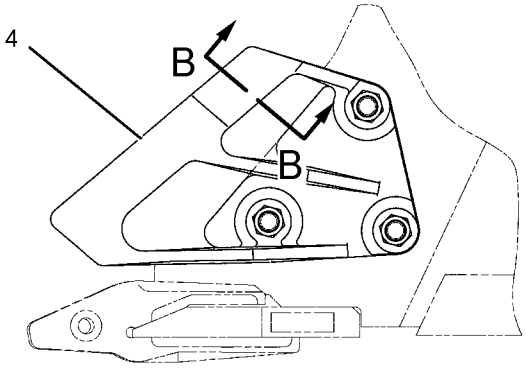

Illustration 299 g01389435

(4) Side cutter

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

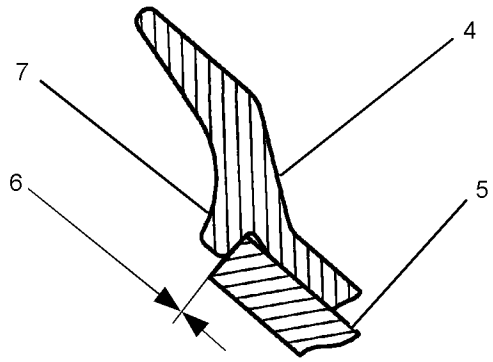

Illustration 300 g01389433

Section B-B From Illustration 299

(4) Side cutter
(5) Side plate on a bucket
(6) 0.0 mm (0.0 inch)
(7) Shear ledge on a side cutter

5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.

6. Torque the mounting bolts to the correct specification.

Side Protectors (If Equipped)

Inspect the wear of the side protector. When too much wear is present, replace the protector.

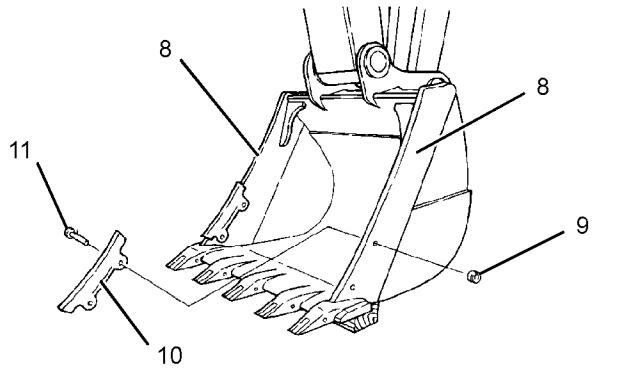

Illustration 301 g01389452

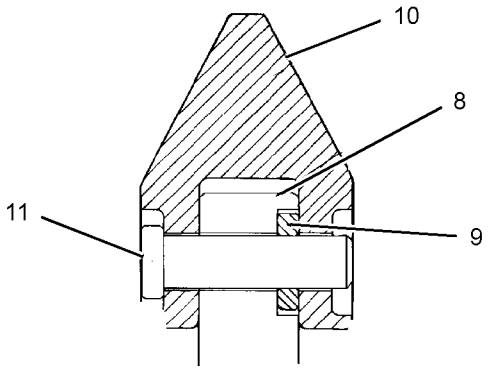

Illustration 302 g01389453

(8) Side plate
(9) Retainer
(10) Side protector
(11) Pin

1. Hit pin (11) from the retainer side of the bucket in order to remove side protector (10) from side plate (8).

2. Clean side protector (10), pin (11), retainer (9) and side plate (8) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims may be required in order to decrease the lateral clearance which will decrease movement. Install the shims between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (9) in side plate (8).

4. Align two pin holes of the new protector and the side plate. Hit the pin from the side of the bucket without the retainer.

Note: If the pin and/or the retainer are worn, replace the pin and/or the retainer.

i03574842

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

⚠ WARNING

Block the bucket before changing the bucket teeth.

To prevent possible injury to the eyes, wear a protective face shield when striking the pin.

The pin, when struck, can fly out and cause injury to nearby personnel.

Bucket Tips

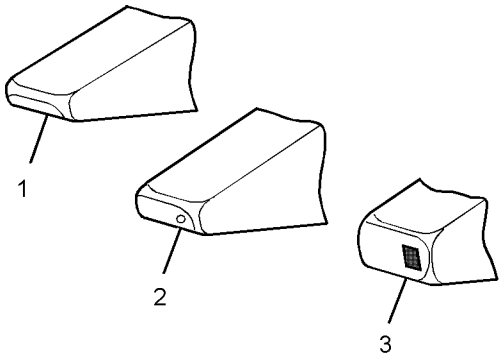

Illustration 303 g01577934

(1) Usable tip
(2) Replaceable bucket tip
(3) Overworn tip

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.

- Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
- Use a Pin-Master. Follow Step 1a through Step 1c for the procedure.

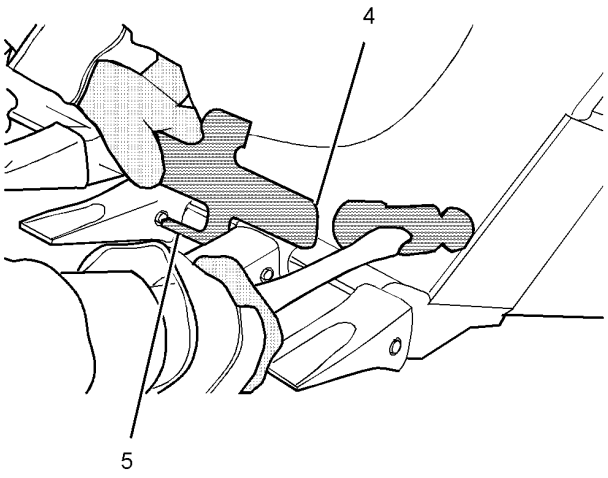

Illustration 304 g01577993

(4) Back of Pin-Master
(5) Extractor

a. Place the Pin-Master on the bucket tip.

b. Align extractor (5) with the pin.

c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

Note: Discard the old pin and the retainer assembly. When you change tips, use a new pin and a new retainer assembly. Refer to the appropriate parts manual for your machine.

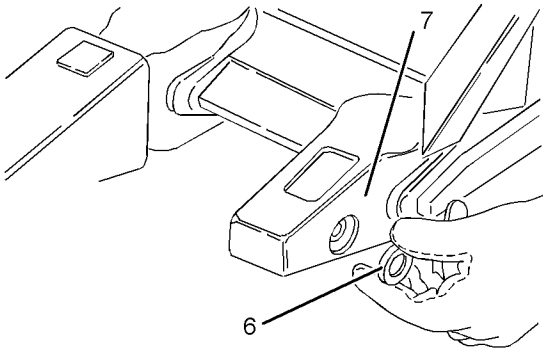

Illustration 305 g01577913

(6) Retainer assembly
(7) Adapter

2. Clean the adapter and the pin.

3. Fit retainer assembly (6) into the counterbore that is in the side of adapter (7). Make sure that the face of the retainer assembly with the marking “OUTSIDE” is visible.

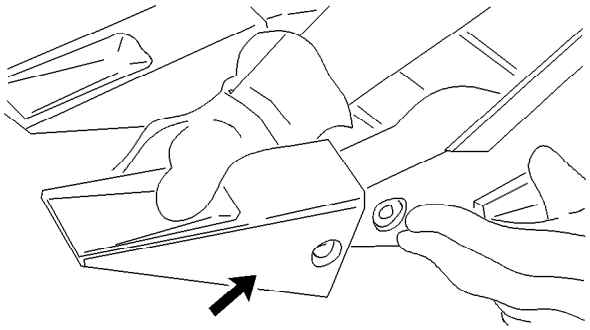

Illustration 306 g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tips can be rotated by 180 degrees in order to allow the tip to wear evenly. You may also move the tips from the outside teeth to the inside teeth. Check the tips often. If wear is present on the tips, rotate the tips. The outside teeth generate the most wear.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the same side of the retainer, drive the pin through the bucket tip, the retainer assembly, and the adapter.
- Use a Pin-Master. Follow Step 5a through Step 5e for the procedure.

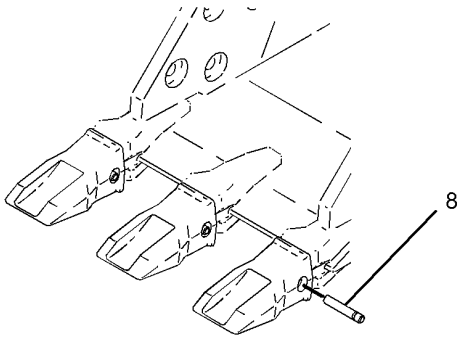

Illustration 307 g01578233

(8) Pin

a. Insert pin (8) through the bucket tip.

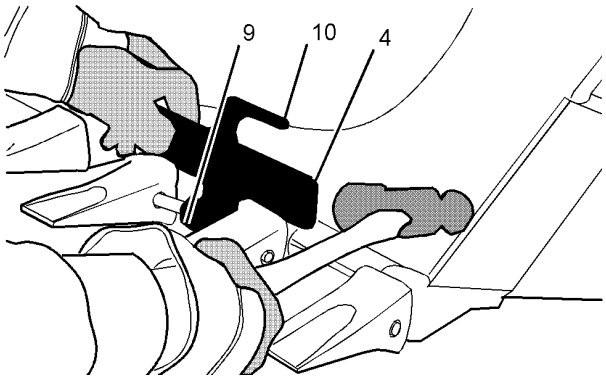

Illustration 308 g01578342

b. Place the Pin-Master over the bucket tips so that the pin will fit into the counterbore of the pin holder (9).

c. Strike the Pin-Master with a hammer at the back of the tool (4) in order to insert the pin.

d. Slide pin holder (9) away from the pin and rotate the tool slightly in order to align pin setter (10) with the pin.

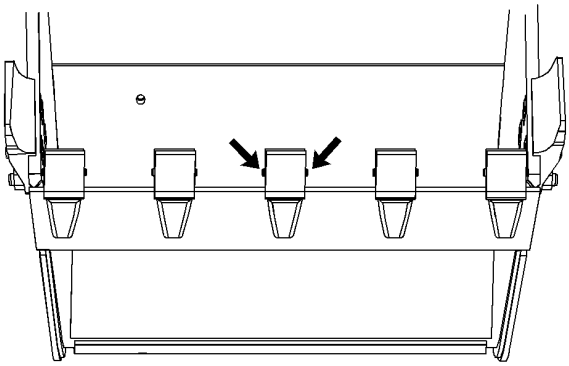

Illustration 309 g01209159

Final assembly of pin into bucket tip

e. Strike the end of the tool until the pin is fully inserted.

Side Cutters

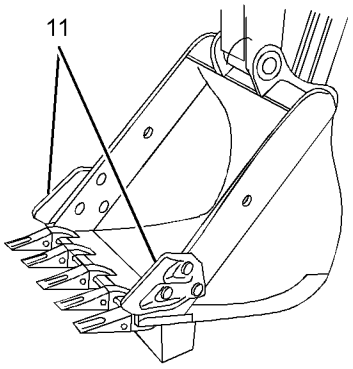

Illustration 310 g01579693

Bucket With Side Cutters

1. Remove the mounting bolts and the side cutters (11).

2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

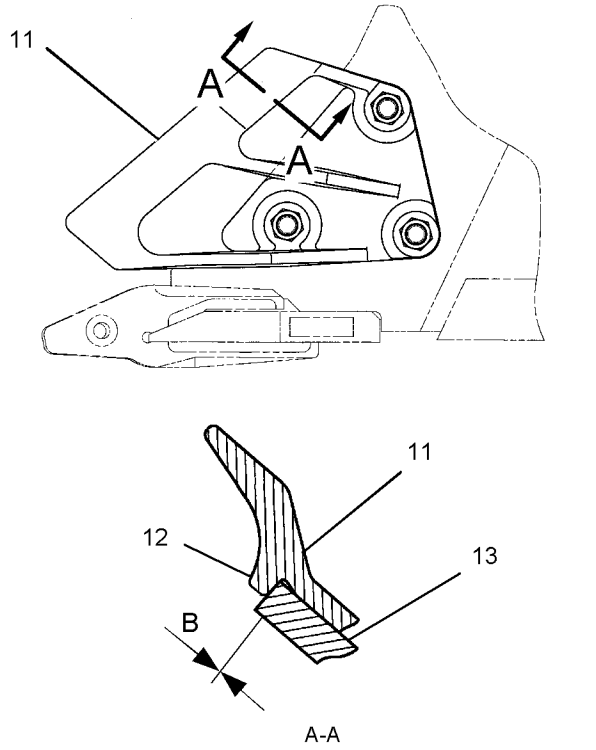

Illustration 311 g01579713

(12) Shear ledge on a side cutter
(13) Side plate on a bucket
(B) 0.0 mm (0.0 inch)

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.

6. Torque the mounting bolts to the correct specification.

Side Protectors (If Equipped)

Inspect the wear of the side protector. When too much wear is present, replace the protector.

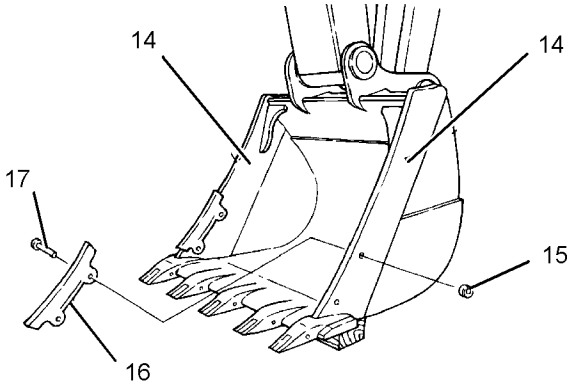

Illustration 312 g01592996

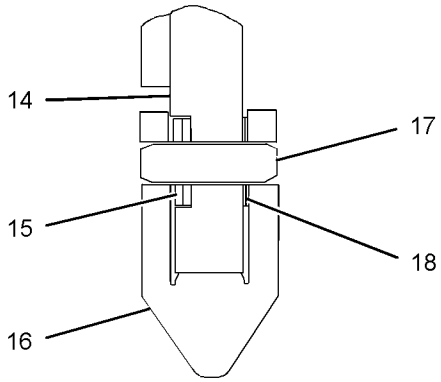

Illustration 313 g01903678

(14) Side plate
(15) Retainer
(16) Side protector
(17) Pin
(18) Shim

1. Hit pin (17) from the side of the bucket without the retainer in order to remove side protector (16) from side plate (14).

2. Clean side protector (16), pin (17), retainer (15) and side plate (14) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims (18) may be required in order to decrease the lateral clearance which will decrease movement. Install the shims (18) between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (15) in side plate (14).

4. Align two pin holes of the new protector and the side plate. Hit the pin from the retainer side of the bucket.

Note: If the pin and/or the retainer are worn, replace the pin and/or the retainer.

i01914851

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-510; 7342-070

S/N: PBD1–Up

S/N: NAS1–Up

S/N: MDT1–Up

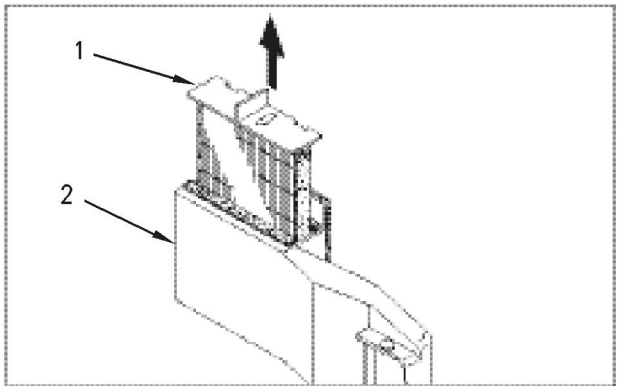

Illustration 314 g00997487

(1) Air Filter
(2) Duct

The fresh air filter is located behind the operator's seat.

1. Remove the air filter from the duct by pulling the air filter upward.

2. Clean the air filter with a maximum of 200 kPa (30 psi) pressure air.

3. After you clean the air filter, inspect the air filter. If the air filter is damaged or badly contaminated, use a new air filter.

4. Install the air filter.

Note: Make sure that the arrow on top of the air filter is facing forward.

i03901495

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-510; 7342-070

S/N: TXA1–Up

S/N: MPG1–Up

S/N: KBZ1–Up

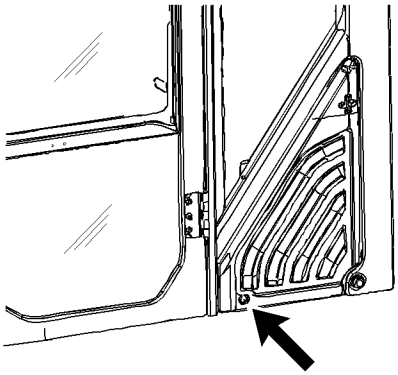

Illustration 315 g01973174

The cab air filter is located on the left side of the cab.

1. Use the ignition key in order to open the access panel.

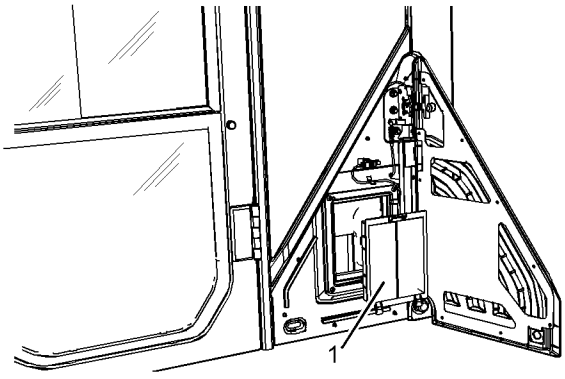

Illustration 316 g02144326

(1) Air filter

2. Remove air filter (1).

3. Clean the air filter with a maximum of 200 kPa (30 psi) pressure air.

4. After you clean the air filter, inspect the air filter. If the air filter is damaged or badly contaminated, use a new air filter.

5. Install the air filter and the filter cover.

i06890848

Camera - Clean/Adjust

SMCS Code: 7348

WARNING

Failure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera could result in slipping and falling which could result in personal injury or death. Be sure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera.

The machine's counterweight and the engine hood are not approved as a maintenance platforms.

WARNING

Unexpected machine movement can cause injury or death.

In order to avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, "Do Not Operate" or similar warning tag to the hydraulic lockout control.

When the rear view camera requires maintenance or service, use the following steps.

1. Park the machine on a level surface.

2. Place the work tool on the level surface.

3. Move the hydraulic lockout control to the LOCKED position.

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

5. Turn the battery disconnect switch to theOFF position and remove the battery disconnect switch key.

Clean Camera Lens

If necessary, clean the camera lens before you operate the machine. Use a soft cloth for cleaning.

Adjust the Area of Visibility

If the camera displays an undesired view, adjust the area of the visibility.

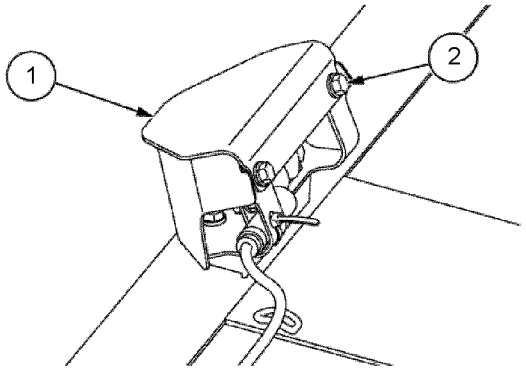

Illustration 317 g01598213

(1) Cover
(2) Bolt

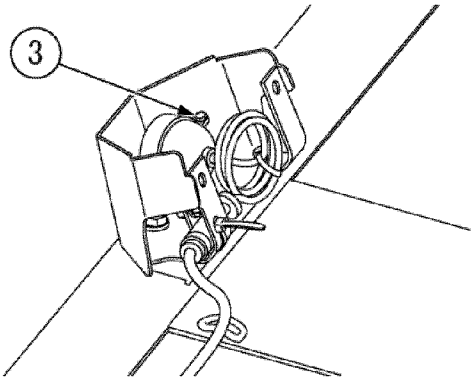

Illustration 318 g01598214

(3) Bolt

1. Remove the two bolts (2) to remove the cover (1).

2. Unfasten the two bolts (3).

Illustration 319 g03678521

3. Adjust the area of the visibility of the camera so that a 1.5 m (5 ft 11 inch) tall obstacle which is 1 m (3 ft) behind the counterweight can be seen.

4. Tighten the two bolts (3) to a torque of 0.5 ± 0.05 N·m (4 ± 0.4 lb in).

5. Tighten the two bolts (2) to a torque of 55 ± 10 N·m (40 ± 7 lb ft) to fix the cover (1).

i02703194

Circuit Breakers - Reset

SMCS Code: 1420-529

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

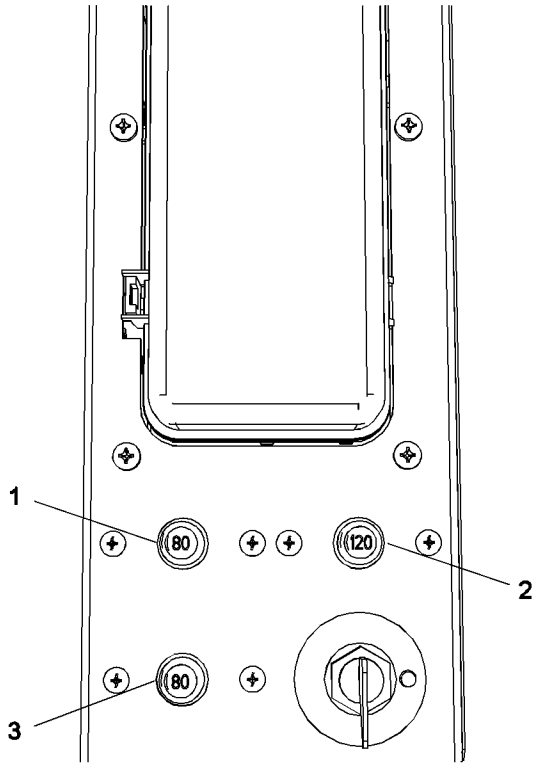

Illustration 320 g01356160

Main Breaker (1) – This circuit breaker is designed to protect the electrical system. The circuit breaker has a capacity of 80 Amp.

