SEBU8560-14 (en-us)
June 2020

Operation and Maintenance Manual

349E Excavator

FJB 1-UP (349E)
WHZ 1-UP (349E)
RGH 1-UP (349E)
SPG 1-UP (349E)
TFG 1-UP (349E)
MPZ 1-UP (349E)
KCN 1-UP (349E)
DGE 1-UP (349E)
KFX 1-UP (349E)
MZW 1-UP (349E)
ETC 1-UP (349E)

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:

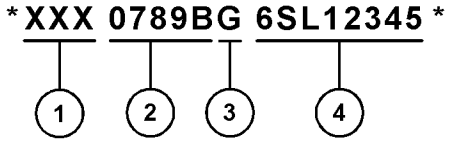

Illustration 1 g03891925

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

i08061512

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. Become familiarized with all safety messages.

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

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

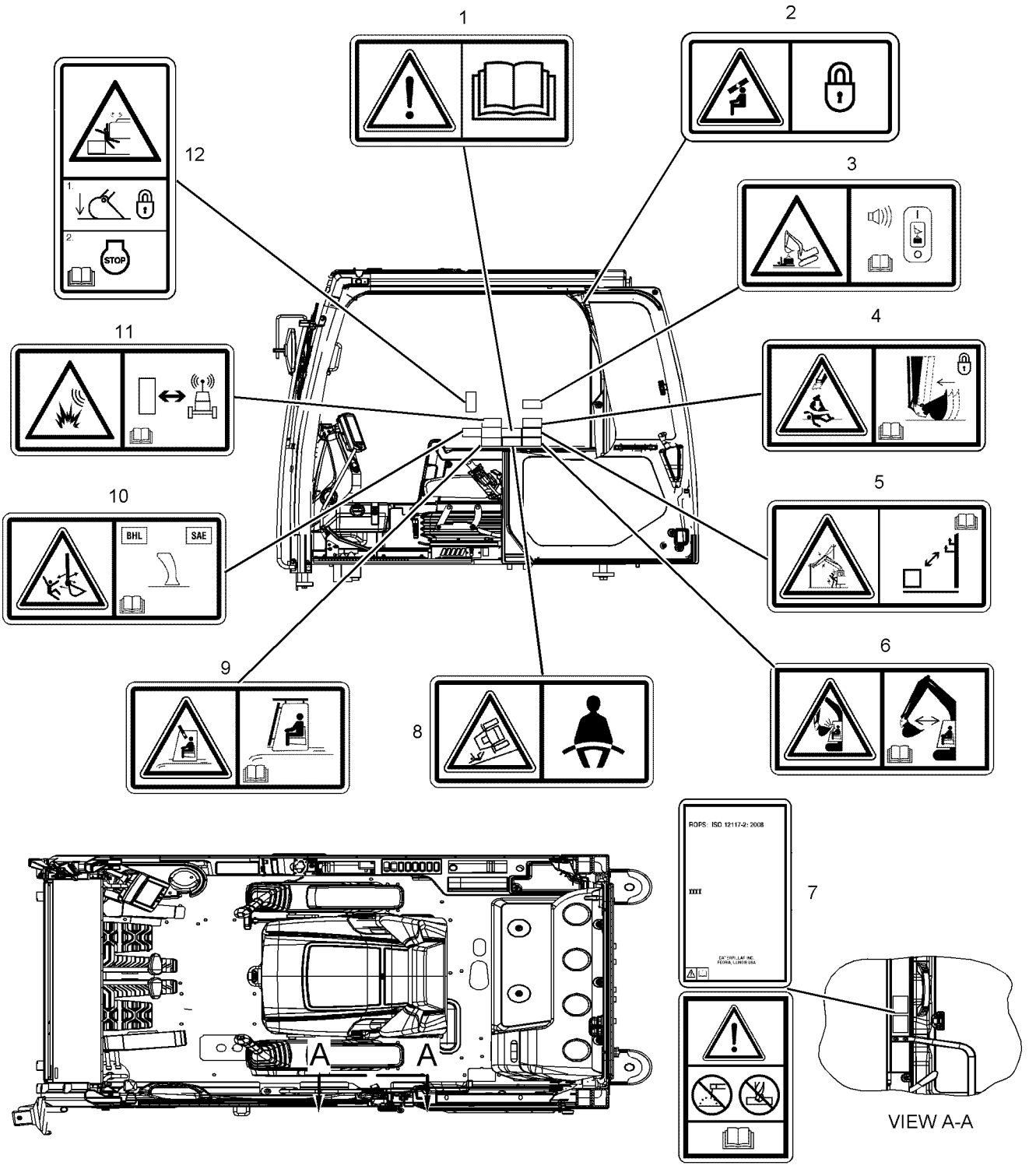

Illustration 2
g02282253

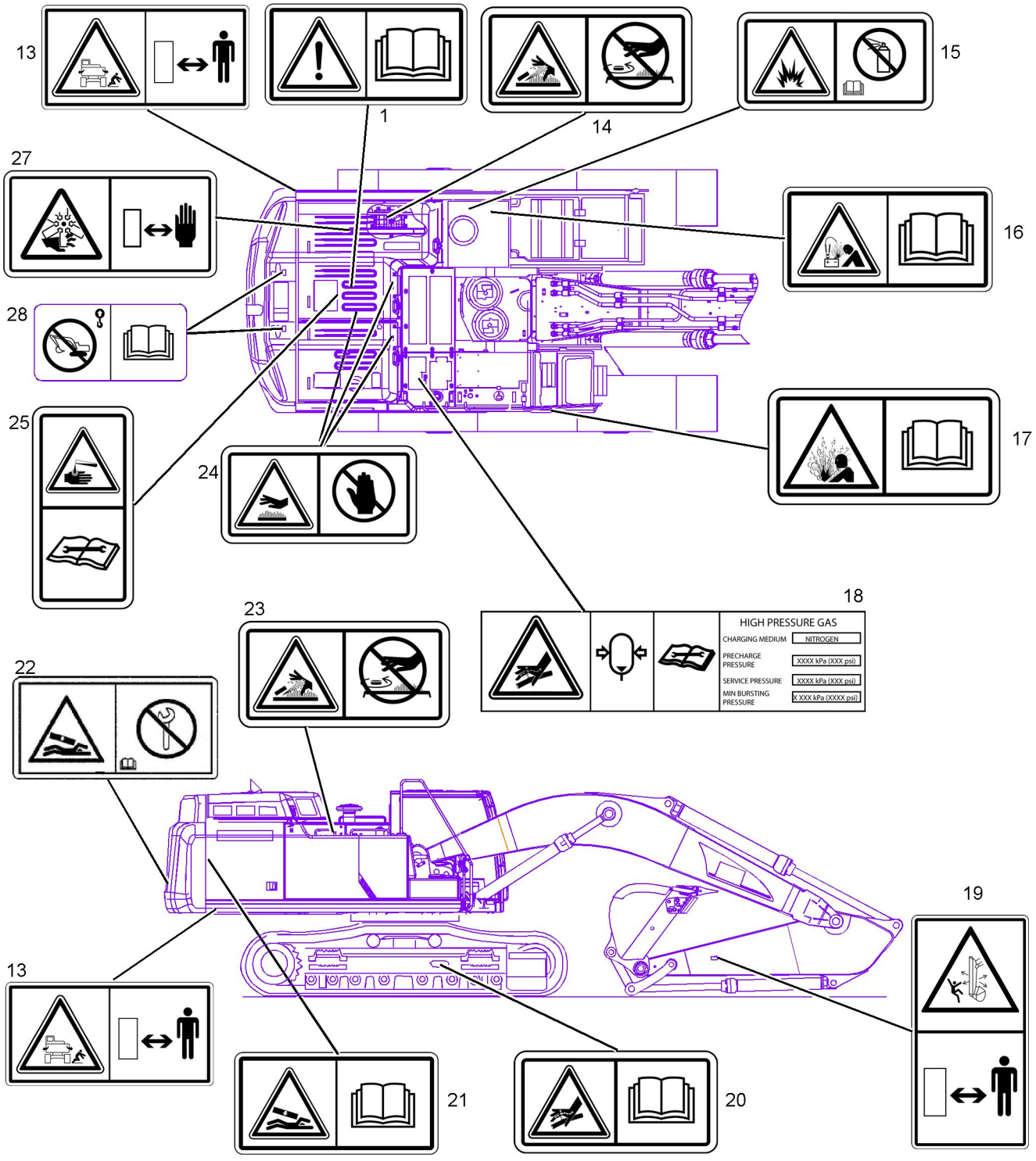

Illustration 3 g06528886

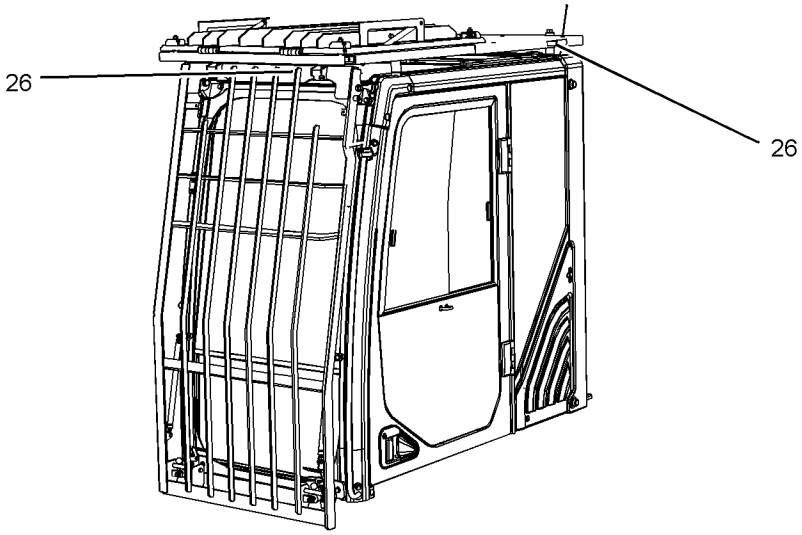

Illustration 4 g03246641

Do Not Operate (1)

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

Illustration 5 g01370904

⚠ WARNING

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

Crushing Hazard (2)

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

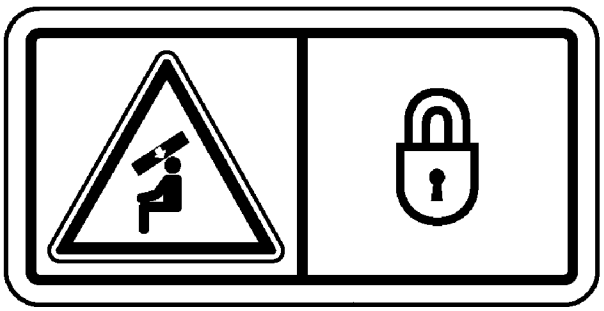

Illustration 6 g02061339

⚠ WARNING

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

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

Overload Warning Device (3)

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

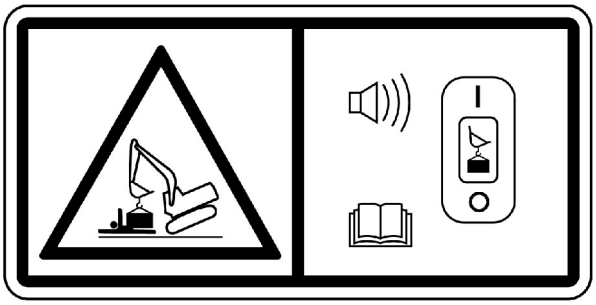

Illustration 7 g01602013

WARNING

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

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

Crushing Injury (4)

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

Illustration 8 g01374035

WARNING

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

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

Electrical Power Lines (5)

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

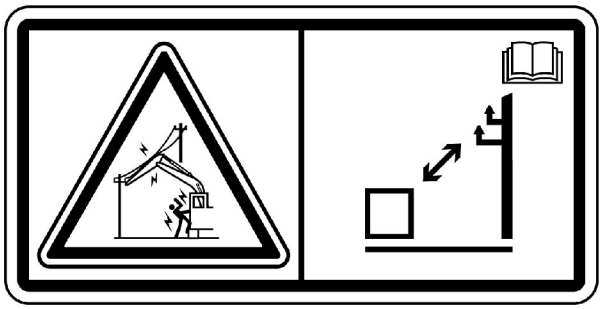

Illustration 9 g01374045

DANGER

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

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

Crushing Hazard (6)

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

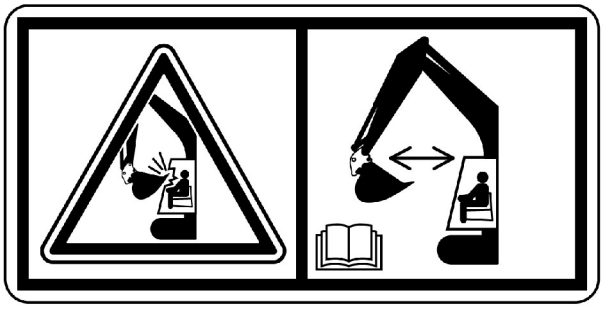

Illustration 10 g01373971

⚠ WARNING

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

Do Not Weld or Drill on ROPS (7)

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

Illustration 11 g01970802

⚠ WARNING

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

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

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

Seat Belt (8)

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

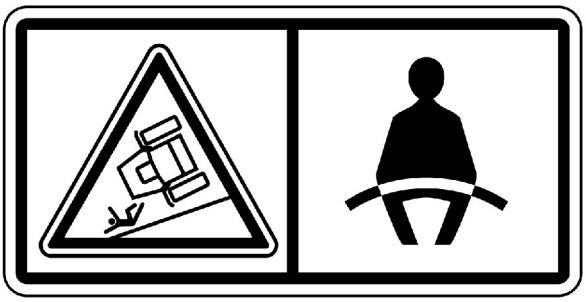

Illustration 12 g01370908

⚠ WARNING

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

Crushing Hazard (9)

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

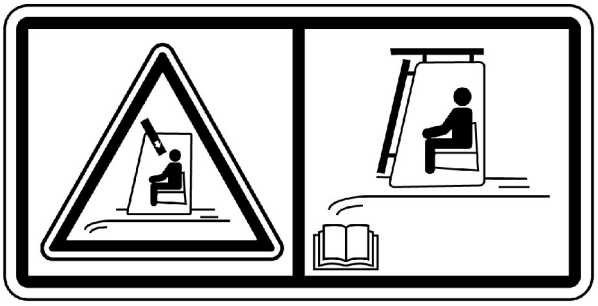

Illustration 13 g01374048

⚠ WARNING

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

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

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

Joystick Controls Alternate Patterns (10)

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

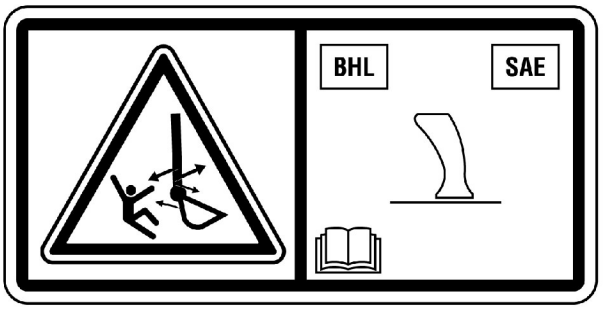

Illustration 14 g01374050

⚠ WARNING

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

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

Product Link (11)

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

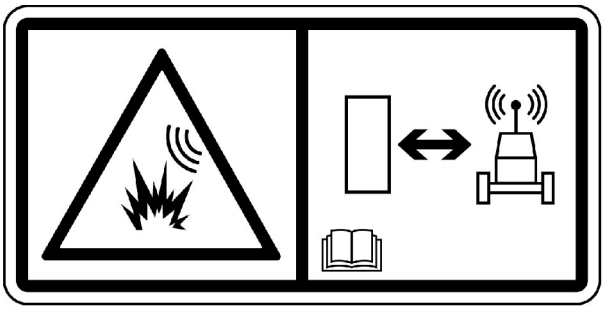

Illustration 15 g01370917

WARNING

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

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

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

Crushing Hazard (12)

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

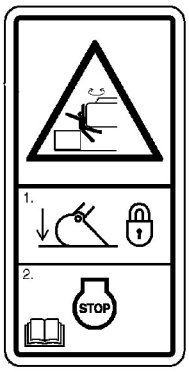

Illustration 16 g02282255

WARNING

Crush Hazard! A machine may move unexpectedly and without warning resulting in personal injury or death.

Before leaving the machine lower the work tool to the ground, lock operator controls, shut off the engine and remove the key.

Refer to Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration” for further information.

Crushing Hazard (13)

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

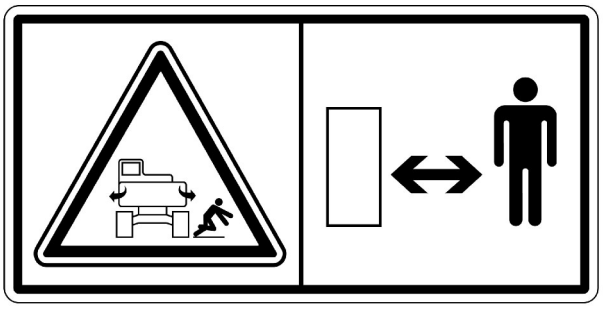

Illustration 17 g01374060

WARNING

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

Pressurized System (14)

This safety message is located next to the cooling system pressure cap.

Illustration 18 g01371640

WARNING

Pressurized system! Hot coolant can cause serious burns, injury or death. To open the cooling system filler cap, stop the engine and wait until the cooling system components are cool. Loosen the cooling system pressure cap slowly in order to relieve the pressure. Read and understand the Operation and Maintenance Manual before performing any cooling system maintenance.

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

Aerosol Starting Aid (15)

This safety message is positioned on the cover of the intake duct of the air cleaner. The following information is not applicable to machines that are equipped with an ether starting aid.

Illustration 19 g01372254

WARNING

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

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

Jump-Start Cables (16)

This safety message is positioned behind the front left access door near the batteries.

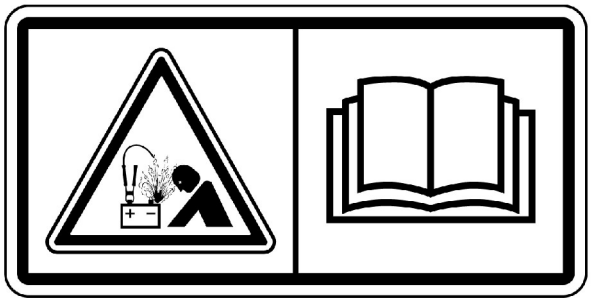

Illustration 20 g01370909

WARNING

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

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

Vapor Explosion (17)

If equipped, this safety message is on the storage compartment for the fuel transfer pump.

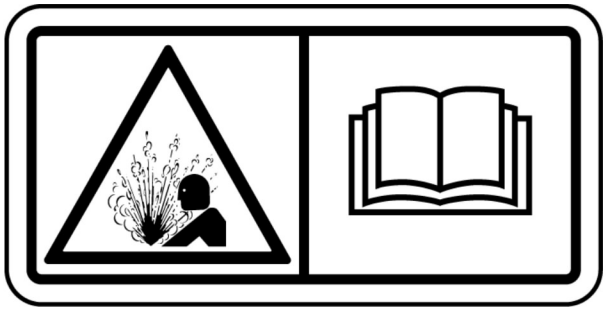

Illustration 21 g01407639

WARNING

Explosion hazard! Fuel vapors can accumulate in the refueling pump compartment and can be ignited by improper operation of the refueling pump. Failure to follow the operating instructions for the refueling pump could result in personal injury or death. Read and follow the operating instructions for the refueling pump in the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, “Fuel Transfer Pump (Refueling)” for further information.

High-Pressure Gas (18)

This safety message is positioned on the accumulator.

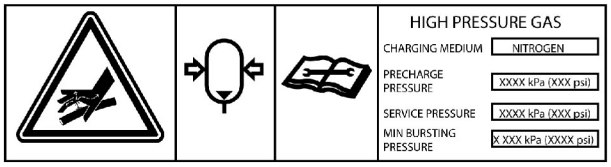

Illustration 22 g01374065

⚠ WARNING

Pressurized System!

Hydraulic accumulators contain gas and oil under high pressure. DO NOT disconnect lines or disassemble any component of a pressurized accumulator. All gas pre-charge must be removed from the accumulator as instructed by the service manual before servicing or disposing of the accumulator or any accumulator component.

Failure to follow the instructions and warnings could result in personal injury or death.

Only use dry nitrogen gas to recharge accumulators. See your Cat dealer for special equipment and detailed information for accumulator service and charging.

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

Crushing Hazard (19)

This safety message is on both sides of the stick.

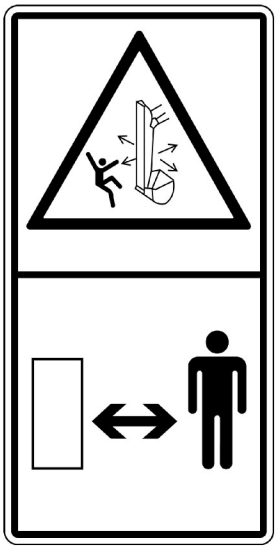

Illustration 23 g01385579

⚠ WARNING

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

High-Pressure Cylinder (20)

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

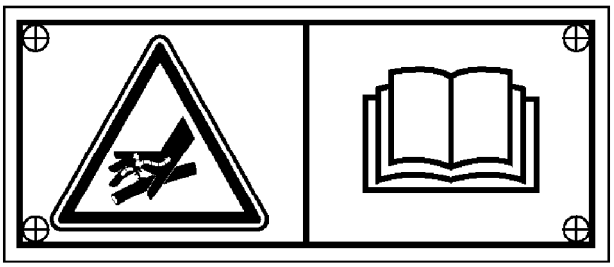

Illustration 24 g01076729

WARNING

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

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

Crushing Hazard (Counterweight) (21)

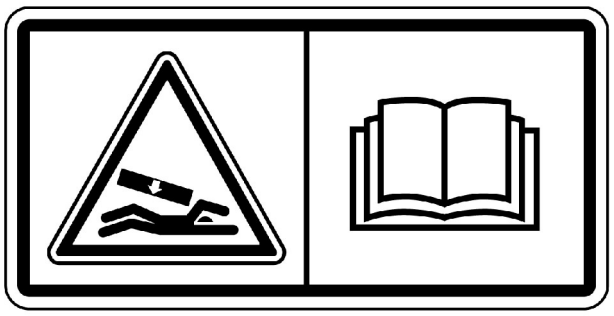

Illustration 25 g01435553

This safety message is on the right side of the machine inside the access door.

WARNING

Crushing Hazard! When the counterweight is in the fully extended position for servicing the machine, secure the extended counterweight with the counterweight lock lever.

Use the counterweight lock lever to avoid possible personnel injury or death from crushing.

Refer to Operation and Maintenance Manual, “Counterweight Remov al and Installation” for further information.

Crushing Hazard (22)

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

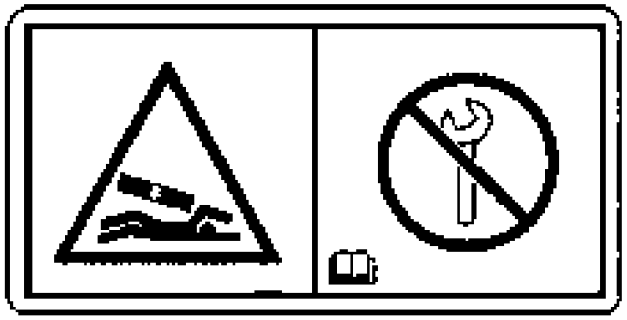

Illustration 26 g06509709

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.

Relieve Hydraulic Tank Pressure (23)

This safety message is on top of the hydraulic tank.

Illustration 27 g01371640

WARNING

HYDRAULIC TANK

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

Hot Surface (24)

This safety message is located in two locations on the engine hood. This safety message is also located under the engine hood.

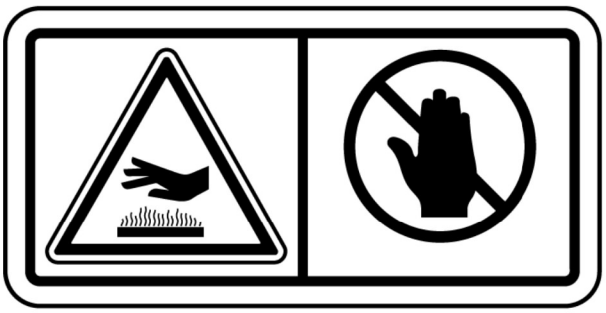

Illustration 28 g01372256

WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

Acid Burn Hazard (25)

This safety message is on the engine.

Illustration 29 g01382725

WARNING

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

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

Falling Object Guard Structure (26)

This safety message is on top of the front falling object guard structure. This safety message is also on the left side of the falling object guard structure on the top of the cab.

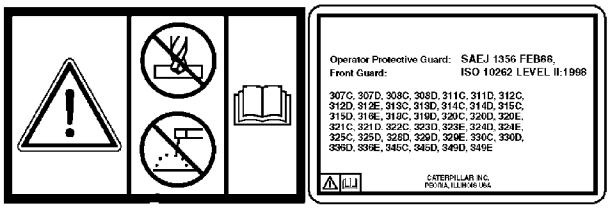

Illustration 30 g02428757

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.

Rotating Fan (27)

This safety message is located near the engine fan.

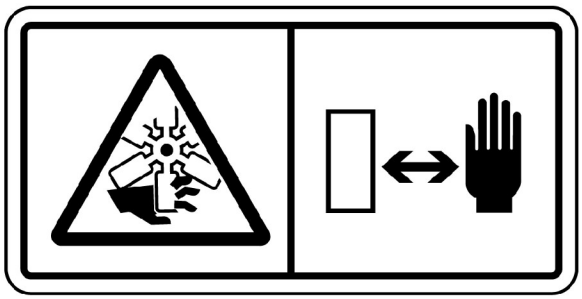

Illustration 31 g01385578

WARNING

Cutting Hazard! Keep hands clear of fan while engine is running. May cause serious injury or death.

Lifting Restriction/Counterweight Only (28)

This safety message is on top of the counterweight.

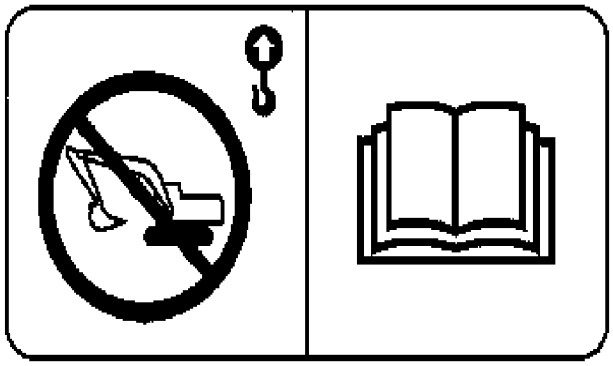

Illustration 32 g03481698

⚠ WARNING

The rear link on the counterweight should be used for the counterweight only. Do not lift the whole Machine by these counterweight links. This could cause serious injury or death. Read Operation and Maintenance Manuals.

See the Operation and Maintenance Manual, “Lifting and Tying Down the Machine" and "Counterweight Removal and Installation”for information on your product.

i05826288

Additional Messages

SMCS Code: 7000; 7405

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

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

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

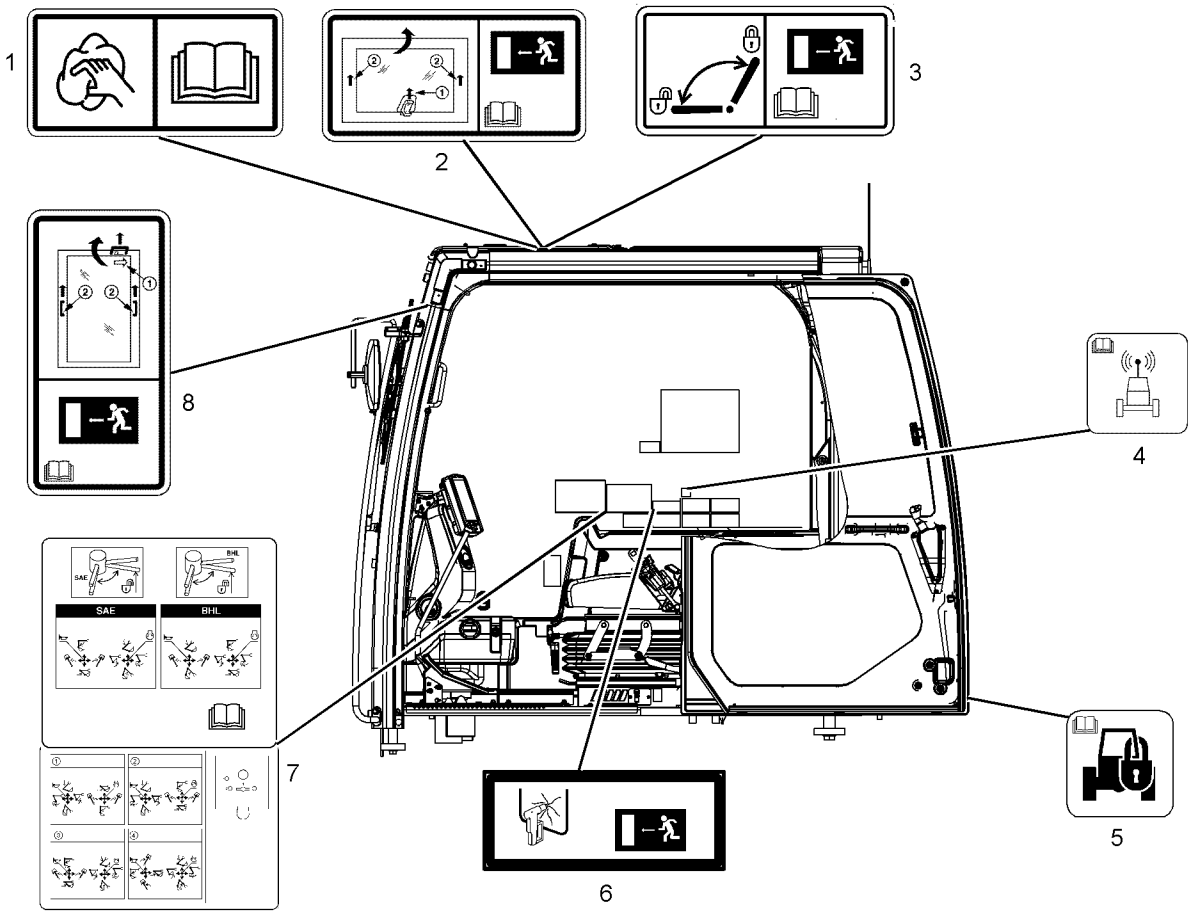

Illustration 33 g03686939

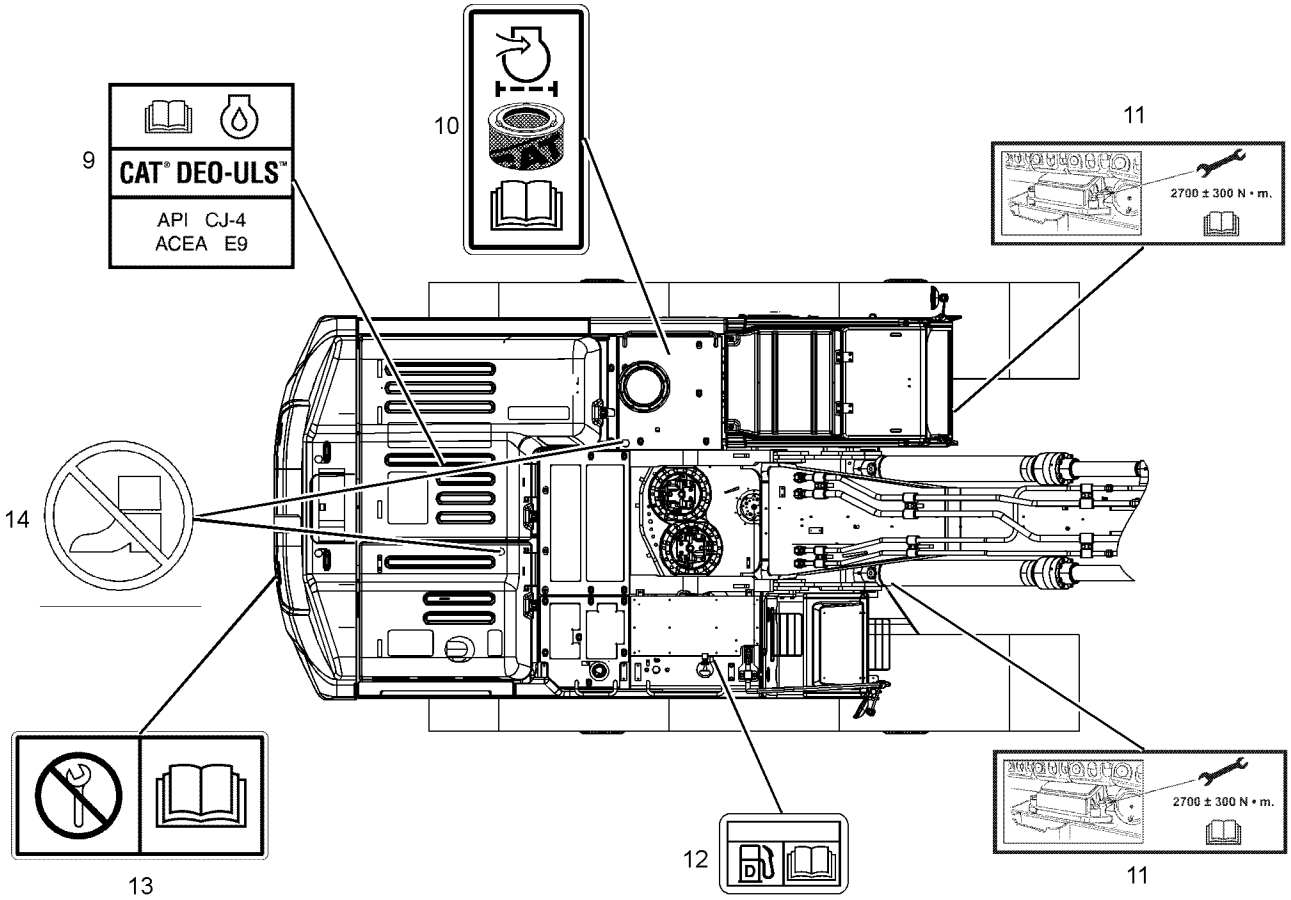

Illustration 34 g03686941

Cleaning Windows (1)

This message is located on the roof hatch.

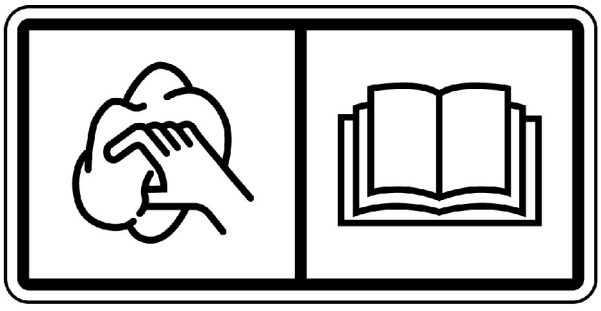

Illustration 35 g01134495

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

Alternate Exit (2)

If equipped, this message is located on the roof hatch.

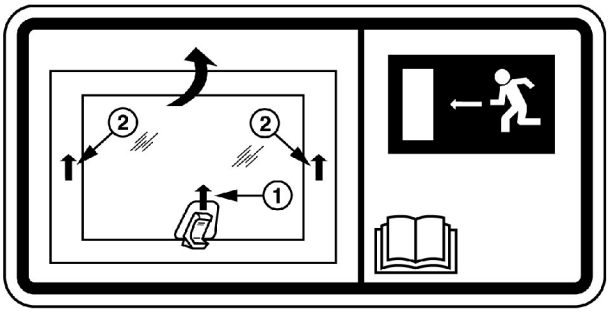

Illustration 36 g02052833

If the Primary exits are blocked, exit the machine through the opening.

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

Alternate Exit Lock/Unlock (3)

If equipped, this message is located on the roof hatch.

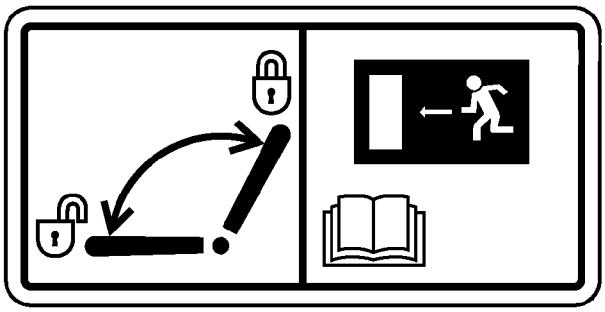

Illustration 37 g02052873

NOTICE
Unlock alternate exit window during machine operations.

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

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

Data Privacy (4)

Illustration 38 g01418953

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

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

Machine Security System (5)

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

Illustration 39 g00951606

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

Refer to Operation and Maintenance Manual, “Machine Security System” for more information.

Alternate Exit (6)

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

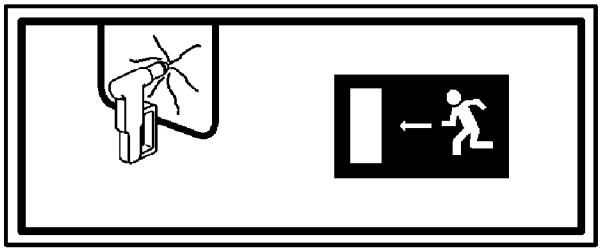

Illustration 40 g01069768

Joystick Controls Alternate Patterns (7)

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

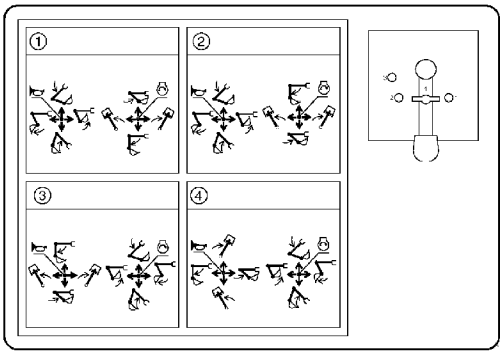

Illustration 41 g03094696

4 Way Valve

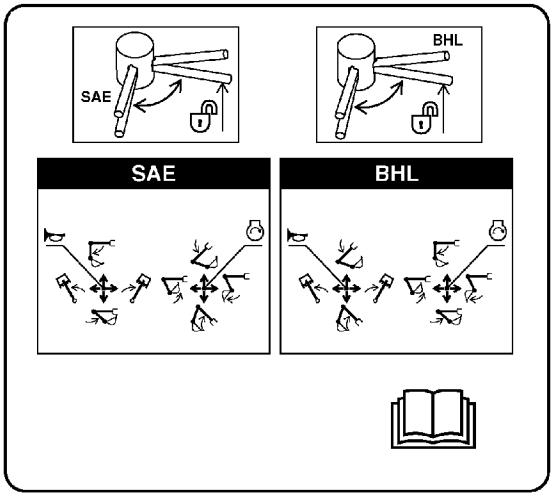

Illustration 42 g02362698

2 Way Valve

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

Alternate Exit (8)

If equipped, this message is located on the front window of the cab in the upper left-hand corner.

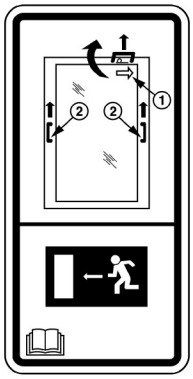

Illustration 43 g02052913

Move the lever to the right in order to unlock the front window. Raise the window into the storage position. Exit through the opening.

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

Engine Oil Requirements (9)

This message is located on top of the engine.

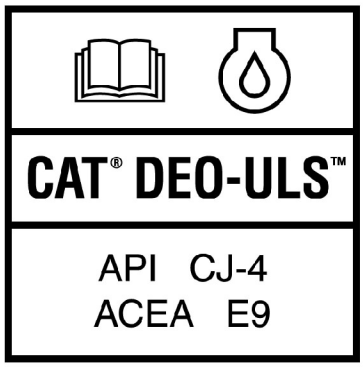

Illustration 44 g02176761

Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.

Radial Seal Air Filters (10)

This message is located on the air cleaner.

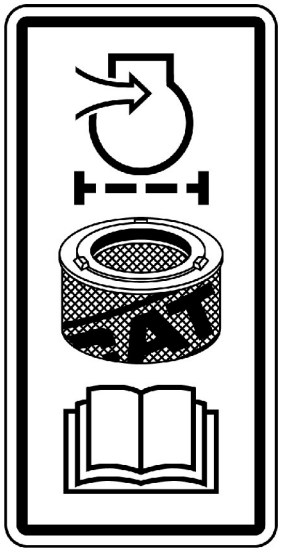

Illustration 45 g01134494

To avoid engine damage, use only Caterpillar radial seal air filters. Other filters will not seal properly. Read the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”.

Adjustable Gauge Undercarriage Frame (11)

This message is located on the front of the track frames of the machine.

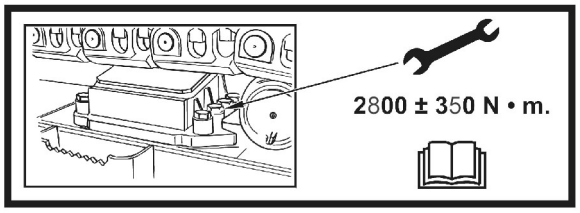

Illustration 46 g03358576

Reference: Refer to the Operation and Maintenance Manual, “Adjustable Gauge Undercarriage Frame” for the procedure in order to adjust the gauge of the tracks.

Diesel Fuel Requirements (12)

This message is located by the fuel tank.

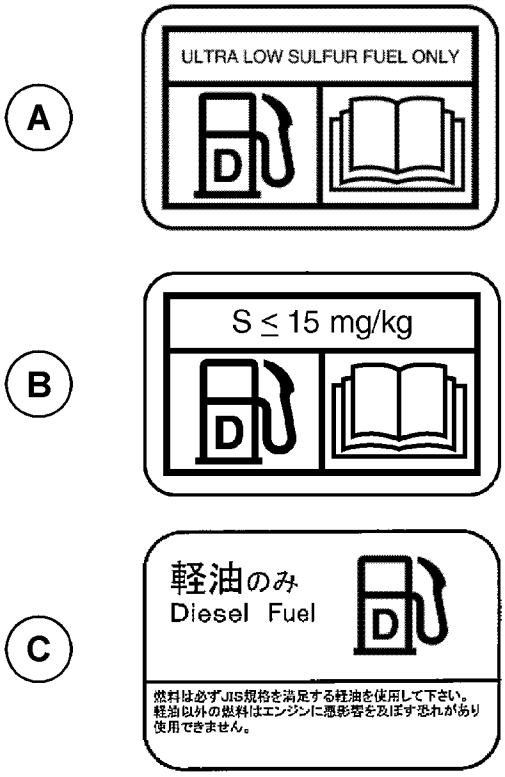

Illustration 47 g03218956

(A) NACD film
(B) EAME film
(C) Japan film

Use Ultralow Sulfur Diesel (ULSD) fuel.

Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.

The United States (U.S.) Environmental Protection Agency (EPA) defines Ultra-Low Sulfur Diesel (ULSD - S15) as a U.S. diesel fuel with a sulfur content not to exceed 15 parts per million (ppm(mg/kg)) or 0.0015 percent by weight. Engines certified to nonroad Tier 4 standards (Stage IV in Europe) and are equipped with exhaust aftertreatment systems are designed to run on ULSD only. Use of LSD or fuels higher than 15 ppm (mg/kg) sulfur in these engines will reduce engine efficiency and engine durability and will damage emissions control systems and/or shorten the service interval. Failures that result form the use of fuels are not Cat factory defects. Therefore the cost of repairs would not be covered by a Cat warranty.

In Europe, ultra low sulfur diesel fuel will have a maximum of 0.0010 percent (10 ppm(mg/kg)) sulfur and is typically referred to as “sulfur-free”. This sulfur level is defined in European Standard “EN 590:2004”.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information about diesel fuels and sulfur.

Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

Counterweight (13)

This message is located on the counterweight.

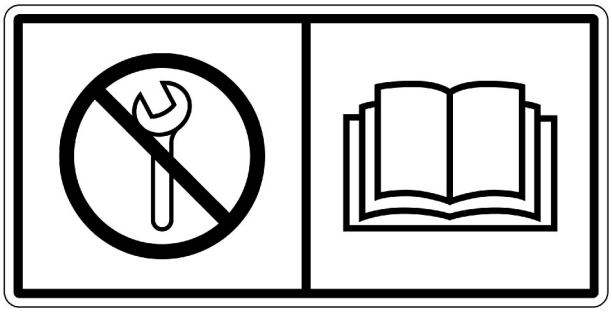

Illustration 48 g01435946

Do not tighten the counterweight mounting bolts without checking the retainer pin for the proper position.

Refer to Operation and Maintenance Manual, “Counterweight Removal and Installation” for more information.

No Step (14)

This message is located on the engine hood on the top of the machine. This message is also located on the left side of the machine behind the cab.

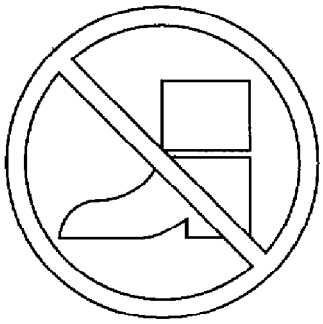

Illustration 49 g00911158

Do not step in this area.

i07746355

General Hazard Information

SMCS Code: 7000

Illustration 50 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.

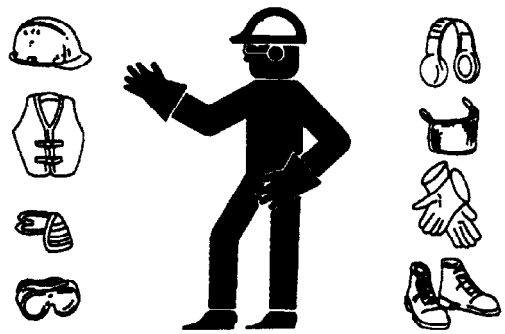

Illustration 51 g00702020

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.

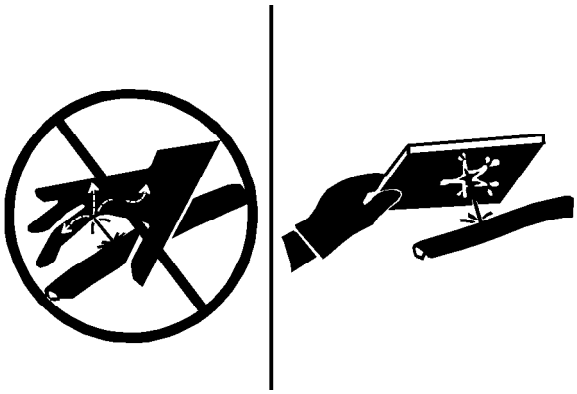

Illustration 52 g00687600

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 53 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

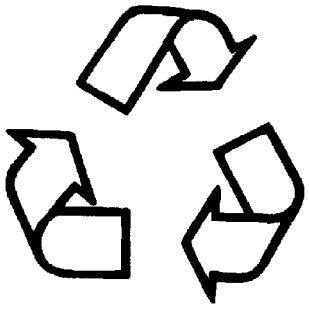

Illustration 54 g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07399130

Burn Prevention

SMCS Code: 7000

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

Induction System

⚠ WARNING

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

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 55 g00704000

Regeneration

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

General

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

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

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

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

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

Illustration 56 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 57 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.

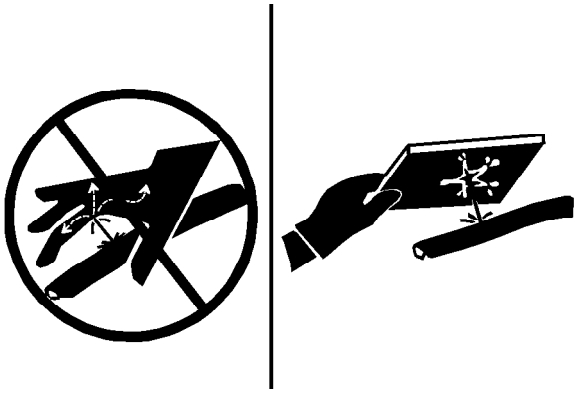

Illustration 58 g00687600

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

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

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

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

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

Ether

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

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

⚠ WARNING

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

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

i03767099

Fire Extinguisher Location

SMCS Code: 7000; 7419

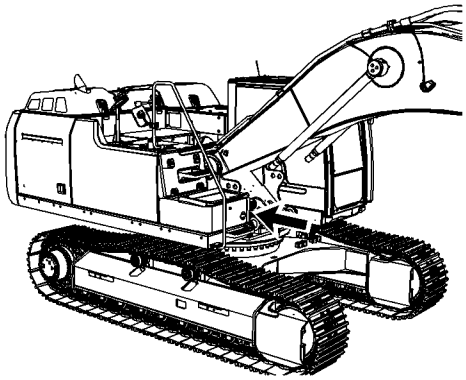

Illustration 59 g02030713

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 recommended location for mounting the fire extinguisher is in the storage box.

i01329108

Track Information

SMCS Code: 4170; 7000

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

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

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

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

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

- Mount the machine.
- Dismount the machine.

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

i00771840

Before Starting Engine

SMCS Code: 1000; 7000

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

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

Adjust the seat so that full pedal travel can be achieved with the operator's back against the back of the seat.

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

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

i07746368

Visibility Information

SMCS Code: 7000

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

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

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

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

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

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

i06231407

Restricted Visibility

SMCS Code: 7000

The size and the configuration of this machine may result in areas that cannot be seen when the operator is seated. For restricted visibility areas, an appropriate job site organization must be utilized to minimize hazards of this restricted visibility. For more information regarding job site organization refer to Operation and Maintenance Manual, “Visibility Information”.

Illustrations 60 and 61 provide an approximate visual indication of the areas at ground level inside a radius of 24 m (79 ft) from the operator of significant restricted visibility for various machine configurations. Refer to the correct illustration for your machine configuration. All restricted visibility areas less than 300 mm wide may not be shown. These illustrations do not indicate areas of restricted visibility for distances outside of the shown radius. The areas of restricted visibility shown in the illustrations are with the track and work tool of the machine in the Travel position. Illustration 62 shows the position of the work tool in the travel position. The Caterpillar authorized work tool that resulted in the largest visibility restriction was used.

Illustration 60 indicates restricted visibility areas at ground level inside the shown radius from the operator without the use of visual aids that may be optional for this product in some markets.

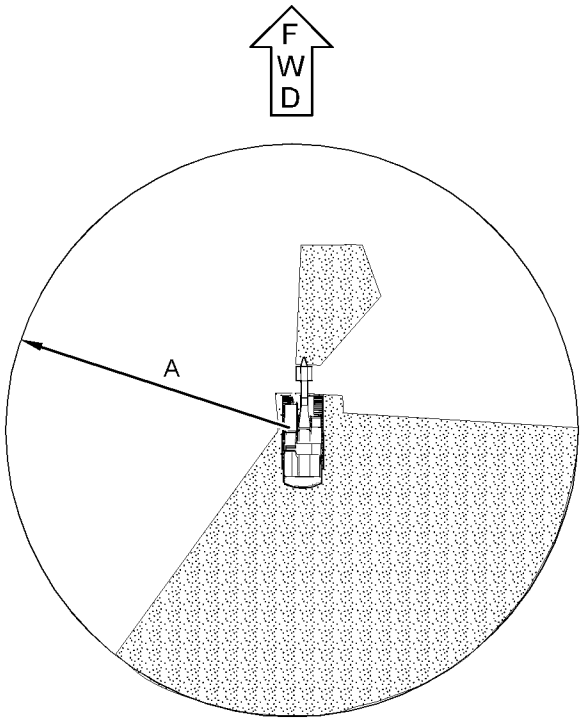

Illustration 60 g03864264

Top view of the machine, ground level visibility without use of optional visual aids

(A) 24 m (79 ft)

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

Illustration 61 indicates restricted visibility areas at ground level inside the shown radius from the operator with the use of available rear camera, right side mirror, and left side mirror installed.

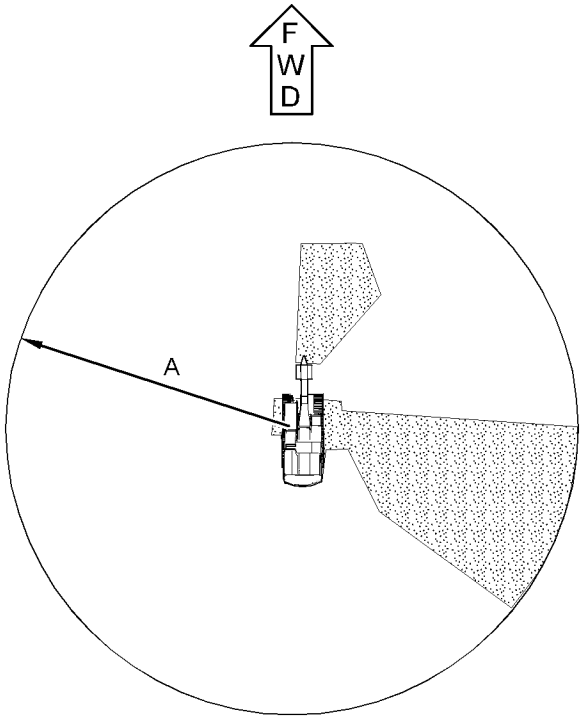

Illustration 61 g03864275

Top view of the machine, ground level visibility with available camera, left side mirror and right side mirror

(A) 24 m (79 ft)

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

Restricted visibility is measured when the front linkage of the machine is in the travel position. Illustration 62 shows the machine in the travel position.

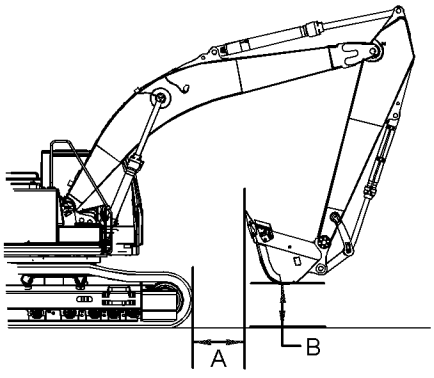

Illustration 62 g02155813

(A) 1 m (3.0 ft) from the front of the machine to the bucket
(B) 0.5 m (1.6 ft) from ground level

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

(continued)

(Table 1, contd)

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Steering System	A problem has been detected with the steering system. (If equipped with steering system monitoring.)	Monitoring System displays Warning Category 3	Move machine to a safe location and stop the engine immediately. Contact your Cat dealer to inspect and, if necessary, repair the steering system.
Overall Machine	Machine service is required.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat dealer for service.

