SEBU7029-05 (en-us)
June 2020

Operation and Maintenance Manual

345B Excavator

4SS 1-UP (345B L)
9GS 1-UP (345B L)
2NW 1-UP (345B L)

Language: Original Instructions

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

Important Safety Information

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

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

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

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

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

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

NOTICE

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

Other parts may not meet certain original equipment specifications.

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

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

Table of Contents

Foreword

California Proposition 65 Warning

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

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

www.P65Warnings.ca.gov

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

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

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

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

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

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

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

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

Safety

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

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

Operation

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

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

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

Maintenance

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

Maintenance Intervals

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

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

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

Certified Engine Maintenance

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

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

Machine Capacity

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

Product Identification Number

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

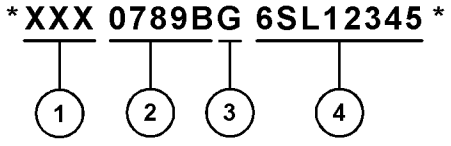

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i08111210

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.

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 sign is attached to a part that is replaced, install a safety message on the replacement part. Any Caterpillar dealer can provide new safety messages.

Do Not Operate

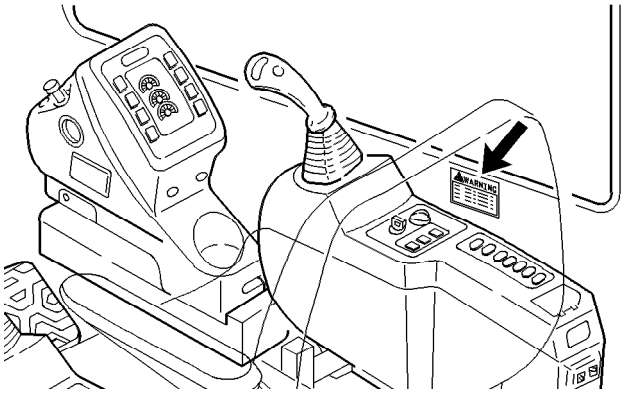

Illustration 2 g00107227

This safety message is positioned in the cab.

Illustration 3 g00038370

WARNING

DO NOT OPERATE OR WORK ON THIS MACHINE UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND WARNINGS IN THE OPERATION AND MAINTENANCE MANUALS. FAILURE TO FOLLOW THE INSTRUCTIONS OR HEED THE WARNINGS COULD RESULT IN INJURY OR DEATH. CONTACT ANY CATERPILLAR DEALER FOR REPLACEMENT MANUALS. PROPER CARE IS YOUR RESPONSIBILITY.

Electrical Shock Hazard (If Equipped)

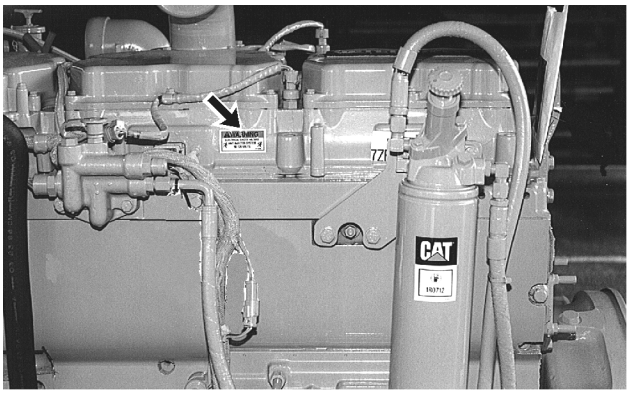

Illustration 4 g00111744

This warning label is located on the engine. This is a typical example of the location of the warning label.

Illustration 5 g00039226

WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

The engine control module (ECM) sends a high voltage signal to the injector solenoid. To help prevent personal injury, disconnect the electronic unit injector enable circuit connector. Do not come in contact with the electronic unit injector terminals while the engine is running.

Height And Reach Of Machine

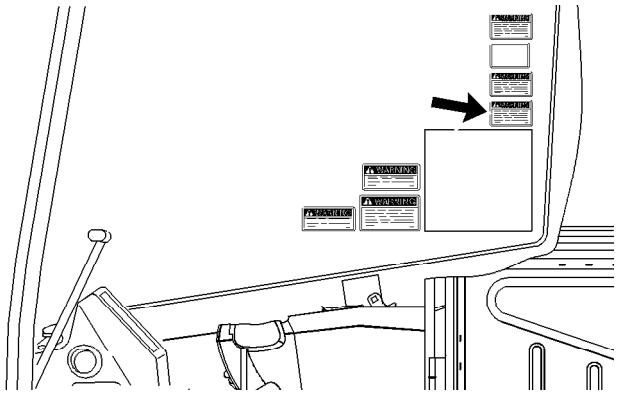

Illustration 6 g00274805

This safety message is positioned in the cab.

Illustration 7 g00100702

WARNING

Know the maximum height and reach of your machine. Serious injury or death by electrocution can occur if machine, work tools, or attachments are not kept a safe distance from electrical power lines. Keep distance at least 3 m (10 ft) Plus additional 10 mm (.4 inch) for each 1,000 volts over 50,000 volts.

Improper Connections For Jump Start Cables

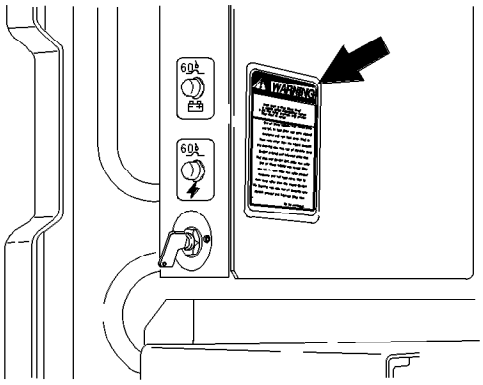

Illustration 8 g00100710

This safety message is positioned on the circuit breaker panel.

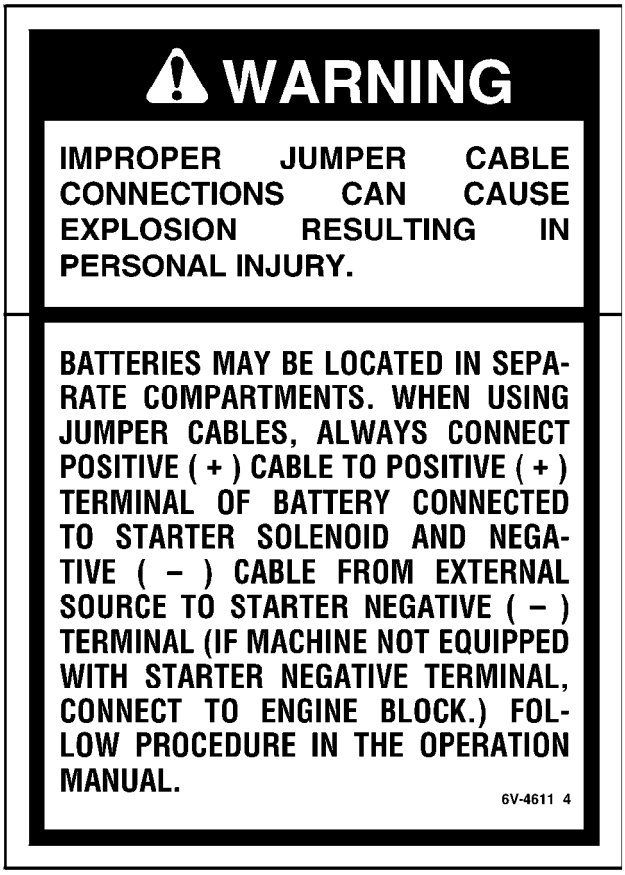

Illustration 9 g00038786

WARNING

IMPROPER JUMPER CABLE CONNECTIONS CAN CAUSE EXPLOSION RESULTING IN PERSONAL INJURY.

BATTERIES MAY BE LOCATED IN SEPARATE COMPARTMENTS. WHEN USING JUMPER CABLES, ALWAYS CONNECT POSITIVE (+) CABLE TO POSITIVE (+) TERMINAL OF BATTERY CONNECTED TO STARTER SOLENOID AND NEGATIVE (-) CABLE FROM EXTERNAL SOURCE TO STARTER NEGATIVE (-) TERMINAL (IF MACHINE NOT EQUIPPED WITH STARTER NEGATIVE TERMINAL, CONNECT TO ENGINE BLOCK.) FOLLOW PROCEDURE IN THE OPERATION MANUAL.

Relieve Hydraulic Tank Pressure

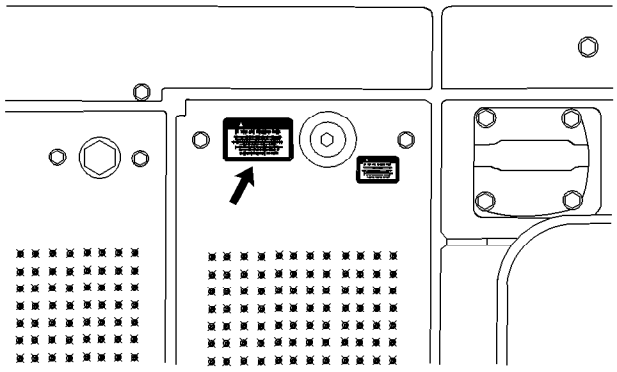

Illustration 10 g00100721

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

Illustration 11 g00100722

WARNING

HYDRAULIC TANK

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

Lift Eyes Can Fail

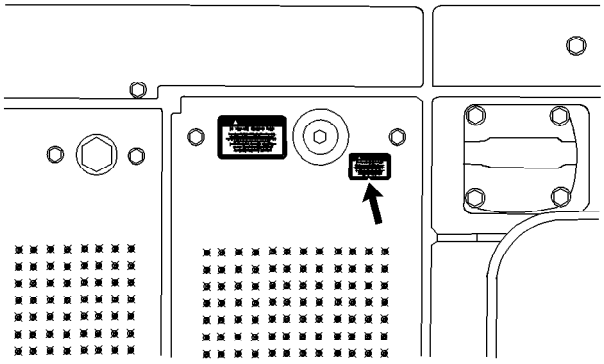

Illustration 12 g00100726

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

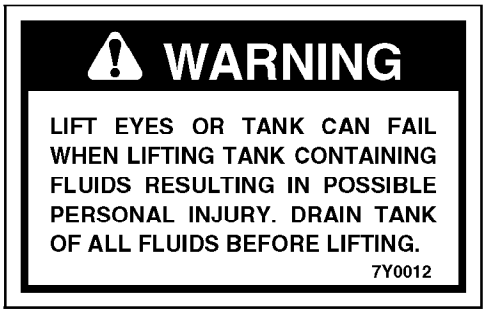

Illustration 13 g00100728

WARNING

LIFT EYES OR TANK CAN FAIL WHEN LIFTING TANK CONTAINING FLUIDS RESULTING IN POSSIBLE PERSONAL INJURY. DRAIN TANK OF ALL FLUIDS BEFORE LIFTING.

High Pressure Gas

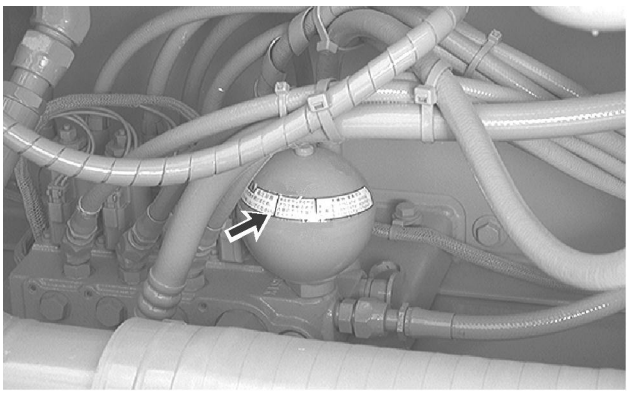

Illustration 14 g00100731

This safety message is positioned on the accumulator.

Illustration 15 g00100733

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.

High Pressure Cylinder

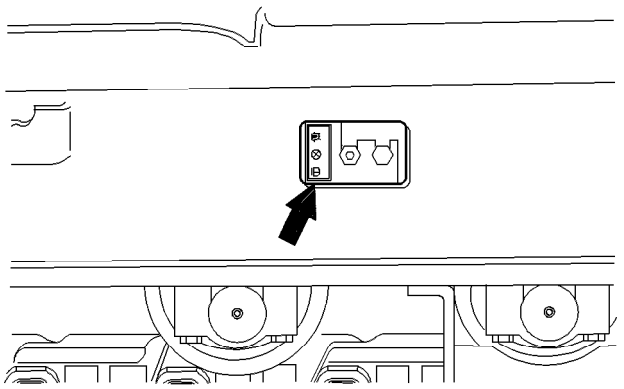

Illustration 16 g00100741

This safety message is positioned on the track adjuster.

Illustration 17 g00100742

HIGH PRESSURE CYLINDER

Do not remove any parts until all of the pressure has been relieved. This will avoid possible personal injury. The knob can be rotated to a maximum of one counterclockwise turn.

See the Operation and Maintenance Manual, “Track Adjustment - Adjust” information for your product.

No Ether

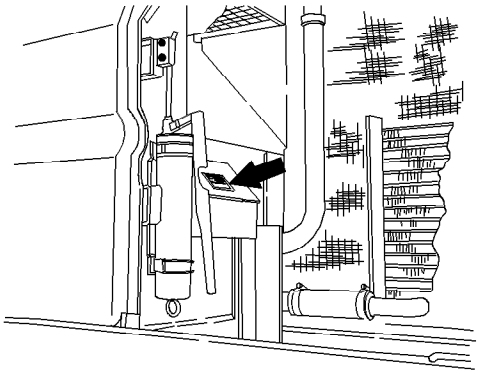

Illustration 18 g00100744

This safety message is positioned on the air cleaner.

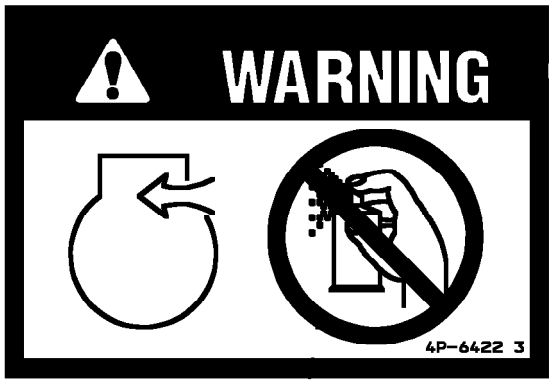

Illustration 19 g00100745

NO ETHER

The following information is not applicable to any machines that are equipped with an ether starting aid.

Do not spray ether into the air intake because this machine is equipped with an air inlet heater. Using ether may result in a serious accident.

To start engines that are equipped with an ether starting aid, refer to the Operation and Maintenance, “Starting Engine” information for your product.

Automatic Engine Speed Control (AEC)

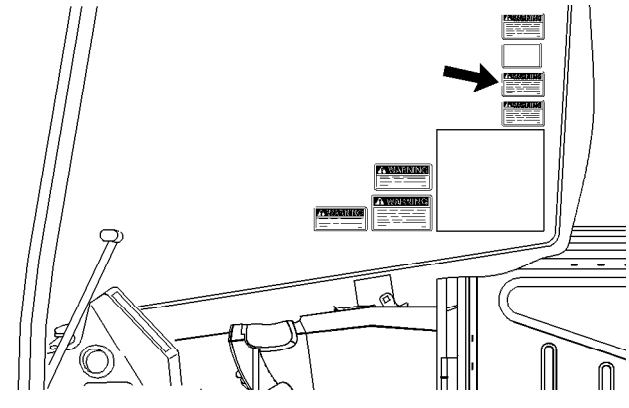

Illustration 20 g00274807

This safety message is positioned in the cab.

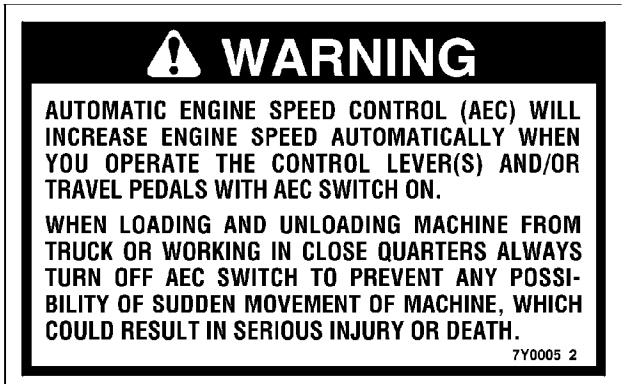

Illustration 21 g00100749

WARNING

AUTOMATIC ENGINE SPEED CONTROL (AEC) WILL INCREASE ENGINE SPEED AUTOMATICALLY WHEN YOU OPERATE THE CONTROL LEVER(S) AND/OR TRAVEL PEDALS WITH AEC SWITCH ON.

WHEN LOADING AND UNLOADING MACHINE FROM TRUCK OR WORKING IN CLOSE QUARTERS ALWAYS TURN OFF AEC SWITCH TO PREVENT ANY POSSIBILITY OF SUDDEN MOVEMENT OF MACHINE, WHICH COULD RESULT IN SERIOUS INJURY OR DEATH.

Travel Speed Control Switch

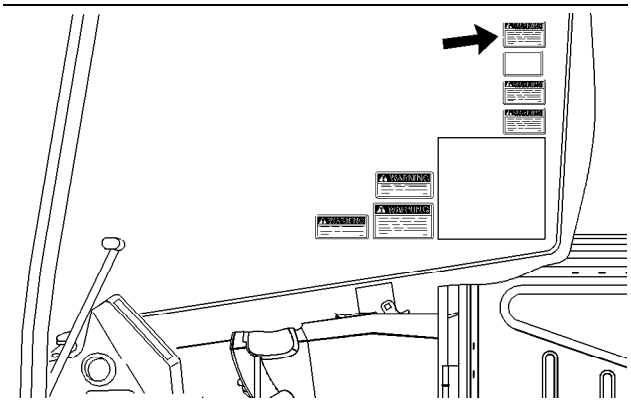

Illustration 22 g00274809

This safety message is positioned in the cab.

Illustration 23 g00100755

WARNING

PUT TRAVEL SPEED CONTROL SWITCH IN LOW POSITION BEFORE DESCENDING A SLOPE OR LOADING OR UNLOADING ON TRAILER. IF TRAVEL SPEED CONTROL SWITCH IS IN HIGH POSITION DURING THESE OPERATIONS, SUDDEN CHANGES IN MACHINE SPEED CAN OCCUR WITH AN ADVERSE EFFECT ON MACHINE CONTROL, RESULTING IN PERSONAL INJURY.

Pressurized System

Illustration 24 g00100759

This safety message is positioned on the radiator.

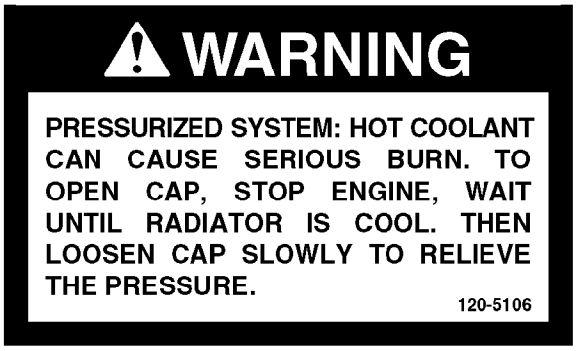

Illustration 25 g00100763

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.

Changes To Machine Control Pattern

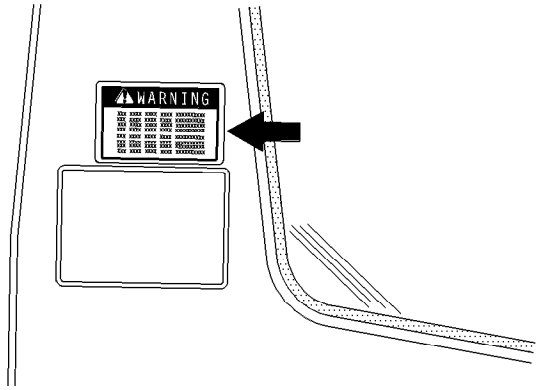

Illustration 26 g00106761

This safety message is positioned on the right side of the cab. This safety message is on machines that are equipped with a two-way valve.

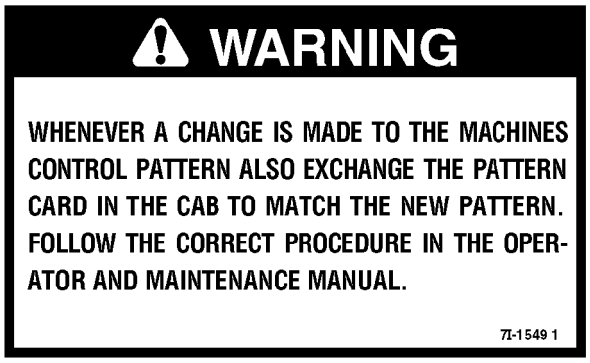

Illustration 27 g00100767

WARNING

WHENEVER A CHANGE IS MADE TO THE MACHINES CONTROL PATTERN ALSO EXCHANGE THE PATTERN CARD IN THE CAB TO MATCH THE NEW PATTERN. FOLLOW THE CORRECT PROCEDURE IN THE OPERATOR AND MAINTENANCE MANUAL.

Machine Control Pattern

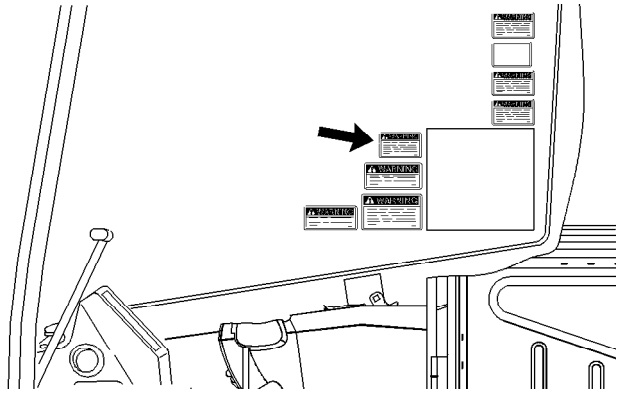

Illustration 28 g00274810

This safety message is positioned in the cab.

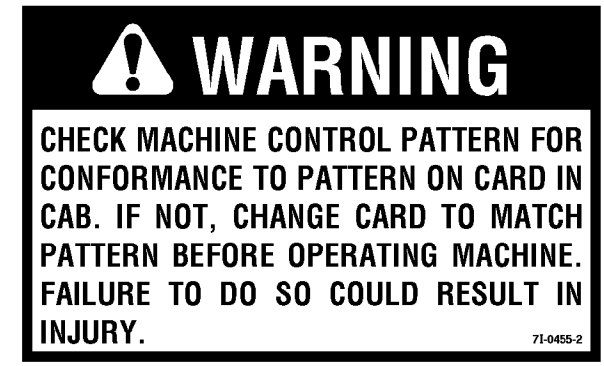

Illustration 29 g00100776

WARNING

CHECK MACHINE CONTROL PATTERN FOR CONFORMANCE TO PATTERN ON CARD IN CAB. IF NOT, CHANGE CARD TO MATCH PATTERN BEFORE OPERATING MACHINE. FAILURE TO DO SO COULD RESULT IN INJURY.

Engagement of the Quick Coupler Wedge

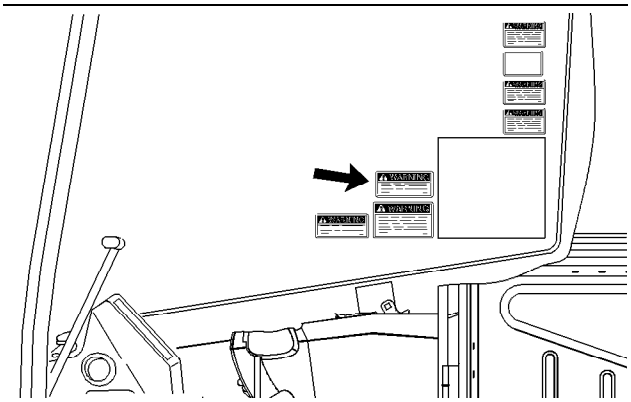

Illustration 30 g00274808

This safety message is positioned in the cab if your machine is equipped with an attachment for the quick coupler.

Illustration 31 g00100783

WARNING

INSPECT COUPLER WEDGE ENGAGEMENT BEFORE OPERATING EXCAVATOR.

SERIOUS INJURY OR DEATH MAY RESULT FROM AN IMPROPERLY ENGAGED COUPLER.

COUPLER WEDGE ENGAGEMENT CAN BE INSPECTED FROM THE CAB BY ROTATING THE BUCKET OR ATTACHMENT IN. EXTEND THE BUCKET CYLINDER (BUCKET CLOSE) TO BRING THE COUPLER ACTUATOR INTO VIEW AND BRING THE STICK IN UNTIL THE WEDGES ARE VISIBLE.

Tilting the Cab

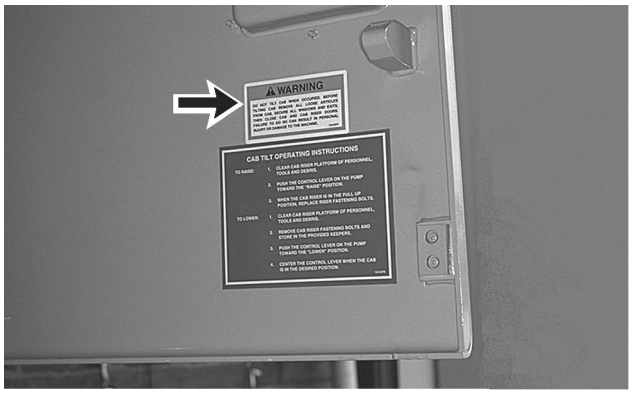

Illustration 32 g00101889

This safety message is positioned inside the left access door on a forest machine. The safety message is positioned on the outside of the cab riser compartment access door on a material handler.

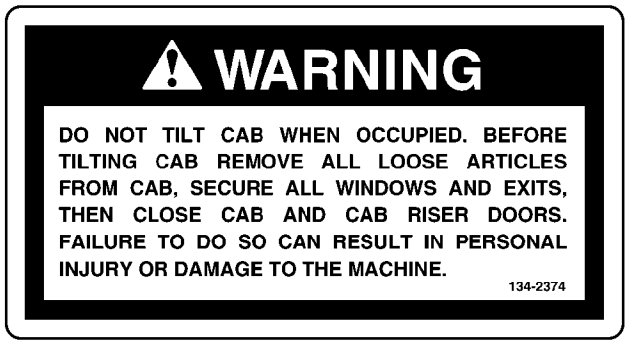

Illustration 33 g00102389

WARNING

DO NOT TILT CAB WHEN OCCUPIED. BEFORE TILTING CAB REMOVE ALL LOOSE ARTICLES FROM CAB, SECURE ALL WINDOWS AND EXITS, AND THEN CLOSE CAB AND CAB RISER DOORS. FAILURE TO DO SO CAN RESULT IN PERSONAL INJURY OR DAMAGE TO THE MACHINE.

Crush Points

Illustration 34 g00107273

This safety message can be positioned in the following locations: inside of the cab riser compartment access door and next to the cab riser compartment access door on the left side of the machine. This safety message is also located on the front of the machine below the cab riser.

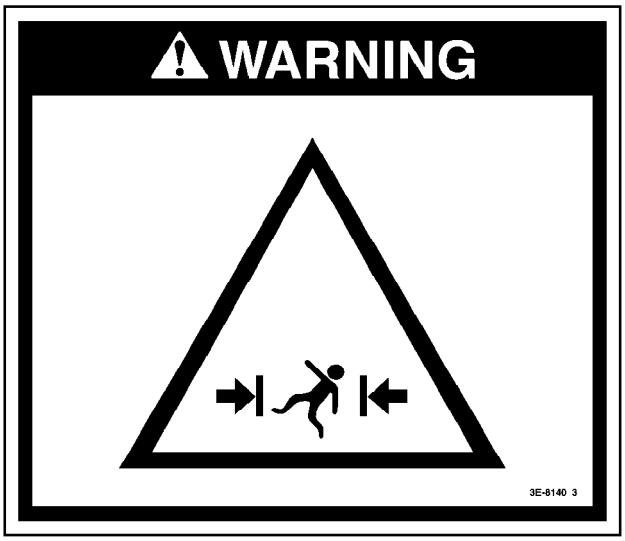

Illustration 35 g00104210

Stand away from the cab when the cab is being tilted for transportation or repair. There is no clearance for a person in this area. Severe injury or death from crushing could occur.

Certification for Falling Object Guard Structure (If Equipped)

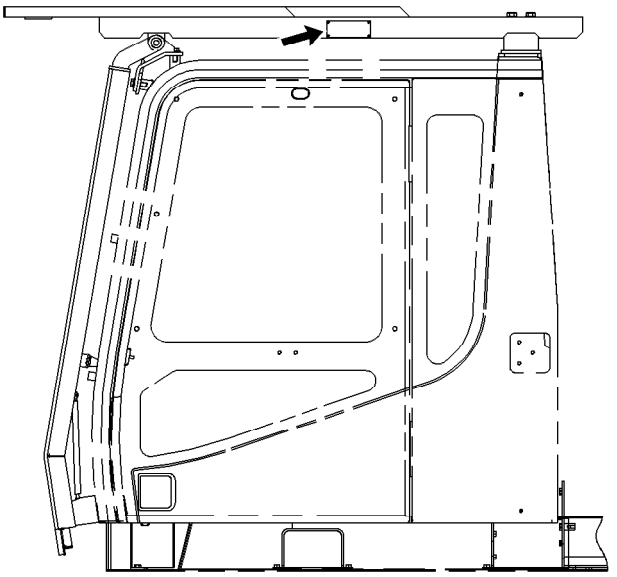

Illustration 36 g00104265

This safety message is located on the left side of the falling object guard structure.

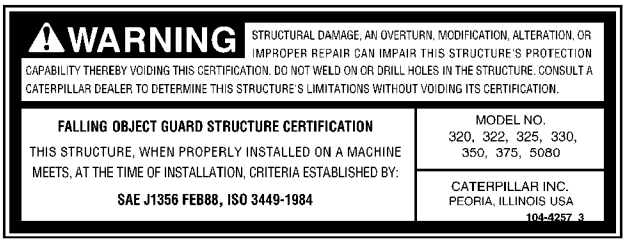

Illustration 37 g00104332

WARNING

STRUCTURAL DAMAGE, AN OVERTURN, MODIFICATION, ALTERATION, OR IMPROPER REPAIR CAN IMPAIR THIS STRUCTURE'S PROTECTION CAPABILITY THEREBY VOIDING THIS CERTIFICATION. DO NOT WELD ON OR DRILL HOLES IN THE STRUCTURE. CONSULT A CATERPILLAR DEALER TO DETERMINE THIS STRUCTURE'S LIMITATIONS WITHOUT VOIDING ITS CERTIFICATION.

Electrical Shock Hazard

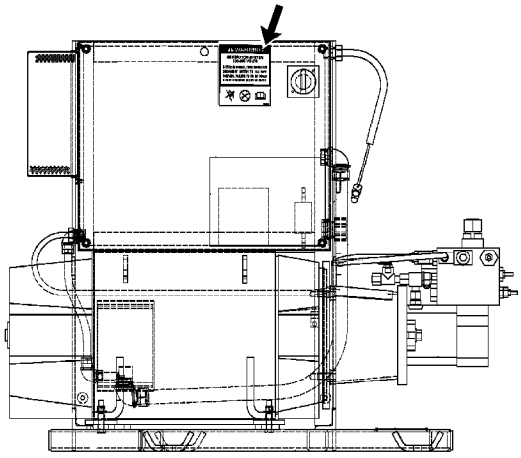

Illustration 38 g00745726

This warning label is located on the generator control panel. The generator control panel is located inside the cab riser.

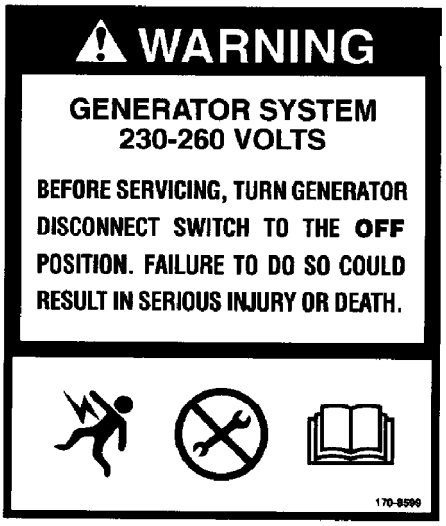

Illustration 39 g00709188

WARNING

Before servicing, turn generator disconnect switch to the OFF position. Failure to do so could result in serious injury or death.

Improper Operation of the System for the Removal of the Counterweight

Illustration 40 g00278621

This safety message is located inside the right rear access door.

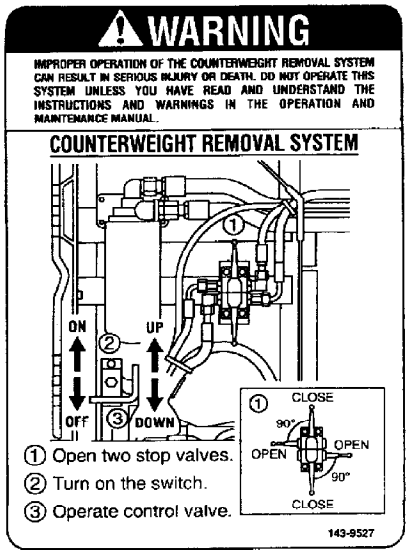

Illustration 41 g00115455

WARNING

IMPROPER OPERATION OF THE COUNTERWEIGHT REMOVAL SYSTEM CAN RESULT IN SERIOUS INJURY OR DEATH. DO NOT OPERATE THIS SYSTEM UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND WARNINGS IN THE OPERATION AND MAINTENANCE MANUAL.

Product Link

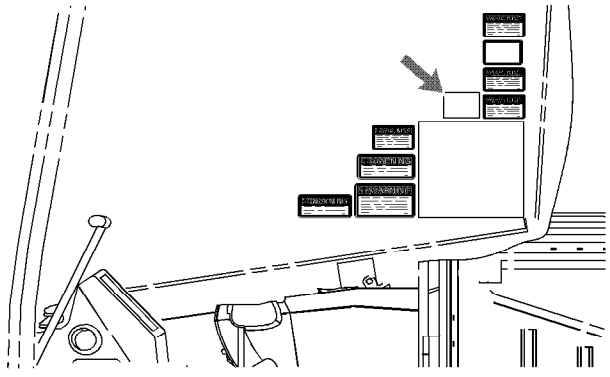

Illustration 42 g01021158

This safety message is positioned in the cab.

Illustration 43 g01013264

WARNING

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

Crushing Hazard

If equipped, this safety message is located near the counterweight mounting bolts.

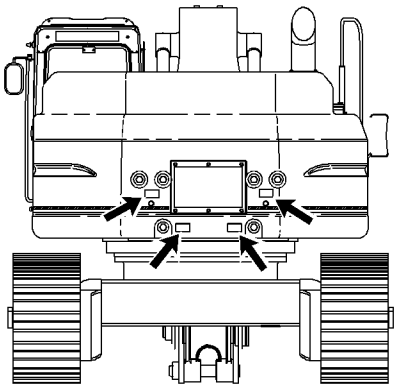

Illustration 44 g06548865

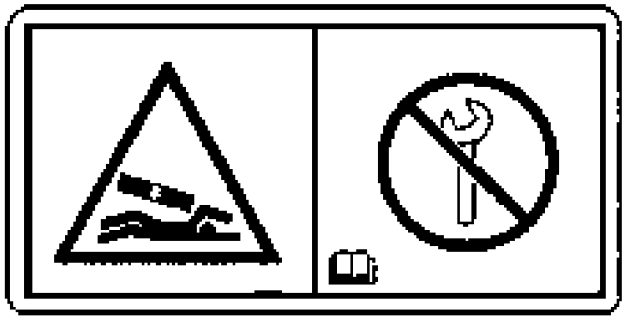

Illustration 45 g06509709

WARNING

Crushing Hazard! Personal injury or death can occur from counterweight falling during removal or installation. Do not remove any counterweight mounting bolts unless you have read and understand the instructions and warnings in the Operation and Maintenance for counterweight removal and installation.

Reference: Refer to Operation and Maintenance Manual, Counterweight Removal and Installation for further information.

i07746355

General Hazard Information

SMCS Code: 7000

Illustration 46 g00104545

Typical example

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

⚠ WARNING

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

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

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

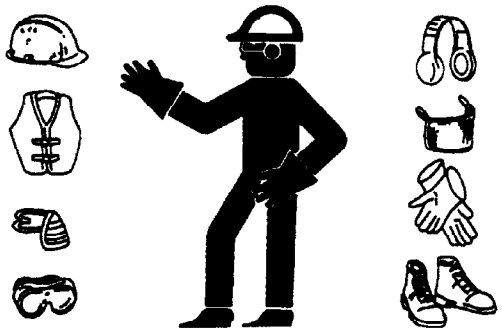

Illustration 47 g00702020

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.

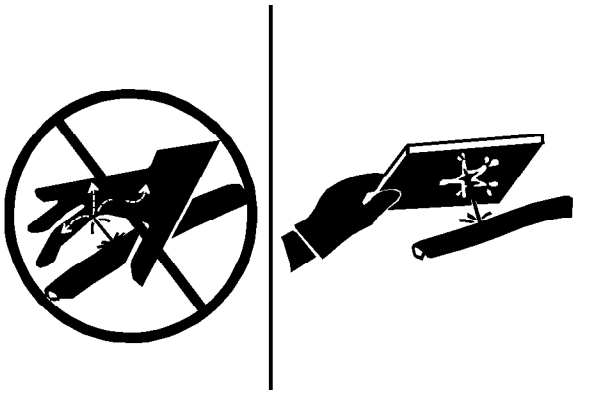

Illustration 48 g00687600

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

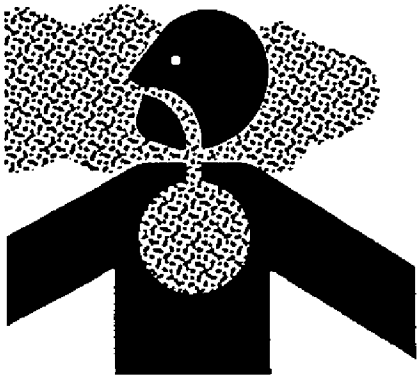

Illustration 49 g02159053

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

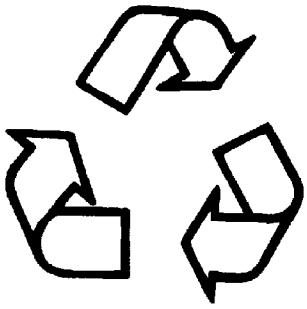

Illustration 50 g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07746334

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i07746336

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 51 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 52 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 53 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.

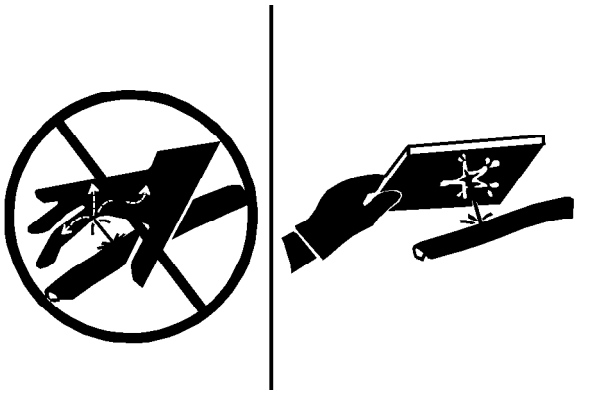

Illustration 54 g00687600

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.

i05474728

Fire Extinguisher Location

SMCS Code: 7000; 7419

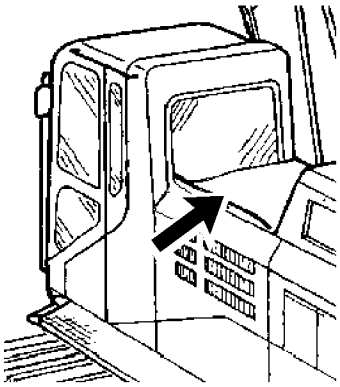

Illustration 55 g03459623

Typical example

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instruction plate. The fire extinguisher may be mounted behind the cab. The fire extinguisher should be mounted so that the fire extinguisher does not block the path of the alternate exit.

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.

i07889511

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

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

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

Critical Failures

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

Table 1

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Line, tubes, and hoses	End fittings are damaged or leaking. Outer coverings are chafed or cut. Wires are exposed. Outer coverings are swelling or ballooning. Flexible parts of the hoses are kinked. Outer covers have exposed embedded armoring. End fittings are displaced.	Visible corrosion, loose, or damaged lines, tubes, or hoses. Visible fluid leaks.	Immediately repair any lines, tubes, or hoses that are corroded, loose, or damaged. Immediately repair any leaks as these may provide fuel for fires.
Electrical Wiring	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation	Visible damage to electrical wiring	Immediately replace damaged wiring
Battery cable(s)	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation of the cable, fouling, corroded terminals, damaged terminals, and loose terminals	Visible damage to battery cable(s)	Immediately replace damaged battery cables
Operator Protective Structure	Structures that are bent, cracked, or loose. Loose, missing, or damaged bolts.	Visible damage to structure. Loose, missing, or damaged bolts.	Do not operate machine with damaged structure or loose, missing, or damaged bolts. Contact your Cat dealer for inspection and repair or replacement options.
Seat Belt	Worn or damaged seat belt or mounting hardware	Visible wear or damage	Immediately replace parts that are worn or damaged.
Seat Belt	Age of seat belt	Three years after date of installation	Replace seat belt three years after date of installation
Safety Messages	Appearance of safety message	Damage to safety messages making them illegible	Replace the illustrations if illegible.
Audible Warning Device(s) (if equipped)	Sound level of audible warning	Reduced or no audible warning present	Immediately repair or replace audible warning devices not working properly.
Camera(s) (if equipped)	Dirt or debris on camera lens	Dirt or debris obstructing camera view	Clean camera before operating machine.
Cab Windows (if equipped)	Dirt, debris, or damaged windows	Dirt or debris obstructing operator visibility. Any damaged windows.	Clean windows before operating machine. Repair or replace damaged windows before operating machine.
Mirrors (if equipped)	Dirt, debris, or damaged mirror	Dirt or debris obstructing operator visibility. Any damaged mirrors.	Clean mirrors before operating machine. Repair or replace damaged mirrors before operating machine.

(continued)

(Table 1, contd)

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Braking System	Inadequate braking performance	System does not pass Braking System - Test(s) included in Maintenance Section or in the Testing and Adjusting Manual	Contact your Cat dealer to inspect and, if necessary, repair the brake system.
Cooling System	The coolant temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the coolant level and check the radiator for debris. Refer to Operation and Maintenance Manual, Cooling System Coolant Level - Check. Check the fan drive belts for the water pump. Refer to Operation and Maintenance Manual, Belts - Inspect/Adjust/ Replace. Make any necessary repairs.
Engine Oil System	A problem has been detected with the engine oil pressure.	Monitoring System displays Warning Category 3	If the warning stays on during low idle, stop the engine and check the engine oil level. Perform any necessary repairs as soon as possible.
Engine system	An engine fault has been detected by the engine ECM.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat dealer for service.
Fuel System	A problem has been detected with the fuel system.	Monitoring System displays Warning Category 3	Stop the engine. Determine the cause of the fault and perform any necessary repairs.
Hydraulic Oil System	The hydraulic oil temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.
Steering System	A problem has been detected with the steering system. (If equipped with steering system monitoring.)	Monitoring System displays Warning Category 3	Move machine to a safe location and stop the engine immediately. Contact your Cat dealer to inspect and, if necessary, repair the steering system.
Overall Machine	Machine service is required.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat dealer for service.

Machine Operation

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

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

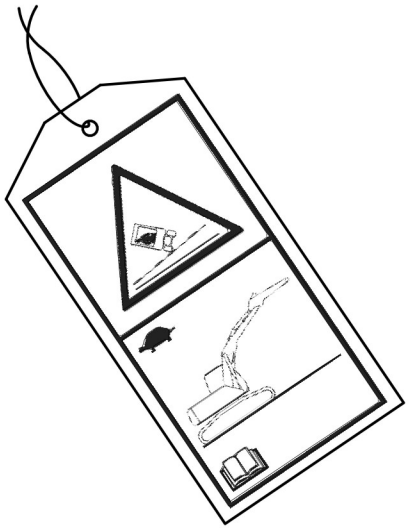

Illustration 56 g02202544

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.

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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.

i06781973

Parking

SMCS Code: 7000

The hydraulic system controls remain pressurized if the accumulator is charged. This condition is true even when the engine is not running. The hydraulic control system pressure should decrease in a short time (approximately 1 minute). While the hydraulic controls maintain a charge, the hydraulic work tools and machine controls remain functional.

There can be residual pressure within the hydraulic system even when the accumulator is empty. Refer to this Operation and Maintenance Manual, “System Pressure Release” before any service is performed to the hydraulic system.

Machine movement that is sudden and unexpected will occur if any of the controls are moved. Machine movement that is sudden and unexpected, 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 on a grade, chock the wheels of the machine.

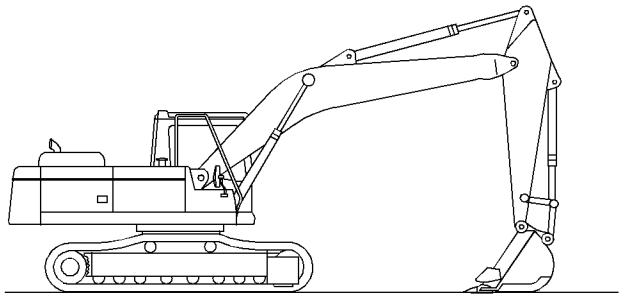

Illustration 57 g02154493

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. 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.

Install barriers or lighting as required to prevent interference in road traffic.

Select places free of danger by flooding and other water damage.

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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.

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Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

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

“The 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 2 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 2

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

i07746362

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.

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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

S/N: 4SS1–Up

S/N: 9GS1–Up

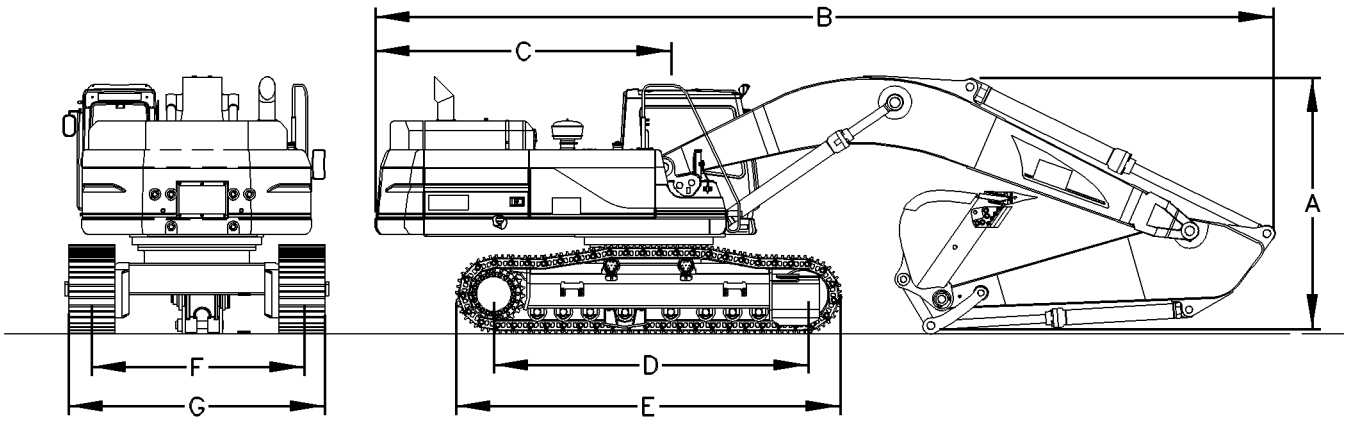

Illustration 58 g00110189

Table 3

345B L Excavator (Fixed Gauge Undercarriage)(1)	
Approximate Weight	44950 kg (99000 lb)
Shipping Height (A)	4600 mm (15 ft 1 inch)
Shipping Length (B)	11570 mm (38 ft)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge (F)	2740 mm (9 ft)
Overall Width(2) (G)	3490 mm (11 ft 5 inch)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 4.8 m (15 ft 9 inch) stick and a 1.7 m^3 (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Width includes 750 mm (30 inch) track shoes.

Table 4

345B L Excavator (Fixed Gauge Undercarriage)(1)	
Approximate Weight	44950 kg (99000 lb)
Shipping Height (A)	3760 mm (12 ft 4 inch)
Shipping Length (B)	11790 mm (38 ft 8 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge (F)	2740 mm (9 ft)
Overall Width(2) (G)	3640 mm (11 ft 11 inch)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.9 m (12 ft 10 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Width includes 900 mm (36 inch) track shoes.

Table 5

345B L Excavator (Fixed Gauge Undercarriage)[1]	
Approximate Weight	44950 kg (99000 lb)
Shipping Height (A)	3620 mm (11 ft 11 inch)
Shipping Length (B)	11760 mm (38 ft 7 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge (F)	2740 mm (9 ft)
Overall Width[2] (G)	3640 mm (11 ft 11 inch)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.35 m (11 ft) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Width includes 900 mm (36 inch) track shoes.

Table 6

345B L Excavator (Fixed Gauge Undercarriage)[1]	
Approximate Weight	44950 kg (99000 lb)
Shipping Height (A)	3730 mm (12 ft 3 inch)
Shipping Length (B)	11310 mm (37 ft 1 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge (F)	2740 mm (9 ft)
Overall Width[2] (G)	3490 mm (11 ft 5 inch)

(1) These specifications are for a machine with a 6.55 m (21 ft 6 inch) boom, a 3.0 m (9 ft 11 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Width includes 750 mm (30 inch) track shoes.

Table 7

345B L Excavator (Variable Gauge Undercarriage)[1]	
Approximate Weight	46700 kg (102900 lb)
Shipping Height (A)	4600 mm (15 ft 1 inch)
Shipping Length (B)	11670 mm (38 ft 3 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge[2] (F)	2390 mm (7 ft 10 inch)
Track Gauge[3](F)	2890 mm (9 ft 6 inch)

(continued)

(Table 7, contd)

Overall Width[4] (G)	3140 mm (10 ft 4 inch)
Overall Width[5] (G)	3640 mm (11 ft 11 inch)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 4.8 m (15 ft 9 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Retracted
(3) Extended
(4) Retracted width includes 750 mm (30 inch) track shoes.
(5) Extended width includes 750 mm (30 inch) track shoes.

Table 8

345B L Excavator (Variable Gauge Undercarriage)[1]	
Approximate Weight	46700 kg (102900 lb)
Shipping Height (A)	3740 mm (12 ft 3 inch)
Shipping Length (B)	11710 mm (38 ft 5 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge[2] (F)	2390 mm (7 ft 10 inch)
Track Gauge[3](F)	2890 mm (9 ft 6 inch)
Overall Width[4](G)	3290 mm (10 ft 10 inch)
Overall Width[5](G)	3790 mm (12 ft 5 inch)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.9 m (12 ft 10 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Retracted
(3) Extended
(4) Retracted width includes 900 mm (36 inch) track shoes.
(5) Extended width includes 900 mm (36 inch) track shoes.

Table 9

345B L Excavator (Variable Gauge Undercarriage)[1]	
Approximate Weight	46700 kg (102900 lb)
Shipping Height (A)	3610 mm (11 ft 10 inch)
Shipping Length (B)	11730 mm (38 ft 6 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge[2] (F)	2390 mm (7 ft 10 inch)
Track Gauge[3](F)	2890 mm (9 ft 6 inch)
Overall Width[4] (G)	3290 mm (10 ft 10 inch)
Overall Width[5] (G)	3790 mm (12 ft 5 inch)

(continued)

(Table 9, contd)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.35 m (11 ft 0 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Retracted
(3) Extended
(4) Retracted width includes 900 mm (36 inch) track shoes.
(5) Extended width includes 900 mm (36 inch) track shoes.

Table 10

345B L Excavator (Variable Gauge Undercarriage)(1)	
Approximate Weight	46700 kg (102900 lb)
Shipping Height (A)	3570 mm (11 ft 9 inch)
Shipping Length (B)	11310 mm (37 ft 1 inch)
Tail Swing Radius (C)	3650 mm (12 ft)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)
Length of Track (E)	5360 mm (17 ft 7 inch)
Track Gauge(2) (F)	2390 mm (7 ft 10 inch)
Track Gauge(3)(F)	2890 mm (9 ft 6 inch)
Overall Width(4) (G)	3140 mm (10 ft 4 inch)
Overall Width(5) (G)	3640 mm (11 ft 11 inch)

(1) These specifications are for a machine with a 6.55 m (21 ft 6 inch) boom, a 3.0 m (9 ft 11 inch) stick and a 1.7 cubic meter (2.25 yd^3) bucket. The fuel tank is 10 percent full.
(2) Retracted
(3) Extended
(4) Retracted width includes 750 mm (30 inch) track shoes.
(5) Extended width includes 750 mm (30 inch) track shoes.

Table 11

345B L Excavator(1)	
Operating weight with 750 mm (30 inch) track shoes	44050 kg (97100 lb)
Operating weight with 750 mm (30 inch) track shoes and counterweight	44436 kg (97951 lb)
Operating weight with 900 mm (36 inch) track shoes	44798 kg (98749 lb)
Operating weight with 900 mm (36 inch) track shoes and counterweight	45184 kg (99600 lb)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.9 m (12 ft 10 inch) stick and a 1.82 m^3 (2.38 yd^3) bucket.

Table 12

345B L Excavator(1)	
Operating weight with 750 mm (30 inch) track shoes	43970 kg (96924 lb)

(continued)

(Table 12, contd)

Operating weight with 750 mm (30 inch) track shoes and counterweight	44356 kg (97775 lb)
Operating weight with 900 mm (36 inch) track shoes	44718 kg (98573 lb)
Operating weight with 900 mm (36 inch) track shoes and counterweight	45104 kg (99424 lb)

(1) These specifications are for a machine with a 6.9 m (22 ft 8 inch) boom, a 3.35 m (11 ft) stick and a 1.82 m^3 (2.38 yd^3) bucket.

Consult your Caterpillar dealer for specifications that are not included in this topic.

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Specifications

SMCS Code: 7000

S/N: 2NW1–Up

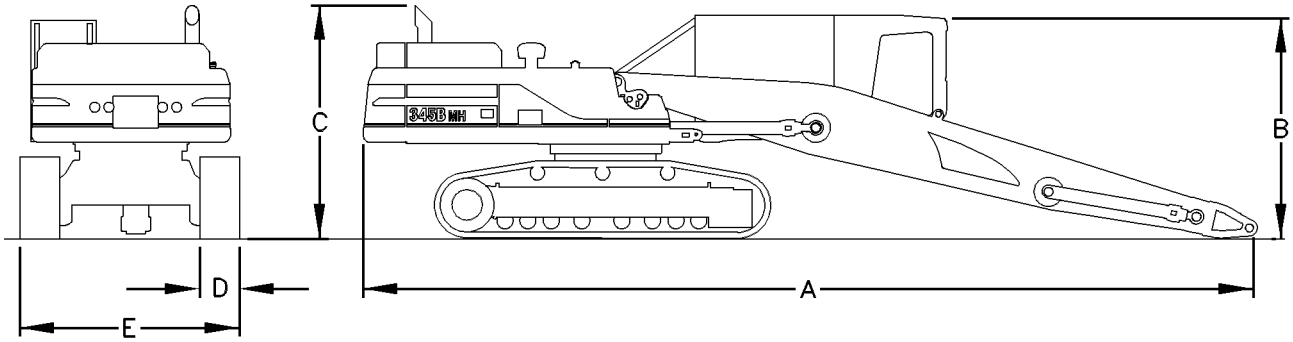


Illustration 59 g00455018

Table 13

345B Material Handler(1)	
Approximate Weight(2)	52800 kg (116160 lb)
Overall Length (A)	13550 mm (44 ft 6 inch)
Height of Tilted Cab (B)	3350 mm (10 ft 8 inch)
Shipping Height (C)	3850 mm (12 ft 8 inch)
Overall Width (D)	3970 mm (12 ft 8 inch)
Track Shoe Width (E)	750 mm (2 ft 6 inch)

(1) These specifications can only be obtained by the removal of the walkway.
(2) This specification is for a machine that has a 10 percent full fuel tank.

i01955306

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 different families by capacity. As a general rule, 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.

Each stick is designed to match a specific family of buckets. It is not possible to attach buckets of a different family to a given stick.

Tables 14 through 17 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.

345B Excavators

Bucket Specifications

Table 14

345B Excavator(1)					
Application	**ISO Capacity of Bucket**	**Width of Bucket**	**Bucket Tip Radius**	**Bucket Weight (with Tips)**	**Number of Bucket Tips**
Heavy Duty (HD)	1.1 m^3 (1.38 yd^3)	925 mm (36.4 inch)	1870 mm (73.6 inch)	1545 kg (3407 lb)	3
	1.3 m^3 (1.75 yd^3)	1098 mm (43.2 inch)		1642 kg (3621 lb)	
	1.6 m^3 (2.13 yd^3)	1246 mm (49.1 inch)		1743 kg (3843 lb)	5
	1.9 m^3 (2.5 yd^3)	1400 mm (55.1 inch)		1882 kg (4150 lb)	
	2.1 m^3 (2.75 yd^3)	1540 mm (60.6 inch)		2015 kg (4443 lb)	6
	2.4 m^3 (3.0 yd^3)	1695 mm (66.7 inch)		2143 kg (4725 lb)	
	2.6 m^3 (3.5 yd^3)	1820 mm (71.7 inch)		2267 kg (4999 lb)	7
General Purpose (GP)	1.3 m^3 (1.75 yd^3)	925 mm (36.4 inch)	2030 mm (79.9 inch)	1542 kg (3400 lb)	3
	1.6 m^3 (2.13 yd^3)	1098 mm (43.2 inch)		1638 kg (3612 lb)	4
	1.8 m^3 (2.38 yd^3)	1226 mm (48.3 inch)	1958 mm (77.1 inch)	1540 kg (3396 lb)	5
	2.0 m^3 (2.5 yd^3)	1246 mm (49.1 inch)	2030 mm (79.9 inch)	1758 kg (3876 lb)	
	2.3 m^3 (3.0 yd^3)	1400 mm (55.1 inch)		1793 kg (3954 lb)	
	2.6 m^3 (3.5 yd^3)	1562 mm (61.5 inch)		2025 kg (4465 lb)	6
	3.0 m^3 (4.0 yd^3)	1737 mm (68.4 inch)		2143 kg (4725 lb)	7
Heavy Duty Rock	1.3 m^3 (1.75 yd^3)	1098 mm (43.2 inch)	1870 mm (73.6 inch)	1751 kg (3861 lb)	4
	1.6 m^3 (2.13 yd^3)	1246 mm (49.1 inch)		1877 kg (4139 lb)	5
	1.9 m^3 (2.5 yd^3)	1400 mm (55.1 inch)		2019 kg (4452 lb)	
Rock Ripping (RR)	0.9 m^3 (1.13 yd^3)	953 mm (37.5 inch)	1870 mm (73.6 inch)	2024 kg (4163 lb)	5

(1) These specifications are for a machine with a “F” bucket and a reach linkage.

Table 15

345B Excavator(1)					
Application	**ISO Capacity of Bucket**	**Width of Bucket**	**Bucket Tip Radius**	**Bucket Weight (with Tips)**	**Number of Bucket Tips**
Heavy Duty (HD)	2.6 m^3 (3.5 yd^3)	1710 mm (67.3 inch)	1994 mm (78.5 inch)	2509 kg (5520 lb)	6
	3.0 m^3 (4.0 yd^3)	1900 mm (74.8 inch)		2682 kg (5900 lb)	
Heavy Duty Rock (HDR)	3.0 m^3 (4.0 yd^3)	1900 mm (74.8 inch)	1994 mm (78.5 inch)	2810 kg (6182 lb)	6

(1) These specifications are for a machine with a “G” bucket and a mass excavation linkage.

345B L Excavators

Table 16

345B Excavators with Long Undercarriage								
				Reach Boom			Mass Boom	
Application	SAE Capacity of Bucket	Width of Bucket	Bucket Family	3.9 m (12 ft 10 inch) Stick with T Bucket	3.35 m (10 ft 10 inch) Stick with T Bucket	2.9 m (10 ft 10 inch) Stick with T Bucket	3.0 m (9 ft 10 inch) Stick with U Bucket	2.9 m (10 ft 10 inch) Stick with U Bucket
Trenching	1.3 m^3	1075 mm (42.3 inch)	F	(1)	(1)	(1)	(2)	(2)
	1.6 m^3	1218 mm (48.0 inch)		(1)	(1)	(1)	(2)	(2)
	1.7 m^3	1225 mm (48.2 inch)		(3)	(1)	(1)	(2)	(2)
	1.9 m^3	1410 mm (55.5 inch)		(1)	(1)	(1)	(2)	(2)
	2.0 m^3	1375 mm (54.1 inch)		(1)	(3)	(1)	(2)	(2)
	2.3 m^3	1525 mm (60.1 inch)		(1)	(1)	(3)	(2)	(2)
Excavation	1.9 m^3		F	(1)	(1)	(1)	(2)	(2)
	2.1 m^3	1750 mm (68.9 inch)	G	(2)	(2)	(2)	(1)	(1)
	2.4 m^3	1980 mm (78.0 inch)		(2)	(2)	(2)	(1)	(1)
	2.0 m^3	1590 mm (62.6 inch)	F	(1)	(1)	(1)	(2)	(2)
	2.2 m^3	1735 mm (68.3 inch)		(1)	(1)	(1)	(2)	(2)
	2.2 m^3	1655 mm (65.2 inch)	G	(2)	(2)	(2)	(3)	(1)
	2.4 m^3	1770 mm (69.7 inch)		(2)	(2)	(2)	(1)	(3)
Mass Excavation	2.6 m^3	2135 mm (84.1 inch)	G	(2)	(2)	(2)	(1)	(1)
	2.6 m^3	1895 mm (74.6 inch)		(2)	(2)	(2)	(1)	(1)
Extreme Service Excavation	2.0 m^3	1600 mm (63.0 inch)	F	(1)	(1)	(1)	(2)	(2)
	2.1 m^3	1600 mm (63.0 inch)		(1)	(1)	(1)	(2)	(2)
Rock	2.2 m^3	1750 mm (68.9 inch)	G	(2)	(2)	(2)	(1)	(1)
	2.4 m^3	1880 mm (74.0 inch)		(2)	(2)	(2)	(1)	(1)

(1) Approved combination
(2) Unavailable
(3) Recommended

Note: Never reverse the bucket in order to use the bucket as a loader.

Note: The “Width of Bucket” indicates the maximum width.

Consult your Caterpillar dealer for more information.