Air Inlet Heater Circuit (2) – This circuit breaker is designed to protect the air inlet heater. The circuit breaker has a capacity of 120 Amp.

Alternator Circuit (3) – This circuit breaker is designed to protect the alternator. If the batteries are installed with reversed polarity, the circuit breaker would prevent the alternator from damaging the rectifier. The circuit breaker has a capacity of 80 Amp.

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.

i05354253

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

⚠ 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.

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.

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

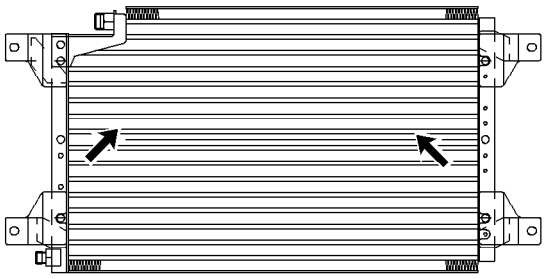

Illustration 321 g00537515
Typical example

2. Inspect the condenser for debris. Clean the condenser, if necessary.

Compressed air is preferred, but high-pressure water or steam can be used to remove dust and general debris from a core.

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

3. Close the access door on the left side of the machine.

i02706150

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

NOTICE
Do not change the coolant until you read and understand the cooling system information in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

Failure to do so could result in damage to the cooling system components.

NOTICE
Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for premixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

If the coolant in the machine is changed to Extended Life Coolant from another type of coolant, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

1. Unlatch the engine hood and raise the engine hood.

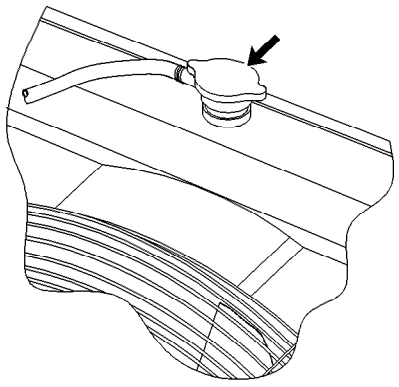

Illustration 322 g00544510

2. Slowly loosen the pressure cap that is on the radiator in order to release pressure from the cooling system.

3. Remove the pressure cap.

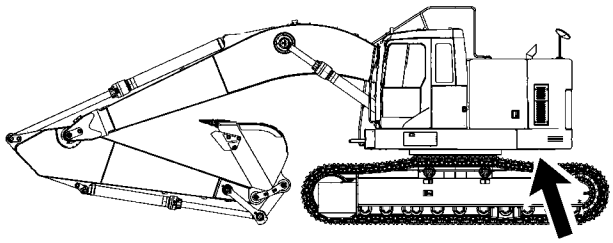

Illustration 323 g01357333

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

4. Remove the access cover that is underneath the radiator.

5. Open the drain valve and allow the coolant to drain into a suitable container. The drain valve is located on the bottom of the radiator.

6. Flush the cooling system. Follow Step 6a through Step 6h in order to properly flush the cooling system.

a. Close the drain valve.

b. Fill the cooling system with clean water.

c. Install the pressure cap.

d. Start the engine and run the engine until the engine reaches operating temperature.

e. Stop the engine and allow the engine to cool.

f. Loosen the pressure cap slowly in order to relieve any pressure in the cooling system.

g. Open the drain valve that is underneath the radiator and allow the coolant to drain into a suitable container.

h. Flush the radiator with clean water until the draining water is transparent.

7. Close the drain valve and install the access cover underneath the radiator.

8. Add the Extended Life Coolant. Refer to the following topics:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

9. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

10. Maintain the coolant level within 13 mm (.5 inches) of the bottom of the filler pipe.

11. Inspect the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.

12. Install the cooling system pressure cap.

13. Stop the engine.

14. Open the left access door.

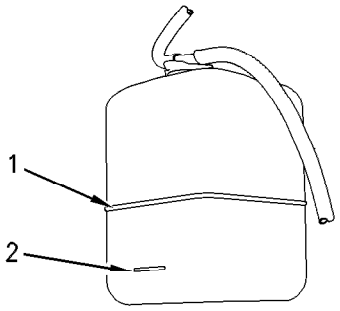

Illustration 324 g00545226

(1) “FULL”
(2) “LOW”

15. Check the coolant reservoir. Maintain the coolant level between “FULL” mark (1) and “LOW” mark (2).

16. If additional coolant is necessary, remove the reservoir cap and add the appropriate coolant solution.

17. Install the reservoir cap.

18. Close the engine hood and latch the engine hood. Close the left access door.

i02586600

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

Use Caterpillar Extended Life Coolant (ELC) when you add coolant to the cooling system. See Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for all cooling system requirements.

Use a Coolant Conditioner Test Kit in order to check the concentration of the coolant.

NOTICE
Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for premixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

1. Park the machine on level ground.

2. Stop the engine.

3. Unlatch the engine hood and raise the engine hood.

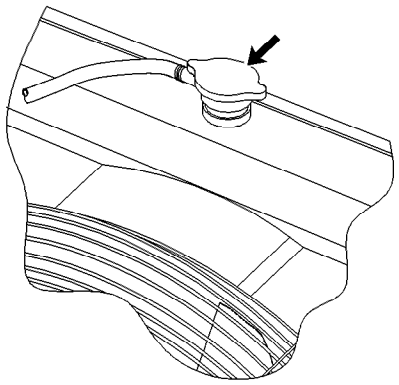

Illustration 325 g00544510

4. Make sure that the cooling system has cooled down. Loosen the cooling system pressure cap slowly in order to relieve system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

5. It may be necessary to drain some coolant from the radiator so that Caterpillar Extender can be added to the cooling system.

Note: Always discard drained fluids according to local regulations.

6. Add Caterpillar Extended Life Coolant (ELC) to the cooling system. Refer to the following topics for the proper amount of Caterpillar Extender:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

7. Inspect the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.

8. Install the cooling system pressure cap.

9. Close the engine hood and latch the engine hood.

i02580035

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV; 1350-040; 1395-535-FLV

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

1. Open the left rear access door.

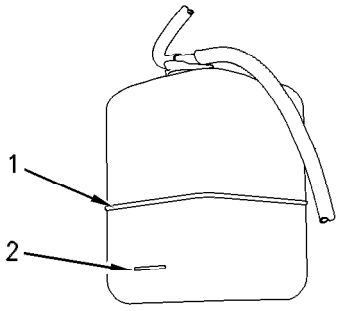

Illustration 326 g00545226

(1) “FULL” level
(2) “LOW” level

2. Check the coolant level of the coolant reservoir. Maintain the coolant level between the “FULL” mark and the “LOW” mark. If the coolant reservoir is empty, follow Steps 2a through 2i.

a. Unlatch the engine hood and raise the engine hood.

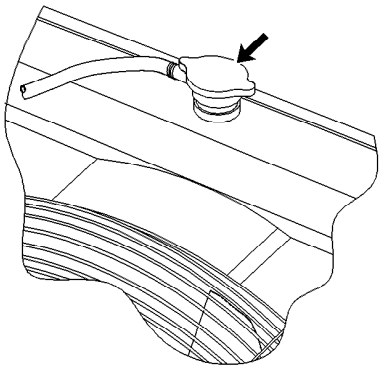

Illustration 327 g00544510

b. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

c. Add the appropriate coolant solution to the cooling system. Refer to the following topics:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

d. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

e. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

f. Inspect the condition of the gasket on the pressure cap. If the gasket is damaged, replace the pressure cap.

g. Install the cooling system pressure cap.

h. Stop the engine.

i. Close the engine hood and latch the engine hood.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

3. If additional coolant is necessary, remove the reservoir cap and add the appropriate coolant solution.

4. Install the reservoir cap.

5. Close the left access door.

i02250847

Cooling System Coolant Sample (Level 1) - Obtain

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

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

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

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

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

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

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

Refer to Special Publication, NENG2500, “Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Cat ® products.

Dispose of all fluids according to local regulations and mandates.

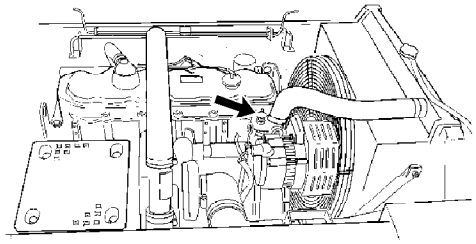

Illustration 328 g00811362

A typical example is shown.

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, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

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

i02062059

Cooling System Coolant Sample (Level 2) - Obtain

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

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.

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

Submit the sample for Level 2 analysis.

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

i02530911

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070; 1054-510

If a warning and a pictograph is displayed on the message display or if the exhaust is black, check the primary filter.

1. Open both access doors on the left side of the machine.

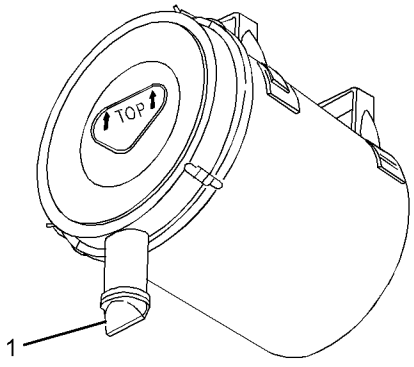

Illustration 329 g01266485

2. Squeeze the outlet tube (1) slightly in order to purge the dirt from the outlet tube.

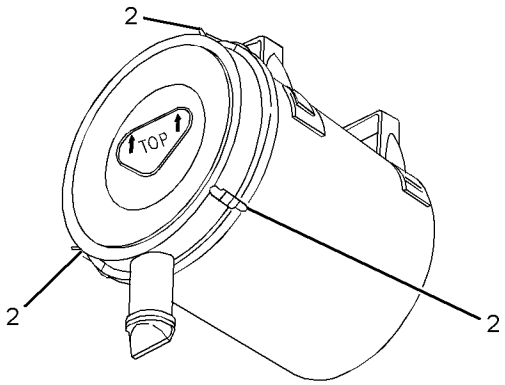

Illustration 330 g01266486

3. Loosen the cover latches (2) and remove the air cleaner cover.

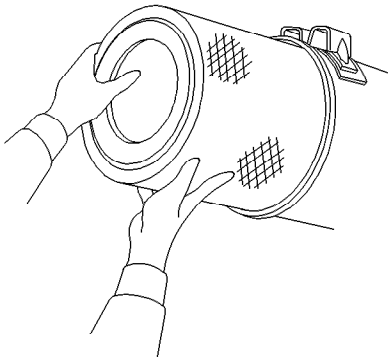

Illustration 331 g00101415

4. Remove the primary filter element from the air cleaner housing.

5. Clean the air cleaner cover and the inside of the air cleaner housing.

6. Inspect the O-ring seal on the air cleaner cover. Replace the O-ring seal if the O-ring seal is worn or damaged.

7. Install the clean primary filter.

Note: Refer to “Cleaning Primary Air Filter Elements”.

8. Install the air cleaner cover and close the latches securely.

Illustration 332 g00101416

Note: Install the air cleaner cover properly. The arrows must point upward.

9. Change the filter if any of the following conditions occurs:

- Restricted Air Filter indicator on the monitor panel still comes on.
- Exhaust smoke is still black after the installation of a primary filter.

10. Close the access doors.

Cleaning Primary Air Filter Elements

NOTICE
Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

When the primary air filter element is cleaned, check for rips or tears in the filter material. Replace the primary air filter element after the primary air filter element has been cleaned six times. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE
Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

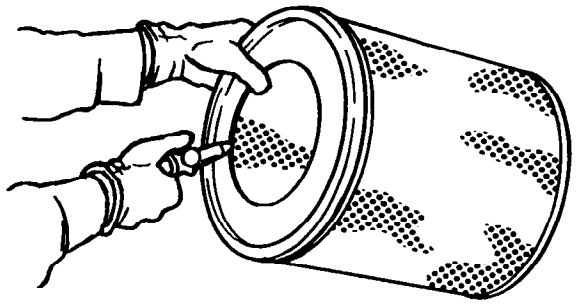

Illustration 333 g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) in order to force dirt particles toward the dirty side (outside).

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning primary air filter elements which require daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

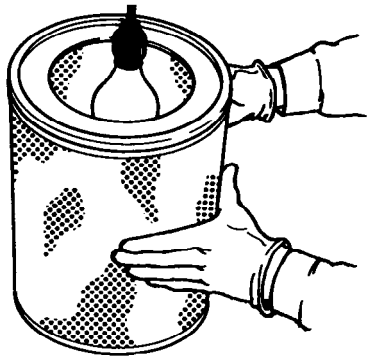

Illustration 334 g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

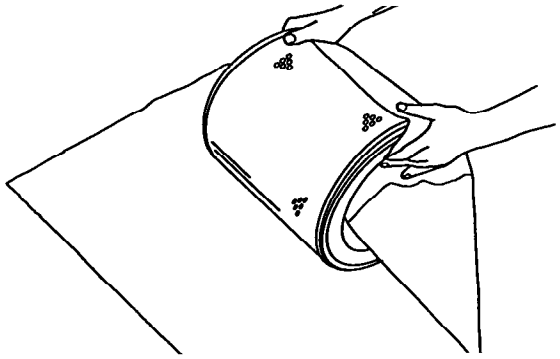

Illustration 335 g00281694

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.

i05770379

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510

NOTICE
Always replace the secondary filter element. Never attempt to reuse the secondary filter element by cleaning the element.

When the primary filter element is replaced, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the air filter restriction warning appears on the message display after the installation of a clean primary filter element.

1. Open the access door on the front left side of the machine.
2. See Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”. Remove the air cleaner cover from the air cleaner housing. Remove the primary filter element from the air cleaner housing.

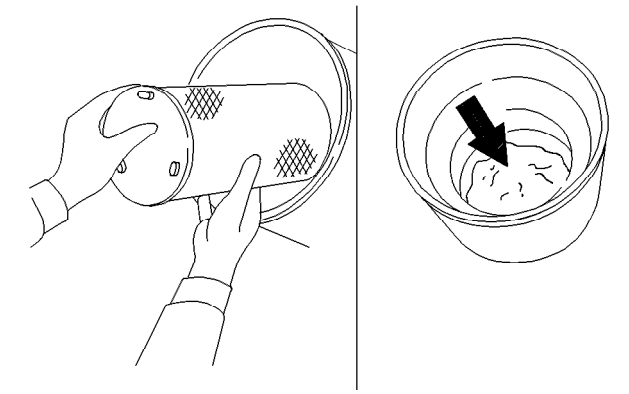

Illustration 336 g00101451

3. Remove the secondary filter element.

4. Cover the air inlet opening. Clean the inside of the air cleaner housing.

5. Remove the cover from the air inlet opening.

6. Install the new secondary filter element.

7. Install the primary filter element.

8. Install the air cleaner cover and close the latches securely.

9. Close the access door.

i02674717

Engine Crankcase Breather - Clean

SMCS Code: 1317-070-DJ

1. Open the engine hood.

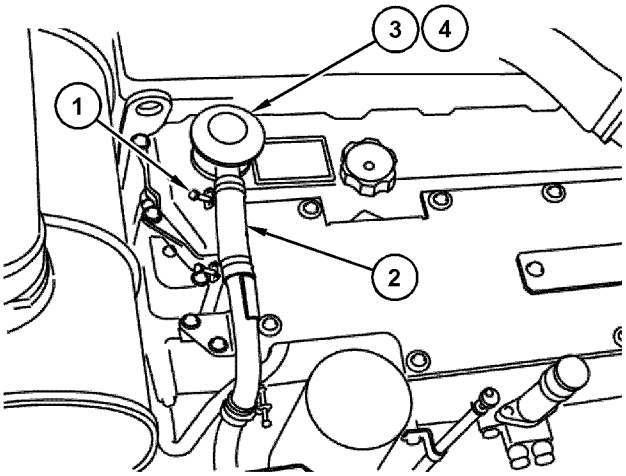

Illustration 337 g01343771

2. Loosen hose clamp (1) and disconnect outlet hose (2) from breather (3).

3. Remove breather (3) and O-ring seal (4).

4. Wash breather (3) in clean, nonflammable solvent.

5. Inspect O-ring seal (4). If the seal is damaged, install a new seal.

6. Install O-ring seal (4) and clean breather (3).

7. Slide outlet hose (2) on breather (3). Tighten hose clamp (1).

8. Close the engine hood.

i02865726

Engine Oil Level - Check

SMCS Code: 1000-535

⚠ WARNING

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

NOTICE
Do not overfill the crankcase. Engine damage can result.

Note: This machine is equipped with both an automated function for checking fluid levels and a dipstick. Refer to Operation and Maintenance Manual, “Monitoring System” regarding the automated system. If the machine is on an incline or the engine has been stopped only for a short time, then the engine oil does not return to the crankcase and the fluid level cannot be properly checked by either method. Park the machine on level ground and check the oil level after the engine has been stopped for at least 30 minutes.

Check the oil level while the engine is stopped. Do not check the oil level while the engine is running.

1. Open the hood.

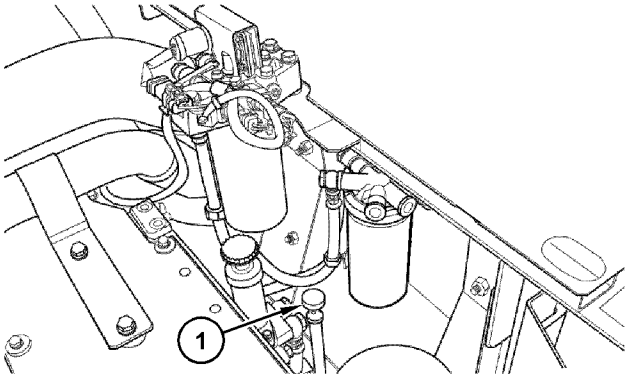

Illustration 338 g01365881

2. Remove the dipstick (1). Wipe the oil off the dipstick (1) and insert the dipstick (1).

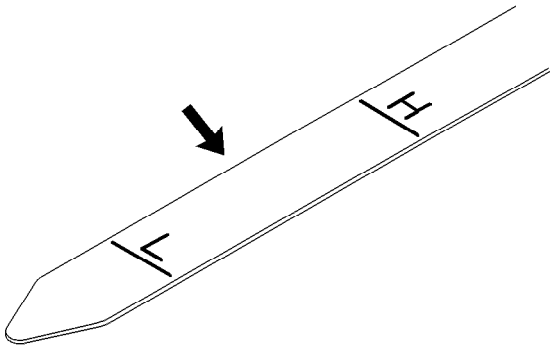

Illustration 339 g00824185

3. Remove the dipstick (1) and check the dipstick (1). The oil level should be between the “H” mark and the “L” mark.

NOTICE
Operating your engine when the oil level is above the “H” mark could cause the crankshaft to dip into the oil. This could lead to excessively high oil temperatures which can reduce the lubricating characteristics of the oil, lead to bearing damage, and could result in loss of engine power.

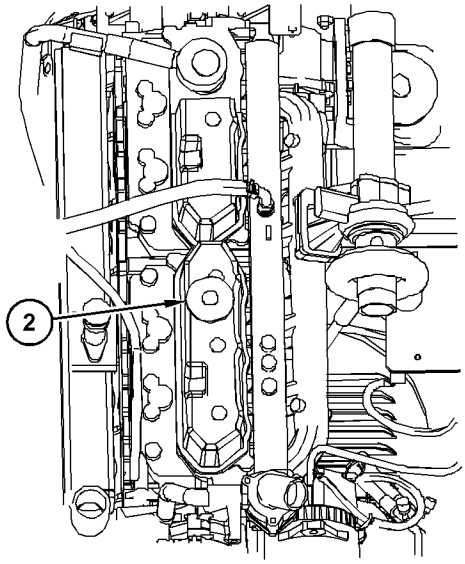

Illustration 340 g01365841

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

4. Remove the oil filler plug (2) in order to add oil, if necessary. See Operation and Maintenance Manual, “Lubrication Viscosity”.

Note: If the oil is deteriorated or badly contaminated, change the oil regardless of the maintenance interval.

5. Clean the oil filler plug (2). Install the oil filler plug (2).

6. Close the hood.

i05794864

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 1000; 1348-008; 1348-554-SM; 7542-554-OC; 7542-008; 7542-554-SM

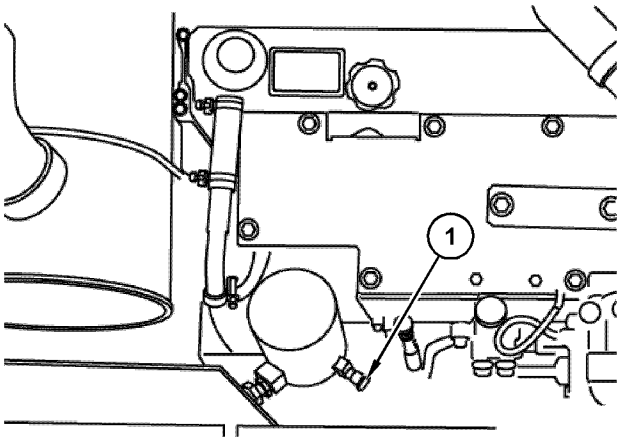

Illustration 341 g01343889

(1) Port for the engine oil sample

Obtain a sample of the engine oil from the sampling port (1) that is located on the engine oil filter housing. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining a sample of the engine oil.

i02720131

Engine Oil and Filter - Change

SMCS Code: 1318-510

⚠ WARNING

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

Note: If the sulfur content in the fuel is greater than 1.5% by weight, use an oil that has a TBN of 30 and reduce the oil change interval by one-half.

Park the machine on a level surface and engage the parking brake. Stop the engine.