Machine Operation

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

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

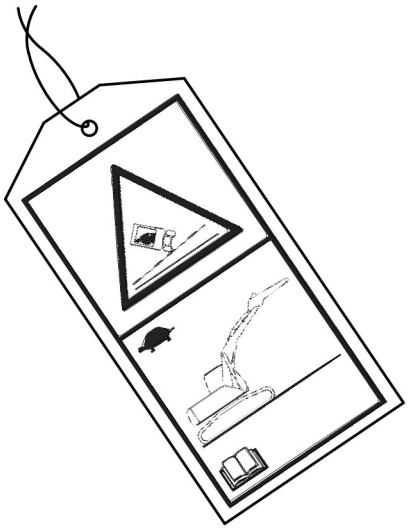

Illustration 63 g02202544

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

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

i06299648

Engine Stopping

SMCS Code: 1000; 7000

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

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

i06304391

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.

If this machine is used to lift objects within Japan, Japanese regulations require the machine to be equipped with a shovel crane configuration.

Contact your Cat dealer for additional information

i07749631

Demolition

SMCS Code: 6700

There maybe local regulations and/or government regulations that govern the use of machines which are designed and used as demolition machinery.

Note: Obey all local and government regulations.

Demolition machinery is designed for demolishing by pushing or pulling, or fragmenting. Demolition is done by crushing or shearing, buildings and/or other civil engineering structures and component parts and/or separating the resultant debris.

If this machine is used for demolition within an area that is controlled by the European Directive 2006/42/EC, the machine must be equipped with:

- Rollover Protective Structure (ROPS, not required for demolition excavators)
- Boom Lowering Control Valve (BLCV) / Stick Lowering Control Valve (SLCV)
- Top Guard / Front Guard
- Bottom / Motor / Swivel Guard
- EN 356 class P5A front window glass
- If a roof window is used to provide visibility to the working area, then roof window shall be equipped with motorized windscreen wipers and washers.

Demolition applications may generate flying debris. Ensure that there are no personnel in the area around the machine where flying debris may travel.

Demolition applications may generate airborne dust that can be hazardous to your health. If you operate the machine in a dust generating applications, use appropriate safeguarding or adequate ventilation to minimize risk.

i04497373

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

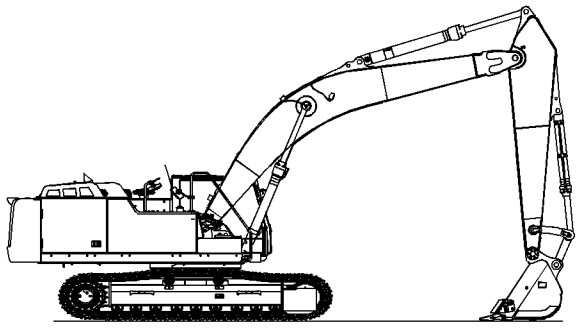

Illustration 64 g02280104

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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Slope Operation

SMCS Code: 7000

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Equipment Lowering with Engine Stopped

SMCS Code: 7000-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

The declared dynamic operator sound pressure level is 73 dB(A) when “ISO6396: 2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70% of the maximum engine cooling fan speed and with the regeneration system for the engine exhaust emissions disabled. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained.

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

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

The declared exterior sound power level (L_{WA}) is 108 dB(A) when the value is measured according to the dynamic test procedure and the conditions that are specified in “ISO 6395 :2008” . The measurement was conducted at 70% of the maximum engine cooling fan speed and with the regeneration system for the engine exhaust emissions disabled. The sound level may vary at different engine cooling fan speeds.

The declared dynamic operator sound pressure level is 73 dB(A) when “ISO6396: 2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70% of the maximum engine cooling fan speed and with the regeneration system for the engine exhaust emissions disabled. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained.

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

Vibration Data for 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 to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

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

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

Table 2

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

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

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

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

5. Perform the following operations smoothly.

a. Steer

b. Brake

c. Accelerate.

d. Shift the gears.

6. Move the attachments smoothly.

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

a. Drive around obstacles and rough terrain.

b. Slow down when 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 to prevent bounce.

d. Haul the machines between workplaces.

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

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

b. Adjust the mirrors to minimize twisted posture.

c. Provide breaks to reduce long periods of sitting.

d. Avoid jumping from the cab.

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

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

Sources

The vibration information and the 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 to find your local dealer:

Caterpillar, Inc.
www.cat.com

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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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Regulatory Information (Japan)

SMCS Code: 7000

S/N: FJB1–Up

S/N: SPG1–Up

S/N: RGH1–Up

S/N: WHZ1–Up

Qualifications for Machine Operation

The following qualifications are required for the operation of this machine:

Excavation and Loading

Completion of the construction machines (for land leveling, hauling, loading, and excavation) operation skill training course. (Qualification by the Industrial Safety and Health Act)

Demolition

Completion of the construction machines (for demolition) operation skill training course. (Qualification by the Industrial Safety and Health Act)

Mining Jobs

Certification by the Director General or Deputy Director General of Bureau of Mine Safety after completion of the safety training course. (Qualification by the Mine Safety Act)

Crane Slinging for the Bucket with a Hook

Completion of the special slinging training for the crane for loads weighing less than 1 ton. (Qualification by the Industrial Safety and Health Act)

Trailer Transportation

In principle, this machine should be transported by a trailer. Select the appropriate trailer regarding the machine weight and measurements shown in the major specifications in the specification part of this manual. Be aware machine weight and transportation measurements differ depending on the various types of attachments.

- In the event heavy items are to be transported, observe the related laws. These laws include Road Traffic Law, Road Laws, Road Transportation Vehicle Laws, and Vehicle Restriction Laws.
- Conduct prior investigation of the road width, ground clearance of road/railway bridges, weight restrictions etc. of the planned transportation route, to confirm the viability of the transportation execution.

Load

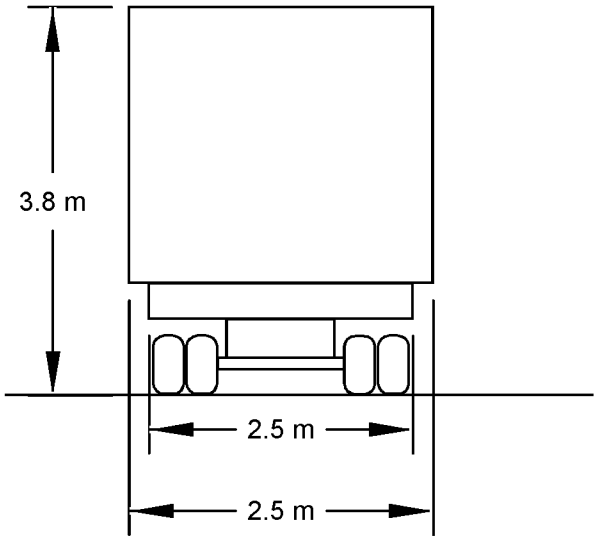

Illustration 65 g02698738

- Not more than 3.8 m (12 ft 6 inch)
- Not more than 2.5 m (8 ft 2 inch)(Safety Standard)
- Not more than 2.5 m (8 ft 2 inch) (Vehicle Restriction Laws)
- Items that protrude out are not allowed. (Government ordinance for Road Traffic Laws)

Transportation weight and measurements are restricted by the Vehicle Restriction Laws. If the actual weight/measurements exceed the limitation figures, you must submit the restriction relaxation request to the pertinent governmental agencies. For details, consult your Cat dealer.

Table 3

Total Length	Not more than 12 m (39 ft 4 inch)
Total Width (A)	Not more than 2.5 m (8 ft 2 inch)

(continued)

(Table 3, contd)

Total Height (B)	Not more than 3.8 m (12 ft 6 inch) when loaded on the trailer.
Total Weight	20 to 25 ton (depending on road, axle, and vehicle length)

Operation of Construction Equipment and the Governing Laws and Regulations

NOTICE
Various laws and regulations, including Industrial Safety and Health Act, are enforced to ensure prevention of injuries on and around construction equipment and safe and comfortable operation of equipment. Be sure to obey them.

NOTICE
The notices regarding machine operation, inspection, maintenance, and safety contained in this manual are applicable only to cases in which the machine is used for the specified jobs. It is impossible for this kind of manual to cover every kind of operation. Therefore, the content of this manual does not necessarily explain all possible cases. Be sure to pay careful attention also to the items not covered by this manual and confirm the safety before starting jobs to prevent human injury and machine damage accidents.

Qualification of Operators

Operation of construction equipment is limited to persons who have any of the following licenses by law.

Note: Employers will face imprisonment up to a maximum of 6 months or a fine of up to a maximum of five hundred thousand yen if they let unqualified personnel operate equipment. Unqualified operators will also be fined up to a maximum of five hundred thousand yen.

- One who completed an operating skill course for vehicle-type construction equipment at a registered training institution.
- One who passed the construction equipment and technologies license examination (Type 1-3) defined by the Construction Industry Law.
- One who completed an operating training course for construction equipment defined by the Vocational Training Law.
- One who took a special training (rules and skills) at a registered training institution to operate equipment weighing less than 3 tons.
- With an auto-drivers license, an operator does not need to complete an operating skill course for construction equipment to operate equipment on the roads that apply to the rules of the Road Traffic Act. However, the operator needs to complete the course to engage in snow clearing or excavating on the roads.
- The operator must be qualified under the Mine Safety Act to operate construction equipment in a mine.

Acquisition of the Qualifications

The company offers training courses for construction machine operation, in addition to other skills. For details, contact the company's dealer in your area.

Regarding machine operation qualifications, also refer to the laws related to the construction machines shown at the end of this manual.

Subsidy System

Small-to-medium-sized construction business companies are eligible to receive a subsidy for a part of training fees and wages when they have their employees attend a training course to improve skills.

Operation of Construction Equipment and the Governing Laws and Regulations

NOTICE
Information about operating skill course for vehicle-type construction equipment (for ground leveling, transporting, loading, excavating).

Industrial Safety and Health Act requires operators of construction equipment weight 3 tons and over to acquire a certificate of completion of an operating skill course. Registered with and authorized by the respective directors general of the regional labor bureaus, we offer operating skill courses for vehicle-type construction equipment and special trainings.

Request for Periodical Self-Inspection

Rules of Periodical Self-Inspection

The employer shall, as provided for by the Ordinance of the Ministry of Health, Labor and Welfare, conduct self-inspection periodically. The employer shall keep the records of the results in respect to construction equipment such as tractor shovels and power shovels, etc., specified by Cabinet Order. (from Article 45, Industrial Safe and Health Act)

Ordinance on Industrial Safety and Hygiene

Periodical self-inspections Article 167

(1) The employer shall, as regards a vehicle type construction machine, carry out self-inspections for the following matters periodically once every period within a year. However, this shall not apply to the non-use period of a vehicle type construction machine, which is not used for a period exceeding 1 year.

(2) The employer shall, as regards a vehicle type construction machine set forth in the proviso of the proceeding paragraph, carry out self-inspection for abnormalities in each part of a construction machine before resuming the operation.

Periodical self-inspections Article 168

(1) The employer shall, as regards a vehicle type construction machine, carry out self-inspections for the following matters periodically once every period within a month. However, this shall not apply to the non-use period of a vehicle type construction machine, which is not used for a period exceeding one month:

- (i) Abnormalities in a brake, a clutch, a controlling device, and working devices.
- (ii) Damage in a wire, rope, and a chain
- (iii) Damage in a bucket, a dipper, etc.

(2) The employer shall, as regards to the vehicle type construction machine set forth in the proviso of the preceding paragraph, carry out self-inspection for the matters listed in each item of the same paragraph before resuming the operation.

Record of Periodical Self-Inspections Article 169

The employer shall, when having carried out the self-inspections set forth in the preceding two Articles, record the results and retain the records for 3 years.

Specified Self-Inspection Article 169-2

The specified self-inspection pertaining to the vehicle type construction machine shall be the self-inspection (prescribed by Article 167) and carried out by qualified personnel. The employer shall, when having carried out the specified self-inspection pertaining to a vehicle type construction machine, affix an inspection sticker stating the month and year when the said specified self-inspection was carried out at a readily visible location of the said machine.

- Caterpillar Japan has a supporting program for self-inspection as a registered inspection agency. Qualified personnel and inspection equipment are available to help customers who do not conduct internal inspections or do not have time to conduct the specified self-inspections. Contact a Cat dealer near you for details.
- Maintenance and inspection record book for a record-saving purpose can be purchased at Caterpillar Japan.
- Penalty: Employer who fails to carry out self-inspections and to record the results will face a fine of up to five hundred thousand yen.

Checkup before Commencing the Work Article 170

The employer shall, when carrying out the work using a vehicle type construction machine, check functions of a brake and a clutch before commencing the work for the day.

Other Rules

Besides qualification for operating equipment and self inspections, the following obligations are set forth in the Industrial Safety and Health Act:

- To conduct health and safety training for new recruits and shop foremen.
- To appoint the operation leader or supervisor, and establish health and safety management system.
- To inform employees of a chain of command at the worksite, communication and signal rules, traveling route of equipment, speed limits, signs of restricted areas, etc. for securing safety in the workplace.

The Industrial Safety and Health Act further also set obligations related to mechanical structures and rental activities of equipment.

Safety comes before anything else. Establish a workplace where no injuries occur by observing the governing laws and by referring to this manual, specifically the descriptions on safety.

Construction Equipment and Environmental Laws

Prohibition of Emissions and Obligations to Recover Fluorocarbons

Law Concerning the Recovery and Destruction of Fluorocarbons (Enforcement date: April 1, 2015)

Being emitted into the atmosphere, Fluorocarbons, used as refrigerants of air conditioning, destroy the ozone layer and accelerate the global warming as a cause of environmental destruction. Follow the instructions below required by law when handling air conditioners to protect the global environment.

1. 1. Do not arbitrarily emit the encapsulated refrigerant installed on the product into the atmosphere.

2. 2. Recover the encapsulated refrigerant when disposing of the product.

Note: Violators of the law will face a maximum one-year imprisonment or a fine up to a maximum of five hundred thousand yen.

When you need to fill, recover a refrigerant or dispose of a product with an encapsulated refrigerant installed, please ask a filling-recovery operator registered with the government of the local prefecture as "class-1 filling-recovery operator." And carry out the simple inspection of air conditioner and keep the record.

Class-1 Specified products sold after October 1, 2015 shall have the label inside of the cab showing the type and quantity of refrigerant, GWP (Global Warming Potential), and precautions for use. (Refer to the fluorocarbon label in the OMM safety section)

Standard Certificate of Transfer

Dear Customers

Japan Construction Equipment Manufacturers Association

Standard Certificate of Transfer

Issued by the Japan Construction Equipment Manufacturers Association

Standard Certificate of Transfer issued by the Japan Construction Equipment Manufacturers Association proves the ownership of your equipment. Request us to issue the certificate as a proof of transfer of ownership.

Commercial transactions of construction equipment are generally made on a long-term installment plan basis with a special provision of reservation of ownership that the seller retains the ownership of the sold equipment until the buyer completely pays off the installments.

Ownership of some construction equipment can be proved with a vehicle inspection certificate, but the certificate is not issued for most of the equipment. Therefore, the buyer will need to present a third party with a proof of ownership of the sold equipment.

Japan Construction Equipment Manufacturers Association launched a system of standard certificate of transfer in 1971 to normalize trading in construction equipment and establishes a business practice relating to transfer of ownership. Customers are kindly requested to understand the intent of the system and request your seller to issue a certificate of transfer.

1. About the standard certificate of transfer

a. Japan Construction Equipment Manufacturers Association (hereinafter referred to as CEMA) sets the rules and form of standard certificate of transfer (hereinafter referred to as certificate of transfer), and members of the CEMA issue the certificate of transfer. A certificate of transfer proves the ownership of equipment.

2. Purpose of issuance

a. A certificate of transfer will be issued for the purpose of clarifying the ownership of equipment and preventing misconduct such as trades of stolen equipment or fraud.

3. Issuer

a. A certificate of transfer will be issued by a distributor (Primary transferer) who sells new construction equipment and is authorized by the CEMA.

4. Eligibility

a. A certificate of transfer will be issued for the equipment, which is sold by CEMA-member distributors and defined as construction equipment by the CEMA

5. Issuance

a. A certificate of transfer will be issued and directly given to a buyer upon the buyer's request when he/she buys eligible equipment from an issuer.

b. A certificate of transfer may not be issued for the equipment, which was sold as new merchandise more than 10 years ago.

c. A certificate of transfer is not permitted to substitute a vehicle inspection certificate.

6. Prohibition of reissuance

a. Certificate of transfer should be safely stored as it will not be reissued under any circumstances.

7. In case a certificate description runs out of space

a. Discretionary page/s to the certificate will be valid with a tally seal of the issuer at the joint of two pages.

Contact CEMA-member companies or distributors for more details of the system.

Industrial Safety and Health Act

Article 164 (Extracted) of Industrial Safety and Health Act (Restriction on use Other Than Main Application)

Article 164

Business Operator must not use construction machineries of vehicle type for applications other than main application of the applicable construction machineries of vehicle type such as: lifting cargos by hydraulic excavator or lifting/lowering workers using the clamshell.

[2] The previous clause will not be applied for any of the following cases:

1. In performing cargo lifting, any one of the following may be applicable.

a. Cannot be avoided due to the nature of the work or necessary in view of performing work in safe.

b. When working with attachments installed for metals of hook or shackle etc or other devices for lifting application applicable to any one of the following as implements for boom or bucket etc

- Enough strength is retained bearable for loads to be applied.
- Load lifted up is not feared to be dropped from the applicable instrument used, due to provided locking device is in use or etc.
- Load not feared of disengaging from the implement.

2. In performing work other than cargo lifting, nothing is feared to do harm to the workers.

[3] The business operator must take the following measures, in performing cargo lifting work applicable to Items 1a and 1b of Step 1 above. To prevent any danger of workers from contact with lifted cargo, drop of lifted cargo or turnover or falling down of construction machineries of vehicle type.

1. Designate one person who issues a sign as well as setting up fixed signs related to cargo lifting work, and follow his signs.

2. Perform work on a flat ground.

3. Keep any worker away from any place where is feared to cause any danger to worker due to contact with a cargo or drop of lifted cargo.

[4] Do not perform any work applying load exceeding the allowed rated max load specified according to structure or materials of the applicable construction machineries of the vehicle type.

[5] In using wire rope in slinging device, use wire rope applicable to every item of the followings.

- Safety coefficient is 6 or more. (The safety coefficient here must be the same as specified in Article 213 item 2 in Safety Rules on Crane Works (Article 34 in Ordinance of Ministry of Labor, 1972) etc. Hereinafter called as "Crane Rules")
- Among wire rope 1 strands, numbers of cut strands (other than filler) are less than 10%.
- Reduction of diameter is 7% or less than nominal diameter.
- Free from kinking.
- Free from badly collapse and corrosion.

[6] In using lifting chain as slinging device, the chain is applicable to every item of the followings.

- Safety coefficient is 5 or more.
- Elongation is 5% or less than the length when the applicable lifting chain was fabricated.
- Reduction of diameter of the cross section of link is 10% or less than diameter of cross section of the applicable link when the applicable lifting chain was manufactured.
- Free from cracks.

[7] In using those other than wire rope and lifting chain as slinging device, they must be free from bad damage and corrosion.

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Specifications

SMCS Code: 7000

Intended Use

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

Application/Configuration Restrictions

The operator station is ROPS certified up to a mass of 58600kg (129190 lb) per ISO 12117-2:2008.

Specification Data

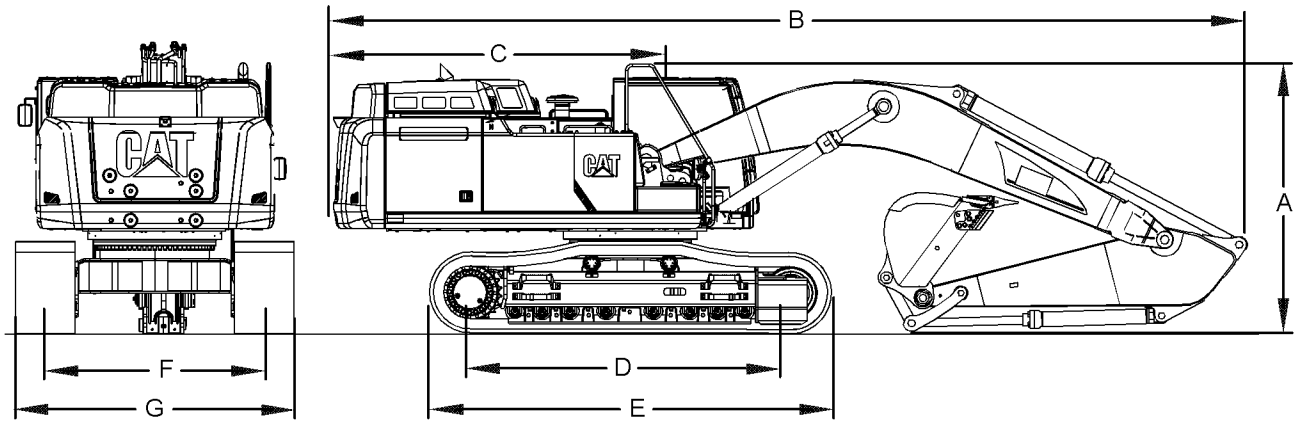

Illustration 66 g02298435

Table 4

349E L Excavator with Fixed Gauge Undercarriage[1]						
	6.9 m (22 ft 8 inch) Reach Boom			7.4 m (24 ft 3 inch) Long Reach Boom	6.55 m (21 ft 6 inch) Mass Boom	
	2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	3.9 m (12 ft 10 inch) Stick	4.3 m (14 ft 1 inch) Stick	2.5 m (8 ft 2 inch) Stick	3.0 m (9 ft 10 inch) Stick
Bucket	3.1 m^3 (4.05 yd^3)				3.2 m^3 (4.19 yd^3)	
Approximate Weight	47700 kg (105200 lb)[2]	49200 kg (108500 lb)[4]	49500 kg (109100 lb)[4]	50000 kg (110200 lb)[4]	50200 kg (110700 lb)[4]	50500 kg (111300 lb)[4]
Shipping Height (A)	3660 mm (12 ft)	3730 mm (12 ft 3 inch)	3670 mm (11 ft 10 inch)	3690 mm (12 ft 1 inch)	3980 mm (13 ft 1 inch)	4020 mm (13 ft 2 inch)
Shipping Length (B)	11910 mm (39 ft 1 inch)	11920 mm (39 ft 1 inch)	11930 mm (39 ft 2 inch)	12420 mm (40 ft 9 inch)	11680 mm (38 ft 4 inch)	11590 mm (38 ft)
Swing Radius (C)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)
Length to Center of Rollers (D)	4360 mm (14 ft 4 inch)	4360 mm (14 ft 4 inch)	4360 mm (14 ft 4 inch)	4360 mm (14 ft 4 inch)	4360 mm (14 ft 4 inch)	4360 mm (14 ft 4 inch)
Length of Track (E)	5370 mm (17 ft 7 inch)	5370 mm (17 ft 7 inch)	5370 mm (17 ft 7 inch)	5370 mm (17 ft 7 inch)	5370 mm (17 ft 7 inch)	5370 mm (17 ft 7 inch)

(continued)

(Table 4, contd)

Track Gauge (F)	2740 mm (8 ft 12 inch)	2740 mm (8 ft 12 inch)	2740 mm (8 ft 12 inch)	2740 mm (8 ft 12 inch)	2740 mm (8 ft 12 inch)	2740 mm (8 ft 12 inch)
Overall Width (G)	3340 mm (10 ft 11 inch)(2)	3340 mm (10 ft 11 inch)(2) 3490 mm (11 ft 5 inch)(3) 3640 mm (11 ft 11 inch)(4)	3340 mm (10 ft 11 inch)(2) 3490 mm (11 ft 5 inch)(3) 3640 mm (11 ft 11 inch)(4)	3340 mm (10 ft 11 inch)(2) 3490 mm (11 ft 5 inch)(3) 3640 mm (11 ft 11 inch)(4)	3340 mm (10 ft 11 inch)(2) 3490 mm (11 ft 5 inch)(3) 3640 mm (11 ft 11 inch)(4)	3340 mm (10 ft 11 inch)(2) 3490 mm (11 ft 5 inch)(3) 3640 mm (11 ft 11 inch)(4)

(1) The fuel tank is 10 percent full.
(2) 600 mm (24 inch) track shoes
(3) 750 mm (28 inch) track shoes
(4) 900 mm (36 inch) track shoes

Table 5

349E L Excavator with Variable Gauge Undercarriage(1)						
	6.9 m (22 ft 8 inch) Reach Boom			**7.4 m (24 ft 3 inch) Long Reach Boom**	**6.55 m (21 ft 6 inch) Mass Boom**	
	2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.9 m (12 ft 10 inch) Stick**	**4.3 m (14 ft 1 inch) Stick**	**2.5 m (8 ft 2 inch) Stick**	**3.0 m (9 ft 10 inch) Stick**
Bucket	3.1 m^3 (4.05 yd^3)				2.8 m^3 (3.66 yd^3)	
Approximate Weight	51800 kg (114200 lb)(4)	52000 kg (114600 lb)(6)	52200 kg (115100 lb)(6)	52700 kg (116200 lb)(4)	53000 kg (116800 lb)(6)	53300 kg (117500 lb)(6)
Shipping Height (A)	3700 mm (12 ft 2 inch)	3550 mm (11 ft 8 inch)	3650 mm (12 ft)	3650 mm (12 ft)	4010 mm (13 ft 2 inch)	4020 mm (13 ft 2 inch)
Shipping Length (B)	11890 mm (39 ft)	11820 mm (38 ft 9 inch)	11890 mm (39 ft)	12370 mm (40 ft 7 inch)	11640 mm (38 ft 4 inch)	11560 mm (38 ft)
Swing Radius (C)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)	3760 mm (12 ft 4 inch)
Length to Center of Rollers (D)	4340 mm (14 ft 3 inch)	4340 mm (14 ft 3 inch)	4340 mm (14 ft 3 inch)	4340 mm (14 ft 3 inch)	4340 mm (14 ft 3 inch)	4340 mm (14 ft 3 inch)
Length of Track (E)	5380 mm (17 ft 8 inch)	5380 mm (17 ft 8 inch)	5380 mm (17 ft 8 inch)	5380 mm (17 ft 8 inch)	5380 mm (17 ft 8 inch)	5380 mm (17 ft 8 inch)
Track Gauge (F)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)	2890 mm (9 ft 6 inch)(2) 2390 mm (7 ft 10 inch)(3)
Overall Width Expanded (G)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)	3490 mm (11 ft 5 inch)(4) 3640 mm (11 ft 11 inch)(5) 3790 mm (12 ft 5 inch)(6)
Overall Width Retracted (G)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)	3000 mm (9 ft 10 inch)(4) 3140 mm (10 ft 4 inch)(5) 3290 mm (10 ft 10 inch)(6)

(1) The fuel tank is 10 percent full.

(continued)

(Table 5, contd)

(2) Expanded
(3) Retracted
(4) 600 mm (24 inch) track shoes
(5) 750 mm (28 inch) track shoes
(6) 900 mm (36 inch) track shoes

Working Ranges

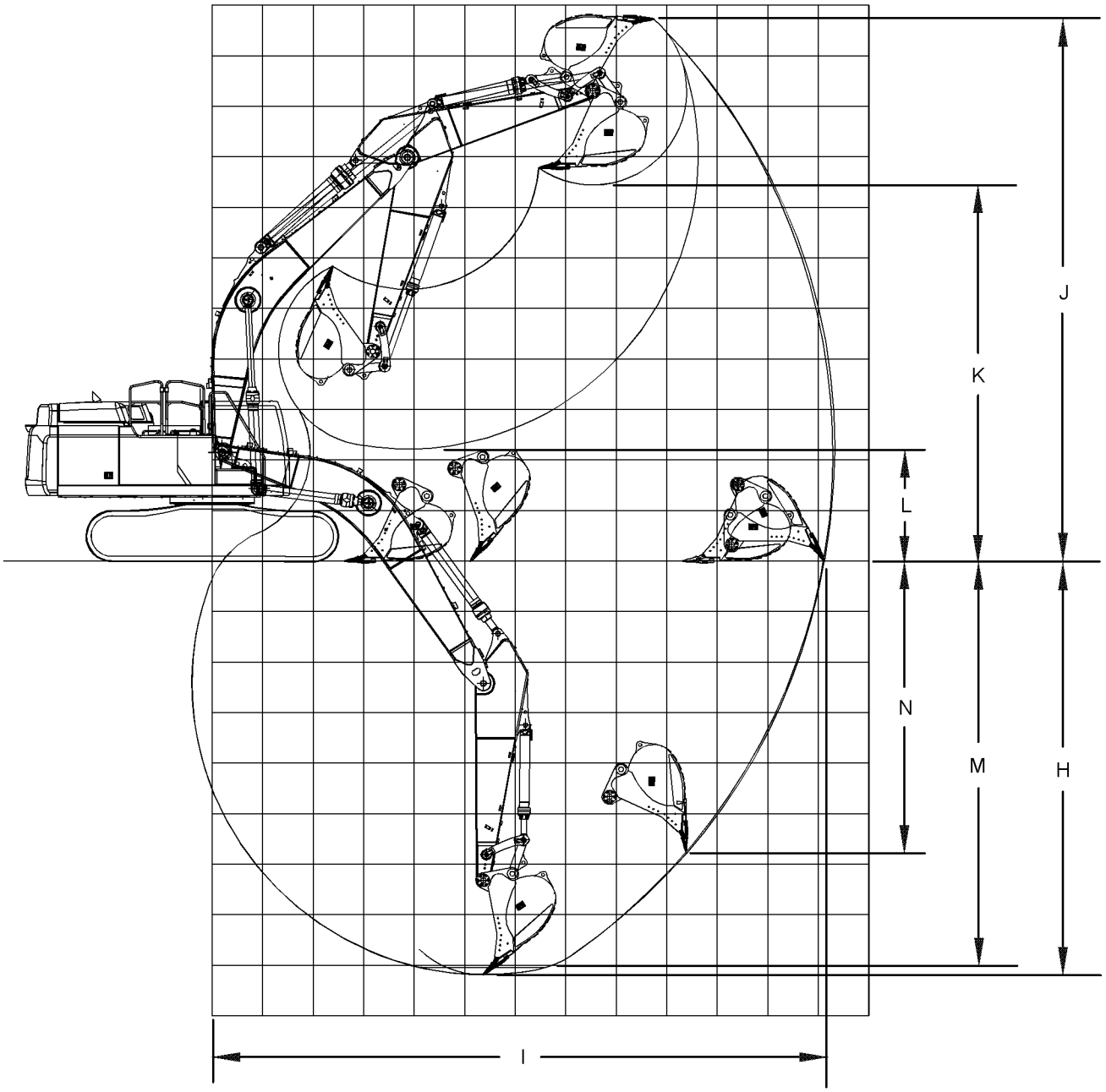

Illustration 67 g03019796

Table 6

349E L Excavator with Fixed Gauge Undercarriage		
	6.9 m (22 ft 8 inch) Reach Boom	**6.55 m (21 ft 6 inch) Mass Boom**

(continued)

(Table 6, contd)

	2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	3.9 m (12 ft 10 inch) Stick	2.5 m (8 ft 2 inch) Stick	3.0 m (9 ft 10 inch) Stick
Bucket	3.08 m^3 (4.03 yd^3)	3.1 m^3 (4.05 yd^3)		3.2 m^3 (4.19 yd^3)	
Maximum Digging Depth (H)	7180 mm (23 ft 7 inch)	7630 mm (25 ft)	8180 mm (26 ft 10 inch)	6730 mm (22 ft 1 inch)	7230 mm (23 ft 9 inch)
Maximum Reach at Ground Level (I)	11290 mm (37 ft 1 inch)	11710 mm (38 ft 5 inch)	12120 mm (39 ft 9 inch)	10740 mm (35 ft 3 inch)	11200 mm (36 ft 11 inch)
Maximum Cutting Height (J)	10640 mm (34 ft 11 inch)	10810 mm (35 ft 6 inch)	10730 mm (35 ft 2 inch)	10110 mm (33 ft 2 inch)	10300 mm (33 ft 10 inch)
Maximum Loading Height (K)	7280 mm (23 ft 11 inch)	7460 mm (24 ft 6 inch)	7450 mm (24 ft 5 inch)	6620 mm (21 ft 9 inch)	6820 mm (22 ft 5 inch)
Minimum Loading Height (L)	3230 mm (10 ft 7 inch)	2780 mm (9 ft 1 inch)	2230 mm (7 ft 4 inch)	3150 mm (10 ft 4 inch)	2650 mm (8 ft 8 inch)
Maximum Cut Depth (M)(1)	7020 mm (23 ft)	7490 mm (24 ft 7 inch)	8050 mm (26 ft 5 inch)	6560 mm (21 ft 8 inch)	7080 mm (23 ft 3 inch)
Maximum Digging Depth (Vertical wall) (N)	5350 mm (17 ft 7 inch)	5760 mm (18 ft 11 inch)	5890 mm (19 ft 4 inch)	4140 mm (13 ft 7 inch)	4570 mm (15 ft)

(1) 2440 mm (8 ft) level bottom

Table 7

349E L Excavator with Variable Gauge Undercarriage					
	6.9 m (22 ft 8 inch) Reach Boom			6.55 m (21 ft 6 inch) Mass Boom	
	2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	3.9 m (12 ft 10 inch) Stick	2.5 m (8 ft 2 inch) Stick	3.0 m (9 ft 10 inch) Stick
Bucket	3.08 m^3 (4.03 yd^3)	2.15 m^3 (2.81 yd^3)		2.8 m^3 (3.66 yd^3)	
Maximum Digging Depth (H)	7040 mm (23 ft 1 inch)	7490 mm (24 ft 7 inch)	8040 mm (26 ft 5 inch)	6640 mm (21 ft 9 inch)	7140 mm (23 ft 5 inch)
Maximum Reach at Ground Level (I)	11260 mm (36 ft 11 inch)	11680 mm (38 ft 4 inch)	12090 mm (39 ft 8 inch)	10760 mm (35 ft 4 inch)	11220 mm (36 ft 10 inch)
Maximum Cutting Height (J)	10690 mm (35 ft 1 inch)	10870 mm (35 ft 8 inch)	10780 mm (35 ft 4 inch)	10240 mm (33 ft 7 inch)	11440 mm (37 ft 6 inch)
Maximum Loading Height (K)	7430 mm (24 ft 5 inch)	7610 mm (25 ft)	7590 mm (24 ft 10 inch)	6720 mm (22 ft 1 inch)	6910 mm (22 ft 8 inch)
Minimum Loading Height (L)	3370 mm (11 ft 1 inch)	2920 mm (9 ft 7 inch)	2370 mm (7 ft 9 inch)	3240 mm (10 ft 8 inch)	2740 mm (9 ft)
Maximum Cut Depth (M)(1)	6880 mm (22 ft 7 inch)	7340 mm (24 ft 1 inch)	7900 mm (25 ft 11 inch)	6740 mm (22 ft 1 inch)	6990 mm (22 ft 11 inch)
Maximum Digging Depth (Vertical wall) (N)	5350 mm (17 ft 7 inch)	5170 mm (17 ft)	5270 mm (17 ft 3 inch)	3910 mm (12 ft 10 inch)	4340 mm (14 ft 3 inch)

(1) 2440 mm (8 ft) level bottom

Long Reach

Table 8

349E L Excavator with Fixed Gauge Undercarriage	
	7.4 m (24 ft 3 inch) Reach Boom
	4.3 m (14 ft 1 inch) Stick
Bucket	3.1 m^3 (4.05 yd^3)
Maximum Digging Depth (H)	8910 mm (29 ft 3 inch)
Maximum Reach at Ground Level (I)	12940 mm (42 ft 5 inch)
Maximum Cutting Height (J)	11160 mm (36 ft 7 inch)
Maximum Loading Height (K)	7890 mm (25 ft 11 inch)
Minimum Loading Height (L)	2250 mm (7 ft 5 inch)
Maximum Cut Depth (M)(1)	8790 mm (28 ft 10 inch)
Maximum Digging Depth (Vertical wall) (N)	6480 mm (21 ft 3 inch)

(1) 2440 mm (8 ft) level bottom

Table 9

349E L Excavator with Variable Gauge Undercarriage	
	7.4 m (24 ft 3 inch) Reach Boom
	4.3 m (14 ft 1 inch) Stick
Bucket	3.1 m^3 (4.05 yd^3)
Maximum Digging Depth (H)	8770 mm (28 ft 9 inch)
Maximum Reach at Ground Level (I)	12910 mm (42 ft 4 inch)
Maximum Cutting Height (J)	11310 mm (37 ft 1 inch)
Maximum Loading Height (K)	8040 mm (26 ft 5 inch)
Minimum Loading Height (L)	2400 mm (7 ft 11 inch)
Maximum Cut Depth (M)(1)	8640 mm (28 ft 4 inch)
Maximum Digging Depth (Vertical wall) (N)	6340 mm (20 ft 10 inch)

(1) 2440 mm (8 ft) level bottom

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Boom/Stick/Bucket Combinations

SMCS Code: 6000; 6700

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

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

A stick is designed to match only one specific family of buckets.

Note: The selection of a compatible boom-stick-bucket combination is a guide. Work tools, uneven ground conditions, soft ground conditions, or poor ground conditions have effects on machine performance. The operator is responsible for being aware of these effects.

Contact your Cat dealer for information on selecting the correct boom-stick-bucket combination.

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

Variable Gauge

Table 10

349E L Excavator without a Quick Coupler(1) Fill (%) = 100								
					6.9 m (22 ft 8 inch) Reach Boom		6.55 m (21 ft 6 inch) Mass Boom	
Bucket Type	Linkage	Width of Bucket	SAE Capacity of Bucket	Weight of Bucket	2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	3.0 m (9 ft 10 inch) Stick	2.5 m (8 ft 2 inch) Stick
General Duty (GD)	TB	1370 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1755 kg (3870 lb)	(5)	(5)		
	UB	1450 mm (58 inch)	2.39 m^3 (3.13 yd^3)	2325 kg (5125 lb)			(5)	(5)
		1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	2420 kg (5330 lb)			(5)	(5)
		2000 mm (80 inch)	3.60 m^3 (4.71 yd^3)	2900 kg (6390 lb)			(2)	(3)
Heavy Duty (HD)	TB	1350 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1974 kg (4350 lb)	(5)	(5)		
		1500 mm (60 inch)	2.41 m^3 (3.16 yd^3)	2065 kg (4550 lb)	(5)	(5)		
		1650 mm (65 inch)	2.41 m^3 (3.15 yd^3)	2210 kg (4870 lb)	(5)	(5)		
		1800 mm (71 inch)	2.69 m^3 (3.52 yd^3)	2425 kg (5340 lb)	(5)	(4)		
		1850 mm (74 inch)	2.78 m^3 (3.64 yd^3)	2420 kg (5335 lb)	(5)	(4)		
	UB	1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2580 kg (5690 lb)			(4)	(5)
		1850 mm (73 inch)	3.19 m^3 (4.16 yd^3)	2740 kg (6040 lb)			(3)	(4)
		1950 mm (77 inch)	3.43 m^3 (4.48 yd^3)	2900 kg (6390 lb)			(3)	(4)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
(2) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(4) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(5) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.

Table 11

349E L Excavator without a Quick Coupler[1] Fill (%) = 90								
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**6.9 m (22 ft 8 inch) Reach Boom**		**6.55 m (21 ft 6 inch) Mass Boom**	
					2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.0 m (9 ft 10 inch) Stick**	**2.5 m (8 ft 2 inch) Stick**
Severe Duty (SD)	TB	1400 mm (55 inch)	1.87 m^3 (2.44 yd^3)	2180 kg (4805 lb)	[4]	[4]		
		1550 mm (61 inch)	2.14 m^3 (2.80 yd^3)	2340 kg (5160 lb)	[4]	[4]		
		1700 mm (67 inch)	2.41 m^3 (3.16 yd^3)	2515 kg (5540 lb)	[4]	[4]		
		1850 mm (74 inch)	2.69 m^3 (3.52 yd^3)	2730 kg (6010 lb)	[4]	[4]		
		1900 mm (75 inch)	2.78 m^3 (3.64 yd^3)	2720 kg (5990 lb)	[4]	[3]		
	UB	1450 mm (58 inch)	2.39 m^3 (3.13 yd^3)	2540 kg (5600 lb)			[4]	[4]
		1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	2650 kg (5840 lb)			[4]	[4]
		1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2730 kg (6015 lb)			[4]	[4]
		1850 mm (73 inch)	3.21 m^3 (4.20 yd^3)	2990 kg (6590 lb)			[3]	[4]
		1950 mm (77 inch)	3.43 m^3 (4.48 yd^3)	3060 kg (6740 lb)			[2]	[3]
Extreme Duty (XD)	UB	1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	3090 kg (6815 lb)			[4]	[4]
		1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	3190 kg (7035 lb)			[3]	[4]

[1] Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
[2] 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
[3] 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
[4] 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.

Table 12

349E L Excavator with a Quick Coupler (CW55)[1]									
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**Fill (%)**	**6.9 m (22 ft 8 inch) Reach Boom**		**6.5 m (21 ft 4 inch) Mass Boom**	
						2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.0 m (9 ft 10 inch) Stick**	**2.5 m (8 ft 2 inch) Stick**
Heavy Duty (HD)	TB	1650 mm (65 inch)	2.41 m^3 (3.15 yd^3)	2195 kg (4840 lb)	100	[5]	[4]		
	UB	1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2480 kg (5465 lb)				[3]	[4]

(continued)

(Table 12, contd)

		1850 mm (73 inch)	3.19 m^3 (4.16 yd^3)	2665 kg (5870 lb)				(2)	(3)
Severe Duty (SD)	UB	1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	25470 kg (5665 lb)	90			(5)	(5)
		1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2655 kg (5850 lb)				(4)	(5)
Extreme Duty (XD)	UB	1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	3090 kg (6800 lb)				(4)	(5)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
(2) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(4) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(5) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.

Fixed Gauge

Table 13

349E L Excavator without a Quick Coupler(1) Fill (%) = 100								
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**6.9 m (22 ft 8 inch) Reach Boom**		**6.55 m (21 ft 6 inch) Mass Boom**	
					2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**2.5 m (8 ft 2 inch) Stick**	**3.0 m (9 ft 10 inch) Stick**
General Duty (GD)	TB	1370 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1755 kg (3870 lb)	(3)	(3)		
	UB	1450 mm (58 inch)	2.39 m^3 (3.13 yd^3)	2325 kg (5125 lb)			**(3)**	(3)
		1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	2420 kg (5330 lb)			(3)	(5)
		2000 mm (80 inch)	3.60 m^3 (4.71 yd^3)	2900 kg (6390 lb)			(2)	(2)
Heavy Duty (HD)	TB	1350 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1974 kg (4350 lb)	(3)	(3)		
		1500 mm (60 inch)	2.41 m^3 (3.16 yd^3)	2065 kg (4550 lb)	(3)	(5)		
		1650 mm (65 inch)	2.41 m^3 (3.15 yd^3)	2210 kg (4870 lb)	(3)	(5)		
		1800 mm (71 inch)	2.69 m^3 (3.52 yd^3)	2425 kg (5340 lb)	(5)	(4)		
		1850 mm (74 inch)	2.78 m^3 (3.64 yd^3)	2420 kg (5335 lb)	(5)	(4)		
	UB	1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2580 kg (5690 lb)			(5)	(4)
		1850 mm (73 inch)	3.19 m^3 (4.16 yd^3)	2740 kg (6040 lb)			(4)	(2)
		1950 mm (77 inch)	3.43 m^3 (4.48 yd^3)	2900 kg (6390 lb)			(4)	(2)

(continued)

(Table 13, contd)
(1) Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
(2) 1200 kg/m³ (2000 lb/yd³) is the maximum density of material.
(3) 2100 kg/m³ (3500 lb/yd³) is the maximum density of material.
(4) 1500 kg/m³ (2500 lb/yd³) is the maximum density of material.
(5) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.

Table 14

349E L Excavator without a Quick Coupler(1) Fill (%) = 90								
Bucket Type	Linkage	Width of Bucket	SAE Capacity of Bucket	Weight of Bucket	6.9 m (22 ft 8 inch) Reach Boom		6.55 m (21 ft 6 inch) Mass Boom	
					2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	2.5 m (8 ft 2 inch) Stick	3.0 m (9 ft 10 inch) Stick
Severe Duty (SD)	TB	1400 mm (55 inch)	1.87 m³ (2.44 yd³)	2180 kg (4805 lb)	(4)	(4)		
		1550 mm (61 inch)	2.14 m³ (2.80 yd³)	2340 kg (5160 lb)	(4)	(4)		
		1700 mm (67 inch)	2.41 m³ (3.16 yd³)	2515 kg (5540 lb)	(4)	(5)		
		1850 mm (74 inch)	2.69 m³ (3.52 yd³)	2730 kg (6010 lb)	(5)	(3)		
		1900 mm (75 inch)	2.78 m³ (3.64 yd³)	2720 kg (5990 lb)	(5)	(3)		
	UB	1450 mm (58 inch)	2.39 m³ (3.13 yd³)	2540 kg (5600 lb)			(4)	(4)
		1550 mm (62 inch)	2.61 m³ (3.41 yd³)	2650 kg (5840 lb)			(4)	(5)
		1650 mm (65 inch)	2.77 m³ (3.62 yd³)	2730 kg (6015 lb)			(4)	(5)
		1850 mm (73 inch)	3.21 m³ (4.20 yd³)	2990 kg (6590 lb)			(3)	(2)
		1950 mm (77 inch)	3.43 m³ (4.48 yd³)	3060 kg (6740 lb)			(3)	(2)
Extreme Duty (XD)	UB	1550 mm (62 inch)	2.61 m³ (3.41 yd³)	3090 kg (6815 lb)			(4)	(3)
		1650 mm (65 inch)	2.77 m³ (3.62 yd³)	3190 kg (7035 lb)			(5)	(3)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
(2) 1200 kg/m³ (2000 lb/yd³) is the maximum density of material.
(3) 1500 kg/m³ (2500 lb/yd³) is the maximum density of material.
(4) 2100 kg/m³ (3500 lb/yd³) is the maximum density of material.
(5) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.

Table 15

349E L Excavator with a Quick Coupler (CW55)(1)							
Bucket Type	Linkage	Width of Bucket	SAE Capacity of Bucket	Weight of Bucket	Fill (%)	6.9 m (22 ft 8 inch) Reach Boom	6.5 m (21 ft 4 inch) Mass Boom

(continued)

(Table 15, contd)

						2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	2.5 m (8 ft 2 inch) Stick	3.0 m (9 ft 10 inch) Stick
Heavy Duty (HD)	TB	1650 mm (65 inch)	2.41 m^3 (3.15 yd^3)	2195 kg (4840 lb)	100	(4)	(3)		
	UB	1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2480 kg (5465 lb)				(3)	(2)
		1850 mm (73 inch)	3.19 m^3 (4.16 yd^3)	2665 kg (5870 lb)				(2)	(1)
Severe Duty (SD)	UB	1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	25470 kg (5665 lb)				(4)	(3)
		1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2655 kg (5850 lb)	90			(4)	(3)
Extreme Duty (XD)	UB	1550 mm (62 inch)	2.61 m^3 (3.41 yd^3)	3090 kg (6800 lb)				(3)	(2)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 600 mm (24 inch) track shoes
(2) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(4) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.

Fixed Gauge

Table 16

349E L Excavator without a Quick Coupler(1)									
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**Fill (%)**	**6.9 m (22 ft 8 inch) Reach Boom**			**Long Reach Boom**
						2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.9 m (12 ft 10 inch) Stick**	**4.3 m (14 ft 1 inch) Stick**
General Duty (GDC)	TB	750 mm (30 inch)	0.95 m^3 (1.24 yd^3)	1310 kg (2890 lb)	100	(2)	(2)	(2)	(2)
		900 mm (36 inch)	1.23 m^3 (1.60 yd^3)	1440 kg (3175 lb)		(2)	(2)	(2)	(2)
		1050 mm (42 inch)	1.51 m^3 (1.98 yd^3)	1525 kg (3361 lb)		(2)	(2)	(2)	(2)
		1200 mm (48 inch)	1.80 m^3 (2.36 yd^3)	1676 kg (3695 lb)		(2)	(2)	(2)	(2)
		1350 mm (54 inch)	2.10 m^3 (2.74 yd^3)	1795 kg (3950 lb)		(2)	(2)	(2)	(3)
		1500 mm (60 inch)	2.39 m^3 (3.13 yd^3)	1945 kg (4280 lb)		(2)	(2)	(3)	(4)
		1700 mm (68 inch)	2.78 m^3 (3.64 yd^3)	2130 kg (4690 lb)		(3)	(4)	(4)	(5)
		1850 mm (74 inch)	3.08 m^3 (4.04 yd^3)	2255 kg (4970 lb)		(4)	(4)	(5)	(5)

(continued)

(Table 16, contd)

General Duty XL (GDXL)	TB	2045 mm (80 inch)	3.82 m^3 (5.00 yd^3)	2375 kg (5230 lb)		(5)	(5)	(6)	(6)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 750 mm (30 inch) track shoes
(2) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(3) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(4) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(5) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(6) 900 kg/m^3 (1500 lb/yd^3) is the maximum density of material.