Table 17

345B Excavators with Long Variable Undercarriage								
				Reach Boom			Mass Boom	
Application	SAE Capacity of Bucket	Width of Bucket	Bucket Family	3.9 m (12 ft 10 inch) Stick with T Bucket	3.35 m (10 ft 10 inch) Stick with T Bucket	2.9 m (10 ft 10 inch) Stick with T Bucket	3.0 m (9 ft 10 inch) Stick with U Bucket	2.9 m (10 ft 10 inch) Stick with U Bucket
Trenching	1.3 m^3	1075 mm (42.3 inch)	F	(1)	(1)	(1)	(2)	(2)
	1.6 m^3	1218 mm (48.0 inch)		(1)	(1)	(1)	(2)	(2)
	1.7 m^3	1225 mm (48.2 inch)		(1)	(1)	(1)	(2)	(2)
	1.9 m^3	1410 mm (55.5 inch)		(3)	(1)	(1)	(2)	(2)
	2.0 m^3	1375 mm (54.1 inch)		(1)	(1)	(1)	(2)	(2)
	2.3 m^3	1525 mm (60.1 inch)		(1)	(1)	(1)	(2)	(2)
Excavation	1.9 m^3		F	(1)	(1)	(1)	(2)	(2)
	2.1 m^3	1750 mm (68.9 inch)	G	(2)	(2)	(2)	(1)	(1)
	2.4 m^3	1980 mm (78.0 inch)		(2)	(2)	(2)	(3)	(1)
	2.0 m^3	1590 mm (62.6 inch)	F	(1)	(3)	(1)	(2)	(2)
	2.2 m^3	1735 mm (68.3 inch)		(1)	(1)	(3)	(2)	(2)
	2.2 m^3	1655 mm (65.2 inch)	G	(2)	(2)	(2)	(1)	(1)
	2.4 m^3	1770 mm (69.7 inch)		(2)	(2)	(2)	(1)	(1)
Mass Excavation	2.6 m^3	2135 mm (84.1 inch)	G	(2)	(2)	(2)	(1)	(3)
	2.6 m^3	1895 mm (74.6 inch)		(2)	(2)	(2)	(1)	(1)
Extreme Service Excavation	2.0 m^3	1600 mm (63.0 inch)	F	(1)	(1)	(1)	(2)	(2)
	2.1 m^3	1600 mm (63.0 inch)		(1)	(1)	(1)	(2)	(2)

(continued)

(Table 17, contd)

Trenching	1.3 m^3	1075 mm (42.3 inch)	F	(1)	(1)	(1)	(2)	(2)
(1)	Rock	2.2 m^3	1750 mm (68.9 inch)	G	(2)	(2)	(2)	(1)
2.4 m^3		1880 mm (74.0 inch)	(2)		(2)	(2)	(1)	(1)

(1) Approved combination
(2) Unavailable
(3) Recommended

Note: Never reverse the bucket in order to use the bucket as a loader.

Note: The “Width of Bucket” indicates the maximum width.

Consult your Caterpillar dealer for more information.

i00889197

Lifting Capacities

SMCS Code: 7000

S/N: 2NW1–Up

The pictographs in illustration 60 are in the charts for lifting capacities. The symbols are explained in the text that follows illustration 60 .

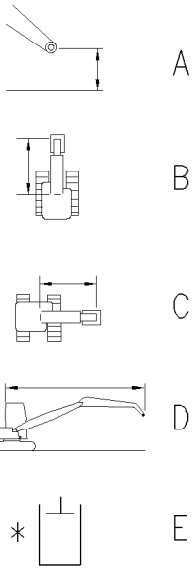
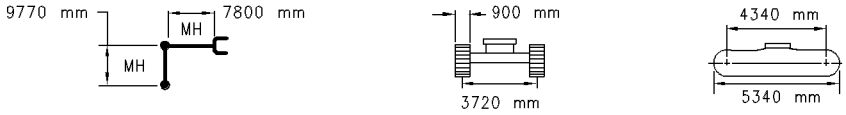


Illustration 60 g00274864

(A) Load point height
(B) Load radius over the front of the machine
(C) Load radius over the side of the machine
(D) Load at maximum reach
(E) Capacity is limited by hydraulics rather than by a tipping load. The loads do not exceed 100 percent of hydraulic lifting capacity. The loads do not exceed 100 percent of tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.

Metric

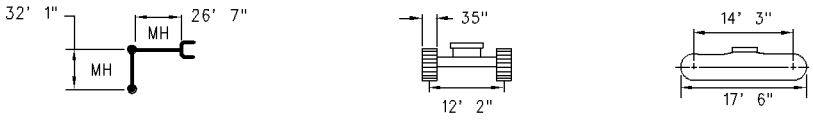


		3.0 m		5.0 m		6.0 m		8.0 m		9.0 m		11.0 m		12.0 m		14.0 m		15.0 m				
																						m
15.0 m	kg									*6850										*5760		10.00
14.0 m	kg											*6940								*5310		12.00
12.0 m	kg											*8250		*6580						*5080		13.00
11.0 m	kg											*8210		*7660		*5670				*4940		14.00
9.0 m	kg											*8340		*7710		*7120	7070			*4900		15.00
8.0 m	kg									*9480		*8570		*7850		*7210	6980	*5620		*4900		16.00
6.0 m	kg							*11380		*9980		*8890		*8030		*7300	6850	6620	5760	*4940		16.00
5.0 m	kg					*14920		*12340		*10520		*9210		*8210	8070	*7390	6710	6530	5670	*5080	5080	16.00
3.0 m	kg			*22490		*16600		*13240		*11070		*9570		*8390	7850	*7440	6530	6390	5530	*5260	4900	16.00
2.0 m	kg			*15100		*17780		*13970		*11520	11470	*9800	9200	*8480	7570	7350	6390	6300	5440	*5530	4850	16.00
0.0 m	kg			*9670		*18190		*14290	14200	*11700	10980	*9890	8890	*8480	7350	7210	6210	6210	5350	5620	4850	16.00
−2.0 m	kg	*5620		*8800		*15510		*14100	13700	*11560	10660	*9750	8620	*8300	7170	7070	6080	*6080	5260	*5440	4900	16.00
−3.0 m	kg	*6490		*8930		*13790		*13420	13380	*11110	10390	*9340	8440	*7940	7030	*6710	6030	*5530	5220	*5220	5080	16.00
−5.0 m	kg	*7260		*9340		*13380		*12240		*10200		*8620	8340	*7260	6980	*5990	5990					
−6.0 m	kg			*9890		*12380		*10520		*8890		*7480		*6210		*4852						
−8.0 m	kg					*9430		*8300		*7070		*5900		*4630								

* ISO 10567
SAE J1097

Illustration 61 g00453771

English



		10.0 ft		15.0 ft		20.0 ft		25.0 ft		30.0 ft		35.0 ft		40.0 ft		45.0 ft		50.0 ft				
																						ft
50.0 ft	lb									*15100										*12700		32.00
45.0 ft	lb											*15300								*11700		38.00
40.0 ft	lb											*18200		*14500						*11200		43.00
35.0 ft	lb											*18100		*16900		*12500				*10900		46.00
30.0 ft	lb											*18400		*17000		*15700	15600			*10800		49.00
25.0 ft	lb									*20900		*18900		*17300		*15900	15400	*12400		*10800		51.00
20.0 ft	lb							*25100		*22000		*19600		*17700		*16100	15100	14600	12700	*10900		52.00
15.0 ft	lb					*32900		*27200		*23200		*20300		*18100	17800	*16300	14800	14400	12500	*11200	11200	53.00
10.0 ft	lb			*49600		*36600		*29200		*24400		*21100		*18500	17300	*16400	14400	14100	12200	*11600	10800	54.00
5.0 ft	lb			*33300		*39200		*30800		*25400	25300	*21600	20300	*18700	16700	16200	14100	13900	12000	*12200	10700	54.00
0.0 ft	lb			*21300		*40100		*31500	31300	*25800	24200	*21800	19600	*18700	16200	15900	13700	13700	11800	12400	10700	54.00
−5.0 ft	lb	*12400		*19400		*34200		*31100	30200	*25500	23500	*21500	19000	*18300	15800	15600	13400	*13400	11600	*12000	10800	53.00
−10.0 ft	lb	*14300		*19700		*30400		*29600	29500	*24500	22900	*20600	18600	*17500	15500	*14800	13300	*12200	11500	*11500	11200	51.00
−15.0 ft	lb	*16000		*20600		*29500		*27000		*22500		*19000	18400	*16000	15400	*13200	13200					
−20.0 ft	lb			*21800		*27300		*23200		*19600		*16500		*13700		*10700						
−25.0 ft	lb					*20800		*18300		*15600		*13000		*10200								

* ISO 10567
SAE J1097

Illustration 62 g00453770

Identification Information

i01654027

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

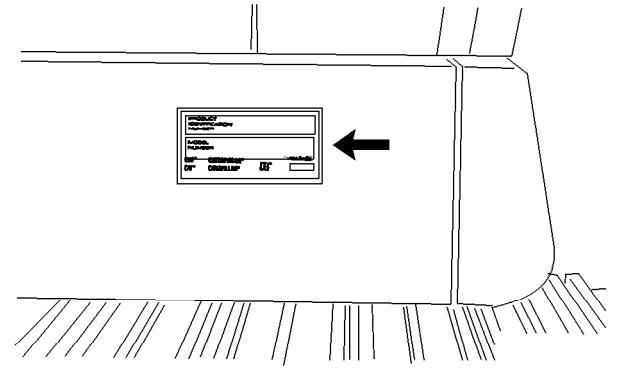


Illustration 63 g00100840

Machine PIN _____

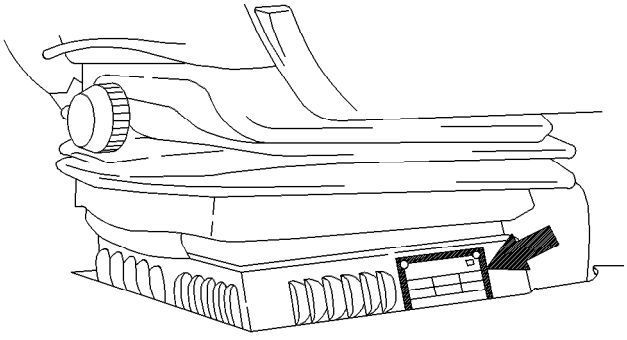


Illustration 64 g00100841

Service Information Number Plate (SIN)

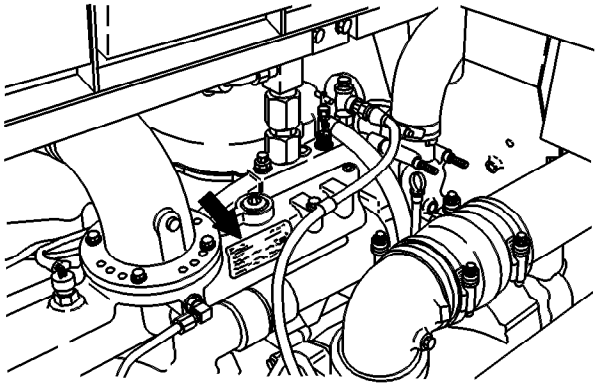


Illustration 65 g00110306

Engine Serial Number _____

i08085827

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Consult your Cat dealer for an Emission Control Warranty Statement.

The emission certification film is on the engine.

Operation Section

Before Operation

i01967054

Daily Inspection

SMCS Code: 1000; 6319; 6700; 7000

⚠ WARNING

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

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the cooling system pressure cap is cool enough to touch with your bare hand.

Remove the cooling system pressure cap slowly to relieve pressure.

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

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

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

First 100 Hours

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

- Operation and Maintenance Manual, “Boom, Stick and Bucket Linkage - Lubricate”

Severe Applications

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

- Operation and Maintenance Manual, “Boom, Stick and Bucket Linkage - Lubricate”

Daily Basis

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

- 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, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Track Adjustment - inspect”
- 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.

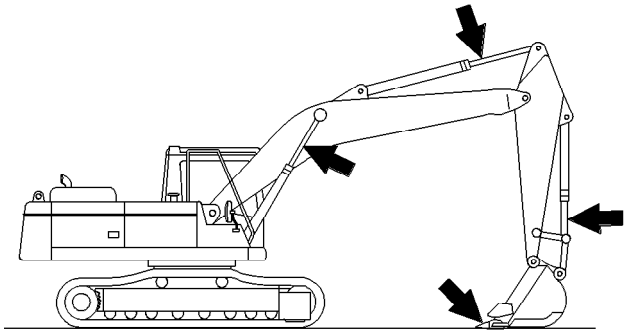


Illustration 66 g00101867

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.

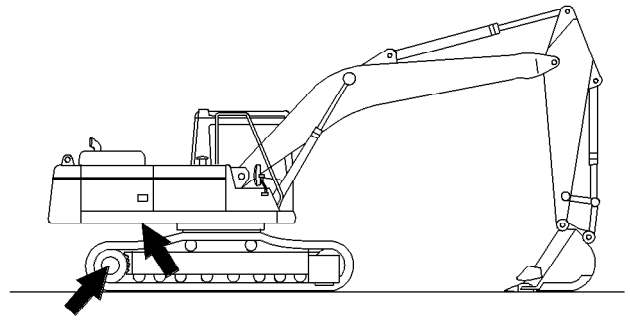


Illustration 67 g00101870

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 differential and 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.

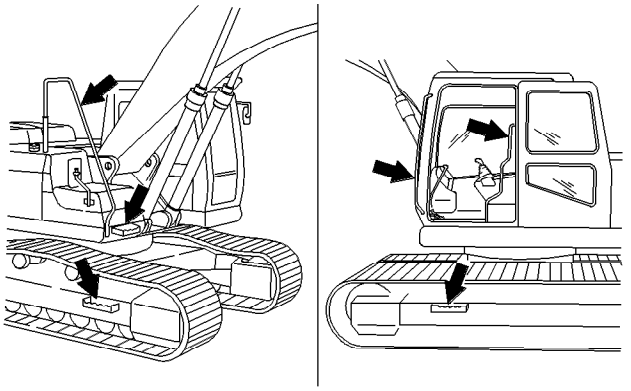


Illustration 68 g00101987

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.

i04027420

Mounting and Dismounting

SMCS Code: 6700; 7000

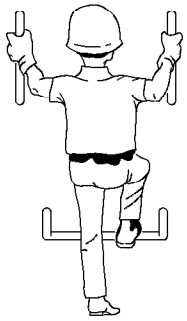


Illustration 69 g00037860

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

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

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

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

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.

Machine Operation

i01451689

Alternate Exit

SMCS Code: 7310

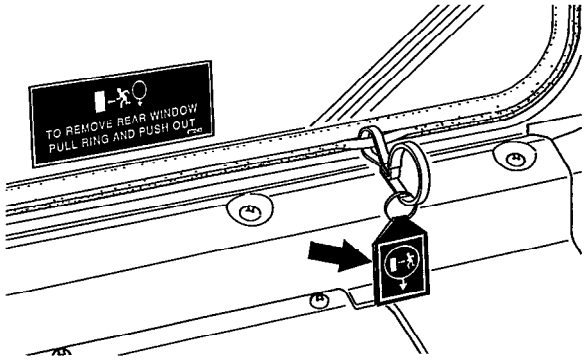


Illustration 70 g00101073

The rear window serves as an alternate exit.

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

Completely remove the O-ring seal 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.

i01957305

Seat

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

Put the hydraulic lockout control in the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Hydraulic Lockout Control”. 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.

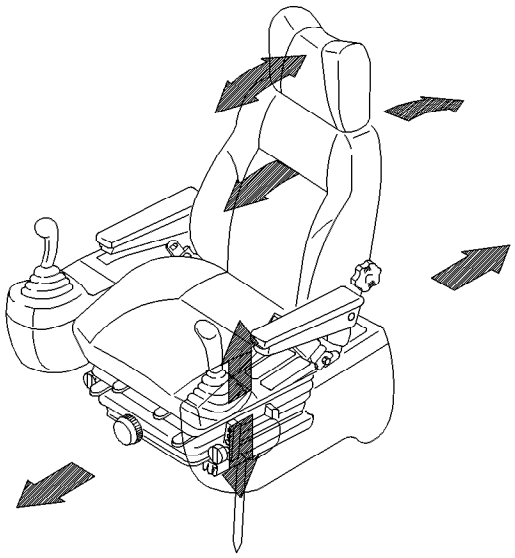


Illustration 71 g00101115

The operator can adjust the seat position forward or backward. The seat position can be adjusted up and down. 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 right console and the left console can be adjusted vertically.

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

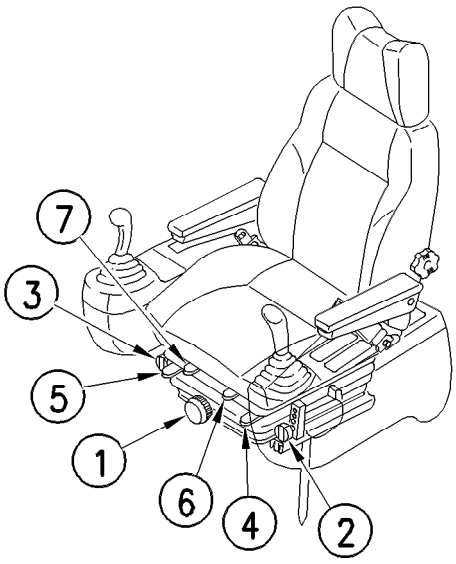


Illustration 72 g00101116

To adjust the seat suspension, turn operator weight adjustment knob (1) (if equipped) until the dial indicator shows the approximate weight of the operator. The adjustment knob has a range of 50 kg to 120 kg (110 lb to 265 lb). Turning the adjustment knob clockwise increases the reading. Turning the adjustment knob counterclockwise decreases the reading.

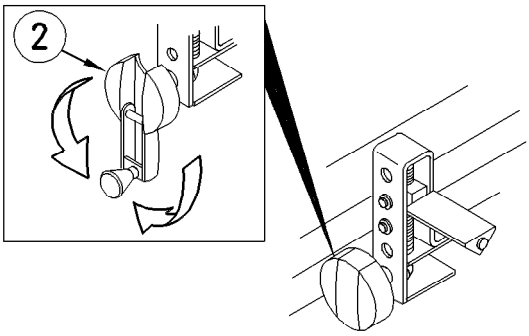


Illustration 73 g00101117

Turn knob (2) (if equipped) in order to tilt the left console to the desired height.

Turn knob (3) (if equipped) in order to tilt the right console to the desired height.

Use the two-position adjustment lever (4) in order to adjust the height of the seat. Pull up lever (4) into the first position. The angle of the seat can now be changed. Only the rear of the seat will tilt. Hold the seat in the desired position. Release the lever. To adjust the height of the seat, pull up lever (4) through the first position and into the second position. The front of the seat and the rear of the seat will raise simultaneously. The front of the seat and rear of the seat will lower simultaneously. Hold the seat in the desired position. Release the lever.

To adjust the seat back tilt to the desired position, turn knob (5).

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 seat forward or backward, pull up lever (7) and hold the lever. Move the seat to the desired position. To lock the seat in the selected position, release the lever.

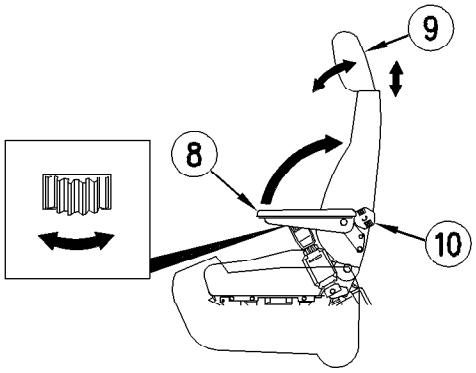


Illustration 74 g00101126

To adjust the angle of the armrest, operate dial (8). 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 operator can adjust the height of headrest (9) (if equipped) and the angle of the headrest. To adjust the headrest, hold the headrest with both hands. Move the headrest forward or backward and move the headrest up and down. Release the headrest when the desired position is attained. The headrest will remain in the desired position.

The lumbar support is located in the back of the seat. Turn knob (10) (if equipped) counterclockwise in order to increase the force of the lumbar support. Turn the knob clockwise in order to decrease the force of the lumbar support.

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

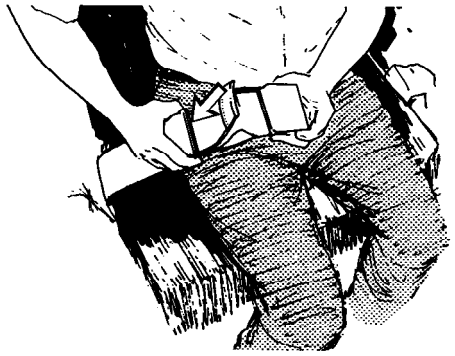


Illustration 75 g00100709

1. Unfasten the seat belt.

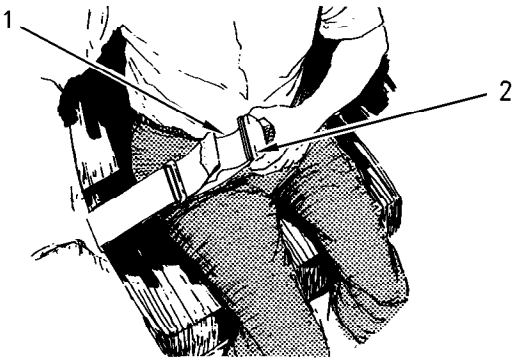


Illustration 76 g00932817

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

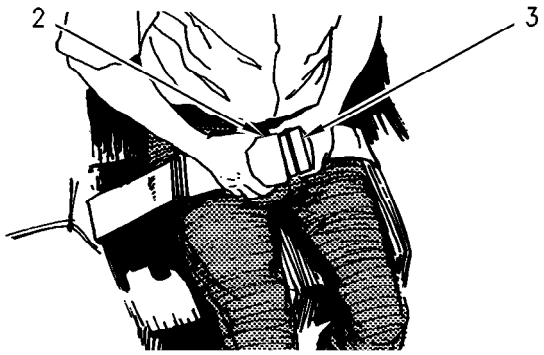


Illustration 78 g00932818

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

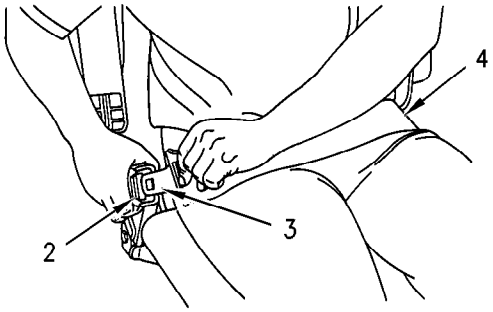


Illustration 80 g00867598

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

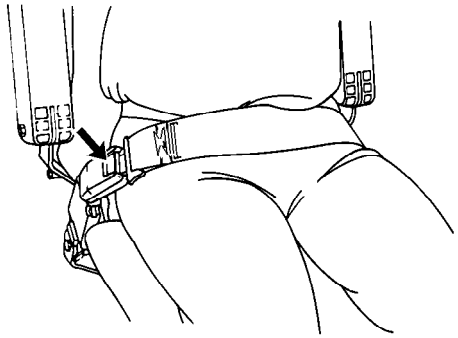


Illustration 81 g00039113

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.

i02013271

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.

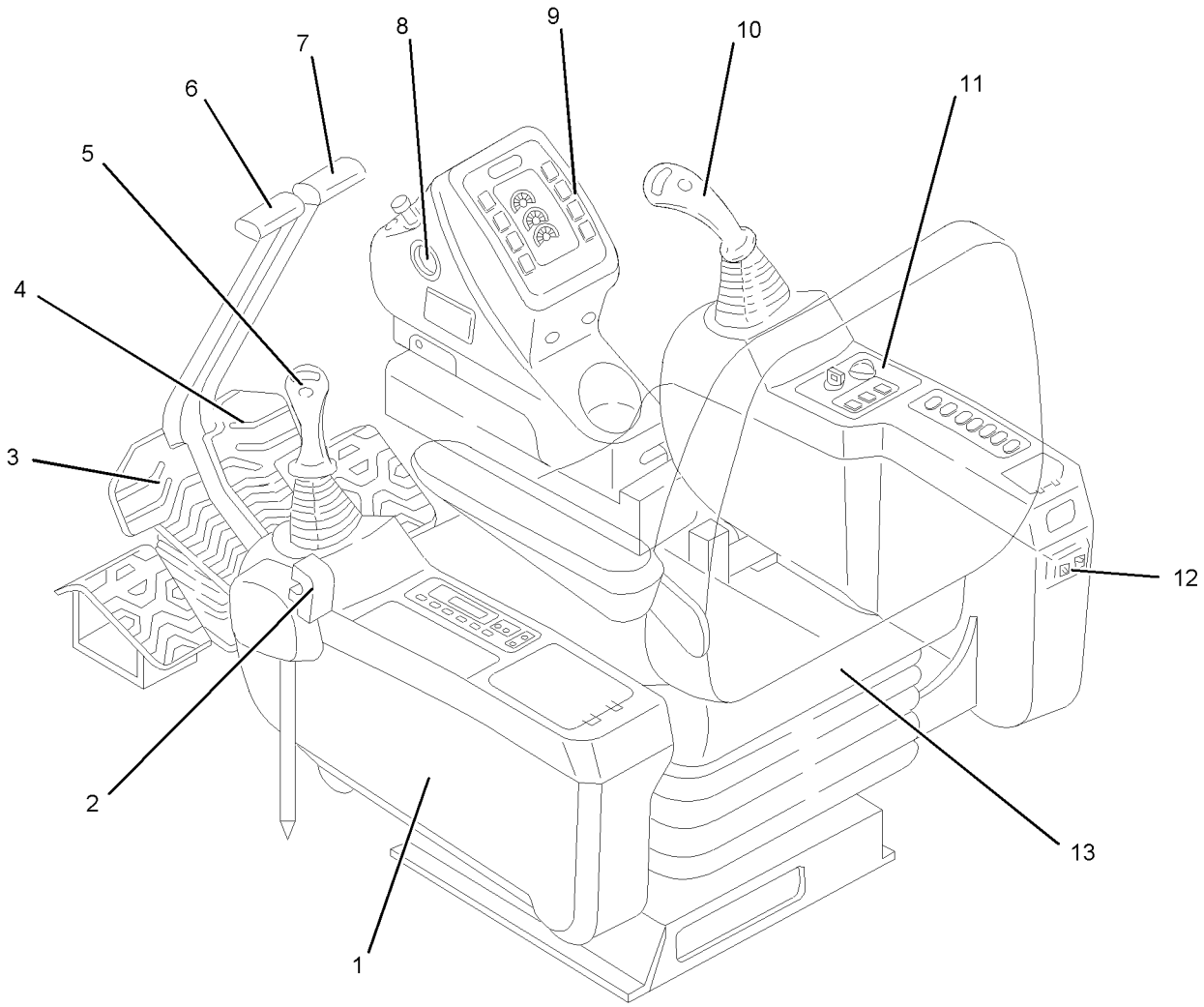


Illustration 82 g01041007

(1) Left Console
(2) Hydraulic Lockout Control
(3) Left Travel Pedal
(4) Right Travel Pedal
(5) Left Joystick
(6) Left Travel Lever
(7) Right Travel Lever
(8) Service Hour Meter
(9) Monitor
(10) Right Joystick
(11) Right Console
(12) Backup Controls
(13) Operator's Seat

i05039774

Battery Disconnect Switch

SMCS Code: 1411-B11

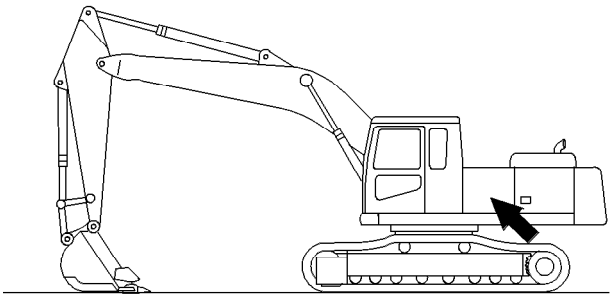


Illustration 83 g00100862

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

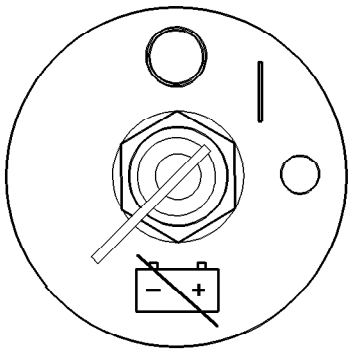


Illustration 84 g00406959

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 Cat dealer.

i01966093

Product Link
(If Equipped)

SMCS Code: 7490; 7602

The Product Link System (201) is a satellite communication device that transmits information regarding the machine to Caterpillar and to Caterpillar Dealers and Customers. The device contains a Global Positioning System and a satellite transmitter/receiver. 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 201 from the satellite. The information that is sent by the Product Link 201 goes to the satellite, and then to the receiving station. The receiving station transmits the data to Caterpillar. The information can then be sent to Caterpillar dealers and Customers.

Note: The Product Link 201 is automatically activated when the battery disconnect switch is in the ON position.

The system consists of three main components:

- Hardware, which includes the following, data module, antenna, wiring and additional mounting hardware.
- Satellite System and Caterpillar Network
- PC Software

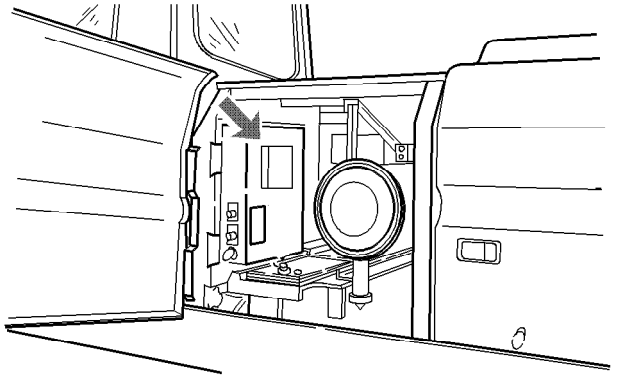


Illustration 85 g01021038

Typical location

⚠ WARNING

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

If the machine is required to work within 6.0 m (20 ft) of a blast area, then the operator must take one of the following precautions:

- Disconnect the Product Link module from the power source by disconnecting the wiring harness at the Product Link module.
- Temporarily remove the Product Link module from the machine.
- Install an ON/OFF switch in order to allow the Product Link module to be turned off from the inside of the cab.

This warning does not supersede the published requirements or the regulations that are found in “Title 30 of the Code of Federal Regulations (CFR)”. Every operation of a mine should conduct a hazard assessment that meets all of the requirements of “Title 30 of the Code of Federal Regulations (CFR)”. This will ensure safe operation in the storage, transportation, loading, and blasting of explosive material. The following specifications are provided in order to aid in conducting hazard assessments. These specifications are also provided in order to aid in ensuring compliance with all local regulations:

- The power of the transmitter for the Product Link is 5 Watts.
- The operating frequency range for the Product Link is 148 - 150 MHz.

Regulatory Compliance

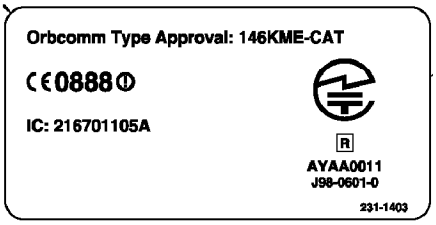
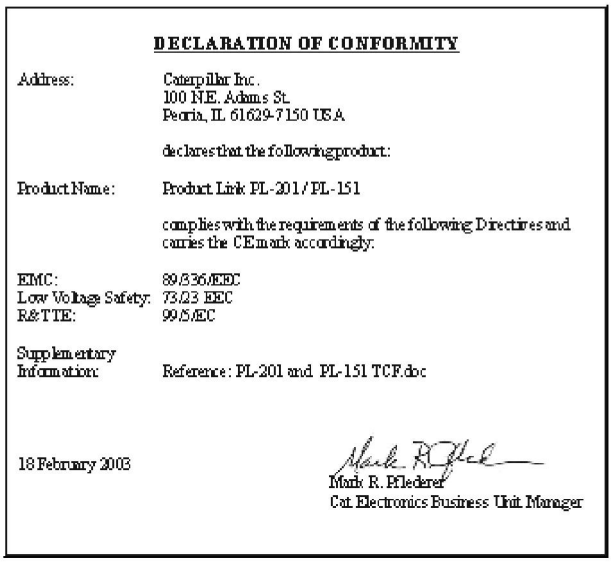


Illustration 86 g01015248

Refer to System Operation, Troubleshooting, and Testing and Adjusting, RENR5885, “ Product Link 151/201” for information about this service tool.

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



DECLARATION OF CONFORMITY

Address: Caterpillar Inc.
100 N.E. Adams St.
Peoria, IL 61629-7150 USA

declares that the following product:

Product Name: Product Link PL-201 / PL-151

complies with the requirements of the following Directives and carries the CE mark accordingly:

EMC: 89/336/EEC
Low Voltage Safety: 73/23 EEC
R&TTE: 99/5/EC

Supplementary Information: Reference: PL-201 and PL-151 TCF.doc

18 February 2003

Mark R. Pfledere
Cat Electronics Business Unit Manager

Illustration 87 g01015235

i01584591

Engine Start Switch

SMCS Code: 1416-ENG

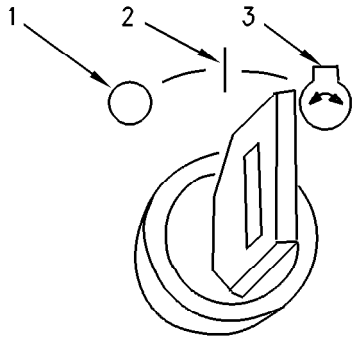


Illustration 88 g00822102

(1) OFF position. (2) ON position. (3) START position.

For details, see the Operation and Maintenance Manual, “Engine Starting”.

i02169424

Ether Starting Aid Switch
(If Equipped)

SMCS Code: 1456

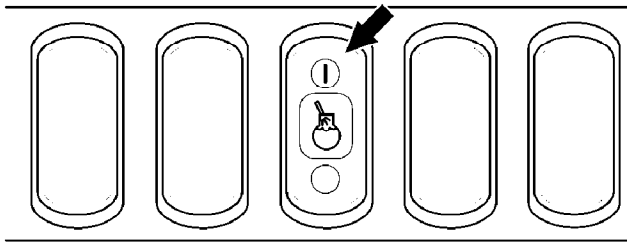


Illustration 89 g00753499

The switch for the ether starting aid is located on the switch panel on the right side of the cab.

Ether Starting Aid – If the engine is difficult to start in cold weather, ether can be injected into the air inlet by activating the ether starting aid.

Ether Starting Aid Activated – Push the right side of the switch only while you crank the engine. Release the switch. A premeasured amount of ether will be injected into the air inlet.

i00651334

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.

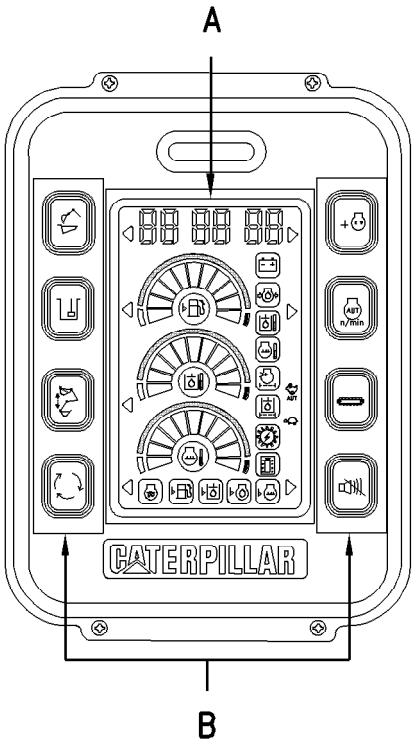


Illustration 90 g00101077

The Electronic Monitor Panel consists of indicators (A) and switches (B). The indicators are gauges and indicators for various machine systems. The switches are for selecting the various work modes and the power modes.

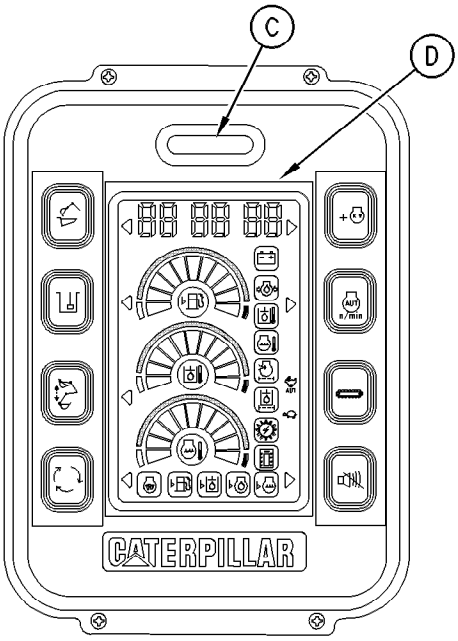


Illustration 91 g00101078

The Electronic Monitor Panel consists of an action alarm, action light (C), and monitor panel (D). The monitor panel has individual alert indicators for each machine system that is listed on the monitor panel.

The monitor panel is designed to alert the operator of an immediate problem or of an impending problem. The problem could be in more than one of the machine systems that are listed.

Functional Test

To ensure proper operation, check the system daily. The functional test can be part of the starting procedure for the engine. For details on starting procedures for the engine, see Operation and Maintenance Manual, “Engine Starting”.

Warning Categories

The electronic monitor panel provides three warning categories. The first warning category requires only operator awareness. The second warning category requires an operator response. The third warning category requires immediate shutdown of the machine systems.

Warning Category 1

In this category, only the alert indicator comes on. 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.

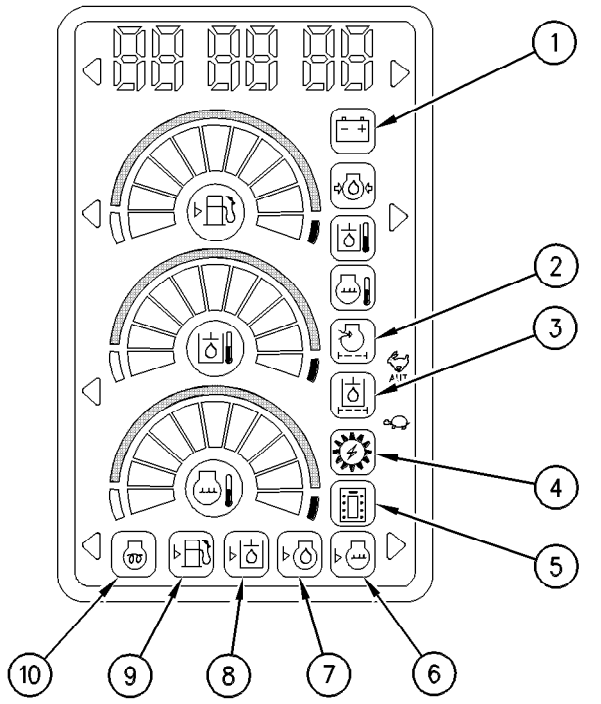


Illustration 92 g00101085

Alternator (1) – This alert indicator indicates that the electrical charging system is malfunctioning. The machine can be operated while the alternator light is on. However, if the electrical accessories are used, the batteries will discharge rapidly. Perform any necessary repairs.

Restricted Air Filter (2) – This indicator indicates that the air filter is restricted. If the air filter is restricted, then 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.

Restricted Hydraulic Return Filter (3) – This indicator indicates that one or both of the two hydraulic return filters (capsule filters) is restricted. A restricted hydraulic return filter will cause hydraulic components to malfunction. Immediately replace the return filter cartridges. Examine the condition of the restricted hydraulic filters. Perform additional repairs, if necessary.

Electronic Controller (4) – When an electronic problem occurs, this indicator light will be activated. The problem may not exist in the electronic controller.

Stop the engine and restart the engine after a few minutes. If the indicator light does not come on, this indicates that a problem does not exist. If the indicator light comes on again, there is a problem in the electrical system. Consult your Caterpillar dealer for any necessary repairs.

Make necessary repairs as soon as possible. If you cannot make immediate repairs, you can operate the machine by placing the backup switch in the MANUAL position. When the backup switch is in the MANUAL position, the power to the electronic monitor panel will be switched off. The monitor panel will not function.

The backup switch is only a temporary procedure. Perform any necessary repairs as soon as possible.

Monitor Panel (5) – If the indicator light comes on, a problem may exist in the monitor panel. The problem might also exist in the data communication lines. Consult your Caterpillar dealer for the necessary repairs.

The machine can be operated, but the electronic monitor panel will not function. Perform any necessary repairs as soon as possible.

Note: If Electronic Controller (4) and Monitor Panel (5) come on at the same time, there is a malfunction. This malfunction is in the communication between the electronic controller and the monitor panel. In this case, consult your Caterpillar dealer for any necessary repairs.

Coolant Level (6) – If this indicator is activated, the coolant level is below the specified level. Add coolant.

If the engine start switch is placed in the ON position for 2 seconds or longer, the prestart monitoring function is activated in order to check the coolant level. This indicator will not go off unless the engine start switch is turned off. If the engine start switch is not placed in the ON position for 2 seconds or longer, the prestart monitoring function will not be activated and the indicator will go off after flashing for 5 seconds.

Engine Oil Level (7) – If this indicator is activated, the engine oil level is below the specified level. Add engine oil.

If the engine start switch is placed in the ON position for 2 seconds or longer, the prestart monitoring function is activated in order to check the engine oil level. This indicator will not go off unless the engine start switch is turned off. If the engine start switch is not placed in the ON position for 2 seconds or longer, the prestart monitoring function will not be activated and the indicator will go off after flashing for 5 seconds.

Hydraulic Oil Level (8) – If this indicator is activated, the hydraulic oil level is below the specified level. Add hydraulic oil.

If the engine start switch is placed in the ON position for 2 seconds or longer, the prestart monitoring function is activated in order to check the hydraulic oil level. This indicator will not go off unless the engine start switch is turned off. If the engine start switch is not placed in the ON position for 2 seconds or longer, the prestart monitoring function will not be activated and the indicator will go off after flashing for 5 seconds.

Fuel Level (9) – If the fuel in the tank is below the specified level, this indicator will come on. Add fuel.

Note: This machine is not equipped with an air inlet heater. However, the indicator for the air inlet heater (10) will come on when the electronic monitoring system is tested.

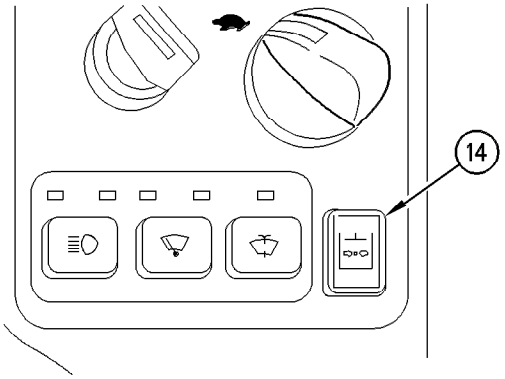


Illustration 93 g00115408

Hydraulic Tank Pressure (14) – If this indicator is activated, the hydraulic tank pressure has not yet reached the operating level. While the indicator is activated, the engine speed is limited to a speed that is less than maximum engine speed. The engine speed is limited in order to protect the hydraulic pump. The indicator will remain activated until the hydraulic tank pressure has reached the predetermined level and the implement control lever is returned to the HOLD position.

Warning Category 2

In this category, the alert indicator and the action light come on. This category requires a change in machine operation in order to reduce excessive temperature in one of the machine systems or more.

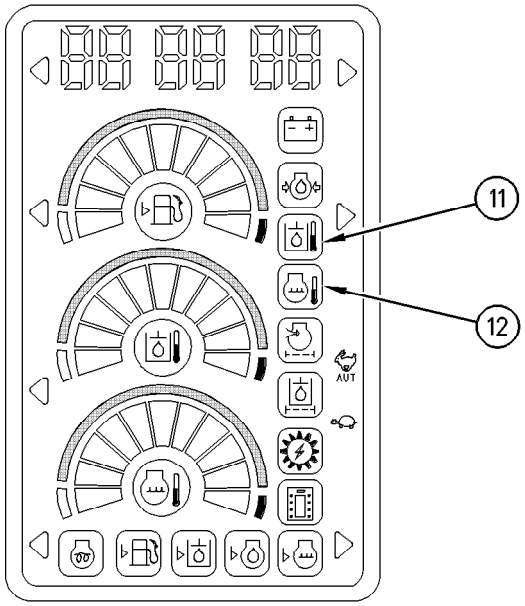


Illustration 94 g00101082

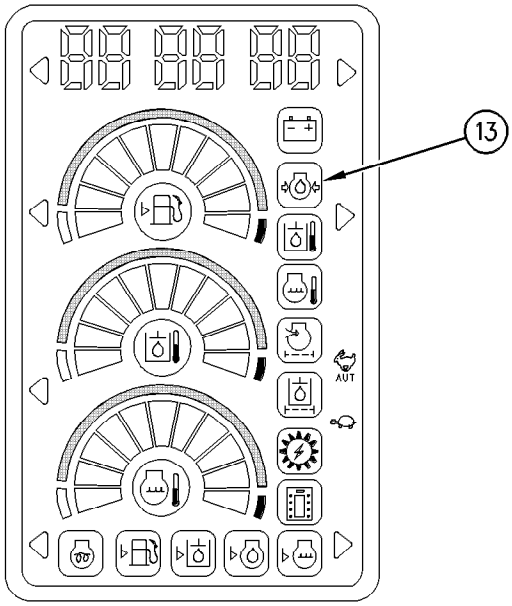


Illustration 95 g00101084

Hydraulic Oil Temperature (11) – This alert indicator indicates excessive hydraulic oil temperature. If this alert indicator comes on, reduce the operating speed of the machine. Keep the engine at low idle until the hydraulic oil temperature decreases to the correct level. If the indicator stays on after restarting machine operation, stop the engine. Check the hydraulic oil level. Check the oil cooler for restriction. Perform any necessary repairs as soon as possible.

Coolant Temperature (12) – This alert indicator indicates excessive coolant temperature. If this alert indicator comes on, reduce the operating speed of the machine. Keep the engine at low idle until the engine is cooled down. If the indicator stays on after running the engine at low idle, stop the engine. Check the coolant level. Check the fan drive belts for the water pump and fan blade. Make any necessary repairs.

Warning Category 3

In this category, the alert indicator and the action light will come on and the action alarm sounds. This category requires immediate shutdown of the machine. The machine must be shutdown in order to prevent injury to the operator and/or severe damage to the machine.

Engine Oil Pressure (13) – This alert indicator indicates low engine oil pressure. If this alert indicator comes on, 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.

i01496570

Gauges

SMCS Code: 7450; 7451; 7490

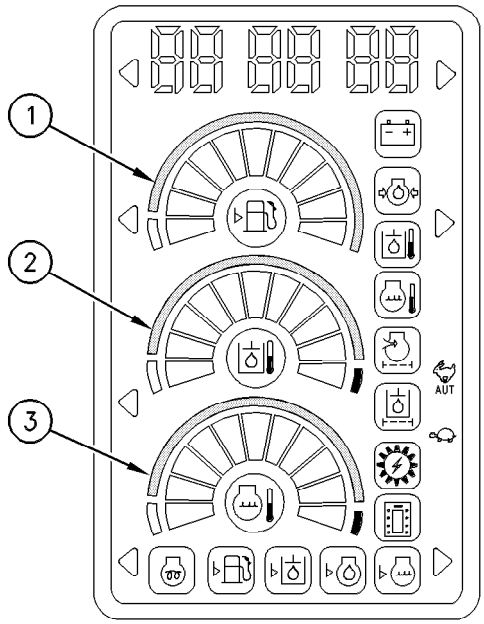


Illustration 96 g00304463

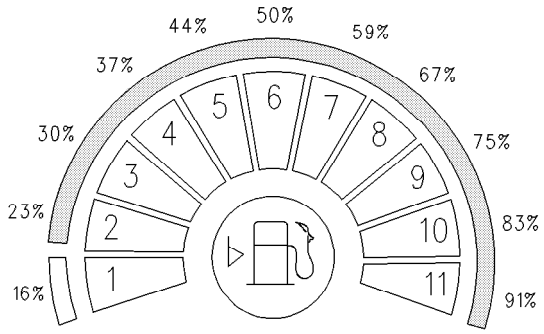


Illustration 97 g00304126

Fuel Level (1) – This gauge indicates fuel tank levels. By using this gauge, an operator can determine the amount of fuel that is in the tank. Use illustration 97 as a reference in order to determine the amount of fuel that is in the fuel tank. Each section of the fuel gauge will illuminate or each section will turn off when the specified percentage that is shown in illustration 97 is reached. Each section of the fuel gauge represents an approximate 8 percent change in the fuel level. When the fuel gauge indicates that the fuel level is in the white range, add fuel immediately.

Hydraulic Oil Temperature (2) – 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 (3) – This gauge indicates the temperature of the engine coolant. The green range is the normal operating temperature. The red range indicates overheating.

i01162607

Magnet Controller and Monitor Panel

SMCS Code: 7490

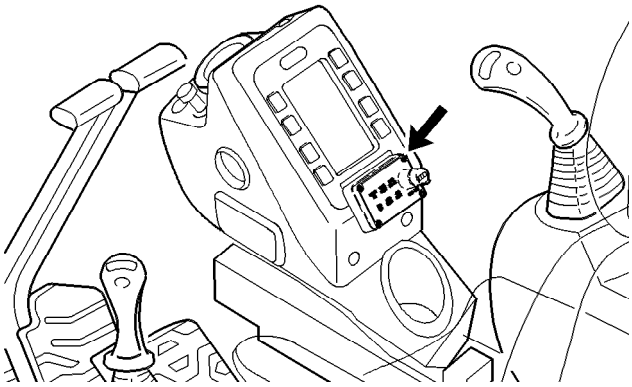


Illustration 98 g00274430

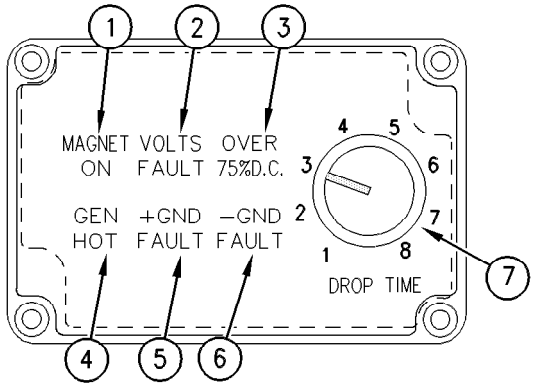


Illustration 99 g00620114

“MAGNET ON” (1) – If this indicator comes on, the magnet is energized.

“VOLTS FAULT” (2) – If this indicator comes on, the voltage is too high or the voltage is too low in order to properly operate the magnet. One or more of the following items could remedy the problem:

- Check the electrical connections.
- Inspect the generator field resistor.
- Check that the generator is operating at the correct speed (1750 RPM).
- Check the generator.

“OVER 75% D.C.” (Duty Cycle) (3) – If this indicator comes on, the magnet is being operated more than 75 percent of the time.

“GEN HOT” (4) – If this indicator comes on, the generator is overheating. One or more of the following items could be the reason that the generator is overheating:

- The magnet is too large.
- There is a short or a ground in the system.
- The duty cycle is too high.
- The voltage is too high.
- There is insufficient airflow through the generator.
- The generator is faulty.

“+ GND FAULT” (5) – If this indicator comes on, the resistance to ground in the positive line has dropped below 50,000 ohms.

“- GND FAULT” (6) – If this indicator comes on, the resistance to ground in the negative line has dropped below 50,000 ohms.

“DROP TIME” (7) – The drop time is controlled by a control dial and a range switch. The settings of both controls will vary depending on the size of the magnet. To achieve the best drop time for a given magnet, you should use the procedure below.

Use the following procedure to set the “DROP TIME” .

1. Determine the size of magnet that is installed on the machine. Locate the settings for the magnet in Table 18 .
2. Set control dial (7) to the lower value that is given in Table 18 . Set the range switch to the position that is shown in Table 18 . The range switch is located on the lower right exterior of the “PLC” enclosure.

Table 18

Initial Settings			
Size of Magnet (kW)	**Magnet Cold Rating (amperes)**	**Position of Control Dial**	**Position of Range Switch**
0 to 7	0 to 30	1 TO 4	OFF
7 to 10	30 to 45	1 TO 6	OFF
11 to 15	45 to 70	1 TO 7	OFF
16 to 25	70 to 110	2 TO 8	OFF
		1 TO 6	ON
26 to 45	110 to 220	3 TO 8	ON

3. Lift the load and drop the load at consecutively higher settings until a clean drop is achieved.

4. Record the settings and the size of the magnet that is being used. When the same magnet is installed, set the control dial and the range switch to the recorded settings.

Note: The initial settings are only suggestions. The actual settings may vary depending on the manufacturer of the magnet. The type of magnet and the material type and consistency will affect the setting. The dial setting will usually be higher for larger magnets. The range switch should be in the OFF position for magnets that are rated at 110 amperes or less. The range switch should only be in the ON position when a clean drop cannot be achieved at any dial setting in the OFF position. The ON position should only be necessary with magnets that are rated 111 Amperes and up.

i01956201

Clock

SMCS Code: 7450

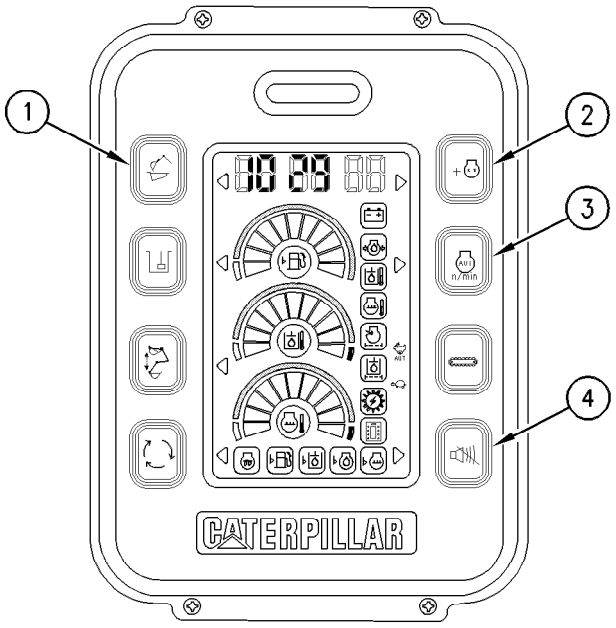


Illustration 100 g00304481

The display shows a time of “10:29” .

Turn the disconnect switch to the OFF position or remove the batteries in order to reset the clock to “1:00” . The following two methods can be used in order to adjust the clock.

- In order to change the setting for the hour, simultaneously press switch (1) for the boom priority mode and alarm cancel switch (4). In order to change the minutes, simultaneously press power mode switch (2) and alarm cancel switch (4). When you push the switches, the unit of time advances by one increment. Hold down the switches in order to continuously change settings.
- When you hold down alarm cancel switch (4), press AEC switch (3). This sets the clock to “00” minutes. If the time that is displayed is 30 minutes or less, the clock will display the preceding hour. If the time that is displayed is more than 30 minutes, the clock will display the succeeding hour.

i00116845

Service Hour Meter

SMCS Code: 7480

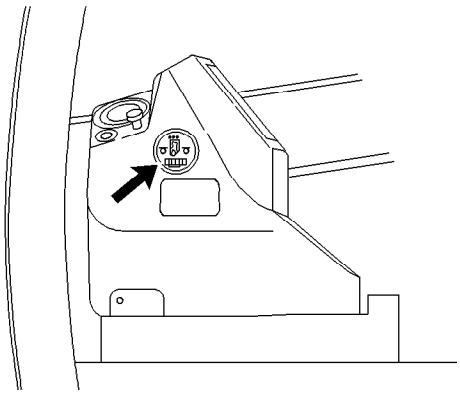


Illustration 101 g00107389

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

i00130703

Light Switches

SMCS Code: 1429-ZS

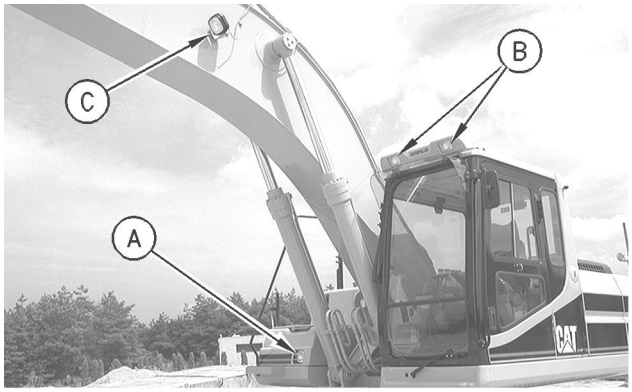


Illustration 102 g00100936

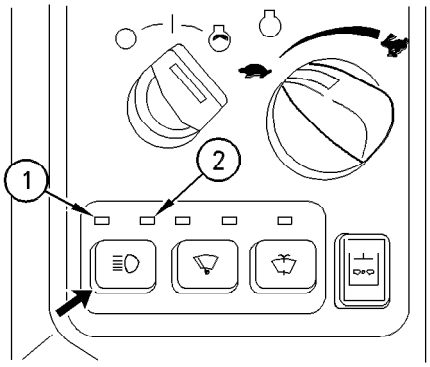


Illustration 103 g00110318

(A) Work Light. (B) Work Light. (C) Work Light. (1) Indicator Light. (2) Indicator Light.

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 that are in the cab indicate the pattern of the work lights that are turned on. When indicator light (1) is on, the following work lights are turned on: work light (A) that is mounted on the chassis, work light (B) that is mounted on the cab and the lights for the monitoring panel.

When indicator light (1) and indicator light (2) are on, the following work lights are turned on: work light (A) that is mounted on the chassis, work light (B) that is mounted on the cab, work light (C) that is mounted on the boom and the lights for the monitoring panel. When both of the indicator lights are off, all of the work lights are off.

i00762969

Travel Alarm
(If Equipped)

SMCS Code: 7429

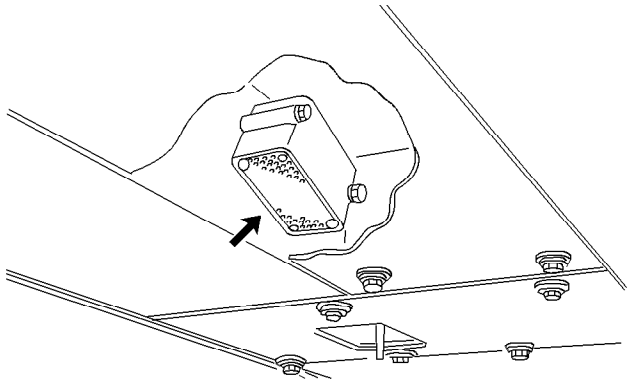


Illustration 104 g00102243

The travel alarm is located under the engine. The travel alarm will sound when the travel lever or the travel pedal is activated.

Travel Alarm Cancel Switch

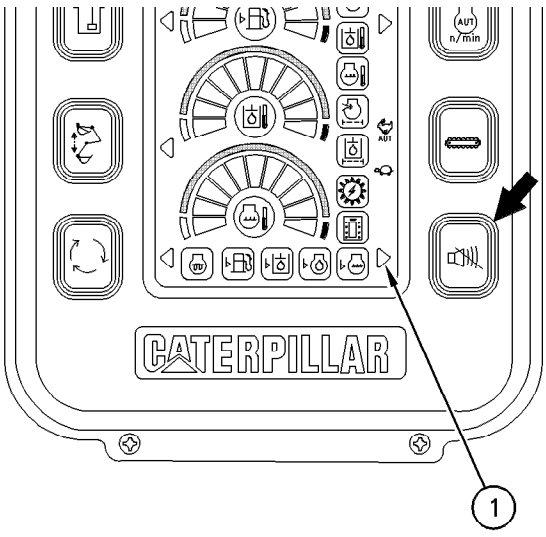


Illustration 105 g00100931

(1) Indicator lamp

Travel Alarm Cancel Switch – This switch is used to stop the travel alarm from sounding. Press the switch in order to stop the alarm. Indicator lamp (1) comes on.

i00659894

Storage Box

SMCS Code: 7268

Interior Storage Box

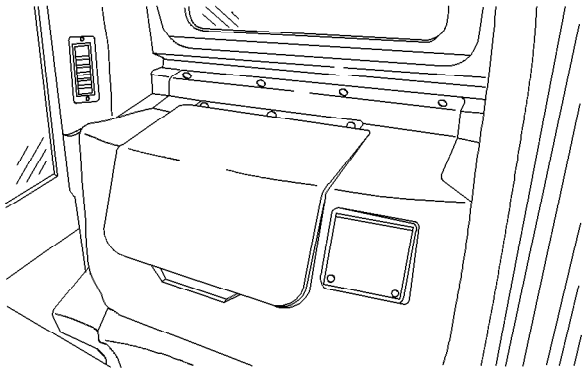


Illustration 106 g00107780

The storage box is used to store miscellaneous items such as a first aid kit or a lunch box.

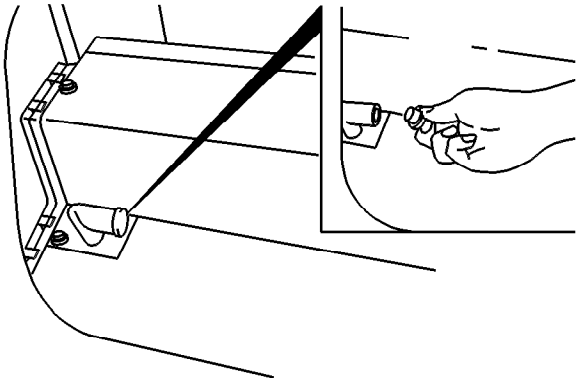


Illustration 107 g00107781

Note: There is a plugged hole inside the storage box. Install the plug that is supplied with the machine into the hole in order to block the air that is coming from the air conditioner or from the heater.

Exterior Storage Box

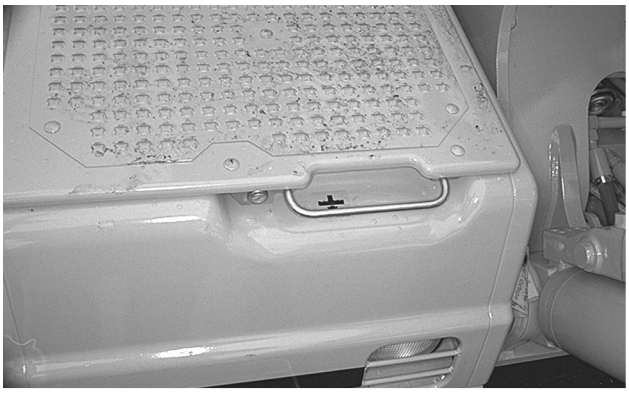


Illustration 108 g00104582

Pull – Pull the handle in order to open the storage box. The storage box is used to store the refueling pump. The storage box is also used to store miscellaneous tools.

i01953622

Air Conditioning and Heating Control

SMCS Code: 7304; 7320; 7337

The automatic temperature control unit adjusts the temperature inside the cab automatically.

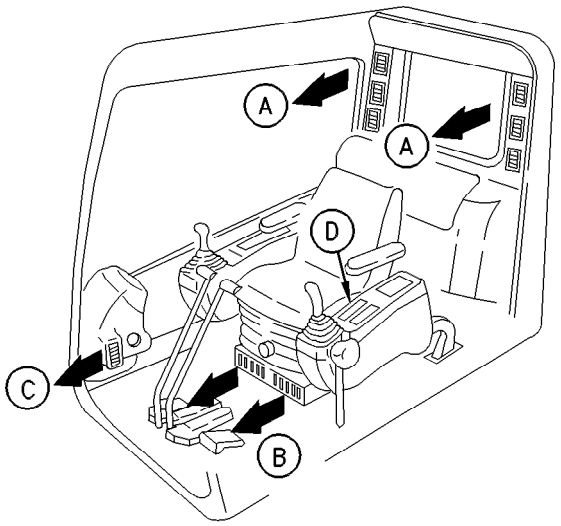


Illustration 109 g00101001

Typical example

(A) Air outlet
(B) Air outlet
(C) Air outlet
(D) Control panel

The automatic temperature control unit is located behind the operator seat.