Note: Drain the crankcase while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

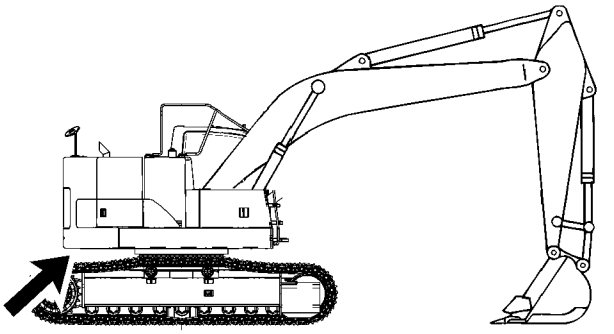

Illustration 342 g01365456

1. The drain valve for the engine crankcase oil is located under the rear of the upper structure.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

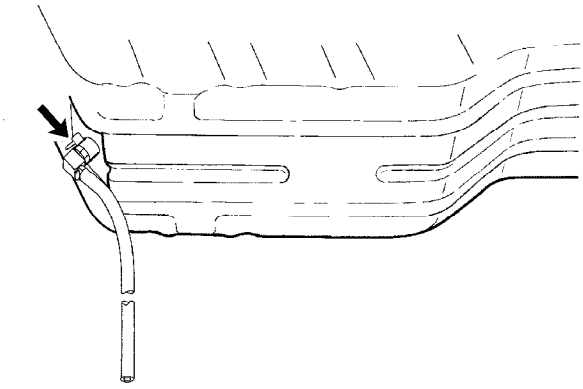

Illustration 343 g00937651

2. Open the crankcase drain valve. Allow the oil to drain into a suitable container.

Note: Discard any drained fluids according to local regulations.

3. Close the drain valve.

4. Open the engine hood.

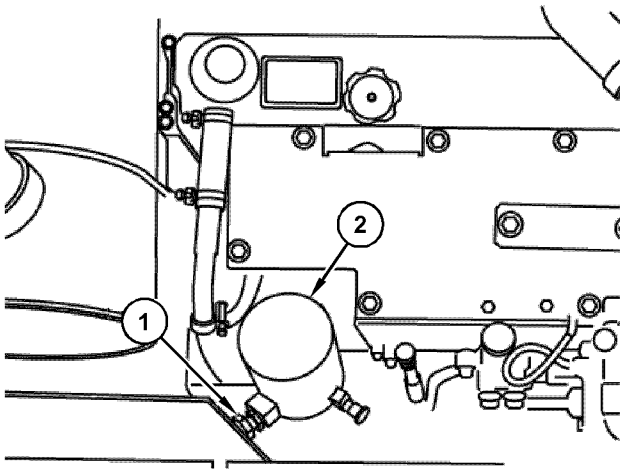

Illustration 344 g01343901

(1) Drain valve
(2) Engine oil filter

5. Open drain valve (1). The drain valve is located on the bottom of engine oil filter (2). Allow the remaining oil in the filter to drain into a suitable container.

6. Close drain valve (1). Tighten the locknut to 40 ± 5 N·m (30 ± 4 lb ft).

7. Remove oil filter (2). See Operation and Maintenance Manual, “Oil Filter - Inspect”. Discard the used oil filter properly.

8. Clean the filter housing base. Make sure that all of the former filter gasket is removed.

9. Apply a thin coat of engine oil to the gasket of the new filter.

10. Install the new oil filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

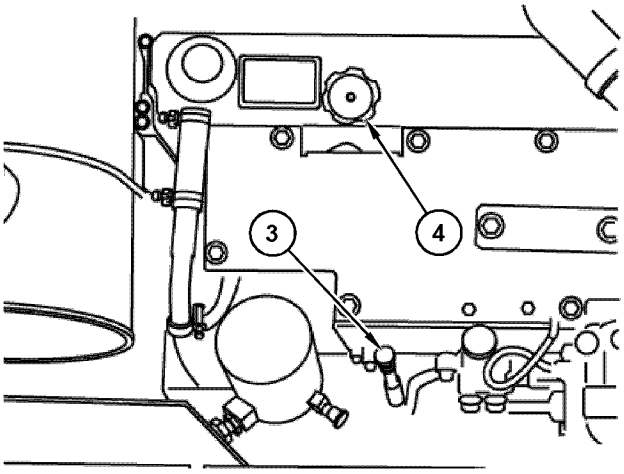

Illustration 345 g01343905

(3) Dipstick
(4) Oil filler plug

11. Remove oil filler plug (4). Fill the crankcase with new oil. See Operation and Maintenance Manual, “Capacities (Refill)” and Operation and Maintenance Manual, “Lubricant Viscosities”. Clean the oil filler plug and install the oil filler plug.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

12. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.

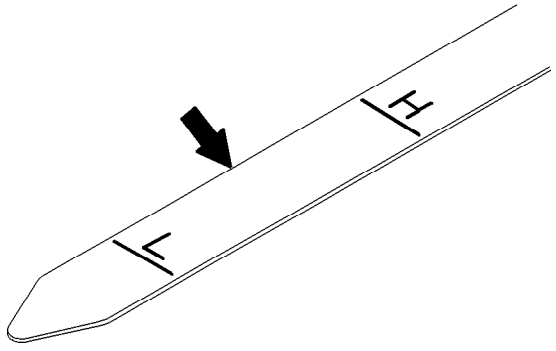

Illustration 346 g00104116

13. Wait for 30 minutes in order to allow the oil to drain back into the crankcase. Check the oil level with dipstick (3). Maintain the oil between the “H” and “L” marks on the dipstick. If necessary, add oil.

14. Close the engine hood.

i01747875

Engine Valve Lash - Check

SMCS Code: 1102-535; 1102; 1102-082; 1105-535; 1105-025; 1121-535; 1209-082; 1209; 1209-535; 7527

Refer to Engine Systems Operation/Testing and Adjusting in order to perform the complete procedure for the valve lash adjustment.

i07681009

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070

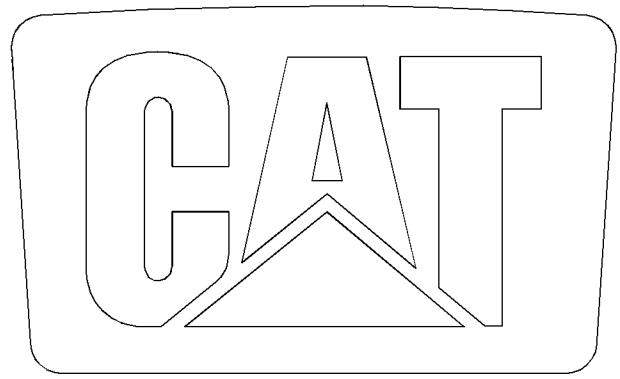

Illustration 347 g02174985

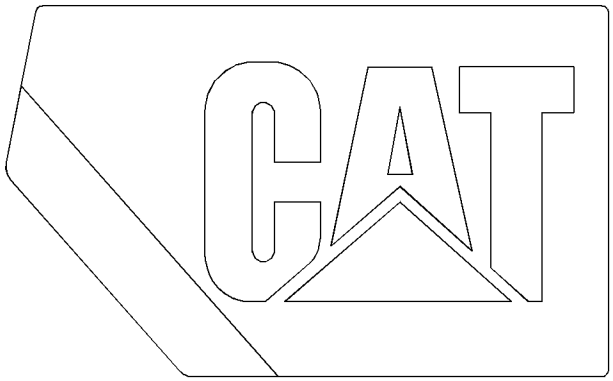

Illustration 348 g02175297

Illustration 349 g06394021

Typical example of the Product Identification Films.

Cleaning of the Films

Make sure that all of the product identification films are legible. Make sure that the recommended procedures are used in order to clean the product identification films. Ensure that all the product identification films are not damaged or missing. Clean the product identification films or replace the films.

Hand Washing

Use a wet solution with no abrasive material that contains no solvents and no alcohol. Use a wet solution with a “pH” value between 3 and 11. Use a soft brush, a rag, or a sponge in order to clean the product identification films. Avoid wearing down the surface of the product identification films with unnecessary scrubbing. Ensure that the surface of the product identification films is flushed with clean water and allow the product identification films to air dry.

Power Washing

Power washing or washing with pressure may be used in order to clean product identification films. However, aggressive washing can damage the product identification films.

Excessive pressure during power washing can damage the product identification films by forcing water underneath the product identification films. Water lessens the adhesion of the product identification film to the product, allowing the product identification film to lift or curl. These problems are magnified by wind. These problems are critical for the perforated film on windows.

To avoid lifting of the edge or other damage to the product identification films, follow these important steps:

- Use a spray nozzle with a wide spray pattern.
- A maximum pressure of 83 bar (1200 psi)
- A maximum water temperature of 50° C (120° F)
- Hold the nozzle perpendicular to the product identification film at a minimum distance of 305 mm (12 inch).
- Do not direct a stream of water at a sharp angle to the edge of the product identification film.

i06882903

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

⚠ WARNING

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

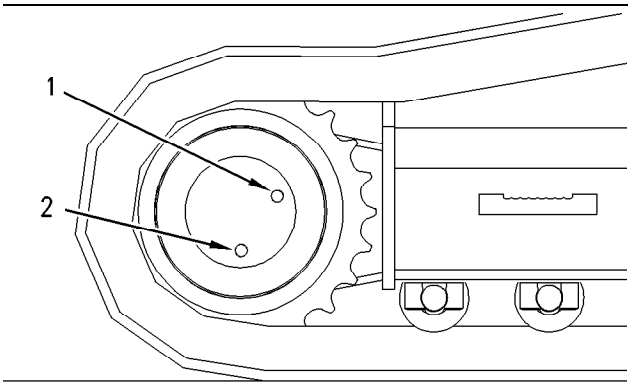

Illustration 350 g00822278

(1) Oil level plug
(2) Oil drain plug

1. Position one final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove drain plug (2) and level plug (1). Allow the oil to drain into a suitable container.

3. Clean the plugs and inspect the O-ring seals. If wear or damage is evident, replace the drain plug, the level plug, and/or the O-ring seals.

4. Install drain plug (2).

5. Fill the final drive to the bottom of the opening on level plug (1). See Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

Note: If the oil fills slowly, the fill hole may be blocked by the planetary gear. Rotate the final drive to move the planetary gear away from the fill hole.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive. The final drive may become contaminated.

6. Install level plug (1).

7. Perform Step 1 to Step 6 on the other final drive. Use a different container for the oil so that the oil samples from the final drives will be separate.

8. Completely remove the oil that has spilled onto surfaces.

9. Start the machine and allow the final drives to run through several cycles.

10. Stop the machine. Check the oil level.

11. Check the drained oil for metal chips or for particles. If there are any chips or particles, consult your Cat dealer.

12. Properly dispose of the drained material. Obey local regulations for the disposal of the material.

i03914051

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

⚠ WARNING

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

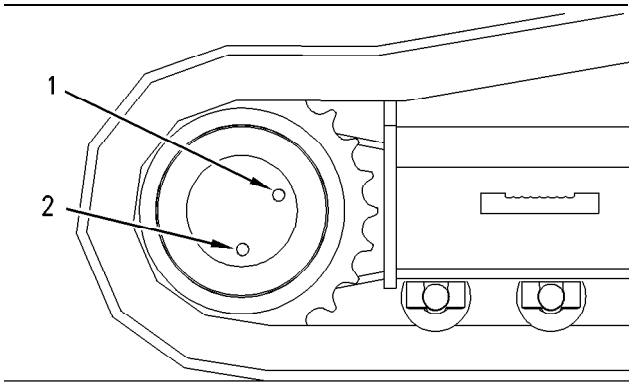

Illustration 351 g00822278

(1) Oil level plug
(2) Oil drain plug

1. Position one final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove oil level plug (1).

3. Check the oil level. The oil should be near the bottom of the level plug opening.

4. Add oil through the level plug opening, if necessary. See Operation and Maintenance, “Lubricant Viscosities”.

Note: If the oil fills slowly, the fill hole may be blocked by the planetary gear. Rotate the final drive in order to move the planetary gear away from the fill hole.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive. The final drive may become contaminated.

5. Clean oil level plug (1). Inspect the O-ring seal. Replace the O-ring seal if the O-ring seal is worn or damaged.

6. Install oil level plug (1).

7. Repeat the procedure for the other final drive.

i03756611

Final Drive Oil Sample - Obtain

SMCS Code: 4011-008; 4050-008; 4050-SM; 7542-008

⚠ WARNING

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

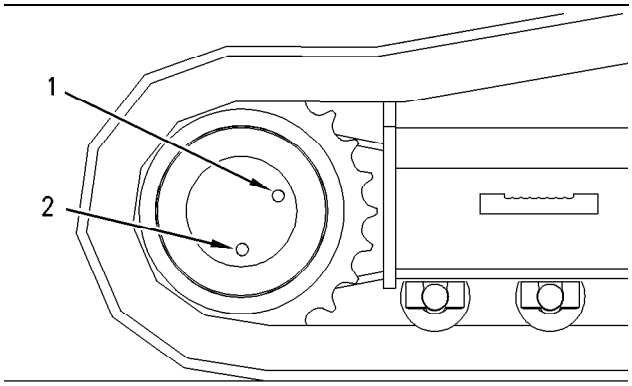

Illustration 352 g00822278

(1) Oil level plug
(2) Oil drain plug

1. Position the final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove oil level plug (1).

3. Obtain a sample of the final drive oil through the hole for the oil level plug.

4. Install oil level plug (1).

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” for more information on obtaining a sample of the final drive oil. For additional information about taking an oil sample, refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample”.

i02674917

Fuel System - Prime

SMCS Code: 1250-548

⚠ 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.

1. Open the engine hood.

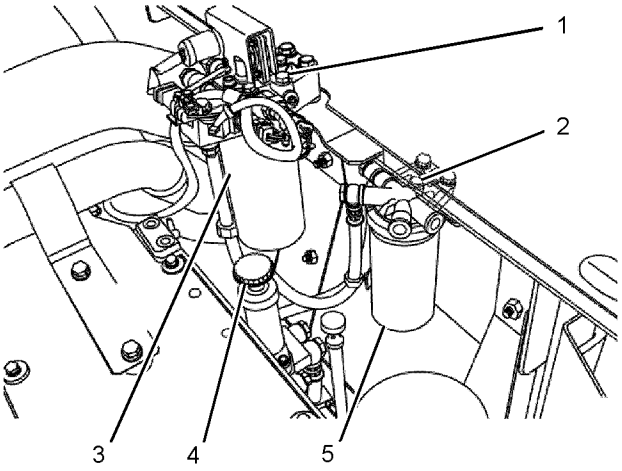

Illustration 353 g01344046

(1) Air vent
(2) Air vent
(3) Secondary fuel filter
(4) Priming pump plunger
(5) Third fuel filter

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

2. Loosen air vent (1) on the secondary fuel filter (3).

3. Rotate priming pump plunger (4) in a counterclockwise rotation. Rotate the plunger until the plunger becomes unlocked. Operate the priming pump plunger.

4. Tighten air vent (1) when the fuel flow is free of air bubbles.

5. Loosen air vent (2) on the third fuel filter (5).

6. Operate priming pump plunger (4).

7. Tighten air vent (2) when the fuel flow is free of air bubbles.

8. Push the plunger (4) inward and rotate the plunger clockwise.

i03017478

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

Note: The replacement interval for this filter is recommended at every 250 service hours or monthly for machines that meet the following conditions for severe applications:

- **Poor fuel storage or poor refueling procedures**
- **Poor fuel cleanliness or low fuel quality**
- **Dusty conditions**

Machines that are operated in normal applications should follow the replacement interval of every 500 service hours or 3 months.

⚠ 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
Do not fill the fuel filters with fuel before installing the fuel filters. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

1. Open the access door on the right side of the machine.

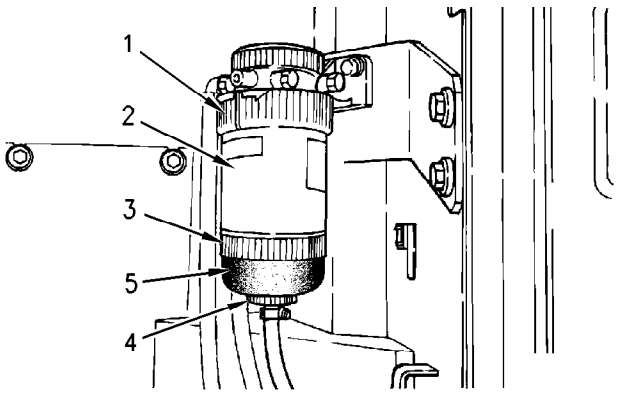

Illustration 354 g00687097

(1) Collar
(2) Water separator element
(3) Collar
(4) Drain valve
(5) Bowl

2. Turn drain valve (4) counterclockwise in order to open the drain valve. The drain valve is on the bottom of the water separator.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

3. Drain the water and the sediment into a suitable container.

Note: Dispose of used fluids according to local regulations.

4. Close drain valve (4).

5. Hold the bottom of water separator element (2) while you loosen collar (3).

6. Remove bowl (5).

7. Loosen collar (1).

8. Remove water separator element (2). Discard water separator element (2).

9. Clean the inside surfaces of the filter head and of the bowl (5).

10. Inspect the O-ring on bowl (5). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.

11. Install a new water separator element. Tighten collar (1) in order to secure the water separator element.

12. Install bowl (5). Tighten collar (3).

Note: Do not start the engine until all service to the fuel system is complete. For instructions about priming the fuel system, refer to Operation and Maintenance Manual, “Fuel System - Prime”.

13. Close the access door.

i03017492

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510

Note: The replacement interval for this filter is recommended at every 250 service hours or monthly for machines that meet the following conditions for severe applications:

- **Poor fuel storage or poor refueling procedures**
- **Poor fuel cleanliness or low fuel quality**
- **Dusty conditions**

Machines that are operated in normal applications should follow the replacement interval of every 500 service hours or 3 months.

⚠ 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
Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel systems parts.

1. Open the engine hood.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

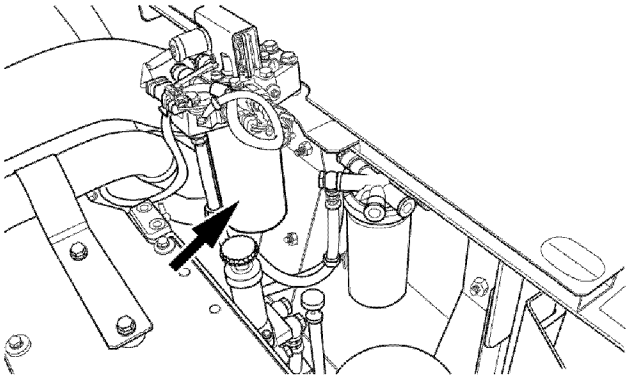

Illustration 355 g01354318

2. Remove the filter.

Note: Always discard used filters according to local regulations.

3. Clean the filter mounting base. Make sure that all of the old filter seal is removed.

4. Apply clean diesel fuel to the seal of the new fuel filter.

5. Install the new fuel filter hand tight until the seal of the fuel filter contacts the filter mounting base.

Note: Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

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.

6. Prime the fuel system. See Operation and Maintenance Manual, “Fuel System - Prime” for instructions.

7. Close the engine hood.

i02700131

Fuel System Third Filter - Replace

SMCS Code: 1261-510

⚠ 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
Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel systems parts.

1. Open the engine hood.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

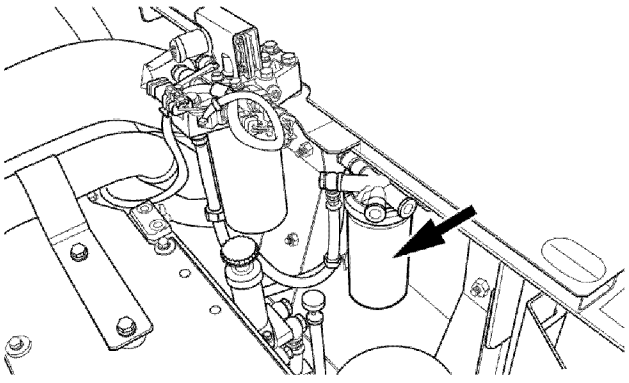

Illustration 356 g01354352

2. Remove the filter.

Note: Always discard used filters according to local regulations.

3. Clean the filter mounting base. Make sure that all of the old filter seal is removed.

4. Apply clean diesel fuel to the seal of the new fuel filter.

5. Install the new fuel filter hand tight until the seal of the fuel filter contacts the filter mounting base.

Note: Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

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.

6. Prime the fuel system. See Operation and Maintenance Manual, “Fuel System - Prime” for instructions.

7. Close the engine hood.

i01853474

Fuel System Water Separator - Drain

SMCS Code: 1263

1. Open the access door on the right side of the machine.

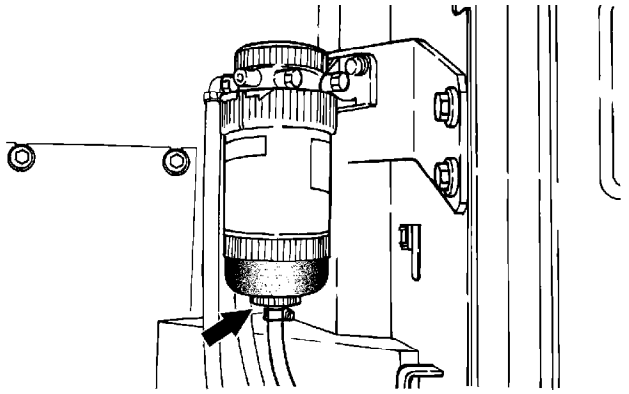

Illustration 357 g00686991

2. Turn the drain valve counterclockwise in order to open the drain valve.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

3. Drain the water and drain the sediment into a suitable container.

Note: Dispose of drained fluids according to local regulations.