Table 17

349E L Excavator without a Quick Coupler(1) Fill (%) = 100										
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**6.9 m (22 ft 8 inch) Reach Boom**			**6.55 m (21 ft 6 inch) Mass Boom**		**Long reach Boom**
					2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.9 m (12 ft 10 inch) Stick**	**3.0 m (9 ft 10 inch) Stick**	**2.5 m (8 ft 2 inch) Stick**	**4.3 m (14 ft 1 inch) Stick**
Heavy Duty (HD)	TB	900 mm (36 inch)	1.08 m^3 (1.41 yd^3)	1595 kg (3515 lb)	(2)	(2)	(2)			(2)
		1050 mm (42 inch)	1.34 m^3 (1.75 yd^3)	1685 kg (3700 lb)	(2)	(2)	(2)			(2)
		1200 mm (48 inch)	1.60 m^3 (2.09 yd^3)	1835 kg (4045 lb)	(2)	(2)	(2)			(2)
		1350 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1975 kg (4350 lb)	(2)	(2)	(2)			(2)
		1500 mm (60 inch)	2.14 m^3 (2.80 yd^3)	2125 kg (4685 lb)	(2)	(2)	(3)			(3)
		1650 mm (66 inch)	2.41 m^3 (3.15 yd^3)	2285 kg (5040 lb)	(2)	(3)	(4)			(4)
		1800 mm (71 inch)	2.69 m^3 (3.52 yd^3)	2425 kg (5340 lb)	(3)	(4)	(4)			(5)
	UB	1650 mm (65 inch)	2.77 m^3 (3.62 yd^3)	2580 kg (5690 lb)				(4)	(3)	
		1850 mm (73 inch)	3.19 m^3 (4.16 yd^3)	2740 kg (6040 lb)				(5)	(4)	
		1950 mm (77 inch)	3.43 m^3 (4.48 yd^3)	2900 kg (6390lb)				(5)	(4)	

(1) Equipped with a 9000 kg (19840 lb) counterweight and 750 mm (30 inch) track shoes
(2) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(3) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(4) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(5) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Table 18

349E L Excavator without a Quick Coupler(1) Fill (%) = 90							
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**6.9 m (22 ft 8 inch) Reach Boom**	**6.55 m (21 ft 6 inch) Mass Boom**	**Long reach Boom**

(continued)

(Table 18, contd)

					2.9 m (9 ft 6 inch) Stick	3.35 m (11 ft) Stick	3.9 m (12 ft 10 inch) Stick	3.0 m (9 ft 10 inch) Stick	2.5 m (8 ft 2 inch) Stick	4.3 m (14 ft 1 inch) Stick
Severe Duty (SD)	TB	760 mm (30 inch)	0.88 m^3 (1.15 yd^3)	1445 kg (3190 lb)	(2)	(2)	(2)			(2)
		900 mm (36 inch)	1.08 m^3 (1.41 yd^3)	1675 kg (3695 lb)	(2)	(2)	(2)			(2)
		1050 mm (42 inch)	1.34 m^3 (1.75 yd^3)	1780 kg (3920 lb)	(2)	(2)	(2)			(2)
		1200 mm (48 inch)	1.60 m^3 (2.09 yd^3)	1950 kg (4300 lb)	(2)	(2)	(2)			(2)
		1400 mm (55 inch)	1.87 m^3 (2.44 yd^3)	2180 kg (4805 lb)	(2)	(2)	(2)			(2)
		1550 mm (61 inch)	2.14 m^3 (2.80 yd^3)	2380 kg (5250 lb)	(2)	(2)	(2)			(3)
		1700 mm (67 inch)	2.41 m^3 (3.16 yd^3)	2525 kg (5565 lb)	(2)	(3)	(3)			(4)
		1850 mm (74 inch)	2.69 m^3 (3.52 yd^3)	2725 kg (6005 lb)	(3)	(4)	(4)			
	UB	1450 mm (58 inch)	2.39 m^3 (3.13 yd^3)	2540 kg (5600 lb)				(2)	(2)	
		1850 mm (73 inch)	3.21 m^3 (4.20 yd^3)	2990 kg (6580 lb)				(4)	(3)	
Extreme Duty (XD)	TB	1250 mm (49 inch)	1.60 m^3 (2.09 yd^3)	2225 kg (4900 lb)	(2)	(2)	(2)			(2)
		1400 mm (55 inch)	1.87 m^3 (2.44 yd^3)	2365 kg (5215 lb)	(2)	(2)	(2)			(2)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 750 mm (30 inch) track shoes
(2) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(3) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(4) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

Table 19

349E L Excavator with a Center Lock Quick Coupler(1)									
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**Fill (%)**	**6.9 m (22 ft 8 inch) Reach Boom**			**Long Reach Boom**
						2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.9 m (12 ft 10 inch) Stick**	**4.3 m (14 ft 1 inch) Stick**
General Duty (GDC)	TB	750 mm (30 inch)	0.95 m^3 (1.24 yd^3)	1310 kg (2890 lb)	100	(2)	(2)	(2)	(2)
		900 mm (36 inch)	1.23 m^3 (1.60 yd^3)	1440 kg (3175 lb)		(2)	(2)	(2)	(2)
		1050 mm (42 inch)	1.51 m^3 (1.98 yd^3)	1525 kg (3361 lb)		(2)	(2)	(2)	(2)

(continued)

(Table 19, contd)

		1200 mm (48 inch)	1.80 m^3 (2.36 yd^3)	1676 kg (3695 lb)		(2)	(2)	(2)	(3)
		1350 mm (54 inch)	2.10 m^3 (2.74 yd^3)	1795 kg (3950 lb)		(2)	(2)	(3)	(4)
		1500 mm (60 inch)	2.39 m^3 (3.13 yd^3)	1945 kg (4280 lb)		(3)	(4)	(4)	(5)
		1700 mm (68 inch)	2.78 m^3 (3.64 yd^3)	2130 kg (4690 lb)		(4)	(5)	(5)	(7)
		1850 mm (74 inch)	3.08 m^3 (4.04 yd^3)	2255 kg (4970 lb)		(5)	(5)	(6)	(5)
General Duty XL (GDXL)	TB	2045 mm (80 inch)	3.82 m^3 (5.00 yd^3)	2375 kg (5230 lb)		(6)	(6)	(7)	(7)
Heavy Duty (HD)	TB	900 mm (36 inch)	1.08 m^3 (1.41 yd^3)	1595 kg (3515 lb)		(2)	(2)	(2)	(2)
		1050 mm (42 inch)	1.34 m^3 (1.75 yd^3)	1685 kg (3715 lb)		(2)	(2)	(2)	(2)
		1200 mm (48 inch)	1.60 m^3 (2.09 yd^3)	1835 kg (4045 lb)		(2)	(2)	(2)	(2)
		1350 mm (54 inch)	1.87 m^3 (2.44 yd^3)	1975 kg (4350 lb)		(2)	(2)	(3)	(4)
		1500 mm (60 inch)	2.14 m^3 (2.80 yd^3)	2125 kg (4685 lb)		(2)	(3)	(4)	(5)
		1650 mm (66 inch)	2.41 m^3 (3.15 yd^3)	2290 kg (5040 lb)		(3)	(4)	(5)	(5)
		1800 mm (71 inch)	2.69 m^3 (3.52 yd^3)	2425 kg (5340 lb)		(4)	(5)	(5)	(6)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 750 mm (30 inch) track shoes
(2) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(3) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(4) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(5) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(6) 900 kg/m^3 (1500 lb/yd^3) is the maximum density of material.
(7) Not Recommended

Table 20

349E L Excavator with a Center Lock Quick Coupler(1)									
Bucket Type	**Linkage**	**Width of Bucket**	**SAE Capacity of Bucket**	**Weight of Bucket**	**Fill (%)**	**6.9 m (22 ft 8 inch) Reach Boom**			**Long Reach Boom**
						2.9 m (9 ft 6 inch) Stick	**3.35 m (11 ft) Stick**	**3.9 m (12 ft 10 inch) Stick**	**4.3 m (14 ft 1 inch) Stick**
Severe Duty (SD)	TB	760 mm (30 inch)	0.88 m^3 (1.15 yd^3)	1445 kg (3190 lb)	90	(2)	(2)	(2)	(2)
		900 mm (36 inch)	1.08 m^3 (1.41 yd^3)	1675 kg (3700 lb)		(2)	(2)	(2)	(2)
		1050 mm (42 inch)	1.34 m^3 (1.75 yd^3)	1780 kg (3920 lb)		(2)	(2)	(2)	(2)

(continued)

(Table 20, contd)

		1200 mm (48 inch)	1.60 m^3 (2.09 yd^3)	1950 kg (4300 lb)		(2)	(2)	(2)	(2)
		1400 mm (55 inch)	1.87 m^3 (2.44 yd^3)	2180 kg (4805 lb)		(2)	(2)	(3)	(4)
		1550 mm (61 inch)	2.14 m^3 (2.80 yd^3)	2380 kg (5250 lb)		(2)	(3)	(4)	(5)
		1700 mm (67 inch)	2.41 m^3 (3.16 yd^3)	2525 kg (5565 lb)		(3)	(4)	(5)	(5)
		1850 mm (74 inch)	2.69 m^3 (3.52 yd^3)	2725 kg (6010 lb)		(4)	(5)	(5)	
Extreme Duty (XD)	TB	1250 mm (49 inch)	1.60 m^3 (2.09 yd^3)	2225 kg (4900 lb)		(2)	(2)	(2)	(3)
		1400 mm (55 inch)	1.87 m^3 (2.44 yd^3)	2365 kg (5215 lb)		(2)	(2)	(3)	(4)

(1) Equipped with a 9000 kg (19840 lb) counterweight and 750 mm (30 inch) track shoes
(2) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(3) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(4) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(5) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Consult your Cat dealer for more information.

i06032384

Lifting Capacities

SMCS Code: 7000

S/N: FJB1–Up

S/N: ETC1–Up

S/N: SPG1–Up

S/N: RGH1–Up

S/N: MZW1–Up

S/N: KFX1–Up

S/N: WHZ1–Up

WARNING

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

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

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

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

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

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

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

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

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

Variable Gauge

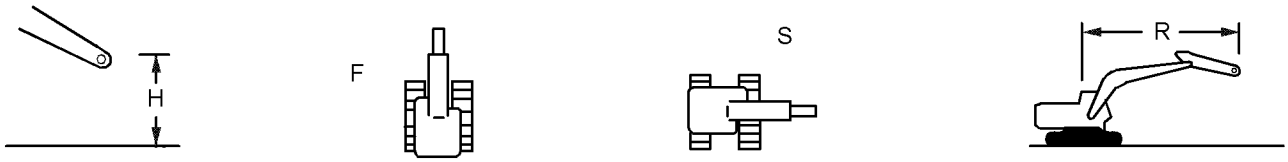


Illustration 68 g02143628

Lift point: Stick nose without bucket

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

Table 21

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8200[2] 18250[2]		7.44 23.95
7.5 m 25.0 ft							11000[2] 24100[2]				7750[2] 17150[2]		8.57 27.88
6.0 m 20.0 ft							11550[2] 25200[2]		10300[2] 19750[2]	8950 19200	7650[2] 16850[2]		9.33 30.48
4.5 m 15.0 ft			19550[2] 41850[2]		14900[2] 32200[2]		12600[2] 27300[2]	11600 24950	11250[2] 24550[2]	8800 18900	7800[2] 17100[2]	7650 16900	9.80 32.09
3.0 m 10.0 ft			24000[2] 51500[2]	23200 50100	17050[2] 36850[2]	15300 33050	13750[2] 29800[2]	11150 24000	11850[2] 25750[2]	8850 18400	8100[2] 17850[2]	7250 16000	10.02 32.85
1.5 m 5.0 ft			17500[2] 41700[2]		18700[2] 40450[2]	14650 31550	14700[2] 31850[2]	10750 23150	12350[2] 26750	8350 17950	8700[2] 19150[2]	7150 15750	10.01 32.83

(continued)

(Table 21, contd)

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0			20350[2] 47100[2]	20350[2] 46700	19400[2] 42050[2]	14250 30700	15250[2] 33000[2]	10500 22600	12250 26400	8150 17600	9700[2] 21300[2]	7300 16100	9.76 32.02
-1.5 m -5.0 ft	14900[2] 33600[2]		25200[2] 54750[2]	21700 46600	19150[2] 41450[2]	14100 30350	15100[2] 32600[2]	10350 22300	12100[2] 26000[2]	8100 17500	11250[2] 24900[2]	7850 17250	9.27 30.36
-3.0 m -10.0 ft	23450[2] 53000[2]		22950[2] 49700[2]	21900 47000	17800[2] 38450[2]	14150 30450	13950[2] 30050[2]	10400 22400			11700[2] 25750[2]	8850 19650	8.47 27.70
-4.5 m -15.0 ft	24350[2] 52500[2]		19100[2] 41100[2]		14900[2] 31850[2]	14400 31050					11450[2] 25100[2]	11050 24750	7.29 23.68

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

Table 22

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9000[2] 19950[2]		7.44 23.95
7.5 m 25.0 ft							12150[2] 26650[2]	12150[2] 26250			8500[2] 18800[2]		8.57 27.88
6.0 m 20.0 ft							12800[2] 27850[2]	11950 25750	11250[2] 21650[2]	8950 19200	8400[2] 18450[2]		9.33 30.48
4.5 m 15.0 ft			21500[2] 46100[2]		16450[2] 35550[2]	16150 34850	13900[2] 30200[2]	11600 25950	12500[2] 27200[2]	8800 18900	8500[2] 18750[2]	7650 16900	9.80 32.09
3.0 m 10.0 ft			26500[2] 56850[2]	23200 50100	18850[2] 40700[2]	15300 33050	15200[2] 32950[2]	11150 24000	12650 27250	8550 18400	8900[2] 19550[2]	7250 16000	10.02 32.85
1.5 m 5.0 ft			18550[2] 44150[2]		20700[2] 44700[2]	14650 31550	16300 35050	10750 23150	12450 26750	8350 17950	9550[2] 21000[2]	7150 15750	10.01 32.83
0			21550[2] 49900[2]	21550[2] 46700	21500[2] 46500[2]	14250 30700	16000 34350	10500 22600	12250 26400	8150 17600	10600[2] 23350[2]	7300 16100	9.76 32.02
-1.5 m -5.0 ft	15800[2] 35600[2]		27900[2] 60600[2]	21700 46600	21200[2] 45900[2]	14100 30350	15850 34050	10350 22300	12200 26300	8100 17500	11750 25850	7850 17250	9.27 30.36

(continued)

(Table 22, contd)

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	24850[2] 56150[2]		25450[2] 55100[2]	21900 47000	19750[2] 42650[2]	14150 30450	15500[2] 33350[2]	10400 22400			13000[2] 28650[2]	8850 19650	8.47 27.70
-4.5 m -15.0 ft	27100[2] 58450[2]		21250[2] 45700[2]		16600[2] 35450[2]	14400 31050					12750[2] 28000[2]	11050 24750	7.29 23.68

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

Table 23

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9800[2] 21750[2]		6.87 22.04
7.5 m 25.0 ft							11700[2] 25700[2]				9200[2] 20300[2]		8.09 26.26
6.0 m 20.0 ft					13700[2] 29650[2]		12150[2] 26500[2]	11850 25500			9050[2] 19950[2]	9000 19950[2]	8.89 29.02
4.5 m 15.0 ft			21050[2] 45000[2]		15650[2] 33800[2]		13100[2] 28400[2]	11450 24700	11700[2] 25500[2]	8700 18700	9200[2] 20250[2]	8150 18000	9.38 30.70
3.0 m 10.0 ft			16600[2] 43100[2]		17700[2] 38200[2]	15150 32650	14150[2] 30650[2]	11050 23850	12150[2] 26400[2]	8500 18300	9650[2] 21200[2]	7700 17000	9.60 31.50
1.5 m 5.0 ft			13200[2] 32150[2]		19100[2] 41250[2]	14550 31350	15000[2] 32450[2]	10700 23050	12400 26700	8300 17900	10400[2] 22900[2]	7600 16750	9.59 31.48
0			19150[2] 44650[2]		19500[2] 42200[2]	14200 30600	15300[2] 33150[2]	10450 22550	12300 26450	8200 17650	11650 25700	7800 17200	9.34 30.63
-1.5 m -5.0 ft	15250[2] 34600[2]		24400[2] 53100[2]	21800 46850	18900[2] 40900[2]	14150 30450	14900[2] 32250[2]	10400 22400			12100[2] 26700[2]	8400 18550	8.82 28.89
-3.0 m -10.0 ft	26150[2] 59050[2]		21800[2] 47200[2]		17150[2] 37050[2]	14250 30700	13350[2] 28600[2]	10500 22650			12100[2] 26650[2]	9700 21500	7.98 26.07
-4.5 m -15.0 ft			17400[2] 37300[2]		13600[2] 28750[2]						11550[2] 25250[2]		6.70 21.74

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

Table 24

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											10700[2] 23750[2]		6.87 22.04
7.5 m 25.0 ft							12900[2] 28400[2]	12050 25850			10050[2] 22200[2]		8.09 26.26
6.0 m 20.0 ft					15100[2] 32700[2]		13450[2] 29250[2]	11850 25500			9900[2] 21800[2]	9000 20050	8.89 29.02
4.5 m 15.0 ft			23200[2] 49600[2]		17300[2] 37300[2]	15950 34400	14500[2] 31400[2]	11450 24700	12850 27600	8700 18700	10050[2] 22150[2]	8150 18000	9.38 30.70
3.0 m 10.0 ft			17600[2] 45650[2]		19550[2] 42200[2]	15150 32650	15650[2] 33950[2]	11050 23850	12600 27150	8500 18300	10550[2] 23150[2]	7700 17000	9.60 31.50
1.5 m 5.0 ft			14000[2] 34100[2]		21100[2] 45650[2]	14550 31350	16200 34900	10700 23050	12400 26700	8300 17900	11300 24900	7600 16750	9.59 31.48
0			20300[2] 47250[2]	20300[2] 46700	21550[2] 46700[2]	14200 30600	15950 34350	10450 22550	12300 26450	8200 17650	11650 25700	7800 17200	9.34 30.63
-1.5 m -5.0 ft	16200[2] 36650[2]		27050[2] 58800[2]	21800 46850	20900[2] 45300[2]	14150 30450	15850 34150	10400 22400			12650 27850	8400 18550	8.82 28.89
-3.0 m -10.0 ft	27700[2] 62600[2]		24150[2] 52400[2]	22050 47350	19050[2] 41100[2]	14250 30700	14850[2] 31800[2]	10500 22650			13450[2] 29650[2]	9700 21500	7.98 26.07
-4.5 m -15.0 ft			19350[2] 41550[2]		15100[2] 32050[2]	14600 31500					12850[2] 28200[2]	12550 28150	6.70 21.74

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

Table 25

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8200[2] 18250[2]		7.44 23.95
7.5 m 25.0 ft							11000[2] 24100[2]				7750[2] 17150[2]		8.57 27.88

(continued)

(Table 25, contd)

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
6.0 m 20.0 ft							11550(2) 25200(2)		10300(2) 19750(2)	9050 19450	7650(2) 16850(2)		9.33 30.48
4.5 m 15.0 ft			19550(2) 41850(2)		14900(2) 32200(2)		12600(2) 27300(2)	11750 25250	11250(2) 24550(2)	8900 19150	7800(2) 17100(2)	7750 17100(2)	9.80 32.09
3.0 m 10.0 ft			24000(2) 51500(2)	23500 50700	17050(2) 36850(2)	15500 33450	13750(2) 29800(2)	11300 24350	11850(2) 25750(2)	8650 18650	8100(2) 17850(2)	7350 16250	10.02 32.85
1.5 m 5.0 ft			17500(2) 41700(2)		18700(2) 40450(2)	14850 32000	14700(2) 31850(2)	10900 23500	12350(2) 26750(2)	8450 18200	8700(2) 19150(2)	7250 16000	10.01 32.83
0			20350(2) 47100(2)		19400(2) 42050(2)	14450 31100	15250(2) 33000(2)	10650 22900	12450 26750	8300 17850	9700(2) 21300(2)	7450 16350	9.76 32.02
-1.5 m -5.0 ft	14900(2) 33600(2)		25200(2) 54750(2)	22000 47250	19150(2) 41450(2)	14300 30750	15100(2) 32600(2)	10500 22600	12100(2) 26000(2)	8250 17750	11250(2) 24900(2)	7950 17500	9.27 30.36
-3.0 m -10.0 ft	23450(2) 53000(2)		22950(2) 49700(2)	22200 47650	17800(2) 38450(2)	14350 30900	13950(2) 30050(2)	10550 22700			11700(2) 25750(2)	9000 19900	8.47 27.70
-4.5 m -15.0 ft	24350(2) 52500(2)		19100(2) 41100(2)		14900(2) 31850(2)	14600 31500					11450(2) 25100(2)	11250 25100	7.29 23.68

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

Table 26

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9000(2) 19950(2)		7.44 23.95
7.5 m 25.0 ft							12150(2) 26650(2)	12150(2) 26550			8500(2) 18800(2)		8.57 27.88
6.0 m 20.0 ft							12800(2) 27850(2)	12100 26100	11250(2) 21650(2)	9050 19450	8400(2) 18450(2)		9.33 30.48
4.5 m 15.0 ft			21500(2) 46100(2)		16450(2) 35550(2)	16350 35250	13900(2) 30200(2)	11750 25250	12500(2) 27200(2)	8900 19150	8500(2) 18750(2)	7750 17150	9.80 32.09

(continued)

(Table 26, contd)

349E L Excavator with a reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
3.0 m 10.0 ft			26500[2] 56850[2]	23500 50700	18850[2] 40700[2]	15500 33450	15200[2] 32950[2]	11300 24350	12850 27650	8650 18650	8900[2] 19550[2]	7350 16250	10.02 32.85
1.5 m 5.0 ft			18550[2] 44150[2]		20700[2] 44700[2]	14850 32000	16300[2] 35300[2]	10900 23500	12600 27150	8450 18200	9550[2] 21000[2]	7250 16000	10.01 32.83
0			21550[2] 49900[2]	21550[2] 47350	21500[2] 46500[2]	14450 31100	16200 34850	10650 22900	12450 26750	8300 17850	10600[2] 23350[2]	7450 16350	9.76 32.02
-1.5 m -5.0 ft	15800[2] 35600[2]		27900[2] 60600[2]	22000 47250	21200[2] 45900[2]	14300 30750	16050 34550	10500 22600	12400 26650	8250 17750	11900 26250	7950 17500	9.27 30.36
-3.0 m -10.0 ft	24850[2] 56150[2]		25450[2] 55100[2]	22200 47650	19750[2] 42650[2]	14350 30900	15500[2] 33350[2]	10550 22700			13000[2] 28650[2]	9000 19900	8.47 27.70
-4.5 m -15.0 ft	27100[2] 58450[2]		21250[2] 45700[2]		16600[2] 35450[2]	14600 31500					12750[2] 28000[2]	11250 25100	7.29 23.68

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

Table 27

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9800[2] 21750[2]		6.87 22.04
7.5 m 25.0 ft							11700[2] 25700[2]				9200[2] 20300[2]		8.09 26.26
6.0 m 20.0 ft					13700[2] 29650[2]		12150[2] 26500[2]	12000 25800			9050[2] 19950[2]		8.89 29.02
4.5 m 15.0 ft			21050[2] 45000[2]		15650[2] 33800[2]		13100[2] 28400[2]	11600 25050	11700[2] 25500[2]	8800 18950	9200[2] 20250[2]	8250 18250	9.38 30.70
3.0 m 10.0 ft			16600[2] 43100[2]		17700[2] 38200[2]	15350 33050	14150[2] 30650[2]	11200 24150	12150[2] 26400[2]	8600 18550	9650[2] 21200[2]	7800 17250	9.60 31.50
1.5 m 5.0 ft			13200[2] 32150[2]		19100[2] 41250[2]	14750 31750	15000[2] 32450[2]	10850 23400	12500[2] 27100	8450 18150	10400[2] 22900[2]	7700 16950	9.59 31.48

(continued)

(Table 27, contd)

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0			19150[2] 44650[2]		19500[2] 42200[2]	14400 31050	15300[2] 33150[2]	10600 22900	12450 26800	8300 17900	11650 25700	7900 17450	9.34 30.63
-1.5 m -5.0 ft	15250[2] 34600[2]		24400[2] 53100[2]	22100 47450	18900[2] 40900[2]	14350 30850	14900[2] 32250[2]	10550 22700			12100[2] 26700[2]	8550 18800	8.82 28.89
-3.0 m -10.0 ft	26150[2] 59050[2]		21800[2] 47200[2]		17150[2] 37050[2]	14450 31100	13350[2] 28600[2]	10650 22950			12100[2] 26650[2]	9850 21800	7.98 26.07
-4.5 m -15.0 ft			17400[2] 37300[2]		13600[2] 28750[2]						11550[2] 25250[2]		6.70 21.74

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

Table 28

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											10700[2] 23750[2]		6.87 22.04
7.5 m 25.0 ft							12900[2] 28400[2]	12200 26200			10050[2] 22200[2]		8.09 26.26
6.0 m 20.0 ft					15100[2] 32700[2]		13450[2] 29250[2]	12000 25800			9900[2] 21800[2]	9150 20300	8.89 29.02
4.5 m 15.0 ft			23200[2] 49600[2]		17300[2] 37300[2]	16150 34800	14500[2] 31400[2]	11600 25050	12950[2] 27950	8800 18950	10050[2] 22150[2]	8250 18250	9.38 30.70
3.0 m 10.0 ft			17600[2] 45650[2]		19550[2] 42200[2]	15350 33050	15650[2] 33950[2]	11200 24150	12800 27500	8600 18550	10550[2] 23150[2]	7800 17250	9.60 31.50
1.5 m 5.0 ft			14000[2] 34100[2]		21100[2] 45650[2]	14750 31750	16450 35400	10850 23400	12600 27100	8450 18150	11400[2] 25000[2]	7700 16950	9.59 31.48
0			20300[2] 47250[2]		21550[2] 46700[2]	14400 31050	16200 34850	10600 22900	12450 26800	8300 17900	11850 26050	7900 17450	9.34 30.63
-1.5 m -5.0 ft	16200[2] 36650[2]		27050[2] 58800[2]	22100 47450	20900[2] 45300[2]	14350 30850	16100 34650	10550 22700			12800 28250	8550 18800	8.82 28.89

(continued)

(Table 28, contd)

349E L Excavator with a reach boom, a 2.9 m (9 ft 6 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 750 mm (30 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	27700[2] 62600[2]		24150[2] 52400[2]	22350 48000	19050[2] 41100[2]	14450 31100	14850[2] 31800[2]	10650 22950			13450[2] 29650[2]	9850 21800	7.98 26.07
-4.5 m -15.0 ft			19350[2] 41550[2]		15100[2] 32050[2]	14800 31950					12850[2] 28200[2]	12750 28200[2]	6.70 21.74

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

Table 29

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9800[2] 21750[2]		6.49 21.30
7.5 m 25.0 ft							11200[2] 21350[2]				9050[2] 20000[2]		7.77 25.21
6.0 m 20.0 ft					12800[2] 28250[2]		11750[2] 25650[2]	11550 24850			8850[2] 19500[2]		8.60 28.07
4.5 m 15.0 ft			19350[2] 41450[2]		14850[2] 32050[2]		12600[2] 27350[2]	11200 24050	10300[2] 22700[2]	8350 18400	8950[2] 19750[2]	8200 18100	9.10 29.81
3.0 m 10.0 ft			23550[2] 50550[2]	22700 49000	16800[2] 36300[2]	14900 32100	13600[2] 29450[2]	10750 23100	11750[2] 25550[2]	8150 17500	9400[2] 20650[2]	7650 16900	9.34 30.63
1.5 m 5.0 ft			21450[2] 51400[2]	21450[2] 46350	18300[2] 39550[2]	14200 30550	14400[2] 31200[2]	10350 22250	12050[2] 25950	7950 17050	10150[2] 22300[2]	7550 16550	9.33 30.61
0			25150[2] 55550[2]	21150 45450	18850[2] 40800[2]	13750 29650	14750[2] 31950[2]	10050 21650	11900 26250	7800 17200	11450[2] 25200[2]	7750 17000	9.06 29.74
-1.5 m -5.0 ft	17800[2] 40300[2]		24200[2] 52550[2]	21150 45350	18350[2] 39700[2]	13650 29350	14350[2] 30950[2]	9950 21450			12050[2] 26500[2]	8400 18500	8.53 27.94
-3.0 m -10.0 ft	27900[2] 60550[2]		21450[2] 46450[2]	21350 45900	16550[2] 35700[2]	13750 29600	12500[2] 26500[2]	10100 21800			12050[2] 26500[2]	9850 21800	7.66 25.01
-4.5 m -15.0 ft			16650[2] 35550[2]		12450[2] 25950[2]						11400[2] 24900[2]		6.32 20.46

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

Table 30

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											10700[2] 23600[2]		6.49 21.30
7.5 m 25.0 ft							12250[2] 23400[2]	11750 23400[2]			9900[2] 21950[2]		7.77 25.21
6.0 m 20.0 ft					14150[2] 31250[2]		13050[2] 28450[2]	11550 24850			9700[2] 21350[2]	9150 20400	8.60 28.07
4.5 m 15.0 ft			21350[2] 45800[2]		16400[2] 35450[2]	15800 34000	13950[2] 30300[2]	11200 24050	11300[2] 24900[2]	8350 18400	9850[2] 21650[2]	8200 18100	9.10 29.81
3.0 m 10.0 ft			26050[2] 55950[2]	22700 49000	18650[2] 40250[2]	14900 32100	15100[2] 32700[2]	10750 23100	12300 26400	8150 17500	10300[2] 22600[2]	7650 16900	9.34 30.63
1.5 m 5.0 ft			22700[2] 54400[2]	21550 46350	20300[2] 43900[2]	14200 30550	15900 34200	10350 22250	12050 25950	7950 17050	11150[2] 24450[2]	7550 16550	9.33 30.61
0			26650[2] 61600[2]	21150 45450	20900[2] 45300[2]	13750 29650	15600 33550	10050 21650	11900 26250	7800 17200	11800 26000	7750 17000	9.06 29.74
-1.5 m -5.0 ft	18900[2] 42700[2]		26900[2] 58350[2]	21150 45350	20400[2] 44150[2]	13650 29350	15500 33300	9950 21450			12850 28400	8400 18500	8.53 27.94
-3.0 m -10.0 ft	30700[2] 67450[2]		23900[2] 51700[2]	21350 45900	18450[2] 39750[2]	13750 29600	13950[2] 29650[2]	10100 21800			13450[2] 29600[2]	9850 21800	7.66 25.01
-4.5 m -15.0 ft			18600[2] 39800[2]		13950[2] 29150[2]						12750[2] 27950[2]		6.32 20.46

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

Table 31

349E L Excavator with a heavy duty mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									11900 26300		7.21 23.37
6.0 m 20.0 ft					14000 30400		12550 27450	11500 24700	11600 25550	10100 22450	8.10 26.43

(continued)

(Table 31, contd)

349E L Excavator with a heavy duty mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
4.5 m 15.0 ft			21050 45100		15750 34050	15650 33700	13250 28850	11150 24000	11800 25950	8900 19750	8.64 28.27
3.0 m 10.0 ft					17600 38000	14800 31950	14150 30650	10750 23150	12350 27150	8350 18400	8.89 29.14
1.5 m 5.0 ft					18800 40700	14200 30600	14800 32100	10400 22400	12400 27350	8200 18050	8.87 29.11
0			23700 54900	21350 45900	19000 41200	13900 29900	14900 32300	10200 21950	12650 27900	8450 18650	8.59 28.20
-1.5 m -5.0 ft	18450 41950		23400 50850	21450 46050	18100 39250	13850 29800	14100 30400	10150 21900	12800 28150	9300 20500	8.03 26.29
-3.0 m -10.0 ft	24600 53550		20200 43650		15750 33900	14000 30200			12600 27650	11150 24800	7.09 23.15
-4.5 m -15.0 ft									12400 27350		5.26 17.26

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

Table 32

349E L Excavator with a heavy duty mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									13000 28700	12400 27900	7.21 23.37
6.0 m 20.0 ft					15500 33600		13900 30400	11500 24700	12700 27950	10100 22450	8.10 26.43
4.5 m 15.0 ft			23250 49800		17450 37650	15650 33700	14700 31950	11150 24000	12900 28350	8900 19750	8.64 28.27
3.0 m 10.0 ft					19500 42100	14800 31950	15700 34000	10750 23150	12550 27700	8350 18400	8.89 29.14
1.5 m 5.0 ft					20850 45100	14200 30600	15950 34300	10400 22400	12400 27350	8200 18050	8.87 29.11
0			25100 58850	21350 45900	21100 45700	13900 29900	15700 33800	10200 21950	12900 28400	8450 18650	8.59 28.20

(continued)

(Table 32, contd)

349E L Excavator with a heavy duty mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON											
(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-1.5 m -5.0 ft	19550 44500		26000 56450	21450 46050	20150 43600	13850 29800	15650 33750	10150 21900	14250 31350	9300 20500	8.03 26.29
-3.0 m -10.0 ft	27450 59750		22450 48600	21750 46750	17550 37750	14000 30200			14050 30900	11150 24800	7.09 23.15
-4.5 m -15.0 ft									13900 30650		5.26 17.26

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

Fixed Gauge

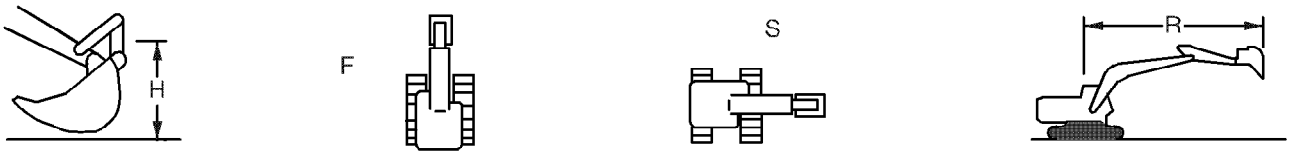


Illustration 69 g01055537

(H) Height
(F) Lifting capacity over the front of the machine
(S) Lifting capacity over the side of the machine
(R) Reach

Table 33

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is OFF														
(H)	(R)													
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius			
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft	
7.5 m 25.0 ft							10550[2] 23250[2]				9100[2] 20150[2]		7.67 24.87	
6.0 m 20.0 ft							11700[2] 25600[2]	10500 22550			8850[2] 19550[2]	8400 18650	8.53 27.85	
4.5 m 15.0 ft			18900[2] 40600[2]		14650[2] 31650[2]	14350 30900	12500[2] 27150[2]	10150 21800	9850[2] 21700[2]	7500 16550	8950[2] 19700[2]	7400 16400	9.07 29.69	

(continued)

(Table 33, contd)

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
3.0 m 10.0 ft			23200[2] 49800[2]	20400 44050	16650[2] 35950[2]	13450 29000	13500[2] 29250[2]	9700 20850	11700[2] 25350	7300 15700	9350[2] 20550[2]	6900 15200	9.33 30.59
1.5 m 5.0 ft			21600[2] 52000[2]	19150 41300	18200[2] 39350[2]	12700 27450	14350[2] 31100[2]	9300 20000	11550 24850	7100 15300	10050[2] 22150[2]	6750 14800	9.34 30.65
0			24500[2] 55700[2]	18750 40250	18850[2] 40800[2]	12300 26450	14750[2] 31950[2]	9000 19350	11400 25150	7000 15450	11250 24750	6850 15100	9.10 29.86
-1.5 m -5.0 ft	16850[2] 38100[2]		24400[2] 52950[2]	18700 40150	18450[2] 39950[2]	12150 26100	14450[2] 31150[2]	8900 19150			12050[2] 26500[2]	7400 16350	8.59 28.16
-3.0 m -10.0 ft	27800[2] 61700[2]		21800[2] 47250[2]	18900 40600	16800[2] 36250[2]	12200 26300	12800[2] 27250[2]	9000 19400			12050[2] 26550[2]	8600 19050	7.76 25.35
-4.5 m -15.0 ft			17250[2] 36950[2]		13050[2] 27450[2]	12600 27250					11500[2] 25250[2]	11350 25250[2]	6.48 20.99

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

Table 34

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft							11550[2] 25650[2]	10650 23500			10000[2] 22050[2]		7.67 24.87
6.0 m 20.0 ft							13000[2] 28350[2]	10500 22550			9700[2] 21400[2]	8400 18650	8.53 27.85
4.5 m 15.0 ft			20900[2] 44800[2]		16200[2] 35050[2]	14350 30900	13850[2] 30150[2]	10150 21800	10750[2] 23700[2]	7500 16550	9800[2] 21600[2]	7400 16400	9.07 29.69
3.0 m 10.0 ft			25650[2] 55100[2]	20400 44050	18450[2] 39850[2]	13450 29000	15000[2] 32500[2]	9700 20850	11800 25350	7300 15700	10250[2] 22500[2]	6900 15200	9.33 30.59
1.5 m 5.0 ft			22900[2] 55050[2]	19150 41300	20200[2] 43650[2]	12700 27450	15300 32850	9300 20000	11550 24850	7100 15300	10950 24050	6750 14800	9.34 30.65
0			25950[2] 60500[2]	18750 40250	20900[2] 45300[2]	12300 26450	14950 32150	9000 19350	11400 25150	7000 15450	11250 24750	6850 15100	9.10 29.86

(continued)

(Table 34, contd)

349E L Excavator with a heavy duty mass boom, a 3.0 m (9 ft 8 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON													
(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-1.5 m -5.0 ft	17850[2] 40400[2]		27100[2] 58800[2]	18700 40150	20500[2] 44400[2]	12150 26100	14800 31900	8900 19150			12150 26850	7400 16350	8.59 28.16
-3.0 m -10.0 ft	29400[2] 66650[2]		24300[2] 52550[2]	18900 40600	18700[2] 40400[2]	12200 26300	14300[2] 30450[2]	9000 19400			13450[2] 29650[2]	8600 19050	7.76 25.35
-4.5 m -15.0 ft			19300[2] 41300[2]		14600[2] 30750[2]	12600 27250					12900[2] 28300[2]	11350 25550	6.48 20.99

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

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

i06032389

Lifting Capacities

SMCS Code: 7000

S/N: FJB1–Up

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: TFG1–Up

S/N: RGH1–Up

S/N: KCN1–Up

S/N: MPZ1–Up

S/N: WHZ1–Up

⚠ WARNING

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

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

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

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

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

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

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

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

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

Variable Gauge

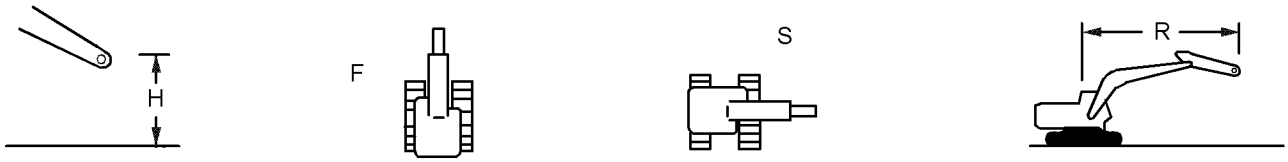


Illustration 70 g02143628

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

Table 35

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											7250(2) 16000(2)		7.98 25.78
7.5 m 25.0 ft									7250(2) 16000(2)		6900(2) 15250(2)		9.05 29.46
6.0 m 20.0 ft							10800(2) 23550(2)		10200(2) 21750(2)	9300 20000	6850(2) 15100(2)		9.77 31.93
4.5 m 15.0 ft					13900(2) 30000(2)		11900(2) 25800(2)		10700(2) 23350(2)	9100 19550	7000(2) 15400(2)		10.22 33.47
3.0 m 10.0 ft			22300(2) 47900(2)		16150(2) 34900(2)	15900 34300	13150(2) 28500(2)	11500 24850	11400(2) 24750(2)	8850 19000	7350(2) 16150(2)	7050 15550	10.43 34.20
1.5 m 5.0 ft			23700(2) 54850(2)	22900 49350	18050(2) 39050(2)	15150 32600	14250(2) 30900(2)	11100 23900	12000(2) 26050(2)	8550 18450	7900(2) 17350(2)	6950 15250	10.42 34.18
0	9150(2) 20700(2)		22750(2) 52600(2)	22300 47900	19100(2) 41400(2)	14650 31500	15000(2) 32450(2)	10750 23150	12400(2) 26800(2)	8350 18050	8800(2) 19350(2)	7050 15550	10.18 33.40

(continued)

(Table 35, contd)

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-1.5 m -5.0 ft	15100[2] 33950[2]		25800[2] 55900[2]	22100 47500	19200[2] 41600[2]	14400 31000	15100[2] 32700[2]	10550 22750	12300[2] 26500[2]	8250 17800	10200[2] 22500[2]	7500 16500	9.71 31.82
-3.0 m -10.0 ft	21850[2] 49300[2]		24000[2] 51950[2]	22200 47700	18300[2] 39550[2]	14350 30950	14400[2] 31050[2]	10550 22700			11350[2] 25050[2]	8350 18500	8.96 29.29
-4.5 m -15.0 ft	27750[2] 59800[2]		20800[2] 44800[2]		16100[2] 34500[2]	14550 31350	12350[2] 26100[2]	10700 23150			11450[2] 25200[2]	10100 22550	7.84 25.52
-6.0 m -20.0 ft			15250[2] 33600[2]		11350[2] 25000[2]						10850[2] 24400[2]		6.18 19.45

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

Table 36

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											7900[2] 17550[2]		7.98 25.78
7.5 m 25.0 ft									7950[2] 17550[2]		7600[2] 16750[2]		9.05 29.46
6.0 m 20.0 ft							11950[2] 26050[2]		11300[2] 23800[2]	9300 20000	7550[2] 16600[2]		9.77 31.93
4.5 m 15.0 ft					15350[2] 33100[2]		13150[2] 28550[2]	12000 25850	11900[2] 25900[2]	9100 19550	7700[2] 16900[2]	7400 16400	10.22 33.47
3.0 m 10.0 ft			24600[2] 52850[2]	24350 52450	17850[2] 38600[2]	15900 34300	14550[2] 31550[2]	11500 24850	12650[2] 27450[2]	8850 19000	8050[2] 17700[2]	7050 15550	10.43 34.20
1.5 m 5.0 ft			25100[2] 59550[2]	22900 49350	20000[2] 43200[2]	15150 32600	15800[2] 34250[2]	11100 23900	12800 27550	8550 18450	8650[2] 19050[2]	6950 15250	10.42 34.18
0	9700[2] 22000[2]		24100[2] 55700[2]	22300 47900	21150[2] 45850[2]	14650 31500	16400 35350	10750 23150	12600 27100	8350 18050	9600[2] 21200[2]	7050 15550	10.18 33.40
-1.5 m -5.0 ft	16000[2] 36000[2]		28550[2] 61900[2]	22100 47500	21300[2] 41600[2]	14400 31000	16200 34900	10550 22750	12450 26850	8250 17800	11150[2] 24650[2]	7500 16500	9.71 31.82

(continued)

(Table 36, contd)

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	23150[2] 52250[2]		26600[2] 57600[2]	22200 47700	20300[2] 43900[2]	14350 30950	16000[2] 34500[2]	10550 22700			12600 27850	8350 18500	8.96 29.29
-4.5 m -15.0 ft	30850[2] 66500[2]		23100[2] 49750[2]	22500 48400	17900[2] 38400[2]	14550 31350	13750[2] 29100[2]	10700 23150			12750[2] 28100[2]	10100 22550	7.84 25.52
-6.0 m -20.0 ft			17050[2] 37600[2]		12700[2] 28000[2]						12150[2] 27300[2]		6.18 19.45

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

Table 37

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8200[2] 18250[2]		7.44 23.95
7.5 m 25.0 ft							11000[2] 24100[2]				7750[2] 17150[2]		8.57 27.88
6.0 m 20.0 ft							11550[2] 25200[2]		10300[2] 19750[2]	9200 19700	7650[2] 16850[2]		9.33 30.48
4.5 m 15.0 ft			19550[2] 41850[2]		14900[2] 32200[2]		12600[2] 27300[2]	11900 25600	11250[2] 24550[2]	9000 19400	7800[2] 17100[2]		9.80 32.09
3.0 m 10.0 ft			24000[2] 51500[2]	23800 51350	17050[2] 36850[2]	15700 33900	13750[2] 29800[2]	11450 24650	11850[2] 25750[2]	8800 18900	8100[2] 17850[2]	7500 16450	10.02 32.85
1.5 m 5.0 ft			17500[2] 41700[2]		18700[2] 40450[2]	15050 32400	14700[2] 31850[2]	11050 23800	12350[2] 26750[2]	8550 18450	8700[2] 19150[2]	7350 16200	10.01 32.83
0			20350[2] 47100[2]		19400[2] 42050[2]	14650 31550	15250[2] 33000[2]	10750 23200	12550[2] 27100[2]	8400 18100	9700[2] 21300[2]	7550 16600	9.76 32.02
-1.5 m -5.0 ft	14900[2] 33600[2]		25200[2] 54750[2]	22300 47900	19150[2] 41450[2]	14500 31200	15100[2] 32600[2]	10650 22950	12100[2] 26000[2]	8350 18050	11250[2] 24900[2]	8050 17750	9.27 30.36

(continued)

(Table 37, contd)

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	23450[2] 53000[2]		22950[2] 49700[2]	22450 48300	17800[2] 38450[2]	14550 31300	13950[2] 30050[2]	10700 23050			11700[2] 25750[2]	9150 20200	8.47 27.70
-4.5 m -15.0 ft	24350[2] 52500[2]		19100[2] 41100[2]		14900[2] 31850[2]	14800 31850[2]					11450[2] 25100[2]	11400 25100	7.29 23.68

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

Table 38

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9000[2] 19950[2]		7.44 23.95
7.5 m 25.0 ft							12150[2] 26650[2]				8500[2] 18800[2]		8.57 27.88
6.0 m 20.0 ft							12800[2] 27850[2]	12250 26400	11250[2] 21650[2]	9200 19700	8400[2] 18450[2]		9.33 30.48
4.5 m 15.0 ft			21500[2] 46100[2]		16450[2] 35550[2]		13900[2] 30200[2]	11900 25600	12500[2] 27200[2]	9000 19400	8500[2] 18750[2]	7900 17400	9.80 32.09
3.0 m 10.0 ft			26500[2] 56850[2]	23800 51350	18850[2] 40700[2]	15700 33900	15200[2] 32950[2]	11450 24650	13050 28050	8800 18900	8900[2] 19550[2]	7500 16450	10.02 32.85
1.5 m 5.0 ft			18550[2] 44150[2]		20700[2] 44700[2]	15050 32400	16300[2] 35300[2]	11050 23800	12800 27500	8550 18450	9550[2] 21000[2]	7350 16200	10.01 32.83
0			21550[2] 49900[2]	21550[2] 48000	21500[2] 46500[2]	14650 31550	16450 35350	10750 23200	12600 27150	8400 18100	10600[2] 23350[2]	7550 16600	9.76 32.02
-1.5 m -5.0 ft	15800[2] 35600[2]		27900[2] 60600[2]	22300 47900	21200[2] 45900[2]	14500 31200	16300 35050	10650 22950	12550 27050	8350 18050	12050 26650	8050 17750	9.27 30.36
-3.0 m -10.0 ft	24850[2] 56150[2]		25450[2] 55100[2]	22450 48300	19750[2] 42650[2]	14550 31300	15500[2] 33350[2]	10700 23050			13000[2] 28650[2]	9150 20200	8.47 27.70
-4.5 m -15.0 ft	27100[2] 58450[2]		21250[2] 45700[2]		16600[2] 35450[2]	14800 31900					12750[2] 28000[2]	11400 25400	7.29 23.68

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

Table 39

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											7250[2] 16000[2]		7.98 25.78
7.5 m 25.0 ft									7250[2] 16000[2]		6900[2] 15250[2]		9.05 29.46
6.0 m 20.0 ft							10800[2] 23500[2]		10150[2] 21750[2]	9300 19950	6850[2] 15100[2]		9.77 31.93
4.5 m 15.0 ft					13850[2] 29900[2]		11850[2] 25750[2]		10700[2] 23250[2]	9050 19500	7000[2] 15400[2]		10.22 33.47
3.0 m 10.0 ft			22200[2] 47700[2]		16100[2] 34800[2]	15850 34200	13100[2] 28400[2]	11500 24750	11350[2] 24650[2]	8800 18950	7350[2] 16150[2]	7000 15450	10.43 34.20
1.5 m 5.0 ft			23700[2] 54600[2]	22850 49150	18000[2] 38900[2]	15100 32500	14200[2] 30750[2]	11050 23800	11950[2] 25950[2]	8550 18350	7900[2] 17350[2]	6900 15200	10.42 34.18
0	9150[2] 20700[2]		22750[2] 52600[2]	22150 47650	19050[2] 41200[2]	14550 31350	14900[2] 32300[2]	10700 23050	12350[2] 26700[2]	8350 17950	8800[2] 19350[2]	7050 15450	10.18 33.40
-1.5 m -5.0 ft	15100[2] 33950[2]		25650[2] 55650[2]	22000 47250	19150[2] 41400[2]	14300 30850	15050[2] 32550[2]	10500 22650	12250[2] 26400[2]	8200 17700	10200[2] 22500[2]	7450 16400	9.71 31.82
-3.0 m -10.0 ft	21850[2] 49300[2]		23900[2] 51700[2]	22100 47450	18200[2] 39350[2]	14300 30800	14350[2] 30900[2]	10500 22600			11300[2] 24900[2]	8300 18400	8.96 29.29
-4.5 m -15.0 ft	27600[2] 59450[2]		20700[2] 44550[2]		16000[2] 34350[2]	14500 31200	12250[2] 26000[2]	10650 23050			11400[2] 25050[2]	10050 22450	7.84 25.52
-6.0 m -20.0 ft			15150[2] 33400[2]		11300[2] 25000[2]						10750[2] 24250[2]		6.18 19.45

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

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

Table 40

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											7900[2] 17550[2]		7.98 25.78
7.5 m 25.0 ft									7950[2] 17550[2]		7600[2] 16750[2]		9.05 29.46
6.0 m 20.0 ft							11900[2] 25950[2]		11250[2] 23800[2]	9300 19950	7550[2] 16600[2]		9.77 31.93
4.5 m 15.0 ft					15300[2] 33000[2]		13100[2] 28500[2]	12000 25800	11850[2] 25800[2]	9050 19500	7700[2] 16900[2]	7400 16350	10.22 33.47
3.0 m 10.0 ft			24550[2] 52700[2]	24250 52350	17800[2] 38450[2]	15850 34200	14500[2] 31450[2]	11500 24750	12600[2] 27350[2]	8800 18950	8050[2] 17700[2]	7000 15450	10.43 34.20
1.5 m 5.0 ft			25100[2] 59550[2]	22850 49150	19900[2] 43050[2]	15100 32500	15750[2] 34100[2]	11050 23800	12750 27500	8550 18350	8650[2] 19050[2]	6900 15200	10.42 34.18
0	9700[2] 22000[2]		24100[2] 55700[2]	22150 47650	21100[2] 45650[2]	14550 31350	16400 35250	10700 23050	12550 27000	8350 17950	9600[2] 21200[2]	7050 15450	10.18 33.40
-1.5 m -5.0 ft	16000[2] 36000[2]		28450[2] 61650[2]	22000 47250	21200[2] 45950[2]	14300 30850	16150 34800	10500 22650	12450 26750	8200 17700	11150[2] 24650[2]	7450 16400	9.71 31.82
-3.0 m -10.0 ft	23150[2] 52250[2]		26500[2] 57350[2]	22100 47450	20200[2] 43700[2]	14300 30800	15950[2] 34350[2]	10500 22600			12550 27750[2]	8300 18400	8.96 29.29
-4.5 m -15.0 ft	30650[2] 66150[2]		23000[2] 49550[2]	22400 48200	17800[2] 38200[2]	14500 31200	13650[2] 28950[2]	10650 23050			12700[2] 27950[2]	10050 22450	7.84 25.52
-6.0 m -20.0 ft			16950[2] 37350[2]		12650[2] 27900[2]						12050[2] 27150[2]		6.18 19.45

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

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

Table 41

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8200[2] 18250[2]		7.44 23.95
7.5 m 25.0 ft							10950[2] 24050[2]				7750[2] 17150[2]		8.57 27.88
6.0 m 20.0 ft							11550[2] 25100[2]		10300[2] 19750[2]	9150 19650	7650[2] 16850[2]		9.33 30.48
4.5 m 15.0 ft			19500[2] 41700[2]		14850[2] 32100[2]		12550[2] 27200[2]	11850 25550	11250[2] 24450[2]	9000 19300	7800[2] 17100[2]		9.80 32.09
3.0 m 10.0 ft			23900[2] 51350[2]	23750 51200	17000[2] 36700[2]	15650 33800	13700[2] 29650[2]	11400 24550	11800[2] 25600[2]	8750 18850	8100[2] 17850[2]	7450 16400	10.02 32.85
1.5 m 5.0 ft			17500[2] 41700[2]		18650[2] 40250[2]	15000 32300	14650[2] 31750[2]	11000 23700	12300[2] 26650[2]	8550 18350	8700[2] 19150[2]	7350 16150	10.01 32.83
0			20350[2] 47100[2]		19350[2] 41850[2]	14550 31400	15150[2] 32850[2]	10700 23100	12450[2] 27000[2]	8350 18050	9700[2] 21300[2]	7500 16500	9.76 32.02
-1.5 m -5.0 ft	14900[2] 33600[2]		25100[2] 54500[2]	22200 47650	19050[2] 41250[2]	14400 31050	15000[2] 32450[2]	10600 22850	12050[2] 25900[2]	8300 17950	11250[2] 24900[2]	8000 17650	9.27 30.36
-3.0 m -10.0 ft	23450[2] 53000[2]		22850[2] 49450[2]	22350 48050	17700[2] 38250[2]	14450 31150	13900[2] 29900[2]	10650 22900			11650[2] 25600[2]	9100 20100	8.47 27.70
-4.5 m -15.0 ft	24200[2] 52150[2]		19000[2] 40850[2]		14850[2] 31700[2]	14750 31700[2]					11350[2] 24950[2]	11350 24950	7.29 23.68

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

Table 42

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9000[2] 19950[2]		7.44 23.95
7.5 m 25.0 ft							12100[2] 26550[2]				8500[2] 18800[2]		8.57 27.88

(continued)

(Table 42, contd)

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
6.0 m 20.0 ft							12750[2] 27750[2]	12250 26350	11250[2] 21650[2]	9150 19650	8400[2] 18450[2]		9.33 30.48
4.5 m 15.0 ft			21450[2] 45950[2]		16400[2] 35450[2]		13900[2] 30100[2]	11850 25550	12450[2] 27100[2]	9000 19300	8500[2] 18750[2]	7850 17350	9.80 32.09
3.0 m 10.0 ft			26400[2] 56700[2]	23750 51200	18800[2] 40600[2]	15650 33800	15150[2] 32850[2]	11400 24550	13000 27950	8750 18850	8900[2] 19550[2]	7450 16400	10.02 32.85
1.5 m 5.0 ft			18550[2] 44150[2]		20600[2] 44550[2]	15000 32300	16250[2] 35150[2]	11000 23700	12750 27450	8550 18350	9550[2] 21000[2]	7350 16150	10.01 32.83
0			21550[2] 49900[2]	21550[2] 47750	21400[2] 46350[2]	14550 31400	16400 35250	10700 23100	12600 27100	8350 18050	10600[2] 23350[2]	7500 16500	9.76 32.02
-1.5 m -5.0 ft	15800[2] 35600[2]		27800[2] 60350[2]	22200 47650	21100[2] 45700[2]	14400 31050	16250 34950	10600 22850	12500 27000	8300 17950	12050 26550	8000 17650	9.27 30.36
-3.0 m -10.0 ft	24850[2] 56150[2]		25300[2] 54850[2]	22350 48050	19650[2] 42450[2]	14450 31150	15450[2] 33200[2]	10650 22900			12950[2] 28500[2]	9100 20100	8.47 27.70
-4.5 m -15.0 ft	26950[2] 58150[2]		21150[2] 45450[2]		16500[2] 35250[2]	14750 31800					12700[2] 27850[2]	11350 25300	7.29 23.68

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

Fixed Gauge

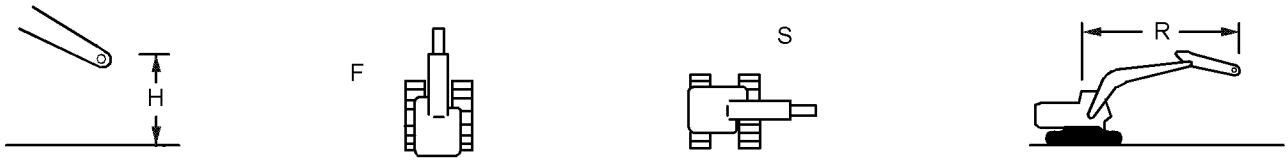


Illustration 71 g02143628

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

Table 43

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									7800[2] 17250[2]				7300[2] 16150[2]		7.86 25.34
7.5 m 25.0 ft													6950[2] 15300[2]		8.96 29.16
6.0 m 20.0 ft									10750[2] 23400[2]		10150[2] 21150[2]	8450 18150	6850[2] 15100[2]		9.71 31.74
4.5 m 15.0 ft							13650[2] 29550[2]		11800[2] 25600[2]	10950 23550	10650[2] 23250[2]	8250 17750	7000[2] 15350[2]	6750 14900	10.18 33.36
3.0 m 10.0 ft					21900[2] 47000[2]		15950[2] 34450[2]	14450 31150	13050[2] 28250[2]	10450 22550	11300[2] 24600[2]	8000 17200	7300[2] 16050[2]	6350 14000	10.42 34.16
1.5 m 5.0 ft					24400[2] 54400[2]	20500 44200	17900[2] 38700[2]	13650 29450	14150[2] 30700[2]	10000 21550	11950[2] 25950[2]	7750 16650	7850[2] 17250[2]	6250 13700	10.43 34.21
0					22550[2] 52150[2]	19850 42650	19050[2] 41250[2]	13150 28300	14950[2] 32350[2]	9650 20850	12100 26000	7550 16200	8700[2] 19100[2]	6300 13900	10.21 33.51
-1.5 m -5.0 ft			14500[2] 32650[2]		25900[2] 56150[2]	19600 42200	19250[2] 41700[2]	12850 27700	15100[2] 32750[2]	9450 20400	11950[2] 25750[2]	7400 15950	10000[2] 22100[2]	6650 14650	9.77 32.01
-3.0 m -10.0 ft	16550[2] 36500[2]		21150[2] 47700[2]		24200[2] 52450[2]	19700 42300	18450[2] 39850[2]	12850 27650	14500[2] 31300[2]	9450 20350	11450[2] 25250[2]	7450 16400	11350[2] 25000[2]	7400 16350	9.04 29.58
-4.5 m -15.0 ft			28350[2] 61200[2]		21200[2] 45650[2]	20000 43000	16350[2] 35200[2]	13000 28000	12650[2] 26850[2]	9600 20700			11450[2] 25200[2]	8850 19750	7.97 25.95
-6.0 m -20.0 ft					15950[2] 33700[2]		12050[2] 24950[2]						10950[2] 24000[2]		6.38 20.50