Redirect the louvers for air outlets (A) and (C) by hand to the desired direction. The louvers for air outlet (B) cannot be redirected.

The heating and air conditioning controls are on control panel (D).

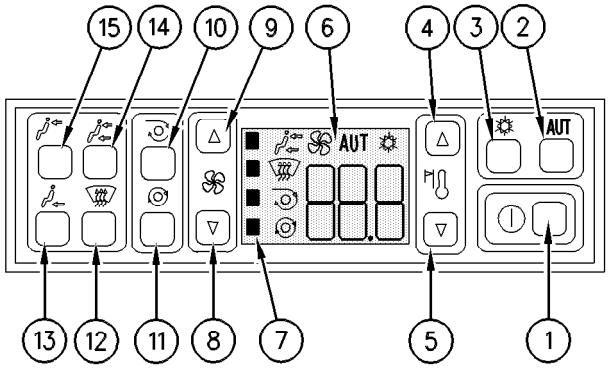


Illustration 110 g00333238

On/Off Switch (1) – If the heating and air conditioning system is off, pushing this switch will turn on the heating and air conditioning system. If the heating and air conditioning system is on, pushing this switch will turn off the heating and air conditioning system.

Temperature Selection Switches – These switches control the temperature of the air that is coming from the air outlets in order to achieve the preset temperature. This preset temperature appears on display (6). If the heating and air conditioning system is in the automatic mode, pushing these switches changes the preset temperature.

Increase (4) – Push this switch in order to increase the temperature of the air that is coming out of the air outlets or push this switch in order to increase the preset temperature.

Decrease (5) – Push this switch in order to decrease the temperature of the air that is coming out of the air outlets or push this switch in order to decrease the preset temperature.

Fan Speed Switches – The fan speed switch directly controls the fan speed if only the fan is being operated. If the heating and air conditioning system is operating in the automatic mode, pushing this switch overrides the automatically selected fan speed.

Increase (9) – Push this switch in order to increase the fan speed.

Decrease (8) – Push this switch in order to decrease the fan speed.

Air Inlet Selection Switches – These switches select the position of the air inlet.

RECIRCULATE (11) – When this position is selected, the air inlet is closed. The air will recirculate inside the cab.

FRESH AIR (10) – When this position is selected, the air inlet is open. Fresh air will circulate into the cab.

Note: If the heating and air conditioning system is in the automatic mode at engine start-up and the temperature inside the cab is too warm or too cool, the damper for fresh air ventilation may automatically close for a few minutes. This will help to bring the air temperature to the preset temperature more quickly.

Air Outlet Selection Switches – This switch selects the position of each air outlet. Each switch controls a separate air outlet.

Upper Body (15) – Depressing this switch directs the air flow out of air outlet (A).

Upper Body and Under Seat (14) – Depressing this switch directs the air flow out of air outlet (A) and air outlet (B).

Under Seat (13) – Depressing this switch directs the air flow out of air outlet (B).

Defrost (12) – Depressing this switch directs the air flow out of air outlet (A) and air outlet (C).

Preset Temperature Display (6) – This display shows the set temperature.

With the display ON, press the temperature selection switch (increase) (4), the temperature selection switch (decrease) (5) and the On/Off switch (1) simultaneously. This will toggle the display between Degrees Celsius and Degrees Fahrenheit.

Air Conditioning Override Switch (3) – If the heating and air conditioning system is in the automatic mode, pushing this switch causes the compressor to run continuously while the compressor tries to maintain the preset temperature. If the heating and air conditioning system is set for operation of the fan only, this switch has no function. The compressor may be operated intermittently during heater operation in order to remove excess humidity from the cab. To cancel this override mode, push switch (3) again.

Automatic Temperature Control Switch (2) – Pushing this button causes the heating and air conditioning system to toggle between the mode for automatic temperature control and the mode for the fan only.

Note: If the fan speed is manually selected and/or the override for the air conditioner is selected, the “AUT” switch must be pushed twice in order to make the fan speed automatic again.

Note: If the heating and air conditioning system is set for operation of the fan only, pressing the temperature selection switch returns the heating and air conditioning system to the automatic mode and the preset temperature will change. This will set the speed of the fan to the mode of fan only.

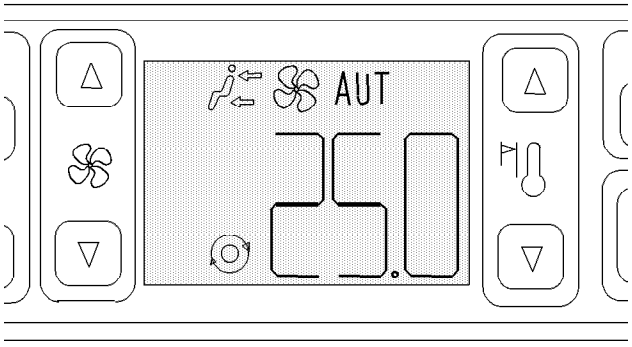


Illustration 111 g00449660

This is an example of the display during the fully automatic mode.

Illustration 112 g00102108

To fully take advantage of the automatic function of the heating and air conditioning system, always keep the direct sunlight sensor clean. Do not put objects near the direct sunlight sensor that will affect the function of the sensor.

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.

i01962160

Air Conditioning and Heating Control
(If Equipped)

SMCS Code: 7304; 7320; 7337

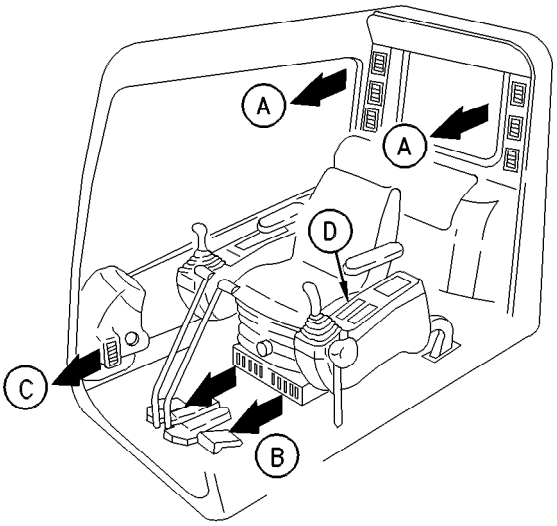


Illustration 113 g00101001

(A) Vent for upper body
(B) Floor vent
(C) Defroster vent
(D) Control panel

Note: For the most efficient operation of the system, use the “AUT” mode and do not close any of the louvers completely.

Automatic Climate Control

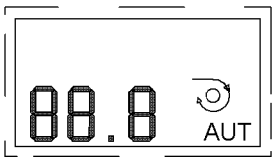


Illustration 114 g01011401

Full “AUT” Display

Press the “AUT” button. The “AUT” symbol, the temperature setpoint and the symbol for recirculation appear in display (1). The operator may select either the open position or the closed position for the fresh air control. The system is in the full automatic mode only when these three items are shown on the display. If there is more than the three symbols shown on the display, the system is in the “AUT” override mode or in the manual control mode. Full automatic mode controls the output air temperature, fan speed, and the air outlets. The ambient temperature determines the air outlets that are used.

If the “AUT” is not showing in display (1), the system is in the full manual control mode.

Note: If the cab temperature is below the selected temperature setpoint, the fan speed will not ramp to full speed until the temperature of the air outlet reaches a preset temperature.

Control Panel

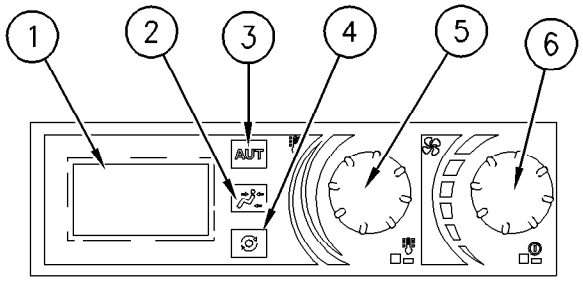


Illustration 115 g00997486

(1) Display
(2) Air Outlet Selection Switch
(3) Automatic Temperature Control Switch
(4) Fresh Air Control
(5) Temperature Control Knob
(6) Power On/Off and Fan Speed Knob

Power ON/OFF (6) – Push the fan speed knob to power on the system or push the fan speed knob to power off the system.

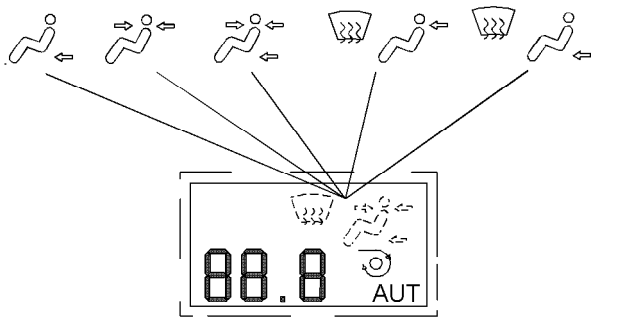


Illustration 116 g01011397

Manual Override of the Automatic Selection of the Air Outlets

Air Outlet Selection Switch (2) – Press the air outlet selection switch in order to cycle through the different positions. The symbol in the display will show the selected position. The air outlets are selected automatically when the graphics for the air outlets are not shown in display (1).

Automatic Temperature Control Switch (3) – Press the “AUT” button for fully automatic operation of the climate control system. Full automatic mode may be enabled at any time. For more information on the operation of the automatic temperature control, refer to “Control Panel”.

Fresh Air Control CLOSED position – Push fresh air switch (4) in order to change the position of the door of the fresh air inlet. The symbol in the display will show the selected position. When this position is selected, the fresh air inlet is closed. The air will recirculate inside the cab.

OPEN Position – When this position is selected, the door to the fresh air inlet is open. Fresh air will be drawn into the cab.

Note: The door for fresh air may close for a few minutes when the machine is started and the system is in automatic mode. This will help to bring the air temperature to the setpoint more quickly.

Temperature Control Knob (5) – If the climate control system is in the automatic mode, rotate the temperature control knob in order to change the temperature setpoint. The desired cab temperature appears on display (1).

Note: The automatic climate control system may take about 3 minutes in order to respond to large temperature changes. Wait at least 3 minutes between temperature changes.

Illustration 117 g01011402

Fan Control Knob (6) – The fan speed is automatically controlled in the automatic mode. Rotate the fan control knob in order to override the automatically selected fan speed. The symbol for the fan with the bar graph for speed control will be added to display (1).

Maximum Heating and Cooling Mode

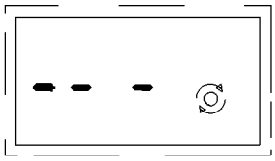


Illustration 118 g00788476

Display for Maximum Heating

Press “AUT” button (3). Rotate temperature control knob (5) clockwise until the setting for maximum heat is shown on the display as illustration 118 . Rotate the temperature control knob (5) counterclockwise in order to cancel maximum heating.

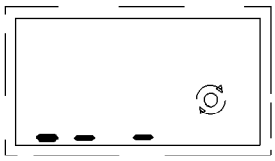


Illustration 119 g00788477

Display for Maximum Cooling

Press “AUT” button (3). Rotate the temperature control knob (5) counterclockwise until the setting for maximum cooling is shown on the display as illustration 119 . Rotate the temperature control knob (5) clockwise in order to cancel maximum cooling.

Both maximum functions are automatic modes.

Rotate the temperature control knob (5) to the desired cab temperature. The climate control system must be in the full “AUT” mode in order to maintain the temperature. If the display does not match illustration 114 , the air conditioning system may not activate for cooling.

Manual Operation

The operator has full control of the system and can set the fan speed (6), air outlet (2), and the amount of heat (5).

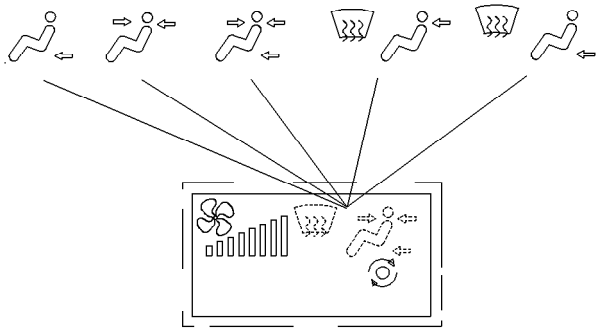


Illustration 120 g00997527

Manual Override of Automatic Temperature Control for Heat

Push temperature control knob (5) in order to control the temperature manually. The temperature setpoint and “AUT” is cleared in display (1). The symbol of the fan with the bar graph for speed and the air outlet will be shown on display (1). Rotate the temperature control knob (5) clockwise in order to increase the temperature. The temperature range is between one and fifteen. **The air conditioner will not run in this mode except when either of the defrost modes are selected.**

Defrost or Dehumidify Operation

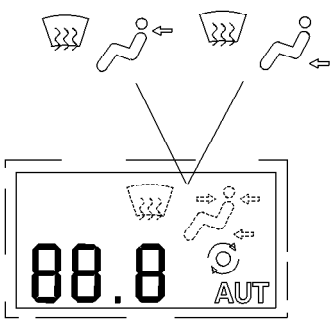


Illustration 121 g00997497

Defrost or Dehumidify Operation

Push the air outlet selection switch (2) until one of the symbols in illustration 121 is shown in display (1). The air is dehumidified while the compressor is operating. Operating the compressor will also defog the windows. The compressor will operate in automatic “AUT” mode or in the manual mode when the symbols for the defrost in illustration 121 are displayed. The compressor is protected from operation when the ambient air temperature sensor is below 4 °C (39 °F).

English Versus Metric Toggle

Turn the system to the ON position. Multiple keys must be pressed simultaneously. Press and hold the automatic temperature control switch (3). At the same time press and hold the temperature control knob (5). This will toggle the display between Degrees Celsius and Degrees Fahrenheit.

i01954807

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. Also, the lever for the hydraulic lockout control must be in the LOCKED position to prevent any possibility of sudden movement of 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 implement to the ground.
- Move the hydraulic lockout control to the LOCKED position.
- Stop the engine.

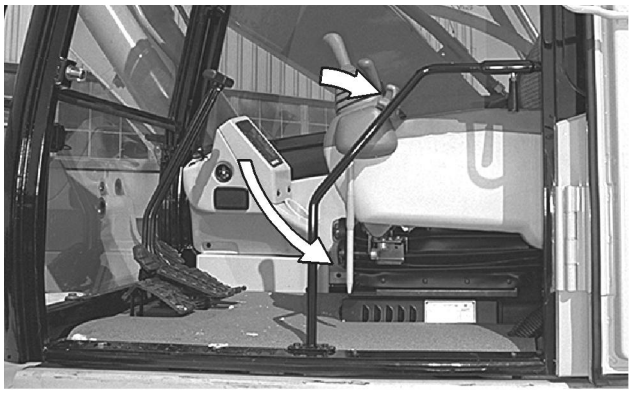


Illustration 122 g00103209

The hydraulic lockout control is shown in the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Hydraulic Lockout Control”.

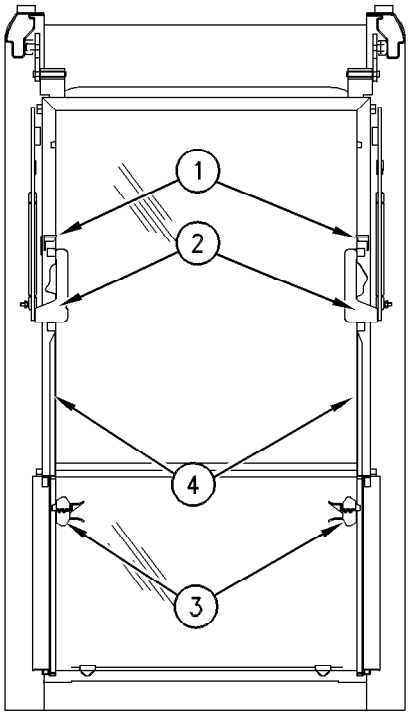


Illustration 123 g00100974

This is a typical example of a front window .

Upper Window

Perform the following procedure in order to open the upper window and close the upper window.

1. Hold both grips (2), and push both latches (1) in order to release the upper window. Lift the window upward until the window is securely latched in the overhead storage position.
2. Release latch (1) in order to lower window (C) from the overhead storage position.

Lower Window

Perform the following procedure in order to open the lower window and close the lower window. The upper window is already open:

1. Squeeze latches (3) in order to release the lower window.
2. Raise the lower window out of the window frame.
3. Store the lower window in brackets (4) that are provided. The brackets are built into the upper window.
4. To close the lower window, reverse the procedure that is used for opening the lower window.

Note: The lower window will only fit in the brackets by one way.

Note: The upper window cannot be raised or lowered with the lower window in the storage brackets.

Perform the following procedure in order to open the lower window and close the lower window. The upper window is closed:

1. Squeeze latches (3) in order to release the lower window.
2. Raise the lower window out of the window frame. The lower window will slide directly into the upper window.
3. To close the lower window, reverse the procedure that is used for opening the lower window.

Note: The upper window cannot be raised or lowered with the lower window in the storage brackets.

i00682114

Mirror

SMCS Code: 7319

S/N: 4SS1–Up

S/N: 9GS1–Up

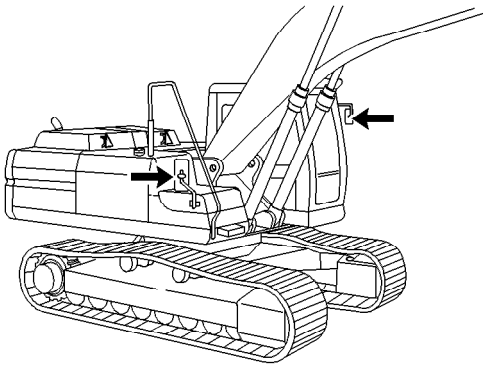


Illustration 124 g00295675

Before operating the machine, adjust the mirrors for the best visibility for the operator.

i00920425

Mirror

SMCS Code: 7319

S/N: 2NW1–Up

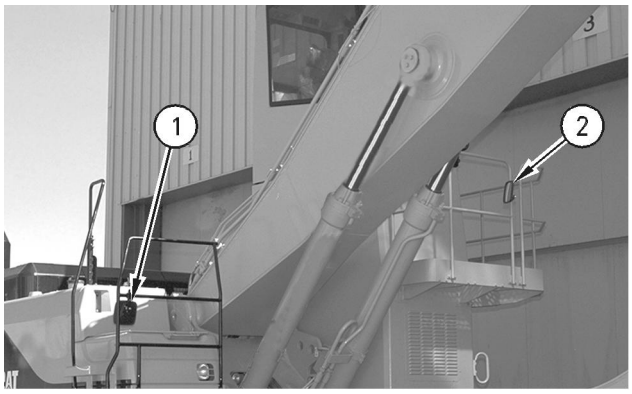


Illustration 125 g00470395

Before operating the machine, adjust mirror (2) so that you can view the right side of the machine through mirror (1).

i01953612

Window Wiper and Washer Control

SMCS Code: 7305; 7306

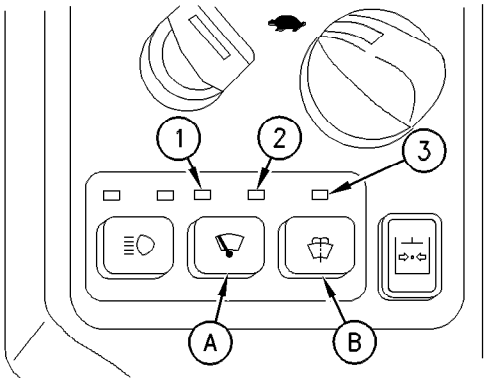


Illustration 126 g00436280

(A) Windshield Wiper Switch
(B) Switch for the Windshield Washer
(1) Indicator Light
(2) Indicator Light
(3) Indicator Light

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

When indicator light (1) is on, the windshield wiper operates intermittently at every five second intervals. When indicator light (2) is on, the windshield wiper operates continuously.

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.

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

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

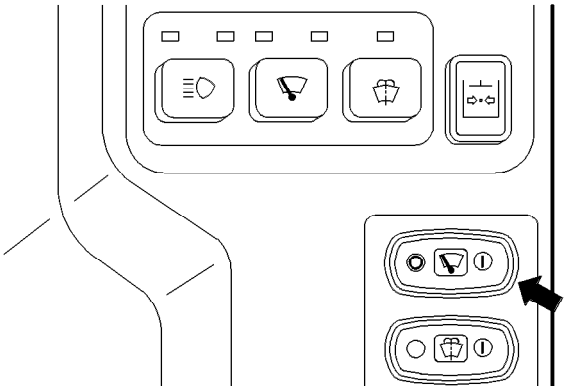


Illustration 127 g00110323

Lower Windshield Wiper – Push down the right half of the switch in order to turn on the lower windshield wiper. Push down the left half of the switch in order to turn off the lower windshield wiper.

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.

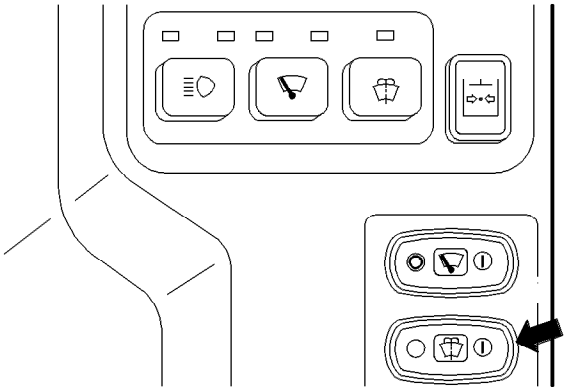


Illustration 128 g00436353

Lower Windshield Washer – Push down the right half of the switch and keep the switch depressed in order to activate the lower windshield washer. While the switch is depressed, the windshield washer fluid will spray from the nozzle. The windshield wiper will also function. When you release the switch, the windshield washer will stop. The windshield wiper will continue to function.

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

i01545641

Cab Visor
(If Equipped)

SMCS Code: 7301-ZZ

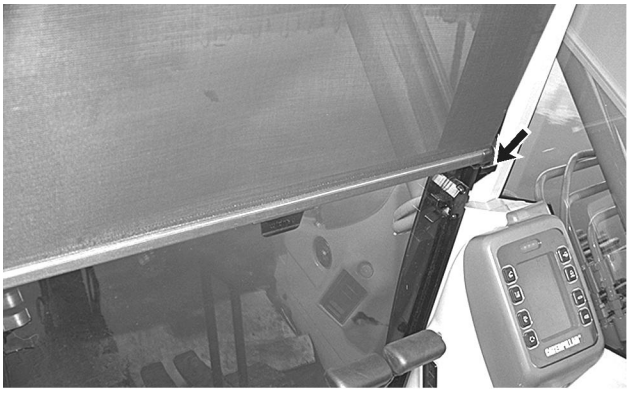


Illustration 129 g00104605

Extend the cab visor. Hook the cab visor to the bracket. The cab visor can be used for the front windshield. The cab visor can also be used for the overhead window.

i00865713

Cab Door

SMCS Code: 7308

Side Window

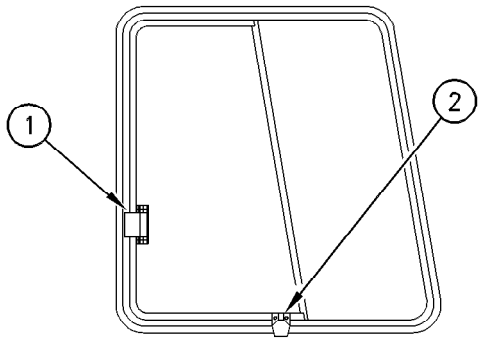


Illustration 130 g00101067

To open the side window, release latch (1) and latch (2) and slide the window. Push down latch (2) when the window is in the desired position.

To close the side window, release latch (2) and slide the window until latch (1) is engaged.

Cab Door

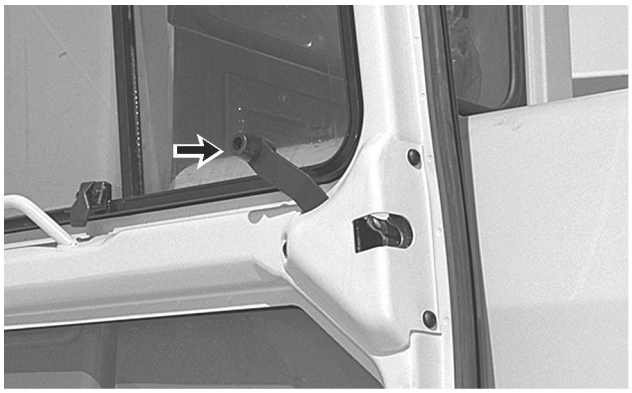


Illustration 131 g00101071

Push the knob of the cab door latch forward 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.

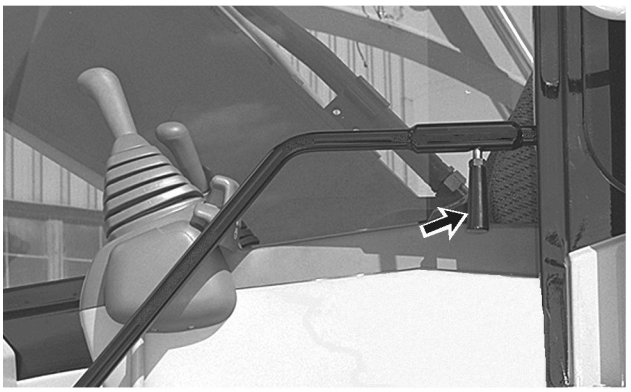


Illustration 132 g00101072

To disengage the cab door from the catch, move the cab door release lever away from the operator.

i02171505

Travel Control

SMCS Code: 5462

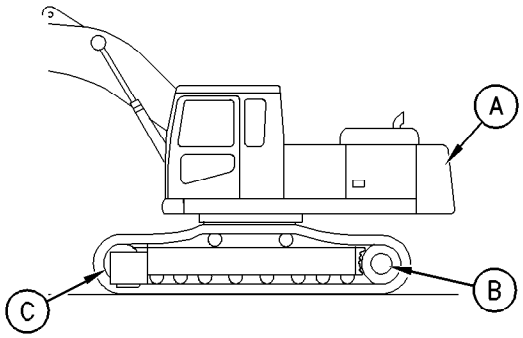


Illustration 133 g00753277

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.

Directional changes at full engine speed are possible. However, decelerating and/or braking is recommended for operator comfort. Decelerating and/or braking will also help to achieve the maximum service life of the transmission components.

If the travel alarm (if equipped) does not sound, consult your Caterpillar dealer.

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.

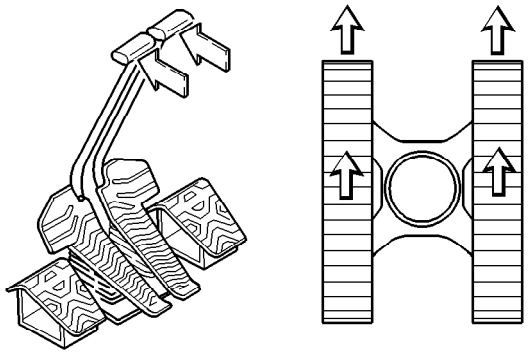


Illustration 134 g00731542

Forward Travel

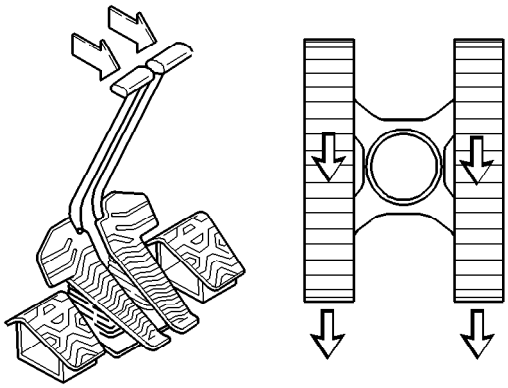


Illustration 135 g00731543

Reverse Travel

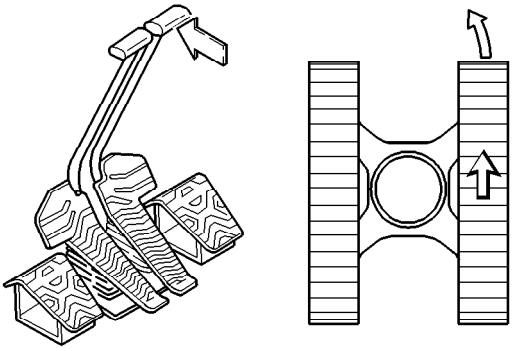


Illustration 136 g00731472

Pivot Left Turn (Forward)

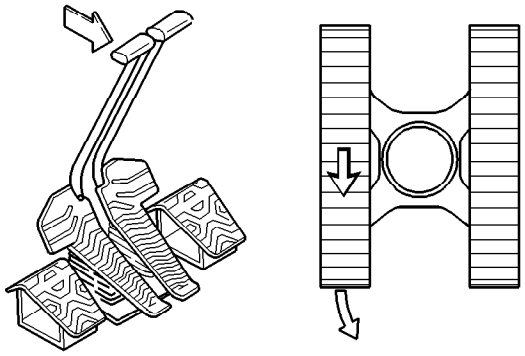


Illustration 137 g00731478

Pivot Left Turn (Reverse)

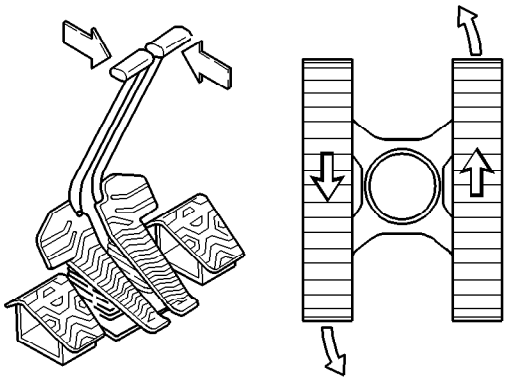


Illustration 138 g00731476

Counterrotate Turn (Left)

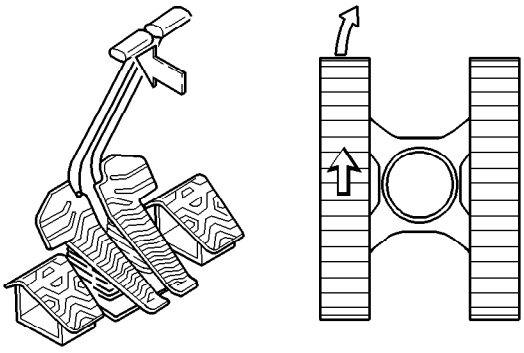


Illustration 139 g00731471

Pivot Right Turn (Forward)

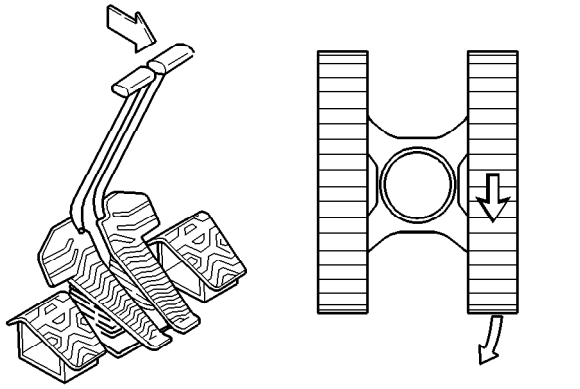


Illustration 140 g00731479
Pivot Right Turn (Reverse)

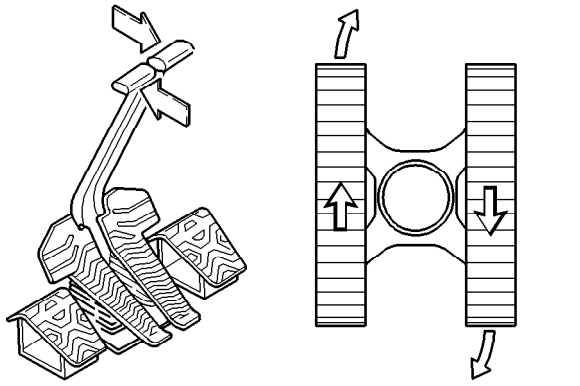


Illustration 141 g00731477
Counterrotate Turn (Right)

i00718877

Engine Speed Control

SMCS Code: 1915

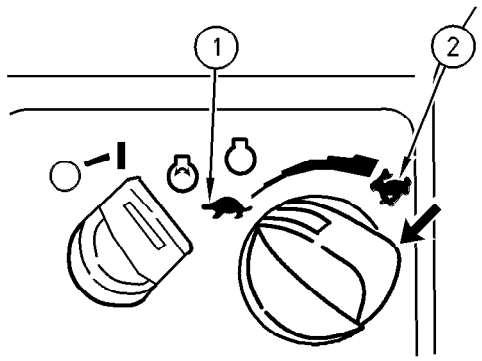


Illustration 142 g00103195
(1) Decrease. (2) Increase.

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

Increase (2) – Turn the engine speed dial clockwise in order to increase the engine speed (engine rpm).

Note: Engine speed is automatically limited to a value which is less than maximum engine speed until the hydraulic tank pressure reaches the operating level.

i01584893

Travel Speed Control

SMCS Code: 7490

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.

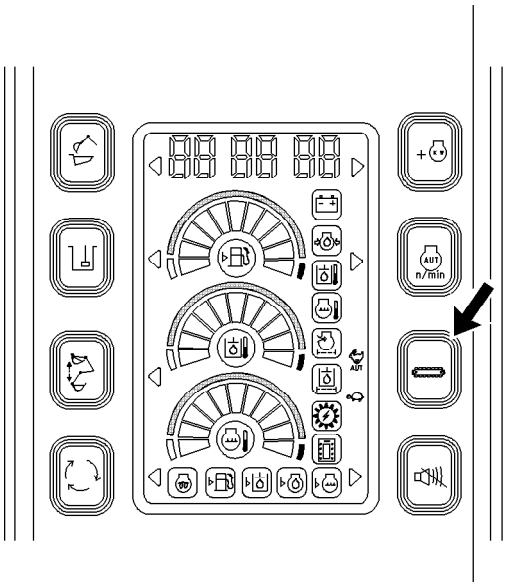


Illustration 143 g00823936

Travel Speed Control Switch – Press the travel speed control switch in order to select high 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.

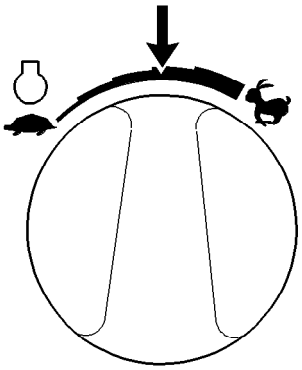


Illustration 144 g00824132

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.

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

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

i01588941

Power Mode Control

SMCS Code: 7490

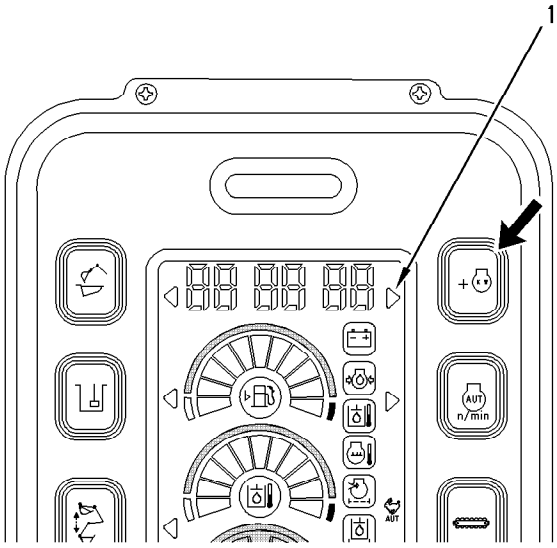


Illustration 145 g00823940

Power Mode Switch – Push this switch in order to change the power mode to ON or to OFF. Select a power mode that is suitable for the working conditions.

When you turn the engine start switch to the OFF position, the previous switch setting is maintained. The power mode is preset to the previous setting when the engine start switch is turned to the ON position again.

Power Mode ON – When the power mode switch is pushed to the ON position, indicator lamp (1) comes on. This power mode is suitable for heavy-duty work that requires a high operating speed. Changing the switch to this position provides maximum power to the machine.

Power Mode OFF – When the power mode switch is pushed to the OFF position, indicator lamp (1) turns off. This power mode is suitable for ordinary work. This power mode provides sufficient power in most applications. This power mode will minimize noise and fuel consumption.

i00796141

Work Mode Control

SMCS Code: 7490

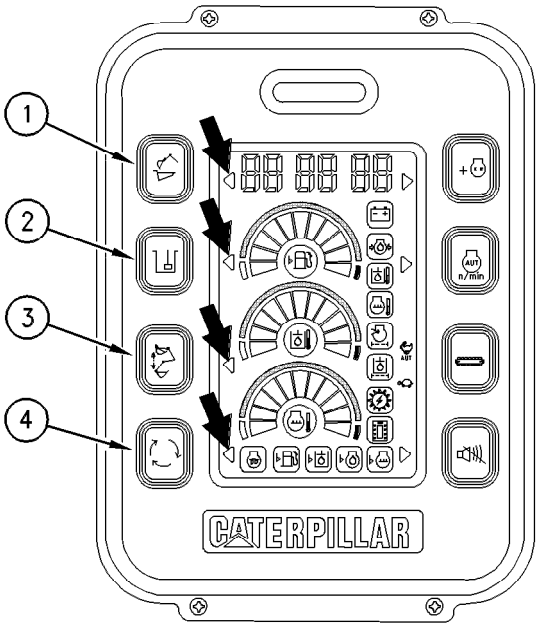


Illustration 146 g00101234

(1) Boom priority mode
(2) Swing priority mode
(3) Fine control mode
(4) User mode

There are four work mode switches on the left side of the monitor panel. Each work mode switch is set for different attachment speeds or for different swing speeds.

Only one work mode can be selected at a time. If a new work mode is selected, the previous work mode is deactivated automatically.

When you turn the engine start switch to the ON position, the previous switch setting is maintained. Select a suitable work mode for the type of work that will be performed. The selected work mode is identified by an indicator lamp to the right of each work mode switch.

Boom Priority Mode (1) – This work mode provides oil flow priority to the boom circuit. This will raise the boom quickly in applications such as loading a truck and deep trenching. In these applications, the raising of the boom is a major portion of the total cycle time. This work mode is the preferred work mode in most applications that involve digging.

Swing Priority Mode (2) – This work mode provides oil flow priority to the swing circuit. Because the hydraulic flow from one of the two main pumps is guaranteed to the swing circuit, swing movement will be easy and consistent regardless of the other hydraulic functions that are being used. This work mode is preferred for applications that require a smooth trench or a smooth trench wall. This work mode is also used when the angle of the swing position is at least 180 degrees.

Fine Control Mode (3) – This work mode limits the oil flow to the circuit that moves the stick inward. Normally, the oil flow to the circuit that moves the stick inward is available from both pumps. This moves the stick quickly. When the fine control mode is used, the oil flow is limited to one pump. This will slow the stick movement, which allows more control. This work mode is used most often when you finish a slope. This work mode is also used for lifting applications or for fine grading.

User Mode (4) – To select the sub-mode, press this switch repeatedly until the desired sub-mode is displayed in the right two positions of the liquid crystal display. This work mode has the following three sub-modes:

- Tamping mode “U1” is suitable for simple forming of surfaces, for compacting, or for similar operations that use the bottom of the bucket. When this mode is selected, the boom raises smoothly and the boom lowers smoothly in order to avoid bumping of the boom and lifting of the machine.
- Mode “U2” provides optional hydraulic power for special attachments. The “U2” mode is set by your Caterpillar dealer only for use in special circumstances.
- Customer mode “U3” allows the operator to choose the preferred modes with a single switch. The operator can set the work mode, the power mode, the pump flow, and the Automatic Engine Speed Control (AEC) according to preset settings. This mode offers the advantage of customizing these settings in order to meet the operator's specific needs.

For example, the customer mode is useful during lifting applications. The fine control mode is the most appropriate conventional mode for lifting applications, but the engine speed and the stick cylinder speed decrease when the machine is not loaded. If the customer mode is used, the engine speed can be set at 100 percent and the pump flow can be set at 70 percent. With the presetting in the customer mode, the machine would achieve the same precise operation as the fine control mode during lifting applications, but the stick cylinder speed would be faster during no-load conditions.

The function of the customer mode cannot be fully utilized unless the parameters are set. The settings of the parameters must be memorized. Consult your Caterpillar dealer if you encounter difficulty in setting the parameters.

For further details, see Operation and Maintenance Manual, “User Mode Control”.

i01157837

User Mode Control

SMCS Code: 7490

The user mode cannot be fully utilized unless the parameters are set. Operational parameters for the user mode are set by using the six-digit liquid crystal display (LCD) and the switches on the electronic monitor panel.

Consult your Caterpillar dealer if you have difficulty in setting the parameters.

Activating Memory

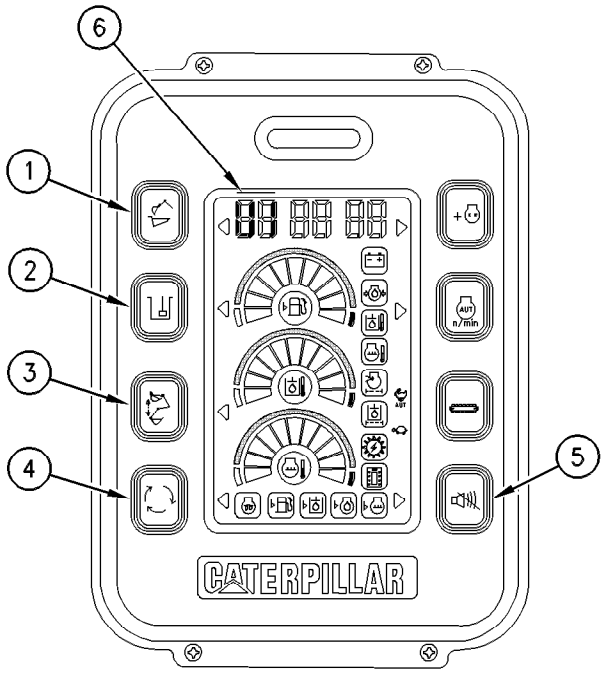


Illustration 147 g00103165

Press alarm cancel switch (5) and switch (4) for user mode simultaneously for more than two seconds. When display (6) flashes, the customer mode can be set by using the following switches.

Switch (1) for Boom Priority Mode – The flashing value in the LCD will increase when this switch is pressed.

Switch (2) for Swing Priority Mode – The flashing value in the LCD will decrease when this switch is pressed.

Switch (3) for Fine Control Mode – The selected flashing position on the LCD will move by one position to the right when this switch is pressed.

Switch (4) for User Mode – The selected flashing position on the LCD will move by one position to the left when this switch is pressed.

Values can be entered only in the position that is flashing on the LCD. Use switch (3) and switch (4) to move the flashing position to the right or to the left.

To return to the normal operating mode, push alarm cancel switch (5) and switch (4) for mode simultaneously for more than two seconds. Display (6) will show the time of day and the position of the engine speed dial.

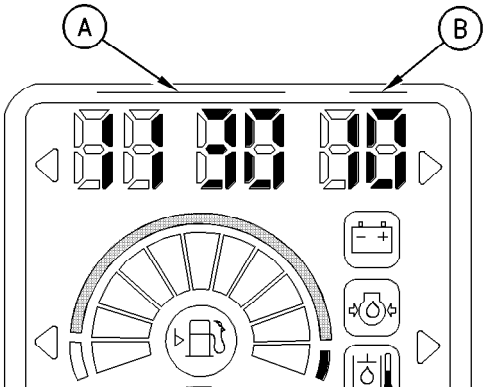


Illustration 148 g00103167

Illustration 148 indicates that time of day (A) is 11:30 and the position of the engine speed dial is “10” .

Selecting a Sub-mode

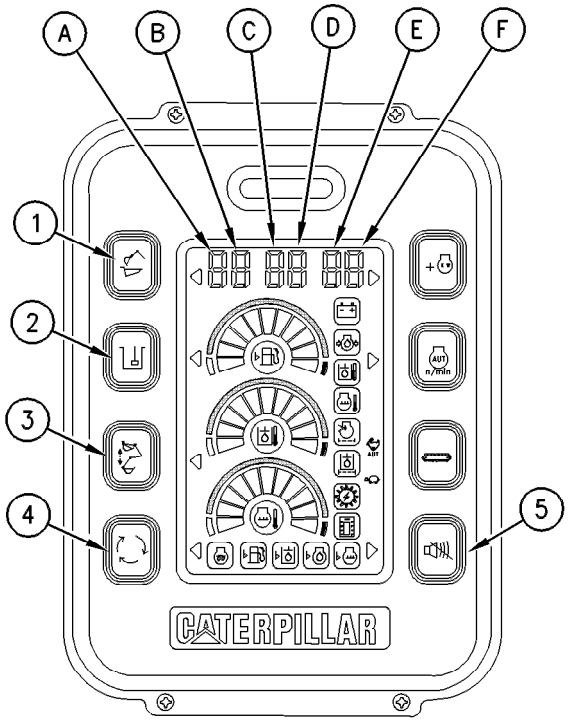


Illustration 149 g00103168

Position (A) and position (B) indicate the sub-mode.

- “U1” indicates the tamping mode. No setting is required for the tamping mode.
- “U2” indicates mode U2. No setting is required for mode U2.
- “U3” indicates the customer mode. The settings for the customer mode can now be set.

If the appropriate sub-mode is not displayed on the LCD, use switch (3) or switch (4) to move the flashing character to position (B). Use switch (1) or switch (2) to change the designation of the sub-mode.

Setting the Customer Mode

To set the user mode, the character in position (B) must be a “3” .

Position (C) is used to select one of the four parameters. Positions (D), (E), and (F) are used to set the function of the parameter.

Refer to the following table in order to determine the values of the positions that will achieve the desired function of the hydraulic excavator while you are operating the machine in the user mode.

Table 19

Positions (A) and (B)	Position (C)		Positions (D), (E), and (F)	
	Setting	Function	Setting	Function
"U3" Customer Mode	"1"	Select work mode.	"–1"	Select boom priority mode.
			"–2"	Select swing priority mode.
			"–3"	Select fine control mode.
	"2"	Select power mode.	"–1"	Power mode is off.
			"–2"	Power mode is on.
	"3"	Select the stage of AEC.	"–1"	Select the first stage of AEC.
			"–2"	Select the second stage of AEC.
	"5"	Set the time delay for the AEC.	"—"	The increment is 0.1 second and the range is 0.1 second to 20 seconds. The initial factory setting for the delay time is 3 seconds. The LCD shows "U3:5-30" .
	"6"	Set engine speed in the second stage of AEC.	"—"	The increment is 10 rpm and the range is 800 rpm to 2200 rpm. The initial factory setting is 1300 rpm. If the LCD shows "US:6-95" , engine speed in the second stage of AEC is set to 950 rpm.
	"7"	Limit the maximum engine speed dial.	"—"	The upper limit of engine speed dial can be set from 1 to 10. The initial factory setting is 10. The LCD shows "US:7-10" .
	"8"	Set hydraulic horsepower at position 10 on the engine speed dial.	"—"	When the engine speed dial is set to position 10 the hydraulic horsepower can be set as a percent of the maximum hydraulic power. The increment is 1 percent and the range is 0 to 100 percent. The initial factory setting is 70 percent. The LCD shows "U3:8-70" .

i00117027

Automatic Engine Speed Control (AEC)

SMCS Code: 7490

The Automatic Engine Speed Control (AEC) automatically reduces engine speed when there is no hydraulic demand or when the hydraulic demand is very small. The AEC system is designed to reduce fuel consumption and noise.

The AEC system will be inoperable while the backup switch of the electronic controller system is in the MAN (MANUAL BACKUP) position. If the hydraulic oil is not at a normal operating temperature, the AEC may respond slowly.

The AEC system operates in the following three modes. Operation 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.

Mode I

- The AEC switch is in the OFF position.
- The switch for manual low idle is not activated.
- The setting of the engine speed dial is between 5 and 10.

The electronic controller automatically reduces engine speed by 100 rpm after there has been no hydraulic demand for approximately three seconds.

Mode II

- The AEC switch is in the ON position.
- The switch for manual low idle is not activated.
- The setting of the engine speed dial is between 5 and 10.

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 three seconds.

Mode III

- The AEC switch is in the ON or OFF position.
- The switch for manual low idle is activated.
- The setting of the engine speed dial is between 3 and 10.

The switch for manual low idle is on the right control lever. Whenever the switch for manual low idle is activated, the engine speed is reduced to approximately 950 rpm. Pressing the switch again will allow the engine speed to return to the setting of the engine speed dial. The setting of the engine speed dial is approximately 1300 rpm (Mode II) if the AEC switch is in the ON position and there is no hydraulic demand.

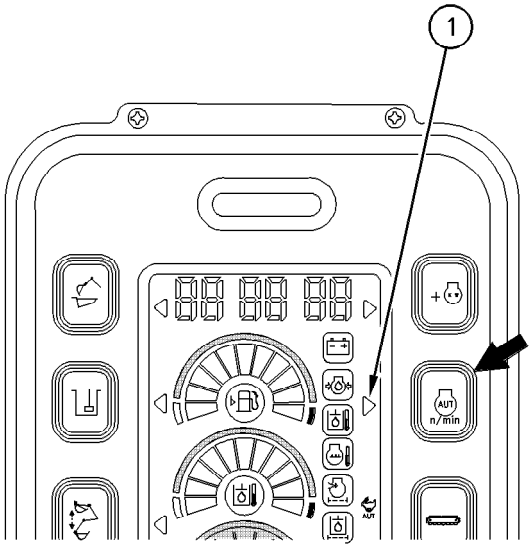


Illustration 150 g00101262

Automatic Engine Speed Control Switch (AEC Switch) – The Automatic Engine Speed Control switch and indicator (1) are activated when the engine start switch is turned to the ON position. When you press the AEC switch, the function of the AEC switch changes from ON to OFF, and vice versa.

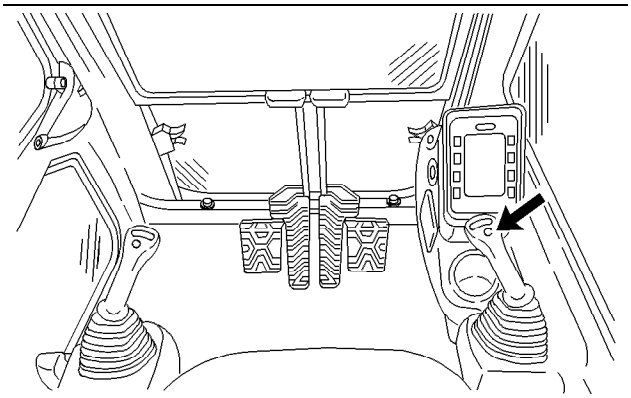


Illustration 151 g00107439

Switch for Manual Low Idle – This switch reduces the engine speed to approximately 950 rpm. This reduction occurs regardless of the setting of the engine speed dial. This reduction also occurs from a setting of 1300 rpm (Mode II) on the AEC. If the switch for manual low idle is pressed again, the engine speed will return to the setting of the engine speed dial or to the setting of 1300 rpm (Mode II) on the AEC. Hydraulic demand is a determining factor for the setting.

i01584900

Backup Controls

SMCS Code: 7000

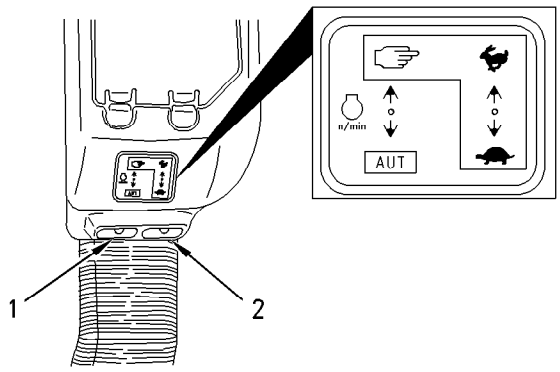


Illustration 152 g00822272

The backup switches are located on the back of the right console.

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 (1) should be in the AUTOMATIC position.

Manual – If a problem occurs in the electronic control system, move backup switch (1) to the MANUAL 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. At the same time, the power supply to the monitor is cut off and all displays on the monitor panel turn off.

Fast Engine Speed – Move backup switch (2) to this position in order to increase the engine speed. This backup switch will not operate if backup switch (1) 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 (2) to this position in order to decrease the engine speed. This backup switch will not operate if backup switch (1) 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.

i02287957

Hydraulic Lockout Control

SMCS Code: 5258-LK

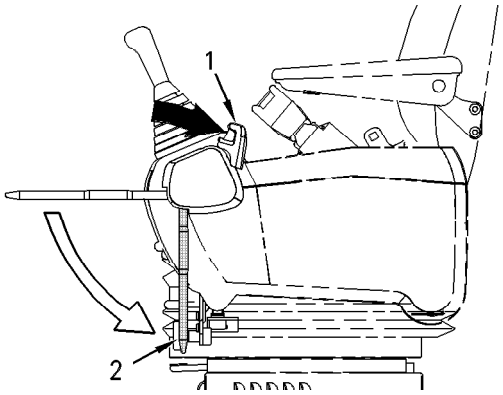


Illustration 153 g00536416

The lever for the hydraulic lockout control is located on the left console.

Locked – Move the travel levers and move the work tool control lever to the center HOLD position. Move the lever for the hydraulic lockout control (1) backward to the LOCKED position. Crossbar (2) will move down. 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.

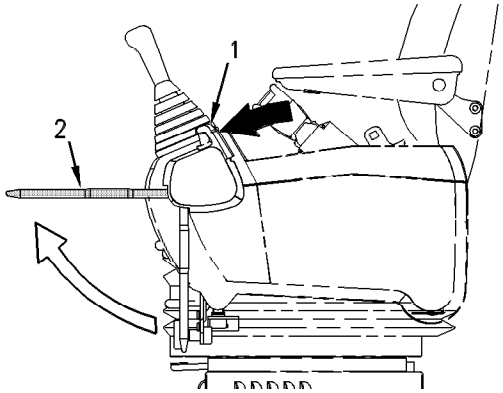


Illustration 154 g00536457

Unlocked – Move the lever for the hydraulic lockout control (1) forward to the UNLOCKED position. Crossbar (2) will move up. This makes all of the factory installed hydraulic controls operable.

i04036189

Joystick Controls

SMCS Code: 5705

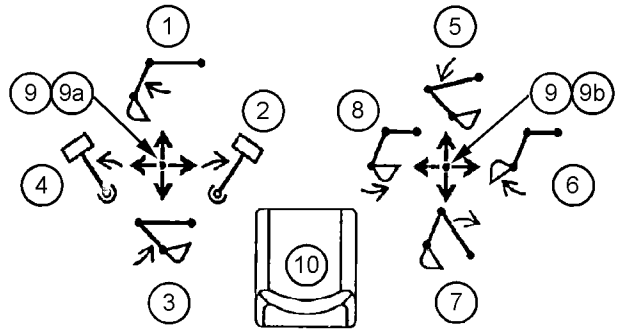


Illustration 155 g02233473

(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.

i02287982

Hammer Control
(If Equipped)

SMCS Code: 5705-WTL

S/N: 4SS1–Up

S/N: 9GS1–Up

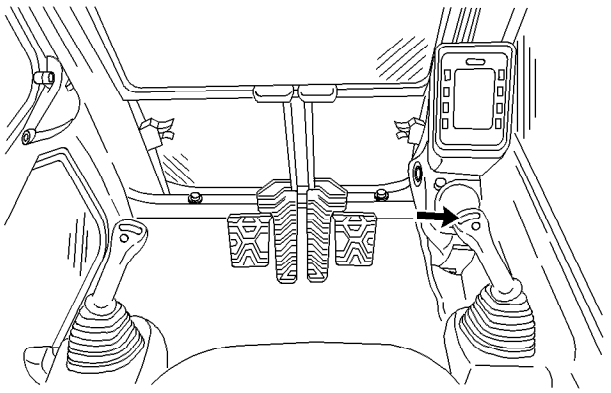


Illustration 156 g00365096

The hydraulic hammer control is located on thework tool control leverthat is located on the right side of the seat.

Hydraulic Hammer ON – Push down the top left button on the right hand control lever in order to activate the hydraulic hammer.

Hydraulic Hammer OFF – Release the top left button on the right hand control lever in order to deactivate the hydraulic hammer.

Note: This machine may also be equipped with a pedal that controls the hydraulic hammer. Refer to Operation and Maintenance Manual, “Work Tool Control Pedal” for more information.

i01521986

Joystick Controls Alternate Patterns
(If Equipped)

SMCS Code: 5059; 5137

⚠ 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.

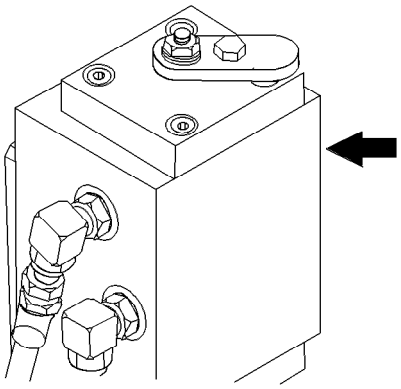


Illustration 157 g00101286

The two-way valve is located at the front left of the swing drives.

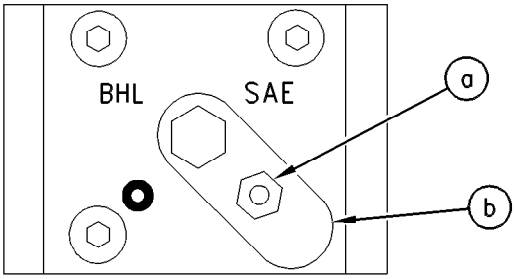


Illustration 158 g00104103

(a) Bolt
(b) Lever

1. Loosen bolt (a) and move lever (b) to the SAE position or to the BHL position.

Note: Illustration 158 shows that the two-way valve is in the SAE position.

2. After you set the machine control pattern, tighten bolt (a) in order to secure lever (b).

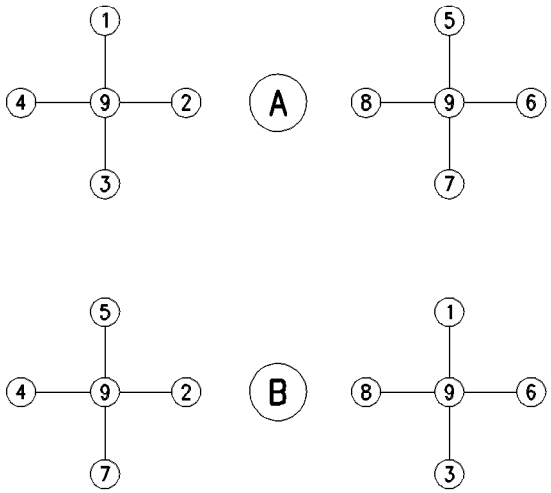


Illustration 159 g00101291

(A) SAE machine control pattern
(B) Machine control pattern for standard backhoe

The patterns on the left side of Illustration 159 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 functions of positions (6) and (8) are 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.

i01546149

Work Tool Flow Mode Control
(If Equipped)

SMCS Code: 7490

S/N: 4SS1–Up

S/N: 9GS1–Up

The combined hydraulic attachment circuit is capable of providing single action or double action. The hydraulic attachment electronic controller, the electronic switch in the operator's compartment, and the manual ball valve select the flow mode and the characteristics of the flow mode. The position of the ball valve selects the single action hydraulic attachment circuit or the double action hydraulic attachment circuit. The electronic switch is used to select the flow modes for each of the hydraulic attachment circuits.

The single action hydraulic attachment circuit is used with attachments such as hydraulic hammers. The double action hydraulic attachment circuit is used with attachments such as shears and clamshell buckets.

When the machine is equipped with a combined hydraulic attachment circuit, the operator can choose from four flow modes: two for the single action hydraulic attachment circuit and two for the double action hydraulic attachment circuit. The flow modes limit the maximum engine speed and pump flow. The ball valve and the electronic switch are used to change the flow mode. The dealer programs the electronic controller for the following reasons:

- Provide the proper flow rates for the attachment.
- Provide the proper engine speeds for the attachment.

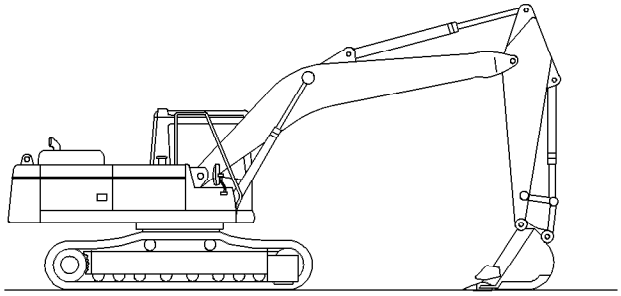


Illustration 160 g00101347

Before you change the flow mode of the hydraulic attachment circuit, place the machine in the servicing position, as shown. Stop the engine.

⚠ WARNING

Make sure that all attachments are in the recommended servicing position and personnel are clear of the attachment before the manual lever on the ball valve is moved. Changing the valve position may cause the attachment to move unexpectedly. Serious injury or death may result.

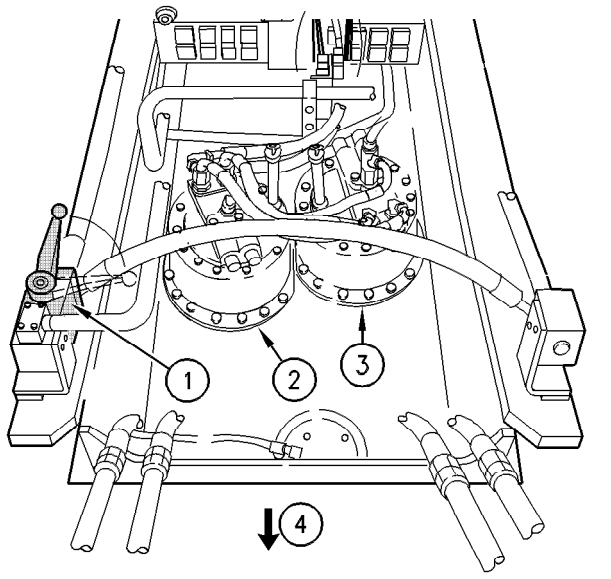


Illustration 161 g00297281

(1) Ball valve
(2) Swing drive
(3) Swing drive
(4) Front of the machine

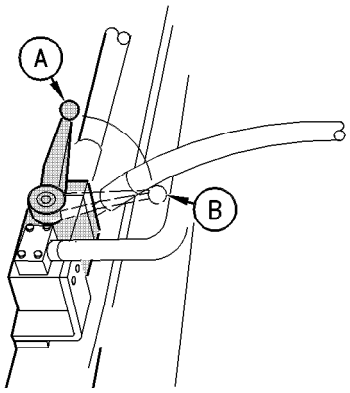


Illustration 162 g00472516

(A) Single action hydraulic attachment
(B) Double action hydraulic attachment

Use the manual lever to turn the ball valve. Make sure that you fully turn the ball valve until the ball valve stops.

In order to use the single action hydraulic attachment circuit (operation of the hydraulic hammer), position the manual lever parallel to the hydraulic line.

In order to use the double action hydraulic attachment circuit (operation of the clamshell or of the shear), position the manual lever so that the lever is perpendicular to the hydraulic line.