4. Close the drain valve.

5. Close the access door.

i02702814

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-STR

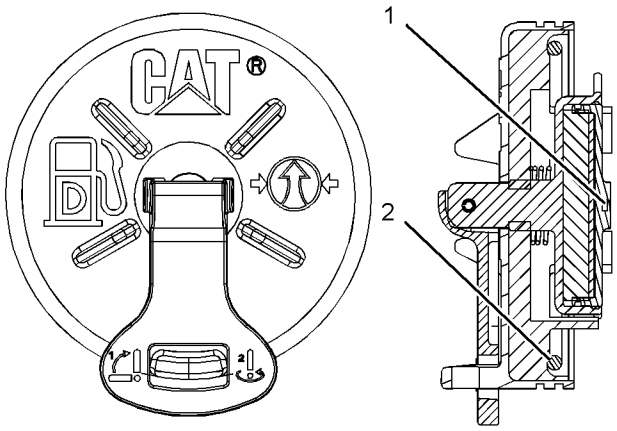

Illustration 358 g01355638

1. Remove the fuel cap.

2. Inspect seal (2) for damage. Replace the seal, if necessary.

3. Remove cover (1) from the fuel cap.

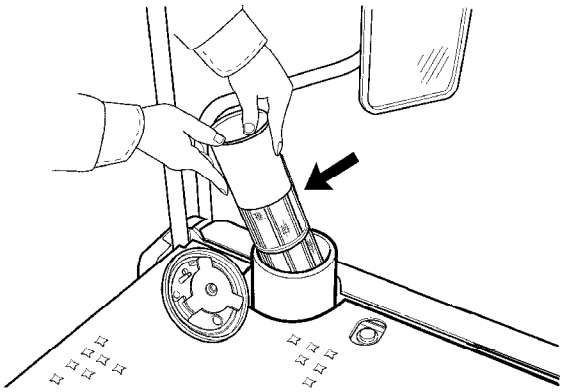

Illustration 359 g00824196

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

4. Remove the strainer that is located in the filler opening.

5. Wash the strainer and the fuel tank cap in a clean, nonflammable solvent.

6. Install a new cover (1).

7. Install the strainer into the filler opening.

8. Install the fuel tank cap.

i04363385

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

Refer to this Operation and Maintenance Manual, “Fuel Tank Shutoff and Drain Control” for the exact location of the fuel tank drain valve

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

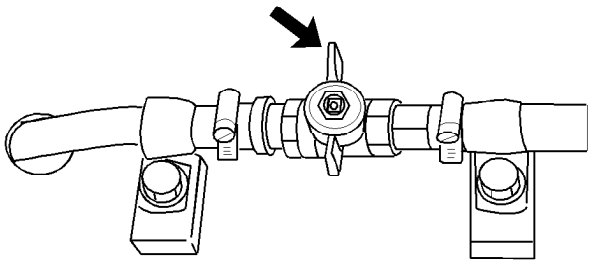

Illustration 360 g01043694
Typical example

1. Open the drain valve by turning the valve counterclockwise. Allow the water and the sediment to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

2. Close the drain valve by turning the valve clockwise.

i03622965

Fuses - Replace

SMCS Code: 1417-510

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

The fuse panel is located on the circuit breaker panel. Open the access cover for fuse access.

Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit and/or repair the circuit.

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 Caterpillar dealer.

To replace a fuse, use the puller that is stored in the fuse panel. Five fuses of 5 Amperes, five fuses of 10 Amperes, one fuse of 20 Amperes, and one fuse of 25 Amperes are contained in the fuse panel as spare fuses.

Early Type

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

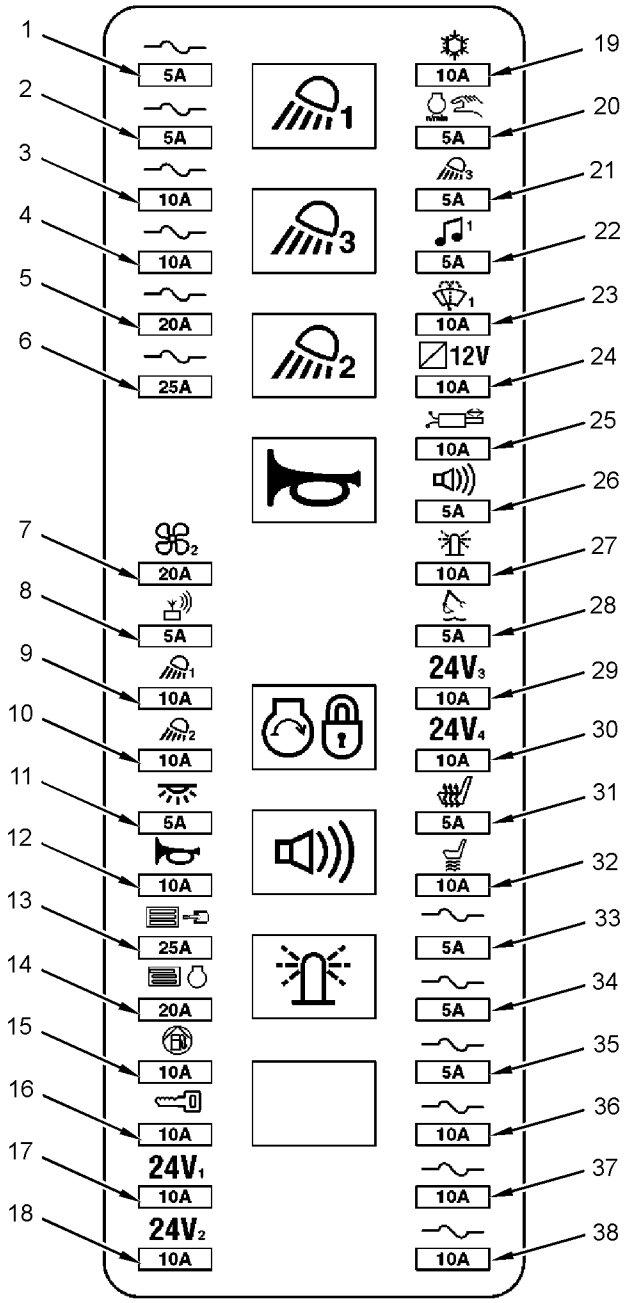

Illustration 361 g01257812

(1) Spare – 5 Amp

(2) Spare – 5 Amp

(3) Spare – 10 Amp

(4) Spare – 10 Amp

(5) Spare – 20 Amp

(6) Spare – 25 Amp

(7) Air Conditioner Blower – 20 Amp

(8) Product Link – 5 Amp

(9) Boom Light – 10 Amp

(10) Cab Lamp – 10 Amp

(11) Monitor – 5 Amp

(12) Horn – 10 Amp

(13) Electric Control Module – 25 Amp

(14) Engine Control – 20 Amp

(15) Priming Pump – 10 Amp

(16) Ignition Switch – 10 Amp

(17) Auxiliary Circuit – 10 Amp

(18) Auxiliary Circuit – 10 Amp

(19) Heater – 10 Amp

(20) Backup – 5 Amp

(21) Chassis Lamp – 5 Amp

(22) Radio – 5 Amp

(23) Wipers – 10 Amp

(24) 12 volt Converter – 10 Amp

(25) Solenoid – 10 Amp

(26) Travel – 5 Amp

(27) Beacon – 10 Amp

(28) Boom Float – 5 Amp

(29) Auxiliary Circuit – 10 Amp

(30) Auxiliary Circuit – 10 Amp

(31) Seat Heater – 5 Amp

(32) Air Suspension Seat – 10 Amp

(33) Spare – 5 Amp

(34) Spare – 5 Amp

(35) Spare – 5 Amp

(36) Spare – 10 Amp

(37) Spare – 10 Amp

(38) Spare – 10 Amp

Later Type

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

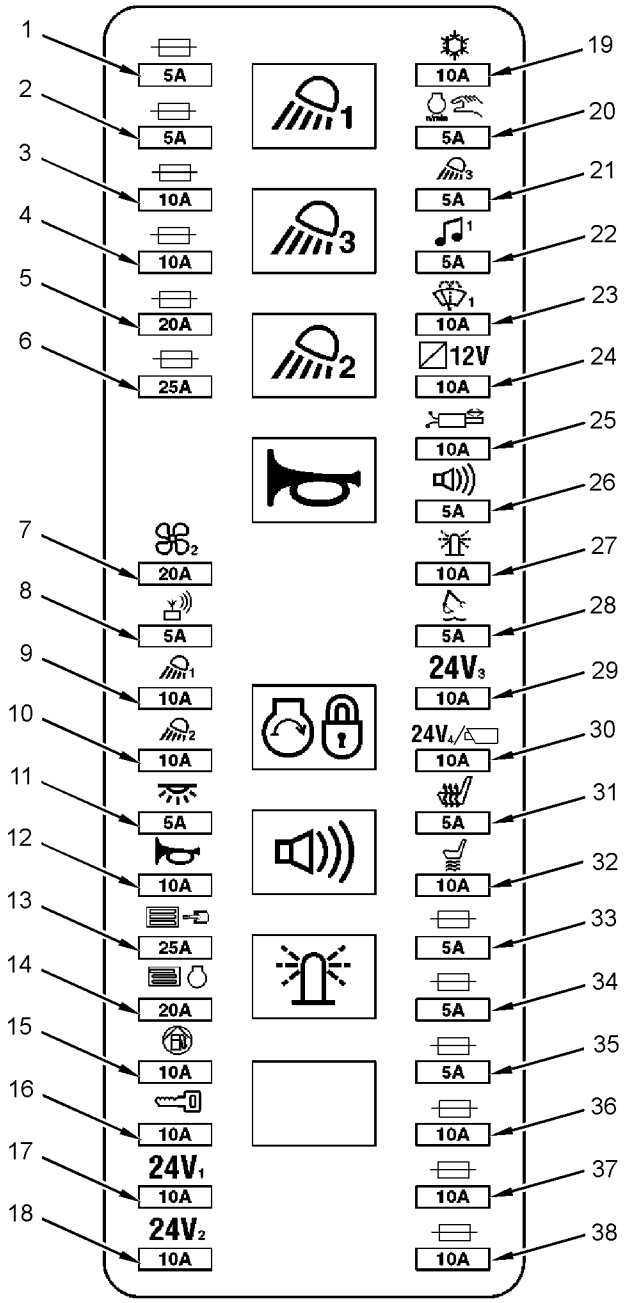

Illustration 362 g01943698

(1) Spare – 5 Amp

(2) Spare – 5 Amp

(3) Spare – 10 Amp

(4) Spare – 10 Amp

(5) Spare – 20 Amp

(6) Spare – 25 Amp

(7) Air Conditioner Blower – 20 Amp

(8) Product Link – 5 Amp

(9) Boom Light – 10 Amp

(10) Cab Lamp – 10 Amp

(11) Monitor – 5 Amp

(12) Horn – 10 Amp

(13) Electric Control Module – 25 Amp

(14) Engine Control – 20 Amp

(15) Priming Pump – 10 Amp

(16) Ignition Switch – 10 Amp

(17) Auxiliary Circuit – 10 Amp

(18) Auxiliary Circuit – 10 Amp

(19) Heater – 10 Amp

(20) Backup – 5 Amp

(21) Chassis Lamp – 5 Amp

(22) Radio – 5 Amp

(23) Wipers – 10 Amp

(24) 12 volt Converter – 10 Amp

(25) Solenoid – 10 Amp

(26) Travel – 5 Amp

(27) Beacon – 10 Amp

(28) Boom Float – 5 Amp

(29) Auxiliary Circuit – 10 Amp

(30) Auxiliary Circuit and Camera – 10 Amp

(31) Seat Heater – 5 Amp

(32) Air Suspension Seat – 10 Amp

(33) Spare – 5 Amp

(34) Spare – 5 Amp

(35) Spare – 5 Amp

(36) Spare – 10 Amp

(37) Spare – 10 Amp

(38) Spare – 10 Amp

Relays

The following list identifies the circuits that are protected by each relay.

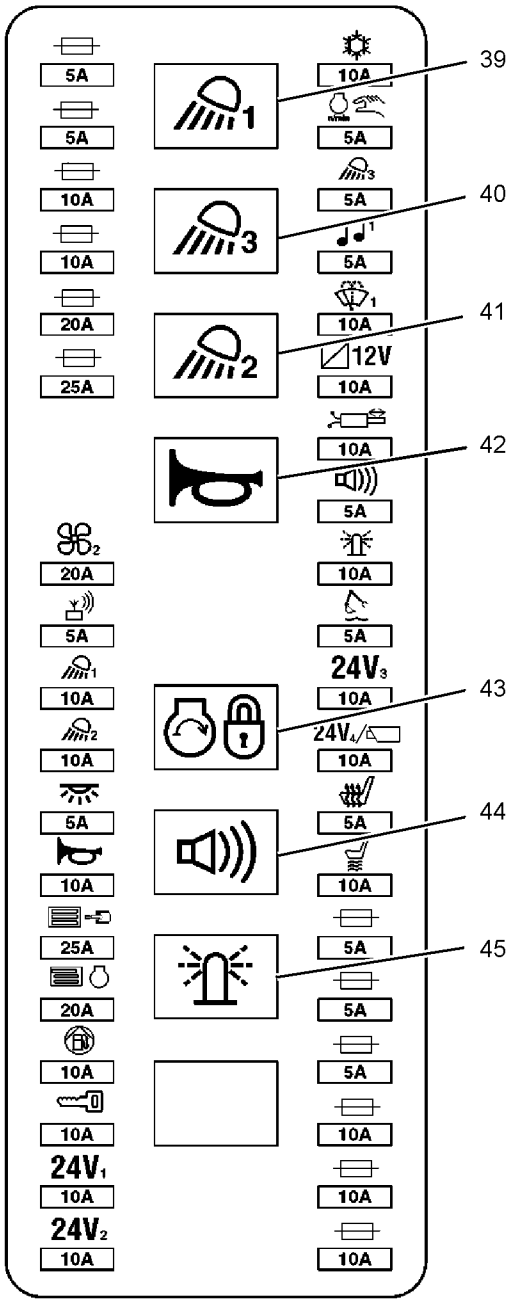

Illustration 363 g01943700

(39) Boom Light – Relay

(40) Chassis Lamp – Relay

(41) Cab Lamp – Relay

(42) Horn – Relay

(43) Neutral Start – Relay

(44) Travel Alarm – Relay

(45) Beacon – Relay

i07349182

High Intensity Discharge Lamp (HID) - Replace
(If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE
Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.
2. Disassemble the housing for the HID lamp in order to have access to the bulb.

Note: On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

3. Remove the bulb from the HID lamp.
4. Install the replacement bulb in the HID lamp.

   If the bulb is an integral part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: In order to avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.

6. Reattach the electrical power to the HID lamp.

7. Check the HID lamp for proper operation.

Note: Consult your Cat dealer for additional information on HID lamps.

i06885696

Hydraulic System Oil - Change

SMCS Code: 5056-044

Cat HYDO Advanced Oil Change Interval

The standard Cat HYDO Advanced oil change interval is every 6000 service hours or 3 years.

The 6000 service hour or 3 year maintenance interval for hydraulic oil (change) is strongly recommended with S·O·S monitoring of the hydraulic oil after 3000 service hours. The interval for S·O·S monitoring is every 500 hours. An oil change is strongly recommended when the oil deterioration or contamination is detected. The maintenance interval for the hydraulic oil filter is not changed.

Machines with hammers are not included in the 6000 service hour or 3 year maintenance interval. Machines with hammers must use the intervals that are listed in the Maintenance Interval Schedule. Machines that are used in severe conditions are not included in the 6000 service hour or 3 year maintenance interval.

Note: If Cat HYDO Advanced hydraulic oil is not used, the normal interval of 6000 hours is decreased to 2000 service hours or 1 year.

Consult your Cat dealer for details.

Procedure to Change the Hydraulic Oil

⚠ WARNING

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

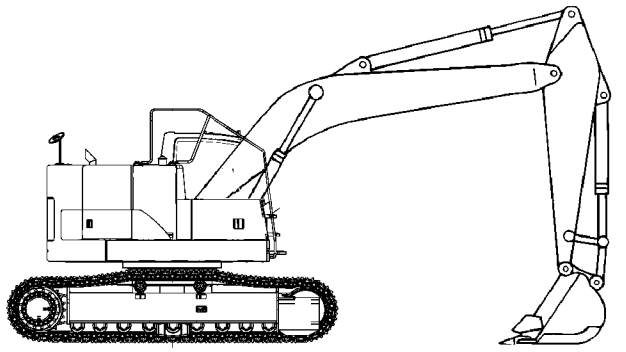

Illustration 364 g01357600

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

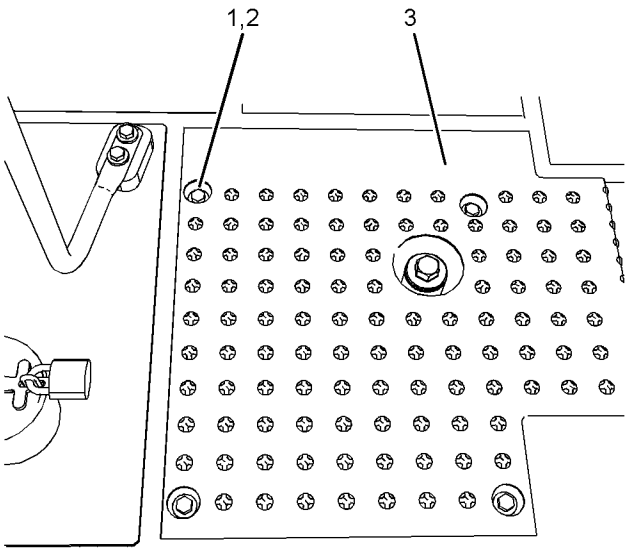

Illustration 365 g01363143

(1) Bolt
(2) Washer
(3) Cover

2. Remove bolts (1), washers (2) and cover (3) from the top of the hydraulic tank.

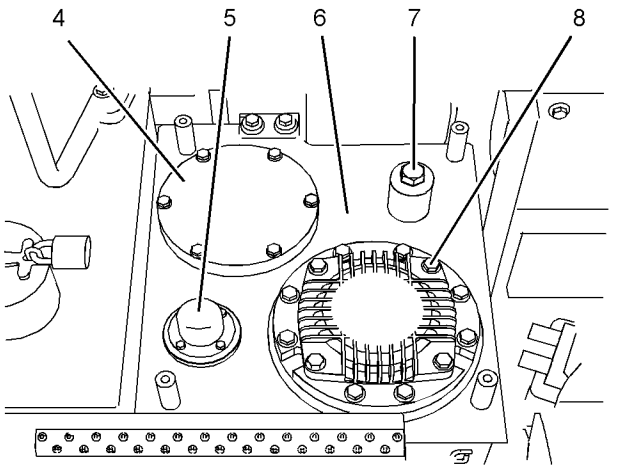

Illustration 366 g01363160

(4) Cover for screen
(5) Breather
(6) Tank
(7) Filler plug
(8) Hydraulic return filter

3. Clean the area thoroughly in order to keep dirt out of screen cover (4). Clean the area thoroughly in order to keep dirt out of filler plug (7).

4. Slowly loosen the filler plug (7) on top of the hydraulic tank in order to relieve remaining internal pressure of the hydraulic tank.

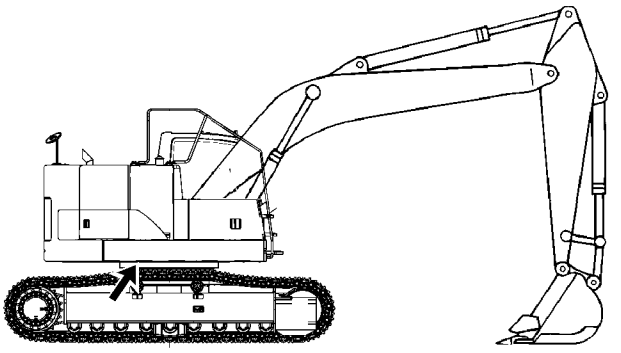

Illustration 367 g01944055

The oil drain valve is located under the hydraulic tank.

5. Remove the hydraulic tank access cover that is located under the upper structure. This will allow access to the drain valve.

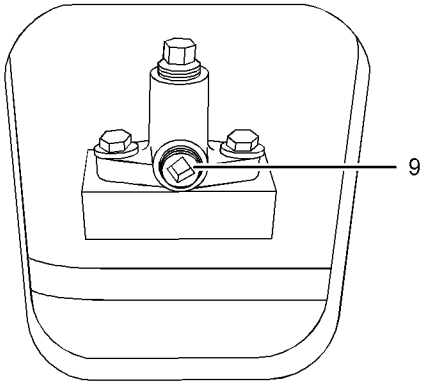

Illustration 368 g01363381

(9) Plug

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

6. Remove plug (9).

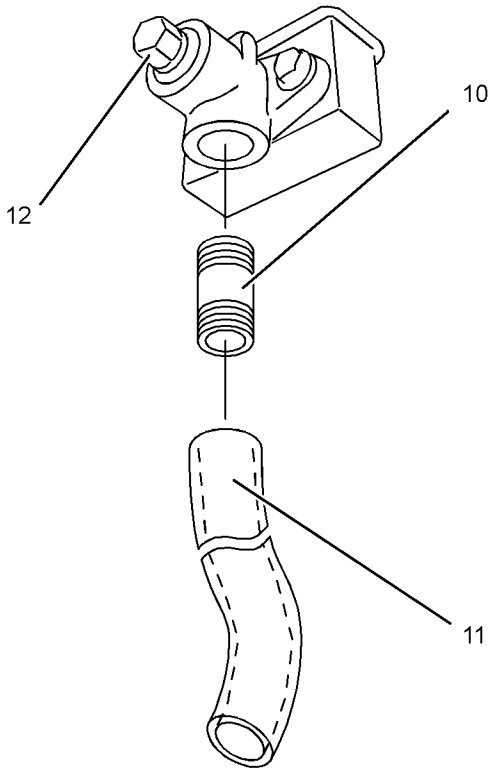

Illustration 369 g01363384

(10) Pipe Nipple
(11) Hose
(12) Drain plug

7. Install a pipe nipple (10) with hose (11) into the hole on the bottom of the hydraulic tank.

8. Loosen drain plug (12) in order to drain the oil.

9. Drain the oil into a suitable container.

10. After the oil has been drained, tighten drain plug (12) to 110 ± 15 N·m (81 ± 11 lb ft).

11. Remove Pipe Nipple (10) and hose (11).

12. Clean plug (9) and install the plug. Tighten the plug to 75 ± 5 N·m (55 ± 5 lb ft).

13. Open the access door on the right side of the machine.

14. Clean the pump, the hydraulic lines, and the hydraulic tank.

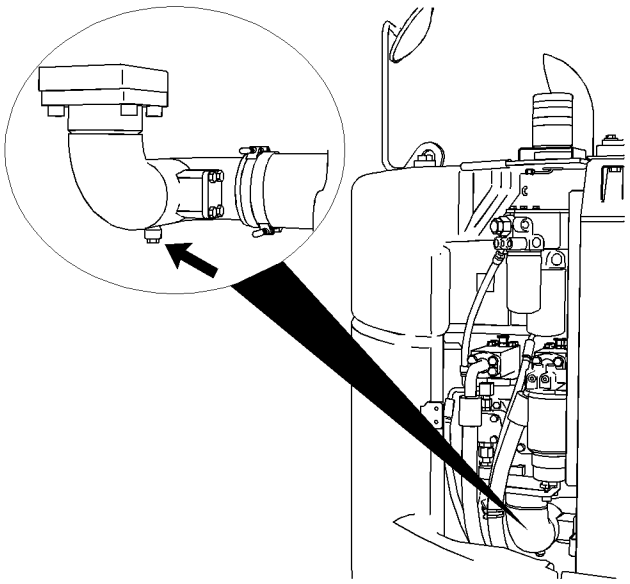

Illustration 370 g01363413

15. Remove the plug from the tube. Allow the oil to drain into a container.

Note: Dispose of used filters and used fluids according to local regulations.

16. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

17. Clean the plug. Install the plug and the O-ring into the drain port.

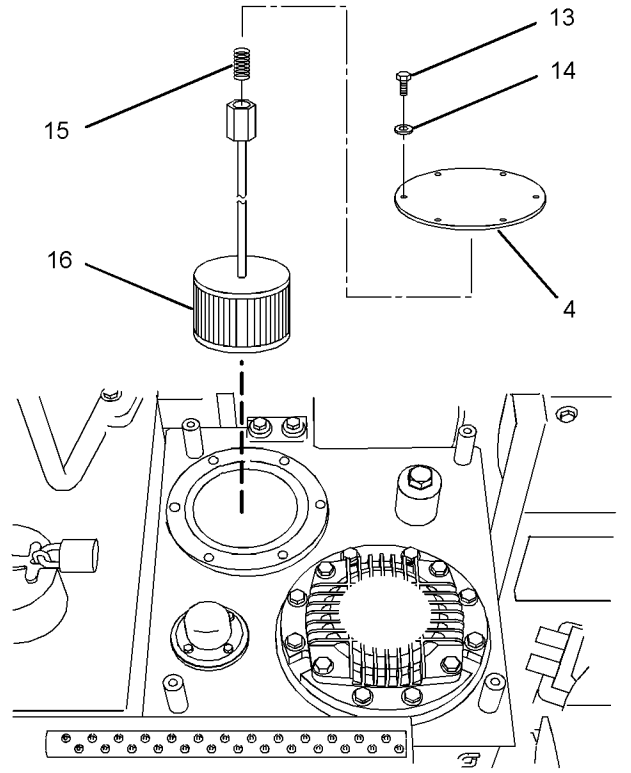

Illustration 371 g01363629

(13) Bolts
(14) Washers
(4) Cover for screen
(15) Spring
(16) Screen

18. Remove bolts (13), washers (14) and cover (4).

Note: Dispose of used filters and used fluids according to local regulations.

Note: Do not allow spring (15) to fall back into the tank.

19. Remove spring (15) and screen (16).

Note: Refer to Operation and Maintenance, “General Hazard Information” for information on containing fluid spillage.

20. Wash the screen (16) in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

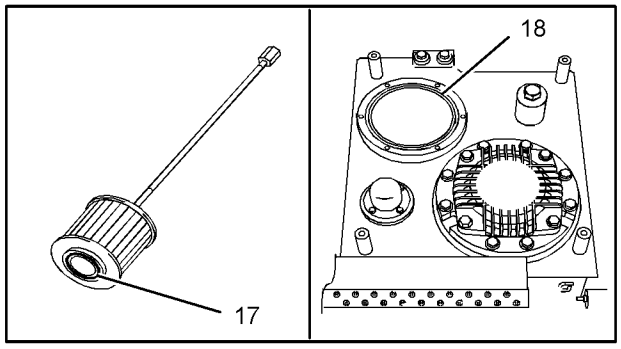

Illustration 372 g01363676

(17) O-ring seal
(18) O-ring seal

21. Remove O-ring seal (17) from the screen.

22. Inspect O-ring seals (17) and (18). Replace the O-ring seals if wear or damage is evident.

23. Install O-ring seal (17) on screen (16).

24. Install screen (16) and spring (15). Then install cover (4), washers (14), and bolts (13).

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

25. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

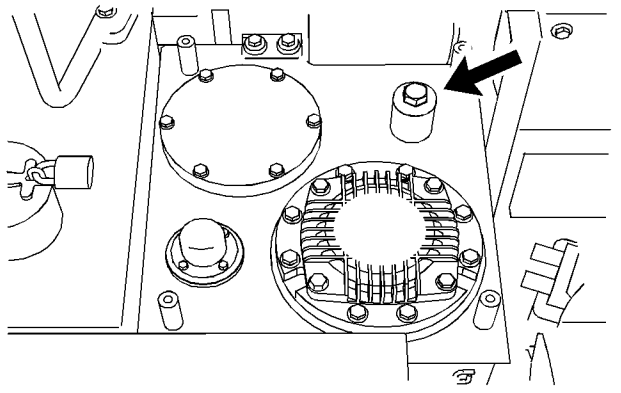

Illustration 373 g01363713

26. Inspect the O-ring seal on the filler plug for damage. Replace the O-ring, if necessary. Clean the filler plug. Install the filler plug.

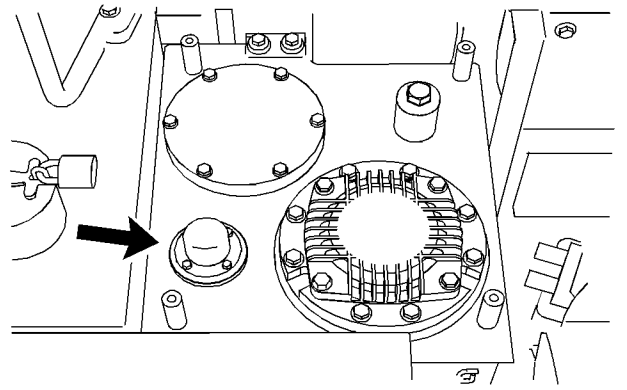

Illustration 374 g01363717

27. Inspect the breather. Clean the breather.

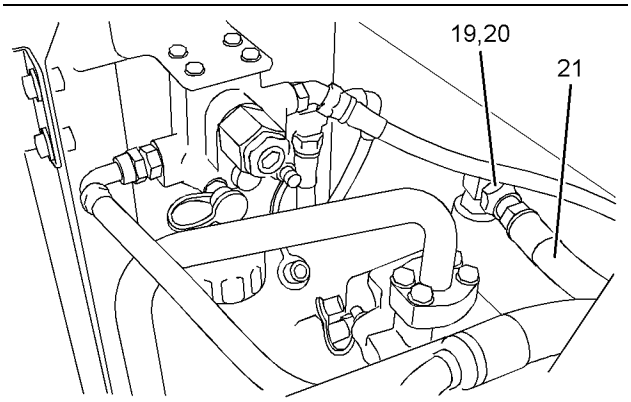

Illustration 375 g01363722

(19) Seal
(20) Connector
(21) Drain hose

Note: Make no attempt to start the engine until the pump has been filled with hydraulic oil. Serious damage to the hydraulic components can result.

28. When the hydraulic oil has been replaced, the air must be removed from the hydraulic oil system. To remove the air from the hydraulic oil system, follow Step 28a through Step 28g.

a. While the engine is stopped, remove drain hose (21), connector(20) and seal (19) from the top of the pump. Add hydraulic oil through the opening.

b. Check the condition of seal (19). If the seal is damaged, replace the seal.

c. After the pump has been filled with oil, install drain hose (21), connector(20) and seal (19) to the original locations.

d. Start the engine. When the engine is at low idle, fully raise the boom. Hold the boom in this position.

e. Slowly loosen the drain hose (21) until the air has been released from the pump.

f. Tighten the drain hose (21).

g. Stop the engine. Slowly lower the boom until the bucket is on the ground. This pressurizes the hydraulic tank.

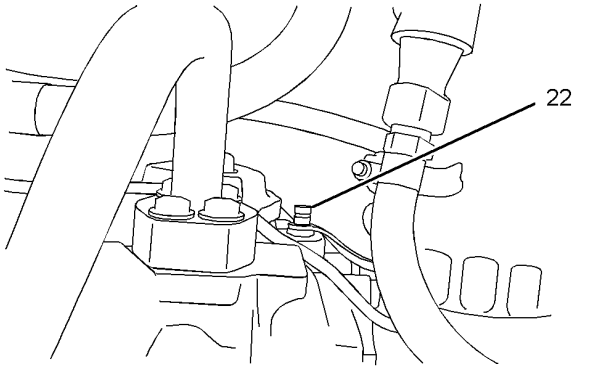

Illustration 376 g01363758

(22) Vent plug

h. Slowly loosen vent plug (22) until the hydraulic oil flows out of the opening. This indicates that the air has been released from the pump.

i. Tighten vent plug (22).

29. Start the engine. Operate the engine at idling speed for five minutes.

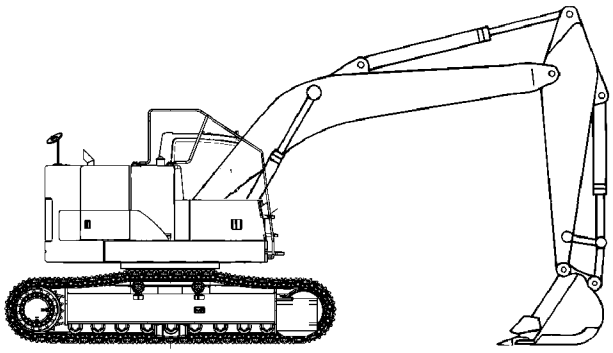

Illustration 377 g01357600

30. Operate the joysticks in order to circulate the hydraulic oil. Lower the bucket to the ground so that the stick is vertical to the ground. Stop the engine.

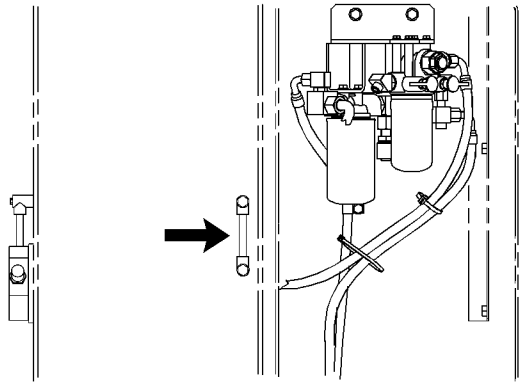

Illustration 378 g01347274

Location of sight glass on the hydraulic tank

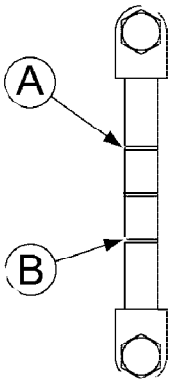

Illustration 379 g00854974

31. Maintain the oil level between the marks on the sight gauge in the appropriate temperature range.

32. Close the access door.

i03625999

Hydraulic System Oil Filter (Case Drain) - Replace

SMCS Code: 5068-510; 5091-510

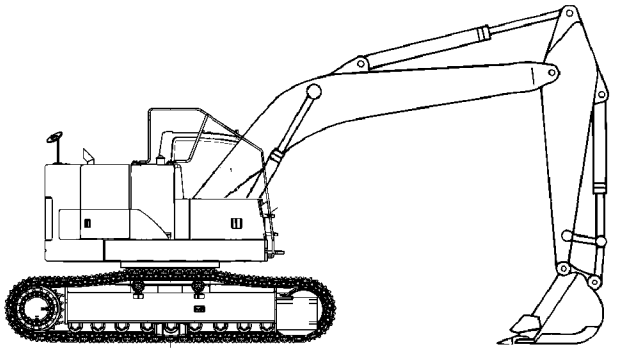

Illustration 380 g01357600

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

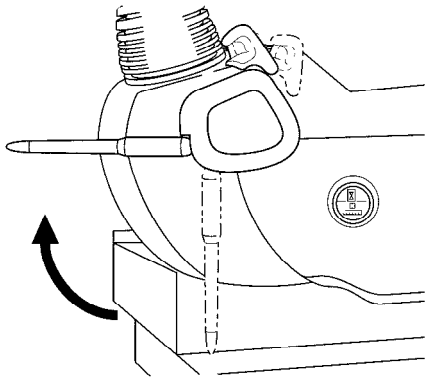

Illustration 381 g00855064

2. Move the hydraulic lockout control to the UNLOCKED position.

3. Turn the engine start switch to the ON position.

4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the pilot lines.

5. Turn the engine start switch to the OFF position and return the hydraulic lockout control to the LOCKED position.

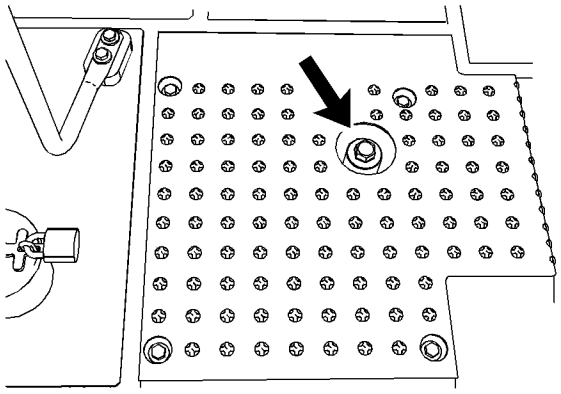

Illustration 382 g01364069

6. Slowly loosen the filler plug on top of the hydraulic tank in order to relieve remaining internal pressure of the hydraulic tank.

7. After the pressure is relieved, tighten the filler plug.

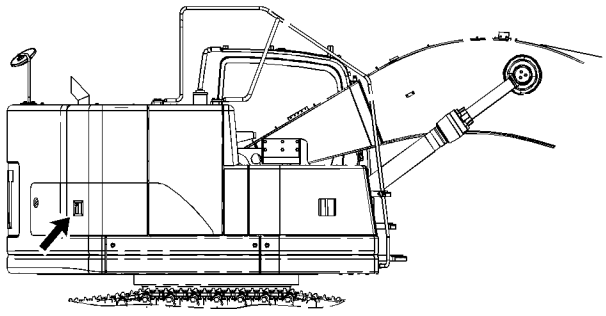

Illustration 383 g01344644

8. Open the access door on the right side of the machine.

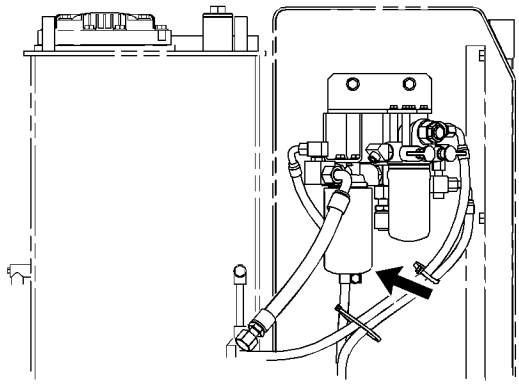

Illustration 384 g01344646

9. Clean the area in order to keep dirt out of the filter base.

10. Remove the used case drain filter from the filter base.

Note: Used filters should always be disposed of according to local regulations.

11. Clean the filter base. Make sure that the old filter seal has been removed.

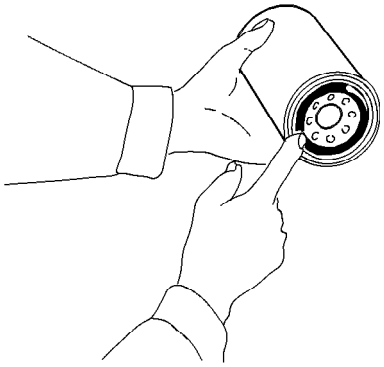

Illustration 385 g00101502

12. Coat the seal of a new case drain filter with clean hydraulic oil.

13. Install the new oil filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

14. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

15. Close the access door on the right side of the machine.

16. Start the engine and operate the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles.

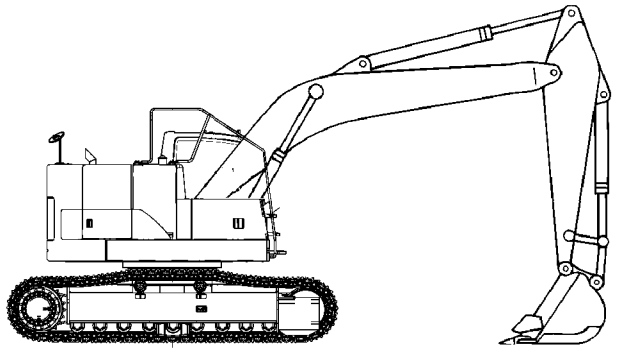

Illustration 386 g01357600

17. Return the machine to the position that is shown in Illustration 386 . Check the machine for oil leaks.

18. Stop the engine.

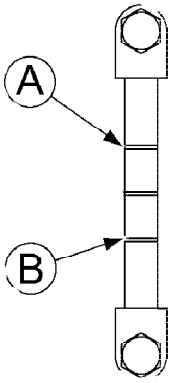

Illustration 387 g00854974

(A) High temperature range
(B) Low temperature range

19. Maintain the oil level in the low temperature range for a cold machine. Maintain the oil level in the high temperature range for a machine that is at a normal operating temperature.

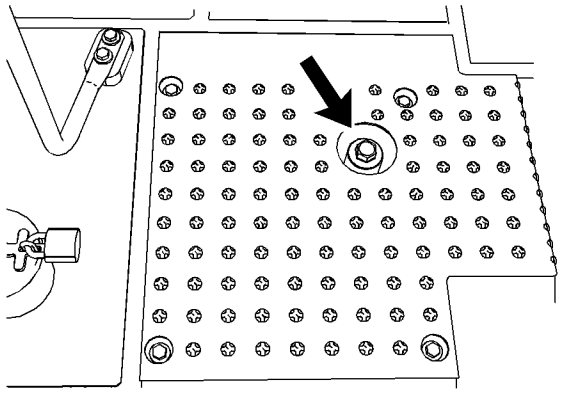

Illustration 388 g01364069

20. Slowly loosen the filler plug in order to relieve any remaining pressure. Remove the filler plug in order to add oil, if necessary.

21. Clean the filler plug. Inspect the O-ring. Replace the O-ring if wear or damage is evident. Install the filler plug.

i02717744

Hydraulic System Oil Filter (Pilot) - Replace

SMCS Code: 5068-510; 5068-510-PS; 5092-510

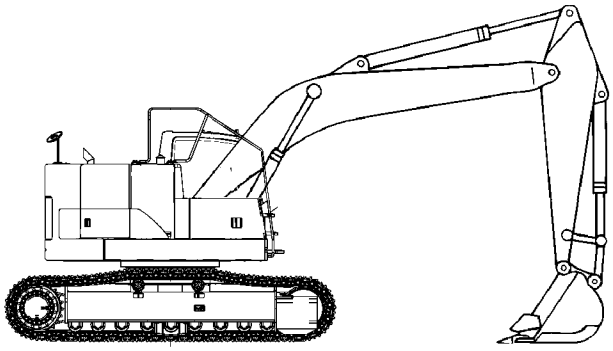

Illustration 389 g01357600

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

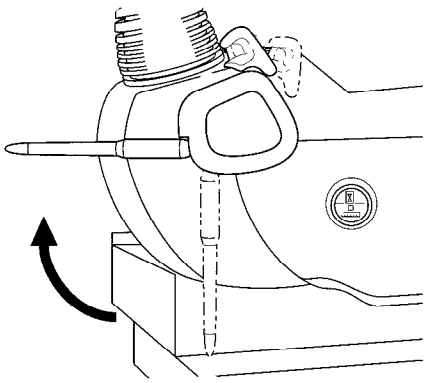

Illustration 390 g00855064

2. Move the hydraulic lockout control to the UNLOCKED position.

3. Turn the engine start switch to the ON position.

4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the pilot lines.

5. Turn the engine start switch to the OFF position and return the hydraulic lockout control to the LOCKED position.

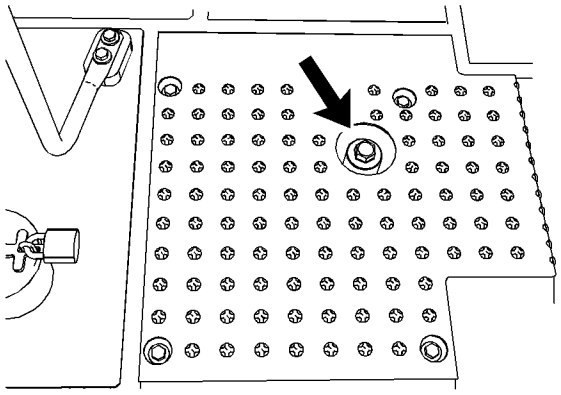

Illustration 391 g01364069

6. Slowly loosen the filler plug on top of the hydraulic tank in order to relieve remaining internal pressure of the hydraulic tank.

7. After the pressure is relieved, tighten the filler plug.

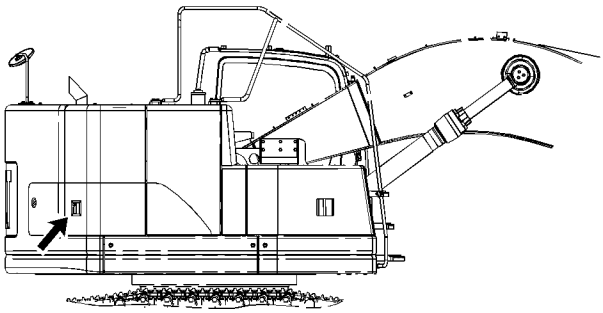

Illustration 392 g01344644

8. Open the access door on the right side of the machine.

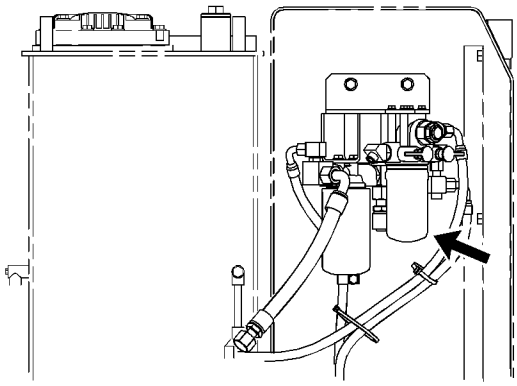

Illustration 393 g01344831

9. Clean the area in order to keep dirt out of the filter base.

10. Remove the used pilot filter element from the filter base.

Note: Used filters should always be disposed of according to local regulations.