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

Table 44

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									8550[2] 18900[2]				7950[2] 17650[2]		7.86 25.34
7.5 m 25.0 ft													7600[2] 16800[2]		8.96 29.16
6.0 m 20.0 ft									11850[2] 25850[2]	11350 24400	11250[2] 23150[2]	8450 18150	7550[2] 16600[2]	7400 16450	9.71 31.74
4.5 m 15.0 ft							15100[2] 32600[2]		13050[2] 28300[2]	10950 23550	11800[2] 25750[2]	8250 17750	7650[2] 16850[2]	6750 14900	10.18 33.36
3.0 m 10.0 ft					24150[2] 51850[2]	21950[2] 47400	17650[2] 38100[2]	14450 31150	14400[2] 31250[2]	10450 22550	12550[2] 27050	8000 17200	8000[2] 17600[2]	6350 14000	10.42 34.16
1.5 m 5.0 ft					25850[2] 60100[2]	20500 44200	19800[2] 42850[2]	13650 29450	15700[2] 34000[2]	10000 21550	12300 26450	7750 16650	8600[2] 18900[2]	6250 13700	10.43 34.21
0					23850[2] 55200[2]	19850 42650	21100[2] 45650[2]	13150 28300	15800 33950	9650 20850	12100 26000	7550 16200	9500[2] 20950[2]	6300 13900	10.21 33.51
-1.5 m -5.0 ft			15350[2] 34600[2]		28450[2] 62150[2]	19600 42200	21350[2] 46200[2]	12850 27700	15550 33500	9450 20400	11950 25750	7400 15950	10650 23500	6650 14650	9.77 32.01
-3.0 m -10.0 ft	17550[2] 38700[2]		22400[2] 50500[2]		26850[2] 58150[2]	19700 42300	20450[2] 44250[2]	12850 27650	15500 33400	9450 20350	11950 26350	7450 16400	11900 26300	7400 16350	9.04 29.58
-4.5 m -15.0 ft			31400[2] 6800[2]		23500[2] 50700[2]	20000 43000	18200[2] 39100[2]	13000 28000	14050[2] 29900[2]	9600 20700			12750[2] 28100[2]	8850 19750	7.97 25.95
-6.0 m -20.0 ft					17800[2] 37650[2]		13450[2] 27900[2]	13450 27900[2]					12300[2] 26850[2]		6.38 20.50

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

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

Table 45

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8300[2] 18400[2]		7.30 23.48
7.5 m 25.0 ft							10950[2] 24100[2]				7800[2] 17200[2]		8.48 27.57
6.0 m 20.0 ft							11500[2] 25050[2]	11200 24050	9850[2] 18600[2]	8350 17850	7650[2] 16850[2]		9.27 30.28
4.5 m 15.0 ft			19050[2] 40850[2]		14700[2] 31750[2]		12500[2] 27100[2]	10800 23250	11200[2] 24450[2]	8150 17550	7750[2] 17050[2]	7150 15800	9.76 31.97
3.0 m 10.0 ft			23600[2] 50700[2]	21450 46300	16850[2] 36450[2]	14250 30700	13650[2] 29550[2]	10350 22350	11800[2] 25600[2]	7950 17100	8100[2] 17750[2]	6750 14900	10.01 32.81
1.5 m 5.0 ft			17600[2] 42100[2]		18600[2] 40150[2]	13550 29200	14650[2] 31700[2]	9950 21500	12300 26450	7750 16650	8650[2] 19000[2]	6600 14550	10.02 32.87
0			19800[2] 46000[2]	19800[2] 42700	19400[2] 41950[2]	13150 28300	15200[2] 32950[2]	9700 20900	12100 26050	7550 16300	9550[2] 21050[2]	6750 14800	9.80 32.14
-1.5 m -5.0 ft	14100[2] 31850[2]		25400[2] 55100[2]	19800 42550	19200[2] 41600[2]	12950 27900	15150[2] 32750[2]	9550 20600	12050 25950	7500 16150	11050[2] 24450[2]	7150 15800	9.33 30.56
-3.0 m -10.0 ft	22550[2] 50950[2]		23200[2] 50300[2]	19950 42900	17950[2] 38850[2]	13000 28000	14150[2] 30400[2]	9550 20650			11700[2] 25750[2]	8050 17850	8.57 28.01
-4.5 m -15.0 ft	25050[2] 54000[2]		19550[2] 42100[2]		15300[2] 32700[2]	13250 28550					11500[2] 25250[2]	9950 22200	7.43 24.14

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

Table 46

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9050[2] 20150[2]		7.30 23.48
7.5 m 25.0 ft							12100[2] 26600[2]	11400 24450			8550[2] 18850[2]		8.48 27.57

(continued)

(Table 46, contd)

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
6.0 m 20.0 ft							12700[2] 27650[2]	11200 24050	10800[2] 20350[2]	8350 17850	8400[2] 18450[2]	7900 17550	9.27 30.28
4.5 m 15.0 ft			21000[2] 45000[2]		16200[2] 35050[2]	15050 32500	13800[2] 29950[2]	10800 23250	12450[2] 27100[2]	8150 17550	8500[2] 18700[2]	7150 15800	9.76 31.97
3.0 m 10.0 ft			26050[2] 56000[2]	21450 46300	18650[2] 40250[2]	14250 30700	15100[2] 32700[2]	10350 22350	12550 26950	7950 17100	8850[2] 19450[2]	6750 14900	10.01 32.81
1.5 m 5.0 ft			18650[2] 44600[2]	18650[2] 43650	20550[2] 44450[2]	13550 29200	16100 34700	9950 21500	12300 26450	7750 16650	9450[2] 20800[2]	6600 14550	10.02 32.87
0			21000[2] 48750[2]	19850 42700	21450[2] 46450[2]	13150 28300	15800 34000	9700 20900	12100 26050	7550 16300	10450[2] 23050[2]	6750 14800	9.80 32.14
-1.5 m -5.0 ft	14950[2] 33750[2]		28100[2] 61000[2]	19800 42550	21250[2] 46050[2]	12950 27900	15650 33650	9550 20600	12050 25950	7500 16150	11450 25300	7150 15800	9.33 30.56
-3.0 m -10.0 ft	23900[2] 53950[2]		25750[2] 55800[2]	19950 42900	19950[2] 43100[2]	13000 28000	15650 33700	9550 20650			13000 28650[2]	8050 17850	8.57 28.01
-4.5 m -15.0 ft	27850[2] 60100[2]		21750[2] 46800[2]	20350 43750	17000[2] 36400[2]	13250 28550					12800[2] 28150[2]	9950 22200	7.43 24.14

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

Table 47

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									7800[2] 17250[2]				7300[2] 16150[2]		7.86 25.34
7.5 m 25.0 ft													6950[2] 15300[2]		8.96 29.16
6.0 m 20.0 ft									10700[2] 23300[2]		10150[2] 21150[2]	8450 18100	6850[2] 15100[2]		9.71 31.74
4.5 m 15.0 ft							13650[2] 29450[2]		11750[2] 25500[2]	10900 23500	10600[2] 23150[2]	8200 17650	7000[2] 15350[2]	6700 14800	10.18 33.36

(continued)

(Table 47, contd)

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
3.0 m 10.0 ft					21800[2] 46850[2]		15900[2] 34350[2]	14400 31050	13000[2] 28150[2]	10400 22450	11300[2] 24500[2]	7950 17100	7300[2] 16050[2]	6350 13950	10.42 34.16
1.5 m 5.0 ft					24400[2] 54150[2]	20400 44000	17850[2] 38550[2]	13600 29300	14100[2] 30550[2]	9950 21500	11900[2] 25850[2]	7700 16550	7850[2] 17250[2]	6200 13600	10.43 34.21
0					22550[2] 52150[2]	19700 42450	19000[2] 41050[2]	13050 28150	14850[2] 32200[2]	9600 20750	12050 25900	7500 16100	8700[2] 19100[2]	6250 13800	10.21 33.51
-1.5 m -5.0 ft			14500[2] 32650[2]		25750[2] 55850[2]	19500 41950	19150[2] 41500[2]	12800 27550	15050[2] 32600[2]	9400 20300	11900 25650	7350 15850	10000[2] 22100[2]	6600 14550	9.77 32.01
-3.0 m -10.0 ft	16550[2] 36500[2]		21150[2] 47700[2]		24100[2] 52200[2]	19600 42100	18350[2] 39700[2]	12750 27450	14450[2] 31150[2]	9400 20200	11400[2] 25100[2]	7400 16300	11300[2] 24850[2]	7350 16250	9.04 29.58
-4.5 m -15.0 ft			28200[2] 60850[2]		21050[2] 45400[2]	19900 42750	16300[2] 35000[2]	12900 27850	12550[2] 26700[2]	9550 20600			11400[2] 25100[2]	8800 19650	7.97 25.95
-6.0 m -20.0 ft					15850[2] 33500[2]		11950[2] 24800[2]						10900[2] 23850[2]		6.38 20.50

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

Table 48

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									8550[2] 18900[2]				7950[2] 17650[2]		7.86 25.34
7.5 m 25.0 ft													7600[2] 16800[2]		8.96 29.16
6.0 m 20.0 ft									11800[2] 25750[2]	11300 24350	11200[2] 23150[2]	8450 18100	7550[2] 16600[2]	7400 16400	9.71 31.74
4.5 m 15.0 ft							15050[2] 32500[2]		13000[2] 28200[2]	10900 23500	11750[2] 25650[2]	8200 17650	7650[2] 16850[2]	6700 14800	10.18 33.36
3.0 m 10.0 ft					24050[2] 51700[2]	21900 47300	17600[2] 37950[2]	14400 31050	14350[2] 31150[2]	10400 22450	12500[2] 27000	7950 17100	8000[2] 17600[2]	6350 13950	10.42 34.16

(continued)

(Table 48, contd)

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
1.5 m 5.0 ft					25850[2] 59900[2]	20400 44000	19750[2] 42700[2]	13600 29300	15650[2] 33900[2]	9950 21500	12250 26400	7700 16550	8600[2] 18900[2]	6200 13600	10.43 34.21
0					23850[2] 55200[2]	19700 42450	21000[2] 45500[2]	13050 28150	15750 33850	9600 20750	12050 25900	7500 16100	9500[2] 20950[2]	6250 13800	10.21 33.51
-1.5 m -5.0 ft			15350[2] 34600[2]		28450[2] 61900[2]	19500 41950	21250[2] 46000[2]	12800 27550	15500 33400	9400 20300	11900 25650	7350 15850	10650 23450	6600 14550	9.77 32.01
-3.0 m -10.0 ft	17550[2] 38700[2]		22400[2] 50500[2]		26750[2] 57900[2]	19600 42100	20350[2] 44050[2]	12750 27450	15450 33300	9400 20200	11950 26350	7400 16300	11850 26250	7350 16250	9.04 29.58
-4.5 m -15.0 ft			31350[2] 67650[2]		23400[2] 50500[2]	19900 42750	18100[2] 38950[2]	12900 27850	14000[2] 29750[2]	9550 20600			12700[2] 27950[2]	8800 19650	7.97 25.95
-6.0 m -20.0 ft					17700[2] 37450[2]		13350[2] 27750[2]						12200[2] 26700[2]		6.38 20.50

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

Table 49

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8300[2] 18400[2]		7.30 23.48
7.5 m 25.0 ft							10950[2] 24000[2]				7800[2] 17200[2]		8.48 27.57
6.0 m 20.0 ft							11450[2] 24950[2]	11150 24000	9850[2] 18600[2]	8300 17800	7650[2] 16850[2]		9.27 30.28
4.5 m 15.0 ft			19000[2] 40750[2]		14650[2] 31650[2]		12450[2] 27000[2]	10800 23200	11200[2] 24350[2]	8150 17500	7750[2] 17050[2]	7100 15750	9.76 31.97
3.0 m 10.0 ft			23550[2] 50550[2]	21350 46150	16800[2] 36300[2]	14200 30600	13600[2] 29450[2]	10350 22250	11750[2] 25500[2]	7900 17000	8100[2] 17750[2]	6700 14800	10.01 32.81
1.5 m 5.0 ft			17600[2] 42100[2]		18500[2] 40000[2]	13500 29100	14600[2] 31550[2]	9950 21400	12250[2] 26350	7700 16550	8650[2] 19000[2]	6600 14500	10.02 32.87

(continued)

(Table 49, contd)

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0			19800[2] 46000[2]	19750 42500	19300[2] 41800[2]	13050 28150	15150[2] 32800[2]	9650 20750	12050 26000	7500 16200	9550[2] 21050[2]	6700 14750	9.80 32.14
-1.5 m -5.0 ft	14100[2] 31850[2]		25250[2] 54850[2]	19700 42350	19100[2] 41400[2]	12900 27750	15050[2] 32600[2]	9500 20450	12000 25850	7450 16050	11050[2] 24450[2]	7100 15700	9.33 30.56
-3.0 m -10.0 ft	22550[2] 50950[2]		23100[2] 50050[2]	19850 42700	17900[2] 38650[2]	12900 27850	14050[2] 30300[2]	9500 20500			11650[2] 25600[2]	8000 17750	8.57 28.01
-4.5 m -15.0 ft	24900[2] 53700[2]		19450[2] 41900[2]		15200[2] 32550[2]	13150 28400					11450[2] 25100[2]	9900 22100	7.43 24.14

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

Table 50

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9050[2] 20150[2]		7.30 23.48
7.5 m 25.0 ft							12100[2] 26550[2]	11400 24450			8550[2] 18850[2]		8.48 27.57
6.0 m 20.0 ft							12650[2] 27600[2]	11150 24000	10800[2] 20350[2]	8300 17800	8400[2] 18450[2]	7900 17500	9.27 30.28
4.5 m 15.0 ft			20950[2] 44900[2]		16150[2] 34950[2]	15050 32450	13750[2] 29850[2]	10800 23200	12400[2] 27000[2]	8150 17500	8500[2] 18700[2]	7100 15750	9.76 31.97
3.0 m 10.0 ft			26000[2] 55800[2]	21350 46150	18600[2] 40100[2]	14200 30600	15050[2] 32600[2]	10350 22250	12500 26900	7900 17000	8850[2] 19450[2]	6700 14800	10.01 32.81
1.5 m 5.0 ft			18650[2] 44600[2]	18650[2] 43450	20500[2] 44250[2]	13500 29100	16100 34600	9950 21400	12250 26350	7700 16550	9450[2] 20800[2]	6600 14500	10.02 32.87
0			21000[2] 48750[2]	19750 42500	21350[2] 46250[2]	13050 28150	15750 33900	9650 20750	12050 26000	7500 16200	10450[2] 23050[2]	6700 14750	9.80 32.14
-1.5 m -5.0 ft	14950[2] 33750[2]		28000[2] 60750[2]	19700 42350	21200[2] 45900[2]	12900 27750	15600 33550	9500 20450	12000 25850	7450 16050	11450 25200	7100 15700	9.33 30.56

(continued)

(Table 50, contd)

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	23900[2] 53950[2]		25650[2] 55550[2]	19850 42700	19850[2] 42900[2]	12900 27850	15600 33600	9500 20500			12950 28500[2]	8000 17750	8.57 28.01
-4.5 m -15.0 ft	27700[2] 59800[2]		21650[2] 46600[2]	20250[2] 43550[2]	16900[2] 36200[2]	13150 28400					12750[2] 28000[2]	9900 22100	7.43 24.14

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

Table 51

349E L Excavator with a mass boom, a 3.0 m (9 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft							4800 10550				9100 20150		7.67 24.87
6.0 m 20.0 ft							11700 25600	10750 23100			8850 19550	8600 19150	8.53 27.85
4.5 m 15.0 ft			18900 40600		14650 31650	14650 31600	12500 27150	10400 22350	9850 21700	7700 17000	8950 19700	7600 16850	9.07 29.69
3.0 m 10.0 ft			23200 49800	20900 45150	16650 35950	13800 29750	13500 29250	9950 21400	11700 25500	7500 16150	9350 20550	7100 15650	9.33 30.59
1.5 m 5.0 ft			21600 52000	19700 42400	18200 39350	13050 28150	14350 31100	9550 20550	11900 25600	7300 15750	10050 22150	6900 15250	9.34 30.65
0			24500 55700	19250 41350	18550 40800	12650 27200	14750 31950	9250 19950	11750 25900	7200 15850	11300 24850	7050 15550	9.10 29.86
-1.5 m -5.0 ft	16850 38100		24400 52950	19200 41250	18450 39950	12450 26850	14450 31150	9150 19700			12050 26500	7600 16800	8.59 28.16
-3.0 m -10.0 ft	27800 61700		21800 47250	19400 41700	16800 36250	12550 27050	12800 27250	9250 19950			12050 26550	8850 19600	7.76 25.35
-4.5 m -15.0 ft			17250 36950		13050 27450	12950 27450					11500 25250		6.48 20.99

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

Table 52

349E L Excavator with a mass boom, a 3.0 m (9 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft							5250 11550	5000 10900			10000 22050		7.67 24.87
6.0 m 20.0 ft							13000 28350	10750 23100			9700 21400	8600 19150	8.53 27.85
4.5 m 15.0 ft			20900 44800		16200 35050	14650 31600	13850 30150	10400 22350	10750 23700	7700 17000	9800 21600	7600 16850	9.07 29.69
3.0 m 10.0 ft			25650 55100	20900 45150	18450 39850	13800 29750	15000 32500	9950 21400	12150 26050	7500 16150	10250 22500	7100 15650	9.33 30.59
1.5 m 5.0 ft			22900 55050	19700 42400	20200 43650	13050 28150	15700 33800	9550 20550	11900 25600	7300 15750	11050 24250	6900 15250	9.34 30.65
0			25950 60500	19250 41350	20900 45300	12650 27200	15400 33100	9250 19950	11750 25900	7200 15850	11550 25450	7050 15550	9.10 29.86
-1.5 m -5.0 ft	17850 40400		27100 58800	19200 41250	20500 44400	12450 26850	15250 32800	9150 19700			12550 27650	7600 16800	8.59 28.16
-3.0 m -10.0 ft	29400 66650		24300 52550	19400 41700	18700 40400	12550 27050	14300 30450	9250 19950			13450 29650	8850 19600	7.76 25.35
-4.5 m -15.0 ft			19300 41300		14600 30750	12950 27950					12900 28300	11700 26200	6.48 20.99

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

Table 53

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									11950 26450	11800 26450	7.10 22.99
6.0 m 20.0 ft					13900 30150		12550 27400	10700 22950	11600 25600	9500 21150	8.03 26.19
4.5 m 15.0 ft			20650 44200		15600 33700	14550 31350	13200 28700	10350 22300	11750 25900	8350 18400	8.60 28.14
3.0 m 10.0 ft			24100 53150	20100 44300	17450 37700	13700 29550	14050 30500	9950 21450	12350 27100	7750 17050	8.87 29.09

(continued)

(Table 53, contd)

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is OFF											
(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
1.5 m 5.0 ft					18750 40550	13100 28200	14750 32000	9600 20700	12200 26900	7550 16600	8.88 29.15
0			22650 53250	19450 41800	19050 41250	12750 27450	14950 32350	9350 20200	12600 27800	7750 17050	8.63 28.33
-1.5 m -5.0 ft	17000 38800		23650 51400	19500 41900	18250 39550	12650 27300	14250 30750	9300 20100	12800 28200	8450 18650	8.10 26.52
-3.0 m -10.0 ft	25100 54700		20600 44550	19800 42550	16100 34650	12850 27650			12650 27800	10050 22250	7.20 23.52
-4.5 m -15.0 ft			15150 32200						11500 25050		5.79 18.72

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

Table 54

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON											
(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									13050 28900	11800 26600	7.10 22.99
6.0 m 20.0 ft					15350 33300	15300 32900	13850 30350	10700 22950	12700 27950	9500 21150	8.03 26.19
4.5 m 15.0 ft			22750 48800	22400 48450	17250 37250	14550 31350	14600 31800	10350 22300	12850 28250	8350 18400	8.60 28.14
3.0 m 10.0 ft			26450 58350	20100 44300	19300 41750	13700 29550	15600 33850	9950 21450	12450 27400	7750 17050	8.87 29.09
1.5 m 5.0 ft					20800 44950	13100 28200	15750 33900	9600 20700	12200 26900	7550 16600	8.88 29.15
0			23950 56350	19450 41800	21150 45800	12750 27450	15500 33350	9350 20200	12600 27800	7750 17050	8.63 28.33
-1.5 m -5.0 ft	18050 41150		26250 57050	19500 41900	20300 43950	12650 27300	15450 33250	9300 20100	13850 30550	8450 18650	8.10 26.52

(continued)

(Table 54, contd)

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	28000 61000		22900 49600	19800 42550	17900 38600	12850 27650			14100 31000	10050 22250	7.20 23.52
-4.5 m -15.0 ft			16950 36050						12900 28100		5.79 18.72

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

Table 55

349E L Excavator with a mass boom, a 3.0 m (9 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft							4800 10550				9100 20150		7.67 24.87
6.0 m 20.0 ft							11700 25600	10500 22550			8850 19550	8400 18650	8.53 27.85
4.5 m 15.0 ft			18900 40600		14650 31650	14350 30900	12500 27150	10150 21800	9850 21700	7500 16550	8950 19700	7400 16400	9.07 29.69
3.0 m 10.0 ft			23200 49800	20400 44050	16650 35950	13450 29000	13500 29250	9700 20850	11700 25350	7300 15700	9350 20550	6900 15200	9.33 30.59
1.5 m 5.0 ft			21600 52000	19150 41300	18200 39350	12700 27450	14350 31100	9300 20000	11550 24850	7100 15300	10050 22150	6750 14800	9.34 30.65
0			24500 55700	18750 40250	18850 40800	12300 26450	14750 31950	9000 19350	11400 25150	7000 15450	11250 24750	6850 15100	9.10 29.86
-1.5 m -5.0 ft	16850 38100		24400 52950	18700 40150	18450 39950	12150 26100	14450 31150	8900 19150			12050 26500	7400 16350	8.59 28.16
-3.0 m -10.0 ft	27800 61700		21800 47250	18900 40600	16800 36250	12200 26300	12800 27250	9000 19400			12050 26550	8600 19050	7.76 25.35
-4.5 m -15.0 ft			17250 36950		13050 27450	12600 27250					11500 25250	11350 25250	6.48 20.99

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

Table 56

349E L Excavator with a mass boom, a 3.0 m (9 ft 10 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft							11550 25450	10650 23500			10000 22050		7.67 24.87
6.0 m 20.0 ft							13000 28350	10500 22550			9700 21400	8400 18650	8.53 27.85
4.5 m 15.0 ft			20900 44800		16200 35050	14350 30900	13850 30150	10150 21800	10750 23700	7500 16550	9800 21600	7400 16400	9.07 29.69
3.0 m 10.0 ft			25650 55100	20400 44050	18450 39850	13450 29000	15000 32500	9700 20850	11800 25350	7300 15700	10250 22500	6900 15200	9.33 30.59
1.5 m 5.0 ft			22900 55050	19150 41300	20200 43650	12700 27450	15300 32850	9300 20000	11550 24850	7100 15300	10950 24050	6750 14800	9.34 30.65
0			25950 60500	18750 40250	20900 45300	12300 26450	14950 32150	9000 19350	11400 25150	7000 15450	11250 24750	6850 15100	9.10 29.86
-1.5 m -5.0 ft	17850 40400		27100 58800	18700 40150	20500 44400	12150 26100	14800 31900	8900 19150			12150 26850	7400 16350	8.59 28.16
-3.0 m -10.0 ft	29400 66650		24300 52550	18900 40600	18700 40400	12200 26300	14300 30450	9000 19400			13450 29650	8600 19050	7.76 25.35
-4.5 m -15.0 ft			19300 41300		14600 30750	12600 27250					12900 28300	11350 25550	6.48 20.99

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

Table 57

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									11950 26450	11550 26000	7.10 22.99
6.0 m 20.0 ft					13900 30150		12550 27400	10400 22350	11600 25600	9250 20600	8.03 26.19
4.5 m 15.0 ft			20650 44200		15600 33700	14200 30600	13200 28700	10100 21750	11750 25900	8100 17950	8.60 28.14
3.0 m 10.0 ft			24100 53150	19600 43200	17450 37700	13350 28850	14050 30500	9700 20900	12100 26650	7500 16600	8.87 29.09

(continued)

(Table 57, contd)

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
1.5 m 5.0 ft					18750 40550	12750 27450	14750 32000	9350 20150	11900 26150	7350 16150	8.88 29.15
0			22650 53250	18950 40650	19050 41250	12400 26700	14950 32350	9100 19650	12250 27000	7550 16600	8.63 28.33
-1.5 m -5.0 ft	17000 38800		23650 51400	19000 40800	18250 39550	12300 26550	14250 30750	9050 19550	12800 28200	8200 18100	8.10 26.52
-3.0 m -10.0 ft	25100 54700		20600 44550	19300 41450	16100 34650	12500 26900			12650 27800	9750 21650	7.20 23.52
-4.5 m -15.0 ft			15150 32200						11500 25050		5.79 18.72

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

Table 58

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
7.5 m 25.0 ft									13050 28900	11550 26000	7.10 22.99
6.0 m 20.0 ft					15350 33300	14950 32150	13850 30350	10400 22350	12700 27950	9250 20600	8.03 26.19
4.5 m 15.0 ft			22750 48800	21900 47300	17250 37250	14200 30600	14600 31800	10100 21750	12850 28250	8100 17950	8.60 28.14
3.0 m 10.0 ft			26450 58350	19600 43200	19300 41750	13350 28850	15600 33800	9700 20900	12100 26650	7500 16600	8.87 29.09
1.5 m 5.0 ft					20800 44950	12750 27450	15300 32950	9350 20150	11900 26150	7350 16150	8.88 29.15
0			23950 56350	18950 40650	21150 45700	12400 26700	15050 32400	9100 19650	12250 27000	7550 16600	8.63 28.33
-1.5 m -5.0 ft	18050 41150		26250 57050	19000 40800	20300 43950	12300 26550	15000 32300	9050 19550	13450 29700	8200 18100	8.10 26.52

(continued)

(Table 58, contd)

349E L Excavator with a mass boom, a 2.5 m (8 ft 2 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 600 mm (24 inch) double grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)										
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-3.0 m -10.0 ft	28000 61000		22900 49600	19300 41450	17900 38600	12500 26900			14100 31000	9750 21650	7.20 23.52
-4.5 m -15.0 ft			16950 36050						12900 28100		5.79 18.72

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

Table 59

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									7800[2] 17250[2]				7300[2] 16150[2]		7.86 25.34
7.5 m 25.0 ft													6950[2] 15300[2]		8.96 29.16
6.0 m 20.0 ft									10750[2] 23400[2]		10150[2] 21150[2]	8450 18150	6850[2] 15100[2]		9.71 31.74
4.5 m 15.0 ft							13650[2] 29550[2]		11800[2] 25600[2]	10950 23550	10650[2] 23250[2]	8250 17750	7000[2] 15350[2]	6750 14900	10.18 33.36
3.0 m 10.0 ft					21900[2] 47000[2]		15950[2] 34450[2]	14450 31150	13050[2] 28250[2]	10450 22550	11300[2] 24600[2]	8000 17200	7300[2] 16050[2]	6350 14000	10.42 34.16
1.5 m 5.0 ft					24400[2] 54400[2]	20500 44200	17900[2] 38700[2]	13650 29450	14150[2] 30700[2]	10000 21550	11950[2] 25950[2]	7750 16650	7850[2] 17250[2]	6250 13700	10.43 34.21
0					22550[2] 52150[2]	19850 42650	19050[2] 41250[2]	13150 28300	14950[2] 32350[2]	9650 20850	12100 26000	7550 16200	8700[2] 19100[2]	6300 13900	10.21 33.51
-1.5 m -5.0 ft			14500[2] 32650[2]		25900[2] 56150[2]	19600 42200	19250[2] 41700[2]	12850 27700	15100[2] 32750[2]	9450 20400	11950 25750	7400 15950	10000[2] 22100[2]	6650 14650	9.77 32.01
-3.0 m -10.0 ft	16550[2] 36500[2]		21150[2] 47700[2]		24200[2] 52450[2]	19700 42300	18450[2] 39850[2]	12850 27650	14500[2] 31300[2]	9450 20350	11450[2] 25250[2]	7450 16400	11350[2] 25000[2]	7400 16350	9.04 29.58

(continued)

(Table 59, contd)

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-4.5 m -15.0 ft			28350[2] 61200[2]		21200[2] 45650[2]	20000 43000	16350[2] 35200[2]	13000 28000	12650[2] 26850[2]	9600 20700			11450[2] 25200[2]	8850 19750	7.97 25.95
-6.0 m -20.0 ft					15950[2] 33700[2]		12050[2] 24950[2]						10950[2] 24000[2]		6.38 20.50

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

Table 60

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									8550[2] 18900[2]				7950[2] 17650[2]		7.86 25.34
7.5 m 25.0 ft													7600[2] 16800[2]		8.96 29.16
6.0 m 20.0 ft									11850[2] 25850[2]	11350 24400	11250[2] 23150[2]	8450 18150	7550[2] 16600[2]	7400 16450	9.71 31.74
4.5 m 15.0 ft							15100[2] 32600[2]		13050[2] 28300[2]	10950 23550	11800[2] 25750[2]	8250 17750	7650[2] 16850[2]	6750 14900	10.18 33.36
3.0 m 10.0 ft					24150[2] 51850[2]	21950[2] 47400	17650[2] 38100[2]	14450 31150	14400[2] 31250[2]	10450 22550	12550[2] 27050	8000 17200	8000[2] 17600[2]	6350 14000	10.42 34.16
1.5 m 5.0 ft					25850[2] 60100[2]	20500 44200	19800[2] 42850[2]	13650 29450	15700[2] 34000[2]	10000 21550	12300 26450	7750 16650	8600[2] 18900[2]	6250 13700	10.43 34.21
0					23850[2] 55200[2]	19850 42650	21100[2] 45650[2]	13150 28300	15800 33950	9650 20850	12100 26000	7550 16200	9500[2] 20950[2]	6300 13900	10.21 33.51
-1.5 m -5.0 ft			15350[2] 34600[2]		28450[2] 62150[2]	19600 42200	21350[2] 46200[2]	12850 27700	15550 33500	9450 20400	11950 25750	7400 15950	10650 23500	6650 14650	9.77 32.01
-3.0 m -10.0 ft	17550[2] 38700[2]		22400[2] 50500[2]		26850[2] 58150[2]	19700 42300	20450[2] 44250[2]	12850 27650	15500 33400	9450 20350	11950 26350	7450 16400	11900 26300	7400 16350	9.04 29.58

(continued)

(Table 60, contd)

349E L Excavator with a standard reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
-4.5 m -15.0 ft			31400(2) 68000(2)		23500(2) 50700(2)	20000 43000	18200(2) 39100(2)	13000 28000	14050(2) 29900(2)	9600 20700			12750(2) 28100(2)	8850 19750	7.97 25.95
-6.0 m -20.0 ft					17800(2) 37650(2)		13450(2) 27900(2)	13450 27900(2)					12300(2) 26850(2)		6.38 20.50

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

Table 61

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes(1)
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8300(2) 18400(2)		7.30 23.48
7.5 m 25.0 ft							10950(2) 24100(2)				7800(2) 17200(2)		8.48 27.57
6.0 m 20.0 ft							11500(2) 25050(2)	11200 24050	9850(2) 18600(2)	8350 17850	7650(2) 16850(2)		9.27 30.28
4.5 m 15.0 ft			19050(2) 40850(2)		14700(2) 31750(2)		12500(2) 27100(2)	10800 23250	11200(2) 24450(2)	8150 17550	7750(2) 17050(2)	7150 15800	9.76 31.97
3.0 m 10.0 ft			23600(2) 50700(2)	21450 46300	16850(2) 36450(2)	14250 30700	13650(2) 29550(2)	10350 22350	11800(2) 25600(2)	7950 17100	8100(2) 17750(2)	6750 14900	10.01 32.81
1.5 m 5.0 ft			17600(2) 42100(2)		18600(2) 40150(2)	13550 29200	14650(2) 31700(2)	9950 21500	12300 26450	7750 16650	8650(2) 19000(2)	6600 14550	10.02 32.87
0			19800(2) 46000(2)	19800(2) 42700	19400(2) 41950(2)	13150 28300	15200(2) 32950(2)	9700 20900	12100 26050	7550 16300	9550(2) 21050(2)	6750 14800	9.80 32.14
-1.5 m -5.0 ft	14100(2) 31850(2)		25400(2) 55100(2)	19800 42550	19200(2) 41600(2)	12950 27900	15150(2) 32750(2)	9550 20600	12050 25950	7500 16150	11050(2) 24450(2)	7150 15800	9.33 30.56
-3.0 m -10.0 ft	22550(2) 50950(2)		23200(2) 50300(2)	19950 42900	17950(2) 38850(2)	13000 28000	14150(2) 30400(2)	9550 20650			11700(2) 25750(2)	8050 17850	8.57 28.01
-4.5 m -15.0 ft	25050(2) 54000(2)		19550(2) 42100(2)		15300(2) 32700(2)	13250 28550					11500(2) 25250(2)	9950 22200	7.43 24.14

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

Table 62

349E L Excavator with a standard reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9050[2] 20150[2]		7.30 23.48
7.5 m 25.0 ft							12100[2] 26600[2]	11400 24450			8550[2] 18850[2]		8.48 27.57
6.0 m 20.0 ft							12700[2] 27650[2]	11200 24050	10800[2] 20350[2]	8350 17850	8400[2] 18450[2]	7900 17550	9.27 30.28
4.5 m 15.0 ft			21000[2] 45000[2]		16200[2] 35050[2]	15050 32500	13800[2] 29950[2]	10800 23250	12450[2] 27100[2]	8150 17550	8500[2] 18700[2]	7150 15800	9.76 31.97
3.0 m 10.0 ft			26050[2] 56000[2]	21450 46300	18650[2] 40250[2]	14250 30700	15100[2] 32700[2]	10350 22350	12550 26950	7950 17100	8850[2] 19450[2]	6750 14900	10.01 32.81
1.5 m 5.0 ft			18650[2] 44600[2]	18650[2] 43650	20550[2] 44450[2]	13550 29200	16100 34700	9950 21500	12300 26450	7750 16650	9450[2] 20800[2]	6600 14550	10.02 32.87
0			21000[2] 48750[2]	19850 42700	21450[2] 46450[2]	13150 28300	15800 34000	9700 20900	12100 26050	7550 16300	10450[2] 23050[2]	6750 14800	9.80 32.14
-1.5 m -5.0 ft	14950[2] 33750[2]		28100[2] 61000[2]	19800 42550	21250[2] 46050[2]	12950 27900	15650 33650	9550 20600	12050 25950	7500 16150	11450 25300	7150 15800	9.33 30.56
-3.0 m -10.0 ft	23900[2] 53950[2]		25750[2] 55800[2]	19950 42900	19950[2] 43100[2]	13000 28000	15650 33700	9550 20650			13000 28650[2]	8050 17850	8.57 28.01
-4.5 m -15.0 ft	27850[2] 60100[2]		21750[2] 46800[2]	20350 43750	17000[2] 36400[2]	13250 28550					12800[2] 28150[2]	9950 22200	7.43 24.14

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

Table 63

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)														
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									7800[2] 17250[2]				7300[2] 16150[2]		7.86 25.34
7.5 m 25.0 ft													6950[2] 15300[2]		8.96 29.16

(continued)

(Table 63, contd)

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
6.0 m 20.0 ft									10700[2] 23300[2]		10150[2] 21150[2]	8450 18100	6850[2] 15100[2]		9.71 31.74
4.5 m 15.0 ft							13650[2] 29450[2]		11750[2] 25500[2]	10900 23500	10600[2] 23150[2]	8200 17650	7000[2] 15350[2]	6700 14800	10.18 33.36
3.0 m 10.0 ft					21800[2] 46850[2]		15900[2] 34350[2]	14400 31050	13000[2] 28150[2]	10400 22450	11300[2] 24500[2]	7950 17100	7300[2] 16050[2]	6350 13950	10.42 34.16
1.5 m 5.0 ft					24400[2] 54150[2]	20400 44000	17850[2] 38550[2]	13600 29300	14100[2] 30550[2]	9950 21500	11900[2] 25850[2]	7700 16550	7850[2] 17250[2]	6200 13600	10.43 34.21
0					22550[2] 52150[2]	19700 42450	19000[2] 41050[2]	13050 28150	14850[2] 32200[2]	9600 20750	12050 25900	7500 16100	8700[2] 19100[2]	6250 13800	10.21 33.51
-1.5 m -5.0 ft			14500[2] 32650[2]		25750[2] 55850[2]	19500 41950	19150[2] 41500[2]	12800 27550	15050[2] 32600[2]	9400 20300	11900 25650	7350 15850	10000[2] 22100[2]	6600 14550	9.77 32.01
-3.0 m -10.0 ft	16550[2] 36500[2]		21150[2] 47700[2]		24100[2] 52200[2]	19600 42100	18350[2] 39700[2]	12750 27450	14450[2] 31150[2]	9400 20200	11400[2] 25100[2]	7400 16300	11300[2] 24850[2]	7350 16250	9.04 29.58
-4.5 m -15.0 ft			28200[2] 60850[2]		21050[2] 45400[2]	19900 42750	16300[2] 35000[2]	12900 27850	12550[2] 26700[2]	9550 20600			11400[2] 25100[2]	8800 19650	7.97 25.95
-6.0 m -20.0 ft					15850[2] 33500[2]		11950[2] 24800[2]						10900[2] 23850[2]		6.38 20.50

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

Table 64

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft									8550[2] 18900[2]				7950[2] 17650[2]		7.86 25.34
7.5 m 25.0 ft													7600[2] 16800[2]		8.96 29.16
6.0 m 20.0 ft									11800[2] 25750[2]	11300 24350	11200[2] 23150[2]	8450 18100	7550[2] 16600[2]	7400 16400	9.71 31.74

(continued)

(Table 64, contd)

349E L Excavator with a heavy duty reach boom, a 3.9 m (12 ft 10 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)															
	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
4.5 m 15.0 ft							15050[2] 32500[2]		13000[2] 28200[2]	10900 23500	11750[2] 25650[2]	8200 17650	7650[2] 16850[2]	6700 14800	10.18 33.36
3.0 m 10.0 ft					24050[2] 51700[2]	21900 47300	17600[2] 37950[2]	14400 31050	14350[2] 31150[2]	10400 22450	12500[2] 27000	7950 17100	8000[2] 17600[2]	6350 13950	10.42 34.16
1.5 m 5.0 ft					25850[2] 59900[2]	20400 44000	19750[2] 42700[2]	13600 29300	15650[2] 33900[2]	9950 21500	12250 26400	7700 16550	8600[2] 18900[2]	6200 13600	10.43 34.21
0					23850[2] 55200[2]	19700 42450	21000[2] 45500[2]	13050 28150	15750 33850	9600 20750	12050 25900	7500 16100	9500[2] 20950[2]	6250 13800	10.21 33.51
-1.5 m -5.0 ft			15350[2] 34600[2]		28450[2] 61900[2]	19500 41950	21250[2] 46000[2]	12800 27550	15500 33400	9400 20300	11900 25650	7350 15850	10650 23450	6600 14550	9.77 32.01
-3.0 m -10.0 ft	17550[2] 38700[2]		22400[2] 50500[2]		26750[2] 57900[2]	19600 42100	20350[2] 44050[2]	12750 27450	15450 33300	9400 20200	11950 26350	7400 16300	11850 26250	7350 16250	9.04 29.58
-4.5 m -15.0 ft			31350[2] 67650[2]		23400[2] 50500[2]	19900 42750	18100[2] 38950[2]	12900 27850	14000[2] 29750[2]	9550 20600			12700[2] 27950[2]	8800 19650	7.97 25.95
-6.0 m -20.0 ft					17700[2] 37450[2]		13350[2] 27750[2]						12200[2] 26700[2]		6.38 20.50

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

Table 65

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											8300[2] 18400[2]		7.30 23.48
7.5 m 25.0 ft							10950[2] 24000[2]				7800[2] 17200[2]		8.48 27.57
6.0 m 20.0 ft							11450[2] 24950[2]	11150 24000	9850[2] 18600[2]	8300 17800	7650[2] 16850[2]		9.27 30.28
4.5 m 15.0 ft			19000[2] 40750[2]		14650[2] 31650[2]		12450[2] 27000[2]	10800 23200	11200[2] 24350[2]	8150 17500	7750[2] 17050[2]	7100 15750	9.76 31.97

(continued)

(Table 65, contd)

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is OFF

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
3.0 m 10.0 ft			23550[2] 50550[2]	21350 46150	16800[2] 36300[2]	14200 30600	13600[2] 29450[2]	10350 22250	11750[2] 25500[2]	7900 17000	8100[2] 17750[2]	6700 14800	10.01 32.81
1.5 m 5.0 ft			17600[2] 42100[2]		18500[2] 40000[2]	13500 29100	14600[2] 31550[2]	9950 21400	12250[2] 26350	7700 16550	8650[2] 19000[2]	6600 14500	10.02 32.87
0			19800[2] 46000[2]	19750 42500	19300[2] 41800[2]	13050 28150	15150[2] 32800[2]	9650 20750	12050 26000	7500 16200	9550[2] 21050[2]	6700 14750	9.80 32.14
-1.5 m -5.0 ft	14100[2] 31850[2]		25250[2] 54850[2]	19700 42350	19100[2] 41400[2]	12900 27750	15050[2] 32600[2]	9500 20450	12000 25850	7450 16050	11050[2] 24450[2]	7100 15700	9.33 30.56
-3.0 m -10.0 ft	22550[2] 50950[2]		23100[2] 50050[2]	19850 42700	17900[2] 38650[2]	12900 27850	14050[2] 30300[2]	9500 20500			11650[2] 25600[2]	8000 17750	8.57 28.01
-4.5 m -15.0 ft	24900[2] 53700[2]		19450[2] 41900[2]		15200[2] 32550[2]	13150 28400					11450[2] 25100[2]	9900 22100	7.43 24.14

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

Table 66

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft											9050[2] 20150[2]		7.30 23.48
7.5 m 25.0 ft							12100[2] 26550[2]	11400 24450			8550[2] 18850[2]		8.48 27.57
6.0 m 20.0 ft							12650[2] 27600[2]	11150 24000	10800[2] 20350[2]	8300 17800	8400[2] 18450[2]	7900 17500	9.27 30.28
4.5 m 15.0 ft			20950[2] 44900[2]		16150[2] 34950[2]	15050 32450	13750[2] 29850[2]	10800 23200	12400[2] 27000[2]	8150 17500	8500[2] 18700[2]	7100 15750	9.76 31.97
3.0 m 10.0 ft			26000[2] 55800[2]	21350 46150	18600[2] 40100[2]	14200 30600	15050[2] 32600[2]	10350 22250	12500 26900	7900 17000	8850[2] 19450[2]	6700 14800	10.01 32.81
1.5 m 5.0 ft			18650[2] 44600[2]	18650[2] 43450	20500[2] 44250[2]	13500 29100	16100 34600	9950 21400	12250 26350	7700 16550	9450[2] 20800[2]	6600 14500	10.02 32.87

(continued)

(Table 66, contd)

349E L Excavator with a heavy duty reach boom, a 3.35 m (10 ft 12 inch) stick, no bucket, a 8600 kg (18950 lb) counterweight, and 900 mm (35 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

(H)	(R)												
	3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft		7.5 m 25.0 ft		9.0 m 30.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0			21000[2] 48750[2]	19750 42500	21350[2] 46250[2]	13050 28150	15750 33900	9650 20750	12050 26000	7500 16200	10450[2] 23050[2]	6700 14750	9.80 32.14
-1.5 m -5.0 ft	14950[2] 33750[2]		28000[2] 60750[2]	19700 42350	21200[2] 45900[2]	12900 27750	15600 33550	9500 20450	12000 25850	7450 16050	11450 25200	7100 15700	9.33 30.56
-3.0 m -10.0 ft	23900[2] 53950[2]		25650[2] 55550[2]	19850 42700	19850[2] 42900[2]	12900 27850	15600 33600	9500 20500			12950 28500[2]	8000 17750	8.57 28.01
-4.5 m -15.0 ft	27700[2] 59800[2]		21650[2] 46600[2]	20250[2] 43550[2]	16900[2] 36200[2]	13150 28400					12750[2] 28000[2]	9900 22100	7.43 24.14

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

Long Reach

Fixed Gauge

Table 67

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds.								
R								
(H)	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft	
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)
4.5 m 15.0 ft							12850[2] 27700[2]	
3.0 m 10.0 ft					21000[2] 45100[2]		15050[2] 32500[2]	13850 29950
1.5 m 5.0 ft					17900[2] 42400[2]		16950[2] 36600[2]	12950 27900
0					17100[2] 39450[2]		18050[2] 39100[2]	12300 26550
−1.5 m −5.0 ft			11500[2] 25900[2]		20500[2] 46900[2]	18400 39500	18350[2] 39700[2]	12000 25850
−3.0 m −10.0 ft	13350[2] 29750[2]		16800[2] 37800[2]		23400[2] 50700[2]	18450 39600	17750[2] 38450[2]	11950 25700
−4.5 m −15.0 ft			23100[2] 52200[2]		21000[2] 45350[2]	18700 40250	16250[2] 35100[2]	12050 25950
−6.0 m −20.0 ft			22300[2]		11750[2] 36700[2]		13450[2] 28600[2]	12400 26750

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds.									
R									
(H)	7.5 m 25.0 ft		9.0 m 30.0 ft		10.5 m 35.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft							6500[2] 14350[2]		8.90 28.81
7.5 m 25.0 ft			8750[2] 18950[2]	8450 18050			6300[2] 13850[2]		9.89 32.22
6.0 m 20.0 ft			9050[2] 19800[2]	8250 17700	6650[2]	6250	6300[2] 13800[2]	6200 13700	10.57 34.56
4.5 m 15.0 ft	10850[2] 23550[2]	10600 22850	9700[2] 21050[2]	7950 17100	8950[2] 17950[2]	6150 13150	6450[2] 14150[2]	5650 12450	11.00 36.05
3.0 m 10.0 ft	12150[2] 26250[2]	10000 21600	10400[2] 22600[2]	7600 16350	9300[2] 20250[2]	5950 12750	6750[2] 14800[2]	5300 11700	11.22 36.80
1.5 m 5.0 ft	13250[2] 28700[2]	9450 20400	11100[2] 24050[2]	7300 15650	9400 20200	5750 12350	7250[2] 15900[2]	5200 11400	11.23 36.84

(continued)

(Table 67, contd)

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds.									
R									
(H)	7.5 m 25.0 ft		9.0 m 30.0 ft		10.5 m 35.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0	14050[2] 30400[2]	9050 19500	11550 24900	7000 15100	9250 19850	5600 12050	7950[2] 17550[2]	5200 11450	11.03 36.19
−1.5 m −5.0 ft	14350[2] 31050[2]	8800 18950	11400 24500	6850 14750	9150	5550	9000 19850	5450 12000	10.62 34.81
−3.0 m −10.0 ft	14000[2] 30300[2]	8700 18750	11350 24400	6800 14650			9850[2] 21650[2]	5950 13150	9.96 32.59
−4.5 m −15.0 ft	12850[2] 27650[2]	8800 18950	10000[2]	6900			10000[2] 22050[2]	6900 15350	9.00 29.35
−6.0 m −20.0 ft	10200[2]	9100					9900[2] 21750[2]	8900 20050	7.63 24.68

(1) Lift capacities are based on “SAE J1097” and “ISO 10567” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 68

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON								
R								
(H)	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft	
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)
4.5 m 15.0 ft							14200[2] 30650[2]	
3.0 m 10.0 ft					23300[2] 49950[2]	21050 45500	16700[2] 36050[2]	13850 29950
1.5 m 5.0 ft					18950[2] 42400[2]	18950[2] 41750	18850[2] 40700[2]	12950 27900
0					18150[2] 41800[2]	18150[2] 40050	20100[2] 43500[2]	12300 26550
−1.5 m −5.0 ft			12200[2] 27500[2]		21750[2] 49700[2]	18400 39500	20400[2] 44200[2]	12000 25850
−3.0 m −10.0 ft	14150[2] 31600[2]		17800[2] 40050[2]		26050[2] 56450[2]	18450 39600	19800[2] 42850[2]	11950 25700
−4.5 m −15.0 ft			24500[2] 55300[2]		23450[2] 50650[2]	18700 40250	18150[2] 39200[2]	12050 25950
−6.0 m −20.0 ft			25050[2]		19250[2] 41100[2]		15050[2] 32100[2]	12400 26750

(continued)

(Table 68, contd)

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.
Heavy lift is ON

R									
(H)	**7.5 m 25.0 ft**		**9.0 m 30.0 ft**		**10.5 m 35.0 ft**		**Maximum Radius**		
	(F)	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**	**m ft**
9.0 m 30.0 ft							7150[2] 15800[2]		8.90 28.81
7.5 m 25.0 ft			9700[2] 20800[2]	8450 18050			6950[2] 15250[2]		9.89 32.22
6.0 m 20.0 ft			10100[2] 22050[2]	8250 17700	7350[2]	6250	6900[2] 15200[2]	6200 13700	10.57 34.56
4.5 m 15.0 ft	12100[2] 26200[2]	10600 22850	10800[2] 23450[2]	7950 17100	9800[2] 19750[2]	6150 13150	7100[2] 15550[2]	5650 12450	11.00 36.05
3.0 m 10.0 ft	13500[2] 29200[2]	10000 21600	11600[2] 25200[2]	7600 16350	9600 20600	5950 12750	7400[2] 16300[2]	5300 11700	11.22 36.80
1.5 m 5.0 ft	14750[2] 31950[2]	9450 20400	11850 25550	7300 15650	9400 20200	5750 12350	7950[2] 17450[2]	5200 11400	11.23 36.84
0	15150 32650	9050 19500	11550 24900	7000 15100	9250 19850	5600 12050	8600 18900	5200 11450	11.03 36.19
−1.5 m −5.0 ft	14900 32000	8800 18950	11400 24500	6850 14750	9150	5550	9000 19850	5450 12000	10.62 34.81
−3.0 m −10.0 ft	14800 31800	8700 18750	11350 24400	6800 14650			9850 21750	5950 13150	9.96 32.59
−4.5 m −15.0 ft	14400[2] 30900[2]	8800 18950	11250	6900			11200[2] 24750[2]	6900 15350	9.00 29.35
−6.0 m −20.0 ft	11500[2]	9100					11150[2] 24500[2]	8900 20050	7.63 24.68

(1) Lift capacities are based on “SAE J1097” and “ISO 10567” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Variable Gauge

Table 69

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.

R								
(H)	**1.5 m 5.0 ft**		**3.0 m 10.0 ft**		**4.5 m 15.0 ft**		**6.0 m 20.0 ft**	
	(F)	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**
4.5 m 15.0 ft							13050[2] 28150[2]	
3.0 m 10.0 ft					21400[2] 45950[2]		15300[2] 32950[2]	
1.5 m 5.0 ft					17450[2] 41250[2]		17100[2] 36950[2]	14400 31050
0			7000[2] 15950[2]		17300[2] 39850[2]		18150[2] 39250[2]	13800 29750
−1.5 m −5.0 ft			12000[2] 26950[2]		21000[2] 47950[2]	20850 44750	18300[2] 39650[2]	13500 29100
−3.0 m −10.0 ft	13800[2] 30750[2]		17350[2] 39050[2]		23200[2] 50300[2]	20900 44950	17650[2] 38200[2]	13450 29000
−4.5 m −15.0 ft			23800[2] 53800[2]		20700[2] 44700[2]		16050[2] 34600[2]	13600 29300
−6.0 m −20.0 ft					16700[2] 35600[2]		13050[2] 27700[2]	13050 27700

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1]
All lifting capacities are in kilograms and pounds.