Never use the manual lever as a step when the manual lever is attached to the ball valve. Remove the manual lever from the ball valve after adjusting the ball valve.

i01954896

Work Tool Flow Control
(If Equipped)

SMCS Code: 7007-WTL

S/N: 4SS1–Up

S/N: 9GS1–Up

Combined Hydraulic Attachment Circuit

With a combined hydraulic attachment circuit, the operator can choose from four flow modes: two for the single action hydraulic attachment circuit and two for the double action hydraulic attachment circuit. The flow modes limit the maximum engine speed and pump flow. The flow modes are set by selecting a position for the ball valve and for the electronic switch. The flow modes are programmed into the electronic controller for each attachment. Consult your Caterpillar dealer if the flow rate needs to be changed for a different attachment.

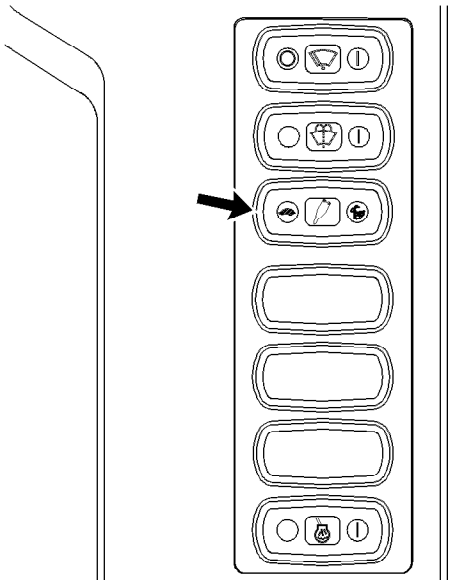


Illustration 163 g00396317

The electronic switch is on the right console.

Hydraulic Flow Rate – To change the hydraulic flow rate of the hydraulic circuit, press either side of this switch.

LOW FLOW Position – Press the left side of the switch for a low hydraulic flow rate.

HIGH FLOW Position – Press the right side of the switch for a high hydraulic flow rate.

When you are changing the machine's implement, the operator must be instructed on the correct positioning of the electronic switch.

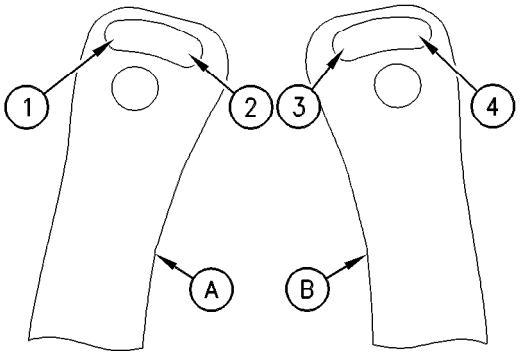


Illustration 164 g00104480

(A) Left Implement Control Lever
(B) Right Implement Control Lever
(1) Counterclockwise rotation of implement
(2) Clockwise rotation of implement
(3) Shear blades CLOSE
(4) Shear blades OPEN

Illustration 164 shows a typical example of the operation of the implement control levers.

i01546267

Work Tool Electronic Controller

SMCS Code: 6700-EK2

S/N: 4SS1–Up

S/N: 9GS1–Up

The Hydraulic Attachment Electronic Controller is equipped only on certain machines.

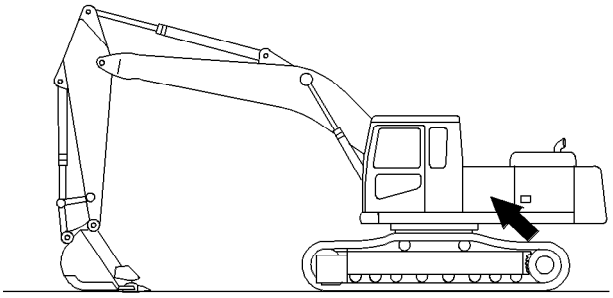


Illustration 165 g00101365

The electronic controller is located inside the front access door on the left side of the machine.

If a machine or a tool malfunctions, the operator may need to report the information that is stored in the electronic controller.

Turn the engine start switch to the ON position in order to activate the electronic controller.

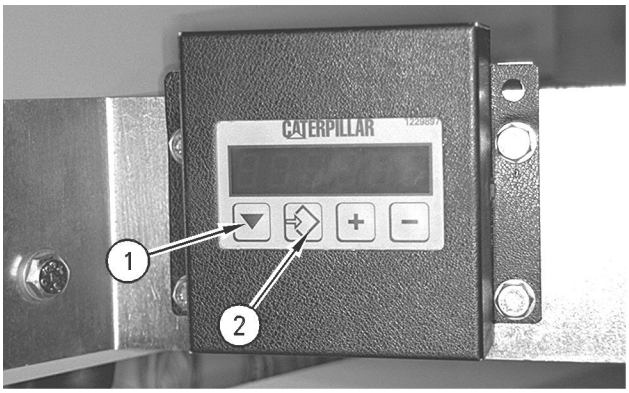


Illustration 166 g00101367

The illustration shows an electronic controller (typical example).

When you activate the electronic controller, read the digital display from left to right. The second digit and the third digit display the version of software. The fourth digit and the fifth digit indicate the number of programmed changes that have been saved for the active mode. (The active mode is determined by the position of the ball valve and of the switch for the hydraulic attachment.)

The electronic controller can display the number of hours that have elapsed in each of the four flow modes. Likewise, the electronic controller can display the settings for the engine speed of the four flow modes and for the hydraulic oil flow of the four flow modes.

Push switch (1) in order to scroll through the digital readouts that pertain to the different flow modes. The first number that is displayed indicates the amount of hours that have elapsed in the active flow mode. The first digit of this number indicates the number that is assigned to the flow mode. The second digit displays an “h” . The “h” means hours. The last four digits indicate the number of hours of machine operation.

Push switch (1) again in order to display the engine speed setting. The first digit that is displayed indicates the number that is assigned to the flow mode. The second digit displays an “E” . The “E” means engine speed. The third digit and the fourth digit indicate the engine speed setting. The engine speed setting determines the speed of the engine. The engine speed will be equal to one of the ten positions of the engine speed dial. This occurs when the hydraulic attachment circuit is activated. If the setting of the electronic controller for the active mode is at “5” , the engine will run at a speed that is equal to the setting at the fifth position of the engine speed dial.

Note: There are two speeds that are set by the electronic controller and by the engine speed dial. During operation of the hydraulic attachment circuit, the engine will operate at the lower speed. The operator should always set the engine speed dial to at least the engine speed setting that is indicated on the electronic controller for the active mode.

The fifth digit shows either an “H” (high flow) or an “L” (low flow). If the “rabbit” side of the switch for the hydraulic attachment is depressed, an “H” is displayed. If the “tortoise” side of the switch for the hydraulic attachment is depressed, an “L” is displayed.

The sixth digit shows a “1” (one-way flow) or a “2” (two-way flow). If the ball valve is positioned parallel to the hydraulic line, a “1” is displayed. If the ball valve is positioned perpendicular to the hydraulic line, a “2” is displayed.

Push switch (1) again in order to display the setting for the hydraulic oil flow. The first digit of this display indicates the number that is assigned to the flow mode. The second digit displays an “F” . The “F” means flow. The third digit and the fourth digit indicate the setting for the flow.

The fifth digit and the sixth digit display the same reading that is described for the display for the engine speed.

Continue to push switch (1) in order to scroll through the remaining flow modes for the following displays: hours of machine operation, the setting for the engine speed and the hydraulic oil flow.

Note: If the machine is equipped with a single action hydraulic attachment circuit, there are only two available flow modes that can be programmed into the electronic controller. If the machine is equipped with a double action hydraulic attachment circuit, there is a total of four flow modes that are programmed into the electronic controller.

Push switch (1) and then push switch (2). The total number of programmed changes that have been saved for all flow modes will be displayed.

Push switch (1) for the display again in order to continue scrolling through the settings for the flow modes.

When the necessary information is retrieved from the electronic controller, close the access door. Turn the engine start switch to the OFF position.

i01034388

Fuel Tank Shutoff and Drain Control

SMCS Code: 1273

The fuel shutoff valve and the fuel tank drain valve are located underneath the fuel tank.

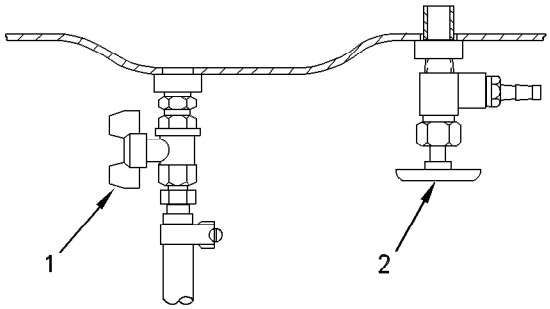


Illustration 167 g00533127

Fuel Tank Drain Valve (1) – To drain the water and sediment from the fuel tank, turn fuel drain valve (1) counterclockwise. To close fuel tank drain valve (1), turn the drain valve clockwise.

Fuel Shutoff Valve (2) – To shut off the fuel supply, turn fuel shutoff valve (2) clockwise. To turn on the fuel supply, turn fuel shutoff valve (2) 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”.

i01289886

Hydraulic Tank Shutoff Valve (If Equipped)

SMCS Code: 1329

S/N: 4SS1–Up

S/N: 9GS1–Up

The hydraulic tank shutoff valve shuts off the hydraulic oil supply between the hydraulic tank and the pumps. This allows the pumps to be worked on without draining the hydraulic tank.

Note: The engine will not start if the hydraulic tank shutoff valve is closed.

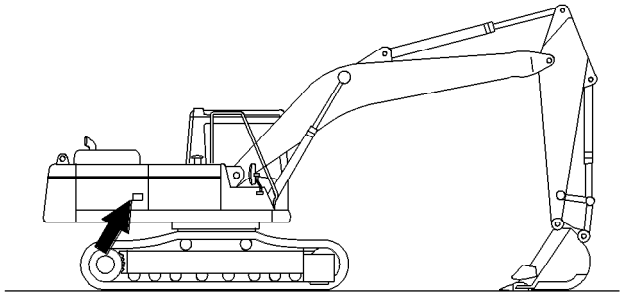


Illustration 168 g00101449

To access the hydraulic tank shutoff valves, open the access door that is located on the right side of the machine. The hydraulic tank shutoff valves are on the right side of the compartment near the bottom of the hydraulic tank.

The machine may be equipped with either 1 or 2 valves. If either of the valves is in the CLOSED position, the engine will not start. The engine will not start in order to ensure that the hydraulic pump has a sufficient supply of hydraulic oil for operation.

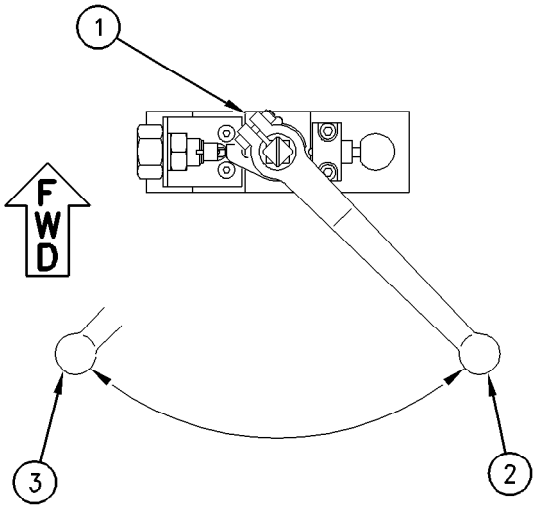


Illustration 169 g00683644

Typical valve

(1) Hydraulic tank shutoff valve
(2) OPEN position
(3) CLOSED position

CLOSED (2) – Move shutoff valve (1) downward in order to shut off the flow of hydraulic oil to the pumps.

OPEN (1) – Move shutoff valve (1) upward in order to allow hydraulic oil to flow to the pumps. The engine will be able to be started now.

Engine Starting

i01955647

Engine Starting
(Machines with Generator)

SMCS Code: 1000; 7000

S/N: 2NW1–Up

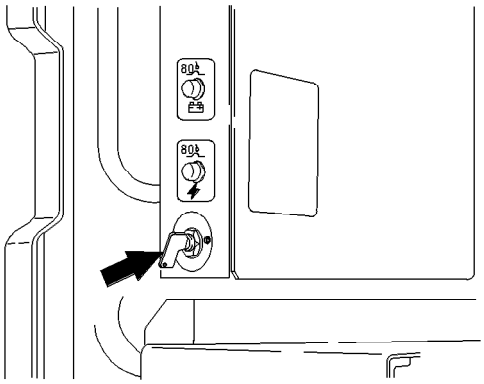


Illustration 170 g00110316

1. Insert the disconnect switch key into the battery disconnect switch. Turn the battery disconnect switch to the ON position.

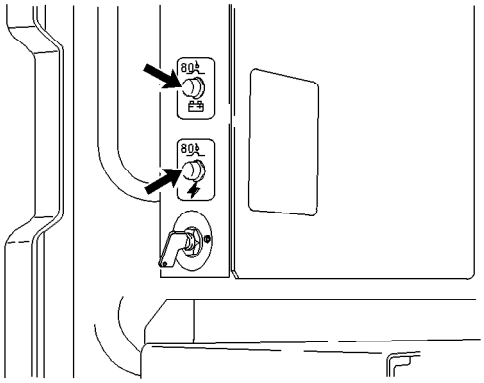


Illustration 171 g00115510

2. Make sure that the reset button for the circuit breaker remains depressed.

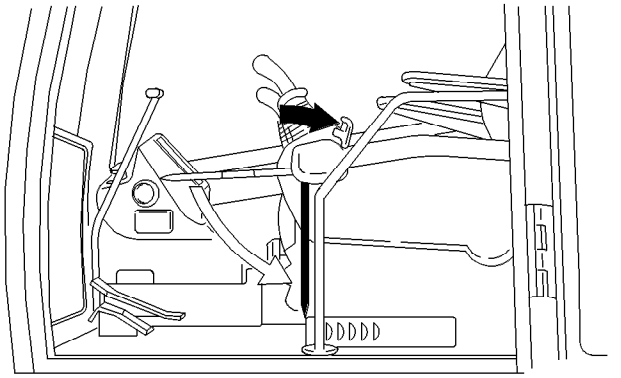


Illustration 172 g00107416

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 hydraulic lockout control is in the LOCKED position.

4. Move the joysticks to the HOLD position.

5. Turn the grapple/magnet switch to the GRAPPLE position.

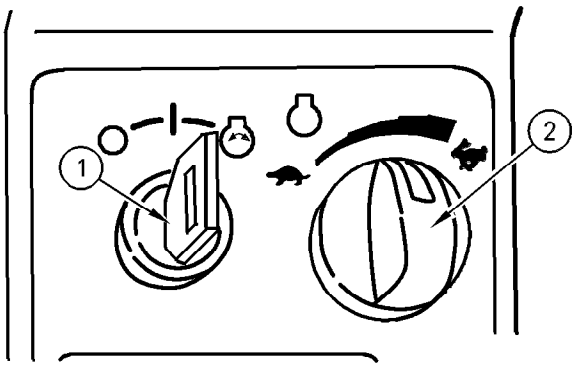


Illustration 173 g00103355

(1) Engine start switch
(2) Engine speed dial

6. Turn engine start switch (1) to the ON position.

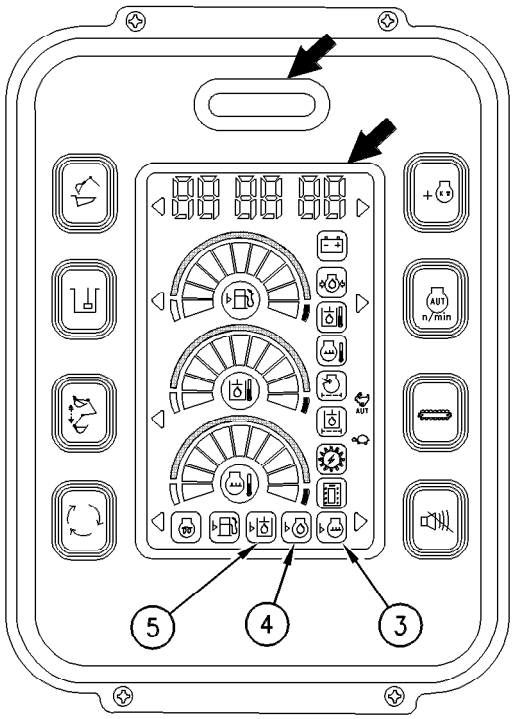


Illustration 174 g00101408

(3) Coolant level
(4) Engine oil level
(5) Hydraulic oil level

7. All of the indicators on the monitor panel should be activated for approximately 1.5 seconds and the action alarm should sound for one second. If any of the indicators are not activated or if the action alarm does not sound, check the electrical system. Make any necessary repairs before you start the engine.

If the starter switch is held in the ON position for 2 seconds or more, the prestart monitoring function will be activated. If the fluid level of the engine coolant, the engine oil, or the hydraulic oil is below the specified level, indicator (3), (4), or (5) will come on.

If the fluid level is too low, add the corresponding fluid to the specified level. Add the fluid before you start the engine.

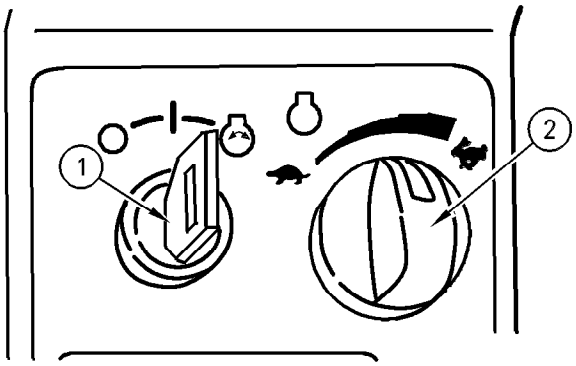


Illustration 175 g00103355

(1) Engine start switch
(2) Engine speed dial

8. Turn engine speed dial (2) to the LOW IDLE position.

9. Turn engine start switch (1) to the START position.

NOTICE
Key must be in run position with engine running to maintain electrical and hydraulic functions and prevent serious machine damage.

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

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

10. Release the engine start switch key after the engine starts.

The engine of this machine is designed to start without starting aids at temperatures above 0°C (32°F). Starting aids are available for temperatures below 0°C (32°F).

11. After the engine starts, observe the indicator lamp for the hydraulic tank pressure.

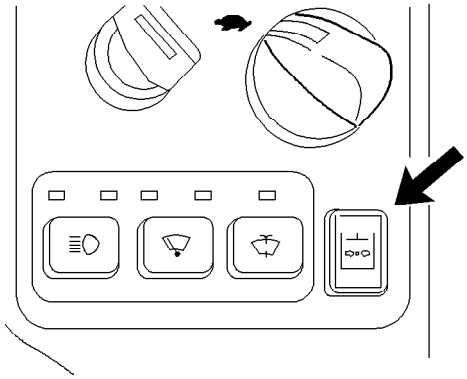


Illustration 176 g00921738

Location of the indicator lamp for the hydraulic tank pressure on right console

12. When the indicator lamp is no longer illuminated, place the grapple/magnet switch in the MAGNET position.

Reference: Refer to Operation and Maintenance Manual, “Grapple and Magnet Control” for further information on the grapple/magnet switch.

i01961251

Engine Starting

SMCS Code: 1000; 7000

NOTICE
Key must be in run position with engine running to maintain electrical and hydraulic functions and prevent serious machine damage.

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

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

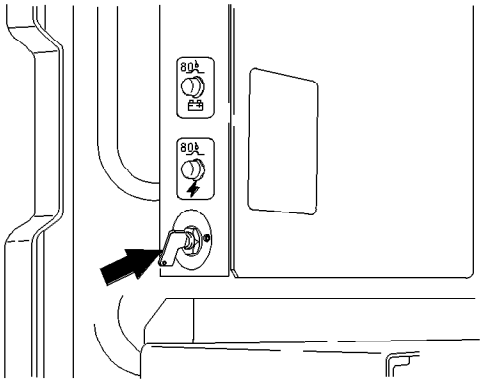


Illustration 177 g00110316

1. Insert the disconnect switch key into the battery disconnect switch. Turn the battery disconnect switch to the ON position.

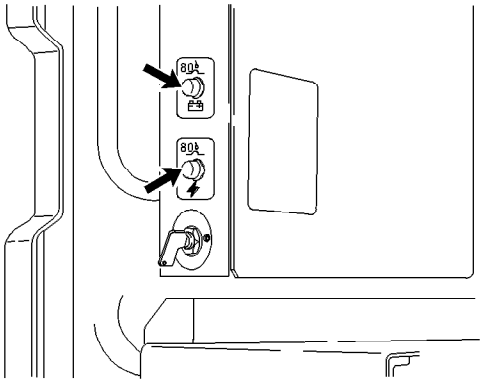


Illustration 178 g00115510

2. Make sure that the reset button for the circuit breaker remains depressed.

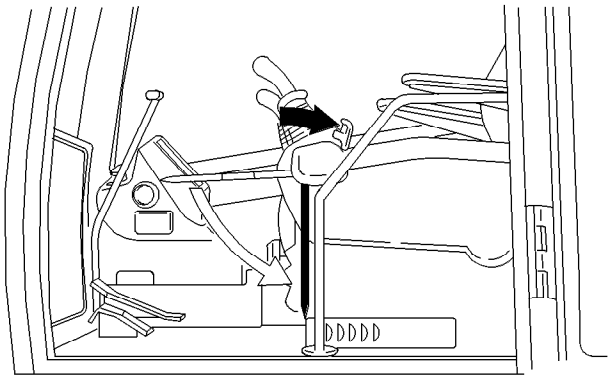


Illustration 179 g00107416

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 hydraulic lockout control is in the LOCKED position.

4. Move the implement control levers to the HOLD position.

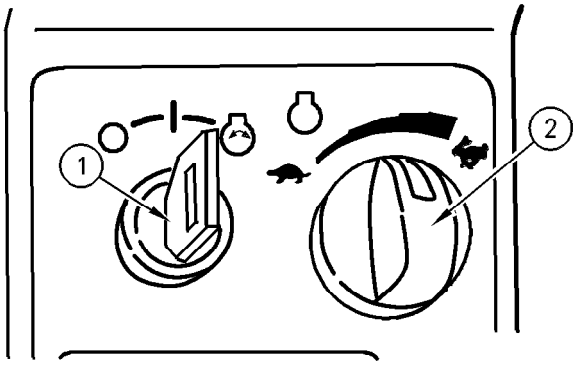


Illustration 180 g00103355

(1) Engine Start Switch. (2) Engine Speed Dial.

5. Turn engine start switch (1) to the ON position.

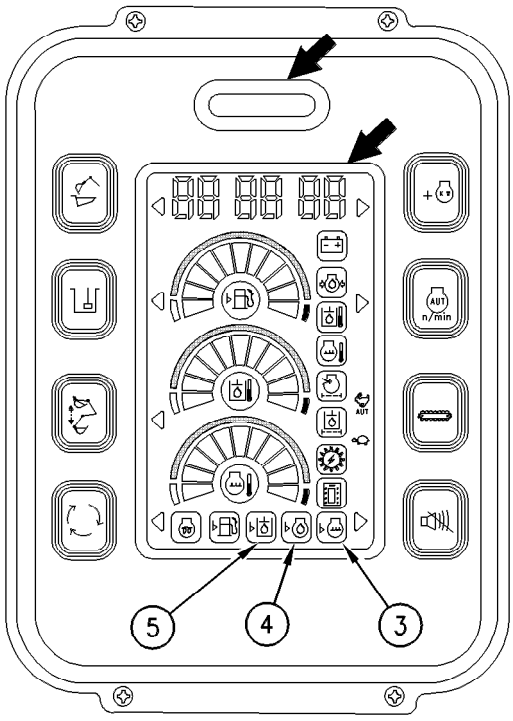


Illustration 181 g00101408

(3) Coolant Level. (4) Engine Oil Level. (5) Hydraulic Oil Level.

6. All of the indicators on the monitor panel should be activated for approximately 1.5 seconds and the action alarm should sound for one second. If any of the indicators are not activated or if the action alarm does not sound, check the electrical system. Make any necessary repairs before you start the engine.

If the starter switch is held in the ON position for 2 seconds or more, the prestart monitoring function will be activated. If the fluid level of the engine coolant, the engine oil, or the hydraulic oil is below the specified level, indicator (3), (4), or (5) will come on.

If the fluid level is too low, add the corresponding fluid to the specified level. Add the fluid before you start the engine.

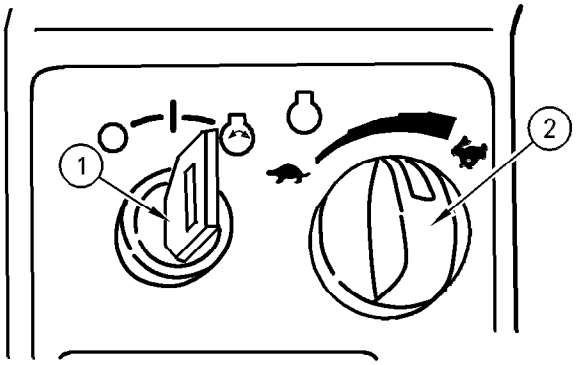


Illustration 182 g00103355

(1) Engine Start Switch. (2) Engine Speed Dial.

7. Turn engine speed dial (2) to the LOW IDLE position.

8. Turn engine start switch (1) to the START position.

9. Release the engine start switch key after the engine starts.

For temperatures above 0°C (32°F), the engine of this machine is designed to start without starting aids. For temperatures below 0°C (32°F), starting aids are available.

i01956213

Engine Starting with Ether Starting Aid

SMCS Code: 1456

If the machine is equipped with an ether starting aid, the machine can start the engine in areas with temperatures that can be as low as −32°C (−25.6°F).

NOTICE
Inject starting aid (ether), only while cranking the engine.

Use sparingly, excessive ether without cranking can cause piston and ring damage.

Wait approximately two seconds before injecting again.

Use ether for cold starting purposes only.

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

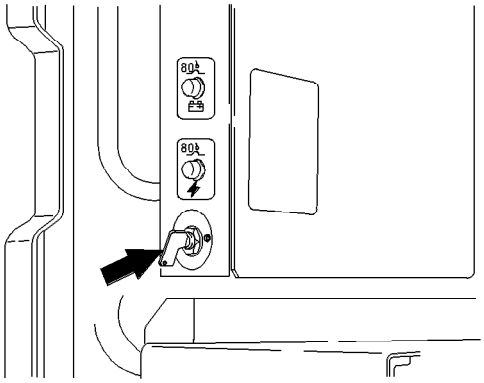


Illustration 183 g00110316

1. Insert the disconnect switch key into the battery disconnect switch. Turn the battery disconnect switch to the ON position.

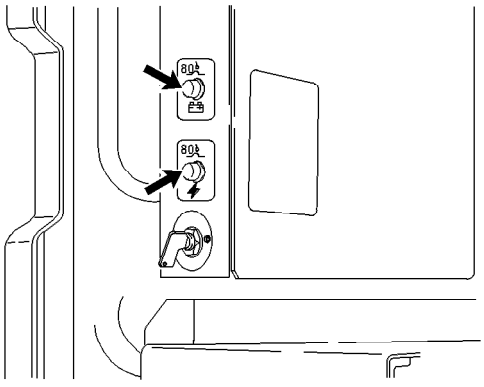


Illustration 184 g00115510

2. Make sure that the reset button for the circuit breaker remains depressed.

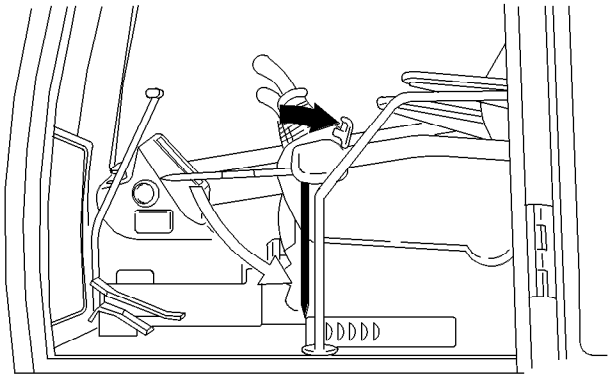


Illustration 185 g00107416

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 hydraulic lockout control is in the LOCKED position.

4. Move the implement control levers to the HOLD position.

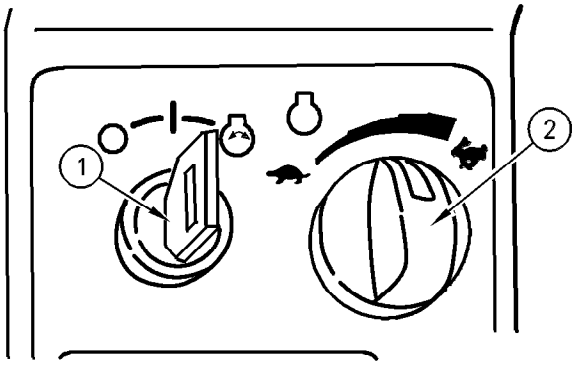


Illustration 186 g00103355

(1) Engine Start Switch. (2) Engine Speed Dial.

5. Turn engine start switch (1) to the ON position.

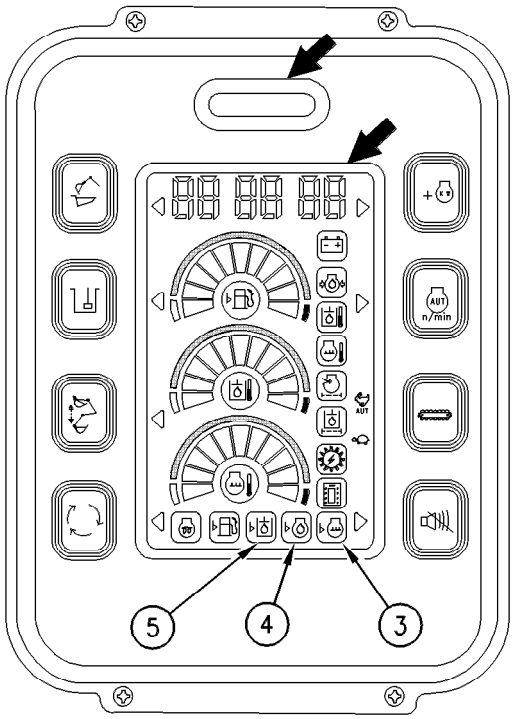


Illustration 187 g00101408

(3) Coolant Level. (4) Engine Oil Level. (5) Hydraulic Oil Level.

6. All of the indicators on the monitor panel should be activated for approximately 1.5 seconds and the action alarm should sound for one second. If any of the indicators are not activated or if the action alarm does not sound, check the electrical system. Make any necessary repairs before you start the engine.

If the starter switch is held in the ON position for 2 seconds or more, the prestart monitoring function will be activated. If the fluid level of the engine coolant, the engine oil, or the hydraulic oil is below the specified level, indicator (3), (4), or (5) will come on.

If the fluid level is too low, add the corresponding fluid to the specified level. Add the fluid before you start the engine.

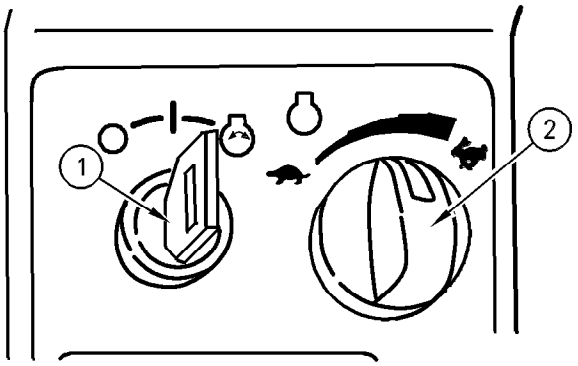


Illustration 188 g00103355

(1) Engine Start Switch. (2) Engine Speed Dial.

7. Turn engine speed dial (2) to the LOW IDLE position.

8. Turn engine start switch (1) to the START position.

9. Release the engine start switch key after the engine starts.

For temperatures above 0°C (32°F), the engine of this machine is designed to start without starting aids. For temperatures below 0°C (32°F), starting aids are available.

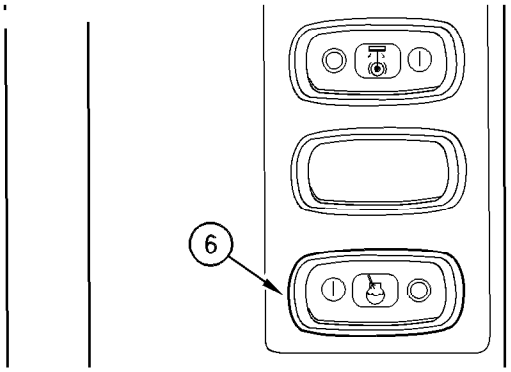


Illustration 189 g00110381

(6) Ether Starting Aid Switch.

10. Push the left side of the ether starting aid switch (6) and release the ether starting aid switch.

11. Operate the ether starting aid switch at intervals of two seconds while you crank the engine. Continue this procedure until the engine starts and the engine is running well.

12. Release the engine start switch key when the engine starts.

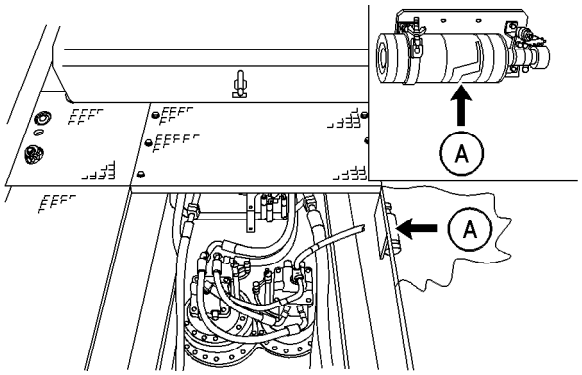


Illustration 190 g00115520

The ether starting aid cylinder (A) is located to the left of the swing drive. For more information, see Operation and Maintenance Manual, “Ether Starting Aid Cylinder - Replace”.

If you are starting the engine in temperatures below −18°C (0°F), the use of optional cold weather starting aids is recommended. A coolant heater, a fuel heater, a jacket water heater, or extra battery capacity may be required.

If you are starting the engine in temperatures below −23°C (−10°F), consult your Caterpillar dealer. Also see Operation and Maintenance Manual, SEBU5898, “Cold Weather Recommendations”, which is available from your Caterpillar dealer.

i02287983

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

S/N: 9GS1–Up

S/N: 2NW1–Up

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

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

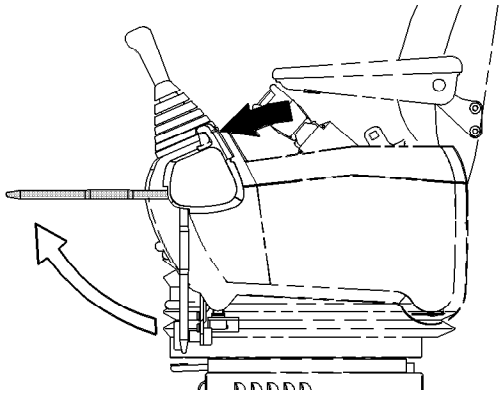


Illustration 191 g00536688

Note: The lever for the hydraulic lockout control must be in the UNLOCKED position before the hydraulic controls will function.

1. Allow the engine to warm up at low idle for at least five minutes. Engage the work tool controls and disengage the work tool controls. This will 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.

2. To warm up the hydraulic oil, turn the engine speed dial to the medium engine speed. Run the engine for approximately five minutes and move the joystick intermittently from the BUCKET DUMP position to the HOLD position.
3. Turn the engine speed dial to the maximum engine speed and repeat Step 2.

   This allows the oil to attain relief pressure, which causes the oil to warm up more rapidly.

4. Cycle all controls in order to circulate warm oil through all hydraulic cylinders and through all hydraulic lines.
5. Observe the gauges and the indicators frequently during the operation.

Operation

i01954582

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.

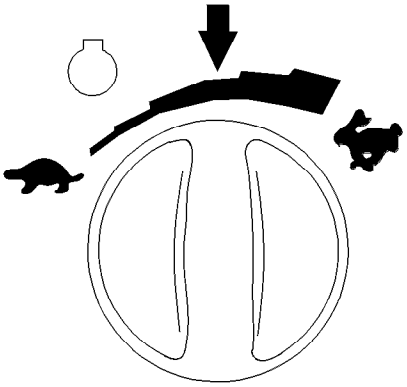


Illustration 192 g00103398

3. Turn the engine speed dial to the operating range.

4. Move the hydraulic lockout control to the UNLOCKED position.

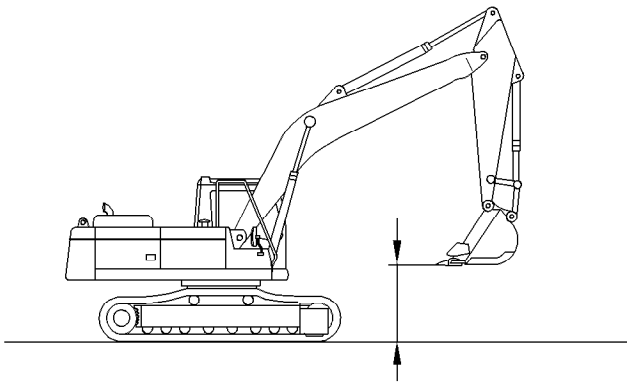


Illustration 193 g00101463

5. Raise the boom enough in order to provide sufficient ground clearance.

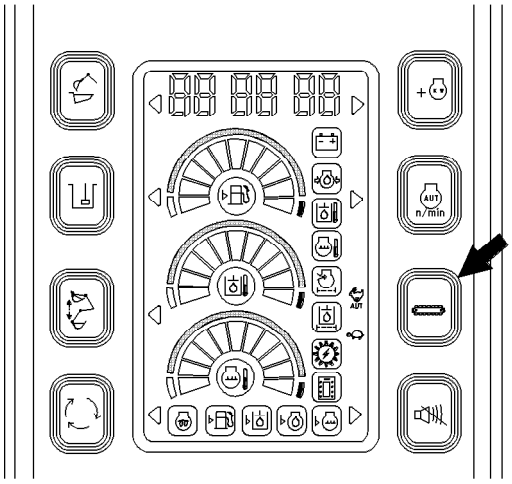


Illustration 194 g00101464

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 and the idlers are 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, “Travel Control” 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.

i00117458

Changing Direction and Speed

SMCS Code: 1000; 7000

Directional changes at full engine speed are possible. However, decelerating is recommended for operator comfort. Decelerating will also help to achieve the maximum service life of the machine components.

If the travel alarm does not sound, consult your Caterpillar dealer.

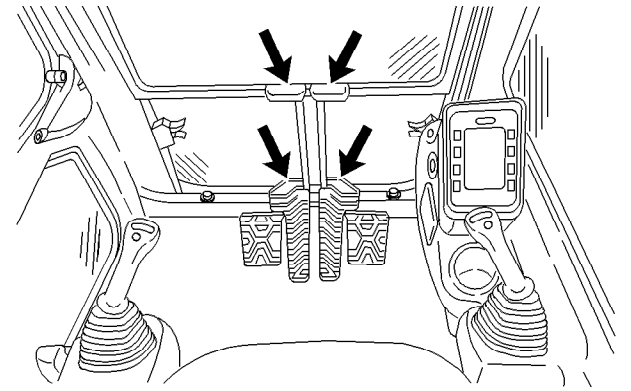


Illustration 195 g00107517

1. Slowly move both of the travel levers or both of the travel pedals toward the rear until the STOP position is reached and the machine stops.

2. Then, move both of the travel levers or both of the travel pedals rearward from the STOP position. If you move the travel levers or the travel pedals farther toward the rear, the travel speed at the selected engine speed will be faster.

3. Slowly move both of the travel levers or both of the travel pedals to the STOP position in order to stop the machine.

i00059294

Frozen Ground Conditions

SMCS Code: 7000

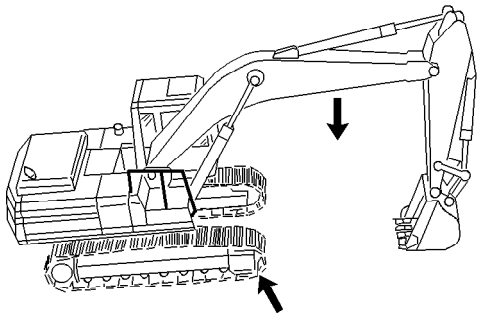


Illustration 196 g00101468

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.

i03106191

Equipment Lowering with Engine Stopped

SMCS Code: 7000

In order to lower the boom, place the hydraulic lockout control 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 the following method to lower the boom.

Note: The boom can be lowered within 60 seconds after turning off the engine if the accumulator is charged. After 60 seconds, the hydraulic electronic control module will shut off and the joysticks will be disabled. The hydraulic lockout control must be in the UNLOCKED position.

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.

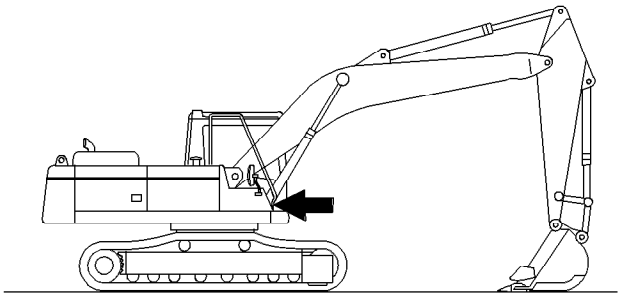


Illustration 197 g00101574

The boom lowering control valve is at the back of the base of the boom. The boom lowering control valve allows the operator to manually lower the boom if the engine is stopped. The boom lowering control valve also ensures that the boom does not fall suddenly if there is an oil leak in the hydraulic line of the boom.

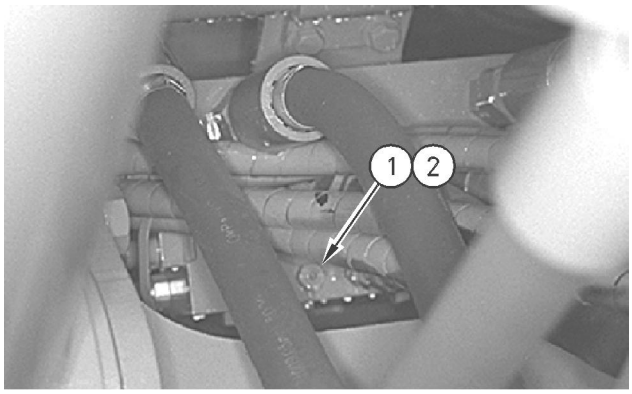


Illustration 198 g00101604

1. Loosen locknut (1).

2. Slowly turn check valve (2) counterclockwise until the check valve stops. The boom will lower to the ground.

3. Make sure that the implement has been completely lowered onto the ground. Turn check valve (2) to the CLOSED position.

4. Tighten locknut (1) to a torque of 55 ± 10 N·m (41 ± 7 lb ft).

5. Before you begin operating the machine, make any necessary repairs.

For additional information, consult your Caterpillar 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

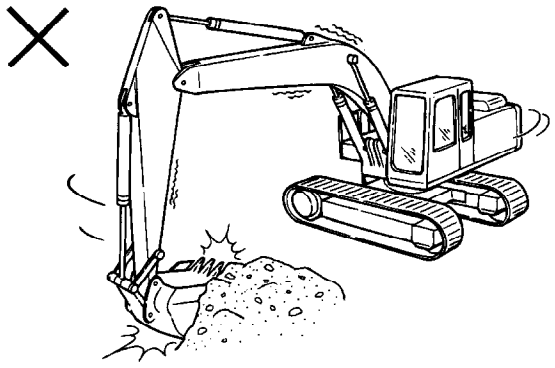


Illustration 199 g00529436

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.

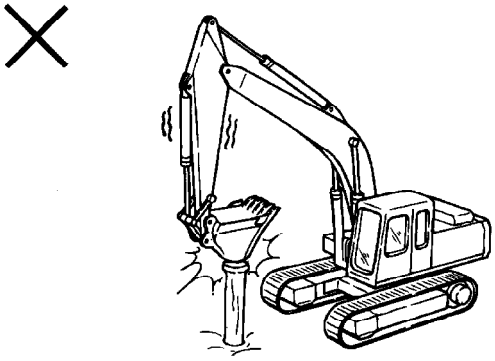


Illustration 200 g00529457

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.

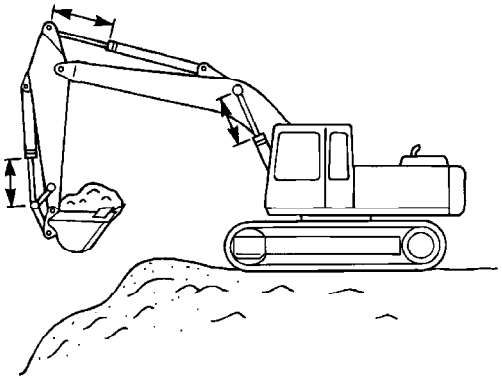


Illustration 201 g00529458

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.

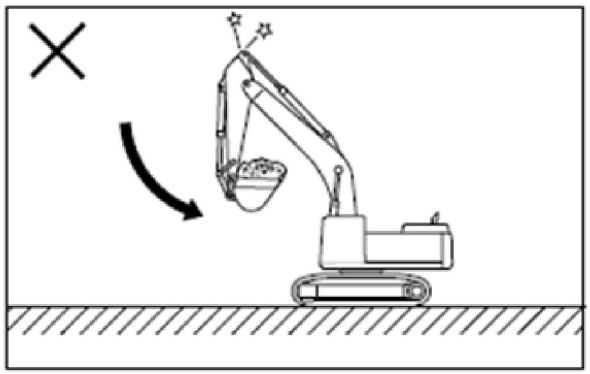


Illustration 202 g03286378

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.

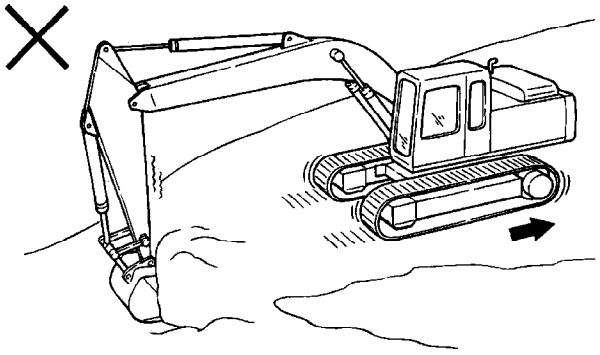


Illustration 203 g00529459

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.

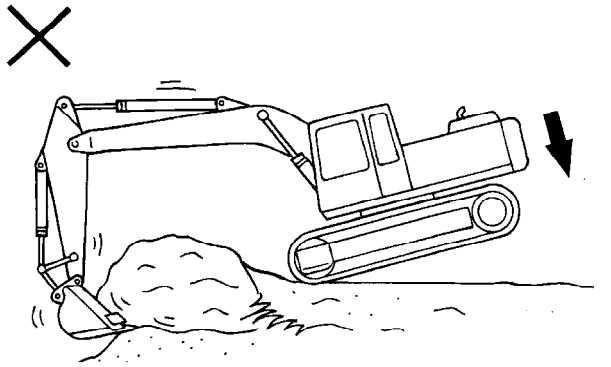


Illustration 204 g00529460

Do not use the dropping force of the rear of the machine for excavation. This operation will damage the machine.

Operating Precaution

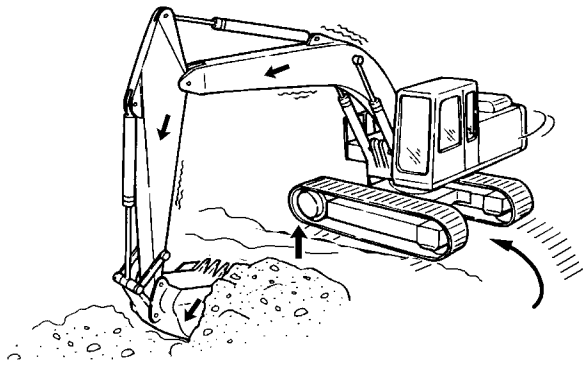


Illustration 205 g01250228

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.

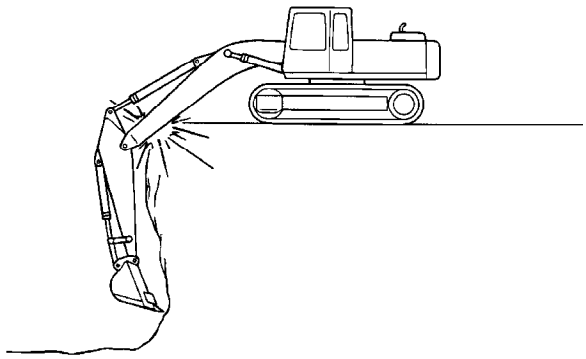


Illustration 206 g00529462

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.

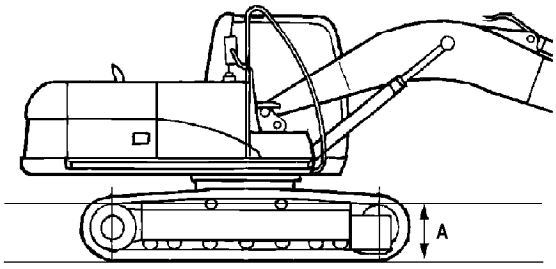


Illustration 207 g00807842

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.

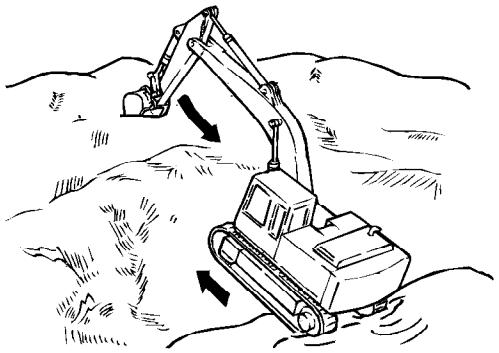


Illustration 208 g00808148

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.

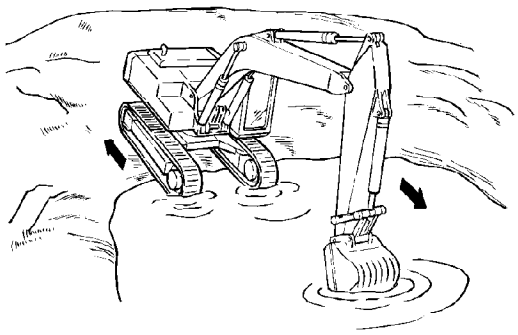


Illustration 209 g00808151

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.

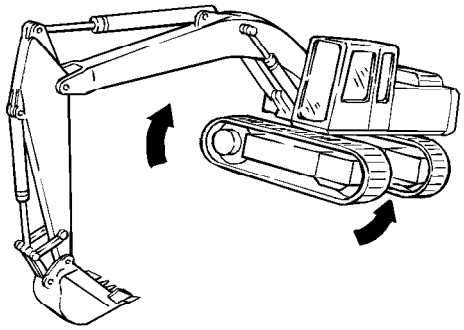


Illustration 210 g00808152

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

S/N: 4SS1–Up

S/N: 9GS1–Up

Digging

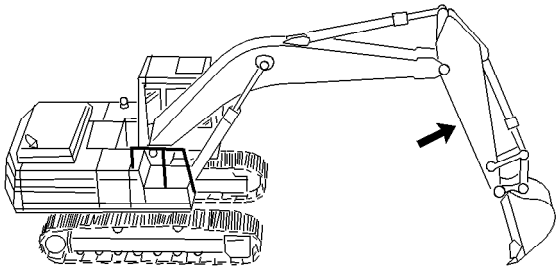


Illustration 211 g00101523

1. Position the stick at a 70 degree angle to the ground.

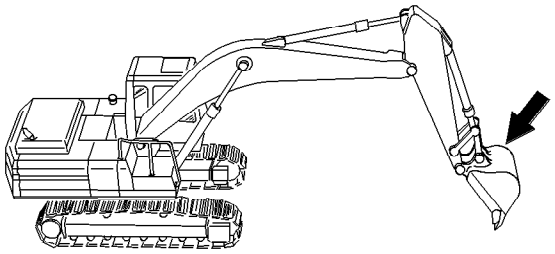


Illustration 212 g00101525

2. Position the bucket cutting edge at a 120 degree angle to the ground. Maximum breakout force can now be exerted with the bucket.

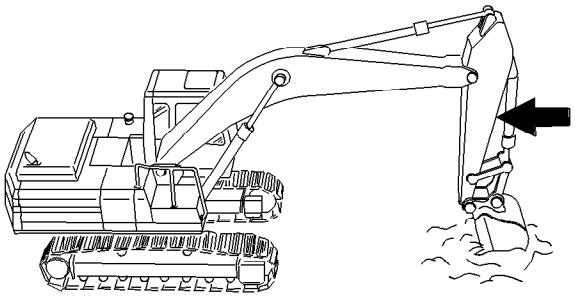


Illustration 213 g00101526

3. Move the stick toward the cab and keep the bucket parallel to the ground.

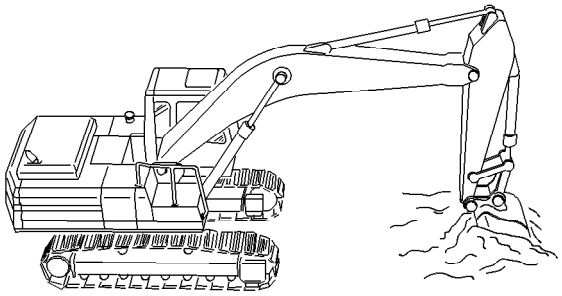


Illustration 214 g00101527

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.

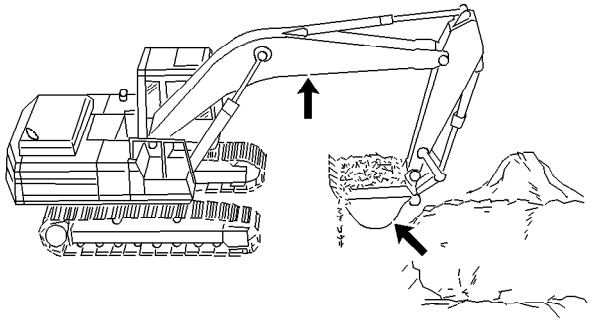


Illustration 215 g00101528

8. Close the bucket and raise the boom when the pass has been completed.

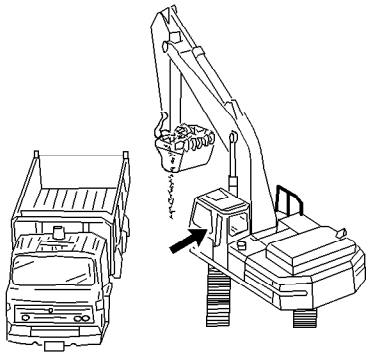


Illustration 216 g00101529

9. Engage the swing control when the bucket is clear of the excavation.

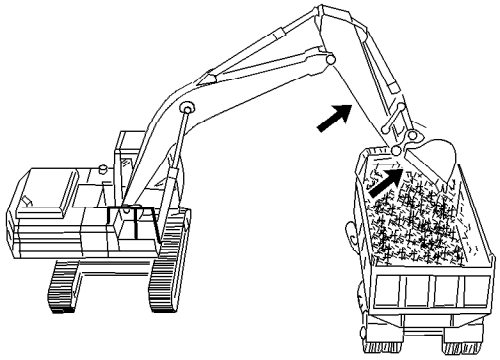


Illustration 217 g00101530

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.

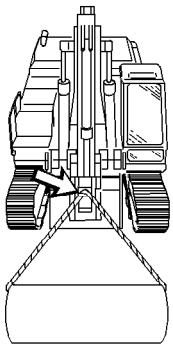


Illustration 218 g00101531

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.

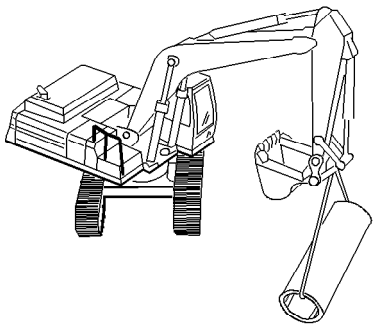


Illustration 219 g00101532

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.

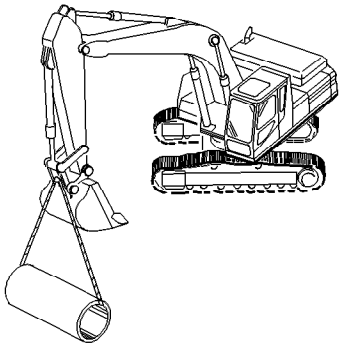


Illustration 220 g00101533

The most stable lifting position is over a corner of the machine.

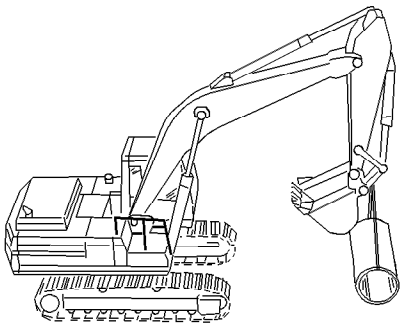


Illustration 221 g00101534

For the best stability, carry a load close to the machine and to the ground.

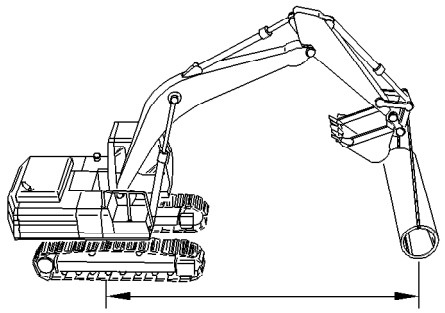


Illustration 222 g00101535

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.

i02541201

Material Handler Operation

SMCS Code: 7000

S/N: 2NW1–Up

⚠ 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 the work tool cylinder, work tool, or linkage could result if the slings are placed incorrectly.

Short slings will prevent excessive load swing.

Note: There may be local government regulations about the use of excavators for the lifting of heavy objects. Please observe those regulations.

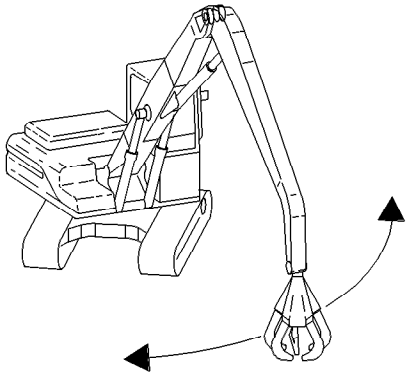


Illustration 223 g00130805

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.

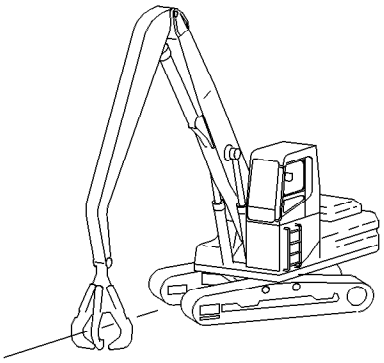


Illustration 224 g00130806

The most stable lifting position is over a corner of the machine.

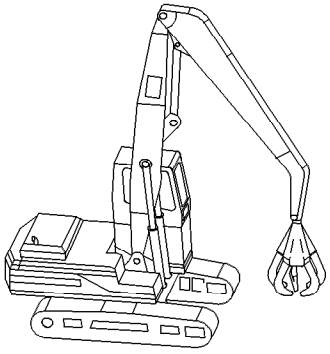


Illustration 225 g00130807

For the best stability, carry a load close to the machine and to the ground.

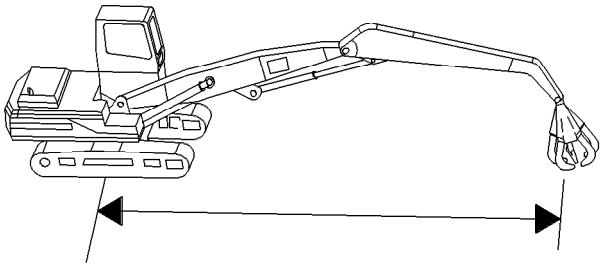


Illustration 226 g00130811

The lift capacity decreases as the distance from the swing centerline increases. Rotate the upper frame by 90 degrees relative to the undercarriage when the machine is working in a stationary application. This will evenly load the swing bearing.

i03548680

Hammer Operation
(If Equipped)

SMCS Code: 5705-WTL

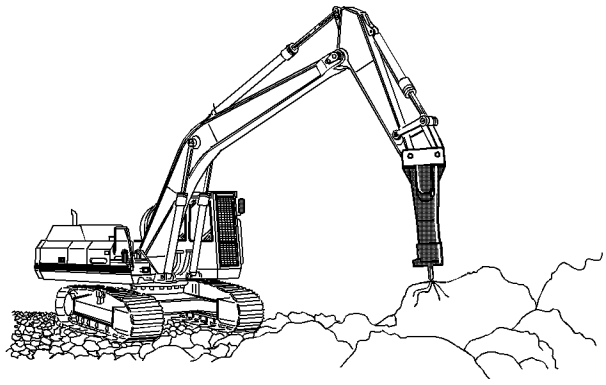


Illustration 227 g01876560

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 228 . 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”.

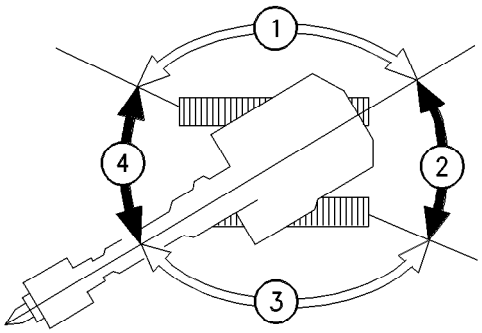


Illustration 228 g00101503

(1) Incorrect working position
(2) Correct working position
(3) Incorrect working position
(4) Correct working position

Parking

i02014194

Stopping the Machine

SMCS Code: 7000

NOTICE
Park on a level surface. If it is necessary to park 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 controls are activated.

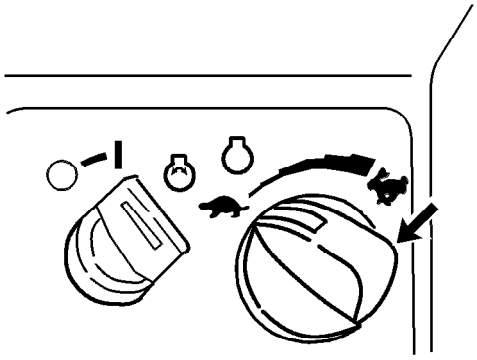


Illustration 229 g00101553

1. Turn the engine speed dial counterclockwise in order to reduce engine speed.

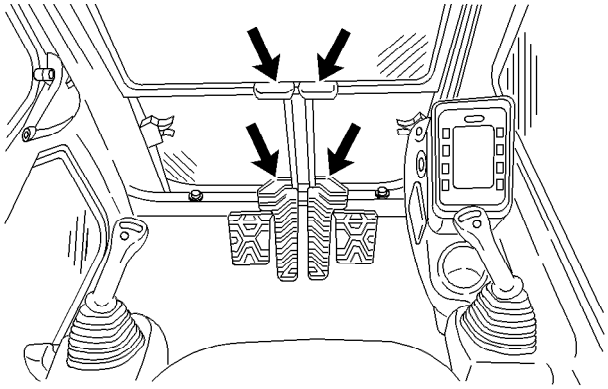


Illustration 230 g00107517

2. Release the travel levers and the travel pedals in order to stop the machine.

3. Lower the work tool to the ground. Apply a slight downward pressure.

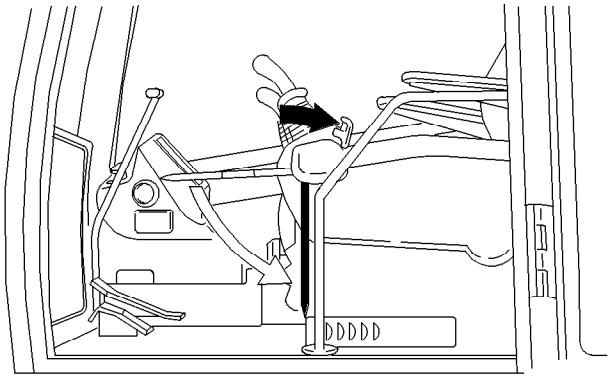


Illustration 231 g00107416

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.