11. Clean the filter base.

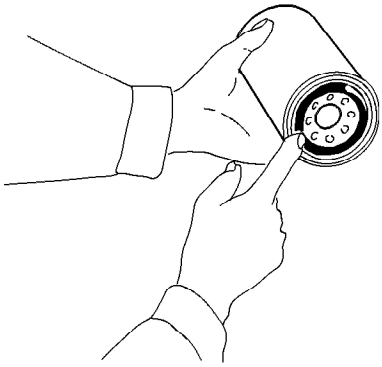

Illustration 394 g00101502

12. Coat the seal of a new pilot filter with clean hydraulic oil.

13. Install the new oil filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

14. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

15. Close the access door.

i02717759

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

The return filter is a cartridge type filter. By using a cartridge type filter, the amount of foreign material that enters the hydraulic system is reduced when the filter element is replaced.

Two different filters are available for the return filter. One filter is used for standard applications such as digging and normal use of a hammer. The second filter is used for an application such as demolishing a ceiling in a tunnel with a hammer.

Note: If the message display shows that the hydraulic return filter is plugged, turn off the machine. After you make sure that the warning has disappeared, start the machine and run the machine on level ground for approximately 10 minutes. If the warning still appears in the message display, inspect the filter and replace the filter, if necessary.

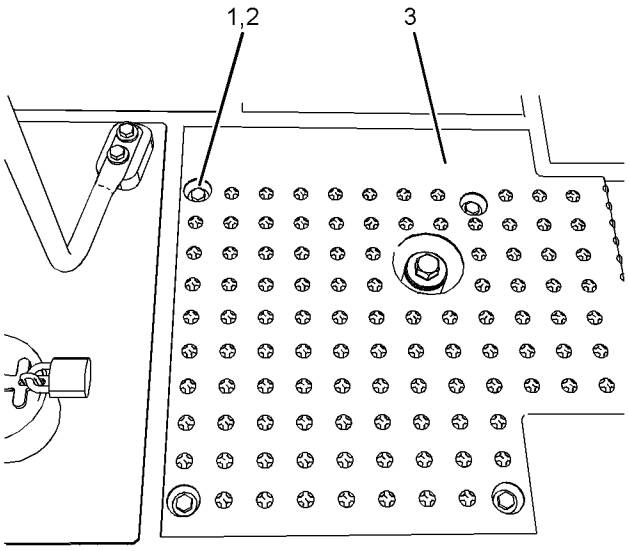

Illustration 395 g01363143

1. Remove bolts (1), washers (2) and plate (3) from the top of the hydraulic tank.

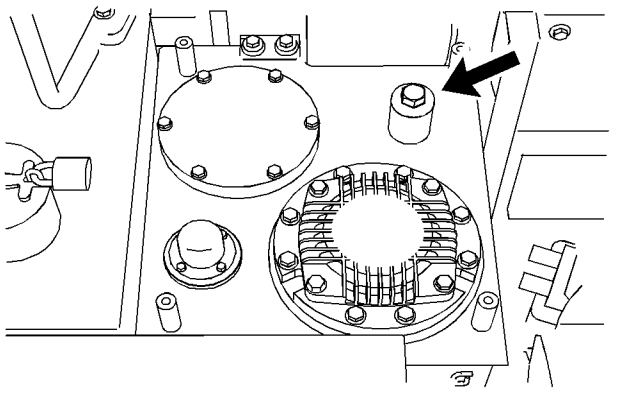

Illustration 396 g01363713

2. Loosen the filler plug in order to relieve remaining hydraulic tank pressure. Tighten the filler plug after the hydraulic tank pressure is relieved.

3. Remove the filter cartridge. Perform Step 3a through Step 3f in order to remove the filter cartridge.

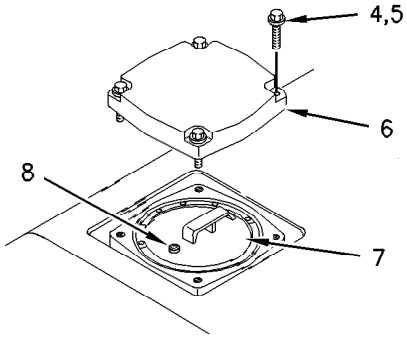

Illustration 397 g00786177

(4) Bolts
(5) Washers
(6) Cover
(7) Filter cartridge
(8) Plug

a. Remove bolts (4), washers (5), and cover (6).

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

b. Remove plug (8) in order to release the pressure in filter cartridge (7).

Note: When plug (8) is removed the oil level in the return filter drops to the level of the hydraulic tank.

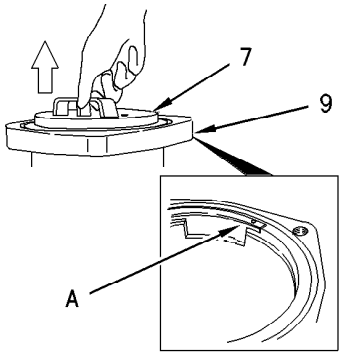

Illustration 398 g00786183

(7) Filter cartridge
(9) Filter case
(A) Guide

c. Pull up the handle at the top of filter cartridge (7) until the filter cartridge contacts guide (A) on filter case (9).

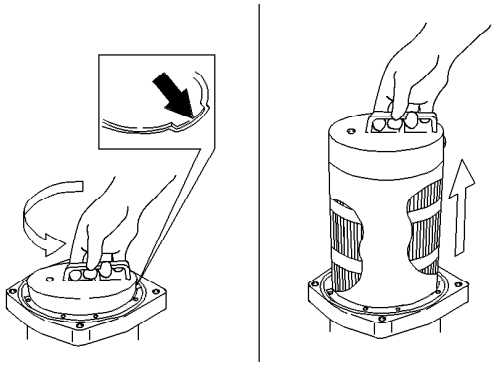

Illustration 399 g00102214

d. Turn the filter cartridge counterclockwise by 180 degrees in order to align the projection of the filter cartridge with the notch of the filter case. Pull out the filter cartridge.

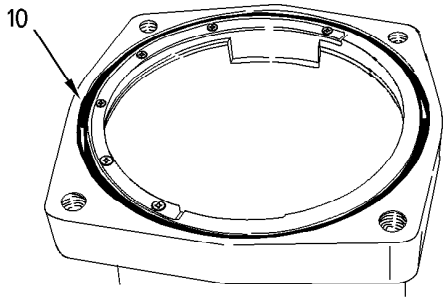

Illustration 400 g00786186

(10) O-ring

e. Inspect the cover and O-ring (10). If either part is damaged, replace the part.

f. Inspect the filter cartridge for debris and for damage. If necessary, replace the filter cartridge.

4. Remove the filter element. Perform Step 4a through Step 4f in order to remove the filter element.

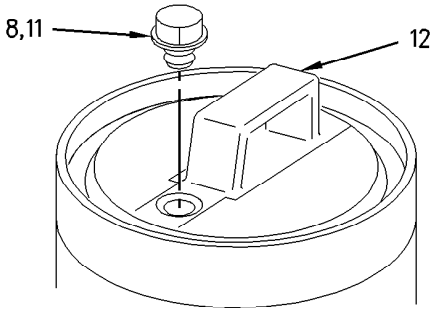

Illustration 401 g00786193

(8) Plug
(11) O-ring
(12) Plate

a. Make sure that plug (8) is removed. Make sure that all of O-ring (11) is removed from plate (12).

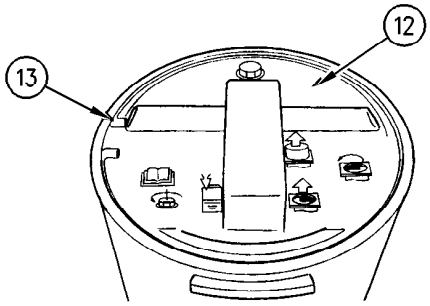

Illustration 402 g00945040

(12) Plate
(13) Spiral retaining ring

b. Remove spiral retaining ring (13).

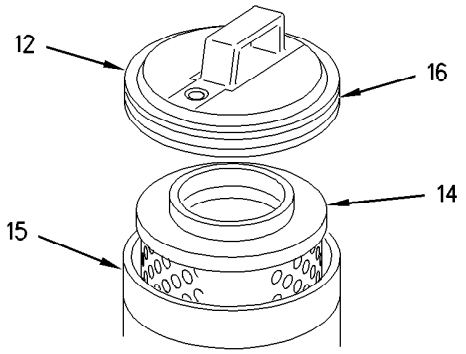

Illustration 403 g00786204

(12) Plate
(14) Filter element
(15) Shell
(16) O-ring

c. Hold the filter cartridge with one hand. Grasp the grip of plate (12) with your other hand. Lift plate (12) in order to separate plate (12) from the filter cartridge.

d. Remove O-ring (16) from plate (8).

e. Lift filter element (14) from shell (15).

f. Pour the remaining oil into a suitable container.

Note: Dispose of used oil according to local regulations.

g. Repeat Step 4a through Step 4f for the other filter groups.

5. Clean the shell of the filter cartridge. Perform Step 5a through Step 5d in order to clean the shell of the filter cartridge.

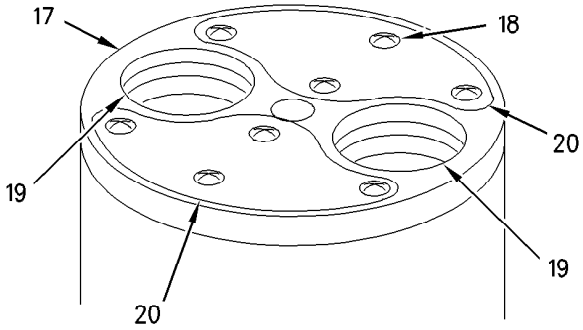

Illustration 404 g00786209

(17) Slide plate
(18) Screws
(19) Port
(20) Blocking pads

a. Turn shell (15) upside-down.

b. Remove screws (18).

c. Remove blocking pads (20) from slide plate (17).

d. Wash the following parts in a clean nonflammable solvent: plug (8), plate (12), spiral retaining ring (13), shell (15) and blocking pads (20). Dry the parts.

6. Install the filter elements. Perform Step 6a through Step 6k in order to install the filter elements.

Note: Consult a Caterpillar dealer for the Service Kit that is needed to install the filter element and the filter cartridge.

a. Apply spray type oil to the inside of shell (15) in order to prevent rust.

b. Apply grease to a new O-ring (16).

c. Plate (12) will contact the inside of shell (15). Apply grease to this point.

d. Apply grease to O-rings inside ports (19) at the bottom of shell (15).

e. Install new blocking pads (20) with screws (18). Tighten the screws to a torque of 0.4 N·m (3.5 lb in).

f. Apply spray type oil into the clearance between shell (15) and slide plate (17).

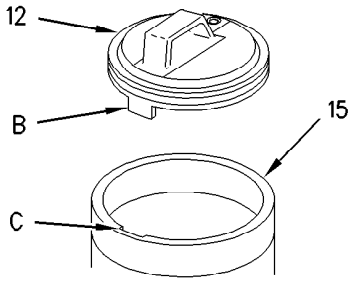

Illustration 405 g00786216

(12) Plate
(15) Shell
(B) Boss
(C) Notch

g. Turn over shell (15). Apply grease to the two O-rings on new element (14). Install element (14) into shell (15).

h. Move boss (B) in alignment with notch (C). Install plate (12) into shell (15).

i. Install spiral retaining ring (13) into the groove in shell (15).

j. Apply grease to new O-ring (11). Install O-ring (11) on plug (8).

k. Install plug (8) into plate (12).

7. Install the filter cartridge. Perform Step 7a through Step 7e in order to install the filter cartridge.

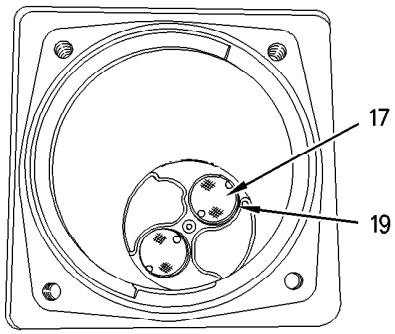

Illustration 406 g00786218

(17) Slide plate
(19) Port

a. Check that ports (19) at the bottom of the filter case are closed.

Note: If the ports are open, rotate slide plate (17) counterclockwise to the stopper in order to fully close the ports. When the ports are fully closed, any remaining oil in the filter case should be completely removed.

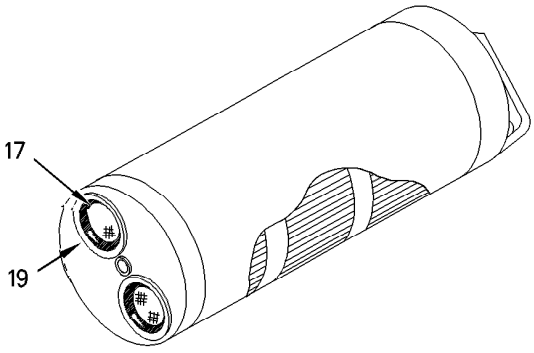

Illustration 407 g00786236

(17) Slide plate
(19) Port

b. Check that ports (19) of the filter cartridge are fully closed.

Note: The filter cartridge cannot be installed unless the ports are fully closed. If the ports are open, rotate slide plate (17) counterclockwise to the stopper in order to fully close the ports.

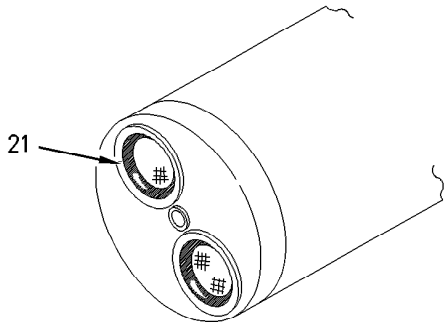

Illustration 408 g00786241

(21) O-rings

c. Check that O-rings (21) have been installed and that oil has been applied to O-rings (21).

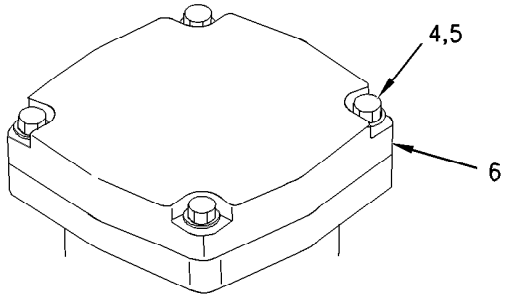

Illustration 409 g00786247

(4) Bolts
(5) Washers
(6) Cover

d. Install the filter cartridge into the filter case. Turn the filter cartridge clockwise by 180 degrees and push down the filter cartridge when the filter cartridge contacts guide (A).

e. Install cover (6), washers (5), and bolts (4). Tighten bolts (4) to a torque of 30 ± 5 N·m (22 ± 4 lb ft).

i05274488

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

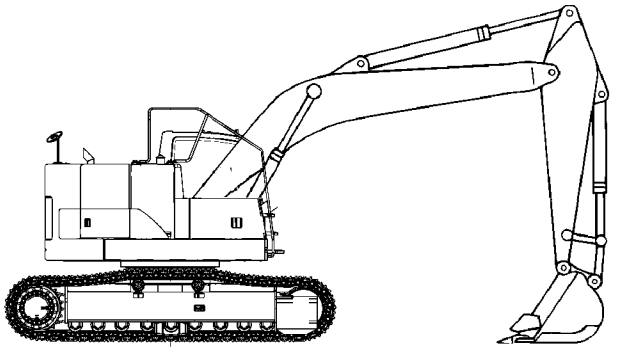

Illustration 410 g01357600

The hydraulic oil tank is on the right side of the machine.

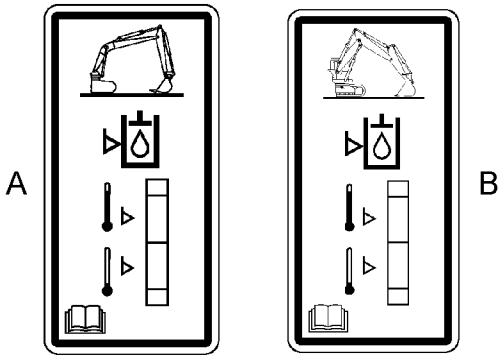

Illustration 411 g03354957

(A) One-Piece Boom
(B) VA Boom

1. Park the machine on level ground. Lower the bucket to the ground with the stick in a vertical position, as shown.

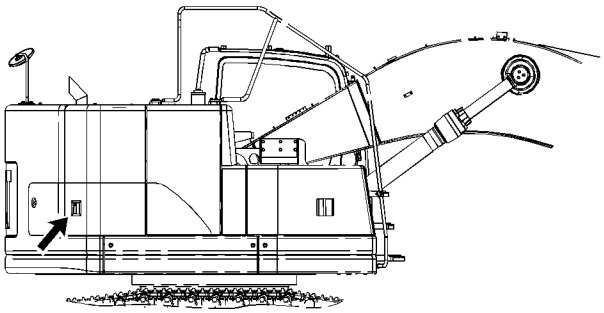

Illustration 412 g01344644

2. Open the access door on the right side of the machine.

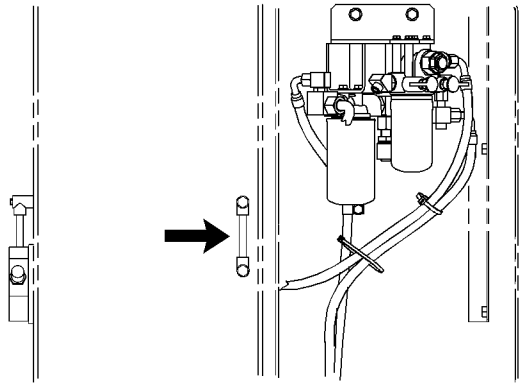

Illustration 413 g01345022

3. Locate the hydraulic oil level gauge on the hydraulic oil tank.

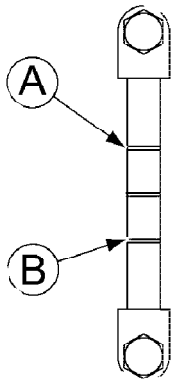

Illustration 414 g00854974

4. For a cold machine, maintain the hydraulic oil level in the low temperature range (B). For a machine that is at normal operating temperature, maintain the hydraulic oil level in the high temperature range (A).

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

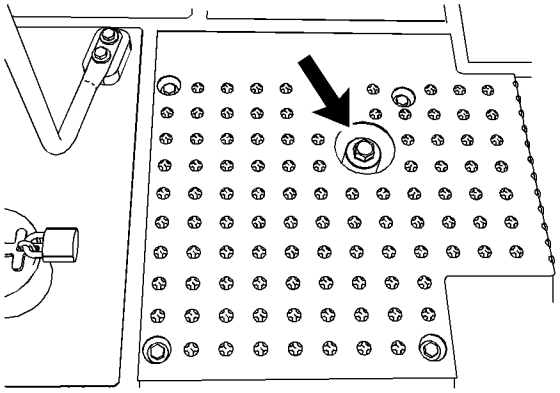

Illustration 415 g01364069

5. Slowly loosen the filler plug on top of the hydraulic tank in order to relieve remaining internal pressure of the hydraulic tank. add oil, if necessary.

6. Clean the filler plug and install the filler plug.

i05966675

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-SM; 5095-008; 7542; 7542-008

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 6000 hours. S·O·S services after 3,000 hour is strongly Recommended. Consult your Cat dealer for details.

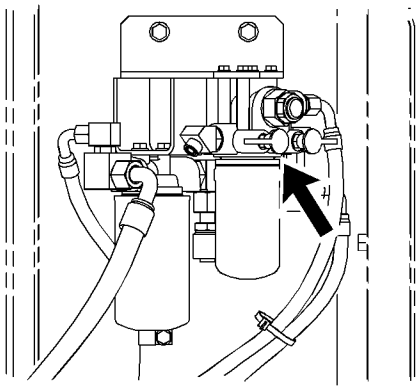

Illustration 416 g01345563

The hydraulic oil sampling valve is near the pilot filter. Obtain a sample of the hydraulic oil from the hydraulic oil sampling valve that is located on the hydraulic oil filter housing. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining a sample of the hydraulic oil.

i02717749

Hydraulic Tank Screen - Clean

SMCS Code: 5056-070-Z3

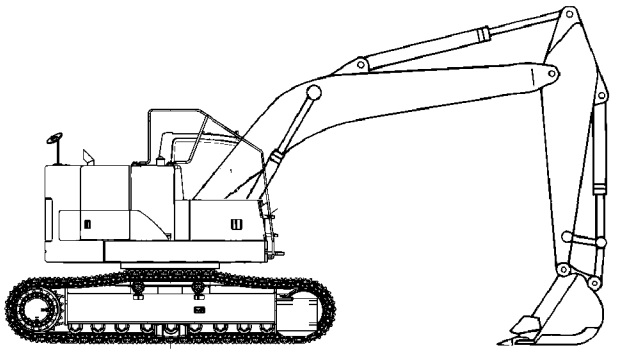

Illustration 417 g01357600

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

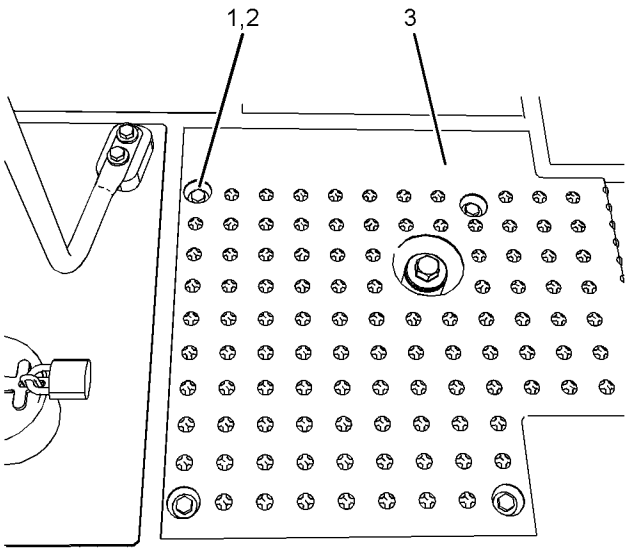

Illustration 418 g01363143

(1) Bolts
(2) Washers
(3) Plate

2. Remove bolts (1), washers (2) and plate (3) from the top of the hydraulic tank.

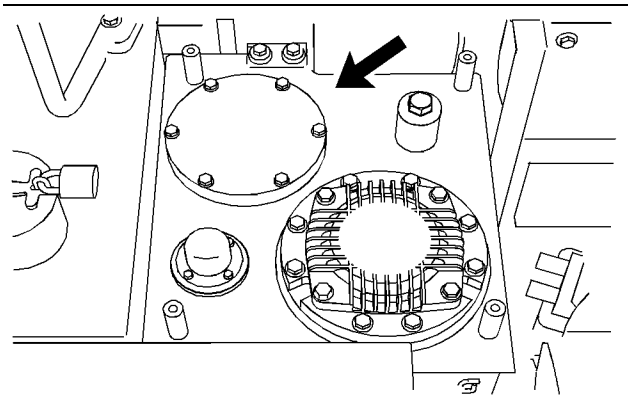

Illustration 419 g01364171

3. Clean the area thoroughly around the screen cover in order to keep dirt out of the hydraulic tank.

4. Relieve remaining internal pressure from the hydraulic tank by loosening the filler plug. After remaining pressure is relieved, tighten the filler plug.