R									
(H)	**7.5 m 25.0 ft**		**9.0 m 30.0 ft**		**10.5 m 35.0 ft**		**Maximum Radius**		
	(F)	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**	**(F)**	**(S)**	**m ft**
9.0 m 30.0 ft			6500[2]				6450[2] 14300[2]		9.01 29.20
7.5 m 25.0 ft			8750[2] 19200[2]	8750 19200			6300[2] 13850[2]		9.97 32.48
6.0 m 20.0 ft			9100[2] 19900[2]	9100 19550	6950[2]		6300[2] 13850[2]	6300 13850	10.62 34.74
4.5 m 15.0 ft	11000[2] 23800[2]		9750[2] 21200[2]	8800 18900	8950[2] 18400[2]	6850 14650	6450[2] 14200[2]	6250 13800	11.03 36.15
3.0 m 10.0 ft	12250[2] 26500[2]	11100 23850	10450[2] 22750[2]	8450 18150	9350[2] 20300[2]	6650 14250	6800[2] 14900[2]	5950 13100	11.23 36.83
1.5 m 5.0 ft	13350[2] 28900[2]	10550 22700	11150[2] 24150[2]	8100 17450	9700[2] 21000[2]	6450 13850	7300[2] 16000[2]	5800 12800	11.22 36.81

(continued)

(Table 69, contd)

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds.									
R									
(H)	7.5 m 25.0 ft		9.0 m 30.0 ft		10.5 m 35.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
0	14100[2] 30550[2]	10150 21800	11600[2] 25100[2]	7850 16900	9650 20750	6300 13550	8050[2] 17550[2]	5900 12950	11.00 36.09
−1.5 m −5.0 ft	14350[2] 31050[2]	9900 21300	11700[2] 25300[2]	7700 16550	9550	6250	9250[2] 20400[2]	6200 13600	10.57 34.63
−3.0 m −10.0 ft	13950[2] 30150[2]	9800 21150	11250[2] 24250[2]	7650 16550			9850[2] 21700[2]	6800 14950	9.89 32.33
−4.5 m −15.0 ft	12700[2] 27250[2]	9900 21400					10000[2] 22050[2]	7900 17600	8.89 28.97
−6.0 m −20.0 ft							9850[2] 21650[2]		7.46 24.12

(1) Lift capacities are based on “SAE J1097” and “ISO 10567” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Table 70

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON								
R								
(H)	1.5 m 5.0 ft		3.0 m 10.0 ft		4.5 m 15.0 ft		6.0 m 20.0 ft	
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)
4.5 m 15.0 ft							14450[2] 31200[2]	
3.0 m 10.0 ft					23700[2] 50900[2]	23400 50500	16950[2] 36550[2]	15350 33050
1.5 m 5.0 ft					18500[2] 43700[2]		19000[2] 41050[2]	14400 31050
0			7500[2] 16950[2]		18350[2] 42250[2]		20150[2] 43650[2]	13800 29750
−1.5 m −5.0 ft			12750[2] 28650[2]		22250[2] 50800[2]	20850 44750	20400[2] 44150[2]	13500 29100
−3.0 m −10.0 ft	14650[2] 32650[2]		18400[2] 41400[2]		25850[2] 56000[2]	20900 44950	19700[2] 42600[2]	13450 29000
−4.5 m −15.0 ft			25200[2] 57000[2]		23100[2] 49900[2]	21250 45600	17950[2] 38700[2]	13600 29300
−6.0 m −20.0 ft					18700[2] 39950[2]		14650[2] 31100[2]	14000 30200

(continued)

(Table 70, contd)

349E L Excavator with a 7.4 m (24 ft 3 inch) long reach boom, a 4.3 m (14 ft 1 inch) stick, no bucket, a 9000 kg (19840 lb) counterweight, and 900 mm (36 inch) triple grouser track shoes[1] All lifting capacities are in kilograms and pounds. Heavy lift is ON									
R									
(H)	7.5 m 25.0 ft		9.0 m 30.0 ft		10.5 m 35.0 ft		Maximum Radius		
	(F)	(S)	(F)	(S)	(F)	(S)	(F)	(S)	m ft
9.0 m 30.0 ft			7150[2]				7100[2] 15700[2]		9.01 29.20
7.5 m 25.0 ft			9750[2] 21300[2]	9300 19900			6900[2] 15250[2]		9.97 32.48
6.0 m 20.0 ft			10150[2] 22150[2]	9100 19550	7650[2]	6950	6950[2] 15250[2]	6800 15100	10.62 34.74
4.5 m 15.0 ft	12200[2] 26450[2]	11650 25150	10850[2] 23600[2]	8800 18900	10000[2] 20200[2]	6850 14650	7100[2] 15600[2]	6250 13800	11.03 36.15
3.0 m 10.0 ft	13600[2] 29500[2]	11100 23850	11700[2] 25350[2]	8450 18150	10000 21500	6650 14250	7450[2] 16400[2]	5950 13100	11.23 36.83
1.5 m 5.0 ft	14900[2] 32200[2]	10550 22700	12350 26600	8100 17450	9800 21100	6450 13850	8000[2] 17600[2]	5800 12800	11.22 36.81
0	15700[2] 34000[2]	10150 21800	12050 26000	7850 16900	9650 20750	6300 13550	8850[2] 19500[2]	5900 12950	11.00 36.09
−1.5 m −5.0 ft	15500 33400	9900 21300	11900 25600	7700 16550	9550	6250	9500 20900	6200 13600	10.57 34.63
−3.0 m −10.0 ft	15450 33250	9800 21150	11850 25550	7650 16550			10450 23050	6800 14950	9.89 32.33
−4.5 m −15.0 ft	14200[2] 30500[2]	9900 21400					11250[2] 24750[2]	7900 17600	8.89 28.97
−6.0 m −20.0 ft							11100[2] 24400[2]	10350 23300	7.46 24.12

(1) Lift capacities are based on “SAE J1097” and “ISO 10567” standards. The listed capacities do not exceed 87 percent of the hydraulic lifting capacity or 75 percent of the tipping capacity. Weight of all lifting accessories must be subtracted from the lifting capacities.
(2) Capacity is limited by hydraulics rather than by a tipping load.

Identification Information

i08106582

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

Product Identification Number (PIN) and Regional Certification Plate

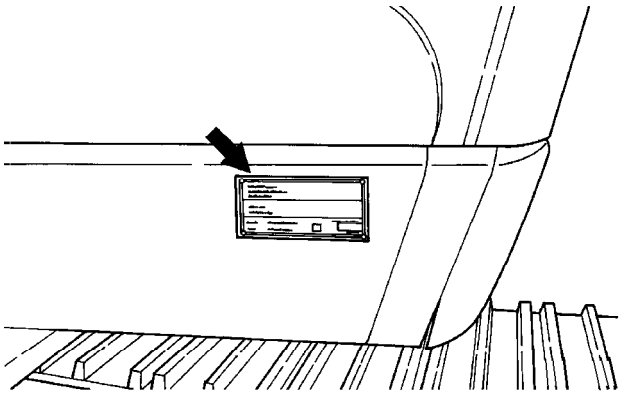


Illustration 72 g00675011

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

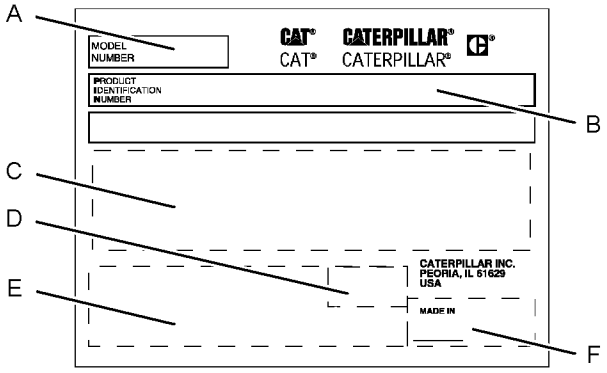


Illustration 73 g02436556

Model number (A)_____

Machine PIN (B)_____

Service Information Plate (C)_____

Year of Manufacture (If Required) (D)_____

Regional Certification Plate (If Required) (E)

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

Local regulation may require documentation of the Year of Manufacture in the OMM. Comply with these regulations.

Regional Certification Plate

Note: The Regional Certification Plate is on machines that are going into the European Union.

Note: The Regional Certification Plate is on machines that are certified to the European Union requirements that were effective at that time.

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

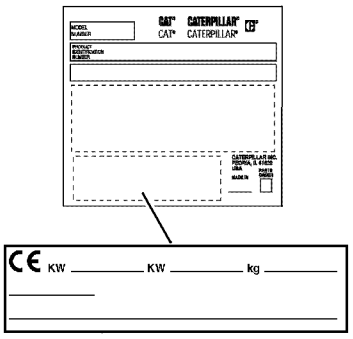


Illustration 74 g01883459

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

- Primary Engine Power (kW)
- Additional Engine Power (kW)
- Typical Machine Weight (kg)
- Year of Construction
- Machine Type

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

EAC Mark for Eurasian Economic Union

For machines compliant to the Eurasian Economic Union requirements, the EAC Mark and manufacture date (month and year) is incorporated into the Machine PIN Plate in the lower left-hand area. The EAC mark plate is placed on machines certified to the Eurasian Economic Union requirements effective at the time of market entry.

For quick reference, record the month and year of manufacture in spaces that are provided below the illustration.

Illustration 75 g06094564

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

Manufacturer Information

Manufacturer:

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

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

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

Machine Specification Film

The machine specification film is on machines that are going into Japan.

The Japanese Industrial Safety and Health Act requires machine specifications to be displayed on a film that can easily be seen by the operator.

If equipped, this film will be located on the cab door.

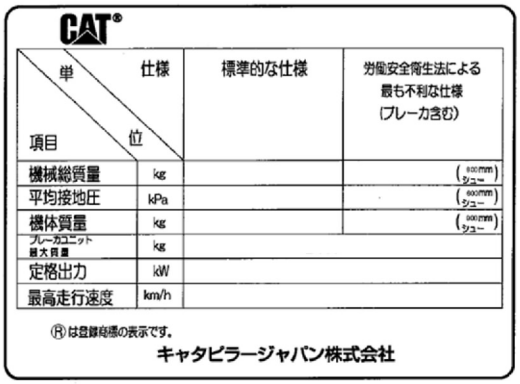


Illustration 76 g03105980

Engine Serial Number

This label is located on the engine.

Engine Serial Number _____

Sound Certification

This film is located on the left side of the machine.

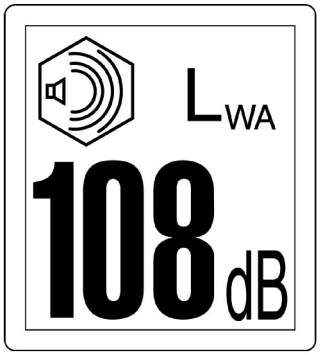


Illustration 77 g02409196

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

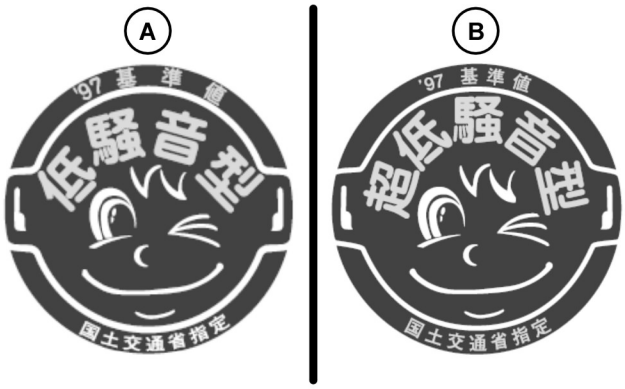


Illustration 78 g03105800

(A) Low Noise Film
(B) Super Low Noise Film

If equipped, these certification labels are used to verify the Japan Ministry of Land, Infrastructure, Transportation, and Tourism (MLIT) noise designation according to the Japan “Designation Rule of Low Noise Type Contrsuction Machine” .

Low Noise (A) – Verifies that the Japan “MLIT” designates the machine as a “Low Noise” type construction machine.

Super Low Noise (B) – Verifies that the Japan “MLIT” designates the machine as a “Super Low Noise” type construction machine.

i05147810

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

S/N: FJB1–Up

S/N: ETC1–Up

S/N: SPG1–Up

S/N: RGH1–Up

S/N: WHZ1–Up

Note: This information is pertinent in Japan.

Illustration 79 g03306058

2011 certification label example

A certification label is located on the cab door.

The certification label verifies that the machine conforms to the 2011 Japan Nonroad Special Motor Vehicle Exhaust Regulation.

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.

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

Table 71

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

ORIGINAL EC or EU DECLARATION OF CONFORMITY

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

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

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

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Hydraulic Excavator
	Model/Type:	349E
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2000/14/EC amended by 2005/88/EC, Note (1)		
2006/42/EC	N/A	
2004/108/EC	N/A	
2014/30/EU	N/A	

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

Done at: **Signature**

Date: **Name/Position**

Note: The above information was correct as of **February 2010**, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Operation Section

Before Operation

i04021647

Mounting and Dismounting

SMCS Code: 6700; 7000

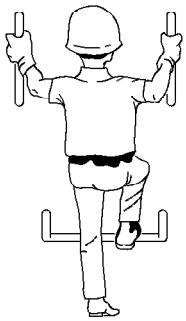


Illustration 80 g00037860
Typical example

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

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

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

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

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

Machine Access System Specifications

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

Alternate Exit

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

i05767689

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 walk-around 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 and Stick Linkage - Lubricate”

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

Severe Applications

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

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

Operation and Maintenance Manual, “ Blade Linkage - Lubricate”

Daily Basis

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

- 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 Operation and Maintenance Manual, “Maintenance Interval Schedule” for all maintenance recommendations.

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.

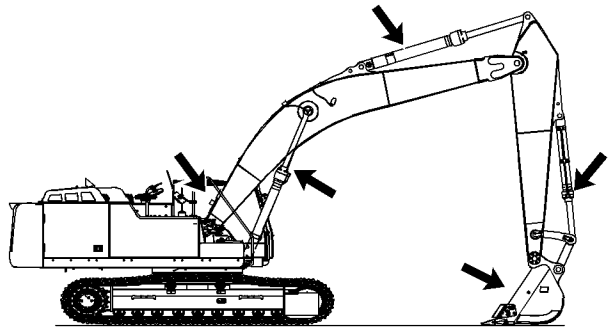


Illustration 81 g02515516

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.

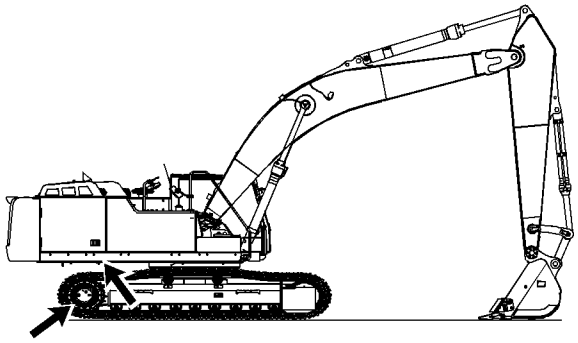


Illustration 82 g02280134

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 tubes and hoses along the boom and stick for wear and leaks. Replace any hoses or tubes that are worn or leak.

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.

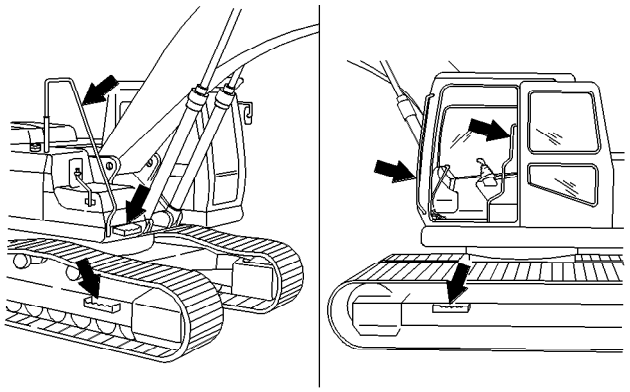


Illustration 83 g00101987

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.

Machine Operation

i06244619

Alternate Exit

SMCS Code: 7310

Front Window (If Equipped)

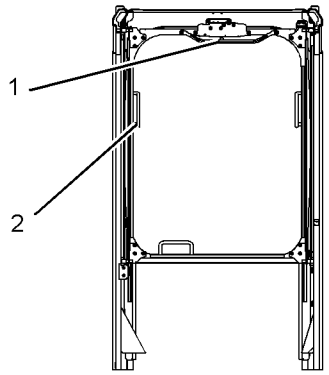


Illustration 84 g02050493

(1) Lever
(2) Handle

The front window serves as an alternate exit.

In order to remove the front window, move lever (1) to the right. Grab handles (2) and lift the window into the overhead storage position. Exit through the front window.

Right Side Window

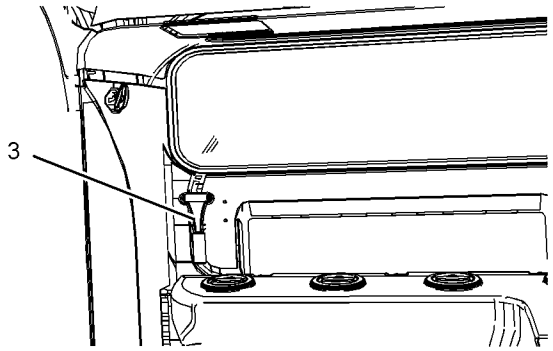


Illustration 85 g02050942

(3) Hammer (If Equipped)

Alternate Exit – The right side window serves as an alternate exit.

Break Glass – Perform the following procedure in order to exit through the right side window. Hammer (3) is mounted near the rear window of the cab. Strike the right side window with the hammer in order to break the glass. Climb through the opening of the right side window in order to exit the cab.

Roof Hatch (If Equipped)

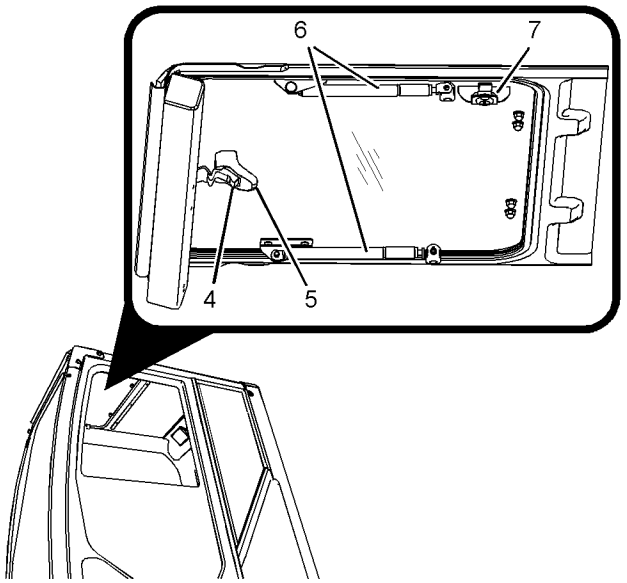


Illustration 86 g02851621

(4) Latch
(5) Grip
(6) Gas springs
(7) Lock mechanism

Note: Before operating the machine, make sure lock mechanism (7) (if equipped) is unlocked.

Alternate Exit – The roof hatch serves as an alternate exit.

Slide the visor cover back. If equipped, make sure lock mechanism (7) is unlocked.

Release latch (4). Hold grip (5) and push the roof hatch outward.

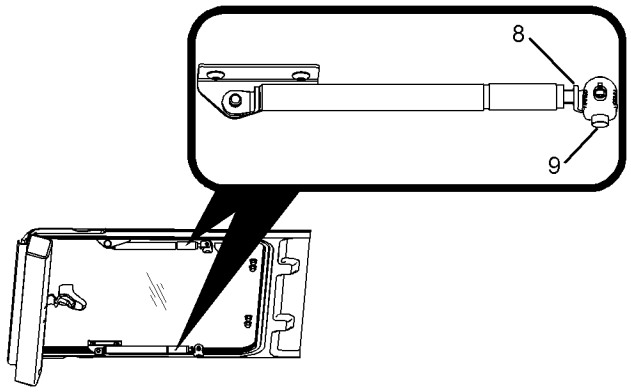


Illustration 87 g02901996

If equipped with gas springs (6), press gas spring release (9) and remove gas spring shaft (8) in order to open hatch wider.

Exit through the roof hatch.

Removing the Roof Hatch from the Outside

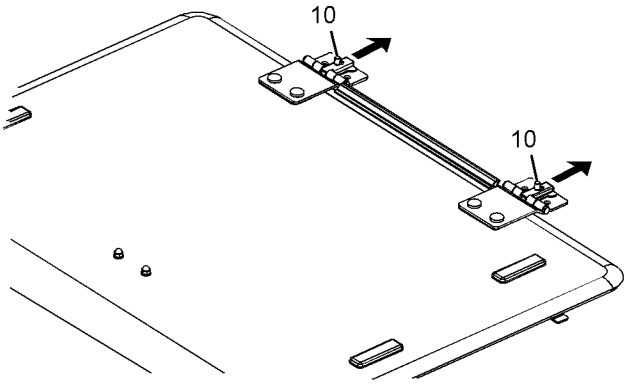


Illustration 88 g02851583

(10) Hinge pin release

If equipped with hinge pin release (10), the roof hatch can also be removed from the outside of the cab.

Press hinge pin release (10) and slide backward. The hinge pin should detach and allow the hatch to be lifted. Exit through the roof hatch.

Note: Lock mechanism (7) (if equipped) must be unlocked in order to allow the hatch to be lifted.

Roof Hatch (If Equipped)

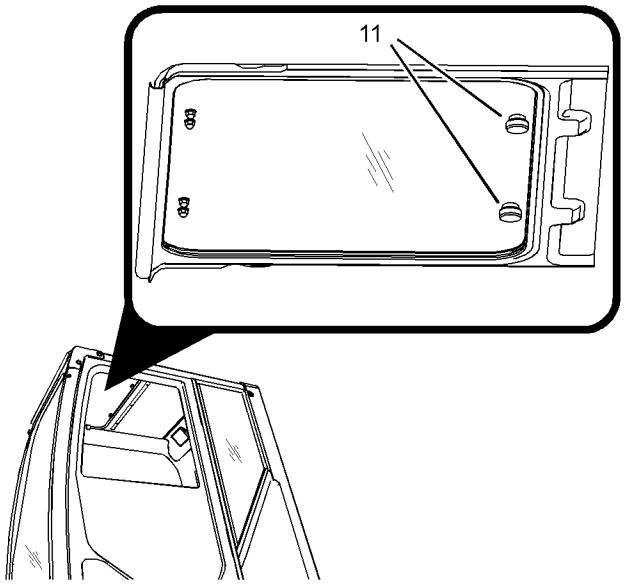


Illustration 89 g02851579

Alternate Exit – The roof hatch serves as an alternate exit.

Slide the visor cover back.

Remove knobs (11) and push the roof hatch outward. Exit through the roof hatch.

Note: Do not open the hatch during general operation in order to maintain the functionality of the alternate exit.

FOGS (If Equipped)

Note: Some FOGS are fixed/bolted-on and others can be opened. This information pertains to FOGS that can be opened.

Top FOGS

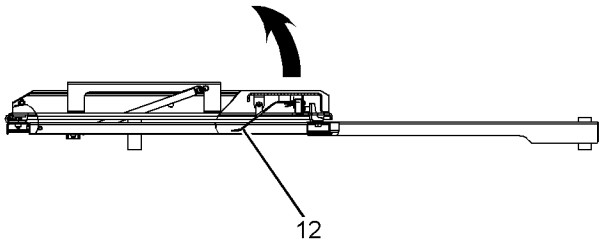


Illustration 90 g02902217

In order to exit through the roof hatch, the FOGS guard is equipped with a release latch. Open the roof hatch as stated above. As the roof hatch is being pushed outward, the roof hatch will hit lever (12). Lever (12) will allow the FOGS to lift upward. Exit through the roof hatch.

In order to open the top FOGS from the outside of the machine, reach under the FOGS and pull up on release lever (12). Follow the directions for removing the hatch from the outside.

Front FOGS

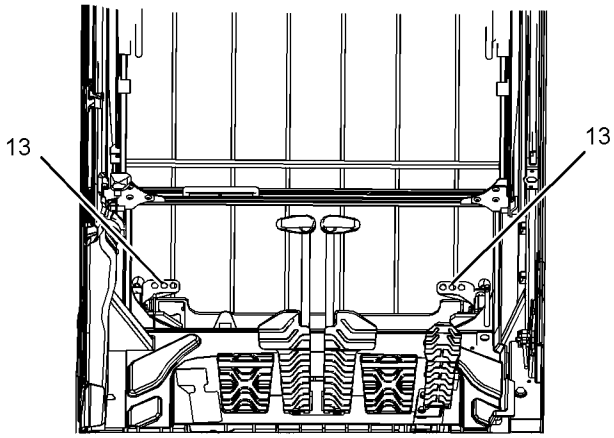


Illustration 91 g02902219

In order to exit through the front window, the FOGS guard is equipped with a release latch. Open the front window as stated above and remove the lower window. Press down on levers (13) in order to open the front FOGS. Exit through the front window.

i07186721

Seat

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

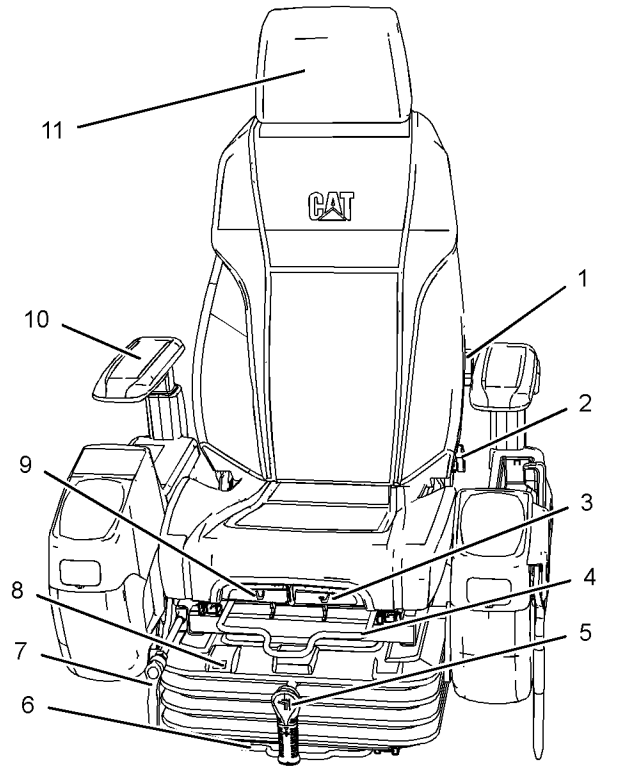


Illustration 92 g01636841

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

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

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

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

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

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

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

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

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

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

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

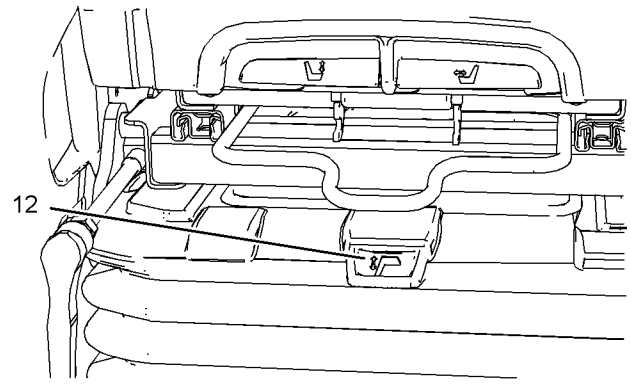


Illustration 93 g01637296

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

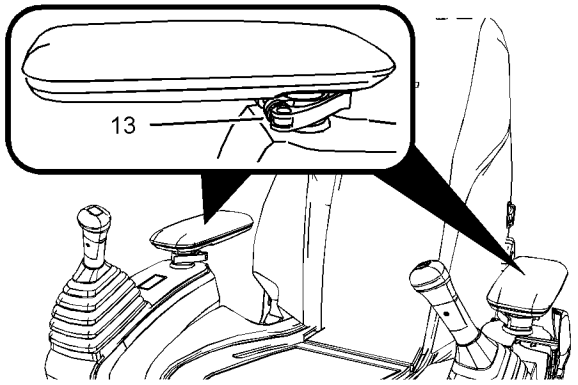


Illustration 94 g02697124

(13) Armrest height adjustment

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

Heated Seat and Ventilated Seat (If Equipped)

⚠ WARNING

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

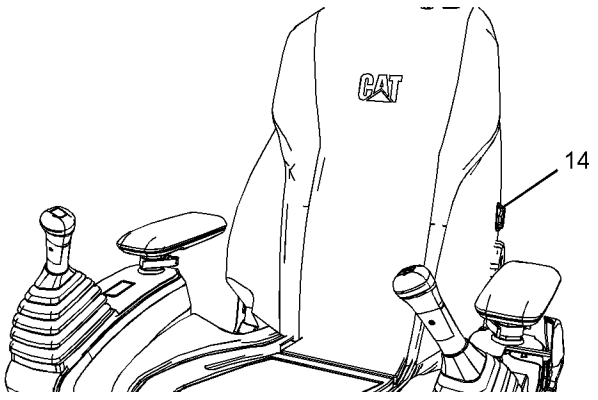


Illustration 95 g02697116

Heated Seat Switch – If equipped with a heated seat, press the top of rocker switch (14) to turn the seat heater to the ON position. Press the bottom of rocker switch (14) to turn the seat heater to the OFF position.

Heated and Ventilated Seat Switch – If equipped with a heated and ventilated seat, press the top of rocker switch (14) for heat. Press the bottom of rocker switch (14) for ventilation. The center switch position is OFF.

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

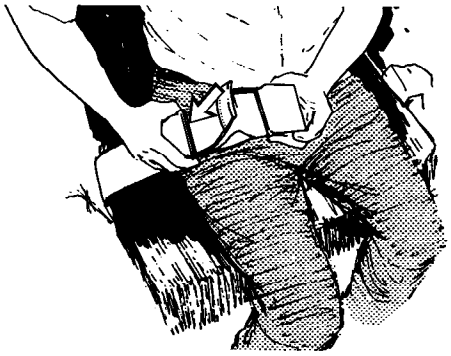


Illustration 96 g00100709

1. Unfasten the seat belt.

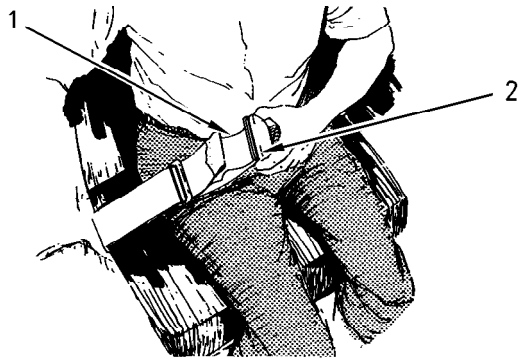


Illustration 97 g00932817

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

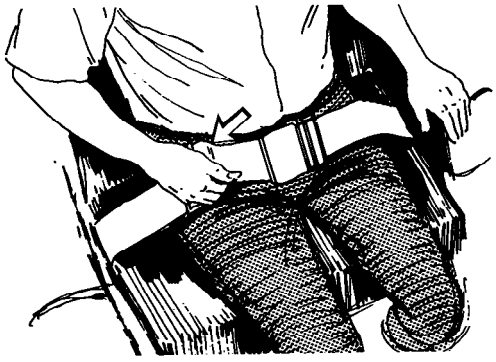


Illustration 98 g00100713

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

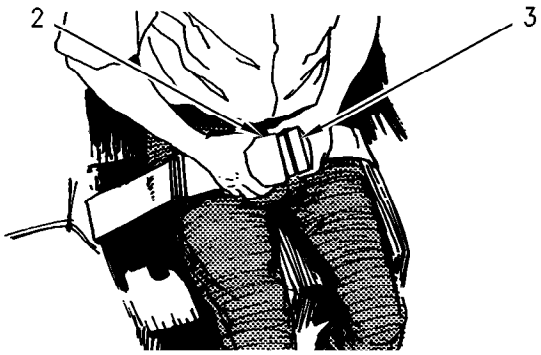


Illustration 99 g00932818

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 100 g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

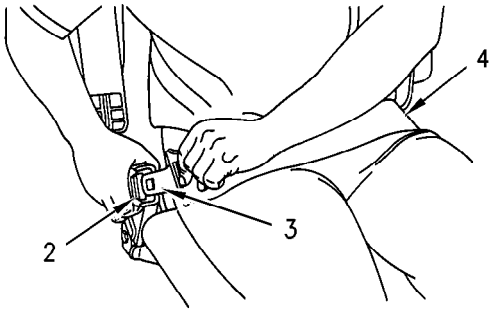


Illustration 101 g00867598

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

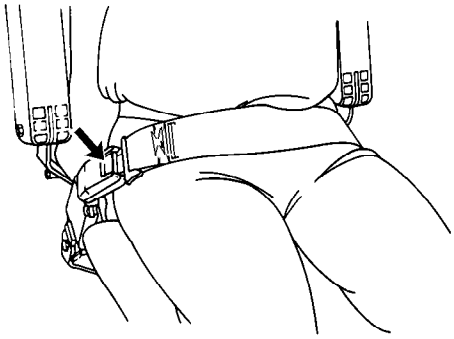


Illustration 102 g00039113

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.

i05832273

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.

Cat Grade Control (If Equipped)

Cat Grade Control is designed to calculate bucket tip position and provide visual and audible feedback to the operator. This feedback allows the operator to achieve the desired grade safer, quicker and more accurately than traditional grading techniques.

For information on how to use Cat Grade Control, refer to Operation and Maintenance Manual, SEBU8358, “Cat Grade Control Depth and Slope for E Series Excavators”.

Operator Controls

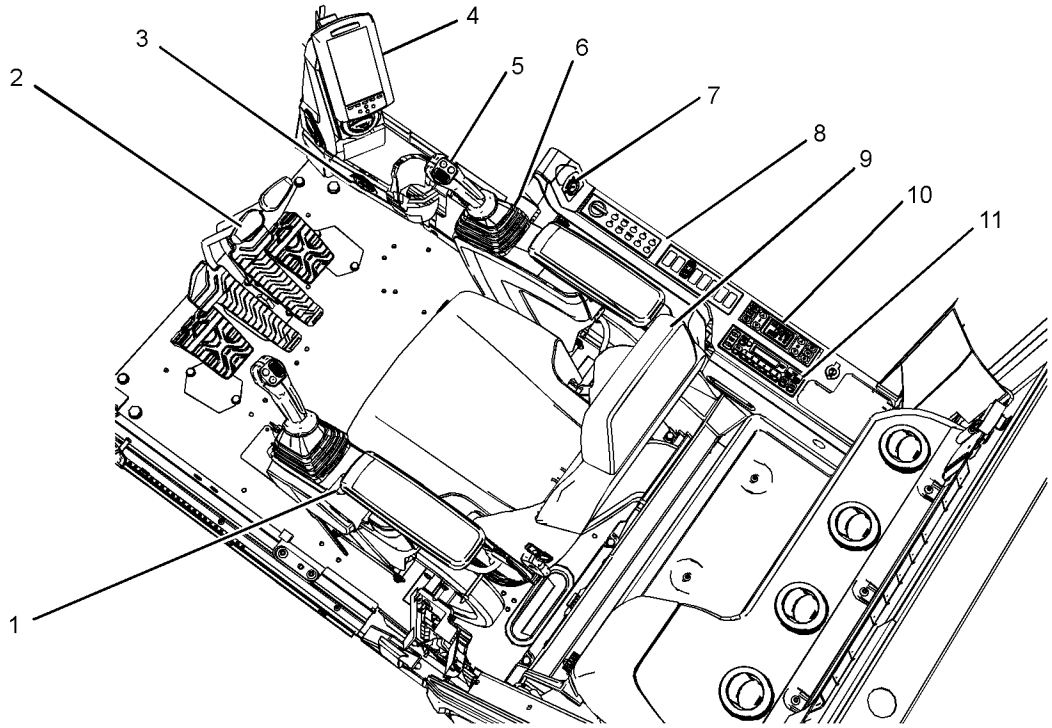


Illustration 103 g02043634

(1) Hydraulic lockout control
(2) Travel controls
(3) Service hour meter
(4) Monitor
(5) Joystick controls
(6) Backup controls (If equipped)
(7) Engine start switch
(8) Right side control panel
(9) Operator seat
(10) Air conditioning and heating control
(11) Radio

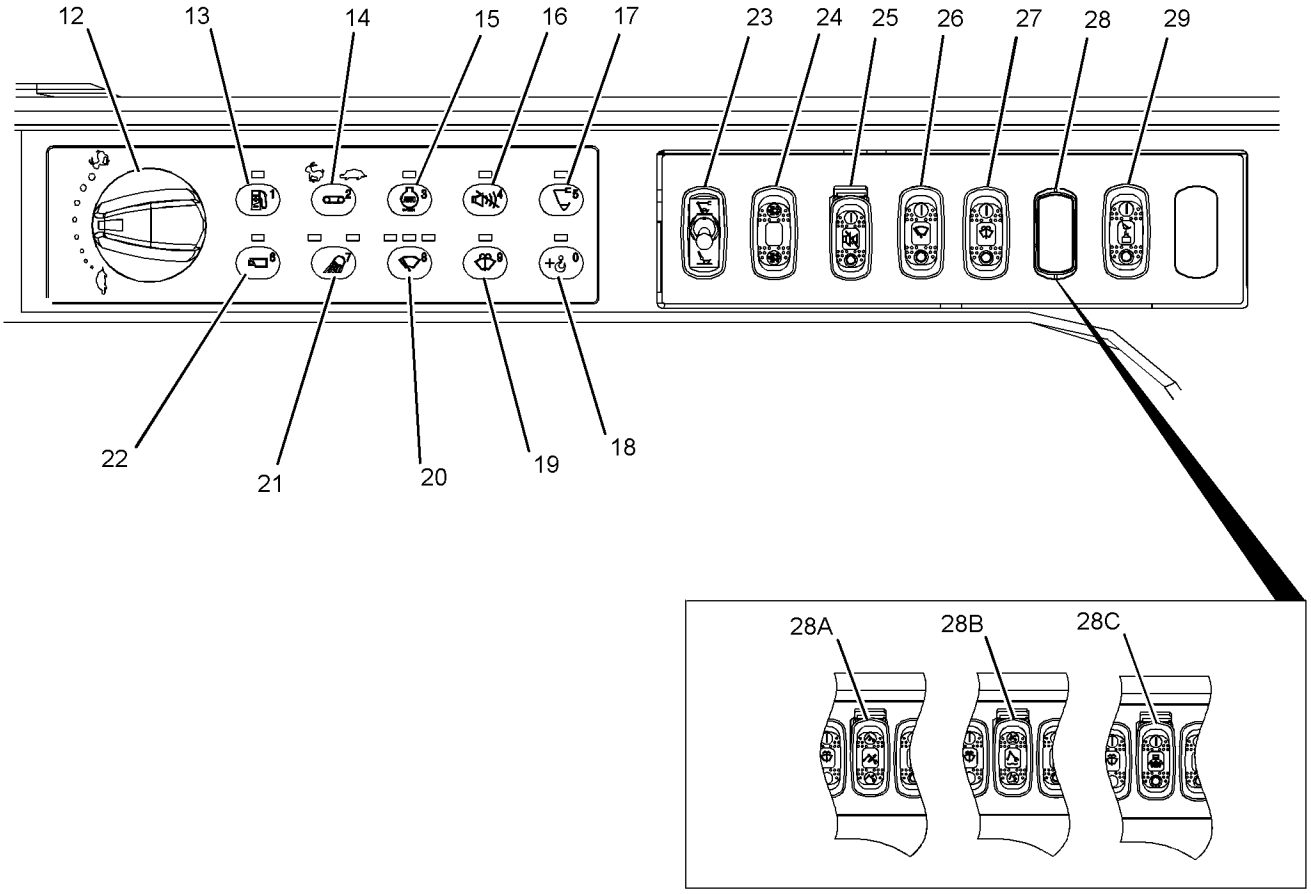


Illustration 104 g03689586

(12) Engine speed control
(13) Power mode
(14) Travel speed control
(15) Automatic engine speed control (AEC)
(16) Travel alarm switch
(17) Work tool control
(18) Heavy lift control
(19) Window washer
(20) Window wiper
(21) Light switch
(22) Rear view camera
(23) Quick coupler control
(24) Cat Regeneration System (CRS) switch
(25) Radio mute
(26) Lower window wiper
(27) Lower window washer
(28A) Boom pressure control switch
(28B) SmartBoom control
(28C) Fine swing control
(29) Overload warning device

Hydraulic Lockout Control (1)

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

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

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

Unlocked – Move the lever for the hydraulic lockout control forward to the UNLOCKED position. All of the factory installed hydraulic controls will become operable.

Travel Control (2)

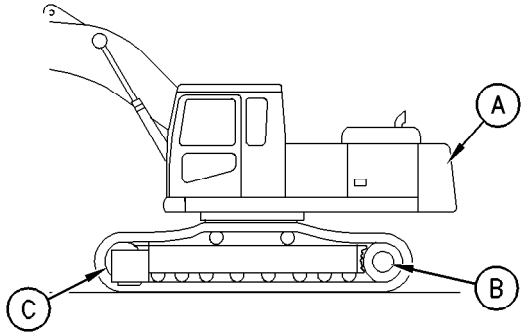


Illustration 105 g00753277

Position for normal travel

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

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

Stop – Release the travel levers/pedals in order to stop the machine. When you release the travel levers/pedals from any position, the travel levers/pedals will return to the CENTER position. The travel brakes will be applied.

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

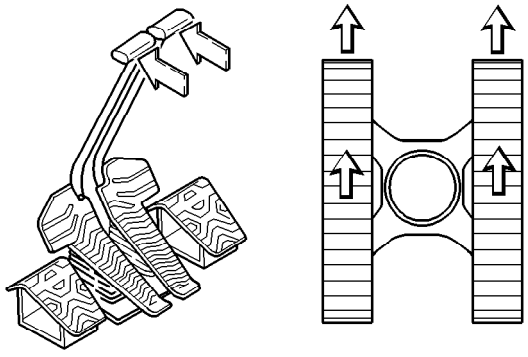


Illustration 106 g00731542

FORWARD travel

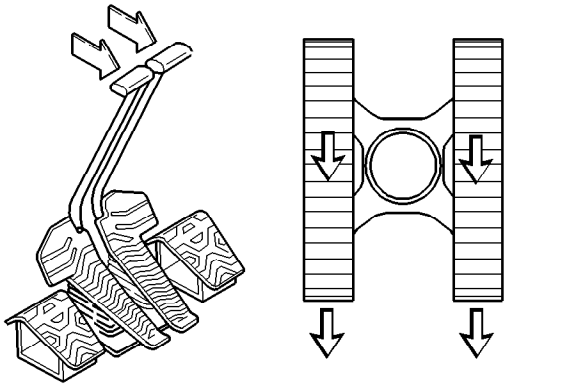


Illustration 107 g00731543

REVERSE travel

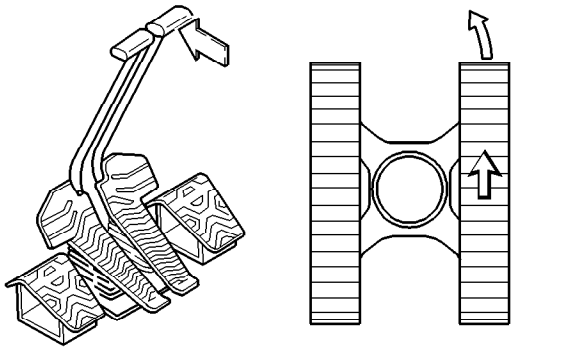


Illustration 108 g00731472

Pivot left turn (FORWARD)

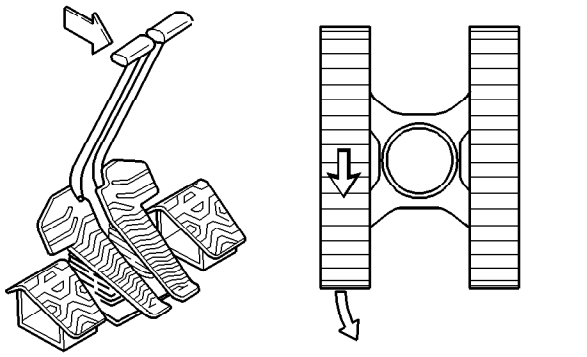


Illustration 109 g00731478

Pivot Left Turn (REVERSE)

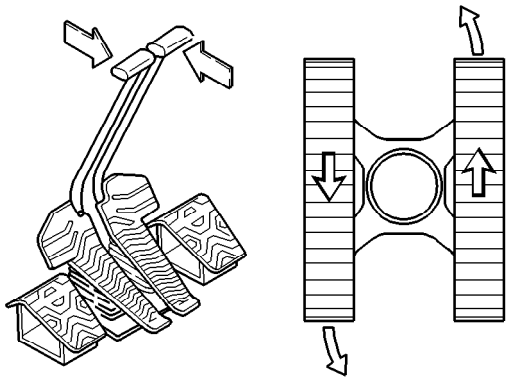


Illustration 110 g00731476
Counterrotate turn (LEFT)

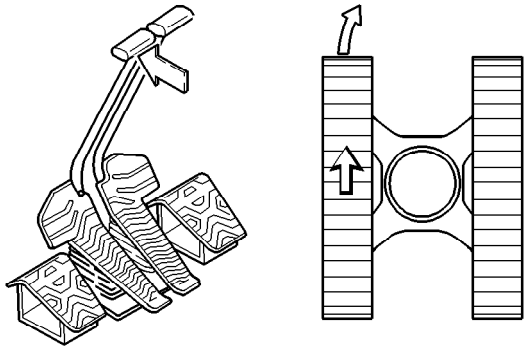


Illustration 111 g00731471
Pivot right turn (FORWARD)

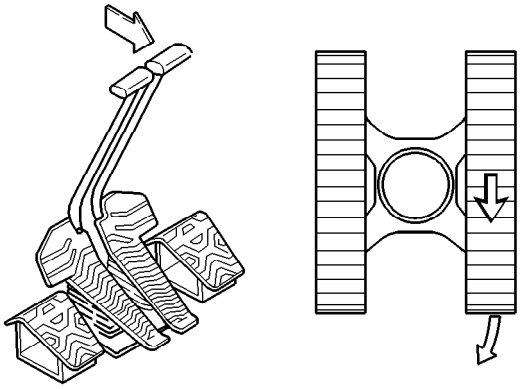


Illustration 112 g00731479
Pivot right turn (REVERSE)

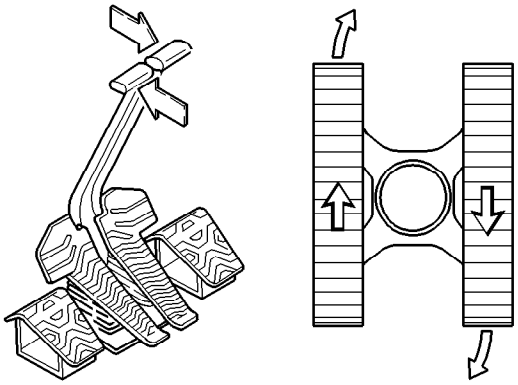


Illustration 113 g00731477
Counterrotate turn (RIGHT)

Service Hour Meter (3)

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

Monitor (4)

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

Joystick Controls (5)

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

Note: During a boom down function the machine ECM may reduce engine speed. This improves the overall fuel consumption.

Backup Controls (6) (If Equipped)

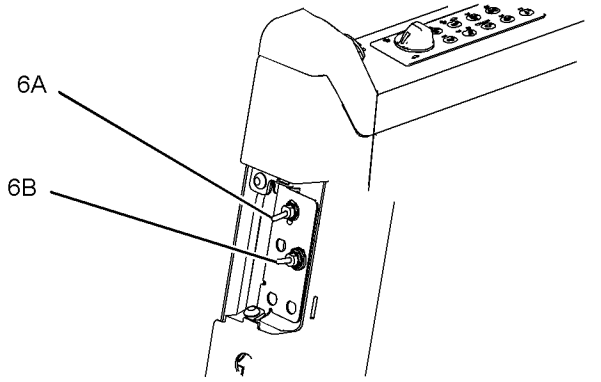


Illustration 114 g02048316

(6A) Manual Fast/Manual Slow Engine Speed Selection
(6B) Automatic/Manual Engine Speed Control

The backup switches are located behind the panel on the right side.

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

Automatic – When the electronic control system is functioning properly, backup switch (6B) should be in this position.

Manual – If a problem occurs in the electronic control system, move backup switch (6B) to this position in order to disconnect the controller circuit of the electronic controller system. In this condition, the machine can be operated at a reduced ratio of pump output on a temporary basis. “BACK UP SWITCH ON” will appear on the message display.

Fast Engine Speed – Move backup switch (6A) to this position in order to increase the engine speed. This backup switch will not operate if backup switch (6B) 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 (6A) to this position in order to decrease the engine speed. This backup switch will not operate if backup switch (6B) 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.

Engine Start Switch (7)

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

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

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

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

Note: If the engine fails to start, return the engine start switch key to the OFF position. Return the key to the start position before you attempt to start the engine again.

Engine Idle Shutdown

This function shuts down the engine after the operator is not operating the machine for a period of time. This function does not shut down other systems, such as the AC, which can run down the battery after idle shutdown. This function comes disabled from the factory but can be enabled and adjusted in the monitoring system. Refer to Operation and Maintenance Manual, “Monitoring System”

Note: Engine Idle Shutdown may be required for local regulations.

The Engine Idle Shutdown (EIS) shuts down the engine if the following conditions are met:

- The control lever is in neutral.

- The engine coolant temperature is greater than 70° C (158° F).
- The battery voltage is greater than 24.5V
- The engine speed is less than 2000 rpm.
- The ambient temperature range is between 0° C (32° F) and 30° C (86° F).
- The Cat Regeneration System (CRS) is not working.

Note: If any service tests or calibrations are running the machine will not enter into engine idle shutdown.

Engine Idle Shut down – The action lamp will illuminate and the monitor will display a message 20 seconds before the engine shuts down. An operator can cancel the shutdown by pressing a button on the monitor or move one of the controls.

Operators Seat (9)

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

Air Conditioning and Heating Control (10)

If equipped, the switch for the air conditioning and heating control is located on the right console.

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

Radio (11)

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

Engine Speed Control (12)

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

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

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

Back up Method for Controlling Engine Speed

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

Check the message display for any error messages. If the error message “ECM ERROR” is displayed, there is a problem in the electronic controller. See “Backup Controls (6) (If Equipped)”.

If the engine speed cannot be adjusted by the engine speed dial and the indicator for the electronic controller does not come on, see “Backup Controls (6) (If Equipped)”.

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

Power Mode (13)

Power Mode – Press this switch in order to active the power mode settings. The modes that can be selected are: “ECONOMY” , “STANDARD HYDRAULIC POWER” and “HIGH HYDRAULIC POWER” . For more information, refer to Operation and Maintenance Manual, “Monitoring System”.

Travel Speed Control (14)

⚠ WARNING

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

Personal injury can result from sudden changes in machine stability.

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

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

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

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

Automatic Engine Speed Control (15)

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

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

The engine rpm will recover automatically to the setting of the engine speed dial when any hydraulic function is activated. The AEC system operates in three modes. Refer to Table 72 for a description of each mode.

Automatic Engine Speed Control (AEC) – The Automatic Engine Speed Control switch is activated when the engine start switch is turned to the ON position. The indicator lamp will turn on. When you press the AEC switch, the function of the AEC switch changes from ON to OFF. The operator can choose from three possible modes for automatic engine speed control. Refer to Table 72 for more details.

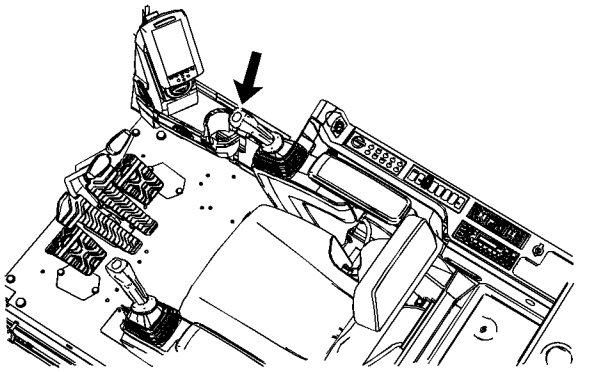


Illustration 115 g02050056

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

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

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

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

Table 72

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

Travel Alarm Cancel Switch (16)

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

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

Work Tool Control (17)

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

Heavy Lift Control (18)

If equipped, push this switch in order to activate heavy lift mode. Also push this switch in order to deactivate heavy lift mode.

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

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

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

Window Wiper and Window Washer (19-20)

Window Washer (19) – Push the switch in order to activate the window washer. While the switch is depressed, the indicator light will come on and washer fluid will spray from the nozzle. The window wiper will also operate while the switch is depressed. After the switch is released for approximately 3 seconds, the window wiper will stop.

Window Wiper (20) – Push the switch in order to activate the window wiper. Whenever the switch is depressed, the mode of the window wiper will change according to the indicator light that is illuminated.

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

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

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

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

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

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

Light Switch (21)

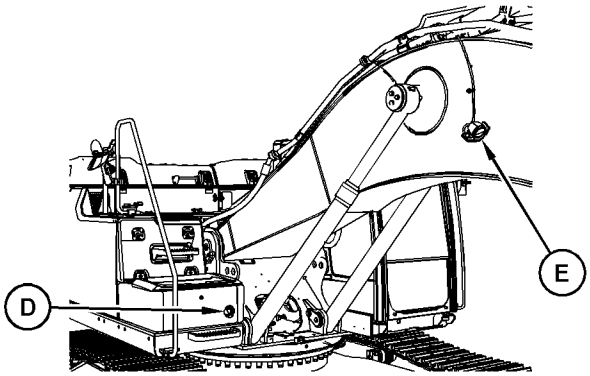


Illustration 116 g02049516

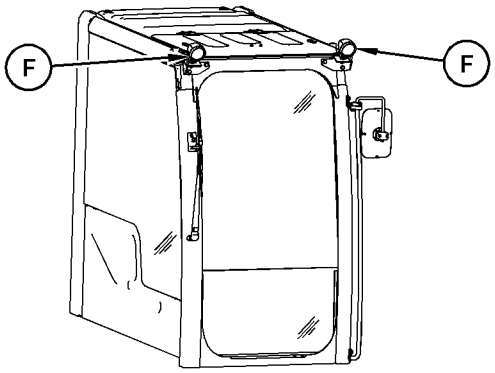


Illustration 117 g02049520

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

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

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

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

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

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

Rear View Camera (22)

Rear View Camera – If equipped, push this switch in order to toggle the images that are shown on the monitor in the cab. For more information, refer to Operation and Maintenance Manual, “Monitoring System”.

Quick Coupler Control (23)

Hydraulic Pin Grabber Quick Coupler

If equipped, the switch for the quick coupler control is located on the right console.

LOCKED – Move the switch to this position in order to engage the quick coupler onto the work tool.

UNLOCKED – Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge. Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized when the switch is in this position.

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

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

Universal Coupler

LOCKED – Move the switch to this position in order to retract the wedge and engage the quick coupler onto the work tool

UNLOCKED – Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge. Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized when the switch is in this position.

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

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

Cat Regeneration System (CRS) Aftertreatment Switch (24)

Force Regeneration – Push in the top of the switch for 2 seconds in order to begin a manual regeneration. An “Active Regen” message will be displayed on the monitor indicating that DPF regeneration cycle is in operation.

Disable Regeneration – Push in the bottom of the switch for 2 seconds in order to deactivate automatic regeneration and/or stop an active DPF regeneration cycle. A “Regen Disabled” message will be displayed on the monitor.

Note: In order to re-enable auto regeneration, cycle the engine start switch to OFF and back to ON.

For more information, refer to Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”.

Radio Mute Switch (25)

Radio Mute Switch – If equipped, press the switch in order to mute the radio. The indicator lamp will turn on.