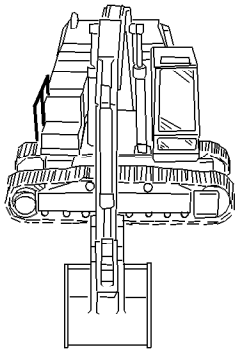


Illustration 232 g00101644

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.

i01957230

Engine Stopping

SMCS Code: 1000; 7000

If the engine is turned off immediately and the machine has been under a load, overheating may occur. This will cause accelerated wear of the engine components.

Refer to the following stopping procedure, in order to allow the engine to cool and prevent excessive temperatures in the turbocharger center housing.

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.

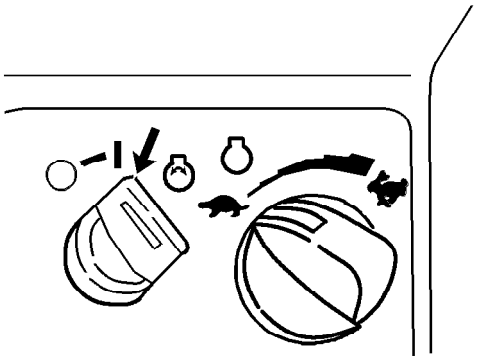


Illustration 233 g00101567

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

i00143071

Leaving the Machine

SMCS Code: 7000

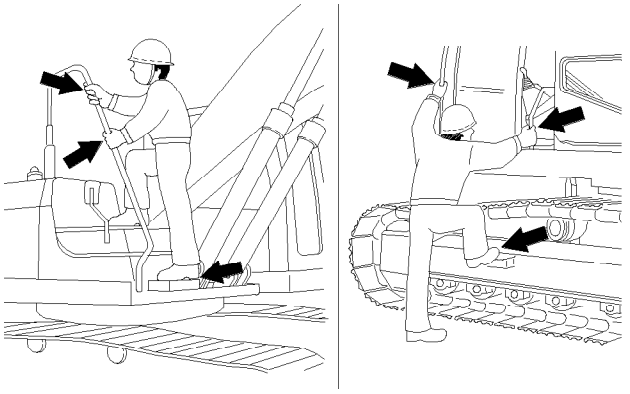


Illustration 234 g00103309

The above illustration shows an operator that is properly dismounting an excavator.

1. Use the steps and the handholds when you dismount. When you dismount, face the machine and use both hands. Be sure that you clean any debris from the steps.

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. When the machine is left for an extended period of one month or longer, turn the key for the battery disconnect switch to the OFF position. 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.

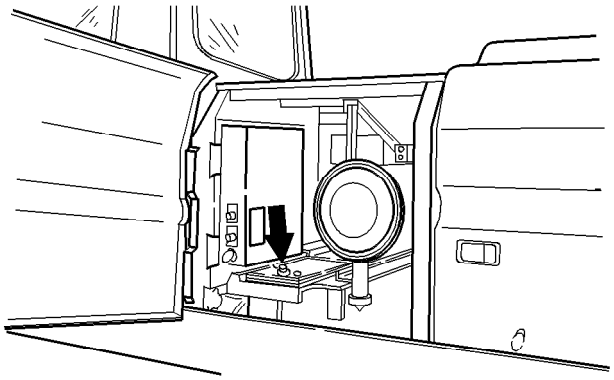


Illustration 235 g00101577

6. Remove the bolt that holds the vandalism guards in place. Remove the vandalism guards from the storage area.

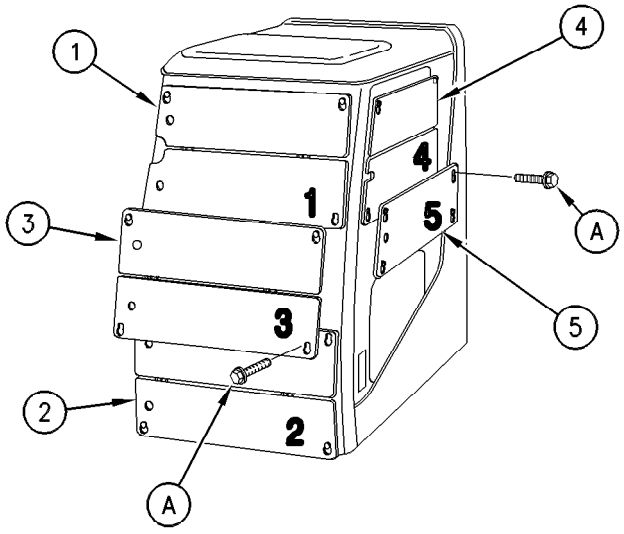


Illustration 236 g00101578

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).

Storing Vandalism Guards

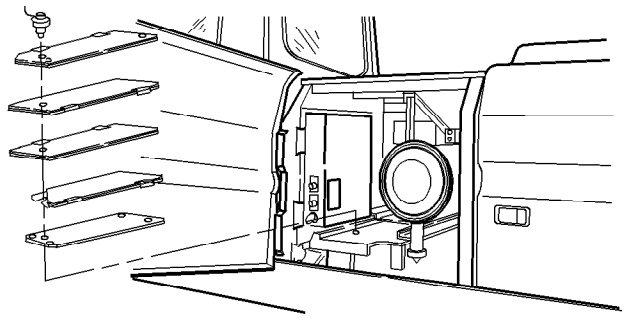


Illustration 237 g00101581

Note: When you are storing the vandalism guards, make sure that you place the guards in the storage area in sequential order, as shown. The vandalism guards will only fit in the storage area in this manner.

Transportation Information

i08036521

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. Certain regions may require the removal of door hooks and cab bumpers, if equipped. Consult all local and regional regulations

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.

8. If equipped, remove door hooks, cab bumpers, and fuel tank step as necessary. Refer to local regulations.

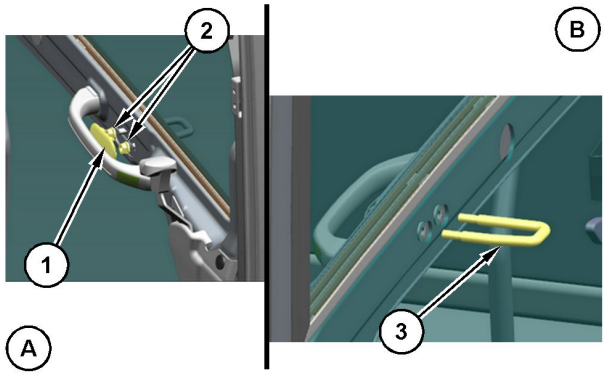


Illustration 238 g06516462

(1) Cover
(2) Nuts
(3) Door Hook
(A) Inside
(B) Outside

a. Remove cover (1) and nuts (2) to remove door hook (3).

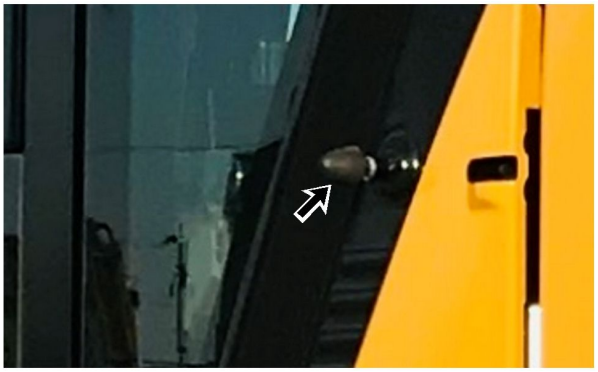


Illustration 239 g06516469

b. Remove any bumpers on your cab.

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.

i01954709

Securing the Machine

SMCS Code: 7000

Comply with any laws that govern the characteristics of a load (length, width, height, and weight).

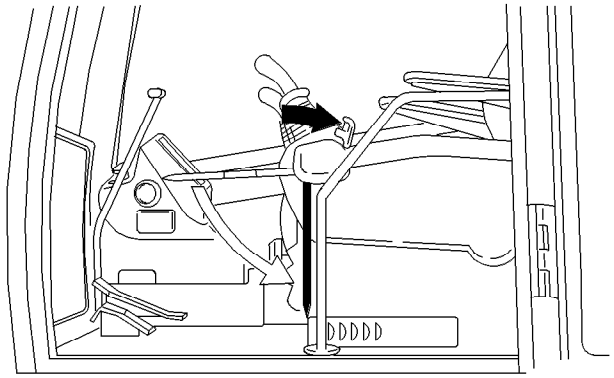


Illustration 240 g00107416

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. 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.

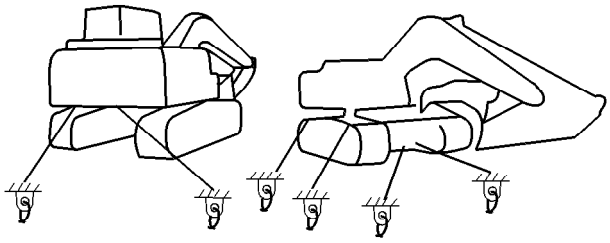


Illustration 241 g00101688

7. 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 on the lower frame, the rear towing eyes on the lower frame, and the rear towing eye that is 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 prevents the upper structure from swinging.

8. Tilt the cab if the machine is equipped with a tilt cab. Refer to Operation and Maintenance Manual, “Cab Tilting” for the procedure to tilt the cab.

Note: The cab must be tilted or the cab must be in the LOWER position before transporting.

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.

i00867921

Cab Tilting

SMCS Code: 7341

S/N: 2NW1–Up

The cab and the cab riser must be tilted in order to lower the overall height of the machine for shipping. A lifting device such as a crane is needed in order to tilt the cab.

⚠ WARNING

Do not tilt the cab when occupied. Before tilting the cab remove all loose articles from the cab, secure all windows and emergency exits, and then close the cab and cab riser doors. Failure to do so can result in personal injury or damage to the machine.

Lower

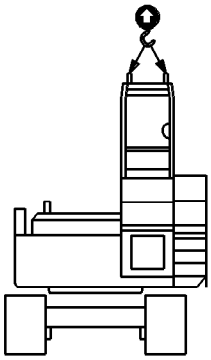


Illustration 242 g00274771

1. Attach a suitable lifting device to the two lifting rings.

Note: The lifting rings are located in the top rear corners of the cab. The approximate weight of the cab, platform, and cab riser is 1700 kg (3750 lb).

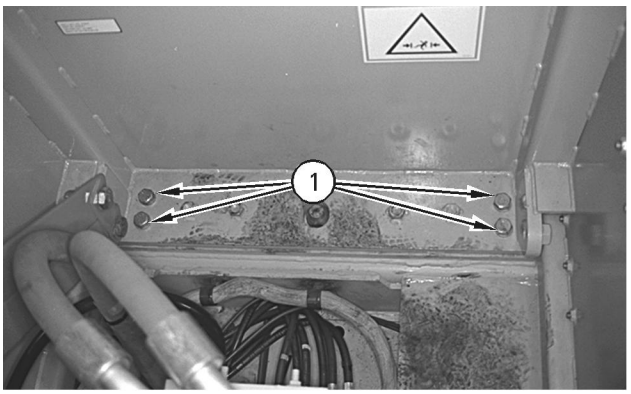


Illustration 243 g00274735

(1) Cab retention bolts.

2. Remove cab retention bolts (1) from the rear of the cab riser compartment and install the cab retention bolts in the provided weld nuts.

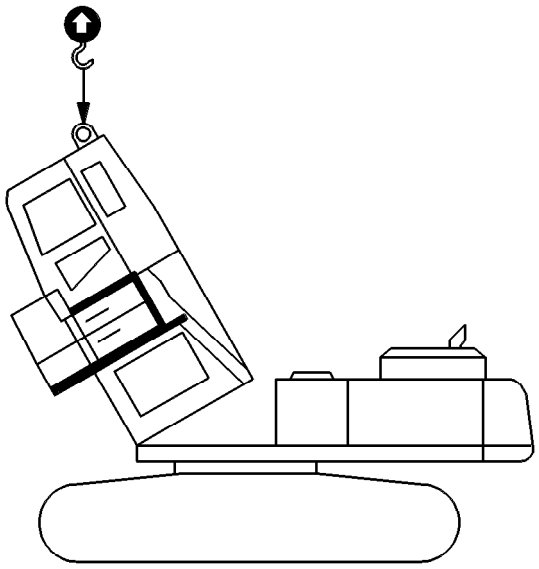


Illustration 244 g00274772

3. Raise the cab riser until the cab riser is beyond the center point.

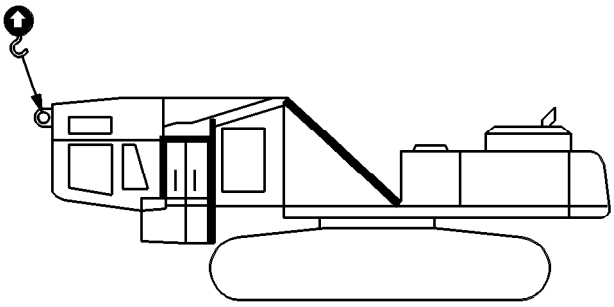


Illustration 245 g00274773

NOTICE
Improper lifting or tiedowns can allow load to shift and cause injury or damage.

NOTICE
Do not apply too much pressure with the lifting device being used. Damage to the riser frame may occur.

4. Slowly lower the cab riser until the brackets can be installed, as shown.

5. Install cab retention bolts (1).

Raise

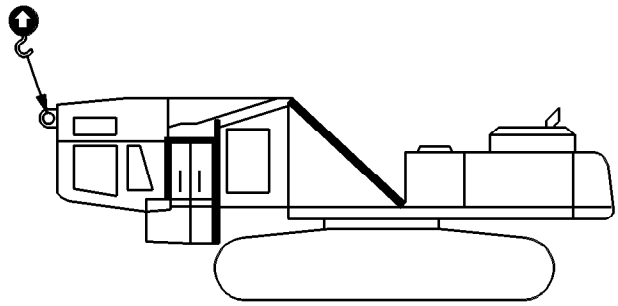


Illustration 246 g00274773

1. Attach a suitable lifting device to the two lifting rings.

Note: The lifting rings are located in the top rear corners of the cab. The approximate weight of the cab, platform, and cab riser is 1700 kg (3750 lb).

2. Remove the brackets. Lay the brackets next to the generator control panel in the bottom of the housing.

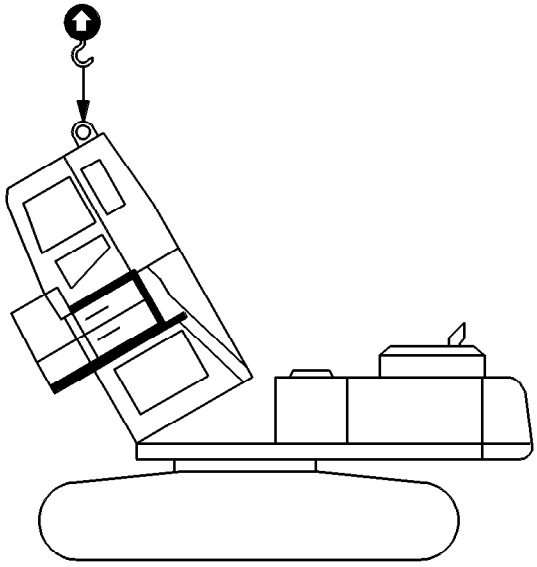


Illustration 247 g00274772

NOTICE
Do not apply too much pressure with the lifting device being used. Damage to the riser frame may occur.

3. Raise the cab riser until the cab riser is beyond the center point.

4. Slowly lower the cab riser until the cab riser is in the original position.

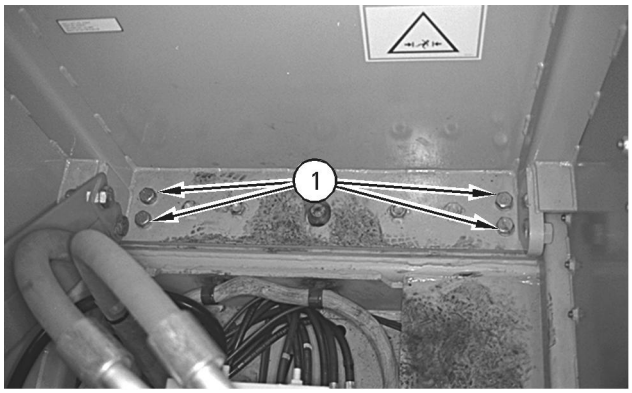


Illustration 248 g00274735

(1) Cab retention bolts.

5. Install cab retention bolts (1).

6. Secure the cab retention bolts.

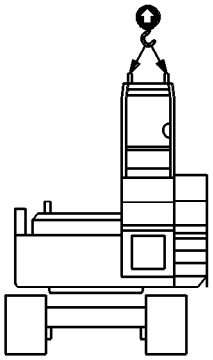


Illustration 249 g00274771

7. Remove the lifting device from the cab.

i00703722

Mirror Installation

SMCS Code: 7319

S/N: 4SS1–Up

S/N: 9GS1–Up

Note: Before you transport the machine, remove the rearview mirror or reposition the rearview mirror inward.

After you transport the machine, reinstall the rearview mirror or return the rearview mirror to the proper position. Use the following procedure.

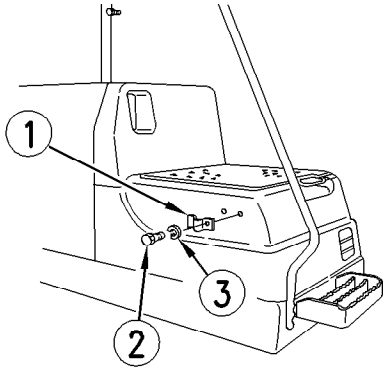


Illustration 250 g00101689

1. Use two bolts (2) and two washers (3) to install bracket (1) on the right side of the storage box.

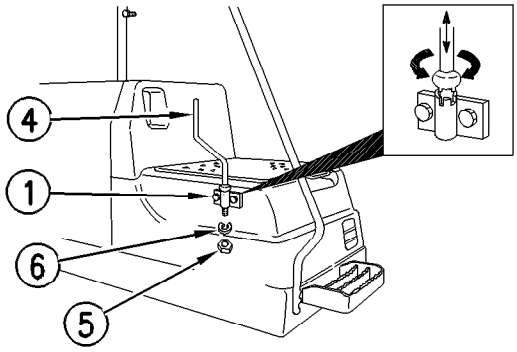


Illustration 251 g00101690

2. Put bar (4) into bracket (1). Align the notches at the lower part of the bar so that the bar faces outward. Secure the bar by tightening nut (5) and washer (6) on the bar.

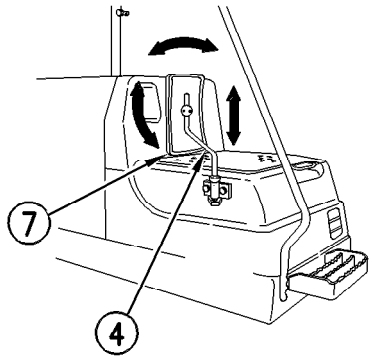


Illustration 252 g00101693

3. Install mirror (7) to bar (4). Rotate the mirror by hand to the desired angle.

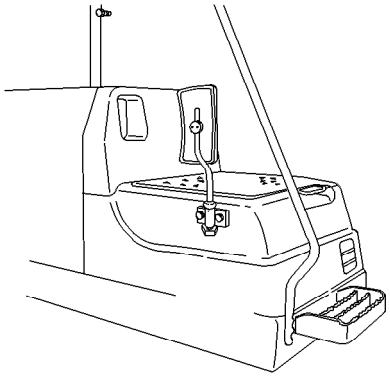


Illustration 253 g00101700

Reposition the rearview mirror inward before you transport the machine.

i02342040

Mirror Installation

SMCS Code: 7319

S/N: 2NW1–Up

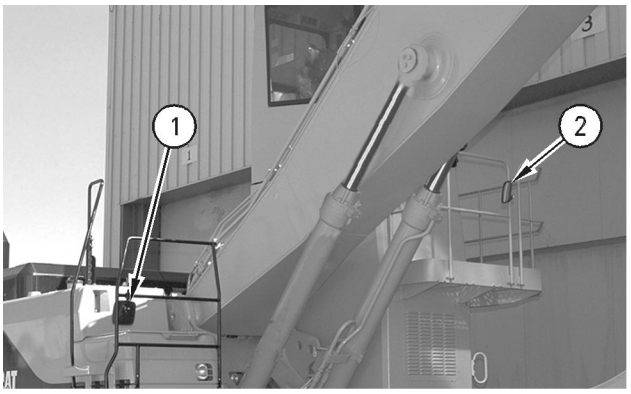


Illustration 254 g00470395

(1) Mirror
(2) Mirror

Before you transport the machine, remove mirror (1) and mirror (2).

After you transport the machine, reinstall the mirrors by using the following procedure:

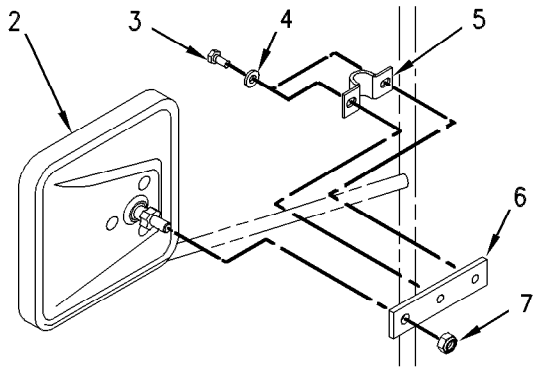


Illustration 255 g00472168

(2) Mirror
(3) Bolt
(4) Washer
(5) Bracket
(6) Bar
(7) Nut

1. Use two bolts (3) and two washers (4) to install bracket (5) to bar (6).

2. Attach mirror (2) to bar (6) by tightening nut (7).

3. Rotate the mirror to the desired angle.

4. Repeat Steps 1 to 3 in order to install mirror (1).

i01288120

Adjustable Gage Undercarriage Frame

SMCS Code: 4150

S/N: 9GS1–Up

S/N: 2NW1–Up

⚠ WARNING

Before extending or retracting the track frames, be sure to keep all other people away from the machine.

Always use two or more people to do this work. Perform machine movements only after getting signals from a signal man.

The automatic engine speed control (AEC) switch must be in the OFF position and the travel speed switch must be in the LOW position.

Never make a sudden movement of the front equipment. When operating the front equipment, slowly activate the controls with extra care.

NOTICE
Before starting adjustment of the track frames, clean the contacting areas of the car body and track frames, and their mounting bolts. Prior to installing the bolts, apply 9M-3710 Anti-Seize Compound to the underside of the head and to the threads of the bolts.

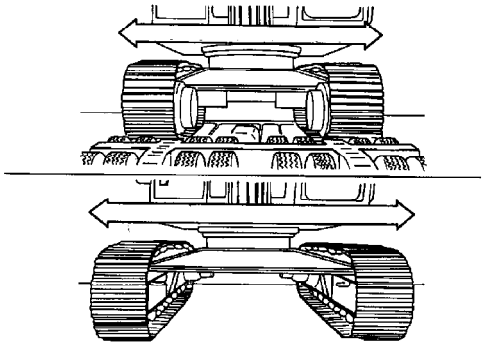


Illustration 256 g00285692

This machine has adjustable track frames that are held in place with bolts. Completely widen the track frames when the machine is being operated. Fully retract the track frames in order to transport the machine.

Retracting

Park the machine on a hard, level surface.

Retract the track frames one at a time.

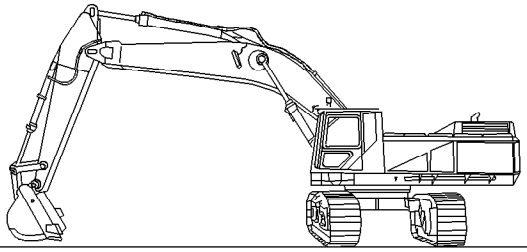


Illustration 257 g00286822

1. Position the machine with the front at a right angle to the track frame that is being retracted, as shown.
2. Stop the engine.

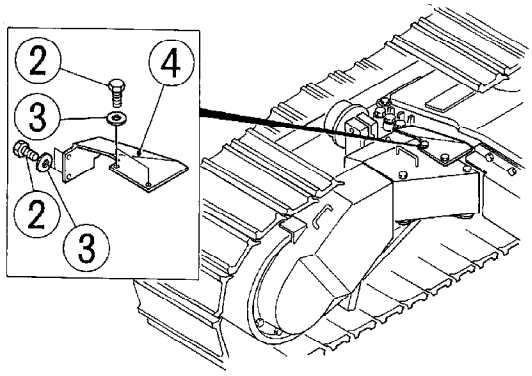


Illustration 258 g00285695

(2) Bolts
(3) Washers
(4) Cover for travel motor

3. Remove four bolts (2), washers (3), and the cover for the travel motor (4).

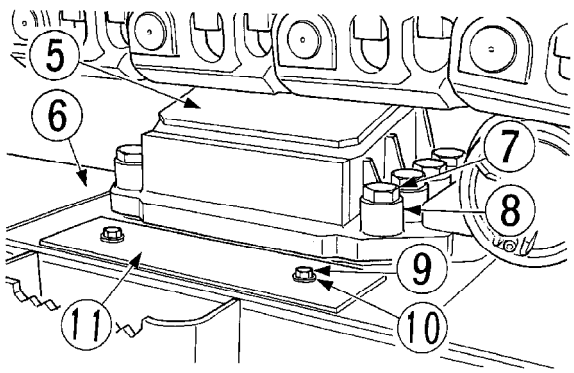


Illustration 259 g00285697

(5) Carbody
(6) Track frame
(7) Bolts
(8) Spacer
(9) Bolt
(10) Washer
(11) Plate

4. Remove 38 bolts (7) and spacers (8). The bolts hold track frame (6) to carbody (5).

5. Loosen four bolts (9) and washers (10). Remove two plates (11).

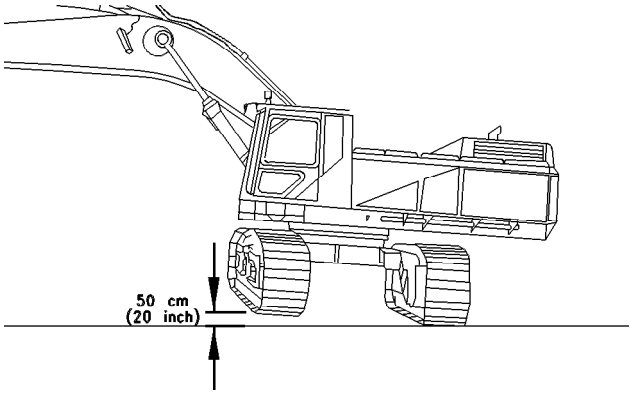


Illustration 260 g00286929

6. Start the engine. Apply downward pressure with the boom in order to raise the track approximately 50 cm (20 inch) above ground level.

7. Slowly run the raised track at a low idle. This will cause the raised track to slide toward the center of the machine. The full sliding distance should be 380 mm (1 ft 3 inch).

8. After the raised track frame has been correctly retracted, lower the track frame to the ground.

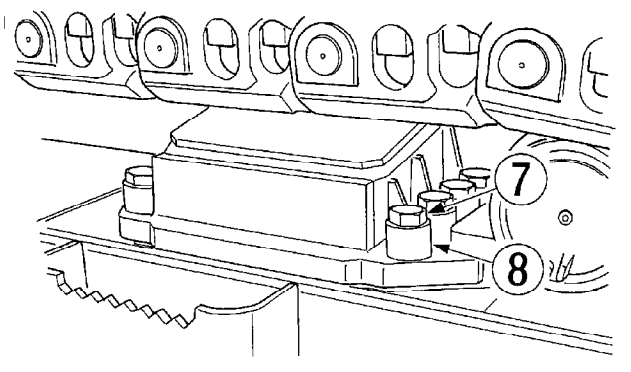


Illustration 261 g00285920

(7) Bolts
(8) Spacers

9. Align the bolt holes of the carbody and track frame. Install 22 bolts (7) and spacers (8). If necessary, slowly operate the machine back and forth until the bolt holes are aligned. Tighten the bolts to a torque of 2700 ± 300 N·m (2000 ± 220 lb ft).

10. Repeat Steps 1 through 9 for the other track frame.

Extending

NOTICE
Damage to the car body guide on the track roller frame can result if the track is raised more than 60 mm (2.4 inch) off the ground, with the car body bolts removed.

Park the machine on a hard, level surface.

Extend the track frames one at a time.

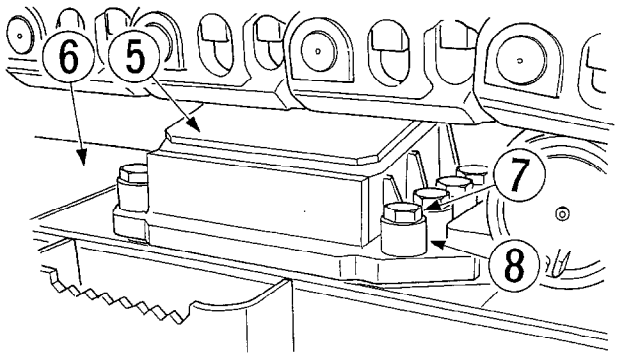


Illustration 262 g00285921

(5) Carbody
(6) Track frame
(7) Bolt
(8) Spacers

1. Remove 22 bolts (7) and spacers (8). The bolts hold track frame (6) to carbody (5).

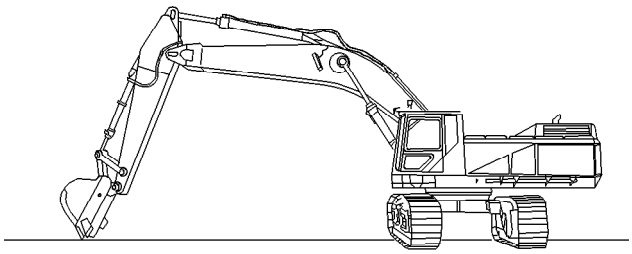


Illustration 263 g00286687

2. Position the boom over the opposite track frame with the stick at an approximate 80 degree angle to the ground. Place the bucket teeth into the ground, as shown. This machine position provides the best stability for extending the track frames.

3. Apply a downward pressure with the boom in order to slightly raise the track.

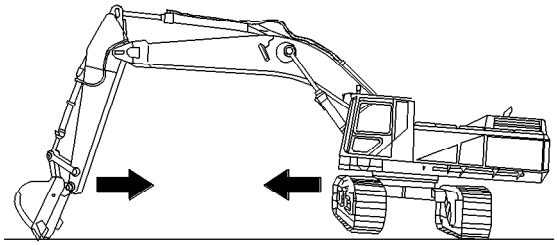


Illustration 264 g00286117

4. Use the STICK IN position to extend the track frame by moving the carbody away from the track.

5. After the track frame has been correctly extended, lower the raised track frame to the ground.

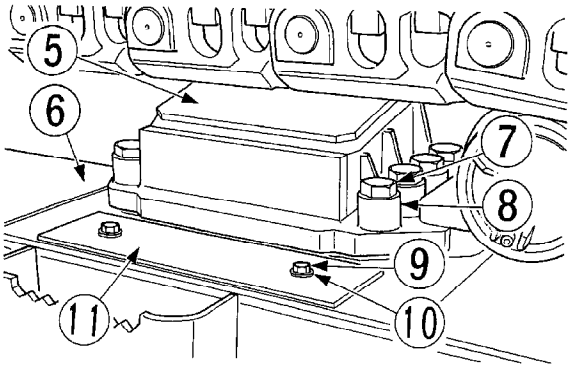


Illustration 265 g00285697

(5) Carbody
(6) Track frame
(7) Bolts
(8) Spacer
(9) Bolt
(10) Washer
(11) Plate

6. Align the bolt holes of the carbody and track frame. Install 38 bolts (7) and spacers (8). If necessary, slowly operate the machine back and forth until the bolt holes are aligned. Tighten the bolts to a torque of 2700 ± 300 N·m (2000 ± 220 lb ft).

7. Install two plates (11) with four bolts (9) and washers (10).

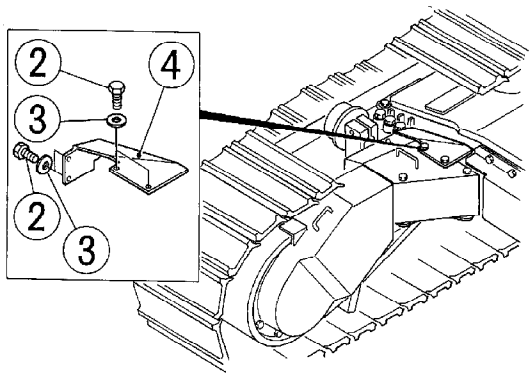


Illustration 266 g00285695

(2) Bolts
(3) Washers
(4) Cover for travel motor

8. Install the cover for the travel motor (4), washers (3), and bolts (2).

9. Repeat Steps 1 through 8 for the other track frame.

i08109798

Counterweight Removal and Installation

SMCS Code: 7056

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.

WARNING

Personal injury or death can occur from a counterweight falling during removal or installation.

Do not allow personnel under or around the counterweight during removal or installation.

Make sure that the lifting device is in good condition and is capable of handling the weight of the counterweight.

WARNING

Personal injury or death can occur from a counterweight falling during removal or installation.

Before you remove the counterweight mounting bolts, read and understand the instructions and warnings in the Operation and Maintenance Manual.

WARNING

Make certain personnel are clear of cable when there is a load on it. Cable can break and cause personal injury.

WARNING

Personal injury or death can occur from a counterweight falling during removal or installation. Before you begin the Removal Procedure, make sure that the support blocks are installed and tightened properly.

WARNING

Crush Hazard. Read and Understand the Operation and Maintenance Manual before performing maintenance on equipment. Could cause serious injury or death.

WARNING

Unexpected machine damage and personal injury or death can occur from any machine operation without counterweight bolt tightened properly.

Make sure to tighten the counterweight mounting bolts when the counterweight is installed.

Counterweight Removal and Installation for Standard Machines

Counterweight Removal

1. Position the machine on a surface that is hard and level. Lower the front implements to the ground.

2. Move the lever for the hydraulic lockout control to the LOCKED position.

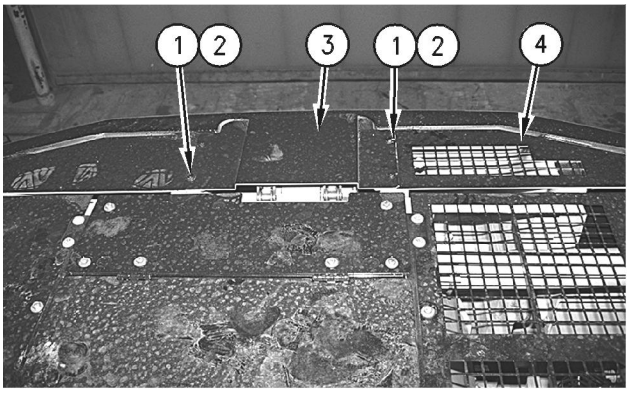


Illustration 267 g00115284

(1) Bolt. (2) Washer. (3) Cover. (4) Cover.

3. Remove six bolts (1) and washers (2). Remove covers (3) and (4).

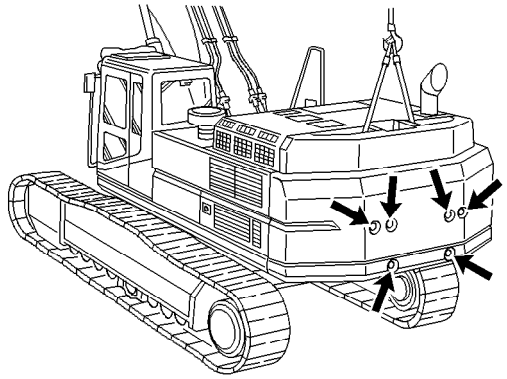


Illustration 268 g00115285

4. Fasten a proper rated cable with shackles to the brackets. Use an appropriate lifting device in order to tension the cable. If the tension in the cable is too great, removing the bolts will be difficult. Also, if the tension in the cable is too small, removing the bolts will be difficult.

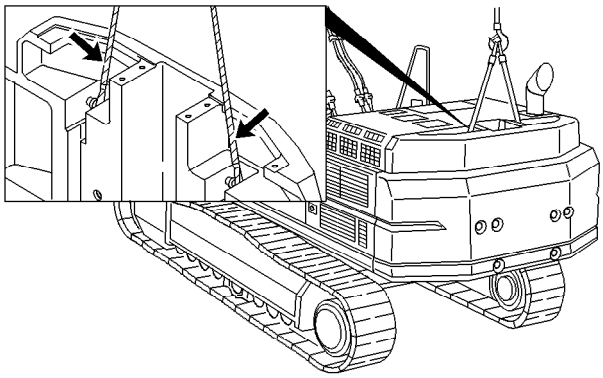


Illustration 269 g00115286

5. Remove six counterweight mounting bolts and six washers.

6. Remove two bolts, two washers and a plate which is located below the counterweight.

7. Lift the counterweight enough so that there is no load on the retaining pins.

8. Separate the counterweight from the machine. Lower the counterweight onto suitable supports.

Counterweight Installation

Perform the removal procedure in reverse order.

Note: Temporarily tighten the six counterweight mounting bolts. Decrease the tension on the lifting cable. Make sure that the counterweight is correctly positioned on the retaining pins. Tighten the bolts to a torque of 2800 ± 350 N·m (2065 ± 258 lb ft).

Machines Equipped with Counterweight Removal System

WARNING

IMPROPER OPERATION OF THE COUNTERWEIGHT REMOVAL SYSTEM CAN RESULT IN SERIOUS INJURY OR DEATH. DO NOT OPERATE THIS SYSTEM UNLESS YOU HAVE READ AND UNDERSTAND THE INSTRUCTIONS AND WARNINGS IN THE OPERATION AND MAINTENANCE MANUAL.

WARNING

Before you remove the counterweight, check for signs of hydraulic oil leaking from the Counterweight Removal System. An oil leak may be a sign of a potential system failure and needs to be corrected before removing the counterweight mounting bolts. A hydraulic leak, along with other factors, can result in personal injury or death.

WARNING

When the removal cylinder is used to lower the counterweight, the counterweight can wedge against the machine frame which stops the downward movement of the counterweight. Since the removal cylinder continues to retract and the counterweight stopped, slack in the chain for the removal cylinder occurs.

The counterweight can suddenly fall due to the slack in the chain which could result in personal injury or death.

Monitor the lowering of the counterweight when the counterweight is being lowered with the removal cylinder. If the removal cylinder is retracted and the downward movement of the counterweight stops, stop the lowering procedure and correct the wedging of the counterweight against the machine frame.

Counterweight Removal

1. Position the upper structure parallel to the tracks.

2. Start the engine. Adjust the engine speed to one-third of full throttle engine speed.

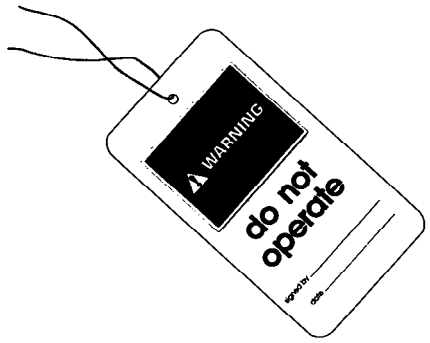


Illustration 270 g00104545

3. Move the lever for the hydraulic lockout control to the LOCKED position. Attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls.

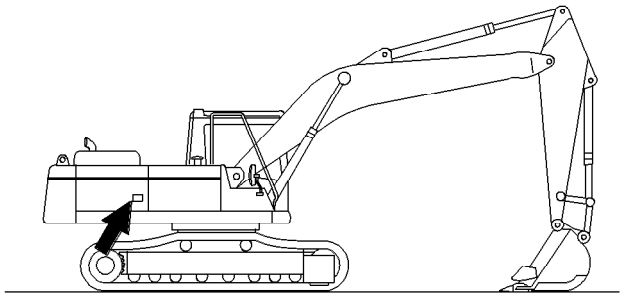


Illustration 271 g00101449

4. Open the rear access door on the right side of the machine.

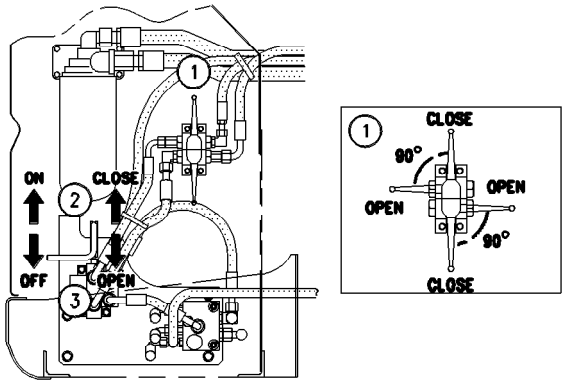


Illustration 272 g00277670

(1) Stop valves. (2) Switch. (3) Control lever.

5. Move switch (1) to the ON position.

6. Move control lever (3) upward in order to relieve the weight on the counterweight mounting bolts. There should be a slight tension on the chains.

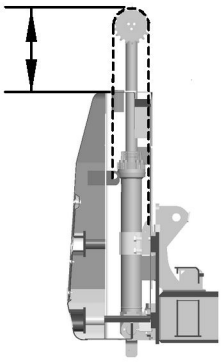


Illustration 273 g06510567

7. There should be a slight tension on the chains. Inspect both chains to verify condition and that the chains are not seized or binding. Monitor chain tension for 5 minutes to verify no leaks and no excessive drift is present indicating service is required before system use. Contact your Cat dealer if service is required.

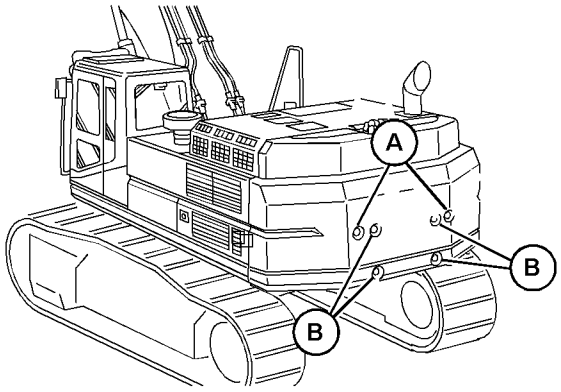


Illustration 274 g06547978

8. Remove bolts (A) from the counterweight.

9. Reinstall bolts (A) and tighten by hand until the bolts are fully engaged.

Note: Do not use tools to reinstall bolts (A).

10. Loosen bolts (A) two full revolutions.

Note: Do not remove bolts (A) from the counterweight.

11. Remove remaining bolts (B).

12. Remove bolts (A) by hand**.**

Note: Do not use tools to remove bolts (A).

Note: If unable to remove bolts (A) by hand, the counterweight removal system may not be appropriately supporting the weight of the counterweight. Adjustment of the linkage, or additional support, may be required to safely remove the final two bolts.

13. Remove two bolts, two washers and a plate that is located below the counterweight.

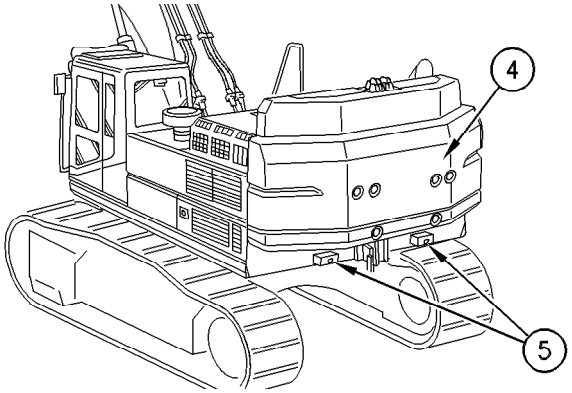


Illustration 275 g00277847

(4) Counterweight. (5) Retaining Pin.

14. Move control lever (3) upward in order to raise the counterweight (4) until access to the retaining pins (5) can be gained.

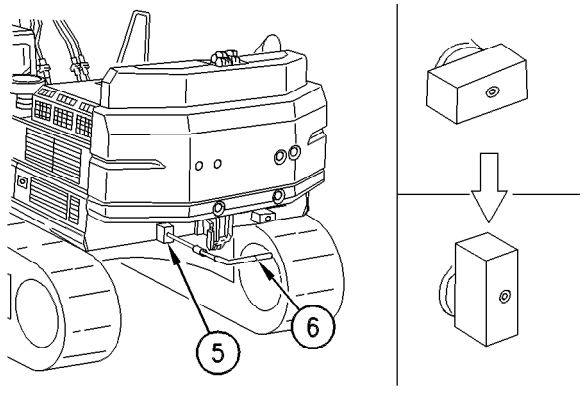


Illustration 276 g00277848

(5) Retaining Pin. (6) Extension.

15. Use a ratchet wrench and an extension (6) in order to rotate each retaining pin (5). Retaining pins (5) require ninety degrees of rotation. The retaining pins (5) are now in the UNLOCKED position.

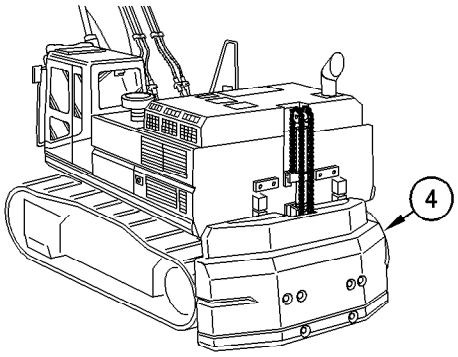


Illustration 277 g00277703

(4) Counterweight.

16. Move control lever (3) downward in order to lower counterweight (4) onto supports on the ground.

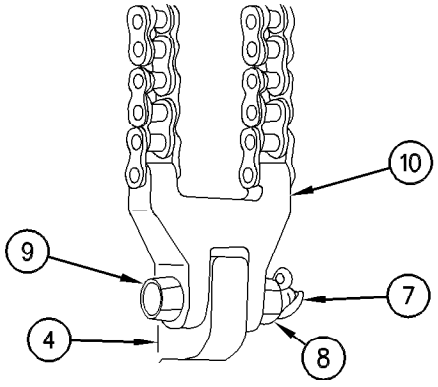


Illustration 278 g00115295

(4) Counterweight. (7) Cotter Pin. (8) Nut. (9) Pin. (10) Chain Bracket.

17. Remove cotter pin (7). Loosen nut (8). Remove pin (9) in order to disconnect chain bracket (10) from counterweight (4).

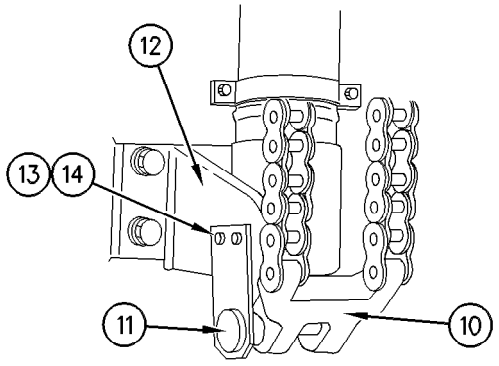


Illustration 279 g00115296

(10) Chain Bracket. (11) Pin.(12) Plate. (13) Bolt. (14) Washer.

18. Pin (11) should be located in one of the storage boxes. Remove pin (11) from the storage box.

19. Install pin (11) into chain bracket (10).

20. Install bolts (13) and washers (14) in order to attach pin (11) to plate (12).

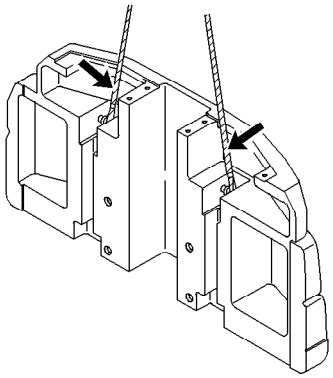


Illustration 280 g00115248

21. Fasten a proper rated cable with shackles to the lifting eyes on the counterweight.

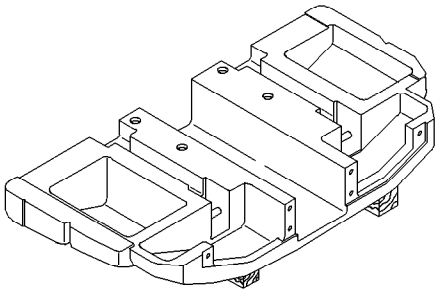


Illustration 281 g00115297

22. Use an appropriate lifting device in order to put the counterweight on suitable supports.

Counterweight Installation

Perform the removal procedure in reverse order.

Note: Before you install the counterweight mounting bolts, make sure that the counterweight is securely held on the retaining pins. There should be a slight amount of slack on the chains.

Tighten the counterweight mounting bolts to a torque of 2800 ± 350 N·m (2065 ± 258 lb ft).

i01953665

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

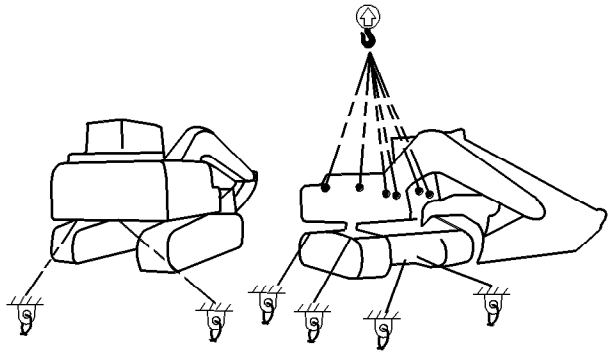


Illustration 282 g00115242

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

The weight and the instructions that are given herein describe the machine as the machine is manufactured by Caterpillar.

Refer to the Operation and Maintenance, “Specifications” for specific weight information.

1. Use proper 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. Use the rear eyes and the front eyes that are provided on the lower frame to fasten tie-downs. Use corner protectors for sharp corners.

4. Move the hydraulic lockout control to the LOCKED position.

Lifting the Machine Segments

Counterweight

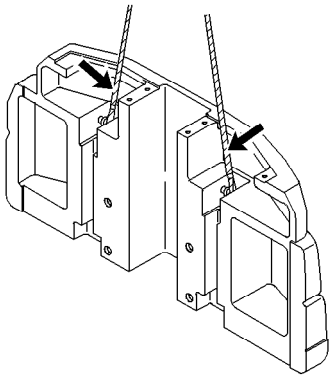


Illustration 283 g00115248

Refer to the Operation and Maintenance, “Counterweight Removal and Installation” for specific information.

Bucket

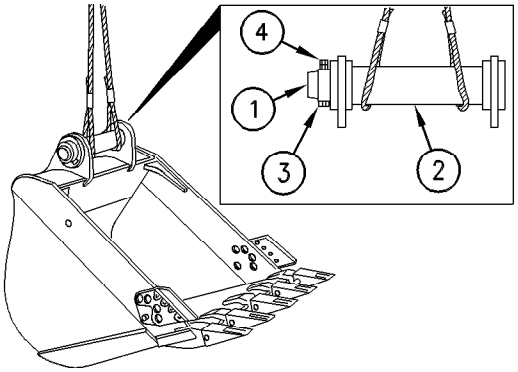


Illustration 284 g00115251

(1) Pin. (2) Sleeve. (3) Bolts. (4) Nuts.

Install pin (1) and install sleeve (2) in the brackets of the bucket. The previous illustration indicates the method to secure pin (1) with bolts (3) and nuts (4). Fasten two proper rated wire cables to pin (1).

Towing Information

i03794657

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.

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 Caterpillar dealer for the equipment that is necessary for towing a disabled machine.

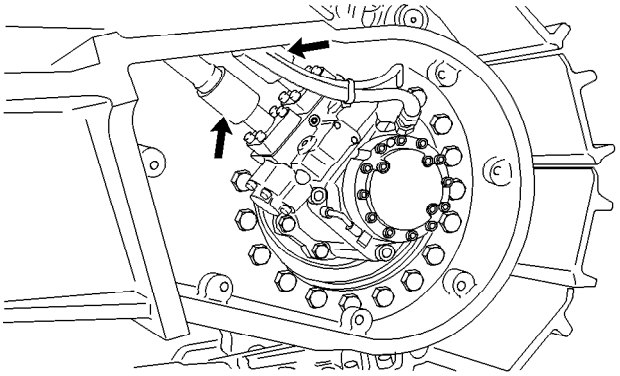


Illustration 285 g00277219

1. Remove the travel drive covers from the base frame.

2. Clean the travel motors, travel brake valves, and nearby areas.

3. Disconnect the hydraulic lines from the brake valve. Plug the disconnected lines.

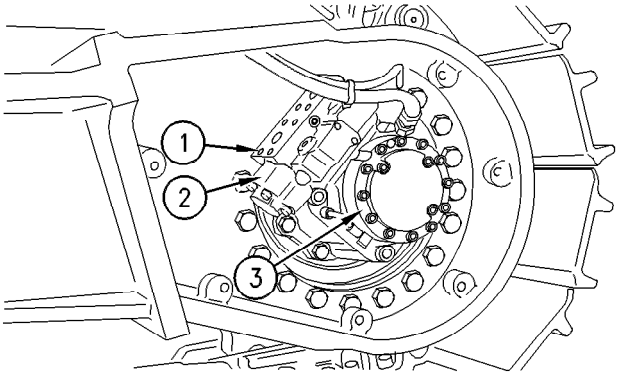


Illustration 286 g00277224

4. Loosen bolts (1). Remove brake valve (2) from travel motor (3).

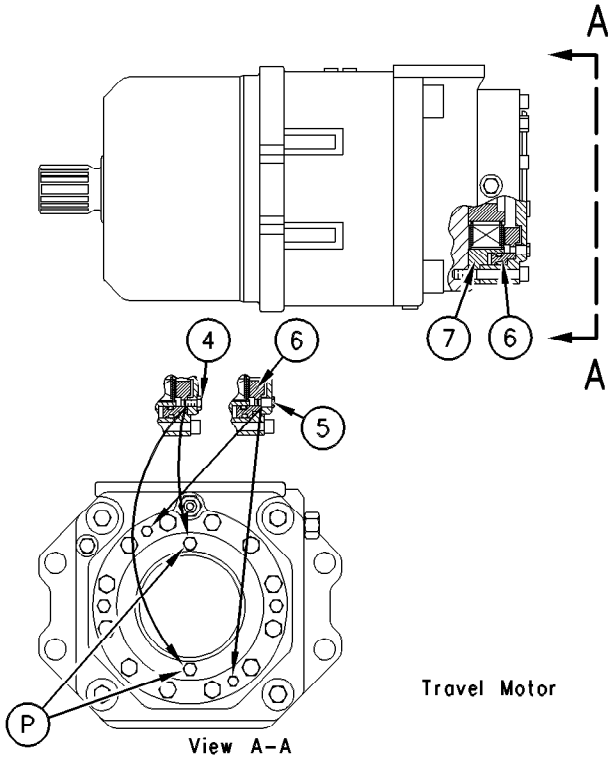


Illustration 287 g00277217

5. Remove two plugs (4).

6. Remove two M16 x 16 bolts (5). Install bolts (5) in two holes (P).

7. Tighten bolts (5). As bolts (5) are tightened, brake piston (6) will move apart from flange (7). This will release the travel motor brake.

⚠ WARNING

Brake valve cover (9) is forced by spring (11). It can fly apart suddenly when the mounting bolts are removed. Take extra care when removing cover (9).

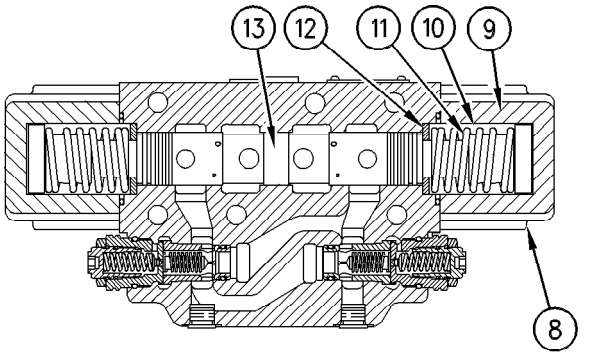


Illustration 288 g00579009

8. Remove bolts (8) in order to remove cover (9) of brake valve (2). To remove bolts (8), remove the two bolts that are separated by 180 degrees. Install two replacement M12 bolts in the removed bolt holes. Tighten the bolts.

9. Remove the remaining two bolts (8). Slowly remove the replacement M12 bolts.

10. Remove bushing (10), spring (11), washer (12) and spool (13) from the brake valve.

11. Install cover (9) to the valve body. Tighten bolts (8).

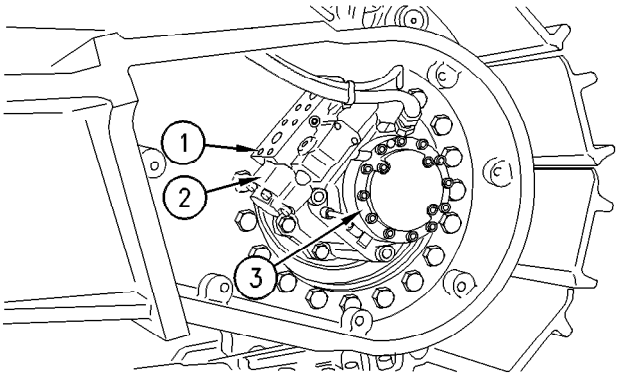


Illustration 289 g00277224

12. Install brake valve (2) to motor (3) with bolts (1). Reconnect the two lines to brake valve (2).

13. Repeat Steps 1 through 12 for the other travel motor.

Note: The parking brake has now been released. The machine is ready for towing.

14. After the machine has been towed, return the brake and the brake valve to the original condition. Verify that the brake and the brake valve activate correctly.

Table 20

Item Number	Part	Recommended Torque	
		N·m	lb ft
(1)	Bolt	100 ± 20	74 ± 10
(8)			

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.

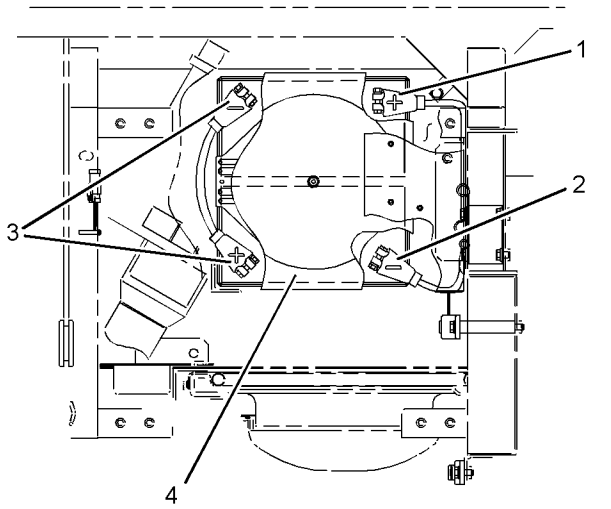


Illustration 290 g01226420

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.

Maintenance Section

Lubricant Viscosities and Refill Capacities

i07279193

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 21

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 22

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 23

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 23, 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 24

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 25

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 25, 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 26

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.

i01984063

Table 27

Approximate Refill Capacities				
Component or System	**Liters**	**US gal**	**Imp gal**	**Recommended Type**
Cooling System	73	19	16	Caterpillar Extended Life Coolant (ELC)
Coolant Reservoir	4.5	1.2	1.0	Caterpillar Extended life Coolant (ELC)
Fuel Tank	600	156	132	No. 1 Diesel Fuel or No. 2 Diesel Fuel
Engine Crankcase with Filter	30	7.8	6.6	API CG-4 Diesel Engine Oil (DEO) or API CF-4 Diesel Engine Oil (DEO)
Hydraulic System(1)	370	96	81	Caterpillar HYDO or Caterpillar HEES
Each Swing Drive	11	2.9	2.4	Caterpillar TDTO
Each Final Drive	15	3.9	3.3	Caterpillar TDTO
Swing Gear	41.6	11	9	Multipurpose Lithium Grease NLGI Grade 2

(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

i07746333

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

2. If equipped, turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

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

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure to reduce the possibility of damage to the following components:

- Bearings of the drive train
- Hydraulic components
- Electrical components
- Other components of the machine

4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.

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

i08110823

Maintenance Interval Schedule

SMCS Code: 7000

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

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

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

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

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 50 Service Hours or Weekly

Every 100 Service Hours of Continuous Hammer Use

Initial 250 Service Hours

Every 250 Service Hours

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 4000 Service Hours or 2 Years

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i00910226

Adjustable Gage Undercarriage Frame - Lubricate
(If Equipped)

SMCS Code: 4150-086-AE

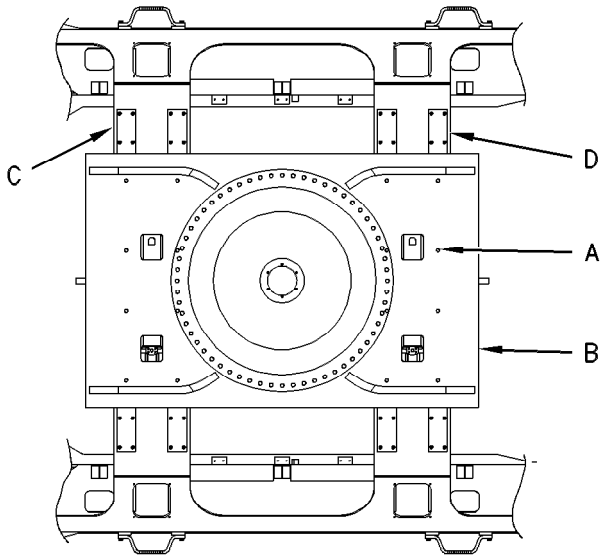


Illustration 291 g00464474

(A) Fittings
(B) Carbody
(C) Left track
(D) Right track

The top and the bottom of carbody (B) has sixteen lubrication grease points.

1. Apply lubricant through fittings (A) on the top and the bottom of the carbody.

i01546851

Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/ Replace

SMCS Code: 1054-510-A/C; 1054-040-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.

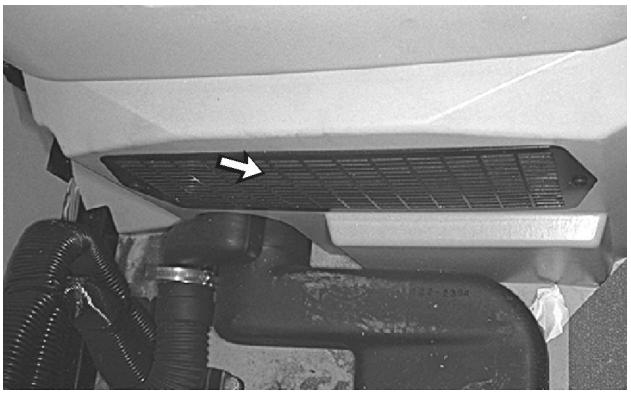


Illustration 292 g00275522

The air conditioner filter is located on the lower left side of the cab behind the seat.