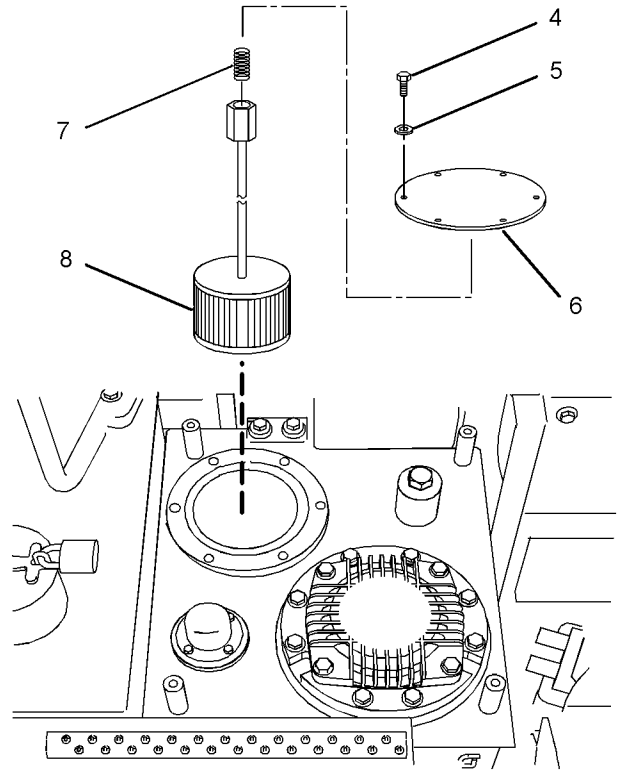

Illustration 420 g01364175

(4) Bolts
(5) Washers
(6) Cover
(7) Spring
(8) Screen

5. Remove bolts (4), washers (5) and cover (6).

Note: Do not allow spring (7) to fall into the tank.

6. Remove spring (7) and screen (8).

Note: Refer to Operation and Maintenance, “General Hazard Information” for information on containing fluid spillage.

7. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

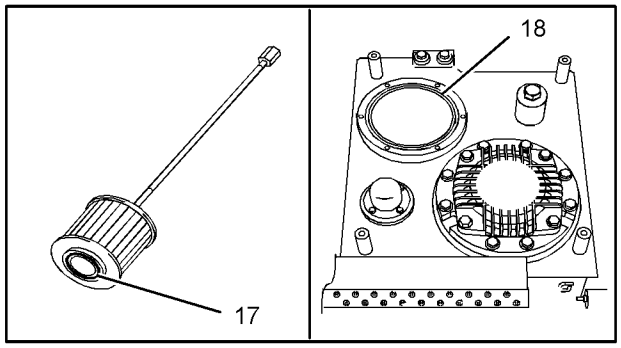

Illustration 421 g01363676

(9) O-ring seal
(10) O-ring seal

8. Remove O-ring seal (9) from screen (8).

9. Inspect O-ring seals (9) and (10). Replace the O-ring seals if wear or damage is evident.

10. Install O-ring seal (9) on screen (8).

11. Install screen (8) and spring (7). Then install cover (6), washers (5), and bolts (4).

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

12. Inspect the O-ring seal on the pressure cap for damage. Replace the O-ring, if necessary. Clean the pressure cap. Install the pressure cap.

13. Install plate (3) with bolts (1) and washers (2).

i02116248

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

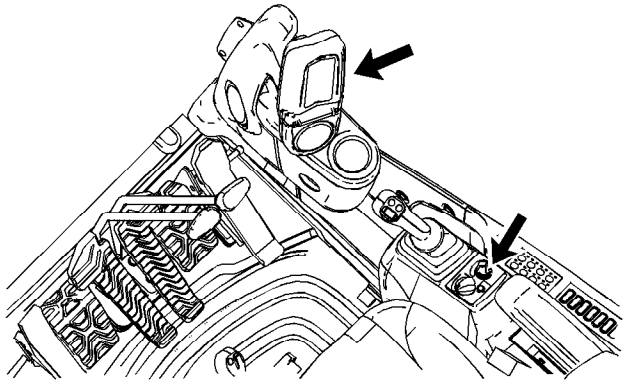

Illustration 422 g01077750

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

2. Start the engine.

3. Look for inoperative gauges.

4. Turn on all machine lights. Check for proper operation.

5. Move the machine forward. Release the travel levers and the travel pedals. The machine should stop.

6. Stop the engine.

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

i02717762

Oil Filter (Hydraulic Hammer) - Replace

SMCS Code: 5068-510

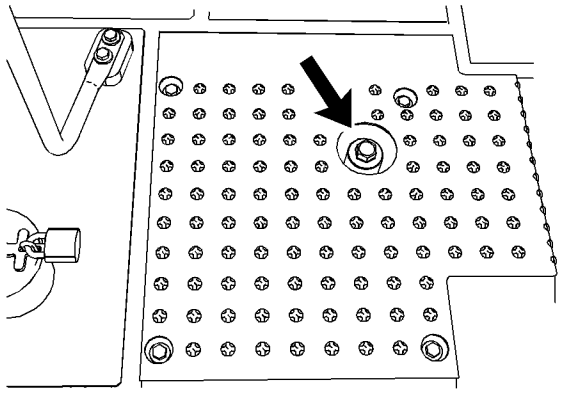

Illustration 423 g01364069

1. Slowly loosen the filler plug on top of the hydraulic tank in order to relieve remaining internal pressure of the hydraulic tank.

2. After remaining pressure is relieved, tighten the filler plug.

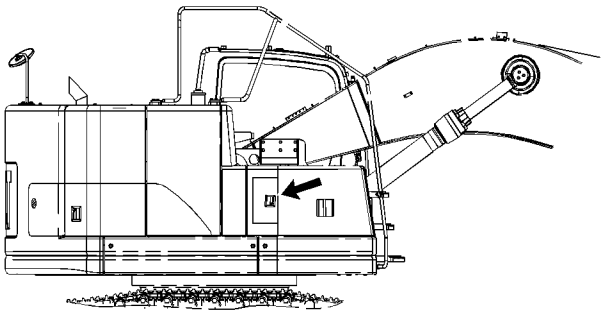

Illustration 424 g01346030

3. Open the access door on the right side of the machine.

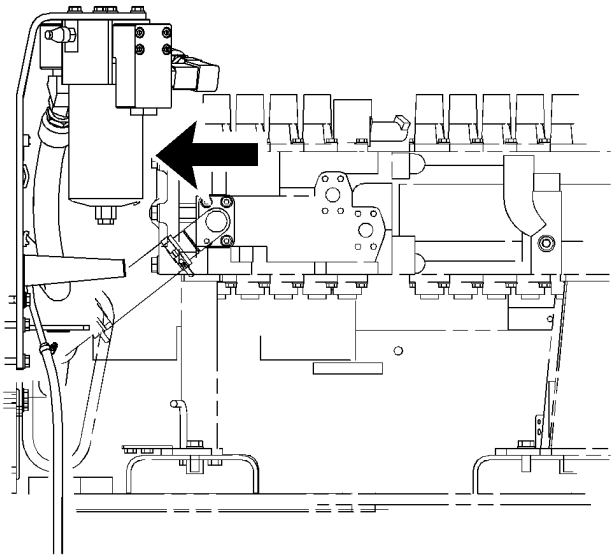

Illustration 425 g01346032

The oil filter for the hydraulic hammer is located behind the right side cover of the machine.

4. Position a suitable container in order to contain the oil.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

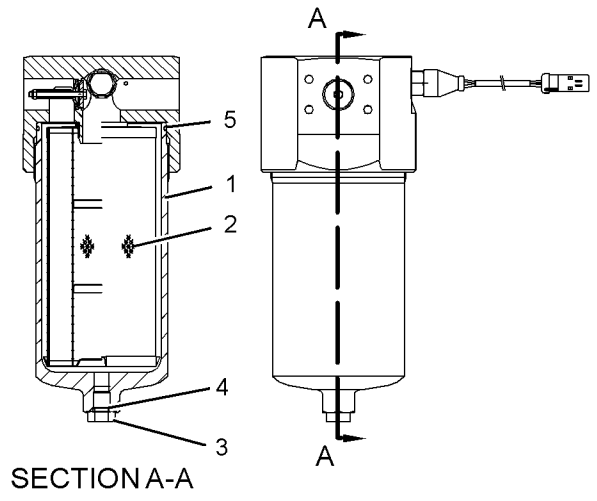

Illustration 426 g01346272

(1) Filter case
(2) Filter element
(3) Drain plug
(4) O-ring
(5) O-ring

5. Loosen drain plug (3) in order to drain oil from filter case (1).

6. Loosen the filter case (1).

7. Lower filter case (1) in order to remove filter element (2).

8. Remove the used filter element from filter base (1).

Note: The element cannot be reused.

Note: Used filter elements should always be disposed of according to local regulations.

9. Clean filter case (1) and install the new filter element.

10. Inspect O-ring (5) of the filter case (1) for damage. Replace the O-ring when it is necessary.

11. Assemble filter case (1). Tighten to a torque of 100 ± 10 N·m (74 ± 7 lb ft).

12. Inspect O-ring (4) of the drain plug (3) for damage. Replace the O-ring when it is necessary.

13. Tighten drain plug (3) to a torque of 60 ± 5 N·m (44 ± 3.5 lb ft).

14. Close the access door.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris

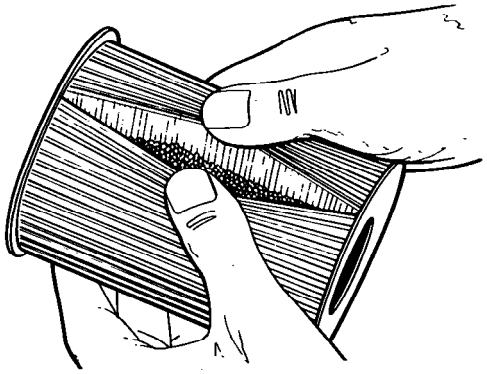

Illustration 427 g00100013

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.

i02430101

Radiator Core - Clean

SMCS Code: 1353-070

1. Open the hood.

2. Open the rear access door on the left side of the machine.

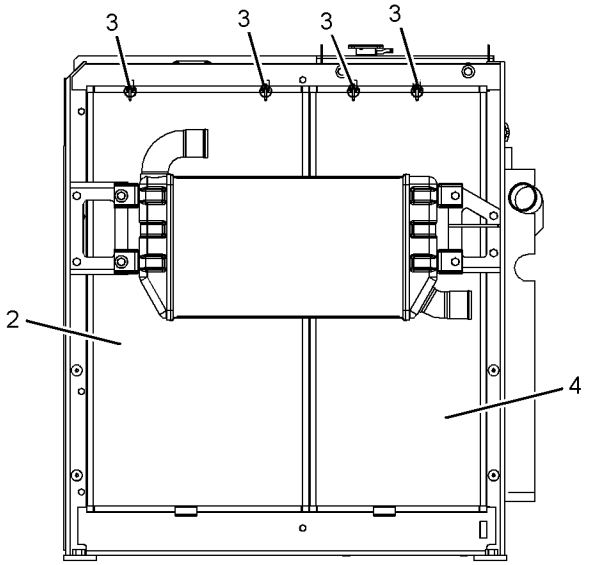

Illustration 428 g01164506

3. Remove four pins (3).

4. Remove screens (2) and (4).

5. Check all of the core fins for debris.

6. Remove dust and debris from all of the core fins and from the screens.

Compressed air is preferred, but high pressure water or steam can be used to remove dust and general debris from a core.

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

7. Install screens (2) and (4) with pins (3).

8. Close the rear access door on the left side of the machine.

9. Close the hood.

i02720049

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510; 7322-710

⚠ WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE
If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

Refer to Service Manual, SENR5664, “Air Conditioning and Heating System with R-134a Refrigerant for All Caterpillar Machines” for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

The receiver-dryer is located behind the left access door.

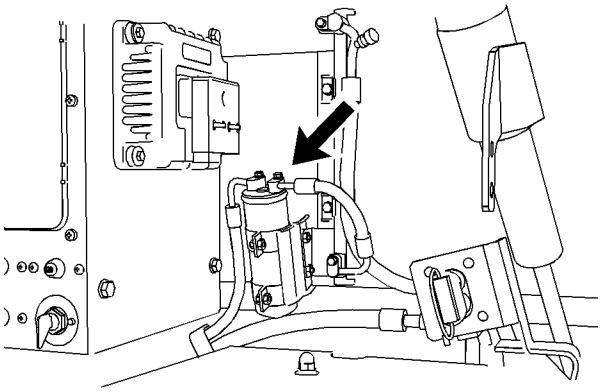

Illustration 429 g01365419

i05252973

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

S/N: TXA1–Up

S/N: MPG1–Up

S/N: KBZ1–Up

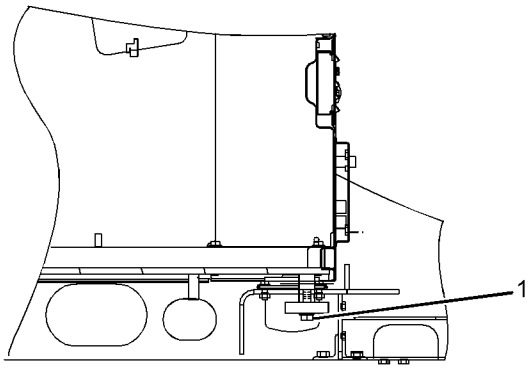

Illustration 430 g01961918

Consult your Caterpillar dealer for repair of any cracks in the ROPS.

Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only. Tighten the M24 bolt (1) to425 ± 50 N·m (315 ± 40 lb ft).

Consult your Cat dealer for inspection of any potential damage or repair of any damage to any operator protective structure. (Including ROPS, FOPS, TOPS, OPS, and OPG) Refer to Special Instruction, SEHS6929 , “Inspection, Maintenance, and Repair of Operator Protective Structures (OPS) and Attachment Installation Guidelines for All Earthmoving Machinery”

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.

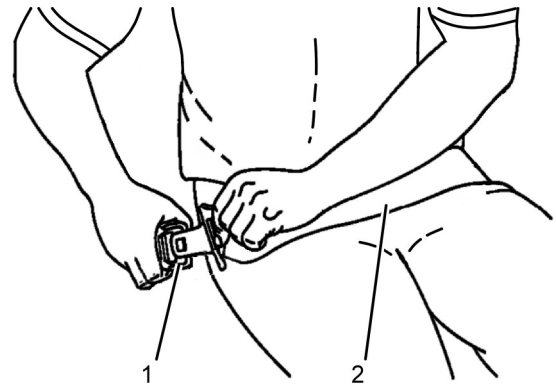

Illustration 431 g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i06891605

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

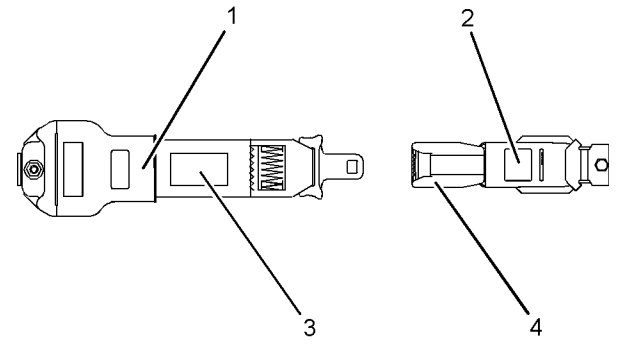

Illustration 432 g01152685

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.

i02706313

Swing Bearing - Lubricate

SMCS Code: 7063-086

Note: Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on the types of grease to use.

Note: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on grease.

Wipe the fittings before you lubricate the swing bearing.

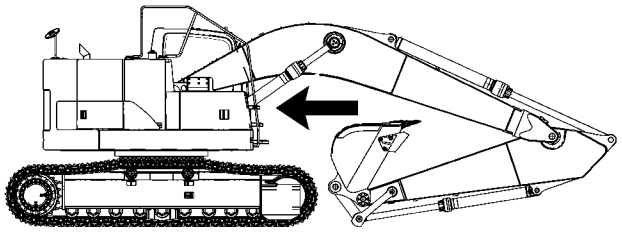

Illustration 433 g01357489

The swing bearing is under the base of the boom.

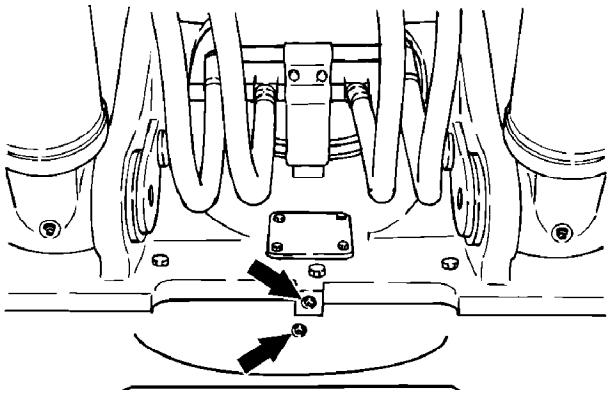

Illustration 434 g00752615

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

i02706328

Swing Drive Oil - Change

SMCS Code: 5459-044

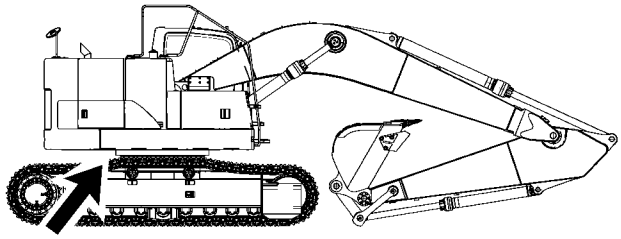

Illustration 435 g01357507

The oil drain hose is under the center of the upper structure.

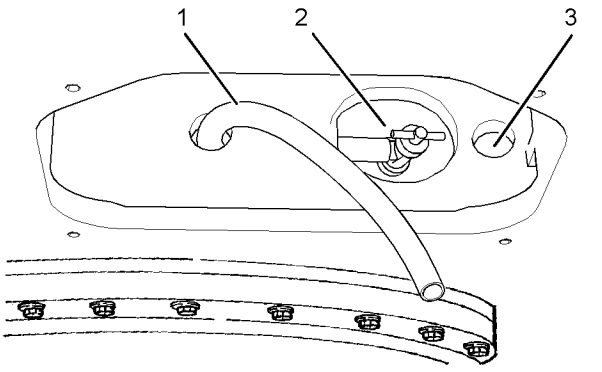

Illustration 436 g01364203

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

1. Remove drain hose (1) from holder (3) on the upper frame. Face the end of the hose toward the container.

2. Loosen the drain valve in hole (2). Drain the oil into a suitable container.

Note: Drained fluids should always be disposed of according to local regulations.

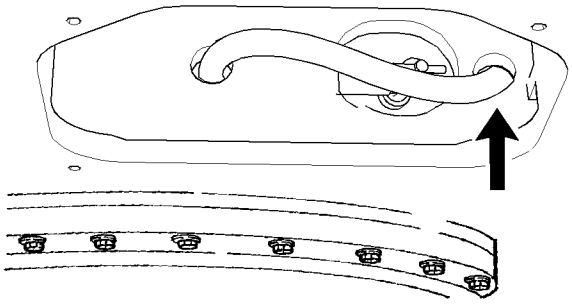

Illustration 437 g01364205

3. Tighten the drain valve. Hook the drain hose (1) to the holder (3). Make sure that the end of the hose is facing upward.

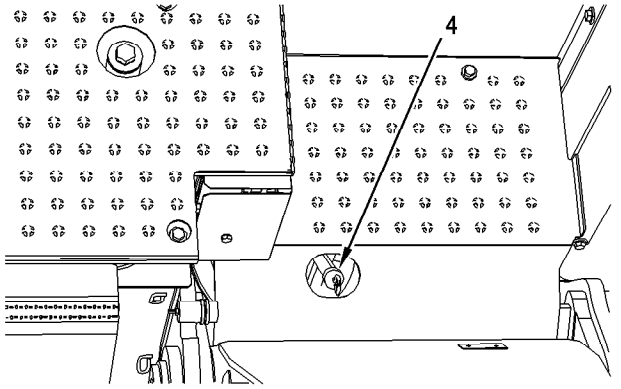

Illustration 438 g00945175

4. Remove dipstick (4).

5. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, “Capacities (Refill)”.

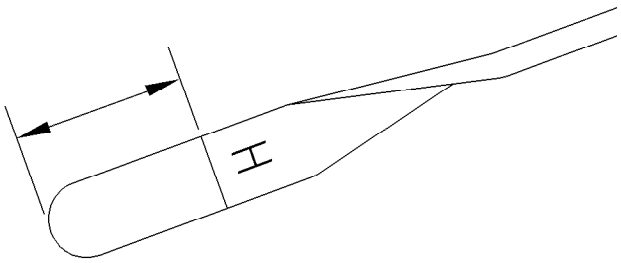

Illustration 439 g00418728

6. maintain the oil level between the tip of the dipstick and the mark on the dipstick .

7. Check the oil that has been drained for metal chips or metal particles. Consult your Caterpillar dealer if any metal chips or metal particles are found.