Lower Window Wiper and Window Washer (26-27) (If Equipped)

Lower Window Wiper (26) – Push down on the top of the switch in order to turn on the lower window wiper. Push down the bottom portion of the switch in order to turn off the lower window wiper.

Lower Window Washer (27) – Push down on the top of the switch and keep the switch depressed in order to activate the lower window washer. While the switch is depressed, the washer fluid will spray from the nozzle.

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

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

Boom Pressure Control (28A)

Boom Pressure Control – If equipped, press the switch in order to turn on the boom control pressure function. The boom pressure control function improves controllability for low load operation such as raking up rocks by reducing vibration and shock.

SmartBoom Control (28B)

This machine is equipped with SmartBoom Control. For more information, refer to Operation and Maintenance Manual, “SmartBoom Control” and Operation and Maintenance Manual, “SmartBoom Operation”.

Fine Swing Control (28C)

⚠ WARNING

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

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

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

Fine Swing Control – If equipped, push down on the top of the switch in order to activate the fine swing control.

When the fine swing control is ON, the swing parking brake is released. Swing control improves during deceleration of a swing because the swing is allowed to drift instead of stopping abruptly.

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

Overload Warning Device (29)

If equipped, the switch for the overload warning device is located on the right console.

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

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

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

Service Port

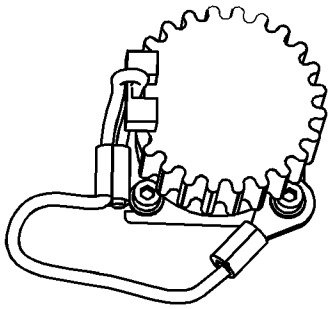


Illustration 118 g03320855

Electronic Technician service port

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

Consult your Cat dealer for additional information.

i05904896

Diesel Particulate Filter Regeneration

SMCS Code: 108F

Regeneration

Regeneration is the removal of soot from the Diesel Particulate Filter (DPF). The Caterpillar Regeneration System (CRS) is used to regenerate the DPF. The DPF traps both soot and ash. The ash is removed through a cleaning process. Refer to Operation and Maintenance Manual, “Diesel Particulate Filter - Clean/Repalce” for more information on the service of the DPF.

Regeneration Indicators

Regeneration Active – This indicator will illuminate in order to show that the CRS is active. This indicator shows that elevated emission temperatures are possible. This indicator will turn off when regeneration is complete.

DPF – This indicator will illuminate in order to show that a regeneration is needed. This indicator will illuminate when the soot level reaches 90%.

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

Regeneration Switch

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

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

Note: The MIDDLE position of the regeneration switch is the default position for automatic regeneration.

Note: You may return to normal operation at any point during a regeneration.

Note: To re-enable automatic regeneration, cycle the engine start switch key or press and hold down the force regeneration switch for 2 seconds. If the soot level is above 15%, regeneration will begin if the machine is at low idle and is parked.

Note: If, the engine start switch key is cycled while the regeneration system is disabled through the disable regeneration switch, press, and hold the disable regeneration switch for 2 seconds to reinitiate the disable regeneration.

Soot Level Monitoring

Illustration 119 g02228033

The soot level monitor indicates the level of soot that has accumulated within the DPF. The five marks on the monitor represent a percentage of soot within the DPF. The first mark indicates 0% soot level. The second mark indicates 25% soot level. The middle mark indicates 50% soot level. The fourth mark indicates 75% soot level. The last mark indicates 100% soot level. The soot level monitor can be used to optimize DPF regenerations based upon the work cycle of your machine. If machine conditions do not allow for an automatic regeneration, a manual regeneration should be performed before the soot level gauge indicates 100%.

Modes of Regeneration

Automatic: The engine ECM uses multiple inputs from the engine and the machine to determine the best time to perform an automatic regeneration. Automatic regenerations can take place throughout the operating cycle of the engine. The regeneration active indicator will be illuminated when a regeneration is being performed. Interruptions of the regeneration are acceptable. If a regeneration is in progress and needs to be stopped for any reason, it is permissible to press the disable regeneration switch or turn off the engine.

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

Note: If an automatic regeneration is started while the engine is at low idle and the machine is taken back to work, this may stop the regeneration. The engine ECM will continue to monitor inputs to determine the best time to restart the regeneration.

Manual: A manual regeneration is initiated by pressing the force regeneration switch. A manual regeneration is allowed when the soot level is equal to or greater than 15%. The machine must be stationary, the parking brake must be applied, and the engine must be at low idle in order to perform a manual regeneration.

Disabled: When the regeneration system is in disabled mode, automatic regenerations will not be performed.

Regeneration System Warning Indicators

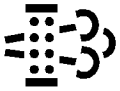


Illustration 120 g02117258

Indicator will illuminate when DPF soot load is greater than 90%

Regeneration should be performed as soon as possible. Machine operation may not allow an automatic regeneration to take place. A manual regeneration should be performed as soon as possible.

Indicator will turn off once DPF regeneration has started.

Note: In some situations, the DPF indicator may stay illuminated when the soot load is below 90%. The illuminated DPF indicator indicates that a complete regeneration has **not** been performed. A complete regeneration is when the soot level is reduced to 0%. If the DPF indicator stays illuminated, perform a regeneration without interruption until the soot level is reduced to 0%. A complete regeneration will reset the DPF indicator.

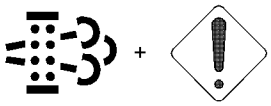


Illustration 121 g02117259

If the amount of soot collected in the DPF has reached a level that a regeneration is **required**, the DPF indicator and an action lamp will illuminate. Stop the machine and apply the parking brake. With the engine at low idle, initiate a manual regeneration. Engine power will be slightly derated if the machine continues to operate.

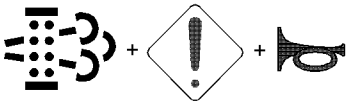


Illustration 122 g02117261

After a certain period, if no action is taken to regenerate an action alarm will activate. After 5 minutes with the action alarm active, the engine will automatically be taken to low idle.

A manual regeneration is required at this time. A complete regeneration will unlock the forced low idle speed. Cycling the engine start switch key will unlock the forced low idle speed.

Once the engine has been in the forced low idle strategy for approximately 10 minutes, regeneration will be locked out. At this time, a regeneration can only be done through Caterpillar Electronic Technician (ET), by an authorized Cat dealer.

After a certain amount of time, engine will automatically shut down. Engine can be restarted but will only run for 30 seconds before shutting down again.

Finally, if the engine is still allowed to run through multiple forced engine shutdowns, all types of regenerations are locked out. The DPF must be replaced. Consult your local Cat dealer if the DPF needs to be replaced.

Key Off Regeneration

The use of the Key Off Regeneration feature and the Delayed Engine Shutdown feature allows the engine to run for a time when the engine start switch is turned to the OFF position. The key may be removed.

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

⚠ WARNING

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

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

Note: Leaving the machine unattended when the engine is running may also result in property damage in the event of a malfunction.

Key off regeneration allows for regeneration when the engine start switch key has been removed. To begin a key off regeneration, the soot level must be between 15% and 100% on the soot level monitor and/or a regeneration is in progress. The following steps outline the procedure of a key off regeneration:

1. Turn the engine start switch to the OFF position.
2. The engine will continue to run for 15 seconds. During this 15 second interval, if a regeneration is desired, press and hold the force regeneration switch for 2 seconds.
3. The key off regeneration will activate and the key off regeneration will last for up to 15 minutes.

i03951634

Battery Disconnect Switch

SMCS Code: 1411-B11

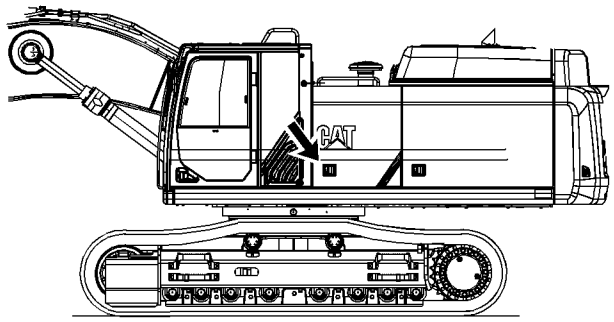


Illustration 123 g02108659

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

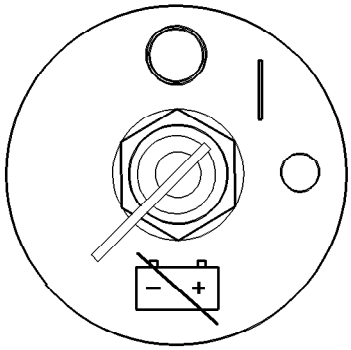


Illustration 124 g00406959

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 and the engine start switch perform different functions. The entire electrical system is disabled when you turn the battery disconnect switch to the OFF position. The battery remains connected to the electrical system when you turn the engine start switch to the OFF position.

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

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.

i05151989

Product Link
(Product Link Japan)

SMCS Code: 7490; 7606

S/N: FJB1–Up

S/N: ETC1–Up

S/N: SPG1–Up

S/N: RGH1–Up

S/N: WHZ1–Up

NOTICE
Vehicles equipped with Product Link Japan are equipped with wireless devices that use public wireless radio waves. Be sure to read and understand the following precautions for use of this system.

Product Link Japan uses public wireless networks and cannot be used in areas where radio wave cannot be received.

A machine may become inoperable if the antenna and corresponding equipment are removed or damaged. If the antenna or corresponding equipment need to be removed, consult with your Cat dealer.

Persons with an implantable cardiac pacemaker or implantable defibrillator must not approach within 22 cm (8 inch) of the antenna that is installed at the rear of an operator seat as such devices can be negatively affected by the radio waves.

Electronic devices can be negatively affected by radio waves. If electronic devices are used near this system, consult the manufacturer of the electronic device regarding the affects of radio waves on operation.

This system consumes power even when the engine start switch is turned "OFF". If storing a machine for an extended period, make sure that the battery is fully charged and turn the power disconnect switch to OFF.

Your machine may be equipped with the Cat ® Product Link Japan system.

The Product Link Japan system is a remote management system in which machine information is automatically transmitted from a machine to a customers office.

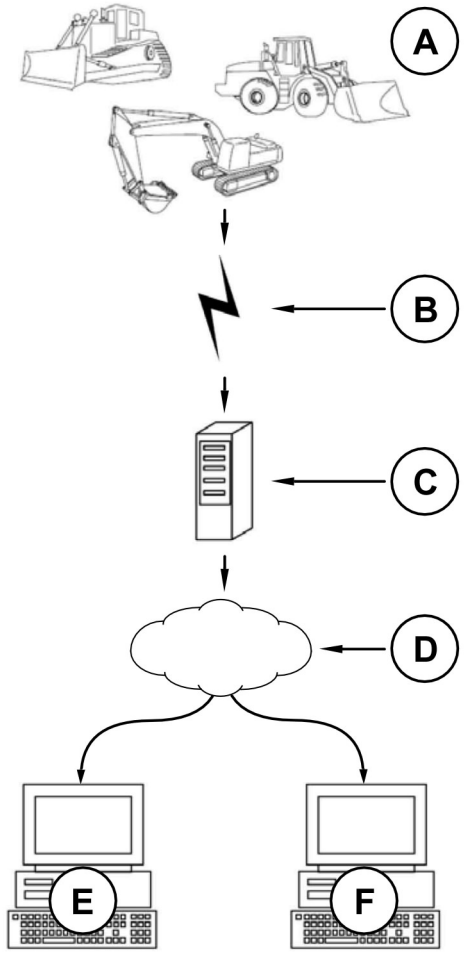


Illustration 125 g03317923

(A) Machine (equipped with Product Link Japan)
(B) Wireless network
(C) Product Link Japan Center Sever
(D) Internet
(E) Customers computer or similar device
(F) Cat dealer computer or similar device

For machines equipped with a wireless device the Product Link Japan system will send information from the machine to the Product Link Japan Center. The transmitted information can then be monitored through the Caterpillar website using a computer or similar device that is connected to the Internet.

Below is a list of items that can be monitored with the Product Link Japan system.

Table 73

Product Link Japan Functions	
Operating Information	Location information (latitude/longitude)
	Accumulated operating time
	Operating status by time period
	Fuel level
Maintenance Information	Engine coolant
	Engine oil
	Hydraulic oil
	Travel drive oil
	Swing drive oil
	Water separator (primary fuel filter)
	Secondary fuel filter
	Fuel pump screen filter
	Fuel tank cap
	Engine oil filter
	Pilot filter
	Drain filter
	Return filter
	Attachment filter
	Blowby gas filter
	Ignition plug
Warnings	Starting restrictions/Area warnings
	Other warnings
Starting Restrictions	Date conditions
	Day of the week conditions
	Time conditions
	Area conditions

Product Link Japan can also be used to specify and apply machine starting restrictions by using a personal computer or similar device that is connected to the Internet. Starting restrictions will prevent the engine from being started in accordance with the specified conditions. See your Cat dealer for additional information.

A “Security System Operating” message will appear on the monitor when a starting restriction has prevented the engine from being started.

Note: Starting restrictions can be temporarily canceled. Notify your site manager for more information or contact your Cat dealer.

Note: A machine may become inoperable if the antenna and corresponding equipment are removed or damaged. Contact your Cat dealer if starting restrictions have been applied when starting restrictions have not been specified.

i08001446

Product Link

SMCS Code: 7490; 7606

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

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

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

Data Broadcasts

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

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

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

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

Operation in a Blast Site for Product Link Radios

⚠ WARNING

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

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

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

- Operation and Maintenance Manual, SEBU8142, “ Product Link - PL121, PL321, PL522, and PL523”
- Operation and Maintenance Manual, SEBU8832, “ Product Link PLE702, PLE602, PLE601, PL641, PL631, PL542, PL240, PL241, PL243, PL141, PL131, PL161, PL083 and PL042 Systems”

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

- Special Instruction, REHS7339, “Installation Procedure for Product Link PLE640 Systems”
- Special Instruction, REHS8850, “Installation Procedure for the Elite Product Link PLE601, PLE641, and PLE631 Systems”
- Special Instruction, SEHS0377, “Installation Procedure for the Product Link PL131, PL141, and PL161 Systems”

- Special Instruction, REHS9111, “Installation Procedure for the Pro Product Link PL641 and PL631 Systems”
- Special Instruction, M0098124, “Installation Procedure for Pro Product Link PL243 Systems”
- Special Instruction, M0109130, “Installation Procedure for Product Link PL683 and PL783 Systems”

i03903396

Power Receptacle
(If Equipped)

SMCS Code: 1436; 7451

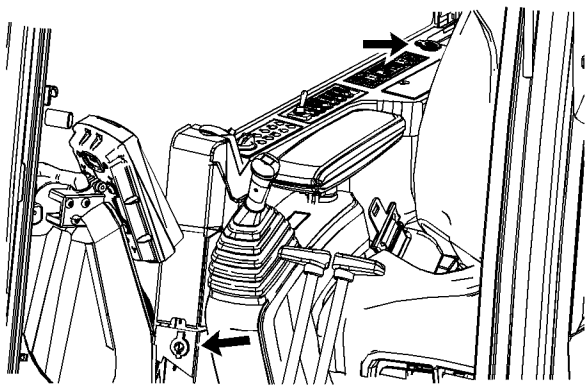


Illustration 126 g02145563

Power Receptacle – Two 12 volt power receptacles are located on the right side console. These power receptacles can be used for powering automotive electrical equipment or accessories. Remove the cap before use.

i07037877

Machine Security System
(If Equipped)

SMCS Code: 7631

Operation Section

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

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

Basic Operation

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

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

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

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

Security Management

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

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

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

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

Regulatory Compliance Section

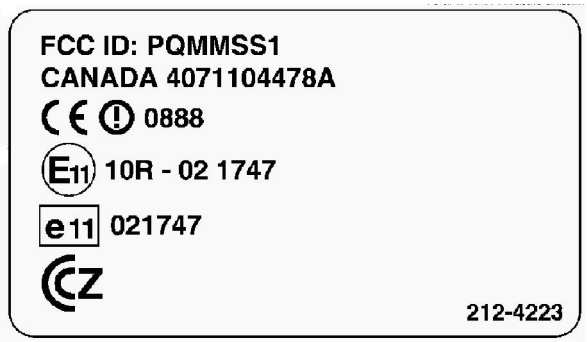
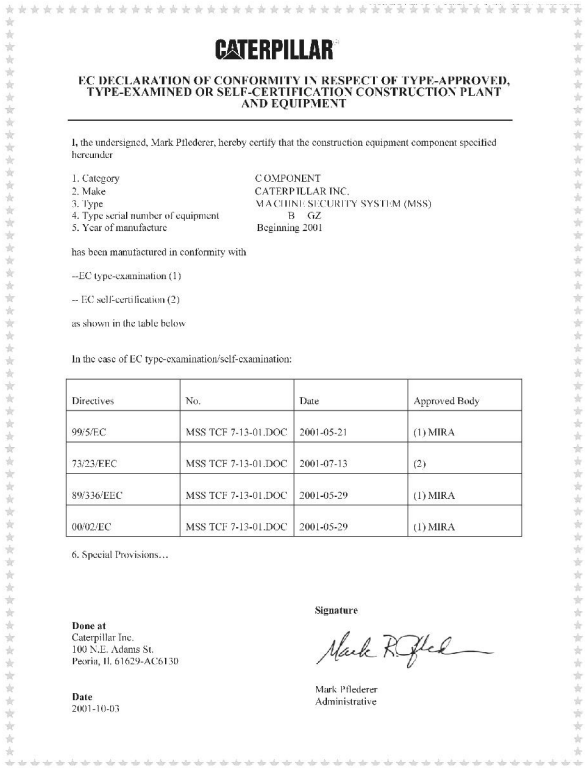


Illustration 127 g00832427

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



CATERPILLAR

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

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

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

has been manufactured in conformity with

-- EC type-examination (1)

-- EC self-certification (2)

as shown in the table below

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

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

6. Special Provisions…

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

Date
2001-10-03

Signature

Mark Pflederer
Administrative

Illustration 128 g00822256

i06584083

Camera

SMCS Code: 7347; 7348

Rear View Camera (If Equipped)

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

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

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

i07526230

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.

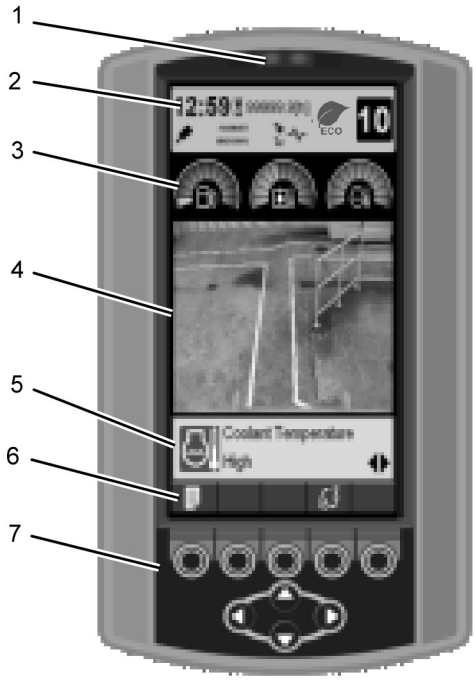


Illustration 129 g02727958

(1) Alert indicator
(2) Clock bar
(3) Gauge area
(4) Camera view
(5) Warning display area
(6) Multi-information area
(7) Keypad

Action Lamp (1)

This action lamp illuminates to show that a problem has occurred with the machine. The action lamp will flash red when a level 2 warning or level 3 warning is active.

Clock Bar (2)

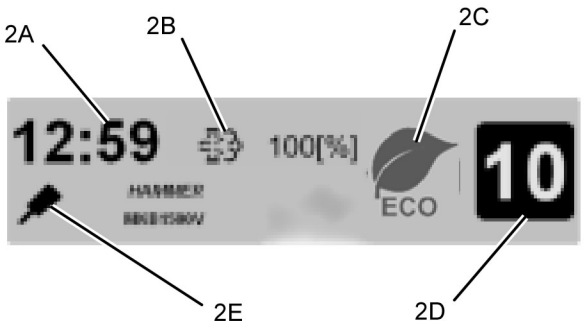


Illustration 130 g02727957

Clock (2A) – The clock function displays the current time.

Service Hour Meter (2B) – This indicator shows the total operating hours of the engine. Use the display to determine the service hour maintenance intervals.

Fuel Consumption Rate (2B) – This indicator shows the rate of fuel consumption.

Fuel Remain Time (2B) – This indicator shows the fuel remaining time.

Soot Load (2B) – This indicator shows the level of soot in the diesel particulate filter (DPF).

Note: Press the screen cycle key to cycle through indicators (9A) -(9C).

Power Mode (2C)

Economy Mode – This indicator shows that the machine is set to operate in the economy mode.

High Hydraulic Power Mode – This indicator shows that the machine is set to operate in the high hydraulic power mode.

Throttle Dial (2D)

The throttle indicator shows the current position of the throttle dial on the right side panel.

Active Tool (2E)

This indicator shows the current work tool that is selected in the menu.

Gauges (3)

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

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

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

Camera View (4) (If Equipped)

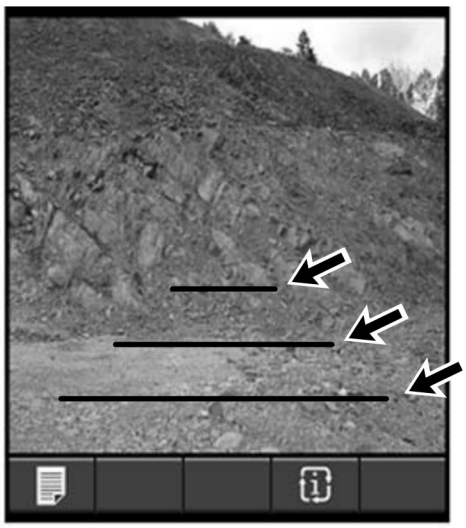


Illustration 131 g03453751

This area on the monitor displays the view of the rear view camera. The camera is mounted on the rear of the counterweight.

Horizontal guide lines on the camera view provide operators a reference of rear distances . The lines do not reflect actual distances and are only for reference. The lines will be displayed as horizontal green lines.

To change the camera view, refer to “Default Screen Preset”.

Illustration 132 g06349693

Note: A warning will appear notifying the operator that the camera is not visible in certain modes. After you have read the warning and understand the content, press the “OK” button.

Warning Display Area (5)

The Monitoring System is designed to alert the operator to an immediate problem with any of the machine systems that are monitored. The Monitoring System is also designed to alert the operator to an impending problem with any of the machine systems that are monitored. The status of any of those monitored systems will be displayed in this area.

Multi-information Area (6)

This area displays miscellaneous information such as the various work tools or other options such as e-fence that are installed on the machine.

Key Pad (7)

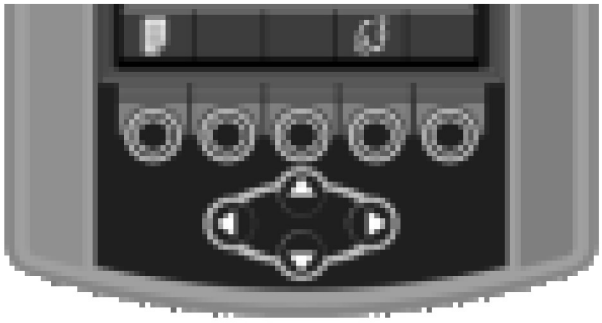


Illustration 133 g02058935

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

Menu Key – Press the menu key to access the main menu.

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

Enter Key – Press the enter key to confirm an entry.

Screen Cycle Key – Press the screen cycle key to cycle the different screen views.

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

Reset Key – Press the reset key to set all counters back to zero.

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

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

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

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

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

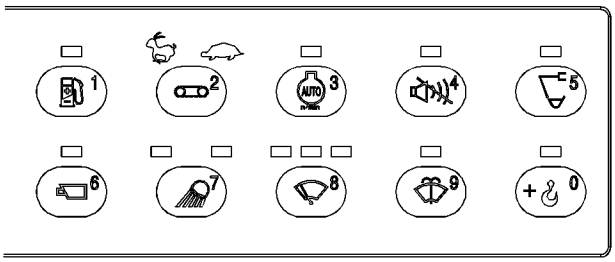


Illustration 134 g03294460
Soft switch panel

Note: The soft switch panel on the right side of the cab can also be used to input numerical values into the monitor.

Prestart Monitoring Function

Turn the engine start switch to the ON position.

After approximately one second, Caterpillar appears in the display and the action lamp turns on.

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

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

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

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

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

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

Machine Warnings

The monitoring system provides three warning categories.

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

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

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

Warning Category 1

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

“ACCUMULATOR PRESSURE WARNING” – Used with Hybrid applications. An abnormality has been detected in the swing accumulator. Stop the engine and contact your Cat dealer.

“DPF LEVEL HIGH REGEN REQUIRED” – DPF levels are high. Perform a forced regeneration. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”.

“ENGINE FAULT CHECK ENGINE” – An abnormality has been detected in the engine. Stop the engine and contact your Cat dealer.

“ENGINE OVER SPEED WARNING” – The engine speed is too fast. Change the operating technique. If the situation continues, contact your Caterpillar Dealer.

“ENGINE SHUTDOWN ACTIVE” – An error has occurred with the engine and the engine is shutting down. Contact your Cat Dealer.

“ENGINE SHUTDOWN IDLE TIME EXCEEDED” – The engine is stopped by engine idle shutdown function. Machine shutdown such as air conditioner is pending. Turn the engine start key to the OFF position.

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

“FUEL PRESSURE HIGH” – The fuel pressure is too high. Contact your Caterpillar Dealer.

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

“REGEN CONDITION ENG TEMP LOW” – The engine temperature does not meet the conditions necessary to start a forced regeneration. Increase the engine temperature. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”.

“REGEN CONDITION NOT MET” – Conditions for a forced regeneration have not been met. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”.

“REGEN SYSTEM FAULT” – An abnormality has been detected in regeneration system. Stop the engine and contact your Cat dealer. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”

“SWING ACCUMULATOR SYSTEM MALFUNCTION” – Used with Hybrid applications. An abnormality has been detected in swing accumulator. The swing accumulator system has been disabled. Contact your Cat dealer.

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

Warning Category 2

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

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

“CHECK LINKAGE MEASURE” – There is an abnormality detected in one of the grade control linkage settings. Verify that the linkage settings are correct. Contact your Cat dealer.

“CHECK MACHINE DIMENSION” – There is an abnormality detected in one of the grade control dimension settings. Verify that the machine dimensions are set correctly. Contact your Cat dealer.

“COOLANT TEMP POWER DERATE” – The coolant temperature is too high. The engine will derate until the coolant temperature decreases to the correct level. If the warning stays on during low idle, stop the engine and inspect the cooling system. Perform any necessary repairs as soon as possible.

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

“DPF LEVEL HIGH REGEN REQUIRED” – DPF levels are high. Perform a forced regeneration. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”

“E-FENCE SYSTEM INTERFERING” – Used with E-Fence application. The machine is operating at or near the E-fence automatic stop parameters. Operate the machine outside of the E-fence automatic stop parameters.

“ENGINE FAULT CHECK ENGINE” – An abnormality has been detected in the engine. Stop the engine and contact your Cat dealer.

“ENGINE SHUTDOWN PENDING” – The engine idle function will shut down the engine in 20 seconds. Operator can cancel the shutdown by pressing a button on the monitor or move one of the controls.

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

“GRADE CONTROL CHECK SENSOR” – There is an abnormality detected in one of the grade control sensors. Contact your Cat dealer.

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

“HYD OIL TEMP POWER DERATE” – The hydraulic oil temperature is too high. The engine will derate until the hydraulic oil temperature decreases to the correct level. If the warning stays on during low idle, stop the engine. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

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

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

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

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

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

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

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

Warning Category 3

“COOLANT TEMP HIGH” – The coolant temperature is too high. 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.

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

“DPF LEVEL HIGH SHUTDOWN SAFELY” – The DPF level exceeds threshold. Stop the machine immediately and perform a forced regeneration. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”

“ENGINE FAULT SHUTDOWN SAFELY” – An abnormality has been detected in the engine. Stop the engine immediately. Contact your Cat dealer.

“ENGINE OIL PRESSURE POWER DERATE” – The engine will derate until the engine oil pressure is at the correct level. 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.

“FUEL FILTER PLUGGED POWER DERATE” – The fuel filter is restricted. Engine speed is restricted. Stop the engine. Determine the cause of the fault and perform any necessary repairs.

“HYD OIL TEMP HIGH” – The hydraulic oil temperature is too high. Stop the engine. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

“INLET AIR TEMP POWER DERATE” – Inlet air temperature exceeds threshold. Engine speed is restricted. Stop the engine. Determine the cause of the fault and perform any necessary repairs.

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

“QUICK COUPLER UNLOCK” – The quick coupler is not locked. Lock the quick couple before operating the machine.

“REGEN LOCKOUT SERVICE REQUIRED” – The DPF level exceeds threshold. The machine will not start. Contact your Cat dealer. See this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”

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

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

Other Messages

Prestart

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

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

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

“FASTEN SEAT BELT” – Please fasten your seat belt.

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

Miscellaneous

“ACTIVE REGEN” – An active regeneration is in process. Push the inhibit regeneration button in order to stop. In case of emergency, turn the key left to stop the engine.

“AUTO WARMING UP STARTING” – The automatic hydraulic warm-up function has been enabled.

“COOLANT TEMP LOW ELEVATED IDLE” – The coolant temperature is low. Engine idle will be elevated.

“ECONOMY MODE SELECTED” – The economy power mode has been selected.

“GLOW ACTIVE WAIT TO START” – If the engine coolant temperature is too low, the glow plugs will be activated. This indicator will appear in the message display when the engine start switch is in the ON position. The engine can be started after the indicator disappears from the message display

“HIGH POWER MODE SELECTED” – The high-power mode has been selected.

“POWER MODE LOCKING” – Power mode has been locked through the power mode setting menu. Refer to this Operation and Maintenance Manual, “Monitoring System”

“QUICK COUPLER LOCKING” – The quick coupler is locking. See this Operation and Maintenance Manual, “Quick Coupler Control”

“REGEN DISABLED” – Regeneration has been disabled.

“STANDARD POWER MODE SELECTED” – The standard power mode has been selected.

"START AUTO WARMING UP?" – To start the automatic hydraulic warm-up function, place the bucket on the ground. Move the hydraulic lockout lever to the LOCKED position, and then press "*" on the monitor.

"VERIFY TOOL LOCKING" – The quick couple has been locked. Verify that the quick coupler is securely fixed to the work tool.

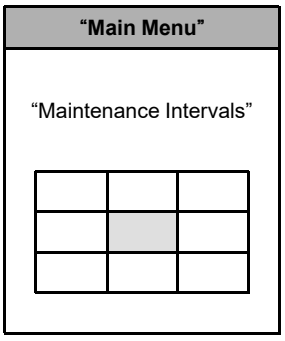
"WARM-UP MODE POWER DERATE" – If the joysticks are held for more than 30 seconds, the machine ECM will go into the warm-up mode power derate setting. The machine ECM limits the hydraulic pump torque to 50 percent. Release the joysticks to cancel this setting. Refer to Operation and Maintenance Manual, "Engine and Machine Warm-Up".

Main Menu

The "Main Menu" allows the operator to view information concerning the machine. This menu also allows the operator to change information concerning the machine.

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

Table 74



2. The "Main Menu" will be displayed with menu options that are installed on the machine. The number of choices can vary. For more information on these menus, refer to the respective descriptions below.

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

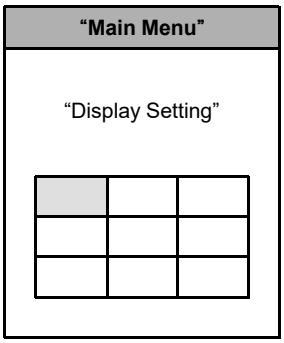
Note: Press the back key or the home key to exit this menu and return to the default display.

Display Setting

The "Display Setting" menu allows the operator to change the various display settings of the monitor.

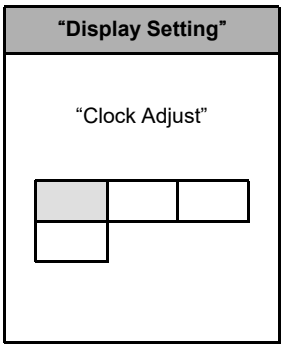
1. Press the menu key.

Table 75



2. Press any of the arrow keys to highlight the "Display Setting" menu. Press the OK key.

Table 76



3. The "Display Setting" menu will be displayed with four new menu options. For more information on these menus, refer to the respective descriptions below.

4. Press any of the arrow keys to highlight the desired menu. Press the OK key in order to open the desired menu.

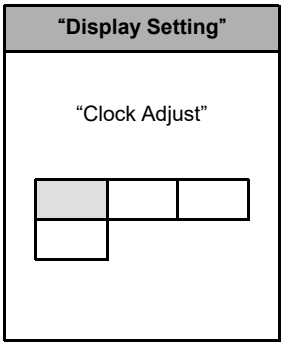
Note: Press the home key to return to the default display.

Adjusting the Clock

The "Clock Adjust" menu allows the operator to change the time on the clock.

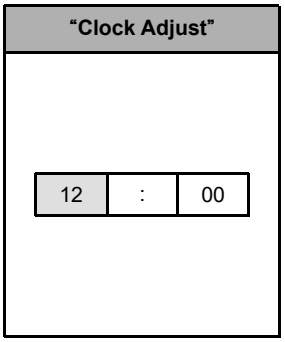
1. Press any of the arrow keys to highlight the “Clock Adjust” menu. Press the OK key.

Table 77



2. The “Clock Adjust” menu will be displayed with the current time. Press the left arrow key or the right arrow key to select the hour or the minute. Press the OK key.

Table 78



3. The hours or the minutes will be highlighted. Press the up arrow key to increase the value. Press the down arrow key to decrease the value.

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

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

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

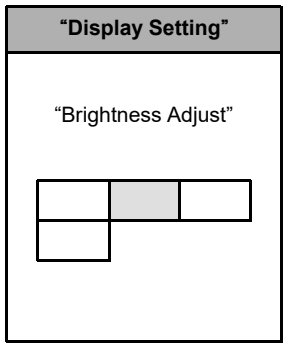
Adjusting the Brightness

The “Brightness Adjust” menu allows the operator to change the brightness of the monitor.

1. Press any of the arrow keys to highlight the “Brightness Adjust” menu. Press the OK key.

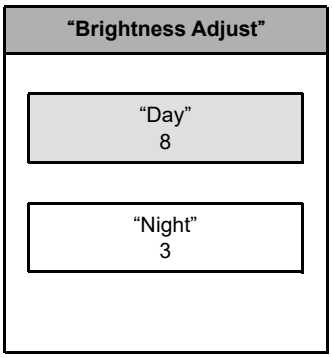
Note: There are two brightness settings. The first setting is used for machine operation during the day. The second setting is used for machine operation at night.

Table 79



2. Press the up arrow key or the down arrow key to select the “Day” setting or the “Night” setting. Press the OK key.

Table 80



3. Press the right key to increase the brightness. Press the left key to decrease the brightness. The brightness can be set between 1 and 10.

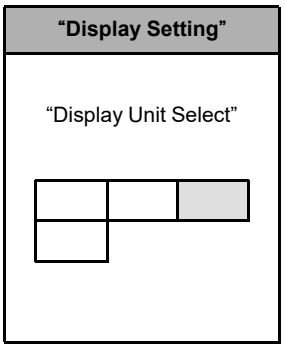
Note: Press the home key to return to the default display.

Display Unit Select

The “Display Unit Select” menu allows the operator to change the display units.

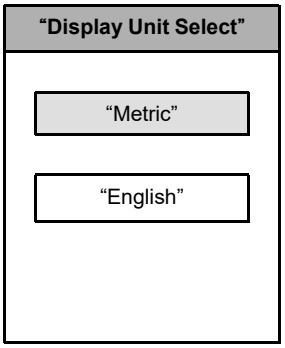
1. Press any of the arrow keys to highlight the “Display Unit Select” menu. Press the OK key.

Table 81



2. Press the up arrow key or the down arrow key to select the "Metric" setting or the "Imperial" setting. Press the OK key.

Table 82



3. Press the "Back" key to return to the previous screen or press the "Home" key to return to the main menu.

Default Screen Preset

The "Default Screen Preset" menu allows the operator to change the default screen image when the monitor is turned on.

Note: This menu function is only available when the machine is equipped with a rear view camera.

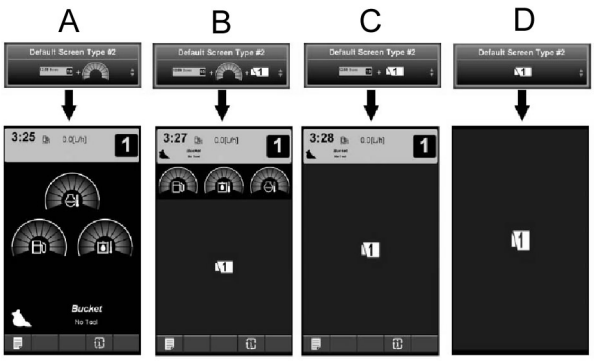
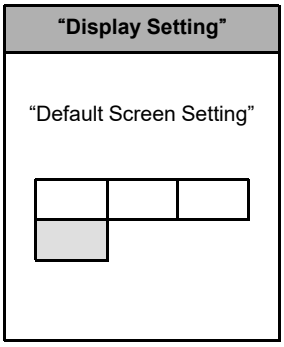


Illustration 135 g02425998

(Pattern A) Camera view is not displayed, and gauges displayed in large view.
(Pattern B) Gauges and camera view displayed simultaneously. Pattern B is the default display if the rear view camera is equipped on the machine.
(Pattern C) Gauges are not displayed. Large view of rear view camera.
(Pattern D) Camera view displayed on full monitor screen. Any warnings or events will default to Pattern B.

1. Press any of the arrow keys to highlight the "Default Screen Setting" menu. Press the OK key.

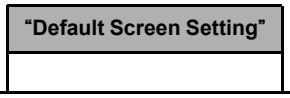
Table 83



2. Press the up arrow key or the down arrow key in order to select the default screen type. Press the OK key to enter the edit mode.

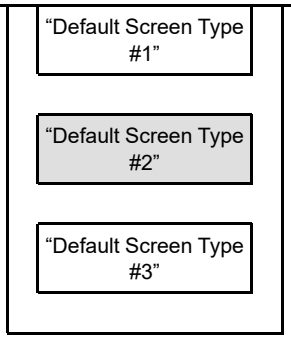
Note: Default screen #1 is preset at the factory and cannot be changed.

Table 84



(continued)

(Table 84, contd)



3. Press the up arrow key or the down arrow key to select the default screen type. Press the OK key to highlight default screen type. Press the up arrow key or the down arrow key to set the display pattern.

Note: Press the monitor view key to preview the selected default screen.

4. Press the OK key to store the pattern that was selected.

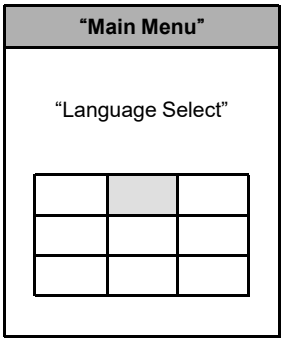
5. Press the "Back" key to return to the previous screen or press the "Home" key to return to the main menu.

Language Selection

The "Language Select" menu allows the operator to change the language settings.

1. Press the menu key.

Table 85



2. Press any of the arrow keys to highlight the "Language Select" menu. Press the OK key.

Table 86

3. The "Language Select" menu will be displayed with a list of available languages. Press the up key or the down key to scroll through the available languages. Press the OK key to select the desired language.

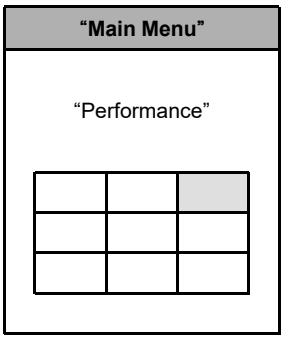
Note: Press the home key to return to the default display.

Performance

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

1. Press the menu key.

Table 87



2. Press the right key or the left key to highlight the "Performance" menu. Press the OK key.

Table 88

"Performance"

(continued)

(Table 88, contd)

“Battery Voltage”
“26.0 [V]”
“Engine Speed”
“1300 [RPM]”
“Engine Coolant Temp”
“20 [°C]”

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

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

Power Mode Setting

The “Power Mode Setting” menu allows the operator to change the various operating power modes.

1. Press the menu key.

Table 89

“Main Menu”
“Power Mode Setting”

2. Press any of the arrow keys to highlight the “Power Mode Setting” menu. Press the OK key.

3. You will be prompted to enter a password. After the password has been entered successfully, the “Power Mode Setting” menu will be displayed.

Note: When the machine leaves the factory, the password is initially set at 1.

Table 90

“Password Entry”

(continued)

(Table 90, contd)

“Enter your password”

1	2	3	4	5
6	7	8	9	0

4. Press the up key or the down key to highlight the desired setting. Press the OK key to confirm the desired selection.

Note: Due to country specific fuel consumption criteria, your machine may not be equipped with all Power Mode options.

Table 91

“Power Mode Setting”
“High Power Mode”
“Standard Power Mode”
“Economy Mode”

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

Maintenance Intervals

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

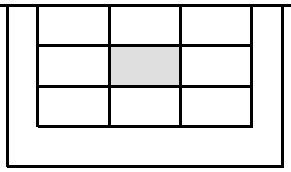
1. Press the menu key.

Table 92

“Main Menu”
“Maintenance Intervals”

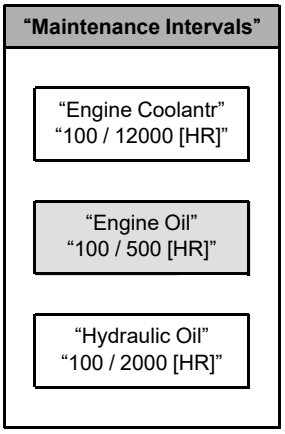
(continued)

(Table 92, contd)



2. Press any of the arrow keys to highlight the "Maintenance Intervals" menu. Press the OK key.

Table 93



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

4. Press the reset key to reset the maintenance hours.

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

Selecting the Work Tool

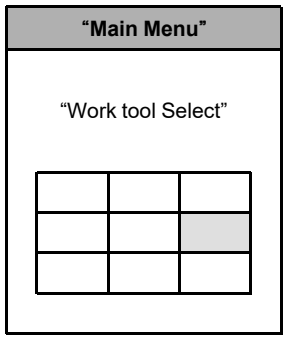
The "Work Tool Select" menu allows the operator to change the settings for the work tool.

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

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

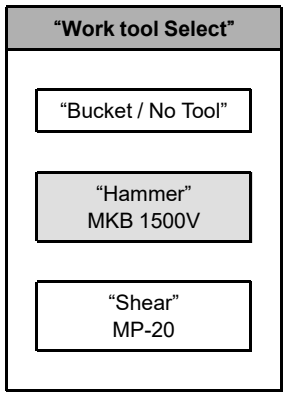
1. Press the menu key.

Table 94



2. Press any of the arrow keys to highlight the "Work Tool Select" menu. Press the OK key.

Table 95



3. Press the up key or the down key to highlight the "Work Tool Select" menu. Press the OK key.

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

4. The "Work Tools Select" menu will be displayed with the current options for work tools. Press the up key or the down key to highlight the desired work tool. Press the OK key to select the new work tool.

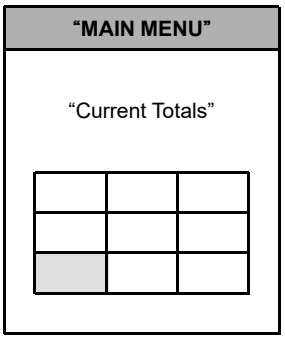
Note: Press the home key to return to the default display.

Current Totals

The "Current Totals" menu allows the operator to view the current totals for the machines systems.

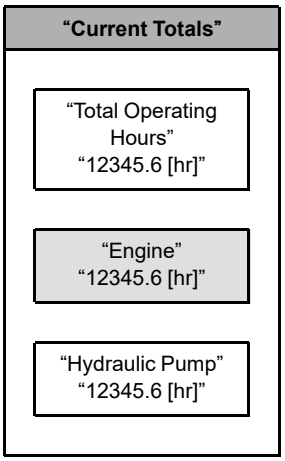
1. Press the menu key.

Table 96



2. Press any of the arrow keys to highlight the "Current Totals" menu. Press the OK key.

Table 97



3. A list of system components will be displayed. Press the up key or the down key to scroll through the list.

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

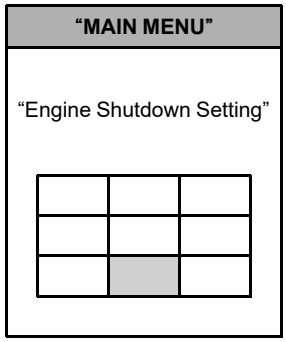
Engine Shutdown Setting

The "Engine Shutdown Setting" menu allows the operator to enable, disable, or adjust the engine idle shutdown function.

1. Press the menu key. You will be prompted to enter a password. After the password has been entered successfully, the "Shutdown Delay Timer" menu will be displayed.

Note: The password is initially set at "1" when the machine leaves the factory,

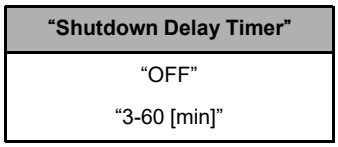
Table 98



2. The "Shutdown Delay Timer" will appear on the monitor in "BLUE" . Press the OK key to activate the edit mode.

Note: The "Shutdown Delay Timer" will appear on the monitor in "GREEN" when the edit mode is activated.

Table 99



3. Press the up key or the down key to change the value. You may select "OFF" to disable the engine idle shutdown function, or select a value between 3 minutes and 60 minutes.

4. Press the OK key to confirm your selection.

Note: The "Shutdown Delay Timer" will appear on the monitor in "BLUE" when the selection has been confirmed.

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

Changing the Password

The "PASSWORD CHANGE" menu allows the operator to change the password.

Note: The password is initially set at "1" when the machine leaves the factory,

1. Press the menu key.

Table 100

"MAIN MENU"
"Password Change"

2. Press any of the arrow keys to highlight the "Password Change" menu. Press the OK key.

Note: You will be prompted to enter a password.

Table 101

"Password Change"
"Enter your password"
_
1 2 3 4 5
6 7 8 9 0

3. After the password has been entered successfully, the "Enter new password" screen will appear.

Table 102

"Password Change"
"Enter new password"
1 2 3 4 5
6 7 8 9 0

4. Press any of the arrow keys to select the desired character.

Note: The password is numeric. You may choose from "0" to "9" .

5. Press the OK key to enter the character.

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

6. After you enter the password, you will be asked to confirm your selection. Press the "ENTER" key to save the password in memory and return to the "Main Menu" screen. Press the back key to return to the "Password Change" menu without saving the password.

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

i04358832

Storage Box

SMCS Code: 7268

Exterior Storage Box

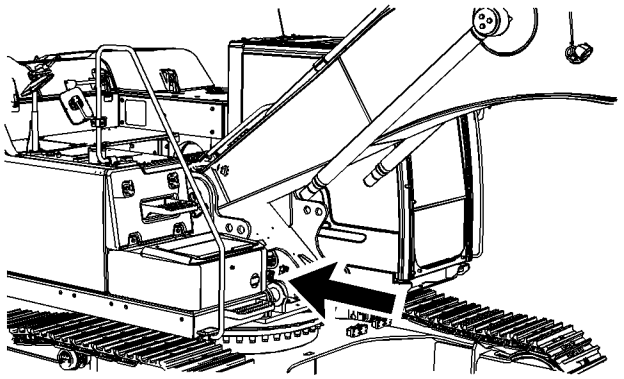


Illustration 136 g02453247

Open the storage box by pressing the push button. The storage box is also used to store miscellaneous tools. The storage box is also used to store the refueling pump (if equipped).

i02817636

Fuel Transfer Pump (Refueling)
(If Equipped)

SMCS Code: 1256

Use the following procedure to pump fuel and store hose.

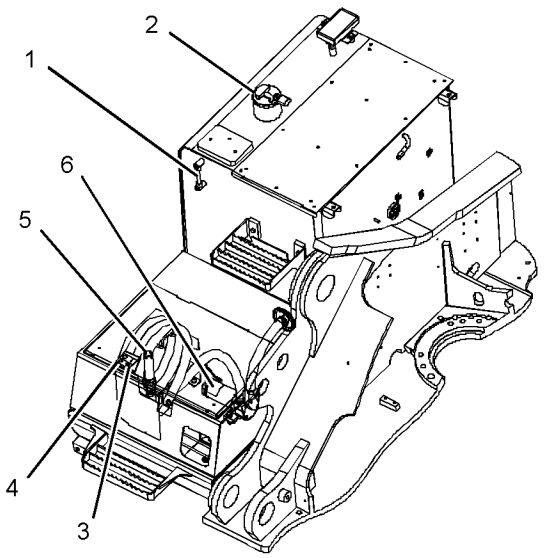


Illustration 137 g01405201

Open the cover of the storage box that is located on the right side in front of the fuel tank.

The electric refueling pump (6) pumps fuel into the fuel tank.

NOTICE
Do not continuously operate the refueling pump for more than 30 minutes. Do not operate the refueling pump more than a few seconds without fuel. Pump damage can result.

On – Push switch (3) in order to activate the refueling pump.

Off – Push switch (4) in order to deactivate the refueling pump.

1. Remove cap (2) from the fuel tank.

2. Properly insert the free end of suction hose (5) into a container of fuel.

3. Push switch (3) in order to supply the fuel to the tank. When the tank is full, the pump stops refueling.

Note: Look at level gauge (1) in order to determine the fuel level.

4. After refueling, install cap (2) to the fuel tank.

5. Make sure that excess fuel is drained from suction hose (5) before storing the suction hose.

6. When you store suction hose (5), wind the hose on the bar. Secure the hose end in place.

NOTICE
To prevent hose damage, do not coil the hose in a tight radius.

7. Close the cover of the storage box.

i03912100

Radio
(If Equipped)

SMCS Code: 7338

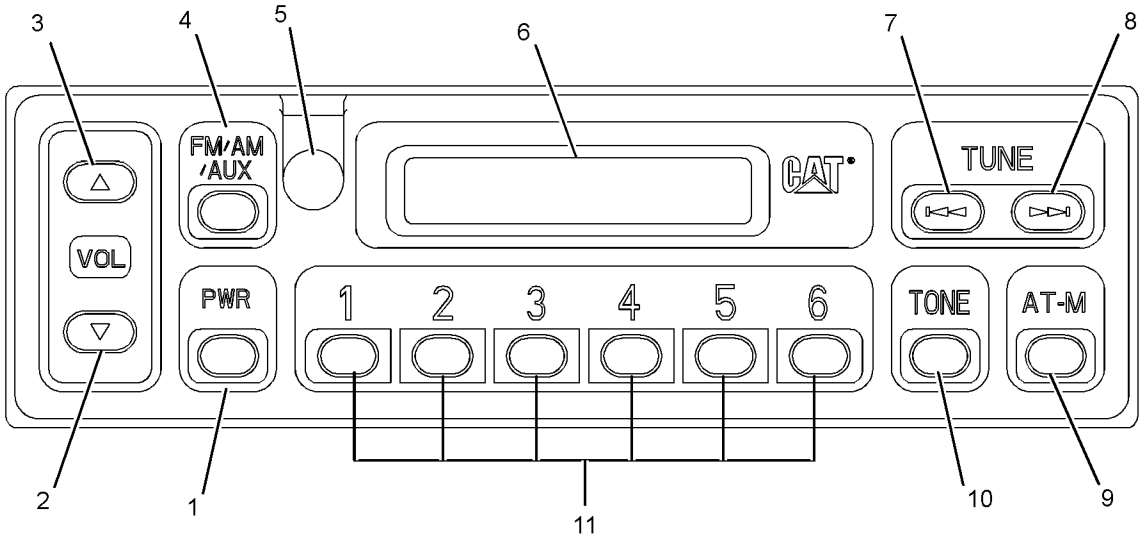


Illustration 138 g02117159

(1) Power switch
(2) Volume control
(3) Volume control
(4) “AM/FM/AUX” selector
(5) Auxiliary plug
(6) Display panel
(7) “Tune” button
(8) “Tune” button
(9) Button for scan and auto memory function
(10) “Tone” control
(11) Preset buttons

Note: When the machine is in operation, turn down the volume of the radio.

Note: The radio can be used only when the battery disconnect switch and the engine start switch are in the ON position.

Note: When a button is pushed, a beep will occur.

(1) Power Switch – Push the power switch in order to turn on the radio. Push the power switch again in order to turn off the radio.

(2) and (3) Volume Control – Push the volume control in order to control the volume. Push the upper volume control in order to increase the sound level and push the lower volume control in order to decrease the sound level.

(4) “AM/FM/AUX” Selector – After you push the “AM/FM/AUX” selector, the selected radio band appears on display panel (6). This button is also used to activate the auxiliary function.

(5) Auxiliary Plug – The front auxiliary plug allows for the connection of a portable audio device.

(6) Display – The display shows various functions such as the station frequency, band, and the volume level.

(7) and (8) “Tune” Buttons – Push the “tune” buttons in order to select a radio station. Pressing “tune” button (7) will decrease the frequency. Pressing “tune” button (6) will increase the frequency. Pressing the “tune” button for less than 0.5 seconds changes the radio station one at a time. Pressing the “tune” buttons for more than 0.5 seconds will change the frequency automatically until a radio station is found.

(9) Scan and Auto Memory – Press button (5) for less than 0.5 seconds in order to listen to 5 seconds of each preset radio station. Press button (5) at least 1.5 seconds in order to store the radio stations with the six strongest signals.

(10) Tone Control – Music is optimized by pressing the tone control so that display (C) will show “MUSIC” .

(11) Preset Buttons – The circuitry in the memory system allows you to preset six radio stations. To preset any of the “preset” buttons, follow the “Presetting Radio Stations” procedure.