1. Slide the operator seat forward.

2. Loosen the bolts and remove the cover.

3. Slide the filter element outward.

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.

6. Install the filter element and the cover.

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.

i07746330

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: 1401-040; 1401; 1401-510; 1401-561; 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.

i01955418

Belts - Inspect/Adjust/Replace

SMCS Code: 1356; 1357; 1357-040; 1357-510; 1357-025; 1358-025; 1358-510; 1359-510; 1359-040; 1359-025; 1359-510-BE; 1359-025-BE; 1359-040-BE; 1361-025; 1361-025-BE; 1361-040-BE; 1361-510; 1361-040; 1361-510-BE; 1397-025; 1397-040; 1397-510; 1405-040; 1405-025-BE; 1405-036; 1405-510-BE; 1405-510; 1405-025; 1405-040-BE; 1802-025; 1802-510

Your engine can be equipped with the following belts:

- Alternator belt
- 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.

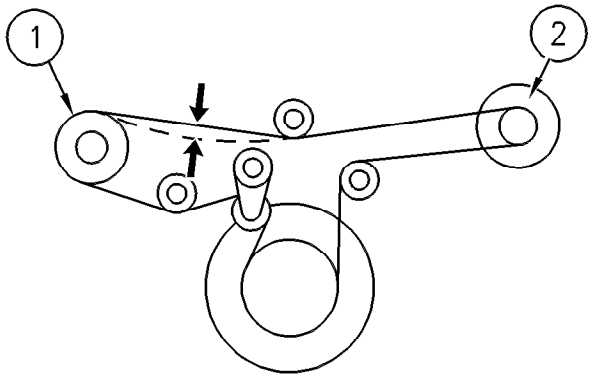


Illustration 293 g00464178

(1) Air conditioner compressor
(2) Alternator

To check the belt tension, apply 110 N (25 lb)of force midway between the pulleys. Correctly adjusted belts will deflect 14 to 20 mm (9/16 to 13/16 inch).

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.

Alternator Belt and Air Conditioner Belt

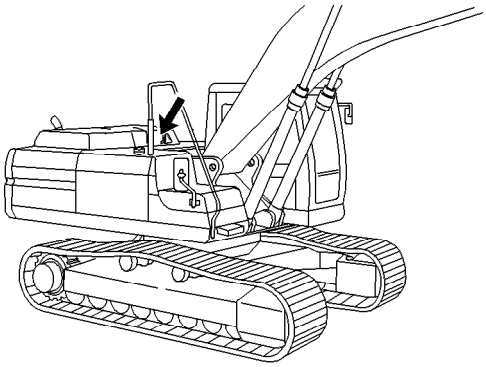


Illustration 294 g00278210

Unlatch the engine hood and raise the engine hood.

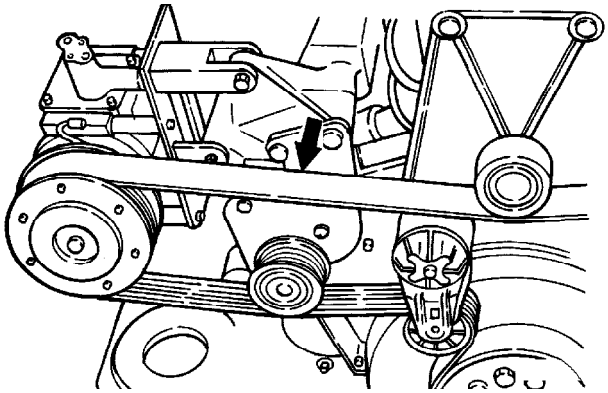


Illustration 295 g00354002

Note: For maximum engine performance and maximum utilization of your engine, inspect the belts for wear and for cracking. Check the belt tension. If the belt tension is too loose, the battery may not charge correctly. Insufficient belt tension may cause wear. If the belt tension is too tight, bearing damage or belt damage may occur.

Note: To check the belt tension, apply 110 N (25 lb) of force midway between the pulleys. Correctly adjusted belts will deflect 13 to 19 mm (1/2 to 3/4 inch).

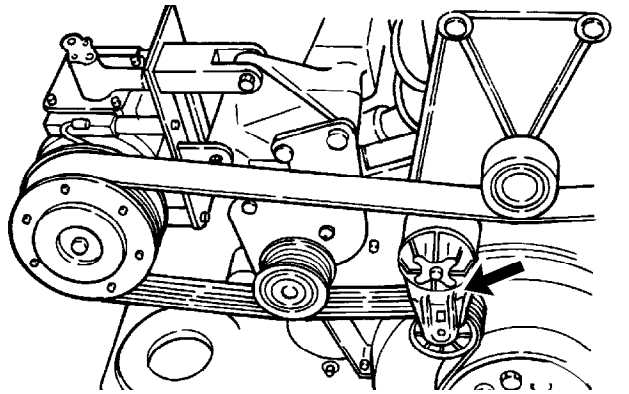


Illustration 296 g00354004

The 345B and 345B L Excavators are equipped with a belt tightener that automatically adjusts the belt to the correct position.

The following belts must be replaced:

- Worn belts
- Damaged belts
- Belts that cannot be adjusted to the correct tension

Close the engine hood and latch the engine hood.

i03865131

Boom Base Pins - Lubricate

SMCS Code: 6501-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

When the boom pin is replaced, lubricate the new boom pin.

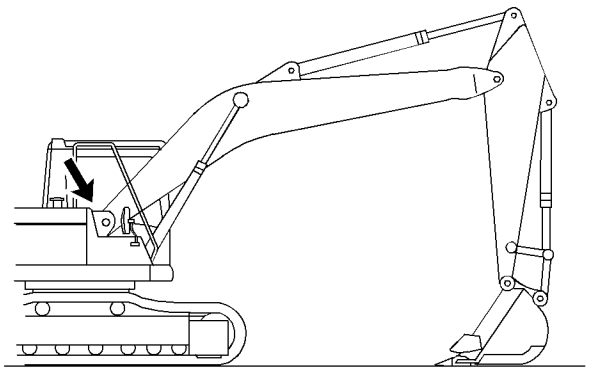


Illustration 297 g02108998

1. Park the machine on a level surface and lower the bucket to the ground.

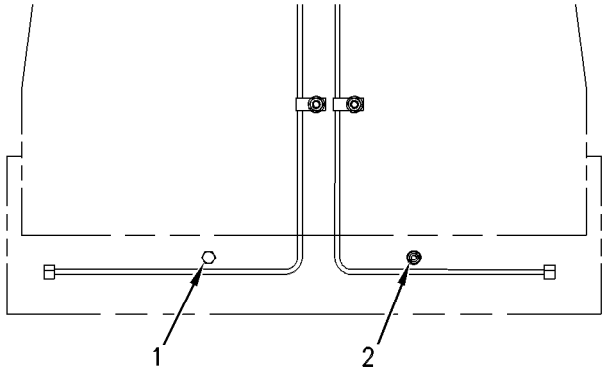


Illustration 298 g00537172

Typical example

(1) Vent plug
(2) Fitting

Note: Vent plug (1) and fitting (2) are on the base of the boom.

2. Remove vent plug (1).

3. Apply lubricant through fitting (2) until lubricant comes out of the plug hole.

4. Install vent plug (1).

i02288188

Boom and Stick Linkage - Lubricate

SMCS Code: 6501-086; 6502-086

S/N: 2NW1–Up

Note: For some applications of the machine, the repeated duty cycle of the front linkage may only require small angular movements of the boom or stick. There might not be enough angular motion in order to distribute the grease between the pin and the bearing. The operator should operate the boom, the stick and the work tool in order to distribute the grease within the joint assemblies.

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.

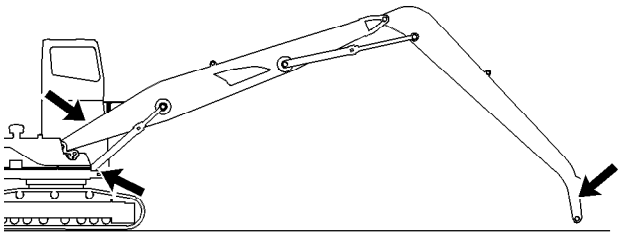


Illustration 299 g00441780

Wipe all fittings before you apply lubricant.

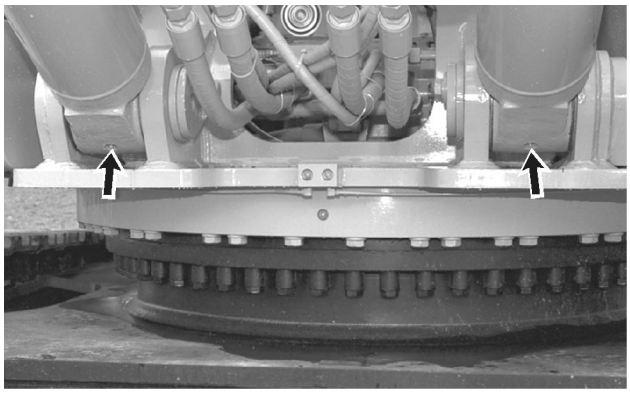


Illustration 300 g00470094

1. Apply lubricant through the fitting at the base of each boom cylinder.

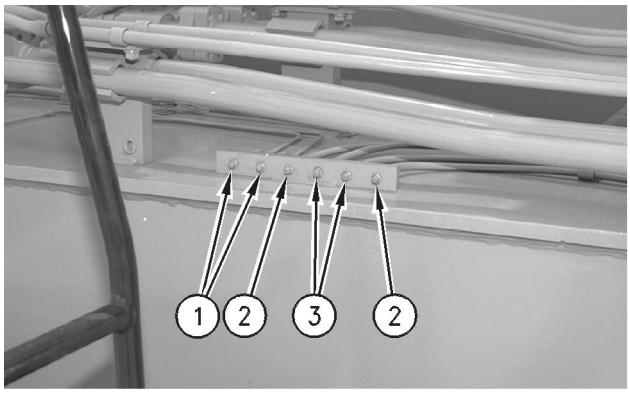


Illustration 301 g00459145

2. The fittings are at the base of the boom. To lubricate the lower boom bearings, apply lubricant through fittings (1). To lubricate the boom cylinder rod, apply lubricant through fittings (2). To lubricate the stick cylinder head, apply lubricant through fittings (3).

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) and (2). Apply lubricant first when the boom is raised and any work tool is suspended. Then apply lubricant when the boom is lowered and the work tool is rested on the ground with a slight downward pressure.

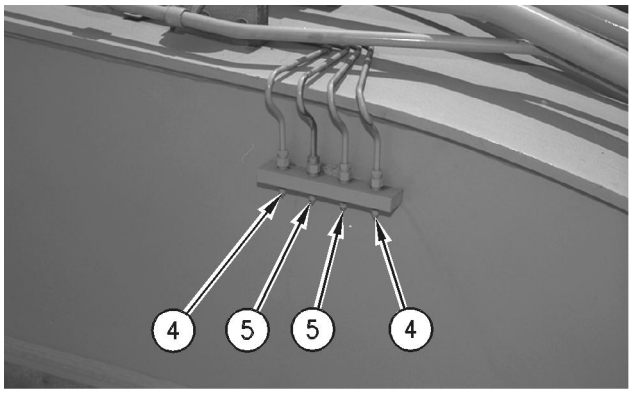


Illustration 302 g00459144

3. The fittings are located at the end of the stick. Apply lubricant through fittings (5) in order to lubricate the connection point of the boom and the stick. Apply lubricant through fittings (4) in order to lubricate the rod end of the stick cylinder.

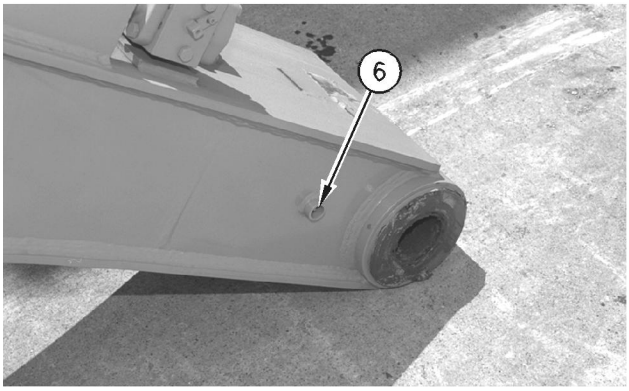


Illustration 303 g00459146

4. This fitting is located at the end of the stick. Apply lubricant through fitting (6) in order to lubricate the connection point between the stick and the work tool.

i03865613

Boom, Stick and Bucket Linkage - Lubricate

SMCS Code: 6501-086; 6502-086; 6513-086

S/N: 4SS1–Up

S/N: 9GS1–Up

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom, stick, and bucket linkage. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on molybdenum grease.

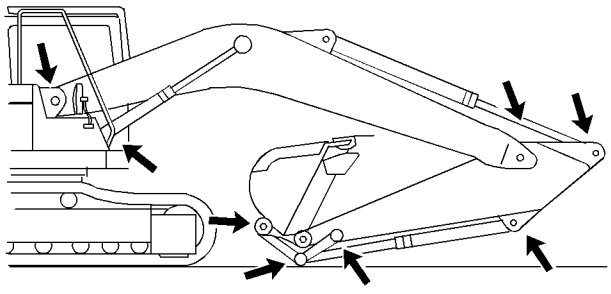


Illustration 304 g02109428

Wipe all fittings before you apply lubricant.

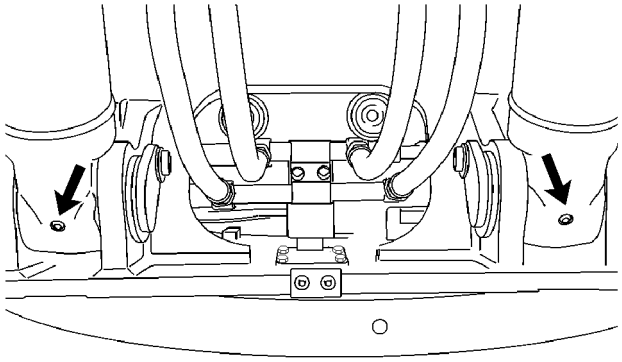


Illustration 305 g01122104

1. Apply lubricant through the fitting at the base of each boom cylinder.

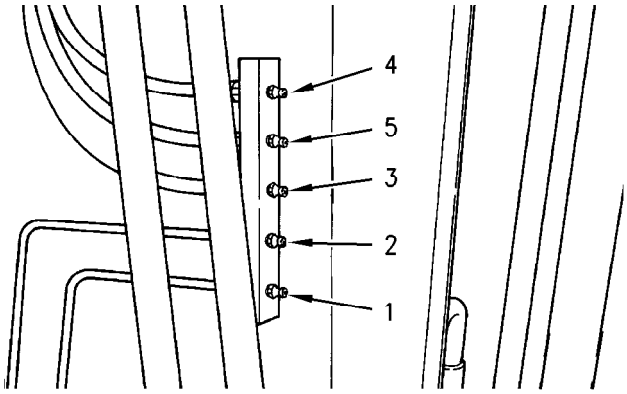


Illustration 306 g00685798

2. The fittings are at the base of the boom. The fittings can be serviced from the platform on the storage box. To lubricate the lower boom bearings, apply lubricant through fittings (1) and (2). To lubricate the boom cylinder rod, apply lubricant through fittings (3) and (4). To lubricate the stick cylinder head, apply lubricant through fitting (5).

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 work tool is suspended. Then apply lubricant when the boom is lowered and the work tool is rested on the ground with a slight downward pressure.

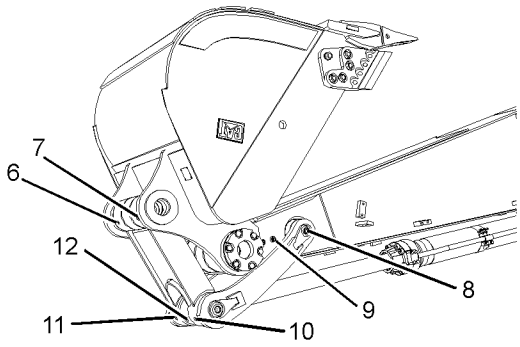


Illustration 307 g01396856

3. Apply lubricant through fittings (6) and (7). These fittings are on the bucket.

4. Apply lubricant through fittings (8) and (9). These fittings are on the stick.

5. Apply lubricant through fittings (10), (11), and (12). These fittings are on the link.

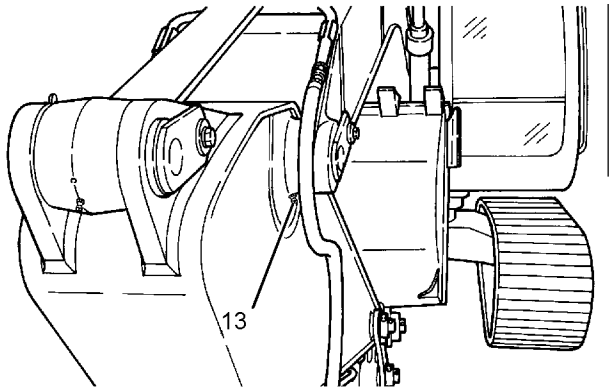


Illustration 308 g01122102

6. Apply lubricant through fitting (13). Fitting (13) is at the connection point of the boom and of the stick.

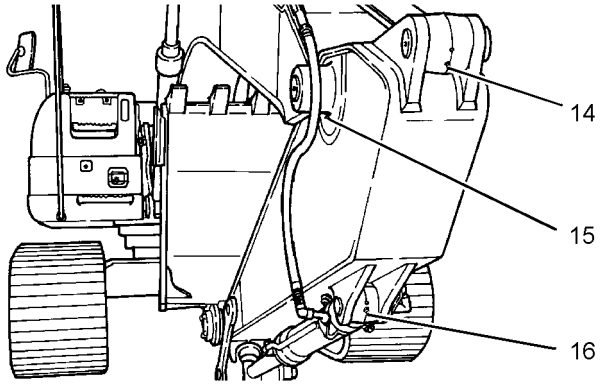


Illustration 309 g01122103

7. Apply lubricant through fitting (14) on the stick cylinder rod. Apply lubricant through fitting (15). Fitting (15) is at the connection point of the boom and of the stick. Apply lubricant through fitting (16) on the bucket cylinder head end.

Grease Block on the Stick

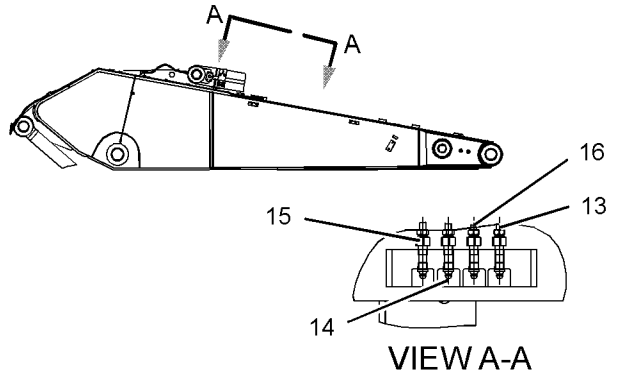


Illustration 310 g01396894

(13) Left side connection point of boom and stick
(14) Stick cylinder rod
(15) Right side connection point of boom and stick
(16) Bucket cylinder head end

Some machines may be equipped with a grease block that is located on the stick. Apply lubricant through the fittings.

i03902571

Bucket Linkage - Inspect/ Adjust

SMCS Code: 6513-025; 6513-040

S/N: 4SS1–Up

S/N: 9GS1–Up

⚠ 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.

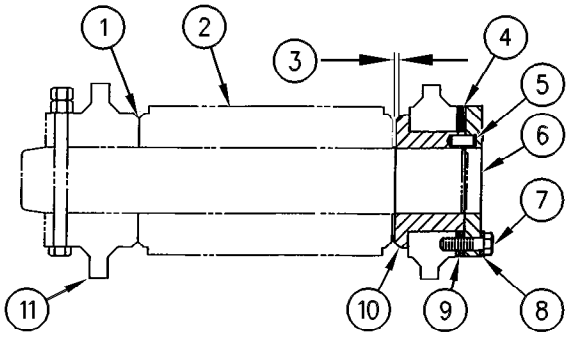


Illustration 311 g00101687

(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 (0.02 to 0.04 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).

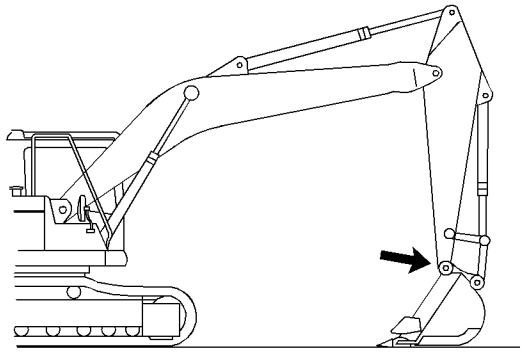


Illustration 312 g02109636

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. Move the hydraulic lockout control to the LOCKED position. 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.

i03574842

Bucket Tips - Inspect/Replace

SMCS Code: 6805-510; 6805-040

S/N: 4SS1–Up

S/N: 9GS1–Up

⚠ 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

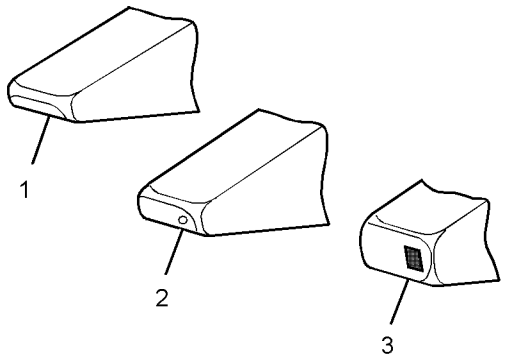


Illustration 313 g01577934

(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.

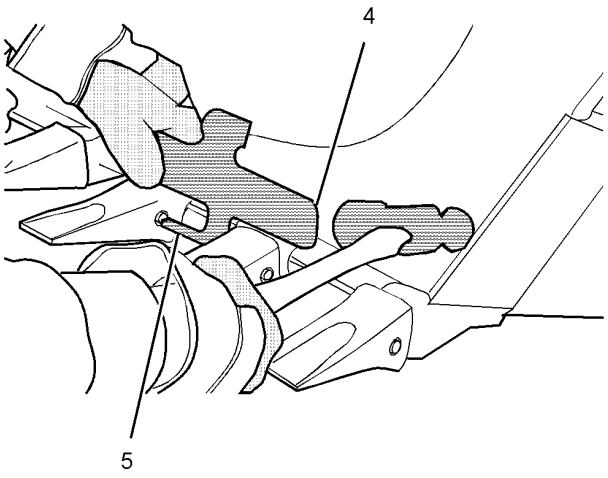


Illustration 314 g01577993

(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.

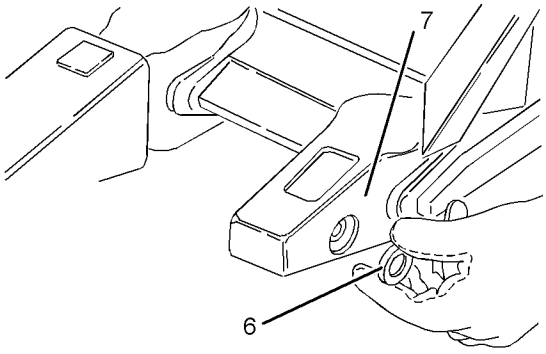


Illustration 315 g01577913

(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.

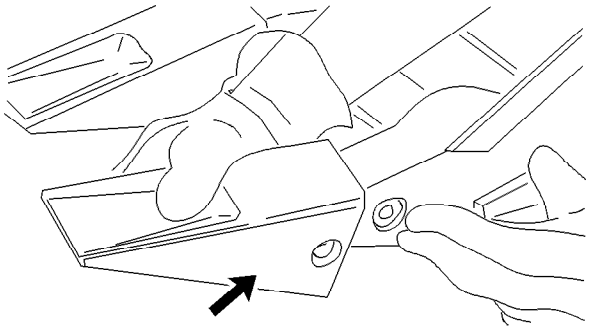


Illustration 316 g00101359

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.

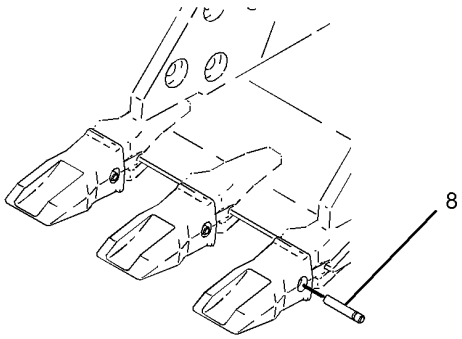


Illustration 317 g01578233

(8) Pin

a. Insert pin (8) through the bucket tip.

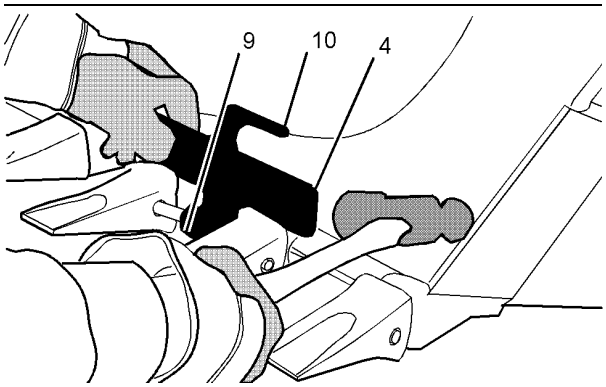


Illustration 318 g01578342

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.

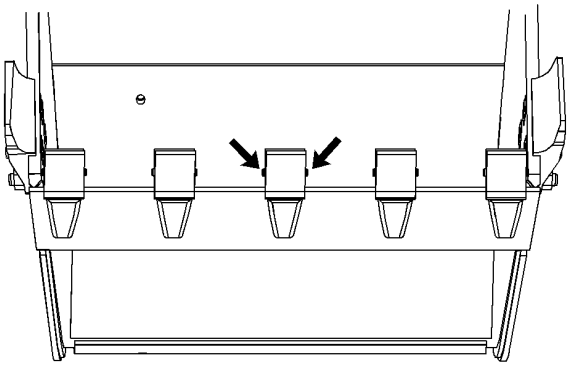


Illustration 319 g01209159

Final assembly of pin into bucket tip

e. Strike the end of the tool until the pin is fully inserted.

Side Cutters

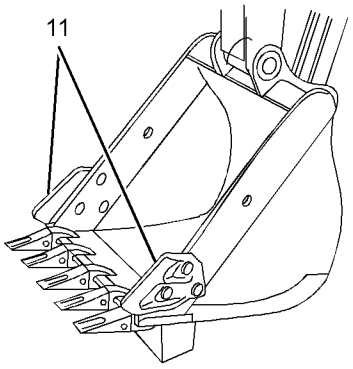


Illustration 320 g01579693

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.

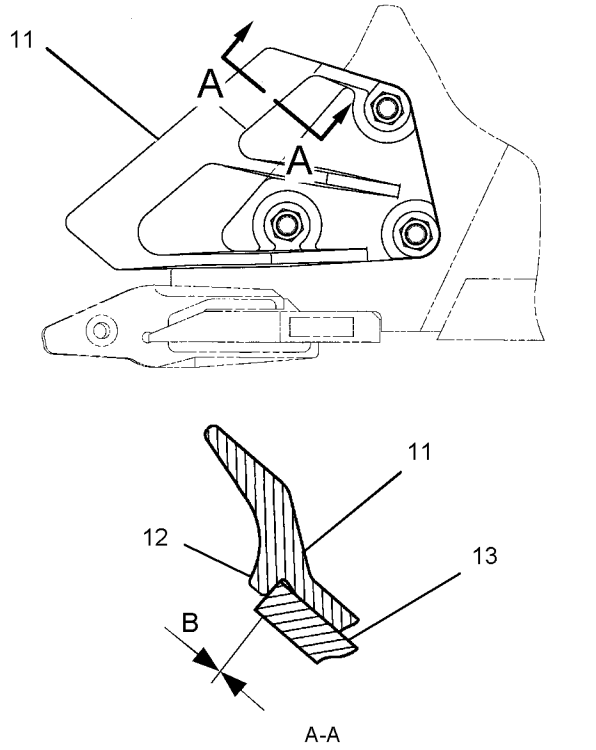


Illustration 321 g01579713

(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.

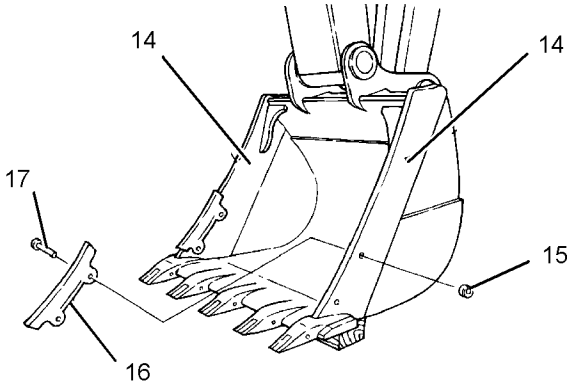


Illustration 322 g01592996

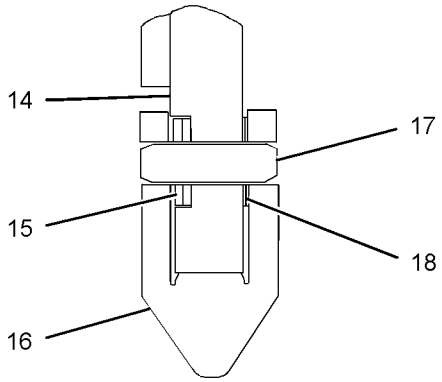


Illustration 323 g01903678

(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.

i01546947

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-070; 7342-510

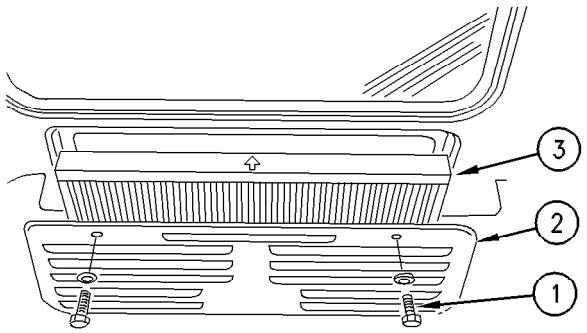


Illustration 324 g00102781

The cab air filter is behind the cab.

1. Loosen two bolts (1) and remove filter cover (2) and air filter (3).

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 and the filter cover.

Note: Make sure that the arrow on top of the air filter is facing forward.

i00143074

Circuit Breakers - Reset

SMCS Code: 1420-529

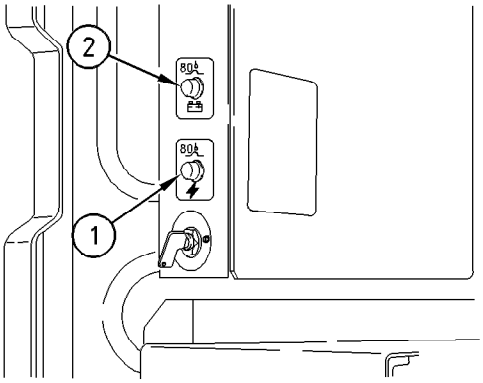


Illustration 325 g00115221

The circuit breakers are inside the access door on the front left of the machine.

Alternator Circuit (1) – 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.

Main Circuit (2) – This circuit breaker is designed to protect the wires between the batteries and the fuses. If the wires are shorted to the machine's body, this circuit breaker would minimize the damage to the wires.

Both circuit breakers have 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.

i01041005

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

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

Repair the fins if found defective.

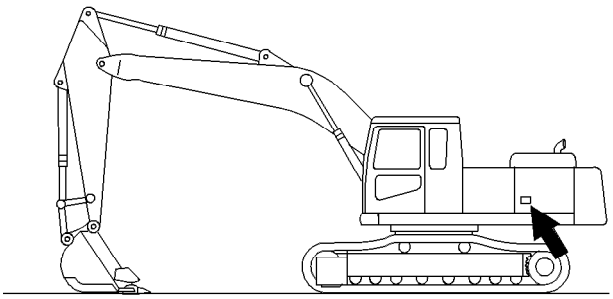


Illustration 326 g00102191

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

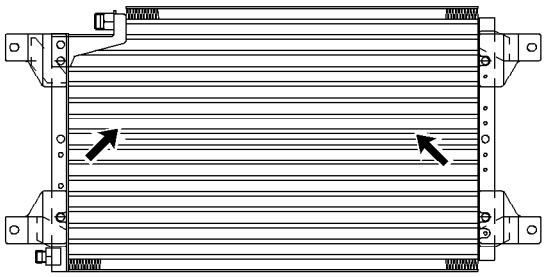


Illustration 327 g00537515
Typical example

2. Inspect the condenser for debris. Clean the condenser, if necessary.

3. Use clean water to wash off all dust and dirt from the condenser.

4. Close the access door.

i02425978

Cooling System Coolant Sample (Level 1) - Obtain

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

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

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

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

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

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

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

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

Dispose of all fluids according to local regulations and mandates.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. The recommended sampling interval for Level 1 Coolant Analysis is every 250 service hours. 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.

- 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.

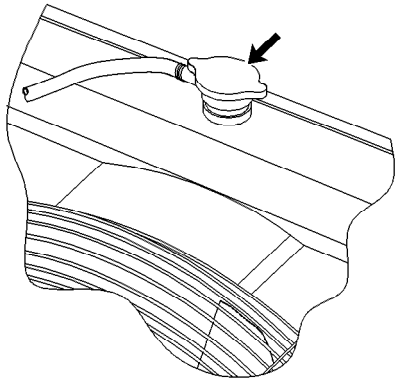


Illustration 328 g00544510

⚠ WARNING

Pressurized System: Hot coolant can cause serious burns. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure.

1. The machine needs to be operated in order to circulate the coolant. Collect the sample after a normal workday. Collect the samples from one to two hours after the engine has been shut off.
2. Start the engine momentarily in order to circulate the coolant again.
3. Shut off the engine.
4. Carefully remove the radiator cap.
5. Use a vacuum pump and draw the sample. Do not allow dirt or other contaminants to enter the sampling bottle. Fill the sampling bottle three-fourths from the top. Do not fill the bottle completely.
6. Place the sampling bottle with the completed label into the mailing tube.
7. Install the radiator cap.

i07349178

Cooling System Coolant Sample (Level 2) - Obtain

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

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

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

Submit the sample for Level 2 analysis.

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

i02014186

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”.

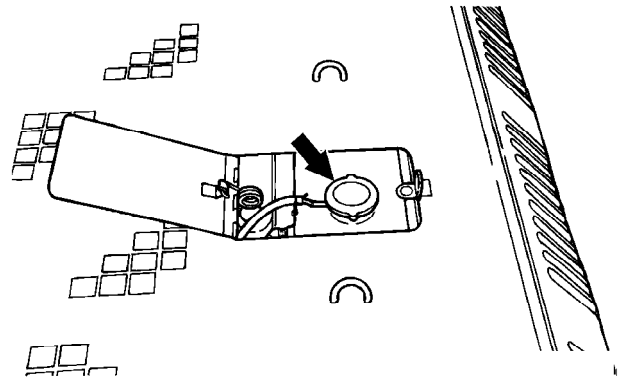


Illustration 329 g00694095

1. Open the radiator cap access cover.

2. Loosen the radiator cap slowly in order to release pressure. Remove the radiator cap.

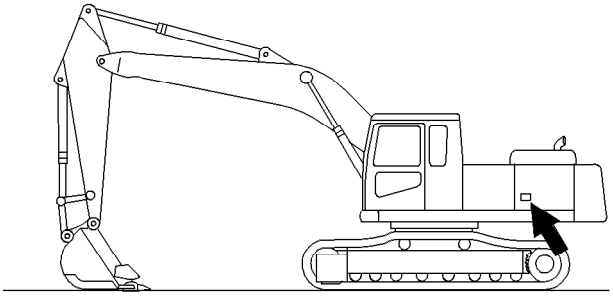


Illustration 330 g00101813

3. Open the radiator access door.

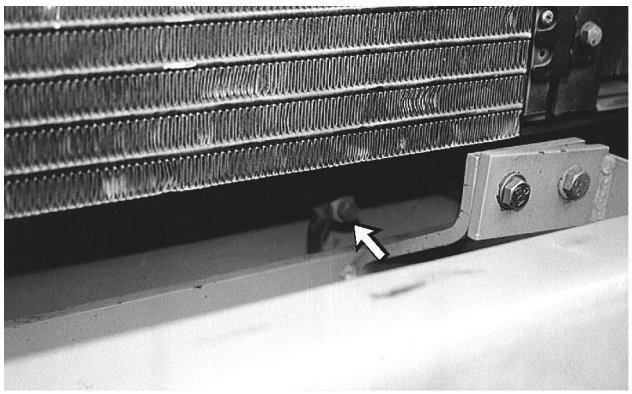


Illustration 331 g00115225

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

4. Open the drain valve and allow the coolant to drain into a suitable container. The drain valve is under the radiator.

Note: Dispose of drained fluids according to local regulations.

5. Flush the cooling system with clean water until the draining water is clean.

6. Close the drain valve.

7. Add the Extended Life Coolant. See Operation and Maintenance Manual, “Capacities (Refill)”.

8. Start the engine. Operate the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.

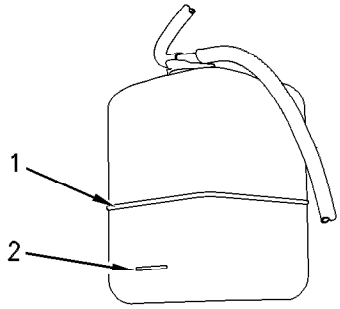


Illustration 332 g00545226

(1) “FULL”
(2) “LOW”

9. Check the coolant reservoir. Maintain the coolant level between the “FULL” mark and the “LOW” mark.

10. Install the radiator cap.

11. Stop the engine.

12. Close the radiator access door.

i02014215

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

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.

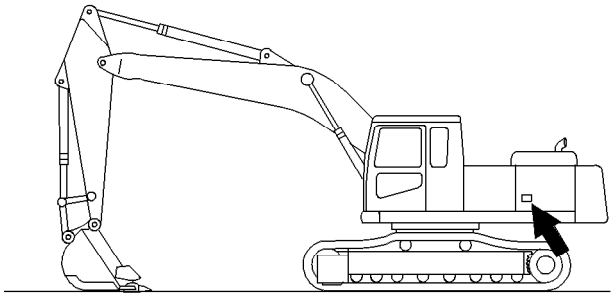


Illustration 333 g00101813

1. Open the radiator access door.

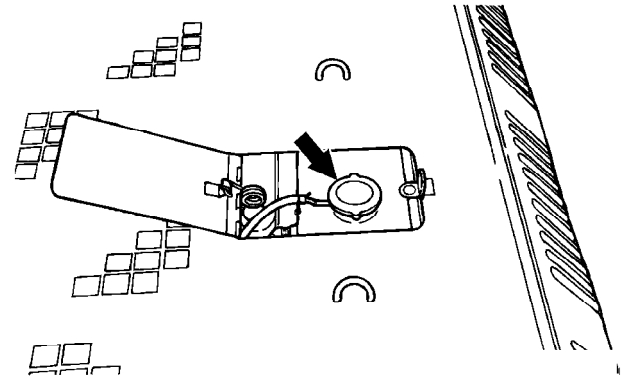


Illustration 334 g00694095

2. Open the radiator cap access cover.

3. Loosen the radiator cap slowly in order to relieve pressure. Remove the radiator cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

4. It may be necessary to drain some coolant from the radiator so that Extender can be added to the cooling system.

Note: Dispose of drained fluids according to local regulations.

5. Add 1.7 L (24 oz) of Extender to the cooling system.

6. Replace the radiator cap if the cap gasket is damaged. Install the radiator cap.

i08129124

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.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system. See the Special Publication, SEBU6250, “Coolant Recommendations” for all cooling system requirements.

Use a coolant conditioner test kit to check the concentration of the coolant.

NOTICE
Use only Caterpillar products or commercial products that have passed Caterpillar EC-1 specification for pre-mixed or concentrated coolants.

Use only Caterpillar Extender with Extended Life Coolant.

Mixing Extended Life Coolant with other products reduces the Extended Life Coolant service life. Failure to follow the recommendations can reduce cooling system components life unless appropriate corrective action is performed.

Note: Refer to Special Publication, SEBU6250, “Extended Life Coolant (ELC)” for instructions regarding contamination of the ELC Cooling System.

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

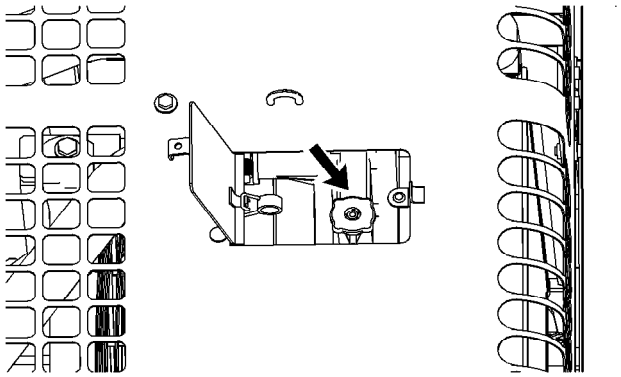


Illustration 335 g01098735

2. Open the radiator cap access cover.

3. Loosen the radiator cap slowly to relieve pressure. Remove the radiator cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

4. It may be necessary to drain some coolant from the radiator so that Extender can be added to the cooling system.

Note: Dispose of drained fluids according to local regulations.

5. Add 0.7 L (24 oz) of Extender to the cooling system.

6. Replace the radiator cap if the cap gasket is damaged. Install the radiator cap.

7. Close the access door.

i02586603

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 access doors on the left side of the machine.

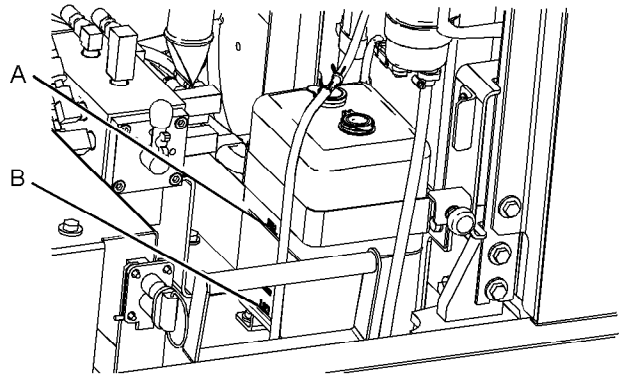


Illustration 336 g01101505

2. Maintain the coolant level between the marks on the coolant reservoir.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

3. If additional coolant is necessary, remove the coolant filler cap and add the appropriate coolant mixture. Install the filler cap.

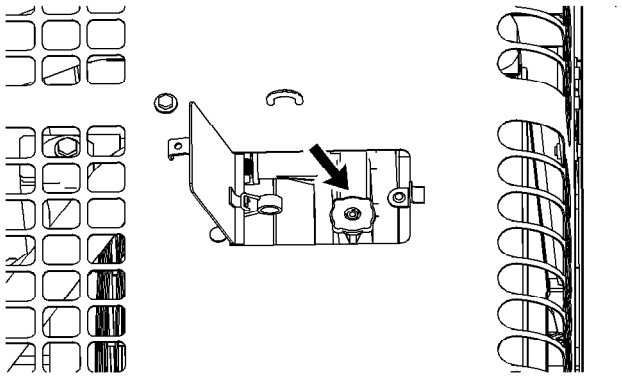


Illustration 337 g01098735

4. If the coolant reservoir is empty, open the radiator cap access cover.

5. Slowly loosen the cooling system pressure cap. Add coolant to the radiator.

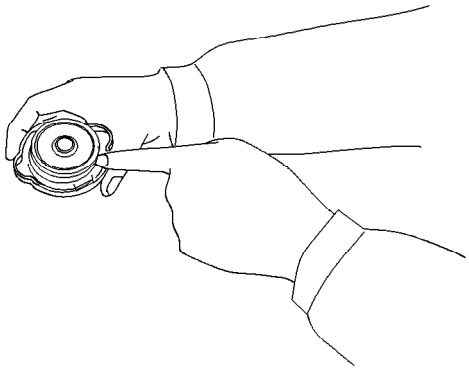


Illustration 338 g00102170

6. Inspect the condition of the cap gasket. Replace the cap gasket, if necessary.

7. Install the cooling system pressure cap.

8. Inspect the radiator core for debris and clean the radiator core, if necessary. Refer to Operation and Maintenance, “Radiator Core - Clean” for more information on cleaning the radiator core.

i00560630

Cooling System Hoses - Inspect

SMCS Code: 1380-040

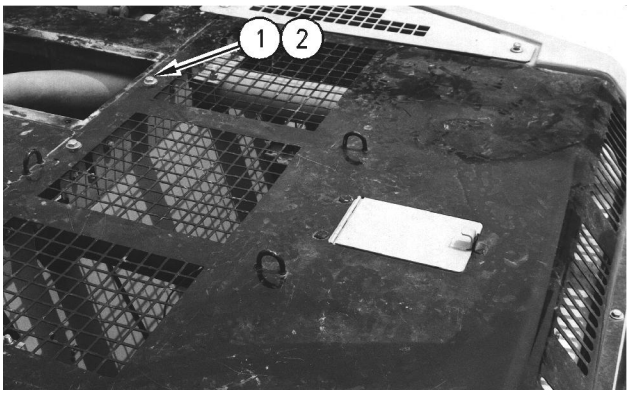


Illustration 339 g00278252

(1) Bolts. (2) Washers.

1. Remove six bolts (1) and washers (2). Remove the engine hood.

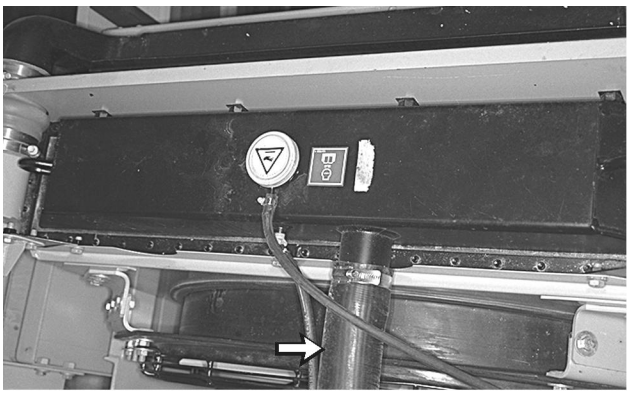


Illustration 340 g00115386

2. Inspect all hoses for leaks due to cracking, for softness next to the clamps, and for loose clamps.

3. Replace hoses that are cracked or soft and tighten any loose clamps.

Replace the Hoses

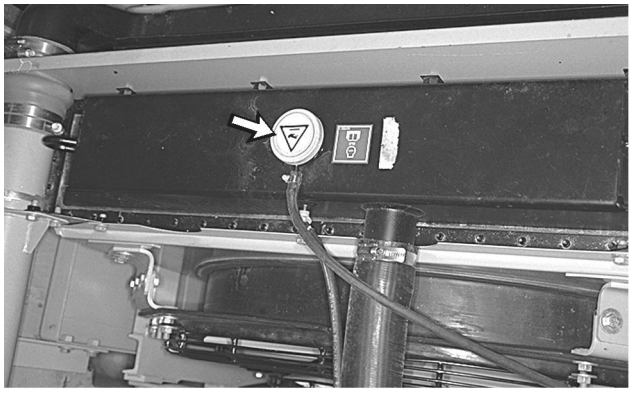


Illustration 341 g00115407

1. Loosen the radiator cap slowly in order to relieve any pressure. Remove the radiator cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

2. Drain the coolant from the cooling system to a level that is below the hose that is being replaced.

Note: Dispose of drained fluids according to local regulations.

3. Loosen the hose clamps and disconnect the damaged hose. Replace the damaged hose with a new hose.

4. Add coolant until the level is between the marks on the coolant reservoir.

i03481843

Counterweight Removal Chain - Inspect
(If Equipped)

SMCS Code: 7056-040-CX

⚠ WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. Inspect the chain.

2. Make sure that the chain is properly lubricated.

3. Make sure that the chain is free of defects, rust, or foreign contaminants.

i03591653

Counterweight Removal Chain - Clean
(If Equipped)

SMCS Code: 7056-070-CX

⚠ WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. If necessary, remove the entire chain assembly in order to properly clean the chain assembly of rust and foreign contaminants.

2. Clean the chain assembly with a clean, nonflammable solvent and a wire brush.

3. Allow the chain assembly to dry. Lubricate the counterweight removal chain. Refer to Operation and Maintenance Manual, “Counterweight Removal Chain - Lubricate” for the proper procedure.

4. If the chain assembly was removed, install the chain assembly.

Note: Always clean the chain of rust and foreign contaminants.

i03591620

Counterweight Removal Chain - Lubricate
(If Equipped)

SMCS Code: 7056-086-CX

⚠ WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. Inspect the chain.

2. Remove any foreign material and rust from the chain.

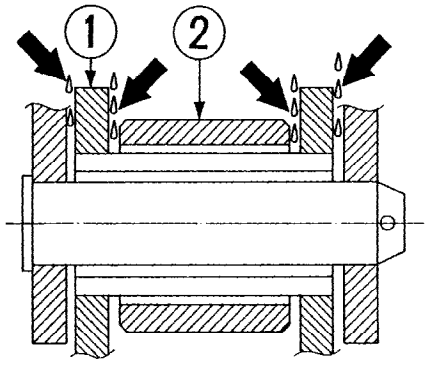


Illustration 342 g00115489

(1) Link plate edge. (2) Roller.

3. Lubricate the surfaces between each link plate edge (1) and roller (2) with SAE 30 engine oil.

Note: Always lubricate the chain during removal of the counterweight, after the counterweight is lowered to the blocks on the ground.

i02354405

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-510; 1054-070

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

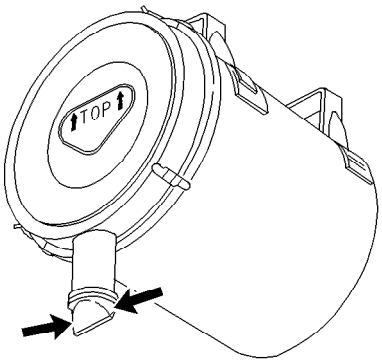


Illustration 343 g00537958

2. Squeeze the outlet tube slightly into a container in order to purge the dirt from the outlet tube.

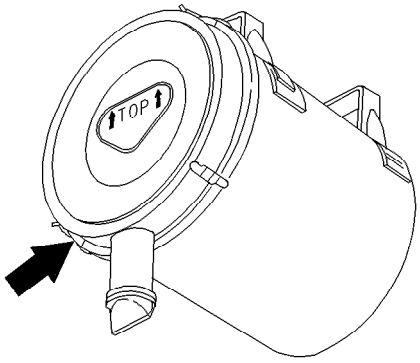


Illustration 344 g00101413

3. Loosen the 6 cover latches and remove the air cleaner cover.

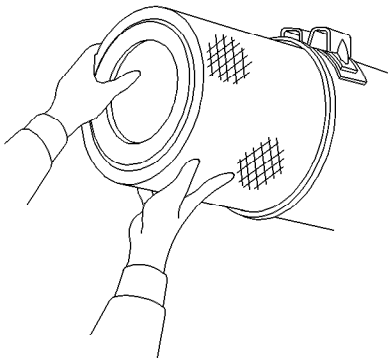


Illustration 345 g00101415

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. Inspect the primary filter. If the primary filter element is not damaged, you can clean the primary element.

Refer to “Cleaning Primary Air Filter Elements”.

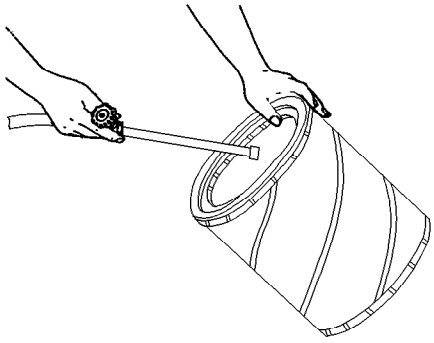


Illustration 346 g00102884

8. Direct air along the pleats inside the primary filter element and outside the primary filter element.

9. Inspect the primary filter element after cleaning. Do not use a primary filter element with damaged pleats, damaged gaskets or damaged seals.

10. Encase the clean primary filter element and store the clean primary filter element in a clean, dry place.

11. Install the clean primary filter.

12. Install the air cleaner cover and close the latches securely.

13. 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.

Note: The primary filter can be cleaned up to six times. Replace the primary filter if the primary filter has been used for one year.

Cleaning Primary Air Filter Elements

NOTICE
Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times if the element is properly cleaned and if the element is properly inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE
Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean 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).

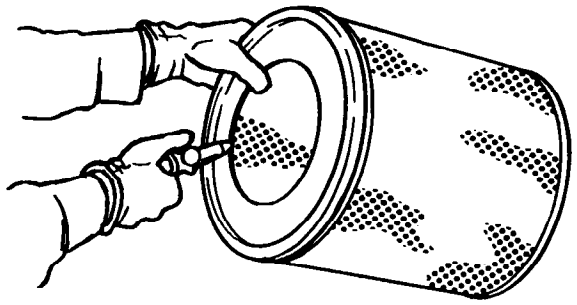


Illustration 347 g00281692

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

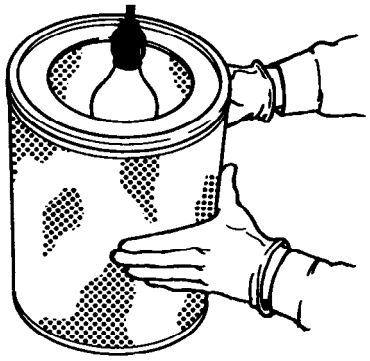


Illustration 348 g00281693

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.

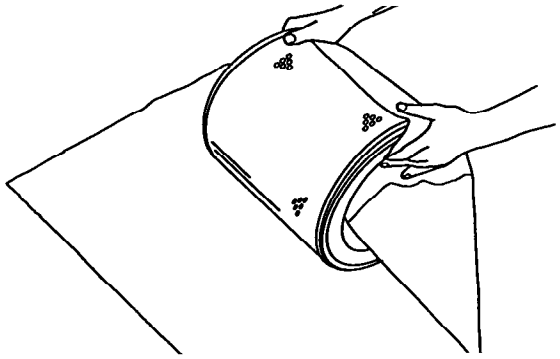


Illustration 349 g00281694

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

i00702568

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 restricted Air Filter indicator comes on after the installation of a clean primary filter element or if the exhaust smoke is still black.

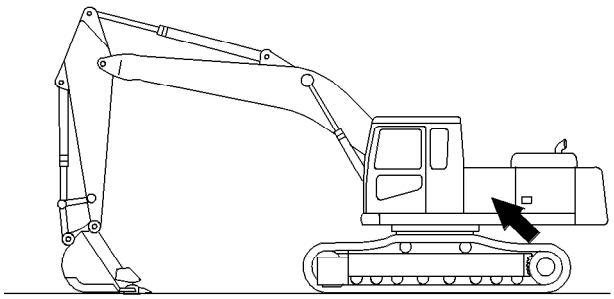


Illustration 350 g00101721

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.

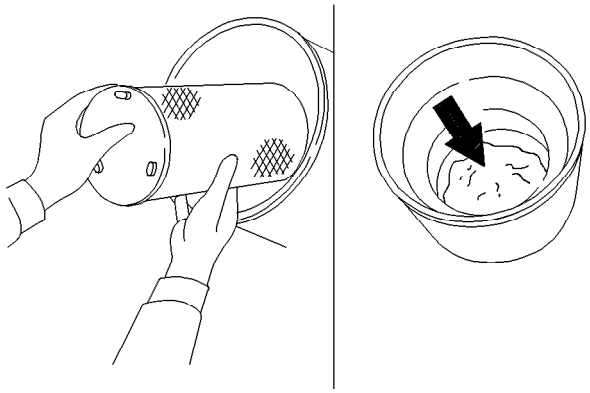


Illustration 351 g00101451

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.

i02174202

Engine Air Precleaner - Clean

SMCS Code: 1055-070-DJ

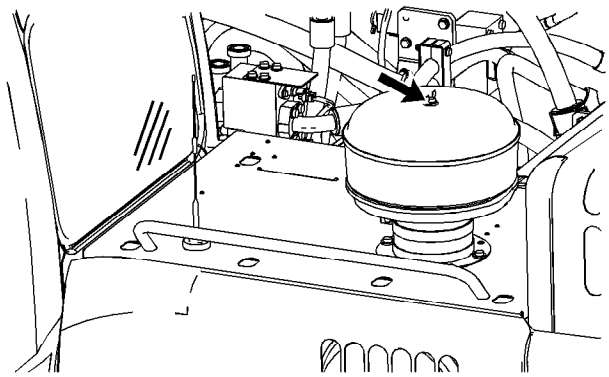


Illustration 352 g01101669

Check the precleaner for accumulation of trash and dirt.

1. Empty the precleaner bowl whenever the dirt reaches the “FULL” mark.
2. Loosen the wing nut on the cover and remove the cover.
3. Empty the precleaner bowl. Wash the precleaner bowl and the cover.
4. Install the precleaner bowl and install the cover. Tighten the wing nut until the wing nut is only finger tight. Do not use a tool to tighten the wing nut.

i00561879

Engine Crankcase Breather - Clean

SMCS Code: 1317-070-DJ

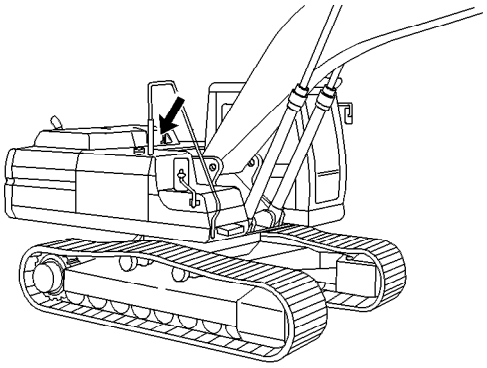


Illustration 353 g00278210

1. Unlatch the engine hood. Raise the engine hood.

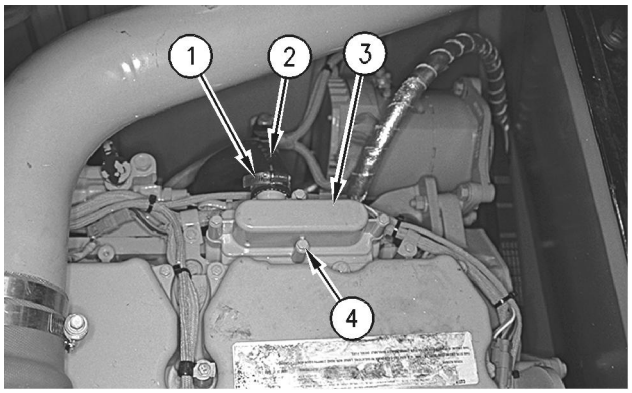


Illustration 354 g00115415

(1) Hose clamp. (2) Outlet hose. (3) Breather. (4) Bolts.

2. Loosen hose clamp (1). Disconnect outlet hose (2) from breather (3).

3. Loosen four bolts (4). Remove breather (3) and the seal.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

4. Wash breather (3) in a clean, nonflammable solvent.

5. Inspect the seal. If the seal is damaged, install a new seal.

6. Install the O-ring seal and clean breather (3). Tighten four bolts (4) to 14 ± 3 N·m (10 ± 2 lb ft).

7. Slide hose on breather (3). Tighten hose clamp (1).

8. Close the engine hood. Latch the engine hood.

i01310252

Engine Oil Level - Check

SMCS Code: 1000-535

NOTICE
Do not overfill the crankcase. Engine damage can result.

Note: This machine is equipped with a function for checking fluid levels. However, if the machine is on an incline or the engine has been stopped only for a short time, the engine oil does not return to the crankcase. The fluid level cannot be properly checked. Park the machine on level ground and check the oil level after the engine has been stopped for at least 15 minutes.

The oil level can be checked while the engine is running or while the engine is stopped. The recommended procedure is checking the oil while the engine is stopped.

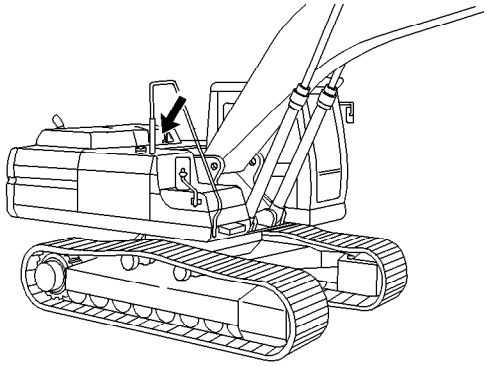


Illustration 355 g00278210

1. Unlatch the engine hood and raise the engine hood.

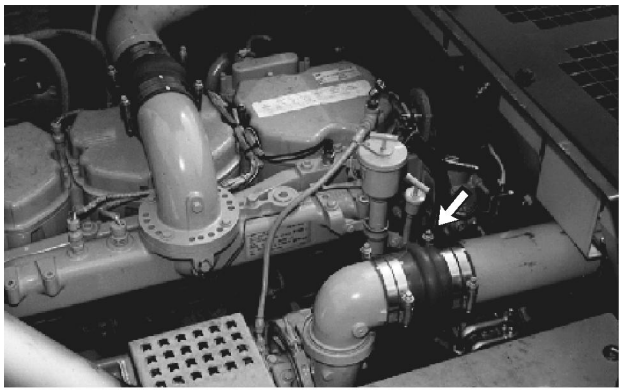


Illustration 356 g00694259

2. Remove the dipstick. Wipe the oil off the dipstick and reinsert the dipstick.

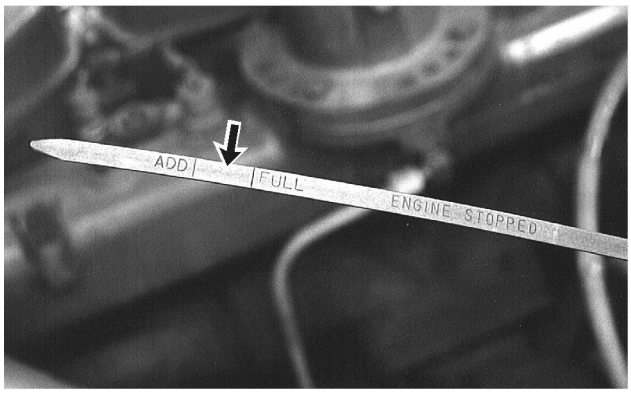


Illustration 357 g00115420

3. Maintain the oil level between the marks on the “ENGINE STOPPED” side of the dipstick. Add oil, if necessary.

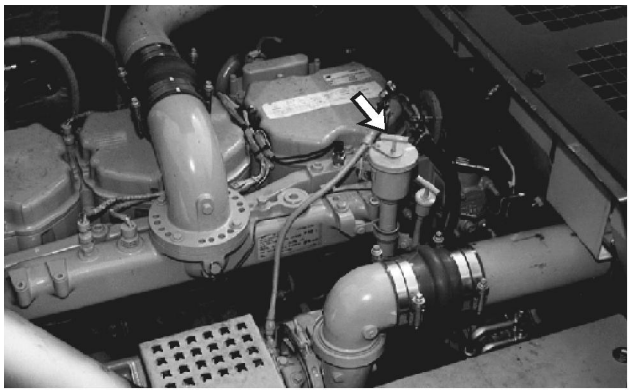


Illustration 358 g00694260

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

4. Remove the oil filler plug in order to add oil.

Note: Oil that is badly contaminated or deteriorated should be replaced early regardless of the change interval.