8. Drained materials should always be disposed of according to local regulations.

i02706232

Swing Drive Oil Level - Check

SMCS Code: 5459-535-FLV

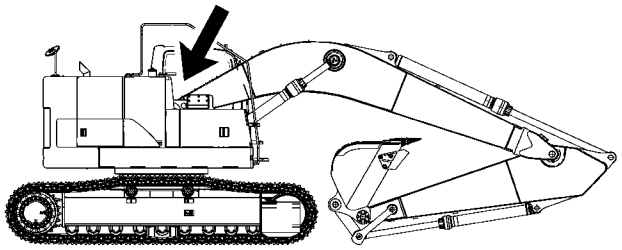

Illustration 440 g01357420

The dipstick for the swing drive oil is located near the rear base of the boom.

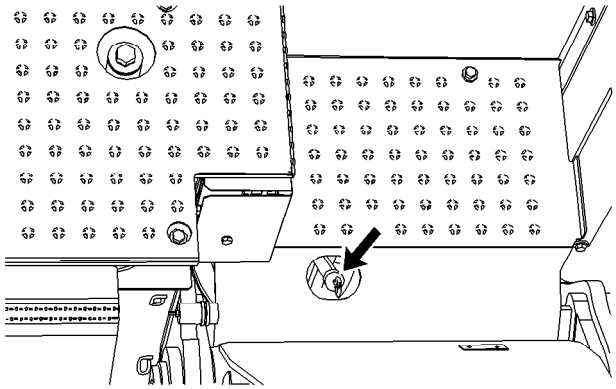

Illustration 441 g00944165

1. Remove the dipstick.

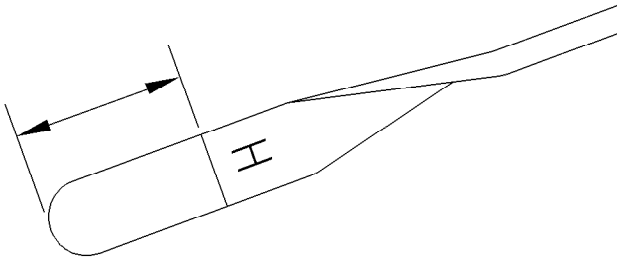

Illustration 442 g00418728

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

2. Check the dipstick. Maintain the oil level between the tip of the dipstick and the mark on the dipstick. Add oil through the dipstick tube, if necessary. Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.

3. Insert the dipstick.

i05966685

Swing Drive Oil Sample - Obtain

SMCS Code: 5459-008; 5459-554-OC; 5459-008-OC; 5459-OC; 7542-008

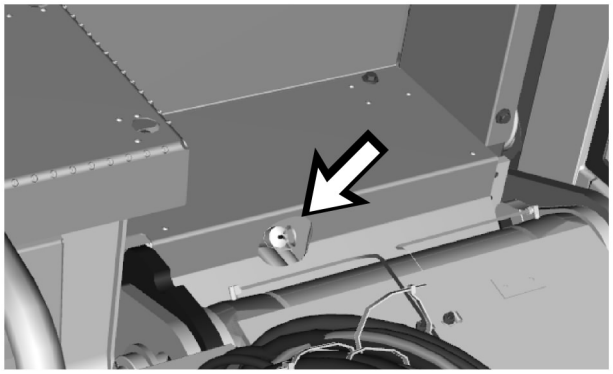

Illustration 443 g03741201

Obtain an oil sample of the swing drive oil through the opening for the dipstick. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining an oil sample from the swing drive housing. Refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining an oil sample from the swing drive housing.

i04607289

Swing Gear - Lubricate

SMCS Code: 7063-086

Note: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on grease.

NOTICE
Improper lubrication can cause damage to machine components.

To avoid damage, make sure that the proper amount of grease is applied to the swing drive.

When the amount of grease in the compartment becomes too large, the agitation loss becomes large, thereby accelerating grease deterioration.

Grease deterioration can cause damage to the pinion gear of the swing drive and swing internal gear.

Not enough grease will result in poor gear lubrication.

Remove the inspection cover that is located near the boom base. Inspect the grease.

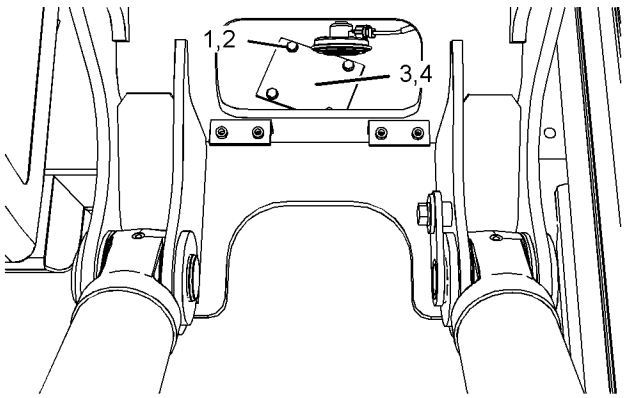

Illustration 444 g02723118

Typical example

(1) Bolts
(2) Washers
(3) Cover
(4) Gasket

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).

2. Inspect gasket (4). Replace the gasket if damage is evident.

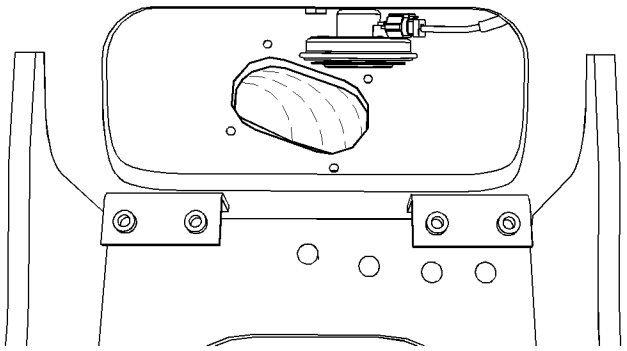

Illustration 445 g02723116

Typical example

3. Check the level of grease. The level of grease is correct when:

- Waves of grease are present from the rotating swing drive pinion.
- The grease is evenly distributed on the floor of the pan.

Note: Smeared or waveless areas are evidence for a lack of grease.

Note: Add grease, as needed. Remove grease, as needed. Too much grease will result in the deterioration of the grease because of excessive movement of the grease. Too little grease will result in poor lubrication of the swing gear.

Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the size of the pan.

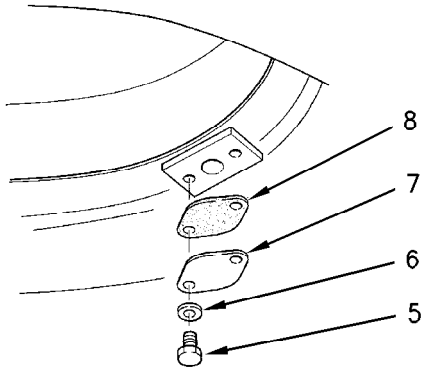

Illustration 446 g00688063

(5) Bolts
(6) Washers
(7) Cover
(8) Gasket

4. Check for contamination and for discolored grease.

5. If the grease is contaminated or discolored with water, change the grease. Remove bolts (5), washers (6), cover (7), and gasket (8) in order to allow the water to drain. When you reinstall cover (7), inspect gasket (8). Replace the gasket if damage is evident.

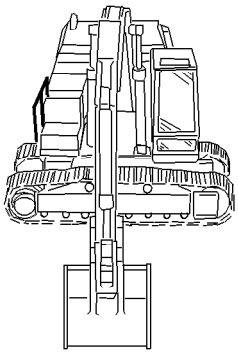

Illustration 447 g00101644

6. Raise the boom and turn the upper structure by 1/4 turn. Lower the bucket to the ground.

7. Repeat Step 6 at every 1/4 turn in four places. Add grease, as needed.

8. Install gasket (4), cover (3), washers (2), and bolts (1).

i05647259

Track Adjustment - Adjust

SMCS Code: 4170-025

⚠ WARNING

Personal injury or death can result from grease under pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve one turn only.

If track does not loosen, close the relief valve and contact your Caterpillar dealer.

NOTICE
Keeping the track properly adjusted will increase the service life of the track and drive components.

Note: The track tension must be adjusted according to the current operating conditions. Keep the track as slack as possible if the soil is heavy.

Measuring Track Tension

1. Operate the machine in the direction of the idlers.

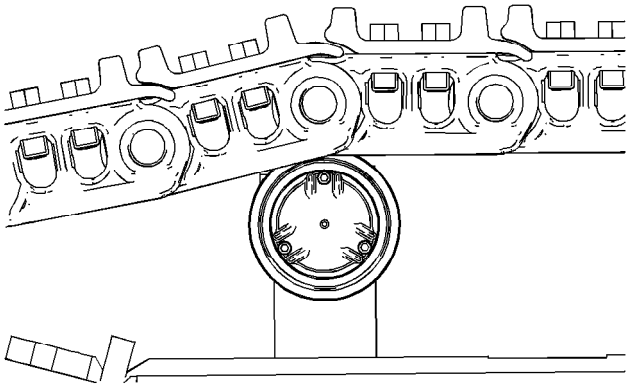

Illustration 448 g01103855

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.

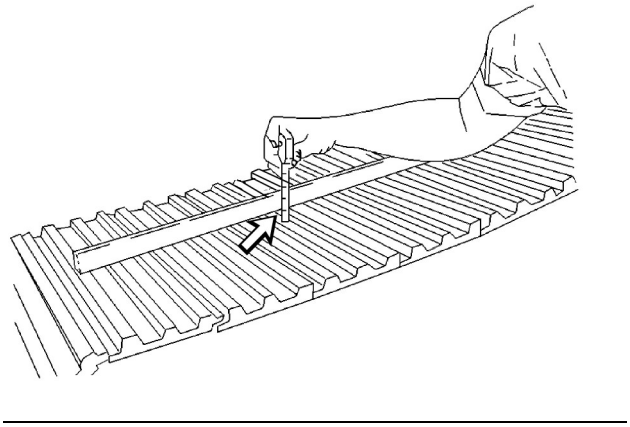

Illustration 449 g03472827

3. Place a straight edge on top of the track grousers between the front carrier roller and the idler. The straight edge should be long enough to reach from the front carrier roller to the idler.

Note: If your machine is equipped with three carrier rollers, place a straight edge on the tracks between the carrier rollers. The straight edge should be long enough to reach from one carrier roller to another carrier roller.

4. Measure the maximum amount of sag in the track. The sag is measured from the highest point of the track grouser to the bottom of the straight edge. A track that is properly adjusted will have a sag of 40.0 to 55.0 mm (1.57 to 2.17 inch).

5. If the track is too tight, or if the track is too loose, adjust the track tension according to the appropriate procedure below.

Adjusting Track Tension

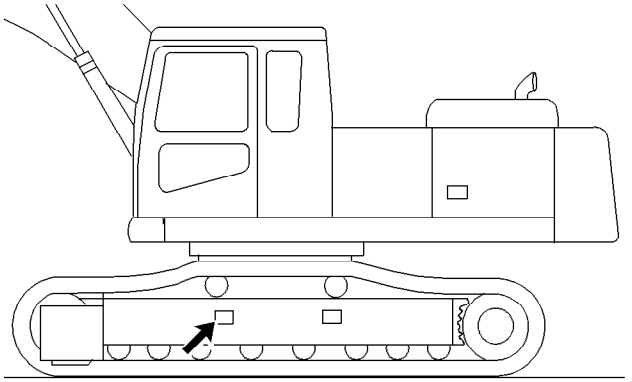

Illustration 450 g00270405

Typical example

The track adjuster is located on the track frame.

Tightening the Track

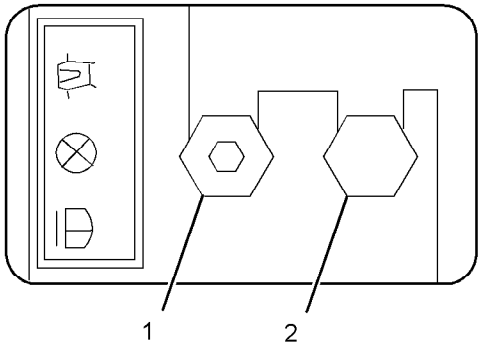

Illustration 451 g01091134

(1) Grease fitting
(2) Relief valve

Wipe the fitting before you add grease.

1. Add grease through grease fitting (1) until the correct track tension is reached.

2. Operate the machine back and forth in order to equalize the pressure.

3. Check the amount of sag. Adjust the track, as needed.

Loosening the Track

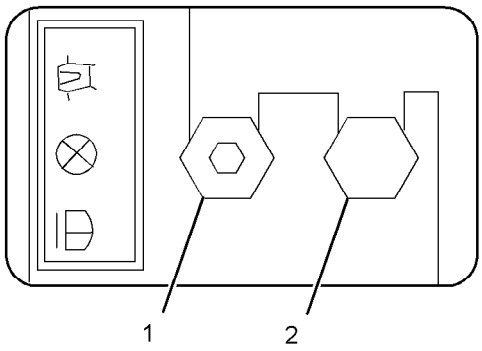

Illustration 452 g01091134

(1) Grease fitting
(2) Relief valve

1. Loosen relief valve (2) carefully until the track begins to loosen. One turn should be the maximum.

2. Tighten relief valve (2) to 34 ± 5 N·m (25 ± 4 lb ft) when the desired track tension is reached.

3. Operate the machine back and forth in order to equalize the pressure.

4. Check the amount of sag. Adjust the track, as needed.

i01590290

Track Adjustment - Inspect

SMCS Code: 4170-040

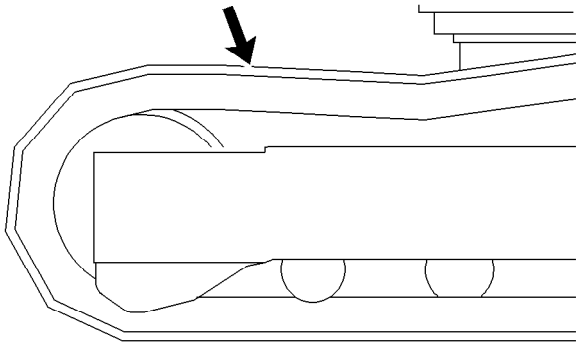

Illustration 453 g00824541

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

If the track appears to be too tight or too loose, refer to Operation and Maintenance Manual, “Track Adjustment - Adjust”.

i05182562

Travel Alarm - Test
(If Equipped)

SMCS Code: 7429-081

You must move the machine in order to test the travel alarm.

1. Start the engine. Move the hydraulic lockout control to the UNLOCKED position.

2. Raise the work tool in order to avoid any obstacles. Make sure that there is adequate overhead clearance.

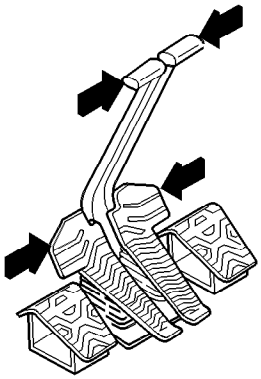

Illustration 454 g00560313

3. Use the travel levers or the travel pedals to move the machine forward. The travel alarm should sound.

4. Release the travel levers and the travel pedals in order to stop the machine.

5. Use the travel levers and the travel pedals to move the machine backward. The travel alarm should sound.

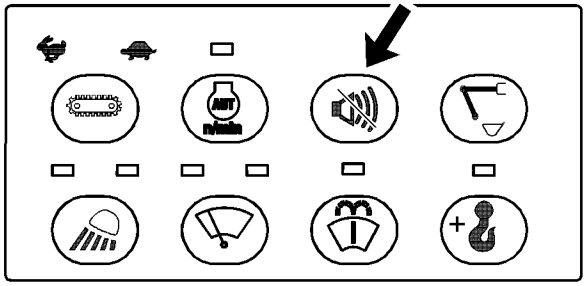

Illustration 455 g03322920

6. Push the alarm cancel switch. The travel alarm should shut off.

7. Stop the machine. Lower the work tool to the ground. Move the Hydraulic lockout control to the LOCKED position. Stop the engine.

i02706365

Undercarriage - Check

SMCS Code: 4150-535

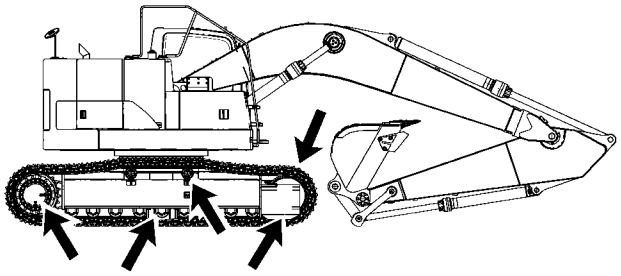

Illustration 456 g01357522

1. Check the carrier rollers, the track rollers, and the idler wheels for possible leakage.

2. Check the surface of the track, the carrier rollers, the track rollers, the idler wheels, the track shoes, and the drive sprockets. Look for signs of wear and loose mounting bolts.

3. Listen for any abnormal noises while you are moving slowly in an open area.

4. If abnormal wear exists or abnormal noises or leaks are found, consult your Caterpillar dealer.

i02706499

Window Washer Reservoir - Fill

SMCS Code: 7306-544-KE

NOTICE
When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

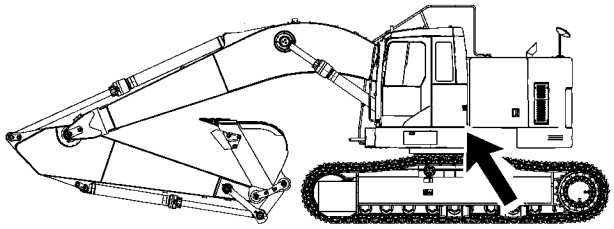

Illustration 457 g01357621

1. The window washer reservoir is located on the left side of the machine.

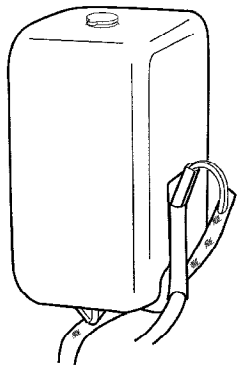

Illustration 458 g00786695

2. Remove the filler cap.

3. Fill the window washer reservoir with washer fluid through the filler opening.

4. Install the filler cap.

i01258249

Window Wiper - Inspect/ Replace

SMCS Code: 7305-040; 7305-510

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i03912371

Windows - Clean

SMCS Code: 7310-070; 7340-070

Clean the outside of the windows from the ground, unless handholds are available.

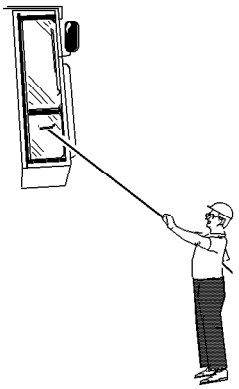

Illustration 459 g00566124

Typical example

Cleaning Methods

Aircraft Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.

Polycarbonate Windows (If equipped)

Wash polycarbonate windows with a mild soap or detergent. Never use a cleaning solvent on polycarbonate windows.

Wash polycarbonate windows with warm water and a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows.

Rinse the windows with a sufficient amount of clean water.

Warranty Section

Warranty Information

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).

b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i05805863

Reference Material

SMCS Code: 1000; 7000

Caterpillar Reference Material

The following literature can be obtained from any Cat dealer:

Special Publication, PEGJ0046, “Understanding S·O·S Services Test”

Special Publication, PEGJ0047, “How to Take a Good Oil Sample”

Special Publication, SEBD0640, “Oil and Your Engine”

Special Publication, PEHJ0191, “S·O·S Fluid Analysis”

Service Magazine, PEHJ0192, “Optimizing Oil Change Intervals ”

Special Publication, PMEP5027, “Extended Life Coolant/Antifreeze Label”

Special Publication, SEBD0518, “Know Your Cooling System”

Special Publication, SEBD0970, “Coolant and Your Engine”

Special Publication, SEBD0717, “Diesel Fuels and Your Engine”

Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”

Special Publication, PEWJ0074, “Caterpillar Filter and Fluid Application Guide”

Special Publication, SELF9001, “Federal Emission Control Warranty and Emission Control Warranty for California”

Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog”

Special Instruction, SEHS7633, “Battery Test Procedure”

Special Instruction, SEHS9031, “Storage Procedure for Caterpillar Products”

Special Instruction, SEHS7332, “Warning Tag - Danger Do Not Operate”

Specifications, SENR3130, “Torque Specifications”

Special Instruction, REHS2365, “An Installation Guide for the Product Link PL121SR and for the PL300”

System Operation, Troubleshooting, Testing and Adjusting, RENR7911, “Product Link 121SR/321SR”

System Operation, RENR8068, “D Series Monitor”

Service Parts, PECP9067, “One Safe Source”

Service Magazine, SEHS6929, “Inspection, Maintenance, and Repair of ROPS and Attachment Installation Guidelines”

Service Manual, UENR4125, “Air Conditioning and Heating R-134a for All Caterpillar Machines”

Service Manual, SENR5664, “Air Conditioning and Heating R-134a for All Caterpillar Machines”

Operation and Maintenance Manual, SEBU5898, “Cold Weather Recommendations for all Caterpillar Machines”

Systems Operation, Troubleshooting, Testing and Adjusting, RENR8143, “Product Link - PL522/523”

Special Instruction, REHS2368, “Installation Procedure For Product Link PL522/523 (Cellular)”

Operation and Maintenance Manual, SEBU8142, “Product Link - 121SR/522/523”

Operation and Maintenance Manual, SEBU8257, “The European Union Physical Agents (Vibration) Directive 2002/44/EC”

Special Instruction, REHS0354, “Charging System Troubleshooting”

Special Instruction, REHS2348, “Product Link PL121SR System”

Operation and Maintenance Decal, SMEU7397, “Hydraulic Hammer”

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 can normally be obtained from your local technological society, from your local library, or from your local college.

SAE J183, “Classification” This can normally be found in the SAE handbook.

SAE J313, “Diesel Fuels” This publication can be found in the SAE handbook. This publication can also be obtained from your local technological society, from your local library, or from your local college.

SAE J754, “Nomenclature” This can normally be found in the SAE handbook.

Engine Manufacturers Association, “Engine Fluids Data Book”

Engine Manufacturers Association
Two North LaSalle Street, Suite 2200
Chicago, IL, USA 60602
E-mail: ema@enginemanufacturers.org
(312) 827-8700
Facsimile: (312) 827-8737

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:	_____	_____	_____