Presetting Radio Stations

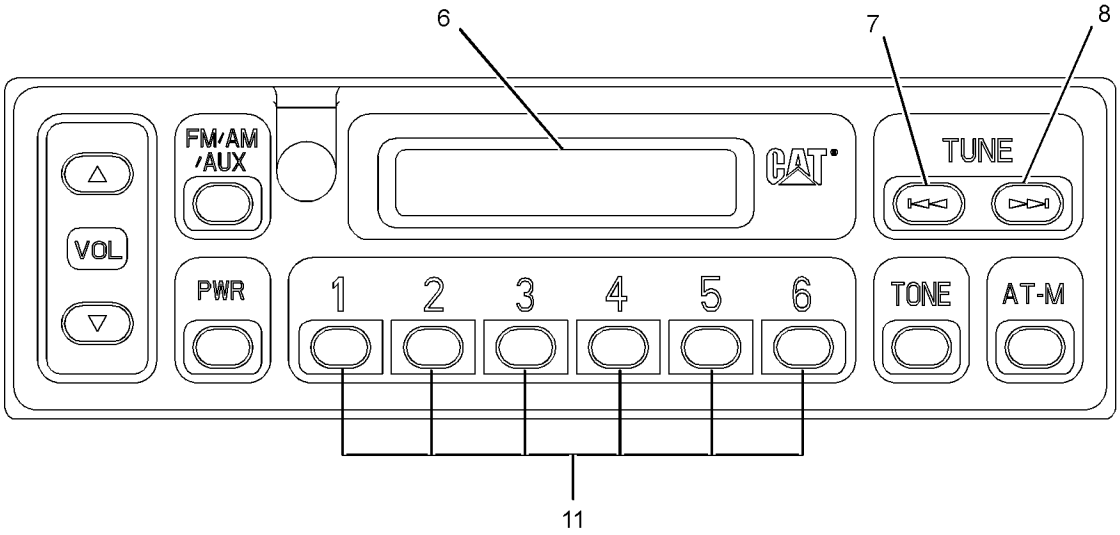


Illustration 139 g02117163

(6) Display
(7) “Tune” button
(8) “Tune” button
(11) Preset buttons

1. Turn on the radio. Select the AM band or the FM band.

2. Select the first radio station by using tuning switch (7) or tuning switch (8).

3. Depress one of preset buttons (11) for more than 1.5 seconds. The radio station will be stored in the memory for the selected preset.

4. Push preset button (11) in order to tune in the radio station.

5. Repeat the same procedure for the remaining preset switches.

Note: When the preset station is faint, use the “tune” buttons to locate a stronger signal.

Scan and Auto Memory

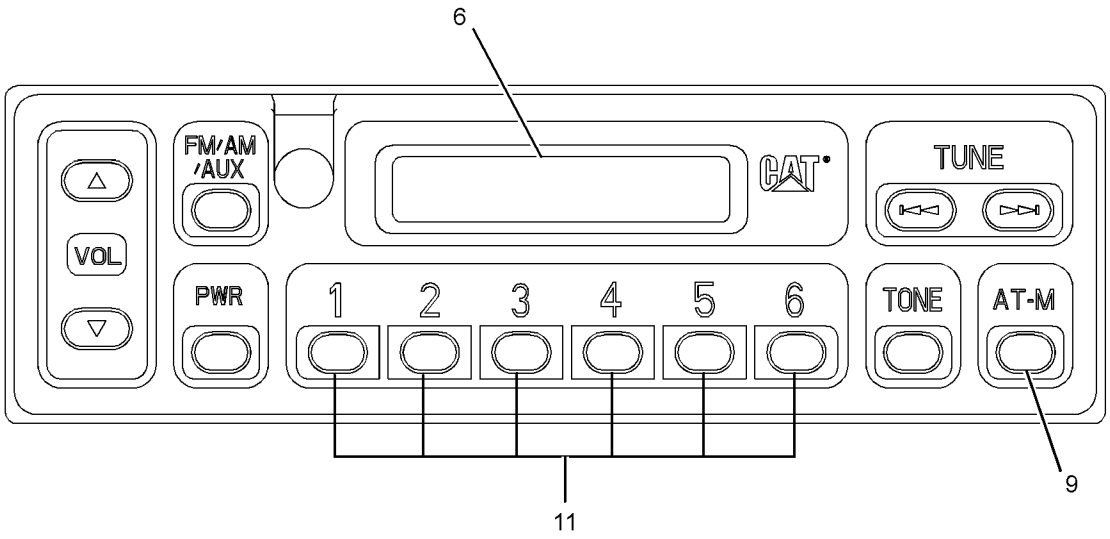


Illustration 140 g02117175

(6) Display (Frequency)
(9) Button for scan and auto memory function
(11) Preset buttons

Scan – Press button (9) for less than 0.5 seconds in order to listen for 5 seconds to each of the preset radio stations. Press button (9) again in order to stop scanning through the preset stations and keep listening to the current station. When this function is used “SCAN” is shown on display (6). The frequency of the radio station is also shown on the display.

Auto Memory – Press button (9) for more than 1.5 seconds in order to store the radio stations that have the strongest signal. The radio stations are stored in the six presets (11). Stations that are already stored in the memory will be erased.

Loss of Memory

The memory system is erased after a few days if the battery is disconnected.

Radio Reception

Note: The radio must be connected to a power source in order to set the area of reception.

Set the area of reception according to the following table:

Table 103

	Display Setting	
AREA	**EU**	**US**
North America		X
Central and South America		X
European Union	X	
Asia / Oceania	X	

Use the following procedure in order to set the desired area.

1. Turn off the radio.
2. Press preset button “1” , preset button “4” and button (9) at the same time. Hold until “EU” or “US” is displayed on the display panel.

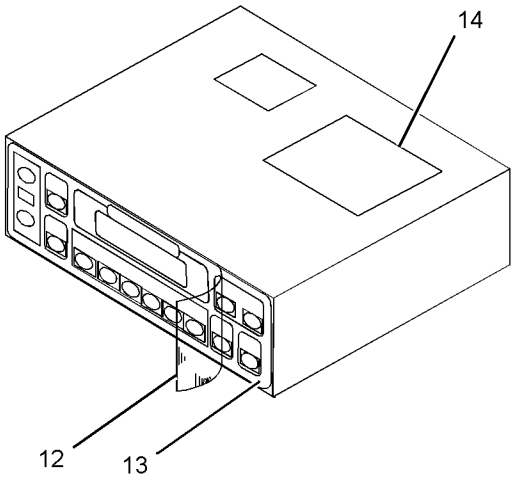


Illustration 141 g02117176

(12) Protective film
(13) Control panel
(14) Method of selection

Note: Remove the film from the radio. Remove the vinyl from the operator seat. The film and vinyl may cause noise interference in the radio.

i06259786

Radio
(If Equipped)

SMCS Code: 7338

An AM/FM radio may be installed in the right side instrument panel.

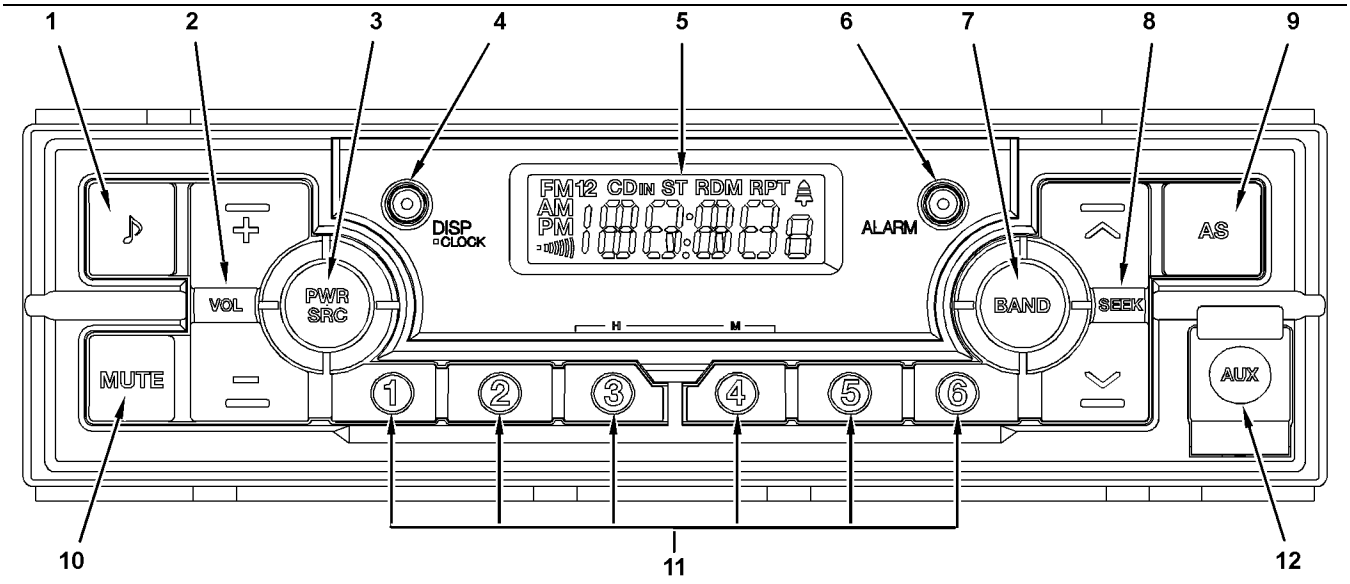


Illustration 142 g02831713

(1) Tone button
(2) Volume control
(3) PWR/SRC button
(4) Display/Clock button
(5) Radio display
(6) Alarm button
(7) AM/FM band button
(8) Tune button
(9) Auto Store button
(10) Mute button
(11) Preset buttons
(12) Auxiliary input

Note: When the machine is in operation turn down the volume of the radio.

Note: The battery disconnect switch and the engine start switch must be in the ON position in order for the radio to function.

Tone Button (1) – In order to adjust the sound effects and tone, press button (1) and select bass “BA” , treble “TR” , or balance “BA” . Use volume control (2) in order to make adjustments.

Volume Control (2) – Press “+” in order to increase the volume. Press “-” in order to decrease the volume.

PWR/SRC Button (3) – Press the PWR/SRC button in order to turn on the power. Press and hold the PWR/SRC button for 2 seconds in order to turn off the power. With the power on, press the PWR/SRC button in order to change the operation mode to either “RADIO” , “AU1(AUX1)” , or AU2(AUX2).

Display/Clock Button (4) – Press this button once in order to select the desired display in radio display (5). Press and hold this button for 2 seconds in order to switch to the clock setting mode. Use the preset button “3” in order to adjust the hour and preset button “4” in order to adjust the minute. Press the display/clock button again in order to return to the radio display.

Radio Display (5) – Displays information such as the clock, station, and band.

Alarm Button (6) – Press this button once in order to turn the alarm on or off. An alarm indicator will appear in the radio display when the alarm in on. Press and hold this button for 2 seconds in order to switch to alarm setting mode. Use the preset button “3” in order to adjust the hour and preset button “4” in order to adjust the minute. Press the alarm button again in order to return to the radio display. During the alarm, there will be a beep for 3 minutes, press the alarm button once in order to stop the alarm.

AM/FM Band Button (7) – Press this button in order to switch between FM1, FM2, AM1, or AM2 while in radio mode.

Tune Button (8) – In order to select a a radio station manually, press “+” or “-” . in order to select a radio station automatically, press and hold “+” or “-” .

Auto Store Button (9) – Press this button in order to store good reception stations with automatically as one of the 6 preset buttons.

Mute Button (10) – Press this button to turn off the sound immediately. “MUTE” will appear in the radio display. Press this button again in order to return to normal operation.

Preset Buttons (11) – Use tune button (8) in order to select a desired radio station to store. Press and hold one of the preset buttons for 2 seconds in order to store the station in the preset memory.

Auxiliary Input (12) – An external input jack is provided in order to allow playback of sound and music from an external device. Use PWR/SRC button (3) in order to select “AU1” .

Radio Reception Area

This unit is set up to receive the following type of reception area frequencies:

- U.S. Standard
- Other Countries
- Europe Standard

Selecting the Radio Reception Area

Note: All station preset memory will be lost once the reception area is changed.

Press AM/FM band selector (2) and select the desired radio band.

U.S. Standard

While pressing tone button (1), press and hold the number “1” preset button for longer than 2 seconds.

Other Countries

While pressing tone button (1), press and hold the number “2” preset button for longer than 2 seconds.

Europe Standard

While pressing tone button (1), press and hold the number “3” preset button for longer than 2 seconds.

i03767393

Air Conditioning and Heating Control

SMCS Code: 7304; 7320; 7337

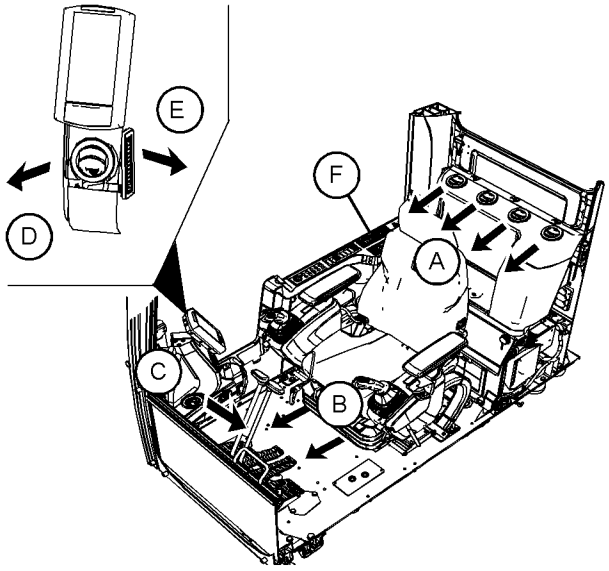


Illustration 143 g02031354

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

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

The climate control panel is located under the right window inside the cab:

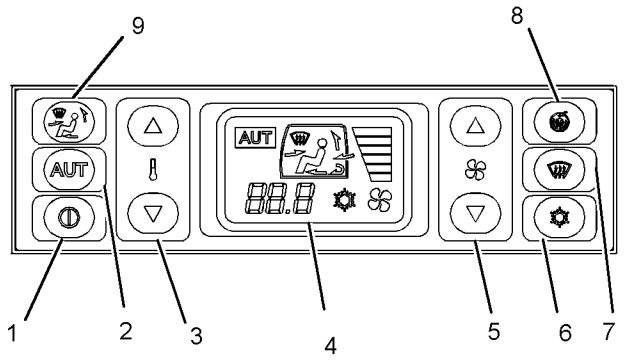


Illustration 144 g02031355

(1) On/Off switch
(2) Automatic control switch
(3) Temperature switch
(4) LCD panel
(5) Fan switch
(6) Compressor switch
(7) Defrost mode
(8) Air inlet select switch
(9) Air outlet select switch

Main Power ON/OFF Switch (1) – Push the ON/OFF switch in order to power on the system. Push the switch again in order to power off the system.

Automatic Control Switch (2) – In order to enter the full “AUT” mode for automatic climate control, push this switch. However, if you push the switch again, you cannot turn off the air conditioning. When the system is in full “AUT” mode, you can manually change specific functions by pushing another switch. If you manually change a specific function, “AUT” does not appear in the display, but the unchanged functions will remain in “AUT” mode. Even on a day that is sunny, a climate control system with only a heater can cool the cab in full “AUT” mode if the ambient temperature is no more than 20 °C (68 °F).

The climate control unit provides excellent operator comfort in the full “AUT” setting. Press the “AUT” switch for full “AUT” mode. Push temperature switch (3) in order to set the desired temperature. The temperature is only shown in metric values. All other functions of climate control will be handled automatically.

In order to take advantage of the full “AUT” setting of the climate control system, always keep the sunlight sensor clean. Do not obstruct the sunlight sensor. If the climate control system is in the full “AUT” setting 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.

Temperature Switch (3) – 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 LCD panel (4). If the heating and air conditioning system is in the automatic mode, pushing these switches changes the preset temperature.

Increase – 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 – 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 Switch (5) – The fan switch directly controls the fan speed. If the climate control system is operating in the automatic mode, pushing this switch overrides the automatically selected fan speed.

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

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

Compressor Switch (6) – Push the switch in order to turn on the compressor or push the switch in order to turn off the compressor. In humid conditions, the compressor may be used to remove moisture from the air in the cab. 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.

Defrost (7) – Depressing this switch will defog the windows. The air will also be dehumidified while the compressor is running. This selection directs air flow out of air outlet (C) and air outlet (D).

Air Inlet Select Switch (8) – This switch selects the position of the air inlet.

Recirculate – When this position is selected, the air inlet is closed. The air will recirculate inside the cab.

Fresh Air – When this position is selected, the air inlet is open. Fresh air will circulate into the cab.

Air Outlet Select Switch (9) – This switch selects the position of each air outlet. Each switch controls a different air outlet.

Upper Body – Selecting this switch will open air outlet (A) and air outlet (D).

Upper Body and Floor – Selecting this switch will open air outlet (A), air outlet (B) and air outlet (D).

Floor – Selecting this switch will open air outlet (B).

Floor and Defroster – Selecting this switch will open air outlet (B) and air outlets (C) and (D).

Consult with your Caterpillar dealer for periodic maintenance of the heating and air conditioning system.

English Versus Metric Toggle

In order to convert the temperature reading from Degrees Celsius to Degrees Fahrenheit, depress both keys of the fan switch at the same time for five seconds. The same action is used for converting the temperature reading from Degrees Fahrenheit to Degrees Celsius.

i06932588

Window (Front)

SMCS Code: 7310-FR

Note: The cab visor (if equipped) must be down before the front window is raised. The front window will not lock in the overhead storage position with the cab visor in the raised position.

To provide full ventilation inside the cab, the upper window and the lower window can be fully opened.

⚠ WARNING

When opening or closing the windows, be extra careful to prevent any personal injury. The hydraulic lockout control must be in the LOCKED position in order to prevent any possibility of sudden movement of the machine due to inadvertent contact with the hydraulic control(s).

Do not change the position of the window until the following items have been done:

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position.
- Stop the engine.

Perform Step 1 through Step 3 to open the upper window.

Note: If equipped, the Cat Grade Control monitor may interfere with the window when opening. Ensure that the monitor is adjusted out of the way before opening the window.

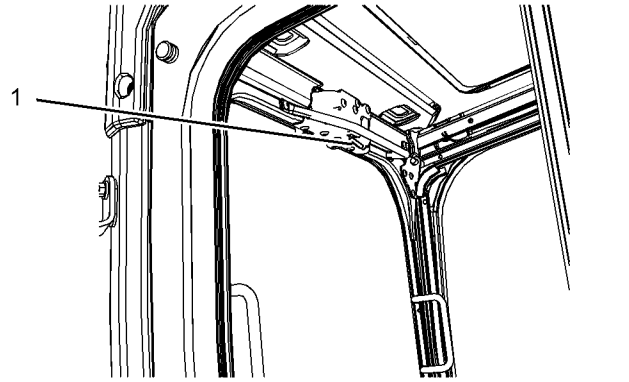


Illustration 145 g02028981

(1) Lever

1. Release the auto-lock latch by moving lever (1) to the right.
2. Hold both grips that are on the window frame. Pull the window upward.

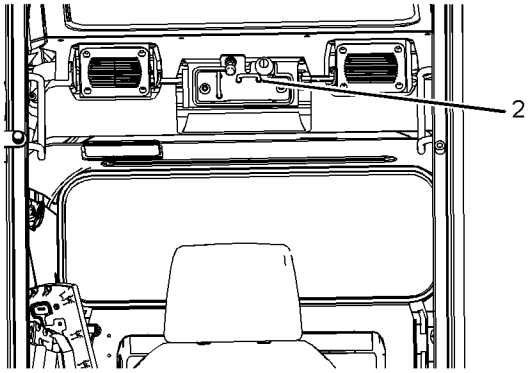


Illustration 146 g02028982

(2) Auto-lock latch

3. Hold both grips that are provided on the window frame and move the window into the STORAGE position until auto-lock latch (2) is engaged.

   Perform Steps 4 through 5 to close the upper window.

Note: If equipped, the Cat Grade Control monitor may interfere with the window when closing. Ensure that the monitor is adjusted out of the way before closing the window.

4. Move the lever of the auto-lock latch (1) in the direction of the arrow to release the auto-lock latch.

5. Reverse Steps 1 through 3 to close the upper window.

Perform Steps 6 through 8 to open the lower window and close the lower window.

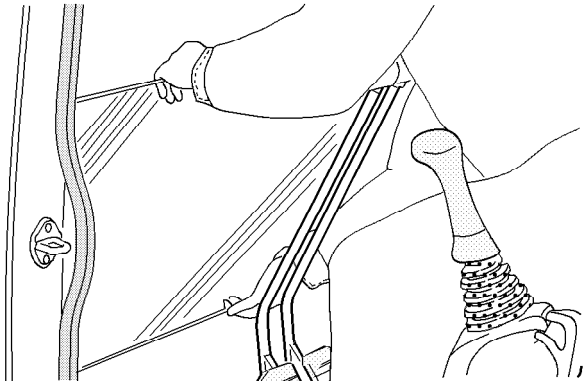


Illustration 147 g00103837

6. Raise the lower window out of the window frame.

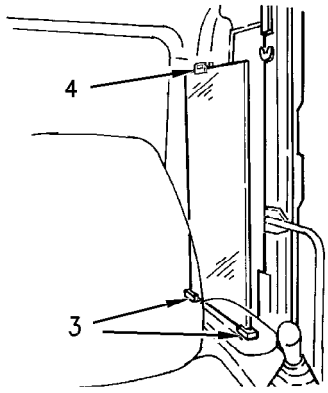


Illustration 148 g00680500

(3) Brackets
(4) Catch

7. Store the lower window in the holder that is located in the rear of the left side cab frame. To store the lower window, locate one end of the lower window into brackets (3). Secure the opposite end of the lower window with catch (4).

8. To close the lower window, reverse the procedure that is used for opening the lower window.

Note: The lower window is curved. The lower window can only be positioned one way in the holders.

i04631333

Mirror
(If Equipped)

SMCS Code: 7319

WARNING

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

WARNING

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

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

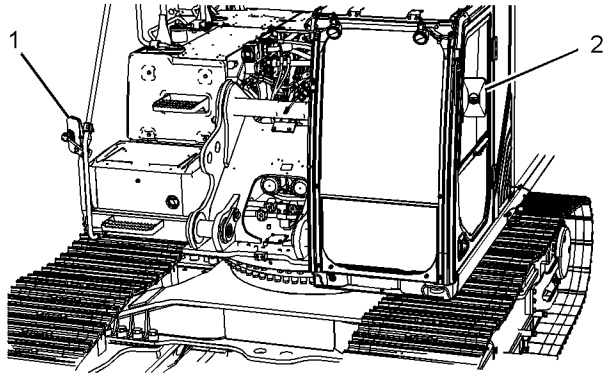


Illustration 149 g02427816

(1) Right side rear view mirror
(2) Left side rear view mirror

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

An appropriate job site organization is also recommended in order to minimize visibility hazards. For more information regarding job site organization refer to this Operation and Maintenance Manual, "Visibility Information"

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

Mirror Adjustment

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, “Operator Controls”.
- Stop the engine.
- Adjust rear view mirrors in order to provide visibility behind the machine at a maximum distance of 30 m (98 ft) from the rear corners of the machine.

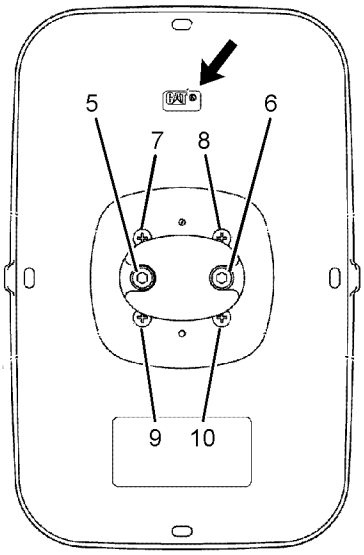


Illustration 150 g02726418

After adjustment of the mirror angle, make sure that the CAT logo is at the top.

Tighten the bolts in sequence of (5) to (6) to 11 ± 2 N·m (8.1 ± 1.5 lb ft).

Tighten the bolts in sequence of (7) to (10) to 2 ± 0.4 N·m (1.5 ± 0.3 lb ft).

Note: Hand tools may be needed in order to adjust the mirrors. Refer to Specifications, SENR3130, “Torque Specifications” for the recommended torque.

Right Side Rear View Mirror (1)

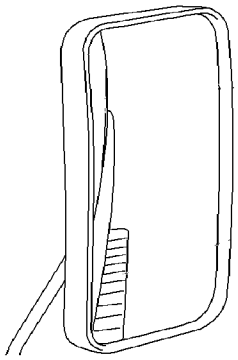


Illustration 151 g01665875

(1) Right side rear view mirror

Adjust the side mirror (1) on the storage box so that the right side access door and the right side track can be seen from the operator seat. Additionally, provide as much visibility to the rear of the machine as possible.

Left Side Rear View Mirror (2)

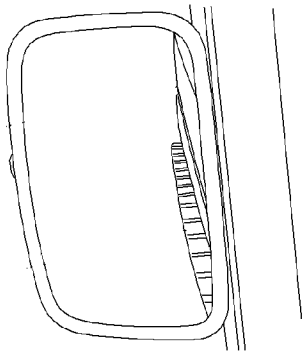


Illustration 152 g01666174

(2) Left side rear view mirror

Adjust the left mirror (2) on the cab so that the left access door and the left side track can be seen from the operator seat. Additionally, provide as much visibility to the rear of the machine as possible.

i02500596

Sun Screen
(If Equipped)

SMCS Code: 7165-ZZ

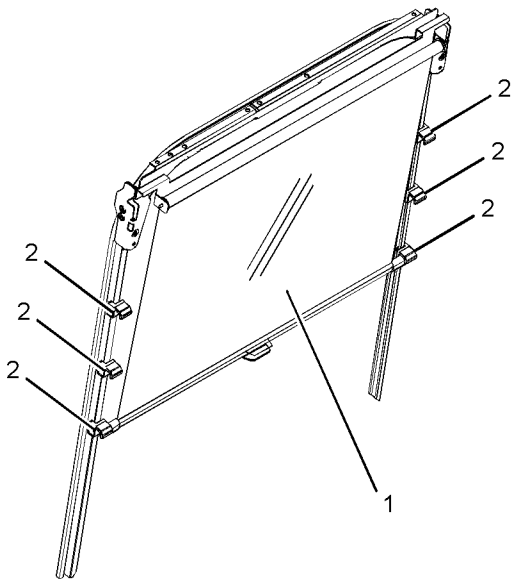


Illustration 153 g01250563

Pull out the sun screen (1). Hook the sun screen to the bracket (2). The sun screen may be positioned in 3 different places.

i01463742

Roof Hatch

SMCS Code: 7303

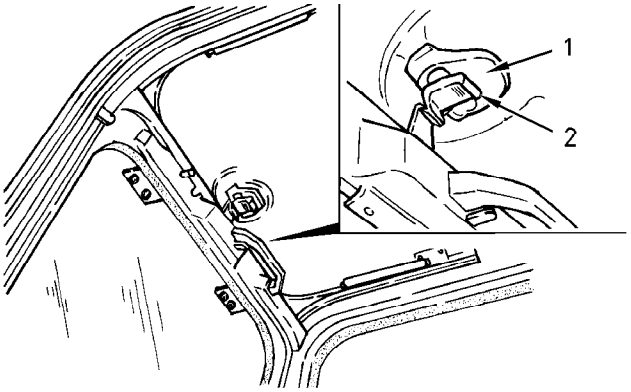


Illustration 154 g00681034

(1) Grip
(2) Lock

In order to open the roof hatch, release lock (2). Hold grip (1) and push the roof hatch backward.

To close the roof hatch, hold grip (1) and pull the roof hatch forward. Engage lock (2) securely.

i03781891

Cab Door

SMCS Code: 7308

S/N: FJB1–Up

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: TFG1–Up

S/N: KCN1–Up

S/N: MZW1–Up

S/N: KFX1–Up

S/N: MPZ1–Up

S/N: WHZ1–Up

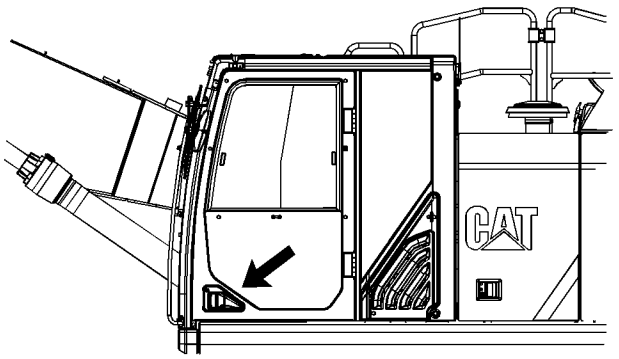


Illustration 155 g02041761

In order to open the cab door from the outside of the cab, pull outward on the door handle.

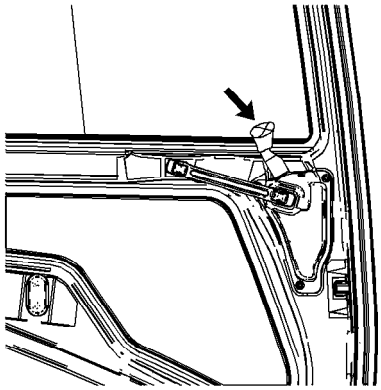


Illustration 156 g01095780

In order to open the cab door from the inside of the cab, push forward on the lever for the cab door latch.

For additional ventilation, open the cab door all the way in order to engage the catch on the exterior wall of the cab.

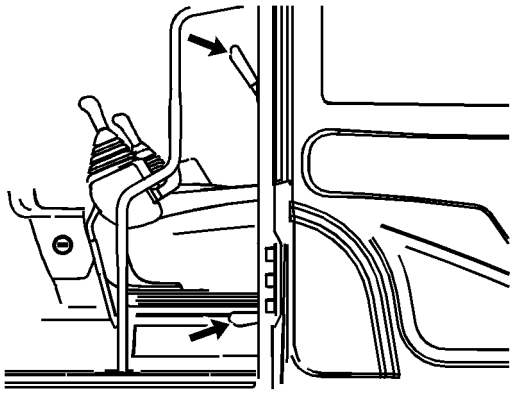


Illustration 157 g01121189

In order to release the cab door from the catch, pull downward on one of the two cab door release levers.

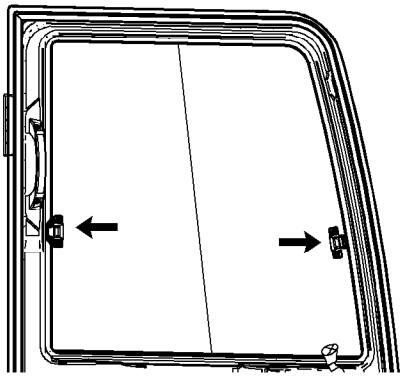


Illustration 158 g01096005

In order to open a window, release the window latch, and then slide the window to the desired position.

i01447292

Travel Control
(Straight Travel Pedal (If Equipped))

SMCS Code: 5462

⚠ WARNING

With certain attachment combinations, the third pedal can have different functions. Always check for third pedal function before using the third pedal. Improper operation of the third pedal could result in serious injury or death.

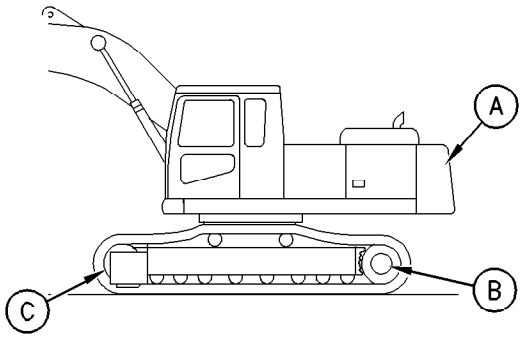


Illustration 159 g00753277

Position for normal travel

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

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

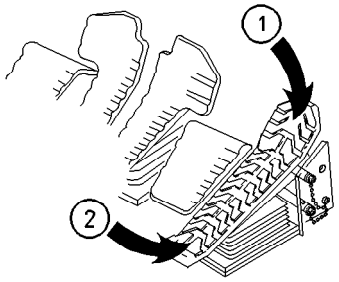


Illustration 160 g00757775

(1) Forward Travel
(2) Reverse Travel

The third pedal is to the right of the right travel pedal. The third pedal controls the forward and backward movement of the machine.

Note: If the third pedal is depressed and a travel pedal or a travel lever is operated, the machine will turn accordingly.

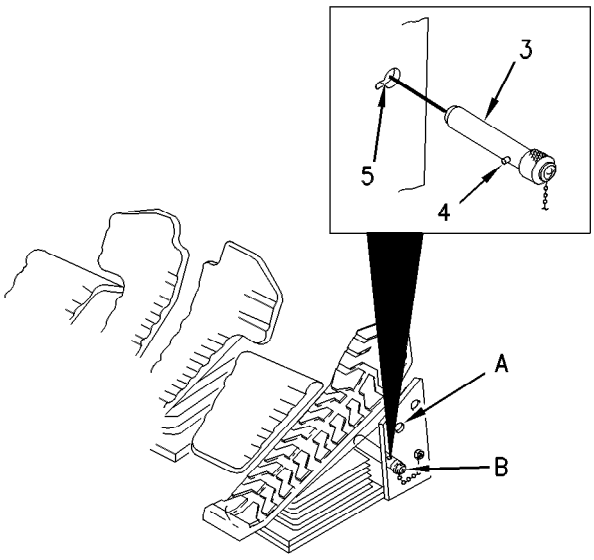


Illustration 161 g00555934

(3) Lock pin
(4) Pin
(5) Notch
(A) LOCKED position
(B) UNLOCKED position (STORAGE position)

When the machine is not operated with the third pedal, install lock pin (3) at the LOCKED position in order to prevent accidental operation.

Note: To prevent lock pin (3) from being pulled out, insert pin (4) through notch (5) and turn lock pin (3) counterclockwise by 1/4 turn.

i03764090

Joystick Controls
(Medium Pressure (If Equipped))

SMCS Code: 5705

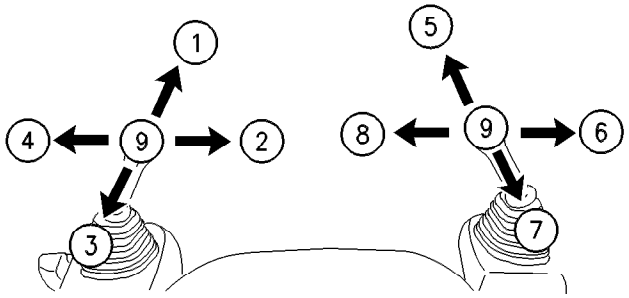


Illustration 162 g00559405

(1) STICK OUT
(2) SWING RIGHT
(3) STICK IN
(4) SWING LEFT
(5) BOOM LOWER
(6) TOOL OPEN
(7) BOOM RAISE
(8) TOOL CLOSE
(9) HOLD

⚠ WARNING

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

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

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

When you release the joysticks from any position, the joysticks will return to HOLD position (9). Movement of the upper structure will stop unless the fine swing control (if equipped) is ON. When the fine swing control is ON, the swing parking brake will not activate until 6.5 seconds after the joystick control for the swing function returns to the HOLD position.

The machine control pattern is initially set at the factory to the SAE system, as shown. The pattern on the left pertains to the left joystick and the pattern on the right pertains to the right joystick.

The machine control pattern can be varied. Refer to Operation and Maintenance Manual, “Joystick Controls Alternate Patterns” for more information.

Two functions may be performed at the same time by moving a joystick diagonally.

Rotating Tool Control

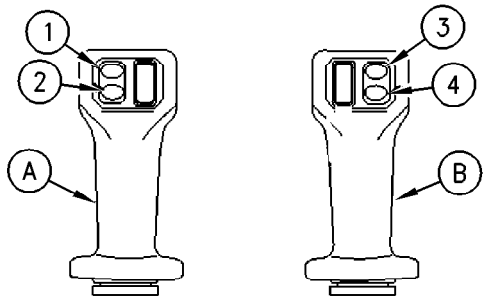


Illustration 163 g00875108

(A) Left joystick
(B) Right joystick
(1) Medium pressure switch
(2) Horn switch
(3) Medium pressure switch
(4) AEC switch

Rotate Clockwise – Press the medium pressure switch (1) on the left joystick in order to rotate the tool clockwise.

Horn – Press the horn switch (2) on the left joystick in order to activate the horn.

Rotate Counterclockwise – Press the medium pressure switch (3) on the right joystick in order to rotate the tool counterclockwise.

AEC Switch – Press the AEC switch (4) on the right joystick in order to activate low engine speed. Press the switch again in order to activate high engine speed.

i04036189

Joystick Controls

SMCS Code: 5705

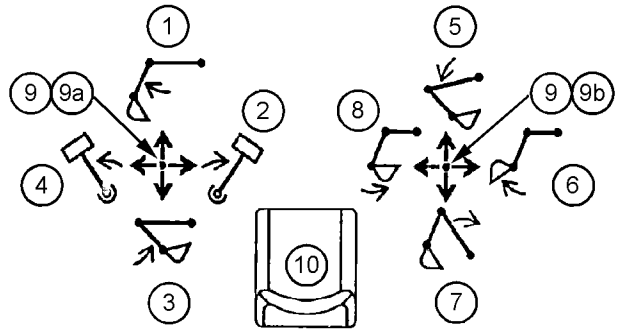


Illustration 164 g02233473

(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.

i04477973

Work Tool Control (One-Way Flow)
(If Equipped)

SMCS Code: 6700

The following information pertains to work tools that require hydraulic oil flow in one direction. Hydraulic hammers are an example of work tools that require hydraulic oil flow in one direction.

Note: For information that pertains to work tools that require hydraulic oil flow in two directions, refer to Operation and Maintenance Manual, “Work Tool Control (Two-Way Flow)”.

Joystick

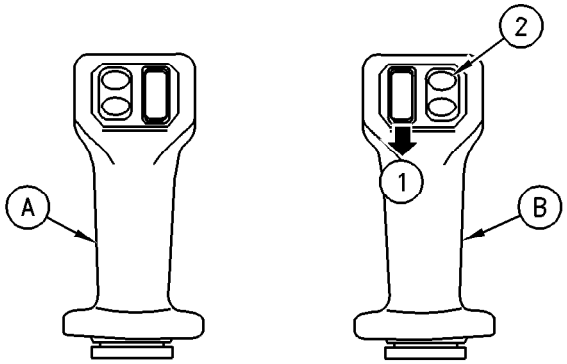


Illustration 165 g00769298

(A) Left joystick
(B) Right joystick

(1) Variable Speed – Move the thumb wheel downward in order to activate the work tool. Move the thumb wheel further in order to increase the speed of the work tool.

(2) On/Off – Push this switch in order to activate the work tool at a constant rate. Push this switch again in order to turn off the work tool.

Work Tool Pedal

⚠ WARNING

With certain attachment combinations, the work tool pedal can have different functions. Always check for work tool pedal function before using the work tool pedal. Improper operation of the work tool pedal could result in serious injury or death.

The work tool pedal can be located on either side of the travel pedals. The work tool pedal allows the operator to modulate the speed of the work tool.

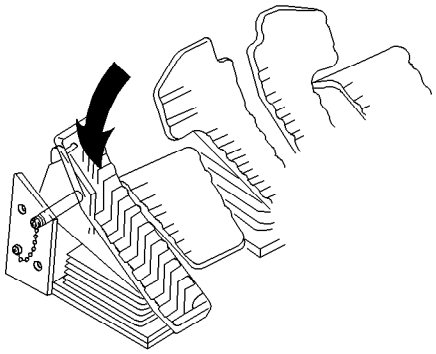


Illustration 166 g00756717

Variable Speed – Push down on the front of the pedal in order to activate the work tool. Move the pedal further in order to increase the speed of the work tool. Release the pedal in order to turn off the work tool.

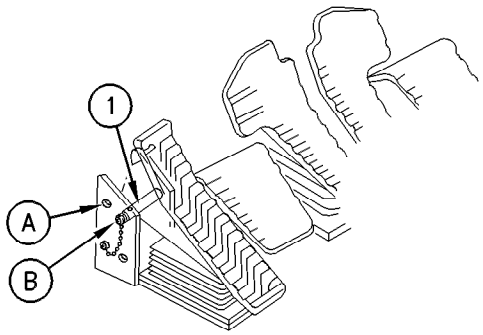


Illustration 167 g00291764

(1) Lock pin
(A) UNLOCKED position
(B) LOCKED position

When you are not using the work tool, put the lock pin (1) in LOCKED position (B). This will lock the work tool pedal in order to prevent any unexpected operation of the work tool.

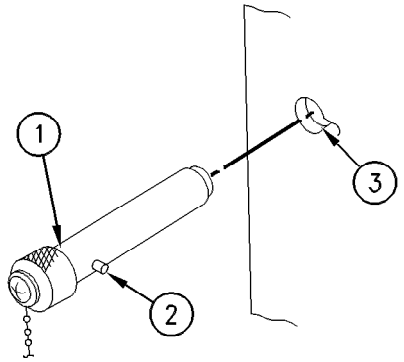


Illustration 168 g00291805

(1) Lock pin
(2) Pin
(3) Notch

Note: To prevent lock pin (1) from being accidentally pulled out, insert pin (2) through notch (3) and turn lock pin (1) counterclockwise by 1/4 turn.

Foot Switch

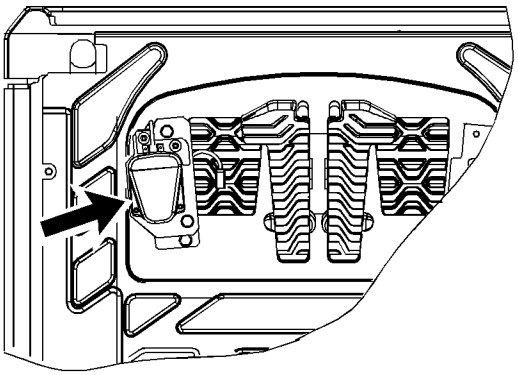


Illustration 169 g02368316

Hydraulic Hammer ON – Push down on the foot switch in order to activate the hydraulic hammer.

Hydraulic Hammer OFF – Release the switch in order to deactivate the hydraulic hammer.

i04477990

Work Tool Control (Two-Way Flow)
(If Equipped)

SMCS Code: 6700

The following information pertains to work tools that require hydraulic oil flow in two directions. These work tools can also be equipped with a rotate circuit. Hydraulic shears, pulverizers, crushers, and grapples are examples of work tools that require hydraulic oil flow in two directions.

Note: For information that pertains to hydraulic hammers, refer to Operation and Maintenance Manual, “Work Tool Control (One-Way)”.

Joystick

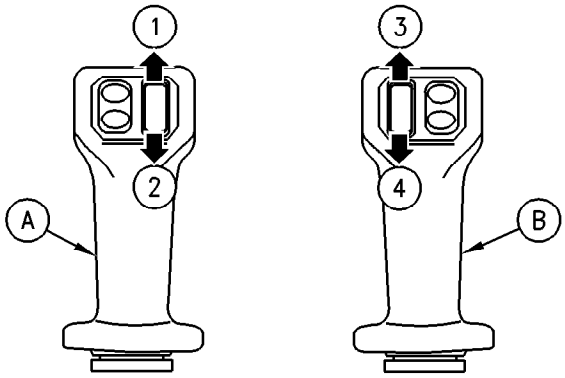


Illustration 170 g00731659

(A) Left joystick
(B) Right joystick

(1) ROTATE CLOCKWISE – Move the thumb wheel upward in order to rotate the work tool clockwise.

(2) ROTATE COUNTERCLOCKWISE – Move the thumb wheel downward in order to rotate the work tool counterclockwise.

(3) CLOSE – Move the thumb wheel upward in order to close the work tool.

(4) OPEN – Move the thumb wheel downward in order to open the work tool.

Work Tool Pedal

⚠ WARNING

With certain attachment combinations, the work tool pedal can have different functions. Always check for work tool pedal function before using the work tool pedal. Improper operation of the work tool pedal could result in serious injury or death.

The work tool pedal can be located on either side of the travel pedals. The work tool pedal allows the operator to vary the speed of the work tool.

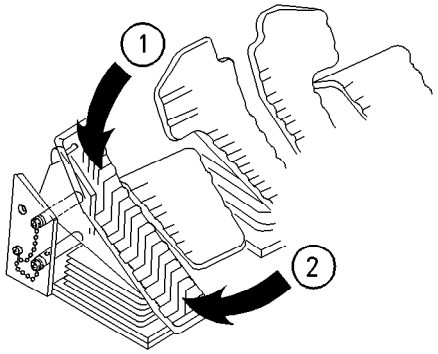


Illustration 171 g00756810

(1) CLOSE – Push down on the front of the pedal in order to close the work tool.

(2) OPEN – Push down on the rear of the pedal in order to open the work tool.

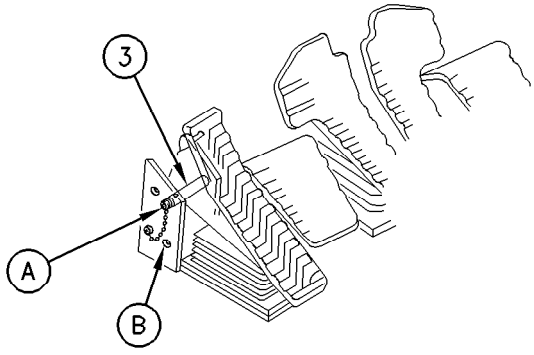


Illustration 172 g00756813

(3) Lock pin
(A) LOCKED position
(B) UNLOCKED position

When you are not using the work tool, put the lock pin (3) in LOCKED position (A). This will lock the work tool pedal in order to prevent any unexpected operation of the work tool.

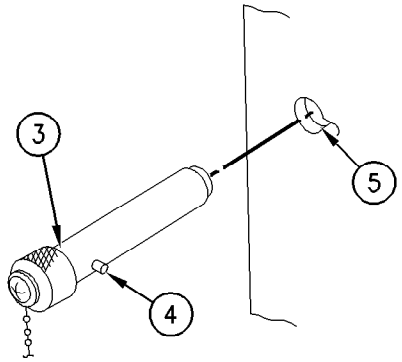


Illustration 173 g00756811

(3) Lock pin
(4) Pin
(5) Notch

Note: To prevent lock pin (3) from being accidentally pulled out, insert pin (4) through notch (5) and turn lock pin (3) by 1/4 turn.

i06836341

SmartBoom Control
(If Equipped)

SMCS Code: 5461-ZS; 7332

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

⚠ WARNING

Personal injury or death can result from not following the proper procedures.

To avoid the possibility of injury or death, follow the established procedure.

⚠ WARNING

Activating the SmartBoom function and using the work tool joystick control while the front of the machine is elevated could result in unexpected machine motion. Unexpected machine motion could result in serious injury or death. Do not activate the SmartBoom function if the front of the machine is elevated by the front linkage.

⚠ WARNING

Do not elevate or lower the track when in the SmartBoom mode. Follow the operation procedures for the SmartBoom in the Operation and Maintenance Manual. Failure to follow these instructions can result in serious injury or death.

⚠ WARNING

Always make sure that the boom control joystick is in the NEUTRAL position before activating the SmartBoom control. Activating the SmartBoom control with the joystick out of the neutral position could resulted in unexpected machine motion which could result in serious injury or death.

⚠ WARNING

Do not select any SmartBoom mode, using the SmartBoom selector switch located on the console, while the tracks are elevated. Selecting the SmartBoom mode with the tracks elevated could result in a sudden drop of the machine which could result in serious injury or death.

⚠ WARNING

If any SmartBoom mode is active and the boom control joystick is in the BOOM DOWN position (forward) with a bucket or a work tool on the ground, pressing the disable button that is located on the front of the right hand joystick could cause a sudden boom down motion. This control function could lift the machine upward, with unexpected machine movement that could result in serious injury or death. Do not press the disable button while the SmartBoom mode is active and the boom control joystick is in the BOOM DOWN position (forward) with a bucket or a work tool on the ground.

⚠ WARNING

Do not attempt to lift the tracks of the machine by using the disable button and applying downward force with the boom lowering control while the machine is in any SmartBoom mode. Releasing the disable button will immediately return the machine to the active SmartBoom mode. This action could cause the machine to drop down abruptly which could result in serious injury or death.

The switches for the SmartBoom are on the right side instrument panel and on the right joystick.

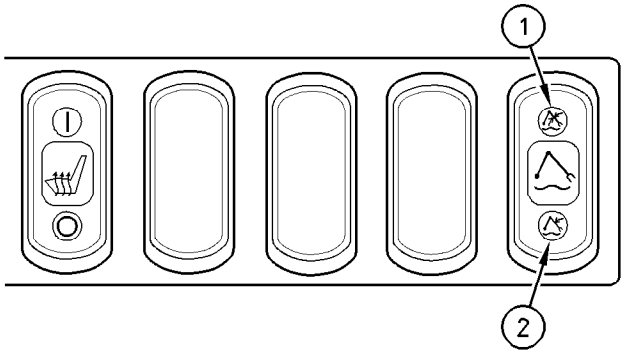


Illustration 174 g00753781

Right side instrument panel

(1) SmartBoom UP AND DOWN – Push down on the top of the rocker switch to activate the SmartBoom UP AND DOWN mode. When the boom control joystick is moved to the BOOM DOWN position, the boom will lower by the weight of the boom.` The boom can move upward freely.

(2) SmartBoom DOWN – Push down on the bottom of the rocker switch to activate the SmartBoom DOWN mode. The boom will lower by the weight of the boom when the control lever is moved to the BOOM LOWER position. This mode prevents the boom from moving upward. To move the boom upward, the operator must use the boom control joystick to activate the BOOM UP mode.

Note: When the rocker switch for the SmartBoom is in the CENTER position, the SmartBoom is no longer functional.

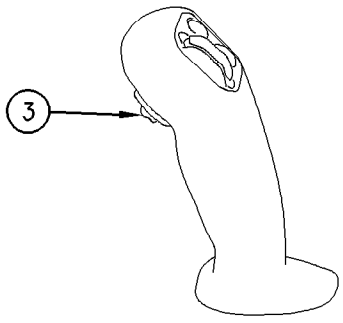


Illustration 175 g00753783

Right Joystick

(3) SmartBoom TEMPORARY DISABLE – Press the trigger switch on the front of the right joystick totemporarily override the SmartBoom function. Release the trigger switch to return to the selected SmartBoom function.

During operation of the SmartBoom, the operator may wish to apply downward force to the boom. When the rocker switch is in the SmartBoom DOWN position or the rocker switch is in the SmartBoom UP AND DOWN position, the operator can disable the SmartBoom function temporarily with the SmartBoom DISABLE switch. While the trigger switch is pressed, BOOM RAISE and BOOM LOWER will operate in the normal modes.

Note: Smart Boom Control function is deactivated when "Reach Front" is selected at "Boom Configuration" on Monitor menu.

i04561876

Joystick Controls Alternate Patterns

SMCS Code: 5059; 5137

Changing Machine Control Pattern By Four-Way Valve (If Equipped)

⚠ WARNING

Whenever a change is made to the machine control pattern, also exchange the pattern card in the cab to match the new pattern.

Check the machine control pattern for conformance to the pattern on the card in the cab. If the pattern does not match, change the card to match the machine control pattern before you operate the machine. Failure to do so could result in personal injury.

If the machine is equipped with a four-way valve, the machine control pattern can easily be changed. The machine control pattern can be changed to the SAE pattern, MHI pattern, KOB pattern, or the former SCM pattern by changing the four-way valve position. To change the four-way valve position, use the following procedure.

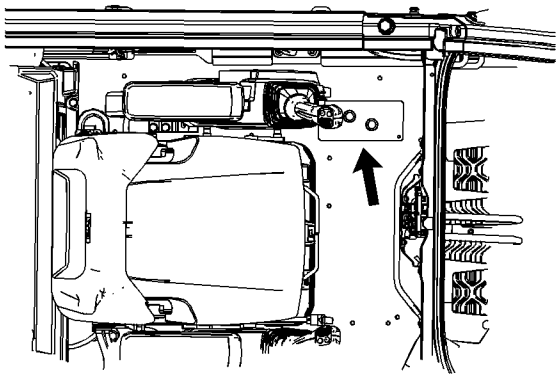


Illustration 176 g02042113

The four-way valve (if equipped) is located underneath the cab floor.

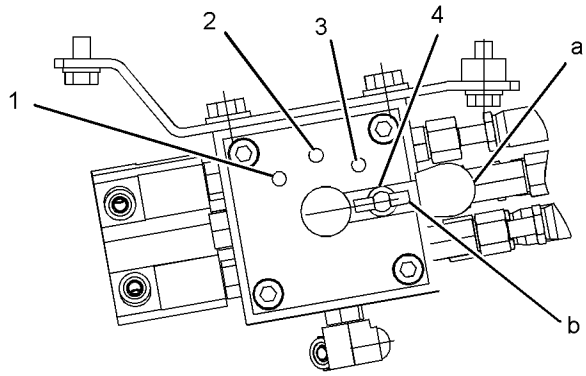


Illustration 177 g02042133

(a) Lever
(b) Bolt
(1) MHI machine control pattern
(2) CJL machine control pattern
(3) KOB machine control pattern
(4) SAE machine control pattern

1. Open the access cover in the floor of the cab.
2. Loosen bolt (b) and move lever (a) to the desired position. The lever can be moved to position (1), (2), (3), or (4).

   Position (1) will change the machine control pattern to the MHI pattern. Position (2) will change the machine control pattern to the CJL pattern. Position (3) will change the machine control pattern to the KOB pattern. Position (4) will change the machine control pattern to the SAE pattern.
3. After the pattern is set, tighten the bolt in order to secure the lever.