5. Clean the filler plug and install the filler plug.

6. Close the engine hood and latch the engine hood.

i02014235

Engine Oil and Filter - Change

SMCS Code: 1318-510

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.

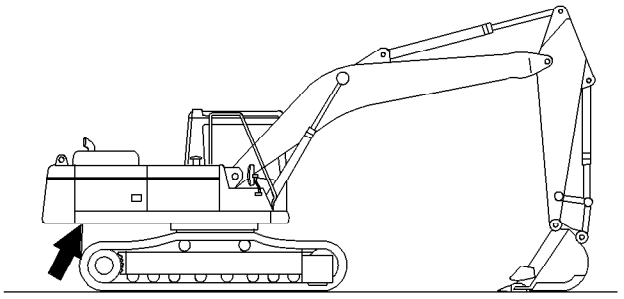


Illustration 359 g00101627

The crankcase drain valve is located under the rear of the upper structure.

1. Remove the bolts and the washers. Open the crankcase drain valve access cover.

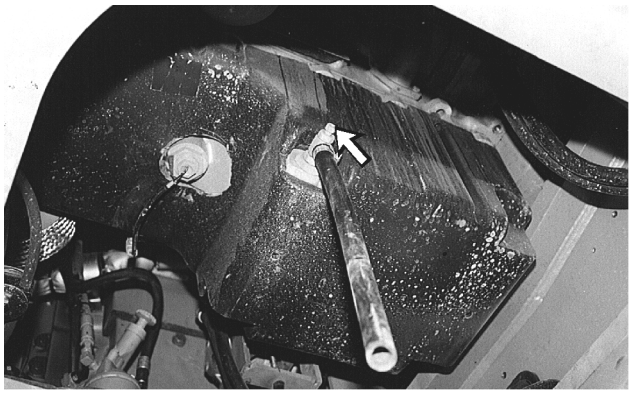


Illustration 360 g00115423

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

2. Open the crankcase drain valve. Allow the oil to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

3. Close the drain valve.

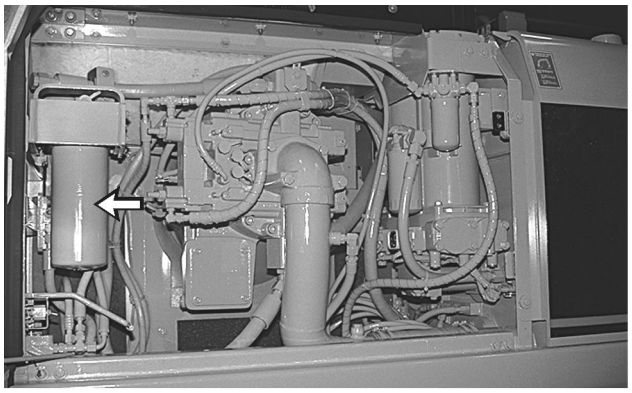


Illustration 361 g00115425

4. Open the access door on the left side of the machine.

5. Remove the oil filter with a strap type wrench. See Operation and Maintenance Manual, “Oil Filter - Inspect”.

Note: Dispose of the used oil filter according to local regulations.

6. Clean the filter housing base. Make sure that all of the old filter gasket is removed.

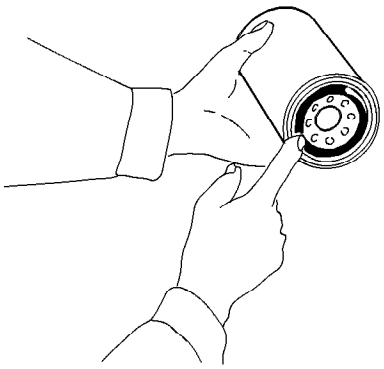


Illustration 362 g00101634

7. Apply a thin coat of engine oil to the gasket of the new filter.

8. Install the new filter by hand. When the gasket contacts the filter base, turn the filter by 270 degrees more. This will tighten the filter sufficiently.

Every new oil filter has rotation index marks that are spaced at 90 degree increments. Use the rotation index marks as a guide for tightening the oil filter.

9. Close the access door on the left side of the machine.

10. Close the crankcase drain valve access cover.

11. Install the bolts and the washers.

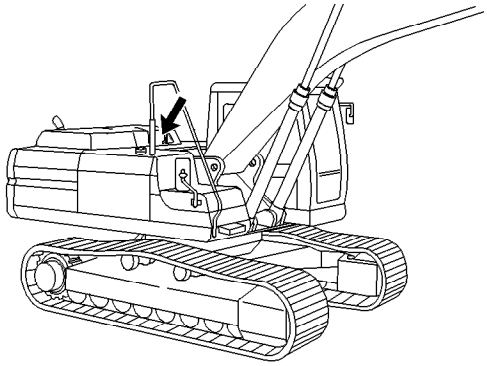


Illustration 363 g00278210

12. Unlatch the engine hood and raise the engine hood.

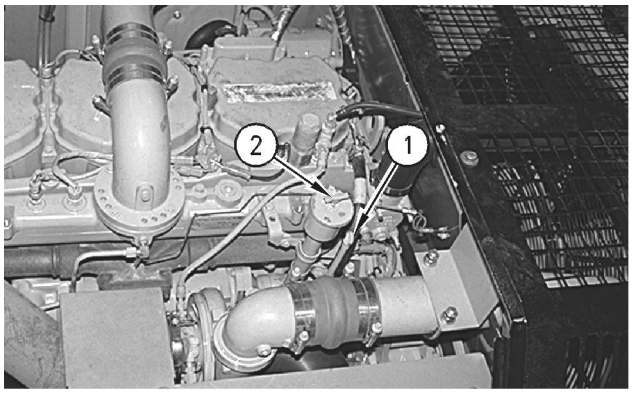


Illustration 364 g00115426

13. Remove oil filler plug (2). Fill the crankcase with new oil. See Operation and Maintenance Manual, “Capacities (Refill)”. 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.

14. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.

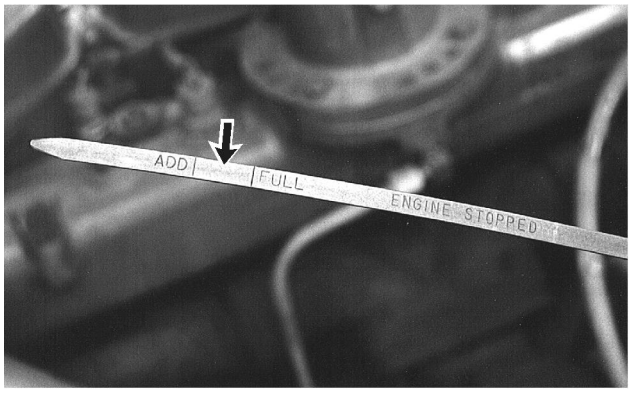


Illustration 365 g00115428

15. Wait for fifteen minutes so that the oil can drain back into the crankcase, before you check the oil.

16. Check the dipstick. Maintain the oil between the marks on the “ENGINE STOPPED” side of the dipstick.

17. Close the engine hood and latch the engine hood.

i02098807

Engine Oil Sample - Obtain

SMCS Code: 1000; 1000-008; 1348-008; 1348-554-SM; 7542-554-SM; 7542-008; 7542-554-OC

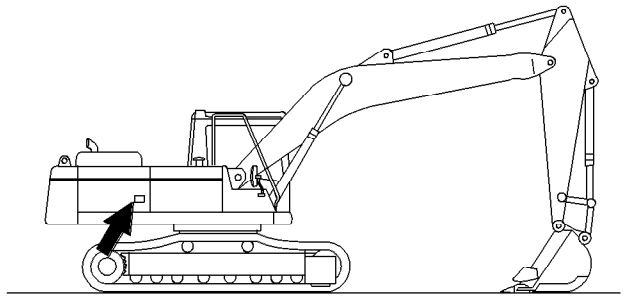


Illustration 366 g00101628

Open the access door on the right side of the machine in order to access the sampling valve.

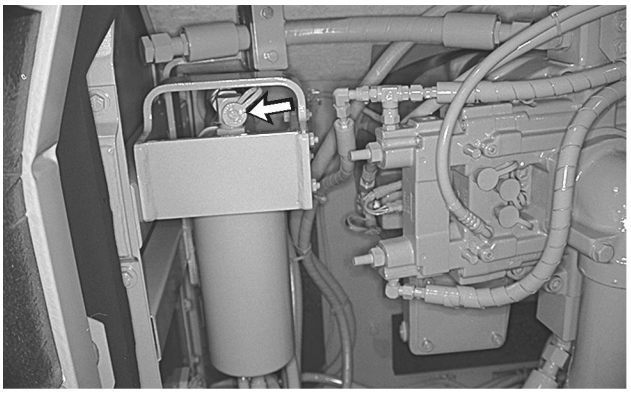


Illustration 367 g00277447

The sampling valve for the engine oil is located on the top of the engine oil filter.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of the engine oil.

i00707053

Engine Valve Lash and Fuel Injector Timing - Check

SMCS Code: 1105-025; 1209-535; 1290-531-FT

Refer to the Service Manual for the complete procedure for checking the engine valve lash. This procedure lists the steps for the engine valve lash adjustment and the steps in order to check the engine valve lash.

Note: Make sure that a qualified mechanic works on the injector fuel timing. Special tools and training are required.

Refer to the Service Manual for the complete procedure for checking the injector fuel timing or for adjusting the injector fuel timing.

Note: The correct fuel timing specification is given on the Engine Information Plate. Fuel timing specifications may differ for distinct engine applications and/or power ratings.

i00059702

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

⚠ WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn to prevent being burned by hot oil spray.

1. Start the engine and run the engine at low idle.

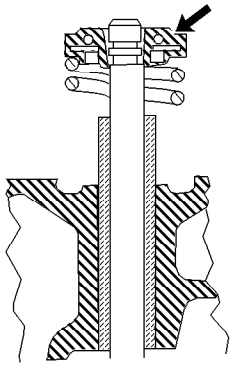


Illustration 368 g00102025

2. Watch the top surface on each valve rotator. Each valve rotator should turn slightly whenever the cylinder valve closes.

If a cylinder valve fails to rotate, consult your Caterpillar dealer.

i01313174

Ether Starting Aid Cylinder - Replace

SMCS Code: 1456-510-CD

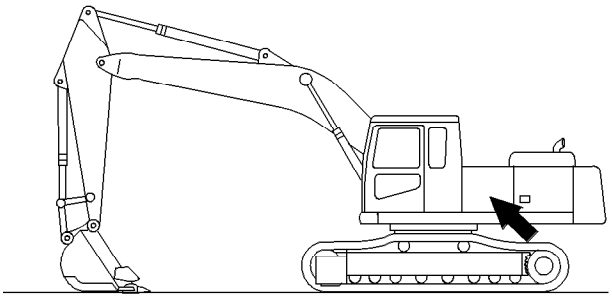


Illustration 369 g00101721

The ether cylinder is located inside the front access door on the front left side of the machine.

Refer to Operation and Maintenance, “Fire Prevention and Explosion Prevention” before you replace the ether cylinders.

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

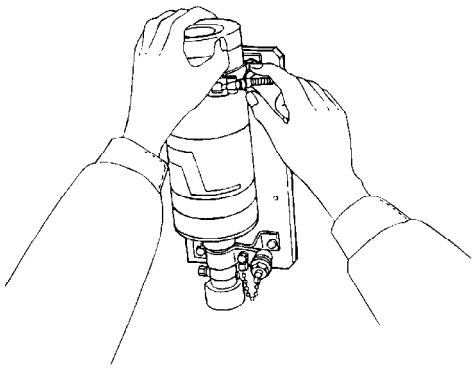


Illustration 370 g00695152

2. Loosen the cylinder retaining clamp. Unscrew the empty ether cylinder and remove the empty ether cylinder.

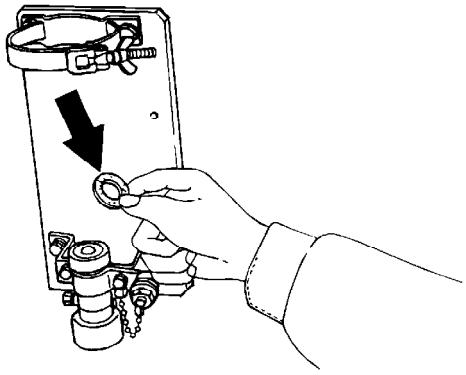


Illustration 371 g00695155

3. Remove the used gasket. Install the new gasket. A new gasket is provided with each new ether starting aid cylinder.

4. Install the new ether starting aid cylinder. Tighten the ether starting aid cylinder hand tight. Tighten the cylinder retaining clamp securely.

5. Close the access door.

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.

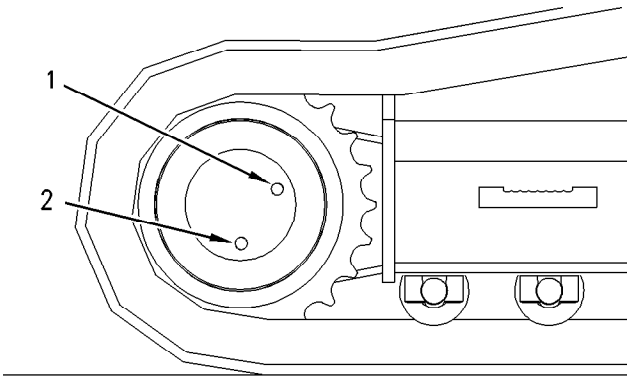


Illustration 372 g00822278

(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.

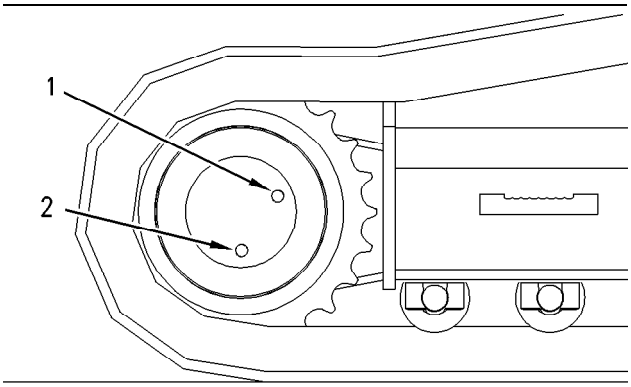


Illustration 373 g00822278

(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.

i02024665

Fuel System - Prime

SMCS Code: 1250-548

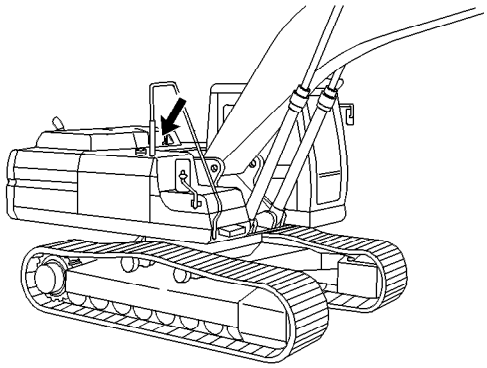


Illustration 374 g00278210

1. Unlatch the engine hood and raise the engine hood.

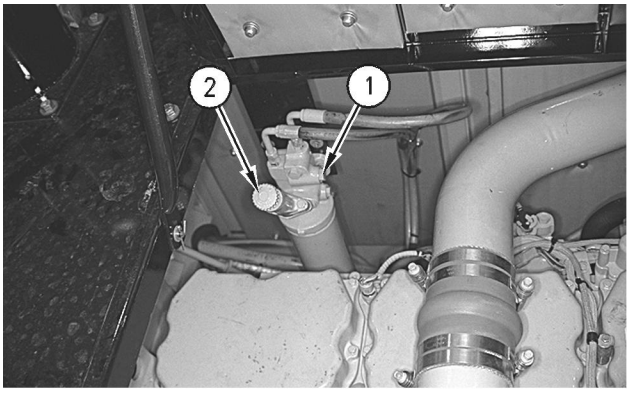


Illustration 375 g00278459

(1) Vent plug
(2) Priming pump plunger

2. Loosen vent plug (1) on the filter.

3. Turn priming pump plunger (2) counterclockwise in order to unlock priming pump plunger (2). Operate priming pump plunger (2).

4. Tighten vent plug (1) when the fuel flows without air bubbles.

5. Push in priming pump plunger (2) and tighten priming pump plunger (2) by hand.

6. Crank the engine. If the engine does not start or if the engine misfires, additional priming is required. Also if the engine emits smoke, additional priming is required.

7. If the engine starts but the engine runs rough, continue to run the engine at low idle. Run the engine at low idle until the engine runs properly.

8. Check the fuel system for leaks. Stop the engine.

9. Close the engine hood and latch the engine hood.

i01958150

Final Drive Oil Sample - Obtain

SMCS Code: 4011-008; 4050-008; 4050-SM; 7542-008

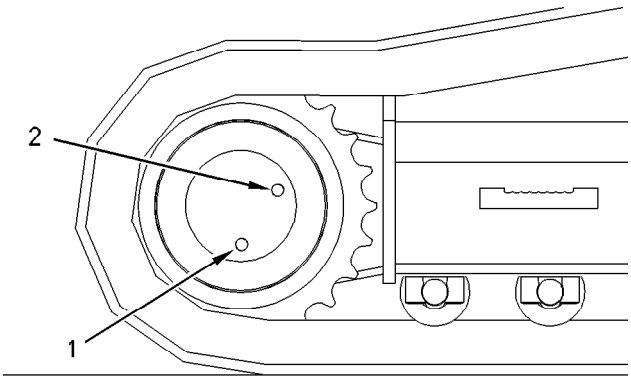


Illustration 376 g00538194

(1) Oil drain plug
(2) Oil level plug

1. Position the final drive so that oil drain plug (1) is at the bottom.

2. Remove oil level plug (2).

3. Obtain a sample of the final drive oil through the hole for the oil level plug.

4. Install oil level plug (2).

Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information on obtaining a sample of the final drive oil. For additional information about obtaining an oil sample, refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i02076875

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

S/N: 4SS552–Up

S/N: 9GS192–Up

S/N: 2NW1–Up

⚠ 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.

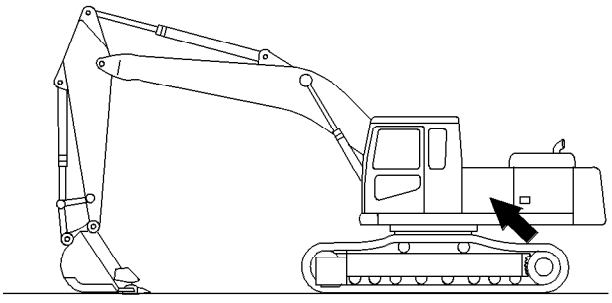


Illustration 377 g00101721

The primary filter/water separator is located behind the left front access door.

1. Open both access doors on the left side of the machine.

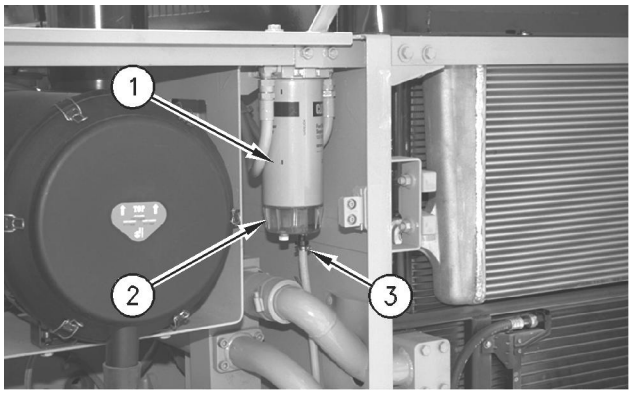


Illustration 378 g00359978

(1) Filter
(2) Bowl
(3) Drain valve

2. Turn drain valve (3) counterclockwise in order to open. The drain valve is located on the bottom of the water separator.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” that pertains to containing fluid spillage.

3. Drain the water and sediment into a suitable container.

Note: Dispose of drained fluids and used filters according to local regulations.

4. Close drain valve (3).

5. Hold the bottom of the filter (1) while you loosen bowl (2).

6. Remove bowl (2).

7. Remove filter (1). Discard filter(1).

Note: The primary filter is a cartridge type filter. The filter cannot be reused.

8. Clean the inside surface of the filter head and of bowl (2).

9. Inspect the O-ring on bowl (2). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.

10. Lubricate the seal of the new element with clean diesel fuel.

11. Install the new filter. Tighten the filter by hand until the seal contacts the filter base. Additionally tighten the filter by 1/3 to 1/2 turn onto filter base.

12. Install bowl (2).

13. Close the access doors.

i01955470

Fuel System Primary Filter/ Water Separator - Clean/ Replace

SMCS Code: 1260-510; 1261; 1263-070

S/N: 4SS1–551

S/N: 9GS1–191

⚠ WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

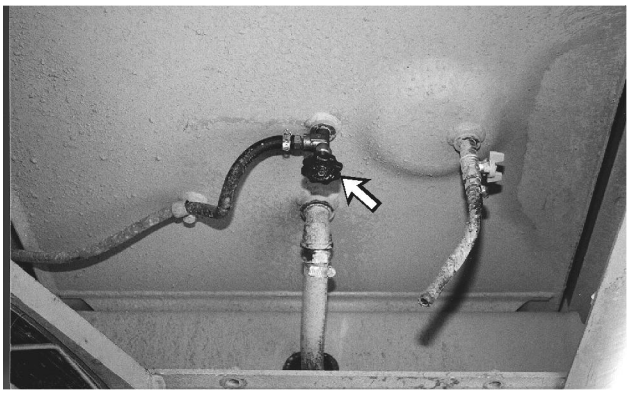


Illustration 379 g00290716

1. The fuel shutoff valve is located under the fuel tank. Turn the fuel supply valve clockwise in order to shut off the fuel supply.

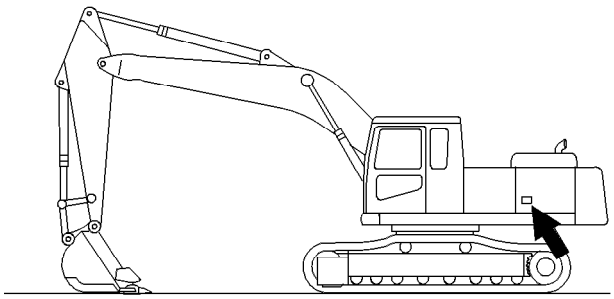


Illustration 380 g00101429

2. Open the access door on the left side of the machine.

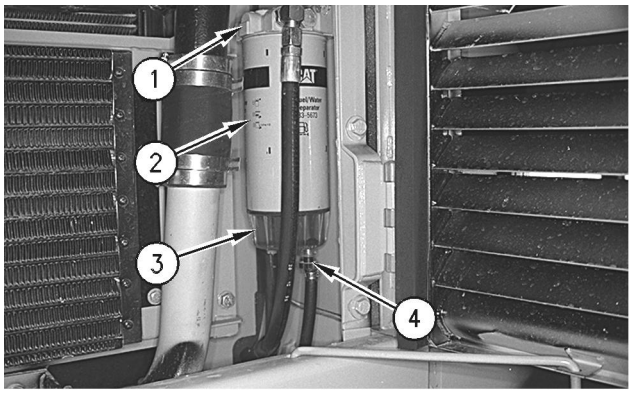


Illustration 381 g00290717

(1) Base. (2) Water separator element. (3) Bowl. (4) Drain valve.

The water separator is located behind the left side access door.

3. Turn drain valve 4 counterclockwise in order to open.

4. Drain the water and sediment into a suitable container.

Note: Dispose of drained fluids and used filters according to local regulations.

5. Close drain valve (4).

6. Hold water separator element (2) while you remove bowl (3).

7. Remove water separator element (2) from base (1). Discard water separator element (2).

Note: The water separator element is a cartridge type filter. The filter cannot be reused.

Note: The water separator element is a cartridge type filter. The filter cannot be reused.

8. Clean the inside surface of the filter head and of bowl (3).

9. Inspect the O-ring on bowl (3). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.

10. Install a new water separator element. Tighten water separator element (2) onto base (1).

11. Install bowl (3).

Note: Do not start the engine until all service to the fuel system is complete. Refer to Operation and Maintenance Manual, “Fuel System Priming Pump - Operation” for instructions on priming the fuel system.

12. Close the access door.

13. Turn the fuel shutoff valve counterclockwise in order to open the fuel supply.

i01955480

Fuel System Primary Filter/ Water Separator - Clean/ Replace

SMCS Code: 1260-510; 1261; 1263-070

S/N: 4SS552–Up

S/N: 9GS192–Up

S/N: 2NW1–Up

⚠ WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

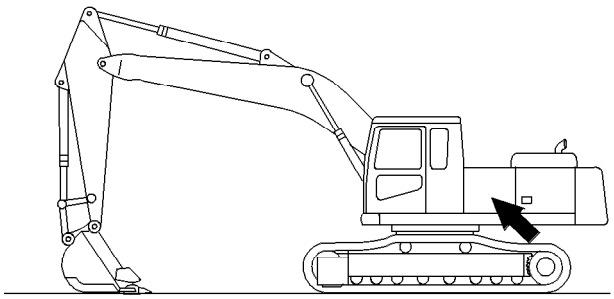


Illustration 382 g00101721

The primary filter/water separator is located behind the left front access door.

1. Open both access doors on the left side of the machine.

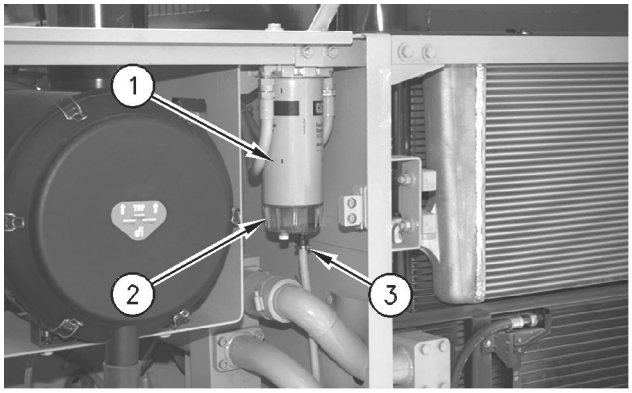


Illustration 383 g00359978

(1) Filter
(2) Bowl
(3) Drain valve

2. Turn drain valve (3) counterclockwise in order to open. The drain valve is located on the bottom of the water separator.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” that pertains to containing fluid spillage.

3. Drain the water and sediment into a suitable container.

Note: Dispose of drained fluids and used filters according to local regulations.

4. Close drain valve (3).

5. Hold the bottom of the filter (1) while you loosen bowl (2).

6. Remove bowl (2).

7. Remove filter (1). Discard filter(1).

Note: The primary filter is a cartridge type filter. The filter cannot be reused.

8. Clean the inside surface of the filter head and of bowl (2).

9. Inspect the O-ring on bowl (2). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.

10. Lubricate the seal of the new element with clean diesel fuel.

11. Install the new filter. Tighten the filter by hand until the seal contacts the filter base. Additionally tighten the filter by 1/3 to 1/2 turn onto filter base.

12. Install bowl (2).

13. Close the access doors.

i02077031

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510

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 system parts.

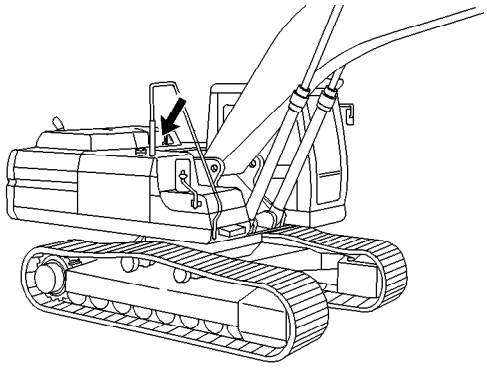


Illustration 384 g00278210

1. Unlatch the engine hood and raise the engine hood.

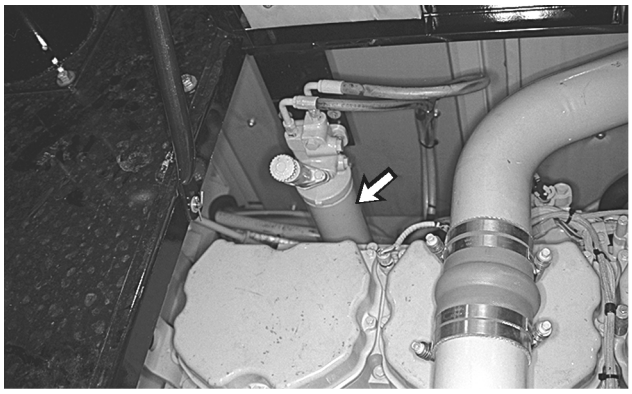


Illustration 385 g00115435

2. Remove the fuel filter.

3. Inspect the fuel filter for debris by cutting the fuel filter open.

Note: The fuel filter is a cartridge type filter. The filter cannot be reused.

Note: Dispose of used filters and used fluids according to local regulations.

4. Clean the filter mounting base. Make sure that all of the old seal is removed.

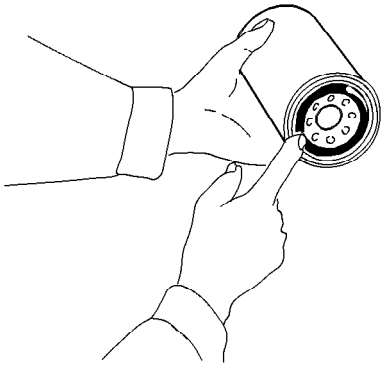


Illustration 386 g00101634

5. Lubricate the seal of the new filter with clean diesel fuel.

6. Install the new filter by hand. Additionally tighten the filter by 3/4 of a turn, after the gasket contacts the filter base.

The filter has rotation index marks that are spaced at 90 degree intervals. Use these rotation index marks as a guide for proper tightening.

7. Prime the fuel system. Refer to Operation and Maintenance, “Fuel System - Prime”.

i00779879

Fuel System Water Separator - Drain

SMCS Code: 1263

S/N: 4SS552–Up

S/N: 9GS192–Up

S/N: 2NW1–Up

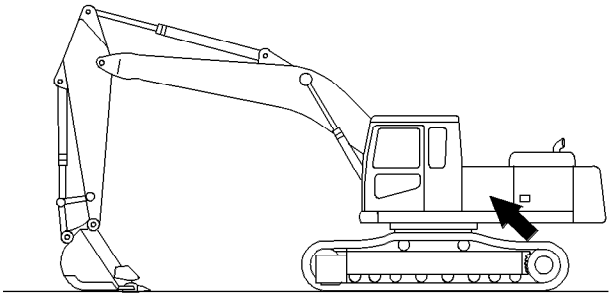


Illustration 387 g00101721

The water separator is located inside the front access door on the front left side of the machine.

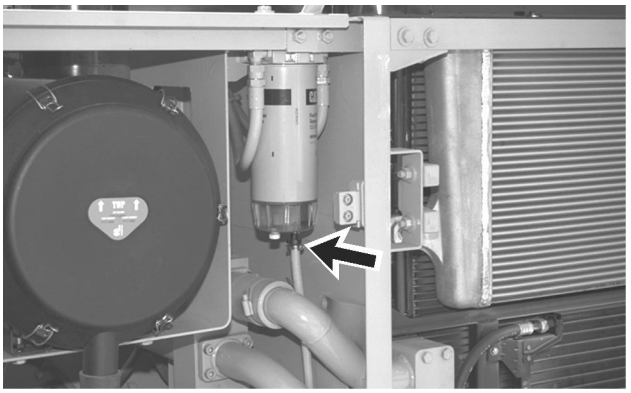


Illustration 388 g00360092

If the bowl is full, the water and sediment should be drained.

1. Turn the drain valve counterclockwise in order to open.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

2. Drain the water and drain the sediment into a suitable container.

Note: Dispose of drained fluids according to local regulations.

3. Close the drain valve.

4. Close the access door.

i00877408

Fuel System Water Separator - Drain

SMCS Code: 1263

S/N: 4SS1–551

S/N: 9GS1–191

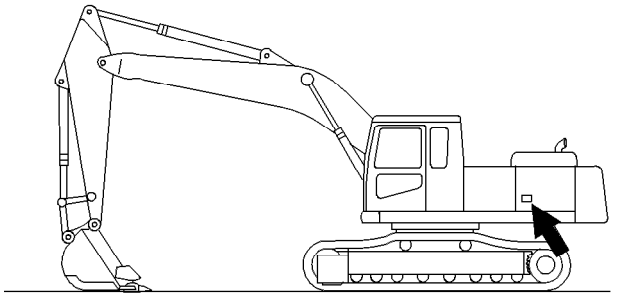


Illustration 389 g00101429

The water separator is located inside the rear access door on the left side of the machine.

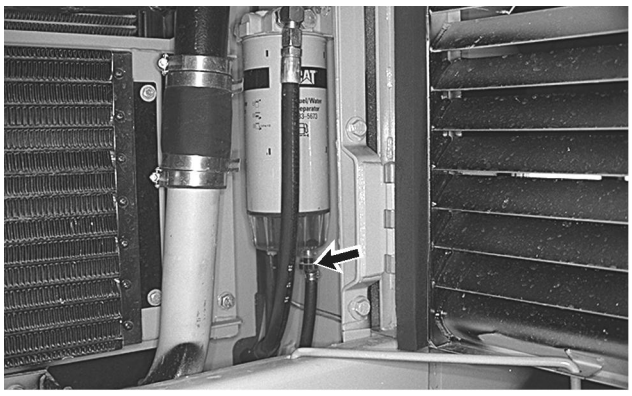


Illustration 390 g00446863

If the bowl is full, the water and sediment should be drained.

1. Turn the drain valve counterclockwise in order to open.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

2. Drain the water and drain the sediment into a suitable container.

Note: Dispose of drained fluids according to local regulations.

3. Close the drain valve.

4. Close the access door.

i00571622

Fuel System Water Separator Element - Replace

SMCS Code: 1263-510-FQ

S/N: 4SS1–Up

S/N: 9GS1–Up

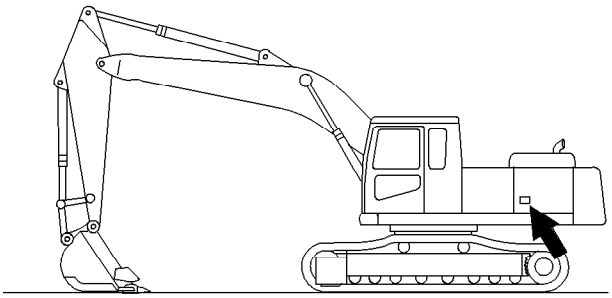


Illustration 391 g00101429

The water separator is located behind the left side access door.

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

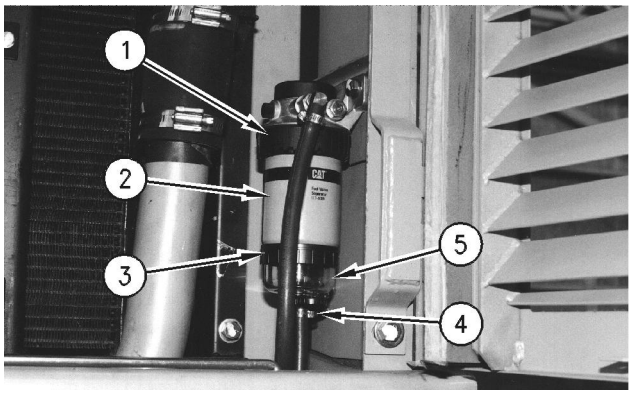


Illustration 392 g00280300

(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 is located on the bottom of the water separator.

3. Drain the water and the sediment into a suitable container.

Note: Dispose of drained fluids and used filters 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).

Note: Dispose of drained fluids and used filters according to local regulations.

Note: The water separator element is a cartridge type filter. The filter cannot be reused.

9. Clean the inside surfaces of the filter head and of 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 Priming Pump - Operate”.

13. Close the access door.

i01313516

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-STR

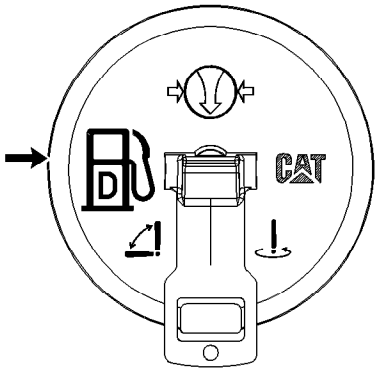


Illustration 393 g00275645

1. Remove the fuel tank cap.

Illustration 394 g00695360

2. Remove the fuel fill screen.

3. Wash the fuel fill screen and the fuel tank cap in a clean, nonflammable solvent.

4. Inspect the gasket of the cap for damage. Replace the cap if the gasket is damaged.

5. Install the fuel fill screen.

6. Install the fuel tank cap.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

i01502765

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

The fuel tank drain valve is located underneath the fuel tank.

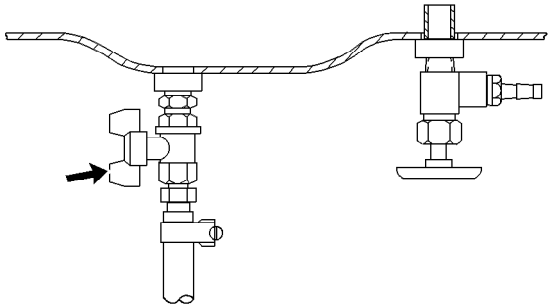


Illustration 395 g00535969

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

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.

Fill the Fuel Tank

You can now add fuel to the fuel tank, if necessary. Remove the fuel tank cap and pump fuel through the opening.

Make sure that you lock the fuel tank cap after the refueling is complete.

i00919685

Fuses - Replace

SMCS Code: 1417-510

Illustration 396 g00101419

The fuse panel is located on the left console. 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 a puller that is stored in the fuse panel. The following fuses are contained in the fuse panel as spare fuses:

- Two 10 Amp fuses
- One 15 Amp fuse

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

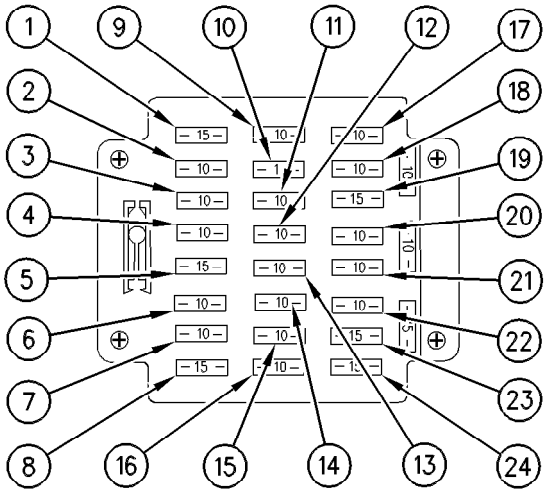


Illustration 397 g00470050

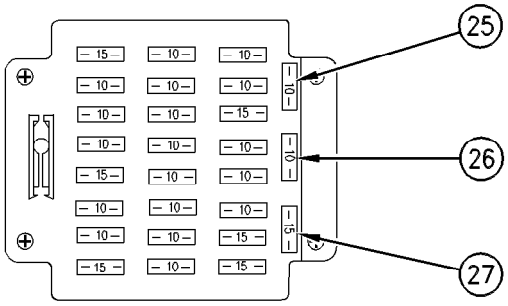


Illustration 398 g00470051

Engine Control Module (ECM) (1) – 15 Amp

Auxiliary Circuit (Attachment) (2) – 10 Amp

Attachment Fan (3) – 10 Amp

Backup Switches for Engine and Pump Controller (4) – 10 Amp

Attachment Lamps (5) – 15 Amp

Auxiliary Circuit (6) – 10 Amp

Hydraulic Lock Solenoid and Hydraulic Lock Limit Switch (7) – 10 Amp

Engine and Pump Controller (8) – 15 Amp

Horn (9) – 10 Amp

Cab Dome Light (10) – 10 Amp

Auxiliary Circuit (11) – 10 Amp

Engine Start Switch (12) – 10 Amp

Auxiliary Circuit (Attachment) (13) – 10 Amp

Attachment Fine Swing Control (14) – 10 Amp

Boom Lamp (15) – 10 Amp

Attachment Lubricator (16) – 10 Amp

Hydraulic Oil Filter Switch and Switch Panel (17) – 10 Amp

Cigar Lighter (18) – 10 Amp

Heater and Air Conditioner (19) – 15 Amp

Windshield Washer and Windshield Wiper (20) – 10 Amp

Lower Windshield Washer and Lower Windshield Wiper (21) – 10 Amp

Converter (22) – 10 Amp

Cab and Chassis Lamp (23) – 15

Auxiliary Hydraulics (Attachment) (24) – 15 Amp

Spare (25) – 10 Amp

Spare (26) – 10 Amp

Spare (27) – 15 Amp

i01965930

Hydraulic System Oil - Change

SMCS Code: 5056-044

4000 Hour Oil Change Interval

A 4000 hour maintenance interval for hydraulic oil (change) is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed. If S·O·S monitoring is not performed, the 2000 hour maintenance interval must be used.

Machines with hammers are not included in the 4000 hour 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 4000 hour maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Lubricants

Approved hydraulic oil must be used to obtain the 4000 hour hydraulic oil change. Refer to the list that follows for approved oils.

Caterpillar Hydraulic Oils

- Cat HYDO
- TDTO
- TDTO (TMS)
- DEO
- Biodegradable Hydraulic Oil (HEES)
- MTO

Commercial Oils

Diesel engine oils (Heavy Duty) with a minimum zinc content of 900 ppm can be used. Acceptable commercial oils are identified by the American Petroleum Institute trademark (API) . Refer to the list that follows for acceptable types of hydraulic oils.

- CF
- CF-4
- CG-4
- CH-4

Note: Industrial hydraulic oils are not recommended for the hydraulic systems of Caterpillar machines. Industrial hydraulic oils are more likely to allow corrosion and Industrial hydraulic oils are more likely to allow excessive wear.

Procedure to Change the Hydraulic Oil

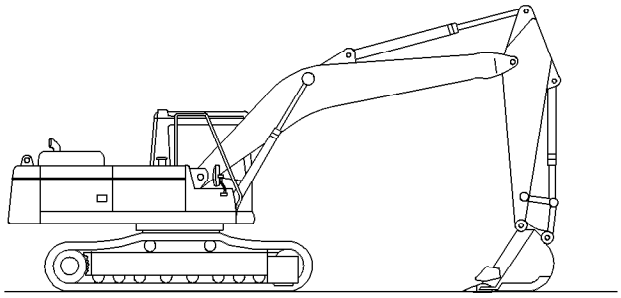


Illustration 399 g00101435

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

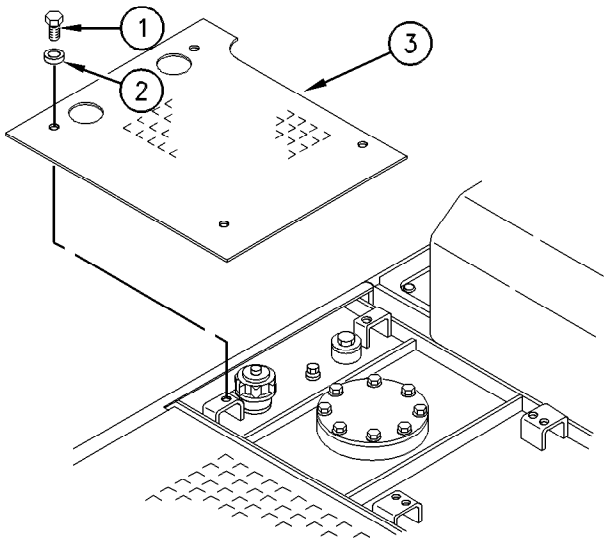


Illustration 400 g00278485

(1) Bolts
(2) Washers
(3) Cover

2. Remove bolts (1), washers (2) and cover (3) from the top of the hydraulic tank.

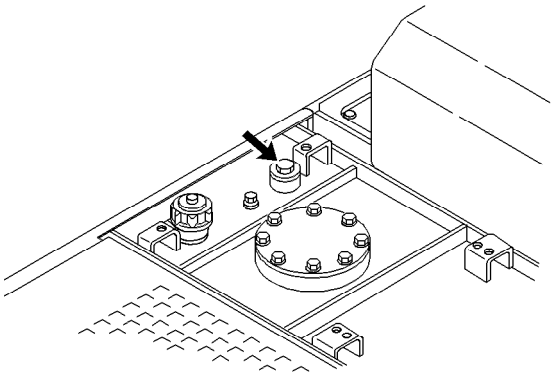


Illustration 401 g00118184

3. Clean the area thoroughly in order to keep dirt out of the screen cover. Clean the area thoroughly in order to keep dirt out of the fill/vent plug.

4. Relieve the internal pressure from the hydraulic tank by loosening the fill/vent plug. After the pressure is relieved, remove the fill/vent plug.

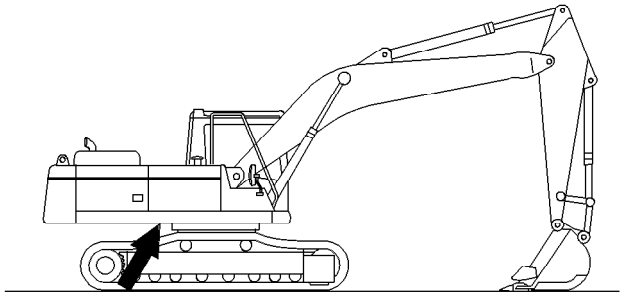


Illustration 402 g00101446

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.

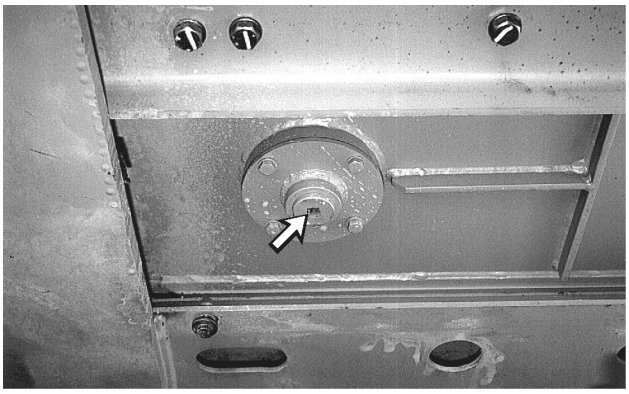


Illustration 403 g00118185

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

6. Remove the oil drain valve plug.

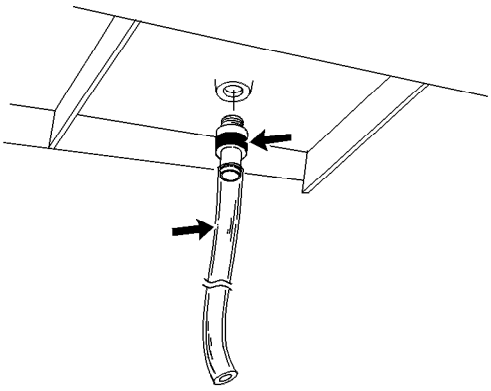


Illustration 404 g00293719

7. Install a Swivel Hose with clear plastic tubing in order to open the drain valve. Drain the oil into a suitable container.

8. Remove the Swivel Hose in order to close the drain valve.

9. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

10. Clean the drain plug. Install the drain plug.

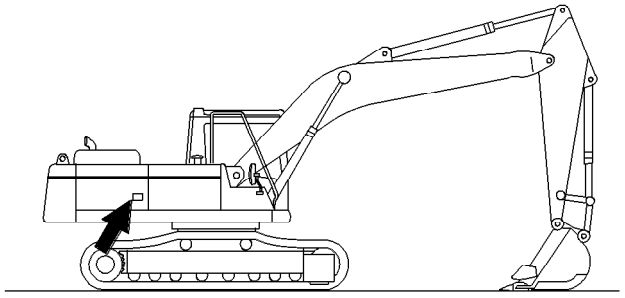


Illustration 405 g00101449

11. Open the access door that is located on the right side of the machine.

12. Clean the pump, the hydraulic lines, and the hydraulic tank.

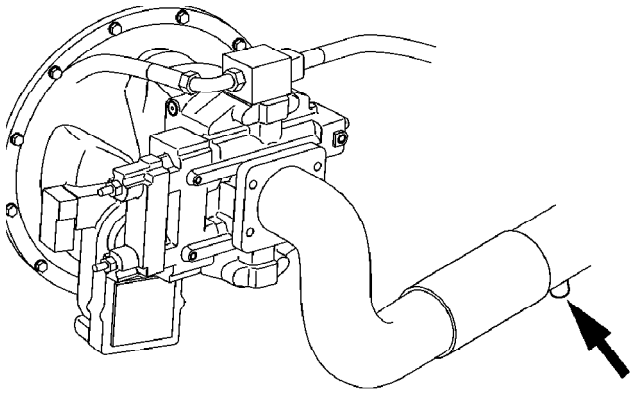


Illustration 406 g00833606

13. 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.

14. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

15. Clean the plug. Install the plug and the O-ring into the drain port.

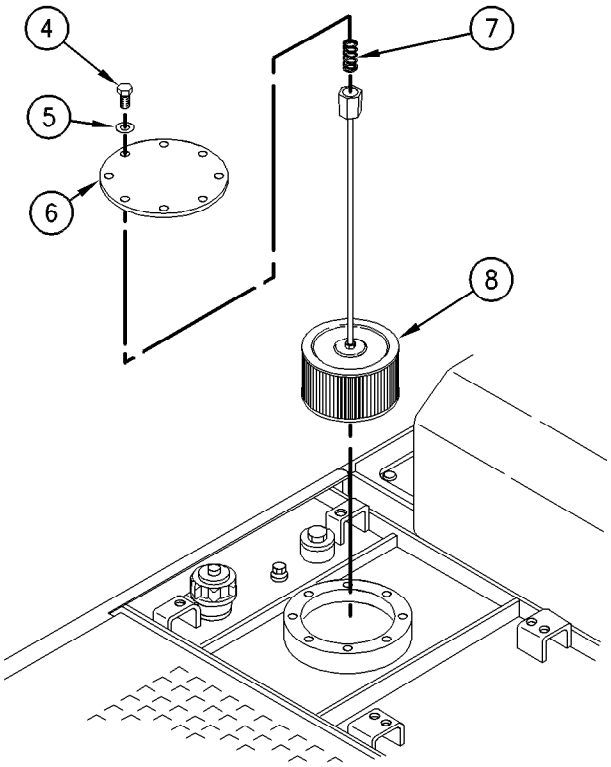


Illustration 407 g00279621

(4) Bolts
(5) Washers
(6) Cover
(7) Spring
(8) Screen

16. Remove bolts (4), washers (5) and cover (6).

Note: Dispose of used filters and used fluids according to local regulations.

Note: Do not allow spring (7) to fall back into the tank.

17. Remove spring (7) and screen (8).

Note: Refer to Operation and Maintenance, “General Hazard Information” for information on containing fluid spillage.

18. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

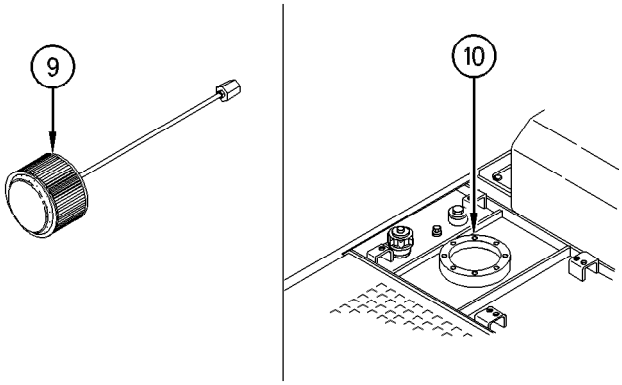


Illustration 408 g00278486

(9) O-ring seal
(10) O-ring seal

19. Inspect O-ring seals (9) and (10). Replace the O-ring seals if wear or damage is evident.

20. 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.

21. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Refill Capacities”.

22. 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.

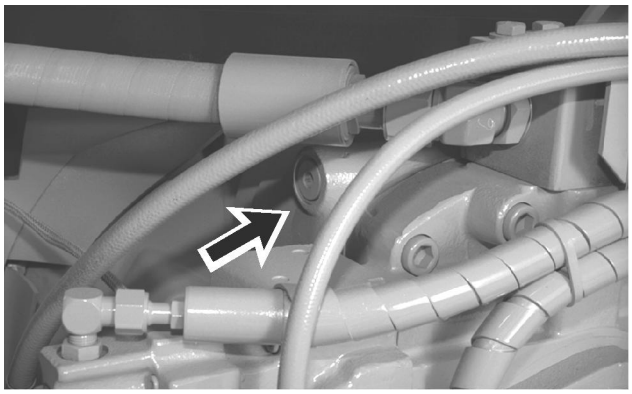


Illustration 409 g00360402

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.

23. When the hydraulic oil has been replaced, the air must be removed from the hydraulic oil system. Use the following procedure to remove the air from the hydraulic oil system.

a. While the engine is stopped, remove the vent plug on the top of the pump. Leave the vent plug unattached for several minutes until the pump is filled with hydraulic oil. After the pump is filled with hydraulic oil, tighten the vent plug. Start the engine. When the engine is at low idle, fully raise the boom. Hold the boom in this position.

b. Stop the engine. Slowly lower the boom until the bucket is on the ground. This pressurizes the hydraulic tank.

c. Slowly loosen the vent plug for several turns until the hydraulic oil flows out of the opening for the vent plug. This indicates that the air has been released from the pump. Tighten the vent plug again.

24. Close the access door.

25. Start the engine. Operate the engine at idling speed for five minutes.

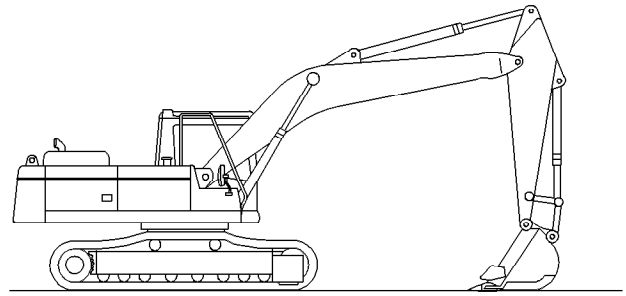


Illustration 410 g00101435

26. Operate the control levers 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.

27. Open the access door that is located on the right side of the machine.

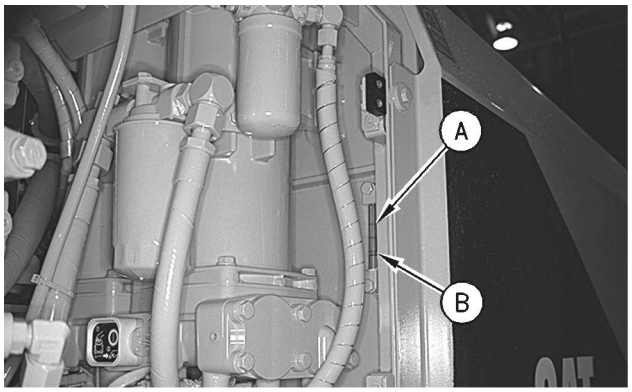


Illustration 411 g00115443

(A) High temperature range
(B) Low temperature range

28. Maintain the oil level between the marks on the sight gauge in the appropriate temperature range.

29. Close the access door.

i01961629

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

The return filter is a cartridge type filter. The return filter reduces the amount of foreign material that enters the hydraulic system when the filter element is replaced.

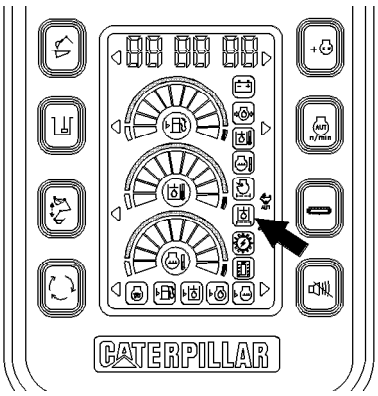


Illustration 412 g00102209

Note: If the indicator for a Restricted Hydraulic Return Filter comes on, push the reset switch at the filter case. Run the machine on level ground for approximately 10 minutes. If the indicator still comes on, inspect the filter and replace the filter, if necessary.

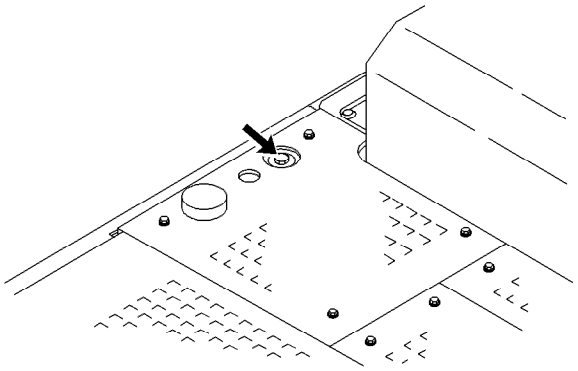


Illustration 413 g00277214

1. Loosen the filler plug in order to relieve the hydraulic tank pressure. Tighten the filler plug after the hydraulic tank pressure is relieved.

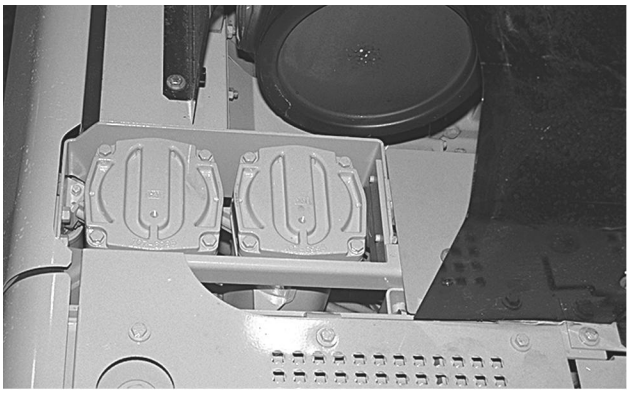


Illustration 414 g00276256

Note: The return filters are located behind the filler plug.

2. Remove the filter cartridge. Perform Step 2a through Step 2f in order to remove the filter cartridge.

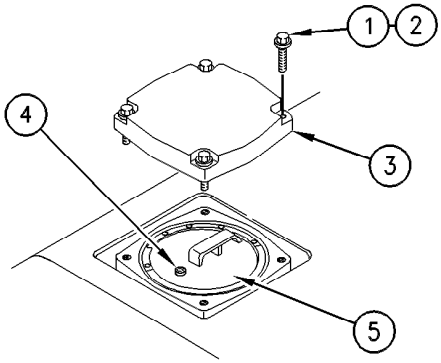


Illustration 415 g00102211

(1) Bolts
(2) Washers
(3) Cover
(4) Plug
(5) Filter cartridge

a. Remove bolts (1), washers (2), and cover (3).

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

b. Remove plug (4) in order to release the pressure in filter cartridge (5).

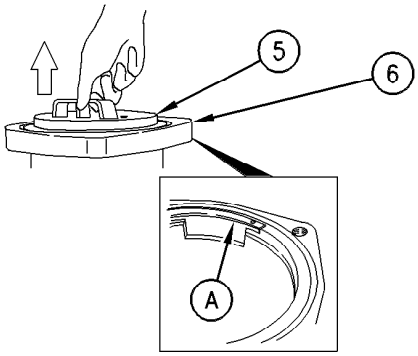


Illustration 416 g00102212

(5) Filter cartridge
(6) Filter case
(A) Guide

c. Pull up the handle at the top of filter cartridge (5) until the filter cartridge contacts guide (A) on filter case (6).

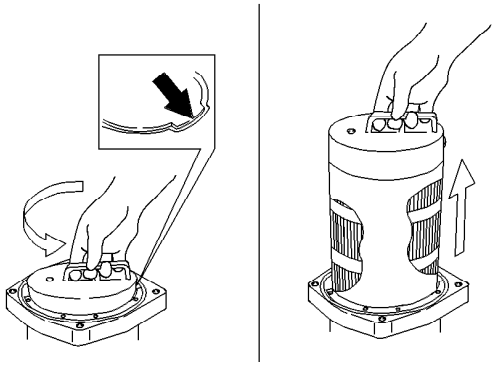


Illustration 417 g00102214

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.

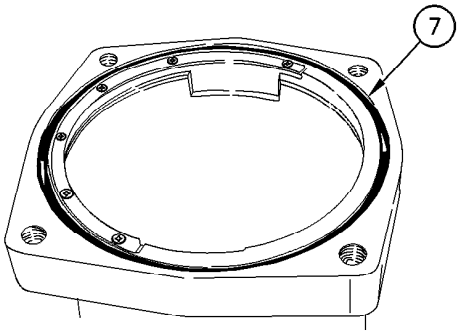


Illustration 418 g00102219

(7) O-ring

e. Inspect the cover and O-ring (7). If either part is damaged, replace the part.

f. Inspect the filter cartridge for debris and for damage. If necessary, replace the filter cartridge.

3. Remove the filter element. Perform Steps 3a through 3f in order to remove the other filter element.

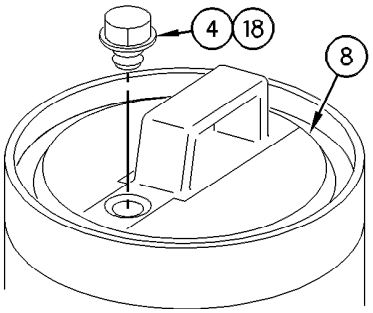


Illustration 419 g00104507

(4) Plug
(8) Plate
(18) O-ring

a. Make sure that plug (4) is removed. Make sure that all of O-ring (18) is removed from plate (8).

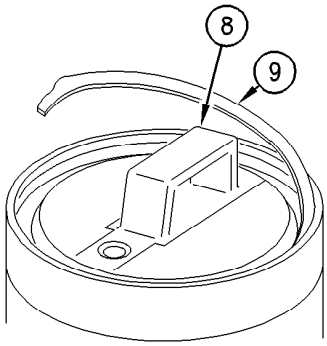


Illustration 420 g00918893

(8) Plate
(9) Spiral retaining ring

b. Remove spiral retaining ring (9).

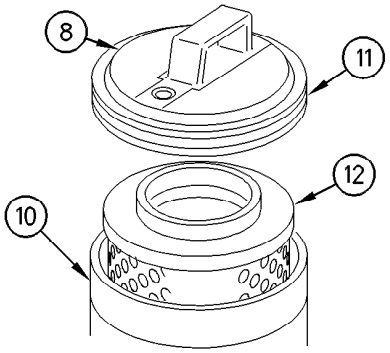


Illustration 421 g00104510

(8) Plate
(10) Shell
(11) O-ring
(12) Filter element

c. Hold the filter cartridge with one hand. Grasp the grip of plate (8) with your other hand. Lift plate (8) in order to separate plate (8) from the filter cartridge.

d. Remove O-ring (11) from plate (8).

e. Lift filter element (12) from shell (10).

f. Pour the remaining oil into a suitable container.

Note: Dispose of used oil according to local regulations.

g. Repeat Step 3a through Step 3f for the other filter.

4. Clean the shell of the filter cartridge. Perform Step 4a through Step 4d in order to clean the shell of the filter cartridge.

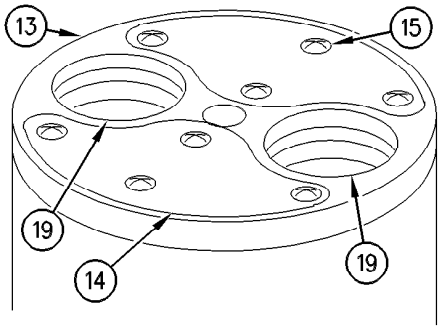


Illustration 422 g00104511

(13) Slide plate
(14) Pads
(15) Screws
(19) Port

a. Turn shell (10) upside-down.

b. Remove screws (15).

c. Remove pads (14) from slide plate (13).

d. Wash the following parts in a clean nonflammable solvent: plug (4), plate (8), spiral retaining ring (9), shell (10) and pads (14). Dry the parts.

e. Repeat Steps 4a through 4d for the other filter.

5. Install the filter elements. Perform Step 5a through Step 5k 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 (10) in order to prevent rust.

b. Apply grease to a new O-ring (11).

c. Plate (8) will contact the inside of shell (10). Apply grease to this point.

d. Apply grease to O-rings inside ports (19) at the bottom of shell (10).

e. Install new pads (14). Tighten screws to a torque of 4 N·m (35 lb in).

f. Apply spray type oil into the clearance between shell (10) and slide plate (13).

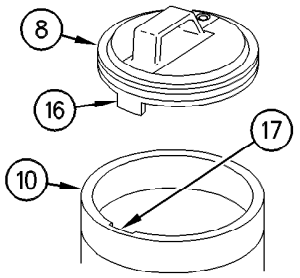


Illustration 423 g00104512

(8) Plate
(10) Shell
(16) Boss
(17) Notch

g. Turn over shell (10). Apply grease to the two O-rings on new element (12). Install element (12) into shell (10).

h. Move boss (16) in alignment with notch (17). Install plate (8) into shell (10).

i. Install spiral retaining ring (9) into the groove in shell (10).

j. Apply grease to new O-ring (18). Install O-ring (18) on plug (4).

k. Install plug (4) into plate (8).

l. Repeat Steps 5a through 5k for the other filter.

6. Install the filter cartridge. Perform Step 6a through Step 6e in order to install the filter cartridge.

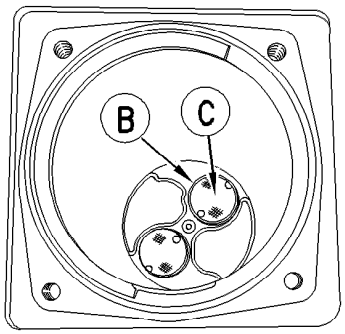


Illustration 424 g00102220

(B) Port
(C) Slide plate

a. Check that ports (B) at the bottom of the filter case are closed.

Note: If the ports are open, rotate slide plate (C) 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.

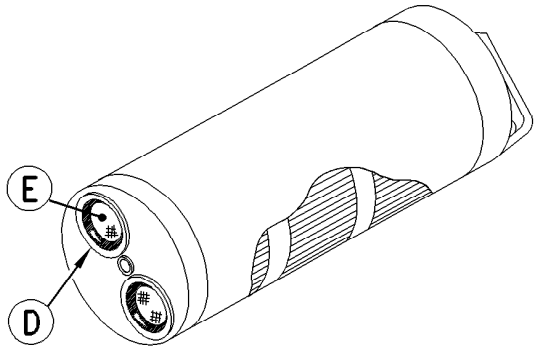


Illustration 425 g00102221

(E) Slide plate
(D) Port

b. Check that ports (D) 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 (E) counterclockwise to the stopper in order to fully close the ports.

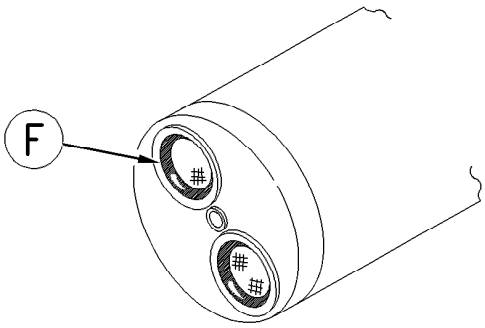


Illustration 426 g00102222

(F) O-rings

c. Check that O-rings (F) have been installed and that oil has been applied to O-rings (F).

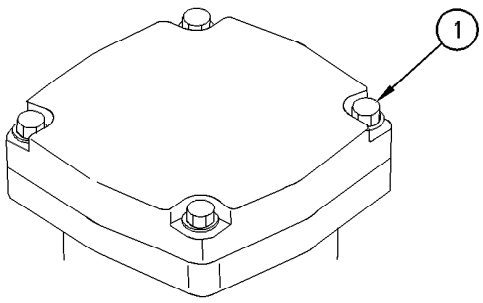


Illustration 427 g00102225

(1) Bolts

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 plug (4), cover (3), washers (2), and bolts (1). Tighten bolts (1) to a torque of 29 ± 5 N·m (22 ± 4 lb ft).

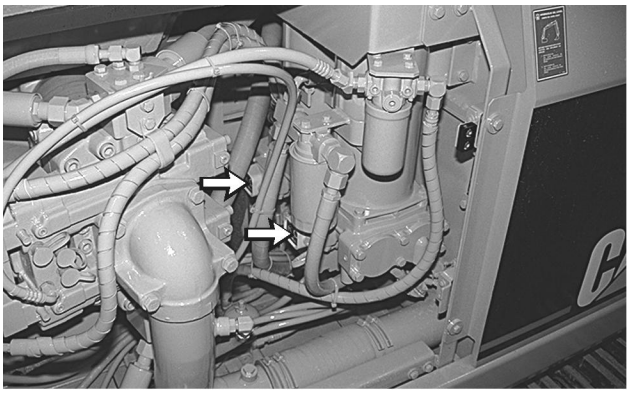


Illustration 428 g00118170

7. To turn off the indicator for a Restricted Hydraulic Return Filter, push the reset switches on the filter case while the engine start switch is in the ON position.

8. Repeat Steps 6a through 6e for the other filter.

i00872233

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

Replace the Pilot Filter

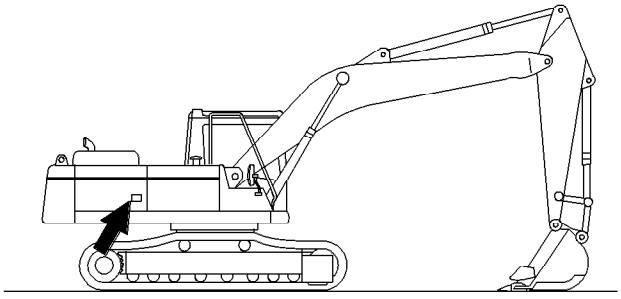


Illustration 429 g00101497

1. Open the access door on the right side of the machine.

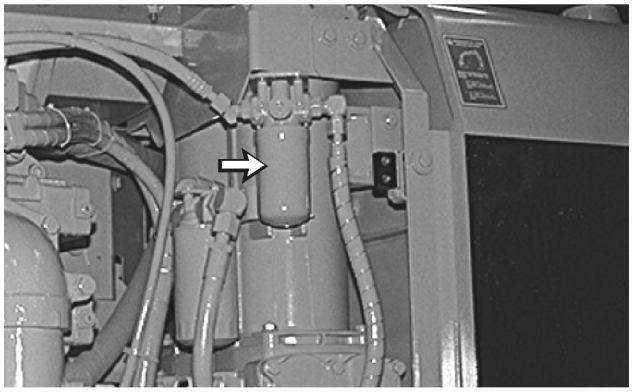


Illustration 430 g00277210

2. Clean the area in order to keep dirt out of the filter base.

3. Remove the used pilot filter element from the filter base.

Note: This element is a cartridge type filter. The element cannot be reused.

Note: Dispose of used filters according to local regulations.

4. Clean the filter base.

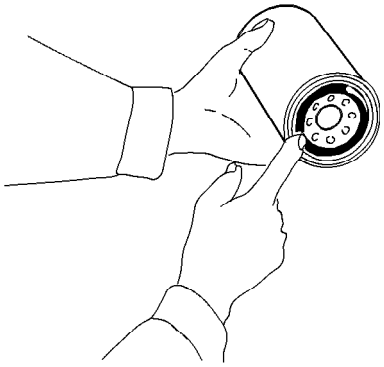


Illustration 431 g00101502

5. Coat the seal of a new pilot filter with clean hydraulic oil. Install the new pilot filter in the filter base. Tighten the pilot filter hand tight.

6. Close the access door.

Replace the Case Drain Filter

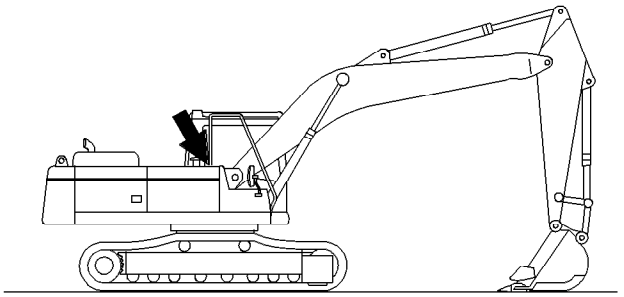


Illustration 432 g00101504

The case drain filter is located on the side of the fuel tank.

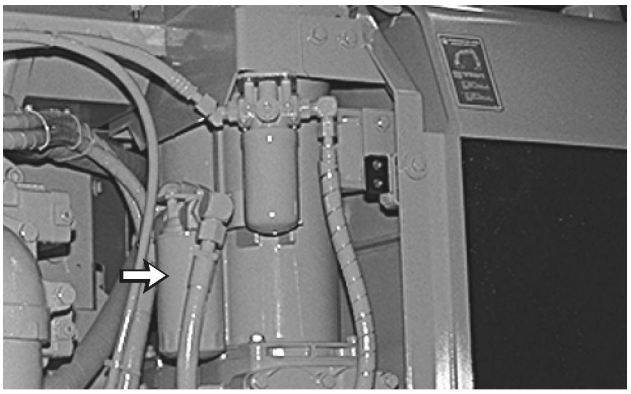


Illustration 433 g00277211

1. Clean the area in order to keep dirt out of the filter base.

2. Remove the used case drain filter from the filter base.

Note: This element is a cartridge type filter. The element cannot be reused.

Note: Dispose of used filters according to local regulations.

3. Clean the filter base.

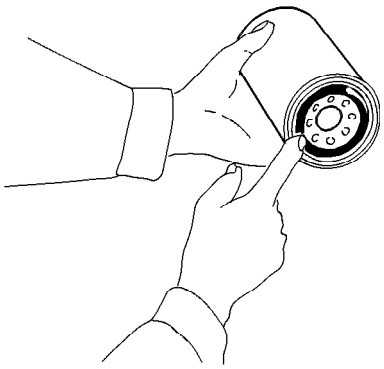


Illustration 434 g00101502

4. Coat the seal of a new case drain filter with clean hydraulic oil. Install the new case drain filter in the filter base. Tighten the case drain filter hand tight.

5. Drive the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles.

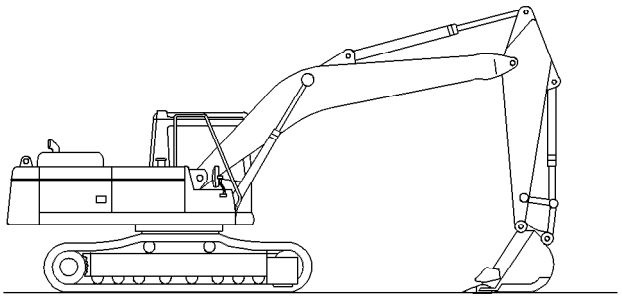


Illustration 435 g00101508

6. Return the machine to the servicing position, as shown. Check the machine for oil leaks.

7. Stop the engine.

8. Open the access door on the right side of the machine in order to access the sight gauge.

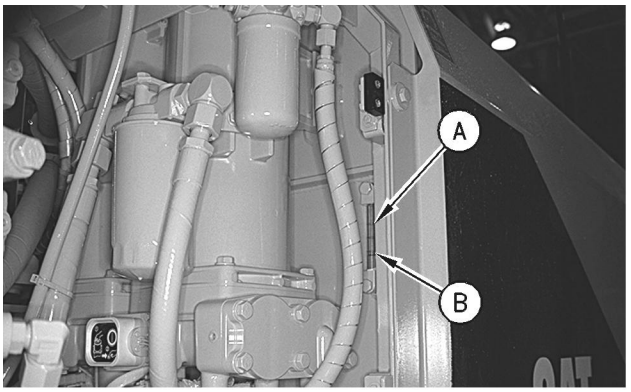


Illustration 436 g00115443

(A) High temperature range
(B) Low temperature range

9. 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.

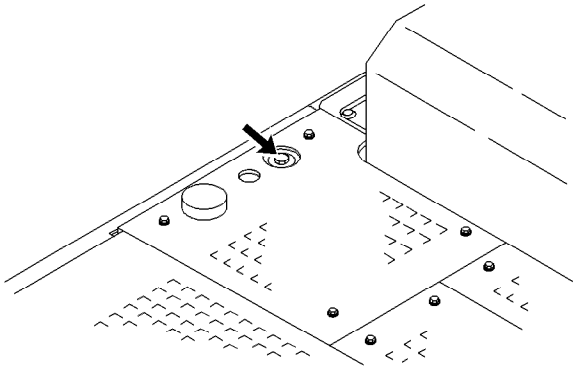


Illustration 437 g00277214

10. Slowly loosen the filler plug in order to relieve any pressure. Remove the filler plug in order to add oil, if necessary.

11. Clean the filler plug. Install the filler plug.

12. Close the access door.

Replace the Case Drain Filter for the Generator (If Equipped)

1. Open the cab riser compartment access door on the left side of the machine.

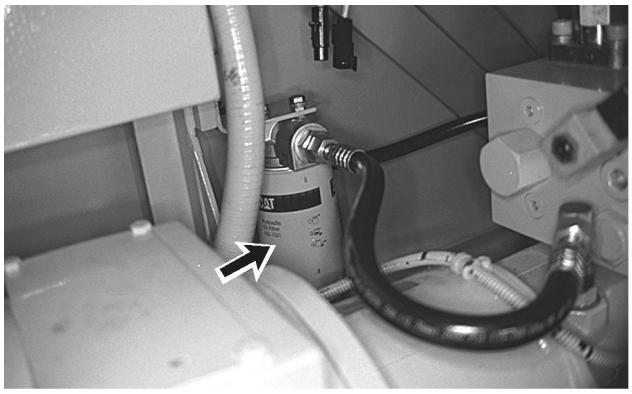


Illustration 438 g00274711

2. Clean the area in order to keep dirt out of the filter base.

3. Remove the used case drain filter from the filter base.

Note: This element is a cartridge type filter. The element cannot be reused.

Note: Dispose of used filters according to local regulations.

4. Clean the filter base.

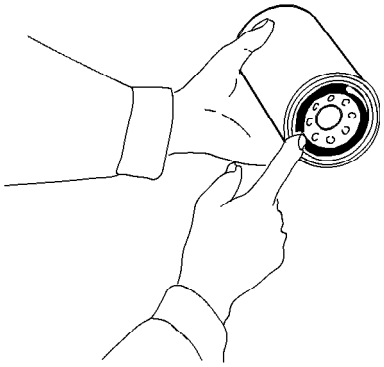


Illustration 439 g00101502

5. Coat the seal of a new case drain filter with clean hydraulic oil. Install the new case drain filter in the filter base. Tighten the case drain filter hand tight.

6. Close the cab riser compartment access door.

7. Drive the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles.

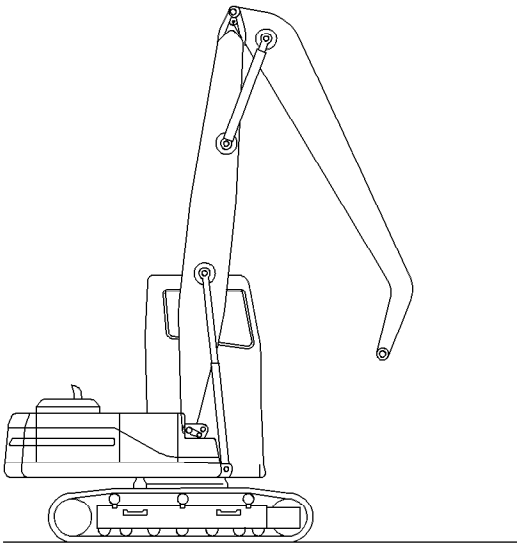


Illustration 440 g00442287

8. Return the machine to the servicing position, as shown. Check the machine for oil leaks.

9. Stop the engine.

10. Open the access door on the right side of the machine in order to access the sight gauge.

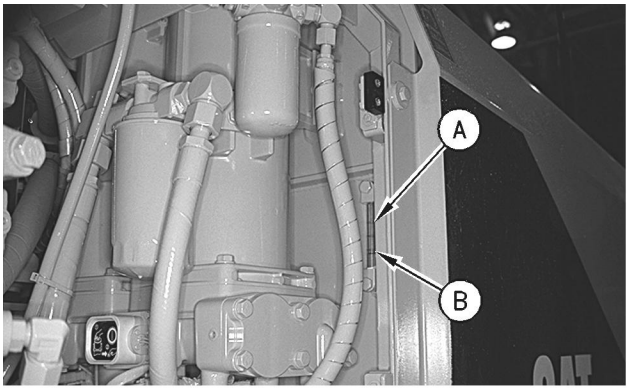


Illustration 441 g00115443

(A) High temperature range
(B) Low temperature range

11. 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.

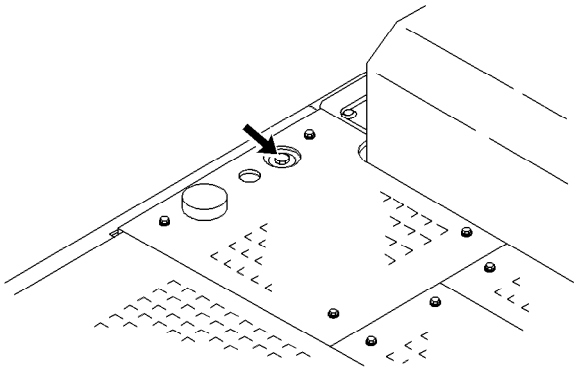


Illustration 442 g00277214

12. Slowly loosen the filler plug in order to relieve any pressure. Remove the filler plug in order to add oil, if necessary.

13. Clean the filler plug. Install the filler plug.

14. Close the access door.

i00670130

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

NOTICE
Never remove the fill/vent plug from the hydraulic tank if the oil is hot.

Air can enter the system and cause pump damage.

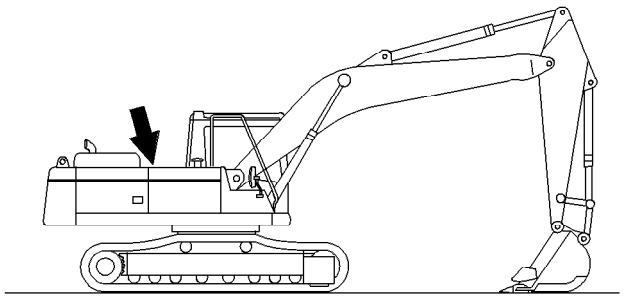


Illustration 443 g00101520

The hydraulic oil tank is on the right side of the machine.

1. Park the machine on level ground. Lower the bucket to the ground with the stick in a vertical position, as shown.

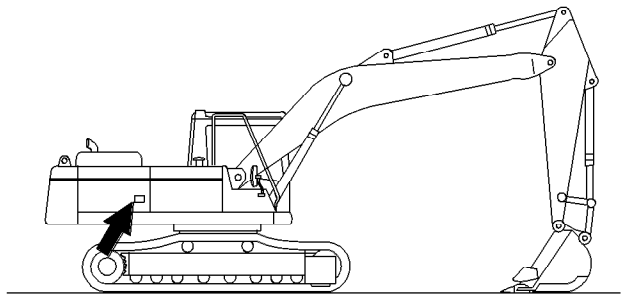


Illustration 444 g00101524

2. Open the access door on the right side of the machine.

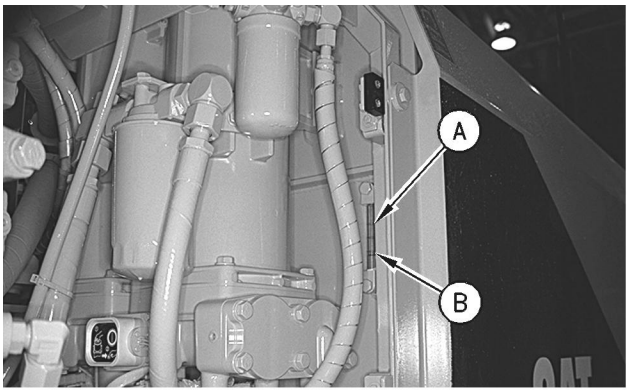


Illustration 445 g00115443

(A) High Temperature Range. (B) Low Temperature Range.

3. For a cold machine, maintain the hydraulic oil level in the low temperature range. For a machine that is at normal operating temperature, maintain the hydraulic oil level in the high temperature range.

4. Close the access door.

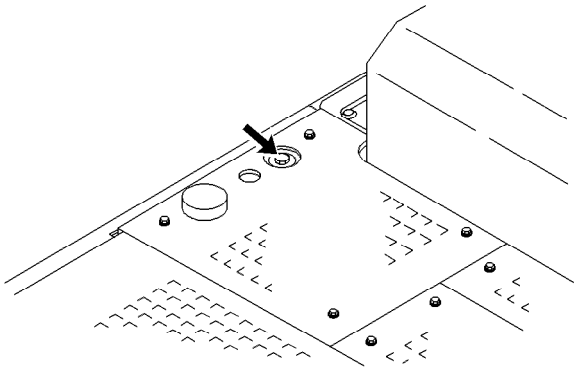


Illustration 446 g00277214

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on containing fluid spillage.

5. Slowly loosen the filler plug in order to relieve any pressure. Add oil, if necessary.

6. Check the O-ring seal of the filler plug. Replace the O-ring seal if the O-ring seal is damaged.

7. Clean the filler plug and install the filler plug.

8. Close the access door.

i01958140

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-SM; 5095-008; 7542-008; 7542

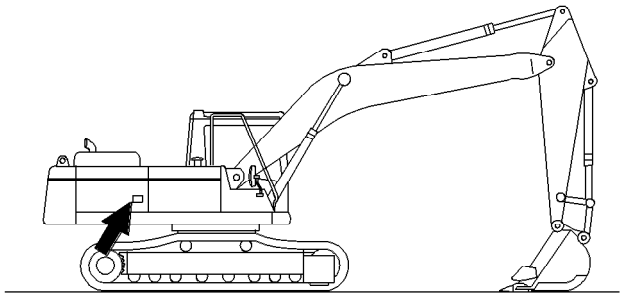


Illustration 447 g00101628

Open the access door on the right side of the machine in order to access the sampling valve.

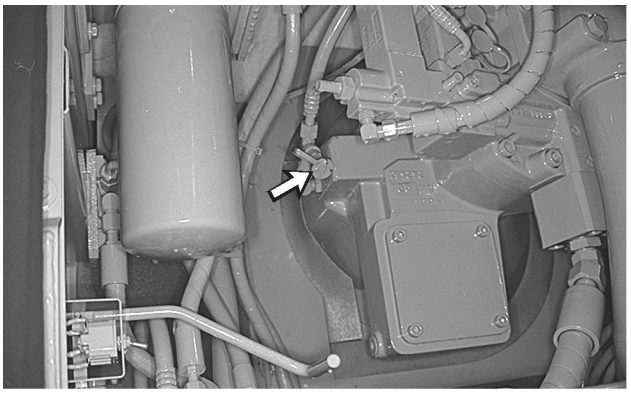


Illustration 448 g00277448

The hydraulic oil sampling valve is located between the engine oil filter and the main pump.

Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to a sample of the hydraulic oil. For additional information about taking an oil sample, refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i00073295

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

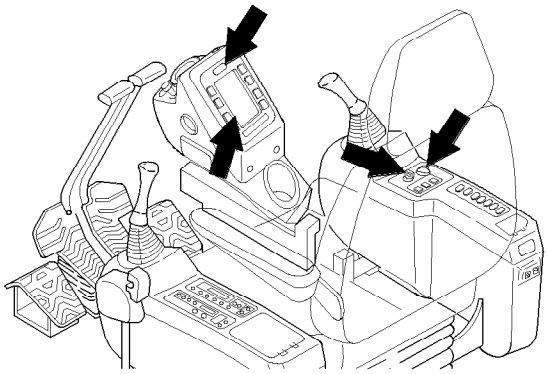


Illustration 449 g00103839

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.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris

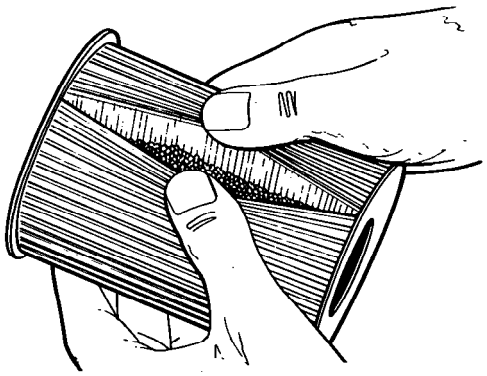


Illustration 450 g00100013

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.

i00872584

Radiator Core - Clean

SMCS Code: 1353-070

S/N: 4SS1–Up

S/N: 9GS1–Up

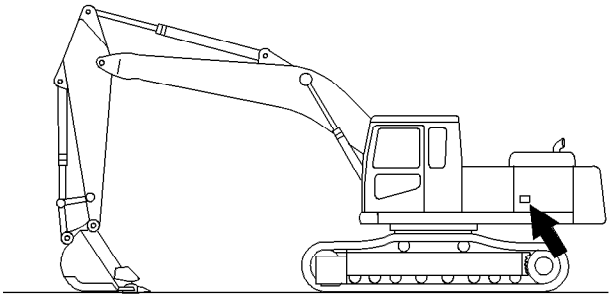


Illustration 451 g00102191

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

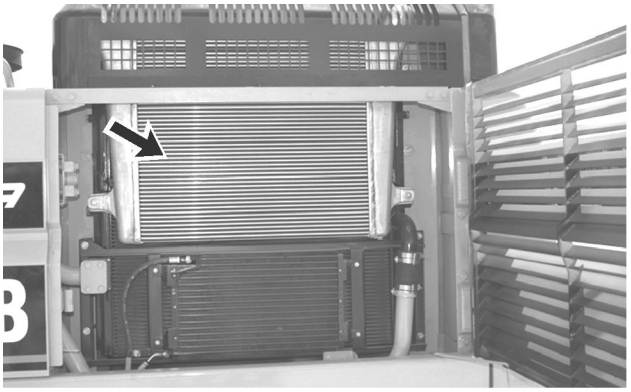


Illustration 452 g00360407

2. Check the radiator fins for debris.

3. Remove dust and debris from the radiator fins.

Refer to Operation and Maintenance, “General Hazard Information” for the proper safety precautions that should be followed before compressed air is used.

Compressed air is preferred, but high pressure water or steam can be used to remove dust and general debris from a radiator. Clean the radiator according to the condition of the radiator.

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

4. Close the access door.

i00872615

Radiator Core - Clean

SMCS Code: 1353-070

S/N: 2NW1–Up

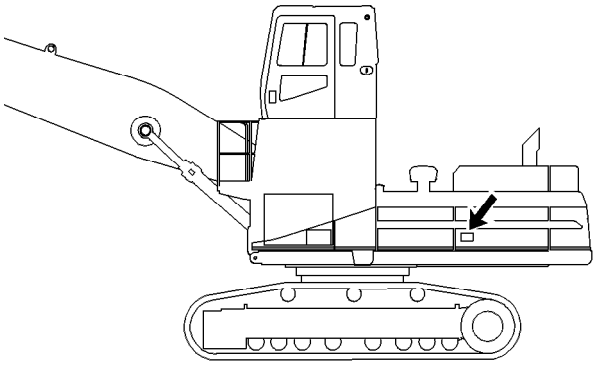


Illustration 453 g00470032

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

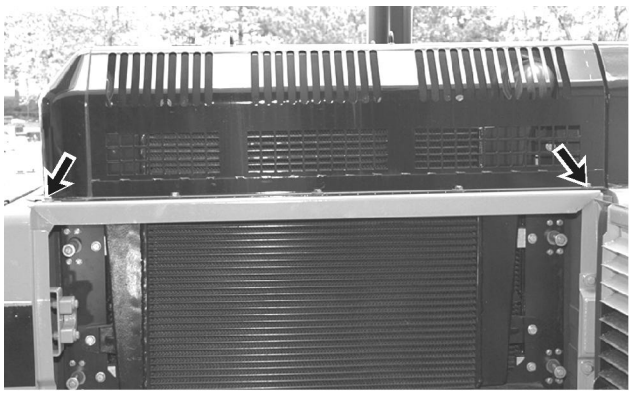


Illustration 454 g00442463

2. Remove two bolts from the hood that is over the radiator.

3. Lift the hood and lock the hood in place.

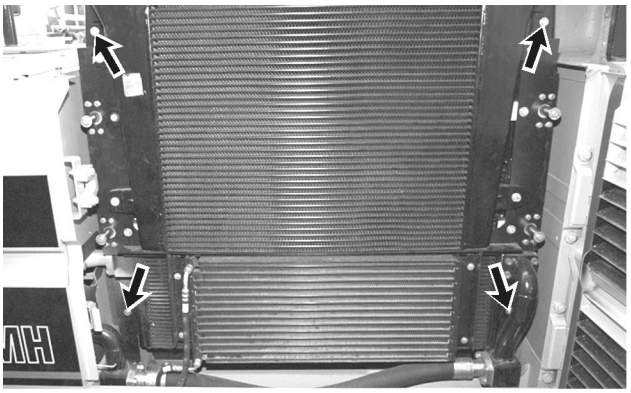


Illustration 455 g00442483

4. Remove four bolts from the hydraulic oil cooler.

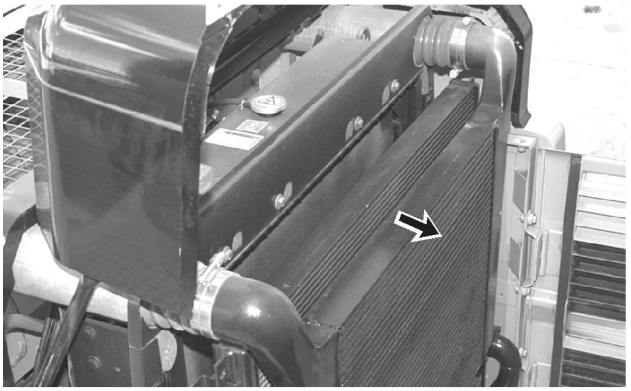


Illustration 456 g00447287

5. Slide the hydraulic oil cooler and the aftercooler away from the machine in order to gain access to the radiator fins.

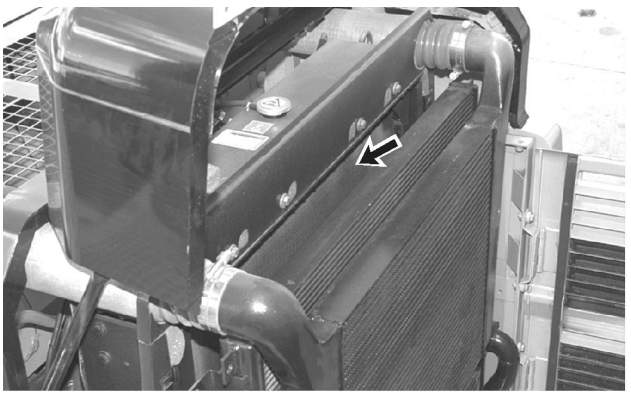


Illustration 457 g00442484

6. Check the radiator fins for debris.

7. Remove dust and debris from the radiator fins and from the screen of the radiator.

Refer to Operation and Maintenance, “General Hazard Information” for the proper safety precautions that should be followed before compressed air is used.

Compressed air is preferred, but high pressure water or steam can be used to remove dust and general debris from a radiator. Clean the radiator according to the condition of the radiator.

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

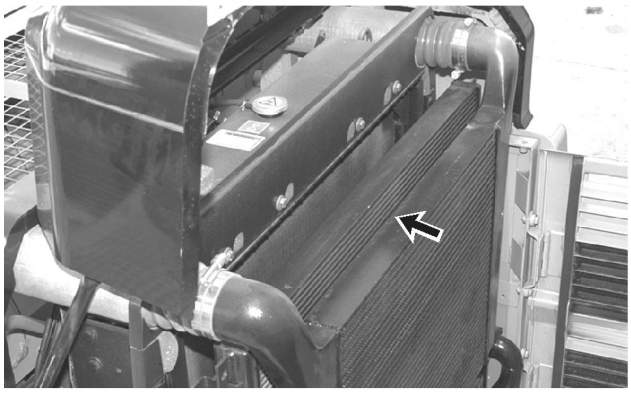


Illustration 458 g00447288

8. Slide the hydraulic oil cooler and the aftercooler toward the machine.

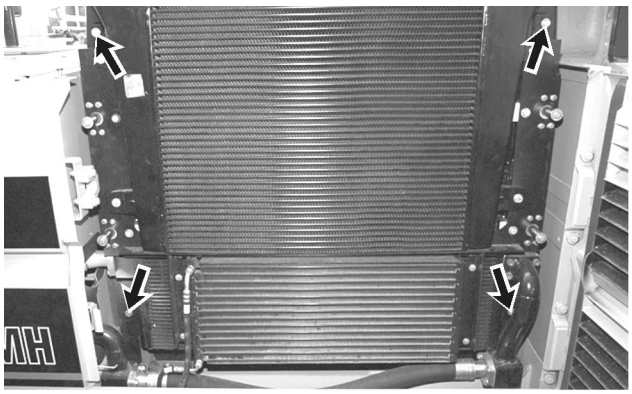


Illustration 459 g00442483

9. Install the four bolts back into the hydraulic oil cooler.

10. Close the hood that is over the radiator.

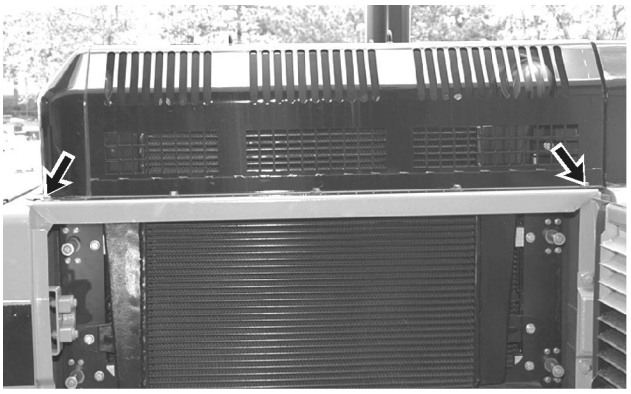


Illustration 460 g00442463

11. Install the two bolts back into the hood.

12. Close the access door.

i05805860

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, “Air Conditioning and Heating R-134a for All Caterpillar Machines” for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

i00112638

Seat Belt - Inspect

SMCS Code: 7327-040

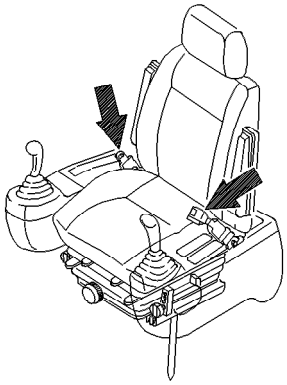


Illustration 461 g00101563

When this machine was shipped from Caterpillar, Inc., this machine was equipped with a seat belt and with a seat belt installation. At the time of installation, the seat belt and the seat belt installation met “SAE J386 JUN85” for an industrial machine and “SAE J386 JUN93”. Consult your Caterpillar dealer for all replacement parts.

Regardless of appearance, replace the seat belt after every three years of use. A date label for determining the age of the seat belt is attached to each seat belt.

Always check the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. If damage or wear is found, replace either the seat belt or the seat belt mounting hardware before operating the machine.

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).

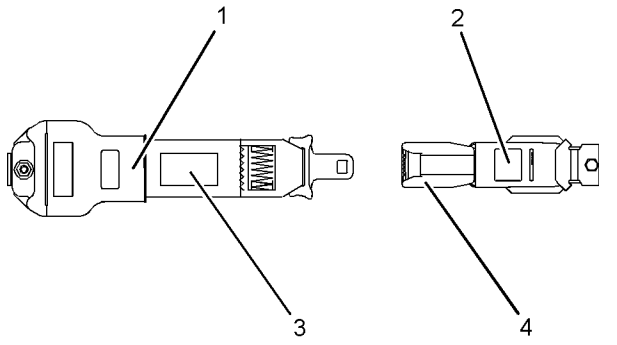


Illustration 462 g01152685

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.

i03867596

Swing Bearing - Lubricate

SMCS Code: 7063-086

Note: Caterpillar recommends the use of multipurpose lithium grease NLGI Grade 2 for lubricating the swing bearing. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on multipurpose lithium grease.

Note: Do not overgrease the swing bearings. Do not grease more than the recommended maintenance interval. Refer to Operation and Maintenance Manual, “Maintenance Interval Schedule” for more information.

Wipe the fittings before you lubricate the swing bearings.

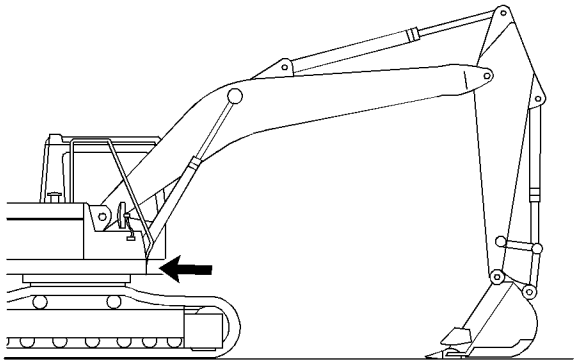


Illustration 463 g02110713

The swing bearings are under the base of the boom.

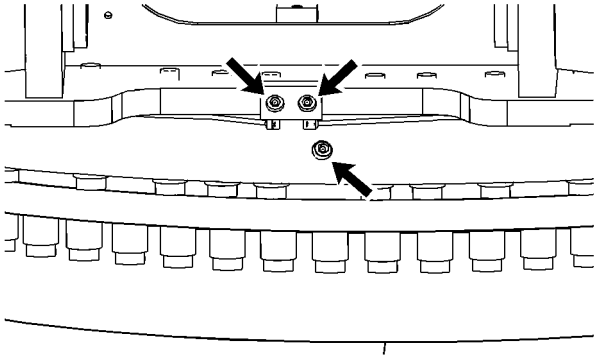


Illustration 464 g01106319

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

i02077056

Swing Drive Oil - Change

SMCS Code: 5459-044

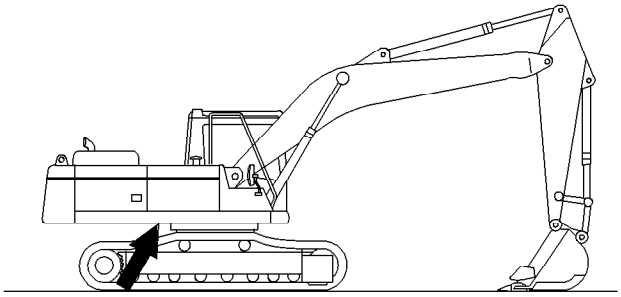


Illustration 465 g00101586

The oil drain hose is under the center of the upper structure.

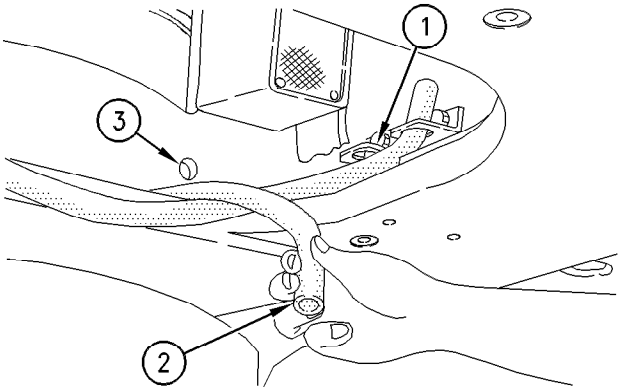


Illustration 466 g00278625

(1) Holder
(2) Drain hose
(3) Hole

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

1. Remove drain hose (2) from holder (1) on the upper frame. Face the end of the hose toward the container.
2. Use a universal joint with a socket extension to loosen the drain valve in hole (3). Drain the oil into a suitable container.

Note: Dispose of drained fluids according to local regulations.

Note: There are two swing drives that are located between the swivel joint and the main control valve. Perform the same procedure for both swing drives.

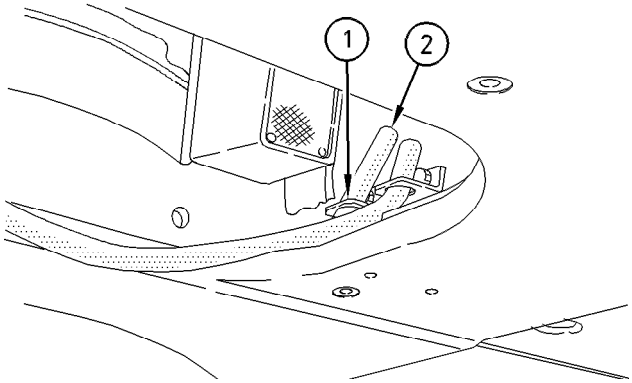


Illustration 467 g00278624

(1) Holder
(2) Drain hose

3. Tighten the drain valve. Hook the drain hose (2) to the holder (1). Make sure that the end of the hose is facing upward.

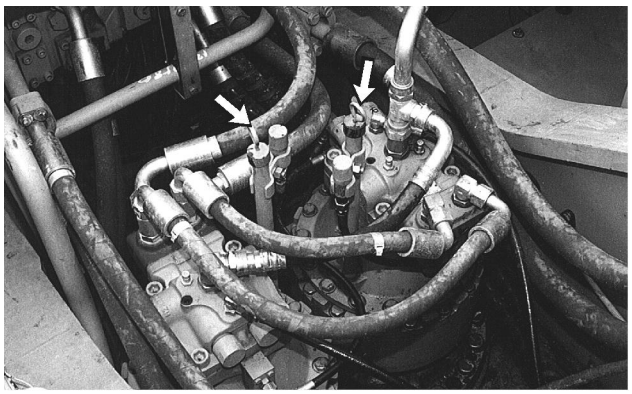


Illustration 468 g00115460

4. Remove the dipstick.

5. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, “Capacities (Refill)”.

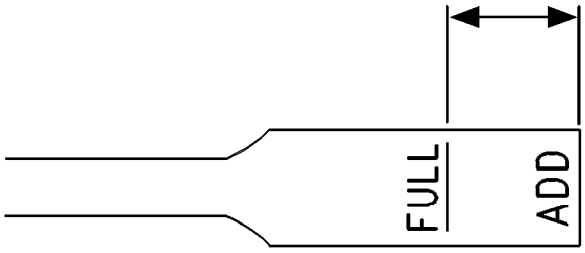


Illustration 469 g01049757

6. Make sure that the oil level is maintained between the tip of the dipstick and the “FULL” 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.

Note: Dispose of drained materials according to local regulations.

i03867532

Swing Drive Oil Level - Check

SMCS Code: 5459-535-FLV

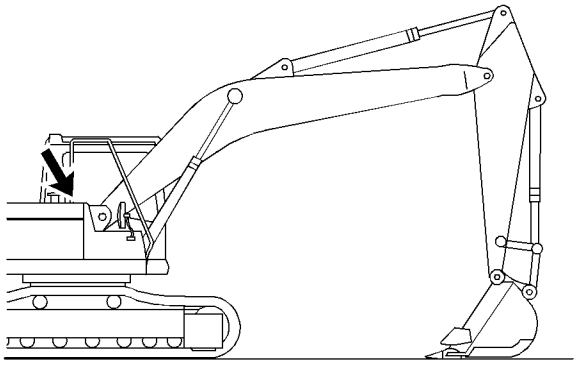


Illustration 470 g02110464

The dipstick for the swing drive oil is on the swing drive at the rear base of the boom.

Note: There are two swing drives that are located between the swivel joint and the main control valve. Perform the same procedure for both swing drives.

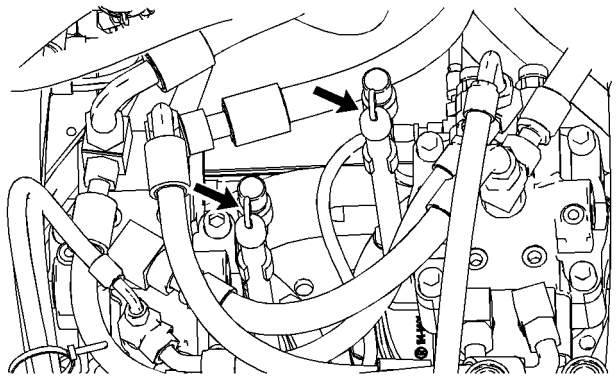


Illustration 471 g01106264

1. Remove the dipstick.

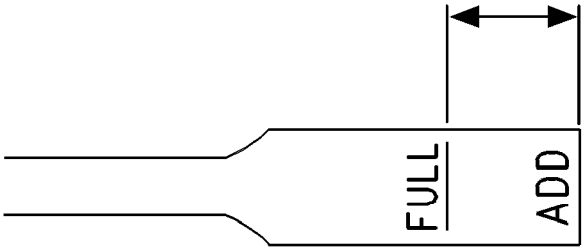


Illustration 472 g01049757

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 “FULL” mark on the dipstick. Add oil through the dipstick tube, if necessary. When the oil level becomes close to the “ADD” mark, add approximately 500 cc of oil. See Operation and Maintenance, “Lubricant Viscosities”.

3. Insert the dipstick.

4. Check the dipstick again.

5. Reinsert the dipstick.

i04787571

Swing Drive Oil Sample - Obtain

SMCS Code: 5459-008-OC; 5459-008; 5459-OC; 5459-554-OC; 7542-008

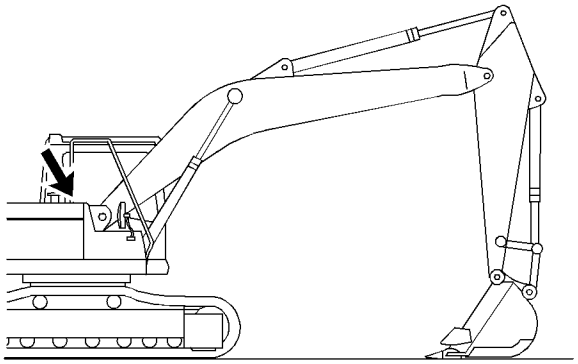


Illustration 473 g02110464

The dipstick for the swing drive oil is on the swing drive at the rear base of the boom.

Note: There are two swing drives that are located between the swivel joint and the main control valve. Perform the same procedure for both swing drives.

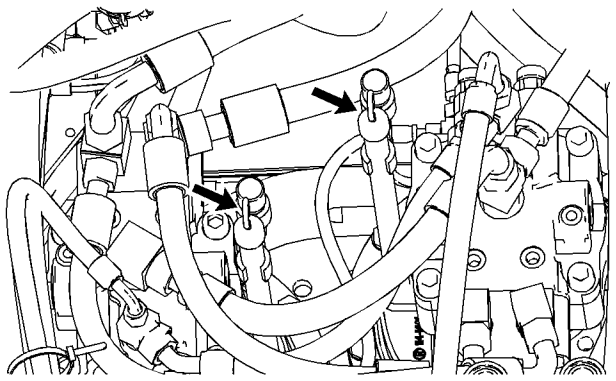


Illustration 474 g01106264

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.

i03804517

Swing Gear - Lubricate

SMCS Code: 7063-086

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.

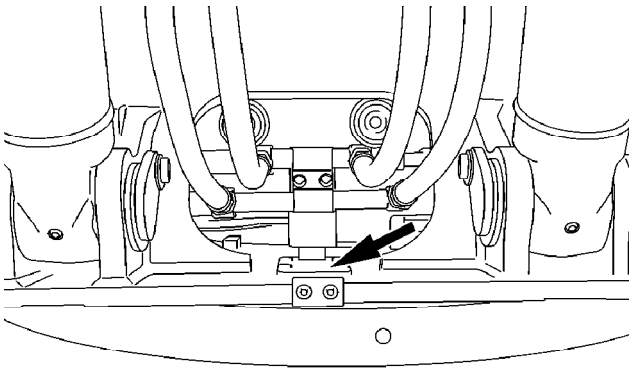


Illustration 475 g00834990

Remove the inspection cover that is located near the boom base. Inspect the grease.

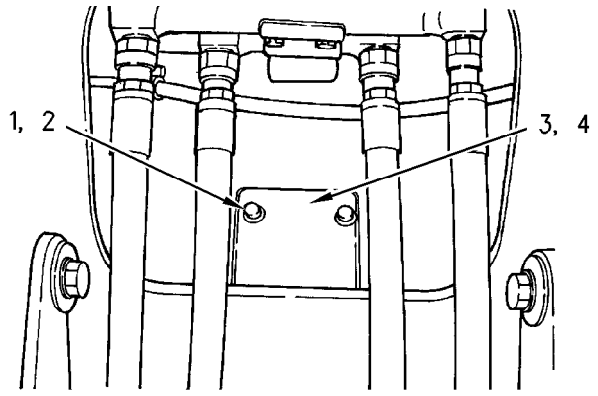


Illustration 476 g00688056

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).

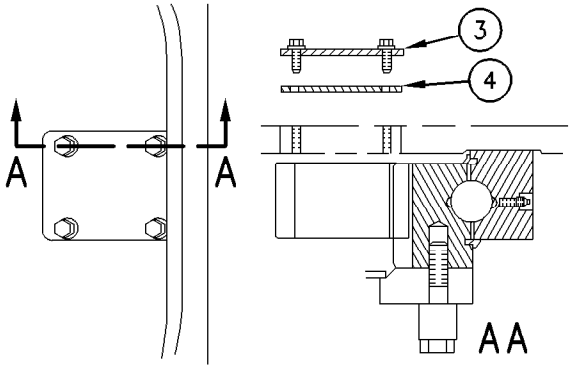


Illustration 477 g00115464

2. Inspect gasket (4). Replace the gasket if damage is evident.

3. Check the level of the grease. The grease should be evenly distributed on the floor of the pan.

Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the capacity of the swing gear.

Add grease, as needed. Remove grease, as needed. Too much grease will result in the deterioration of the grease that is caused by excessive movement of the grease. Too little grease will result in poor lubrication of the swing gear.

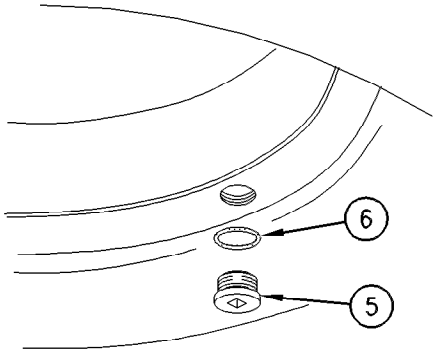


Illustration 478 g00101653

4. Check for contamination and for discolored grease.

5. If the grease is contaminated or discolored with water, change the grease. Remove plug (5) in order to allow the water to drain. When you reinstall plug (5), inspect O-ring seal (6). Replace the O-ring seal if damage is evident.

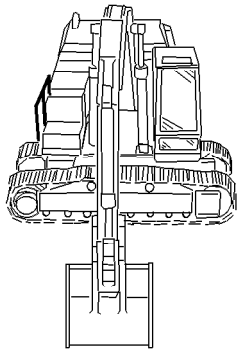


Illustration 479 g00101644

6. Raise the boom and turn the upper structure by 90 degrees. Lower the bucket to the ground.

7. Repeat Step 6 at every 90 degrees in 4 places. Add grease, as needed.

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.

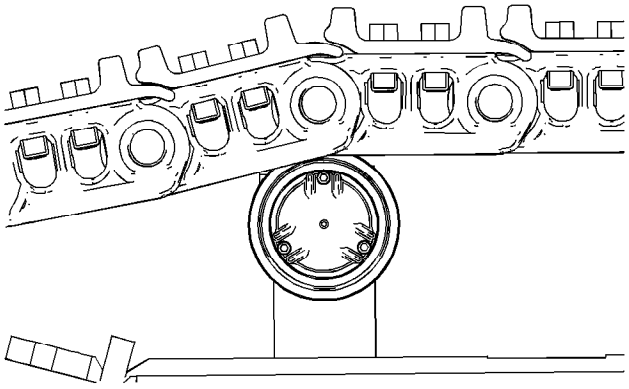


Illustration 480 g01103855

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.

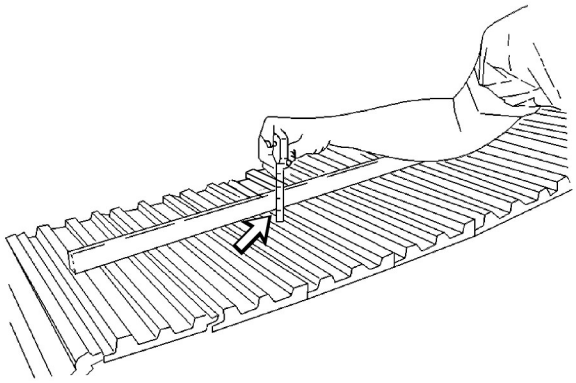


Illustration 481 g03472827

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

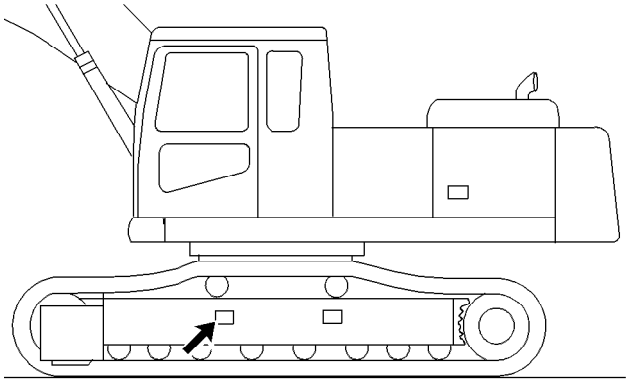


Illustration 482 g00270405

Typical example

The track adjuster is located on the track frame.

Tightening the Track

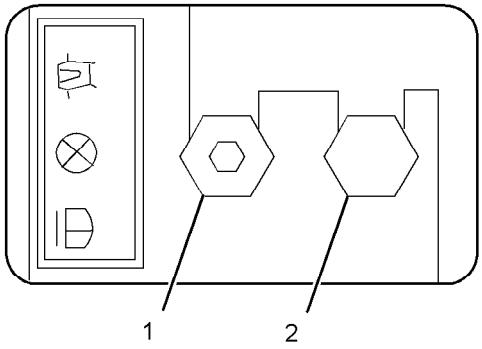


Illustration 483 g01091134

(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

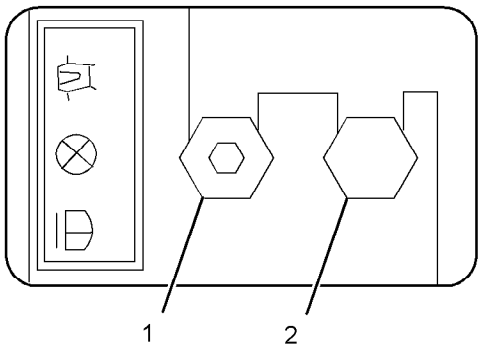


Illustration 484 g01091134

(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.

i00370385

Track Adjustment - Inspect

SMCS Code: 4170-040

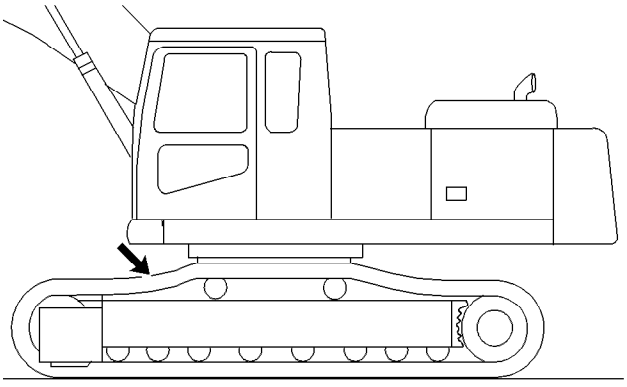


Illustration 485 g00270359

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, see Operation and Maintenance Manual, “Track Adjustment - Adjust”.

i01981714

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 implements in order to avoid any obstacles. Make sure that there is adequate overhead clearance.

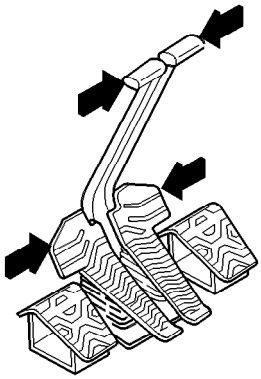


Illustration 486 g00560313

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.

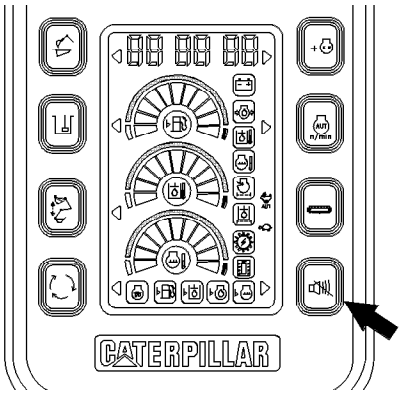


Illustration 487 g00101993

6. Push the alarm cancel switch. The travel alarm should shut off.
7. Stop the machine. Lower the implements. Move the hydraulic lockout control to the LOCKED position. Stop the engine.

i03934011

Undercarriage - Check

SMCS Code: 4150-535

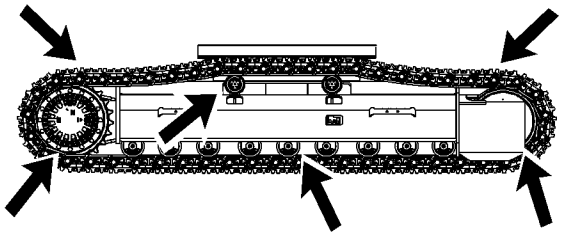


Illustration 488 g02154815

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.

i01955707

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.

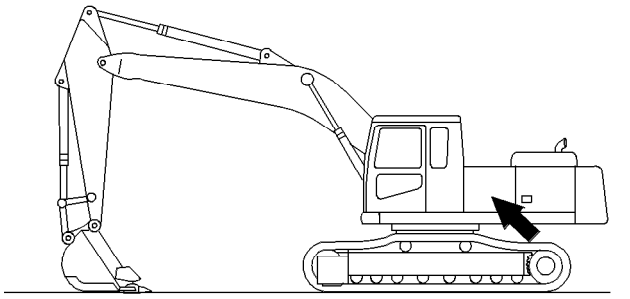


Illustration 489 g00101721

The bottle for the windshield washer fluid is located behind the cab.

1. Open both access doors on the left side of the machine. The rear access door must be opened first.

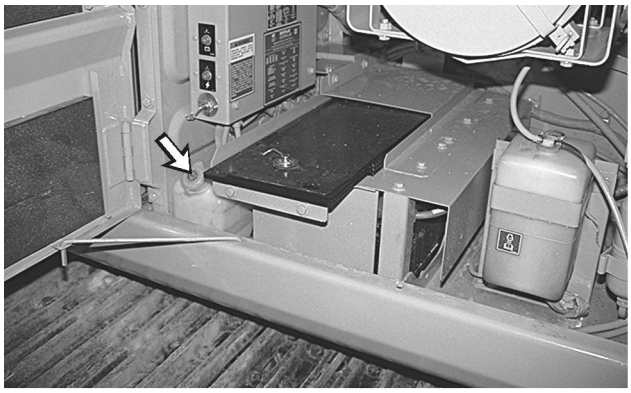


Illustration 490 g00270301

2. Remove the filler cap.

3. Fill the bottle with washer fluid through the filler opening.

4. Install the filler cap.

5. Close the access doors.

6. The window washer nozzles can be adjusted so that the washer fluid will be sprayed in the desired direction.

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.

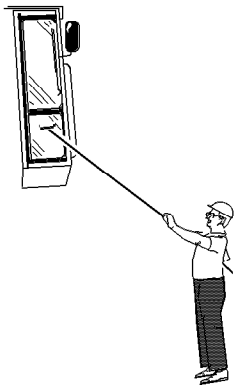


Illustration 491 g00566124

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.

Reference Information Section

Reference Materials

i01958158

Reference Material

SMCS Code: 1000; 7000

Caterpillar Reference Material

Special Publication, SENR5664, “Air Conditioning and Heater R-134a for All Caterpillar Machines”

Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”

Special Publication, LEDQ7315, “CG-4 Oil The Preferred Oil for Caterpillar Engines”

Special Publication, SEBU5898, “Cold Weather Recommendations”

Special Publication, SEBD0970, “Coolant and Your Engine”

Special Publication, SEBD400-03, “Dictionary of Pictograph Symbols”

Special Publication, SEBD0717, “Diesel Fuels and Your Engine”

Special Publication, NEHP5621, “How to Select the Right Grease for Any Job”. This publication lists the typical characteristics for eleven of Caterpillar's greases.

Special Publication, PEHP6001, “How to Take a Good Oil Sample”

Special Publication, SEBD0518, “Know Your Cooling System”

Special Publication, PEEP5027, “Label - ELC Radiator Label”

Special Publication, SEBD0640, “Oil and Your Engine”

Special Publication, SMBU6981, “Emissions Control Warranty Information for US, Canada, and California”

Service Magazine, SEBD1587, “What ROPS/FOPS Certification Means”

Service Magazine, SEBD6929, “Inspection, Maintenance and Repair of ROPS and Attachment Installation Guidelines”

System Operation, Troubleshooting and Testing Adjusting, RENR5885, “Product Link 151/201”

Special Publication, PECP9067, “One Safe Source”

Special Publication, PEHP6047, “Product Data Sheet for Caterpillar Biodegradable Hydraulic Oil (HEES)”

Special Publication, PEHP7041, “Product Data Sheet for Caterpillar Diesel Engine Oils (DEO)” CG-4 Engine Oils (International Markets)

Special Publication, PEHP8038, “Product Data Sheet for Caterpillar Diesel Engine Oils (DEO)” CH-4 Engine Oils, (North America, Australia)

Special Publication, PEHP4036, “Product Data Sheet for Caterpillar ELC”

Special Publication, PEHP7508, “Product Data Sheet for Caterpillar Gear Oil (GO)”

Special Publication, PEHP0005, “Product Data Sheet for Caterpillar Hydraulic Oil (HYDO)”

Special Publication, PEHP0003, “Product Data Sheet for Multipurpose Lithium Complex Grease (MPG)”

Special Publication, NEDG6022, “Product Data Sheet for Multipurpose Lithium Complex Grease with Molybdenum (MPGM)”

Special Publication, PEHP3050, “Product Data Sheet for Caterpillar Multipurpose Tractor Oil (MTO)”

Special Publication, PEHP8035, “Product Data Sheet for TDTO Transmission Multi-Season (TMS)”

Special Publication, PEHP0017, “Product Data Sheet for Special Purpose Grease (SPG) Bearing Lubricant”

Special Publication, PEHP7057, “S·O·S Coolant Analysis”

Special Publication, SENR3130, “Torque Specifications”

Special Publication, PEHP7076, “Understanding S·O·S Services Test”

Additional Reference Material

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.

Engine Manufacturers Association, “Engine Fluids Data Book”

Engine Manufacturers Association
Two North LaSalle Street, Suite 2200
Chicago, Illinois, USA 60602
E-mail: ema@enginemanufacturers.org
(312) 827-8700
Facsimile: (312) 827-8737

SAE J754, “Nomenclature” This can normally be found in the SAE handbook.

ASTM D2896, “TBN Measurements” This can normally be obtained from your local technological society, from your local library, or from your local college.

i07743978

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

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

Utilize appropriate personal protective equipment when decommissioning and disposing product.

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

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____