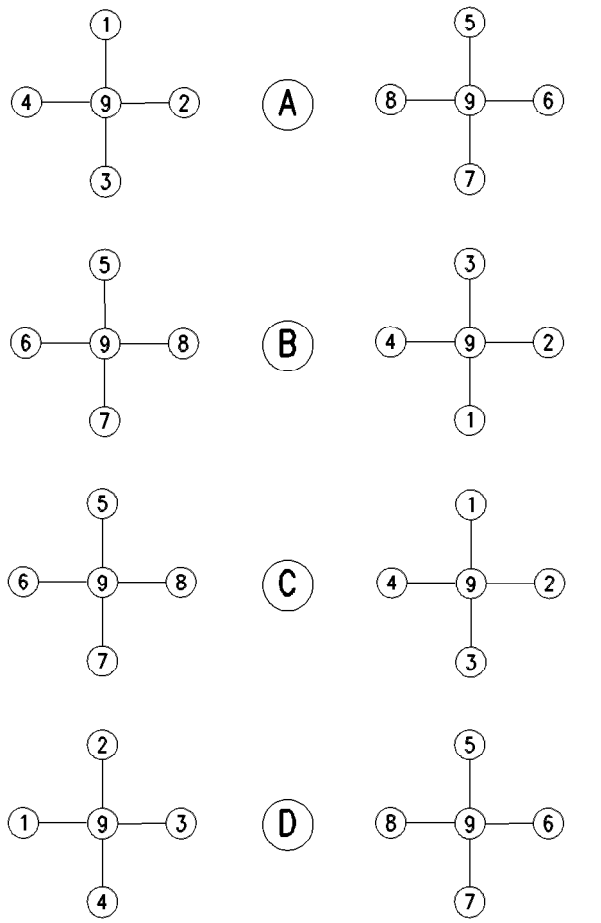


Illustration 178 g00102959

(A) SAE machine control pattern
(B) MHI machine control pattern
(C) KOB machine control pattern
(D) Former SCM machine control pattern

The patterns on the left side of the illustration show the possible configurations for the left control lever. The patterns on the right side of the illustration show the possible configurations for the right control lever.

STICK OUT (1) – Move the control lever to this position in order to move the stick outward.

SWING RIGHT (2) – Move the control lever to this position in order to swing the upper structure to the right.

STICK IN (3) – Move the control lever to this position in order to move the stick inward.

SWING LEFT (4) – Move the control lever to this position in order to swing the upper structure to the left.

BOOM LOWER (5) – Move the control lever to this position in order to lower the boom.

BUCKET DUMP (6) – Move the control lever to this position in order to dump the bucket.

BOOM RAISE (7) – Move the control lever to this position in order to raise the boom.

BUCKET CLOSE (8) – Move the control lever to this position in order to close the bucket.

HOLD (9) – When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the upper structure will stop.

Two functions may be performed at the same time by moving a control lever diagonally.

If the machine is equipped with a hydraulic hammer, the function of position (6) and of position (8) is different.

HYDRAULIC HAMMER RAISE (6) – Move the control lever to this position in order to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position in order to lower the hydraulic hammer.

Changing Machine Control Pattern by Two-Way Valve (If Equipped)

⚠ WARNING

Whenever a change is made to the machine control pattern, also exchange the pattern card in the cab to match the new pattern.

Check the machine control pattern for conformance to the pattern on the card in the cab. If the pattern does not match, change the card to match the machine control pattern before you operate the machine. Failure to do so could result in personal injury.

The machine control pattern can easily be changed to the SAE pattern or to the standard backhoe loader hydraulic pattern (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.

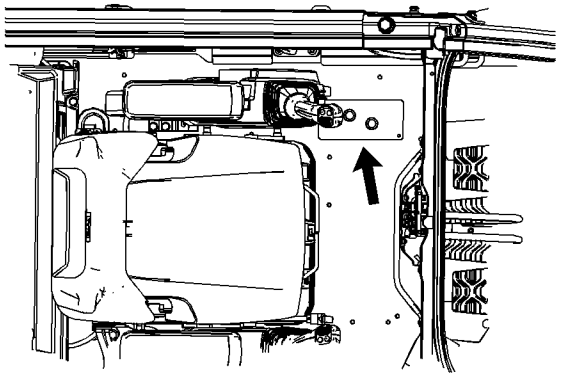


Illustration 179 g02042113

The two-way valve is located underneath the cab floor.

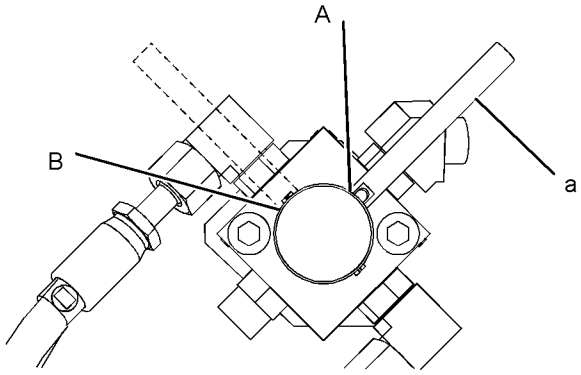


Illustration 180 g02042557

(a) Lever
(A) SAE machine control pattern
(B) BHL machine control pattern

1. Open the access cover in the floor of the cab.

2. Pull up on lever (a) and turn the lever to the SAE position or to the BHL position.

Note: Illustration 180 shows that the two-way valve is in the SAE position.

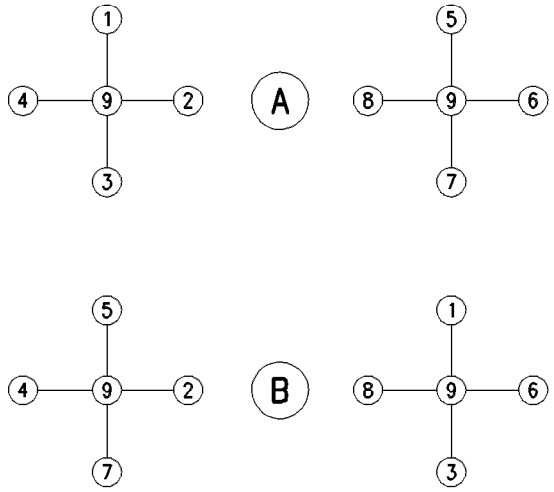


Illustration 181 g00102966

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

The patterns on the left side of the illustration show the possible configurations for the left control lever. The patterns on the right side of the illustration show the possible configurations for the right control lever.

STICK OUT (1) – Move the control lever to this position in order to move the stick outward.

SWING RIGHT (2) – Move the control lever to this position in order to swing the upper structure to the right.

STICK IN (3) – Move the control lever to this position in order to move the stick inward.

SWING LEFT (4) – Move the control lever to this position in order to swing the upper structure to the left.

BOOM LOWER (5) – Move the control lever to this position in order to lower the boom.

BUCKET DUMP (6) – Move the control lever to this position in order to dump the bucket.

BOOM RAISE (7) – Move the control lever to this position in order to raise the boom.

BUCKET CLOSE (8) – Move the control lever to this position in order to close the bucket.

HOLD (9) – When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the upper structure will stop.

Two functions may be performed at the same time by moving a control lever diagonally.

If the machine is equipped with a hydraulic hammer, the function of position (6) and of position (8) is different.

HYDRAULIC HAMMER RAISE (6) – Move the control lever to this position in order to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position in order to lower the hydraulic hammer.

i04177660

Fuel Tank Shutoff and Drain Control

SMCS Code: 1273

The fuel tank drain valve and the fuel shutoff valve are located inside the access door on the right side of the machine. The fuel tank drain valve is located under the main hydraulic pump. The fuel shutoff valve is located on the fuel system water separator.

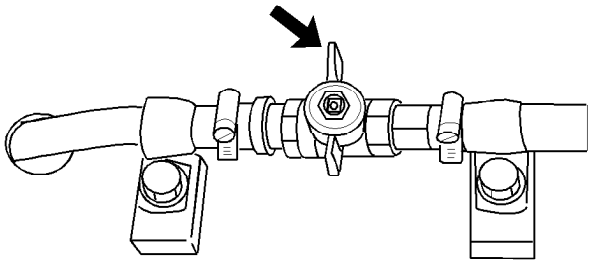


Illustration 182 g01043694

Fuel tank drain valve

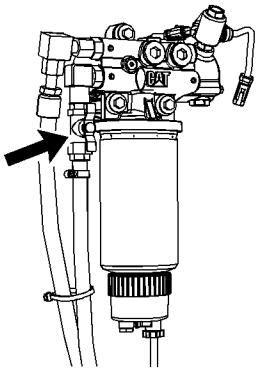


Illustration 183 g02368038

Fuel shutoff valve

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

Fuel Shutoff Valve – To shut off the fuel supply, turn the fuel shutoff valve clockwise. To turn on the fuel supply, turn the fuel shutoff valve counterclockwise.

Note: For more detailed information that pertains to draining the water and sediment from the fuel tank, refer to Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”.

Engine Starting

i05906648

Engine Starting

SMCS Code: 1000; 1090; 1456; 7000

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

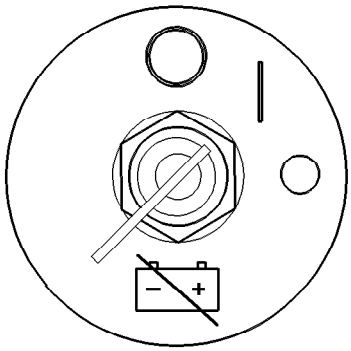


Illustration 184 g00406959

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

2. Make sure that the reset button for the circuit breaker remains depressed. Refer to Operation and Maintenance Manual, “Circuit Breakers - Reset”.

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

This machine is equipped with an engine neutral start system. The system only allows the engine to start when the lever for the hydraulic lockout control is in the LOCKED position.

4. Move the joysticks to the HOLD position.

5. Before you start the engine, check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine. Briefly sound the horn before you start the engine.

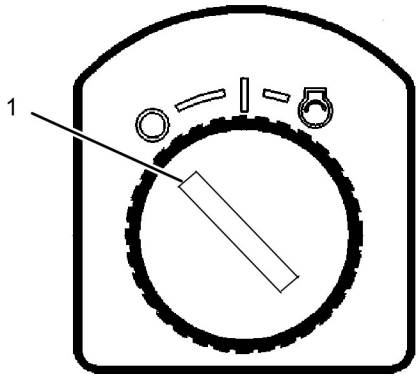


Illustration 185 g03718205

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

7. The monitoring system starts.

Note: For more information on the monitoring system, refer to Operation and Maintenance Manual, “Monitoring System”.

8. If the engine start switch is placed in the ON position for 2 seconds or more, the prestart check of the monitoring system will be activated. If any fluid levels are low, the low fluid level will be shown on the message display. Refer to Operation and Maintenance Manual, “Monitoring System” for more information on the prestart monitoring function.

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

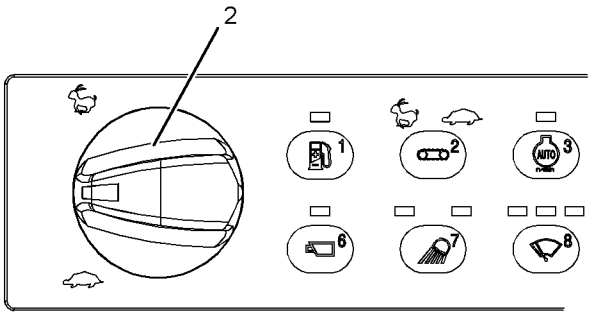


Illustration 186 g02204433

9. Turn engine speed dial (2) to speed position “1” .

NOTICE
Do not crank the engine for more than 30 seconds. If the engine does not start, allow the starter to cool for two minutes before cranking again. The engine start switch must be turned to the OFF position before trying to restart.

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

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

This machines engine with standard specifications can start in areas that have temperatures as low as −18°C (0°F). For areas that are cooler, a starting kit for cold weather is available.

i06954966

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE
Keep engine speed low and do not operate until the message 'Warm-Up Mode Power Derate" on the monitor goes out. If it does not go out within thirty seconds, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

NOTICE
Always run the engine at low idle for at least ten minutes before performing any other operations in cold conditions or each time the engine oil and oil filter are changed in order to protect your engine and hydraulic components.

NOTICE
Depending on the ambient temperature, in order to prevent the machine operation with high speed without sufficient lubrication at the turbo bearing, the engine speed may be set to low speed and the hydraulic power minimized for a pre-determined time after the engine starts. Refer to turbo protection feature.

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

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

During extended idling in cold ambient conditions, engine speed may operate between 900 rpm and 1000 rpm. Operation at 1000 rpm is minimal and will only last for up to 20 minutes. The regeneration active indicator may also illuminate during extended idling conditions to signal that a regeneration is in progress.

Hydraulic System

⚠ WARNING

When you cycle the machine controls, the machine can move suddenly. Contact between the machine and external objects or ground personnel can result in serious injury or death. Before you cycle the machine controls, the machine should be located in an unobstructed, hazard-free work area that is away from external objects and ground personnel.

1. Make sure that the area is clear of personnel and equipment.

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

2. Allow the engine to warm up at low idle for at least 5 minutes. Engage the work tool controls and disengage the work tool controls. 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.

NOTICE
The hydraulic oil temperature should be higher than 25 °C (77 °F) before performing work with the machine. Make sure that the warm-up procedure is performed.

If the hydraulic oil temperature is less than 25 °C (77 °F) and the machine is operated abruptly, serious damage to the hydraulic components may occur.

Note: The recommended operating temperature of the hydraulic fluid for this machine is 55 °C (131 °F).

3. To warm up the hydraulic oil, turn the engine speed dial to the medium engine speed. Run the engine for approximately 5 minutes and move the joystick intermittently from the BUCKET DUMP position to the HOLD position. Do not hold the joystick in the BUCKET DUMP position with the bucket cylinder fully extended for more than 10 seconds.

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

Note: If the joysticks are held for more than 30 seconds, the machine ECM will go into a “Warm-Up Mode Power Derate” setting. “Warm-Up Mode Power Derate” will be shown on the monitor screen. When “Warm-Up Mode Power Derate” is active, the machine ECM limits the hydraulic pump torque to 50 percent. Release the joysticks in order to cancel the “Warm-Up Mode Power Derate” setting.

4. Turn the engine speed dial to the maximum engine speed and repeat step 3.

5. Cycle all controls in order to circulate warm oil through all hydraulic cylinders and all hydraulic lines, and through the swing motor and travel motors.

6. Observe the gauges and the indicators frequently during the operation.

Turbo Protection Power Derate – After an engine start, the engine speed will be set to dial one position and the hydraulic power limited for a time period . During this period, the monitor displays the message "Warm -Up Mode Power Derate". (Maximum is around 30 seconds). After the turbo bearing lubrication is sufficient, the engine speed goes to the setting dial speed and the monitor stops to display the message.

Dynamic Cool Engine Elevated Idle (DCEEI)

The Dynamic Cool Engine Elevated Idle (DCEEI) feature will temporarily increase the low idle engine speed when the engine coolant is below normal operating temperature. Increasing the low idle speed will accelerate the warm-up of the engine and fluids. When the engine coolant reaches normal operating temperature, the engine speed returns to the low idle speed.

Extended periods of low engine idle can also result in lower coolant temperatures. During extended periods of low engine idle, the engine idle speed will automatically increase if the engine coolant drops below the operating temperature. This increase in the engine idle speed will prevent overcooling of the engine.

Improve Cold Weather Performance

Covers installed over the vents in the radiator compartment door will help to control overcooling in ambient temperatures below −15° C (5° F).

The materials used for the covers and the method used to install the covers is at the installers discretion.

Install the covers if overcooling is observed while the machine is idling in ambient temperatures below −15° C (5° F).

Stop the machine, and remove the covers under the following conditions:

- The ambient temperature is above −15° C (5° F).
- The engine temperature gauge indicates overheating.
- The hydraulic oil temperature gauge indicates overheating.

Installation

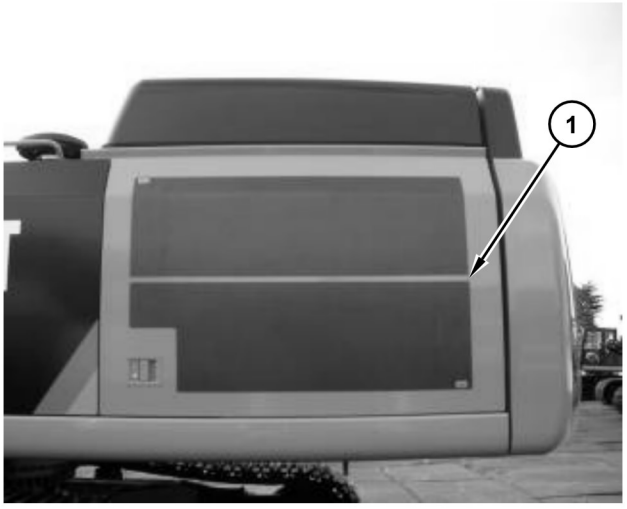


Illustration 187 g03707408

Typical example of cover location on the radiator compartment door

(1) Covers

1. Clean the surface of the radiator compartment door.

2. Install the covers in the location shown in Illustration 187 . The covers should fully cover the door vents.

Operation

i06231546

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.

Sound the horn and allow adequate time for bystanders to clear the area before moving the machine into a restricted visibility area. Follow local practices for your machine application. For more information refer to Operation and Maintenance Manual, “Restricted Visibility”.

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.

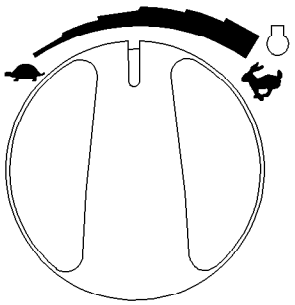


Illustration 188 g00732198

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

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

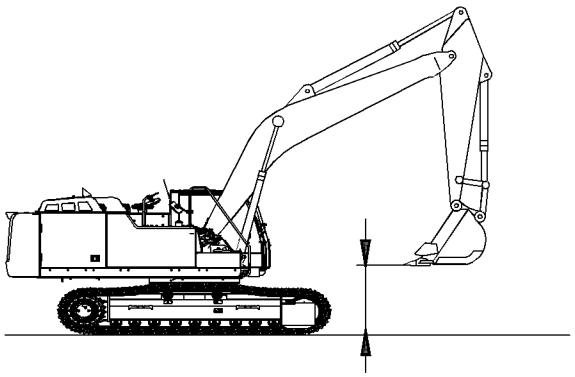


Illustration 189 g02145475

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

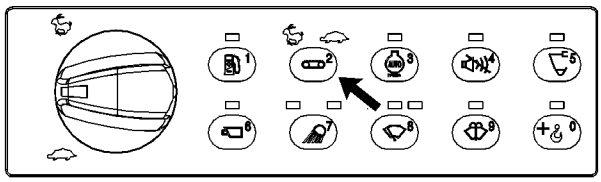


Illustration 190 g03262356

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, “Operator Controls” for information about spot turning and about pivot turns.

11. When you make turns in soft material, travel in a forward direction occasionally in order to clear the tracks.

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

Lifting Objects

If the machine is equipped with the CE plate per requirements for the European Union, used to lift objects, then the machine must be equipped with the optional boom lowering control valve and an overload warning device.

A fit for purpose test was completed in order to confirm that a properly equipped machine meets the requirements of the European Union Machinery Directive “2006/42/EC” for lifting objects.

The overload warning device (if equipped) must be adjusted for the bucket linkage and bucket size that is installed on the machine. Adjust the overload warning device for proper operation.

The setting for the overload warning device (if equipped) should be checked by an authorized dealer.

i00059294

Frozen Ground Conditions

SMCS Code: 7000

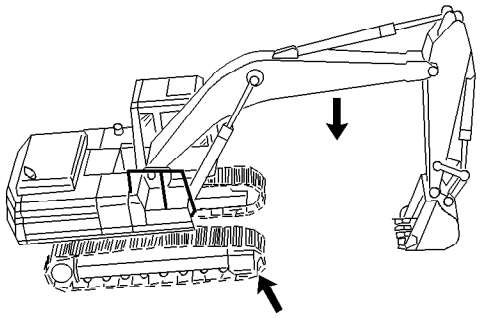


Illustration 191 g00101468

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.

i04364834

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 one of the following procedures in order to lower the boom.

Machines Equipped 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.

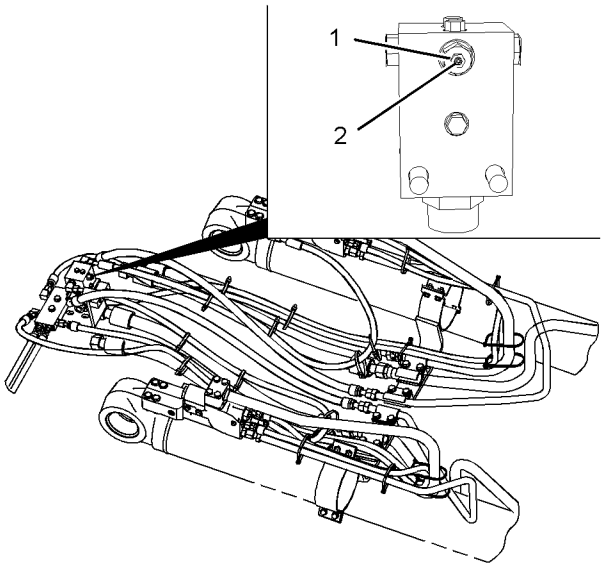


Illustration 192 g01753833

(1) Locknut
(2) Check valve

The boom lowering control valve is located 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.

1. Loosen locknut (1) of the boom lowering check valve.

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

3. Make sure that the work tool has been lowered onto the ground. Tighten check valve (2) to a torque of 2.25 ± 0.25 N·m (1.66 ± 0.18 lb ft).

4. Tighten locknut (1) to a torque of 4 ± 0.5 N·m (3.0 ± 0.37 lb ft).

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

For additional information, consult your Caterpillar dealer.

Machines without a Boom Lowering Control Valve

⚠ WARNING

Be sure no one is under or near the work tools before manually lowering the boom. Keep all personnel away from the boom drop area when lowering the boom with the engine stopped in order to avoid possible personal injury.

When you must manually lower the boom due to engine shutdown, use the following procedure.

Relieve the pressure in the hydraulic system before manually lowering the boom. Move the hydraulic lockout lever to the UNLOCKED position. Move the travel levers/pedals forward and backward in order to relieve the pressure.

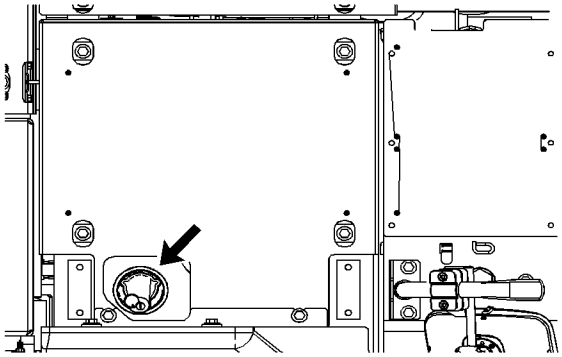


Illustration 193 g02024028

Hydraulic tank filler cap location

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

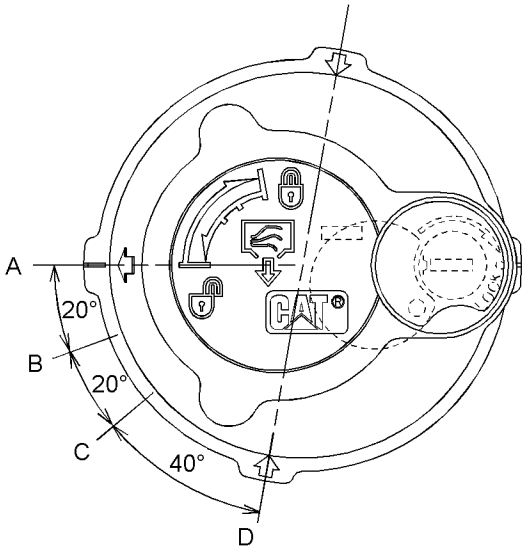


Illustration 194 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

1. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 194 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, remove the filler cap.

2. Open the engine hood.

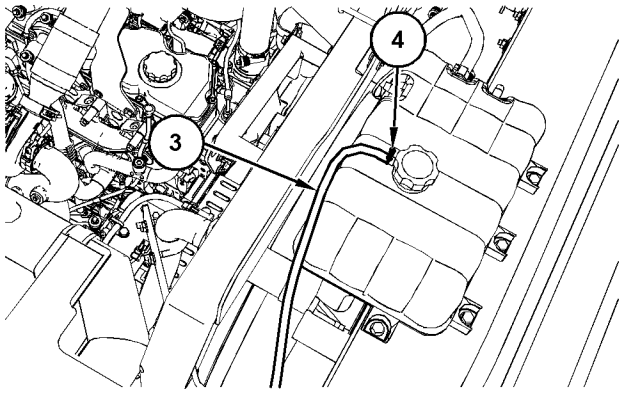


Illustration 195 g02518196

(3) Hose
(4) Clamp

3. Loosen clamp (4) and disconnect hose (3) from the radiator.

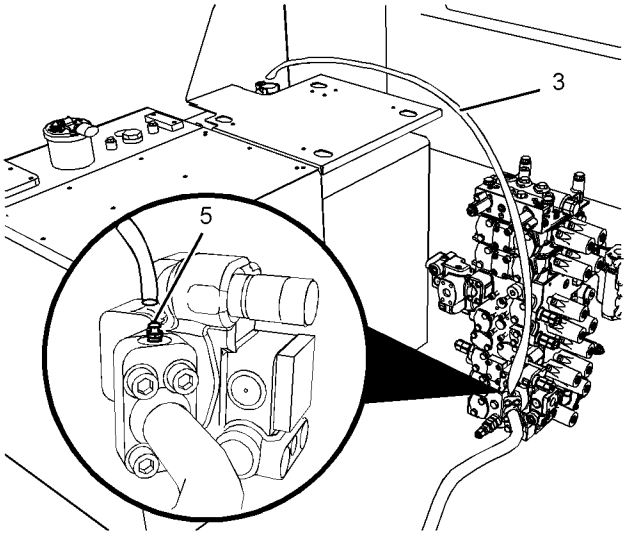


Illustration 196 g02518977

(3) Hose
(5) Screw

4. Connect one end of hose (3) to screw (5). Put the other end of hose (3) into the filler plug opening.

5. Slowly loosen screw (5) by a maximum of 1/2 turn. This allows the hydraulic oil in the boom circuit to drain into the hydraulic tank. The boom will now start to lower.

6. Make sure that the work tool has lowered all the way to the ground. Tighten screw (5) to a torque of 13 ± 2 N·m (9 ± 1 lb ft).

7. Disconnect hose (3) from screw (5). Do not allow the oil that is contained in hose (3) to spill. Drain the oil into a suitable container.

8. Connect hose (3) to the original position on the radiator and install hydraulic tank filler cap.

9. Close the engine hood.

After completion of the manual boom lowering, make necessary repairs before you operate the machine again.

Pressure Release of Auxiliary Lines

⚠ WARNING

Personal injury can result from hot oil spray and raised work tools.

Make sure all the work tools have been lowered, the oil is cool and the pressure has been released from the hydraulic system before removing any components or lines.

Do not allow hot oil or components to contact skin.

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

Refer to the procedure below before any of the following conditions.

- The work tool is changed.
- The position of the ball valve is changed.

1. Turn the engine start switch to the OFF position.

2. Place the hydraulic lockout lever to ON position.

3. Release the pressure in the auxiliary lines by pressing the auxiliary control buttons or the auxiliary control pedal three times.

4. Place the hydraulic lockout lever in the OFF position.

5. Change the work tool.

Note: There should be movement in the auxiliary hydraulic lines as the pressure is released. If there is no movement in the auxiliary hydraulic lines, start the engine and run the engine for 20 seconds. Repeat steps 1 to 5.

For additional information, consult your Cat dealer.

Operating Techniques

i05125989

Operating Technique Information

SMCS Code: 7000

⚠ WARNING

Know the maximum height and the maximum reach of your machine. Serious injury or death by electrocution can occur if the machine or the work tools are not kept a safe distance from electrical power lines. Keep a distance of at least 3000 mm (118 inch) plus an additional 10 mm (0.4 inch) for each 1000 volts over 50000 volts.

For safety, one of the following may require a greater distance:

- Local codes
- State codes
- Requirements of the job site

NOTICE
When swinging into a ditch, do not use the ditch to stop the swinging motion. Inspect the machine for damage if the boom is swung into a bank or an object.

Repeated stopping by an object can cause structural damage if the boom is swung into a bank or an object.

With certain boom-stick-bucket combinations, the bucket or worktool can hit the cab and/or the front structure of the machine. Always check for interference when first operating a new bucket or a new work tool. Keep the bucket or work tool away from the cab and away from the front structure during operation.

Whenever the tracks of the machine raise off the ground while digging, lower the machine back to the ground smoothly. DO NOT DROP OR CATCH IT WITH THE HYDRAULICS. Damage to the machine can result.

With certain combinations of work tools, the third pedal can have different functions. Always check the function of the third pedal before you use the third pedal.

Know the location of any buried cables. Mark the locations clearly before you dig.

Consult your Caterpillar dealer for special work tool tips that are available for use in severe applications.

Move the machine whenever the position for operating the machine is not efficient. The machine can be moved forward or backward during the operating cycle.

When you operate the machine in close places, utilize the bucket or the other work tool in order to perform the following functions:

- Pushing the machine
- Pulling the machine
- Lifting the tracks

Use a comfortable travel speed while you operate the machine.

Operating efficiency can be increased by using more than one machine control to perform a task.

Never swing a load over a truck cab or workers.

Position the truck so that material can be loaded from the rear of the truck or from the side of the truck. Load the truck evenly so that the rear axles are not overloaded.

An oversize bucket or a bucket that is equipped with side cutters should not be used in rocky material. These types of buckets slow down the cycle. Damage to the bucket and to other machine components could result.

Restricted Operation

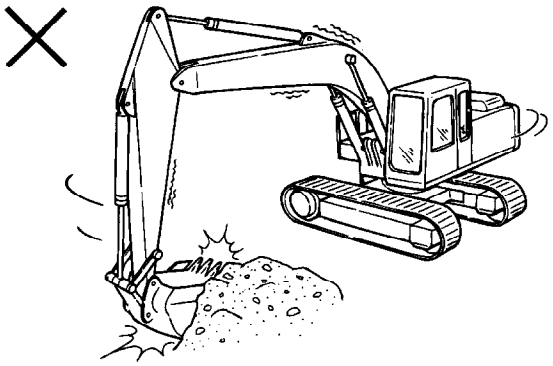


Illustration 197 g00529436

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.

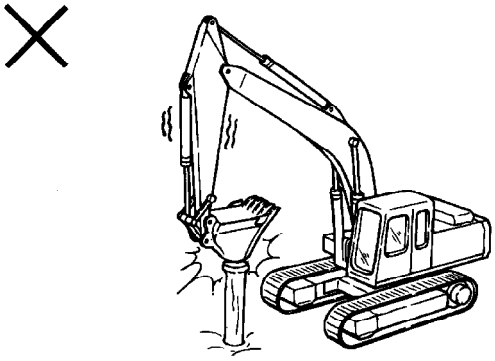


Illustration 198 g00529457

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.

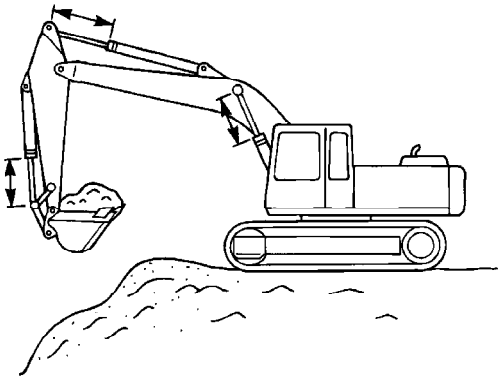


Illustration 199 g00529458

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.

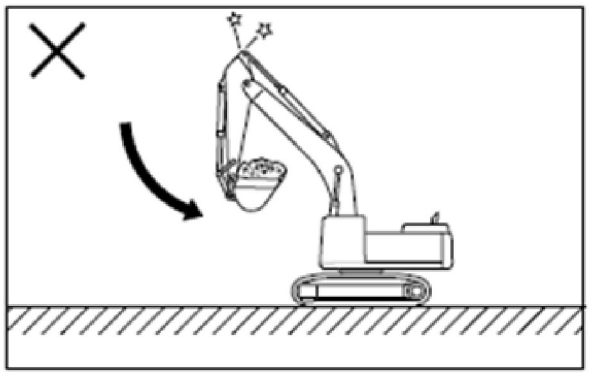


Illustration 200 g03286378

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.

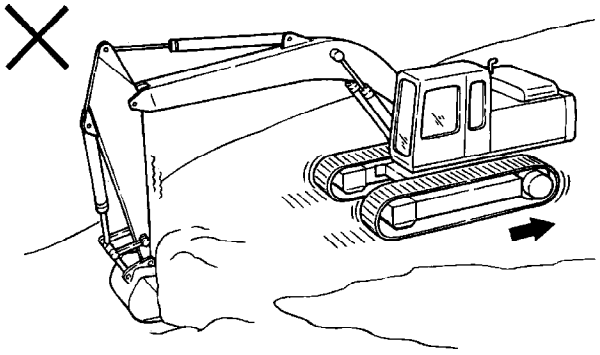


Illustration 201 g00529459

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.

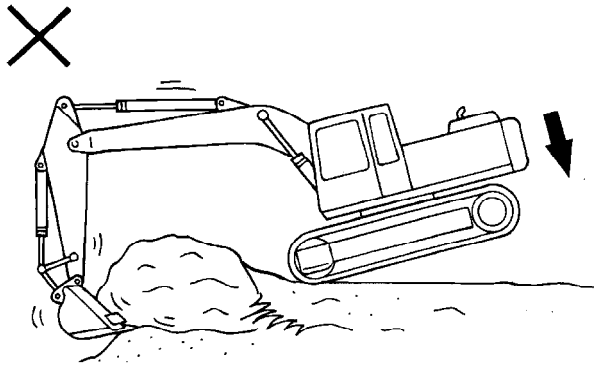


Illustration 202 g00529460

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

Operating Precaution

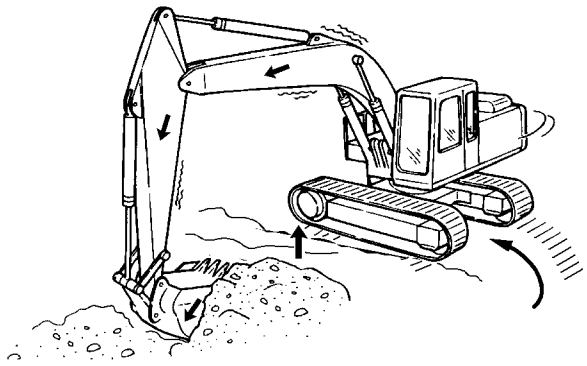


Illustration 203 g01250228

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.

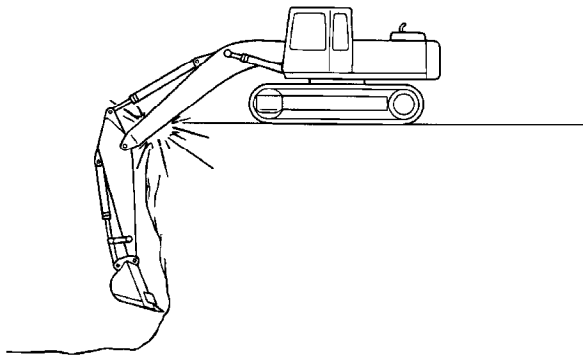


Illustration 204 g00529462

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.

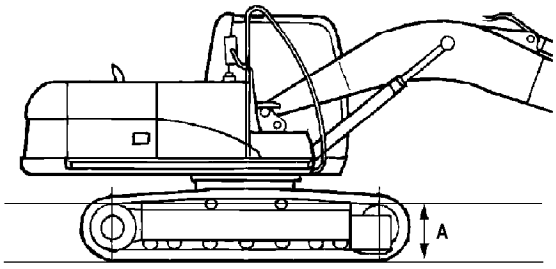


Illustration 205 g00807842

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.

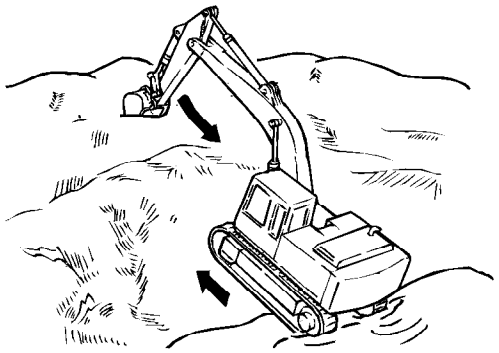


Illustration 206 g00808148

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.

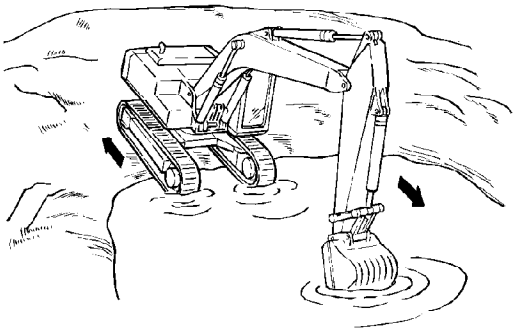


Illustration 207 g00808151

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.

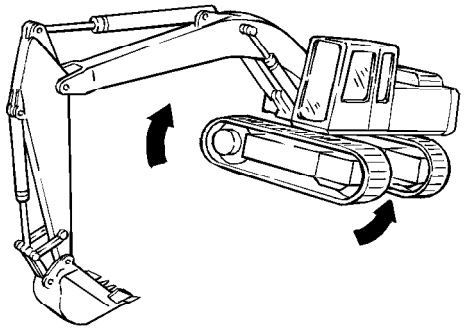


Illustration 208 g00808152

3. It may be impossible to travel because the bottom of the frame comes into contact with the ground or the undercarriage is clogged with mud or gravel. In this case, operate the boom and the stick together. Raise the track and rotate the track forward and backward in order to remove the mud and the gravel.

i05150572

Boom, Stick and Bucket Operation

SMCS Code: 7000

Digging

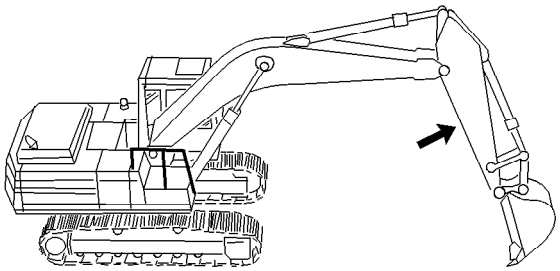


Illustration 209 g00101523

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

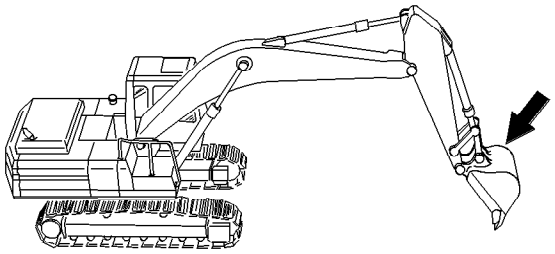


Illustration 210 g00101525

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

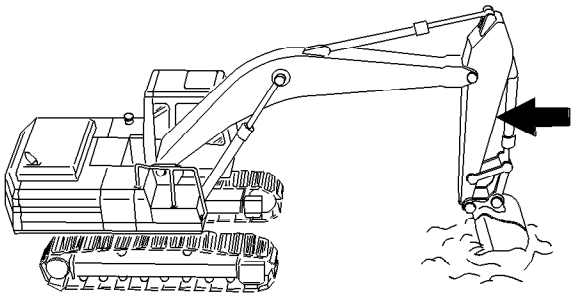


Illustration 211 g00101526

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

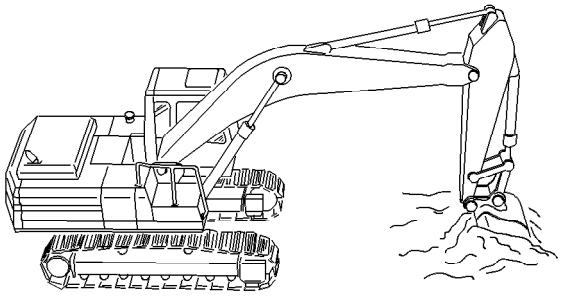


Illustration 212 g00101527

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.

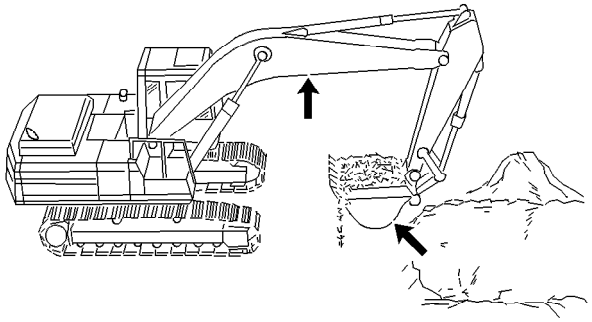


Illustration 213 g00101528

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

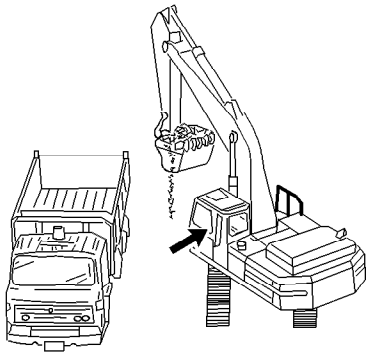


Illustration 214 g00101529

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

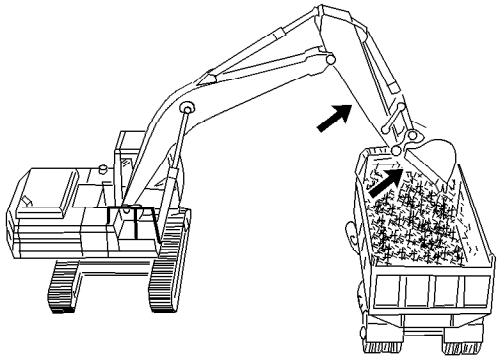


Illustration 215 g00101530

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.

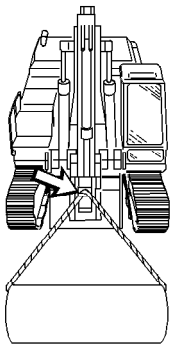


Illustration 216 g00101531

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.

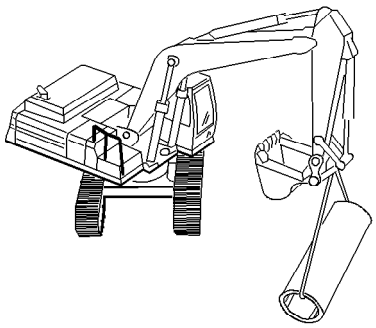


Illustration 217 g00101532

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.

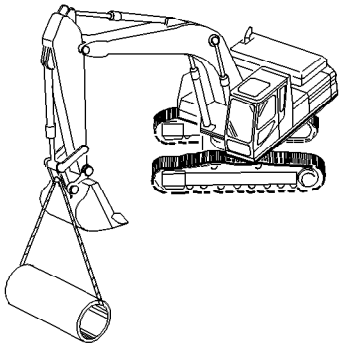


Illustration 218 g00101533

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

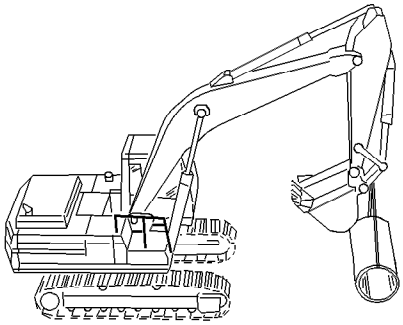


Illustration 219 g00101534

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

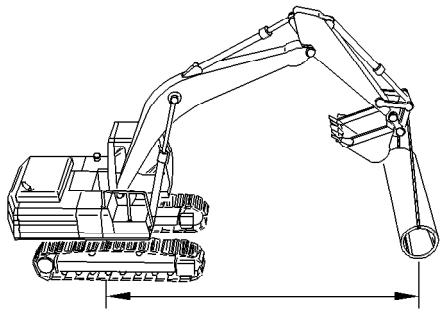


Illustration 220 g00101535

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.

i03875131

SmartBoom Operation
(If Equipped)

SMCS Code: 5461-ZS; 7332

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

⚠ WARNING

Personal injury or death can result from not following the proper procedures.

To avoid the possibility of injury or death, follow the established procedure.

⚠ WARNING

Activating the SmartBoom function and using the work tool joystick control while the front of the machine is elevated could result in unexpected machine motion. Unexpected machine motion could result in serious injury or death. Do not activate the SmartBoom function if the front of the machine is elevated by the front linkage.

⚠ WARNING

Do not elevate or lower the track when in the SmartBoom mode. Follow the operation procedures for the SmartBoom in the Operation and Maintenance Manual. Failure to follow these instructions can result in serious injury or death.

⚠ WARNING

Always make sure that the boom control joystick is in the NEUTRAL position before activating the SmartBoom control. Activating the SmartBoom control with the joystick out of the neutral position could resulted in unexpected machine motion which could result in serious injury or death.

⚠ WARNING

Do not select any SmartBoom mode, using the SmartBoom selector switch located on the console, while the tracks are elevated. Selecting the SmartBoom mode with the tracks elevated could result in a sudden drop of the machine which could result in serious injury or death.

⚠ WARNING

If any SmartBoom mode is active and the boom control joystick is in the BOOM DOWN position (forward) with a bucket or a work tool on the ground, pressing the disable button that is located on the front of the right hand joystick could cause a sudden boom down motion. This control function could lift the machine upward, with unexpected machine movement that could result in serious injury or death. Do not press the disable button while the SmartBoom mode is active and the boom control joystick is in the BOOM DOWN position (forward) with a bucket or a work tool on the ground.

⚠ WARNING

Do not attempt to lift the tracks of the machine by using the disable button and applying downward force with the boom lowering control while the machine is in any SmartBoom mode. Releasing the disable button will immediately return the machine to the active SmartBoom mode. This action could cause the machine to drop down abruptly which could result in serious injury or death.

The Caterpillar SmartBoom provides significant advantages in the following operations:

Excavation and Loading

The operator should select the SmartBoom UP AND DOWN mode for excavating operations and for loading operations. This mode is effective during the return cycle. The BOOM DOWN movement is assisted by gravity, and the pump flow that is normally required for the boom circuit is available for faster STICK OUT and SWING functions. More work is performed for the amount of hydraulic oil flow that is provided by the pumps. This results in faster cycle times and improved fuel efficiency.

When the SmartBoom UP AND DOWN mode is active, no downward hydraulic force is applied to the boom. The operator can intermittently apply downward hydraulic force when the force is required for bucket penetration. A button on the right joystick enables the operator to override the SmartBoom mode.

Hammering

The operator should select the SmartBoom DOWN mode for hammering operations. In the SmartBoom DOWN mode, the weight of the hammer plus the boom and the stick provides sufficient downward force for effective hammering. This mode prevents the hammer from rebounding. The boom follows the hammer downward freely as the tool penetrates the rock. This mode also reduces strain on the machine structures.

Advantages

In hammering, the SmartBoom provides the following advantages:

- The mode reduces shock in the cab.
- The mode reduces strain on machine structures.
- The mode prevents blank shots.
- The mode maintains optimum frequency.

In rock cleaning, the SmartBoom provides the following advantages:

- The mode reduces strain on machine structures.
- The mode reduces wear on the bucket and the teeth.
- The mode maintains optimum frequency.

In a leveling operation, the SmartBoom eases the operation. Only STICK IN actuation and bucket actuation are required to level the surface.

In material handling, the SmartBoom reduces the chance of damage below the material.

i05068589

Quick Coupler Operation (Hydraulic Pin Grabber Quick Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

S/N: FJB1–Up

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: TFG1–Up

S/N: RGH1–Up

S/N: KCN1–Up

S/N: MPZ1–Up

S/N: WHZ1–Up

NOTICE
The Caterpillar Quick Coupler (Hydraulic Pin Grabber) is not designed to be used in applications where there is long exposure to excessive vibration. The vibration caused by extensive use of a hydraulic hammer as well as the added weight of certain demolition tools such as shears, crushers, and pulverizers may cause premature wear and decreased service life of the coupler.

Be sure to carefully inspect the coupler daily for cracks, bent components, wear, distressed welds, etc. when operating with any of the above work tools.

General Operation

The quick coupler is used to change work tools while the operator remains in the cab. The quick coupler can be used with a broad range of buckets and work tools. Each work tool must have a set of pins in order for the quick coupler to work properly.

The work tools are held onto the quick coupler by hydraulic pressure. If pressure is lost, a check valve in the hydraulic cylinder traps oil in the cylinder. In addition to the check valve, a blocking bar locks the work tools to the quick coupler. Ensure that the hydraulic system and the blocking bar are working properly before using the quick coupler.

A lifting eye is included on the quick coupler. Release the work tool from the quick coupler in order to use the lifting eye to pick up loads. In order to lift a load with the lifting eye, extend the bucket cylinder until the quick coupler is in a VERTICAL position. Do not exceed the rated load for the machine.

NOTICE
Once the work tool has been properly attached to the coupler, no loosening of the work tool should occur. Refer to the “Quick Coupler Installation and Removal” section of the quick coupler Operation and Maintenance Manual for additional information. If at any point after the proper attachment and back drag testing of the work tool, should the work tool then become loose or if the rear pin of the work tool detaches from the movable hook, stop work immediately and safely ground and detach the work tool. Consult your Cat dealer to inspect the coupler prior to putting the coupler back into service. This situation could indicate potential coupler damage that may not be readily visible to the customer or operator of the machine and coupler.

NOTICE
Inspection of the Center-Lock coupler is required after a failure of the primary engaging system or a miscoupling of the tool, causing the work tool to swing by the secondary lock. Contact your Cat dealer.

Refer to Special Instruction, REHS5676, “The Inspection Procedure for the Center-Lock Coupler” for the proper procedure.

Note: Machines operating hydromechanical work tools equipped with a Center-Lock Pin Grabber Coupler, the addition of a Hydromechanical Conversion Kit may also be required. Refer to the Operation and Maintenance Manual for the quick coupler for more information or consult your Cat dealer.

Quick Coupler Operation

Description of the Instruction Film

An instruction film is included with the quick coupler. The instruction film illustrates the operation of the quick coupler.

Note: For detailed instructions on the operation of the quick coupler, refer to “Coupling the Work Tool” and “Uncoupling the Work Tool”.

The instruction film should be legible at all times. Clean the film or replace the film if the film is not legible. When you clean the film, use a cloth, water, and soap. Do not use solvent, gasoline, or harsh chemicals to clean the film. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the film. Loose adhesive will allow the film to fall. If the film is damaged or the film is missing, replace the film. For more information, consult your Cat dealer.

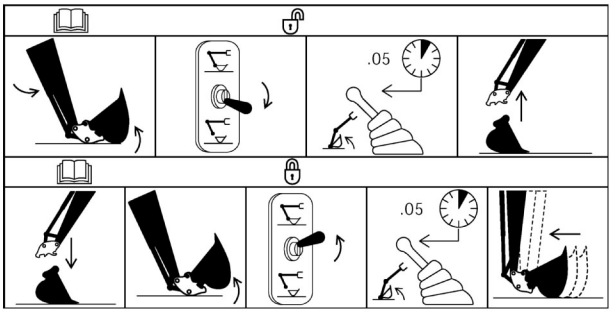


Illustration 221 g01231702
Instruction film

Description of the Top Frame on the Film (Uncoupling the Work Tool)

1. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.
2. Move the electric switch to the UNLOCK position.
3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked.
4. Place the work tool in the storage position close to the ground. Retract the bucket cylinder until the tool is disengaged from the quick coupler.

Description of the Bottom Frame on the Film (Coupling the Work Tool)

1. Engage the quick coupler onto the work tool.
2. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.
3. Move the electric switch to the LOCK position.
4. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked.

5. Make sure that the quick coupler pins are engaged. Retract the bucket cylinder and drag the attachment on the ground. This method will ensure that the quick coupler pins are engaged.

⚠ WARNING

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

NOTICE
Back drag the work tool on the ground to ensure the quick coupler is properly locked.

Do Not strike the work tool on the ground to ensure the quick coupler is properly locked. Striking the work tool on the ground will result in damage to the coupler cylinder.

Electric Switch Operation

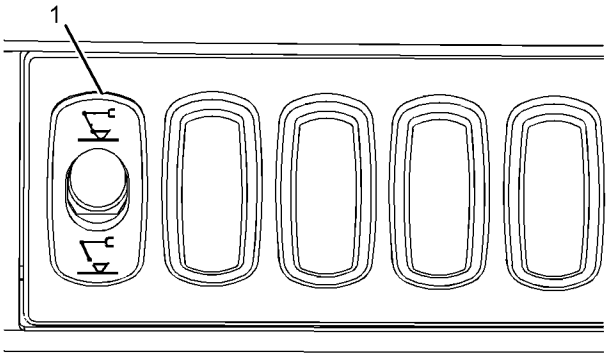


Illustration 222 g01354192

The electric switch (1) is located inside the cab. The electric switch has two positions that are used for coupling the work tool and uncoupling the work tool. Examples of the early switch type and the later switch type have been shown above. Refer to this Operation and Maintenance Manual, “Operator Controls” for the location of the electric switch.

UNLOCK – In order to unlock the coupler, extend the stick cylinder and extend the bucket cylinder until the bucket is fully curled under the stick. Pull the switch outward and move the switch toward the UNLOCK position. A buzzer will sound. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked. The switch must remain in the UNLOCK position until another work tool is attached. The switch must remain in the UNLOCK position in order to prevent the blocking bar from jamming.

LOCK – In order to lock the coupler, engage the quick coupler onto the work tool. Extend the stick cylinder and extend the bucket cylinder until the bucket is fully curled under the stick. Pull the switch outward and move the switch toward the LOCK position. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked. Make sure that the quick coupler is engaged onto the pins. Retract the bucket cylinder and drag the attachment on the ground. This method will ensure that the quick coupler is engaged onto the pins.

Coupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before engaging the quick coupler. Ensure that the work tool or bucket is not carrying a load.

Serious injury or death may result from engaging the work tool or bucket when it is in an unstable position or carrying a load.

⚠ WARNING

Inspect the quick coupler engagement before operating the machine.

Serious injury or death may result from improperly engaged coupler.

⚠ WARNING

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

⚠ WARNING

The buzzer will not sound when the switch is in the lock position. The position of the switch does not confirm the coupler pins are engaged. A physical test is required by dragging the attachment on the ground to confirm the coupler pins are engaged.

NOTICE
With certain work tool combinations, including quick couplers, the work tool can hit the cab or the front of the machine. Always check for interference when first operating a new work tool.

1. Position the bucket or the work tool on a level surface.

2. Make sure that the pins are in the bucket or the work tool. Make sure that the pin keepers are installed correctly.

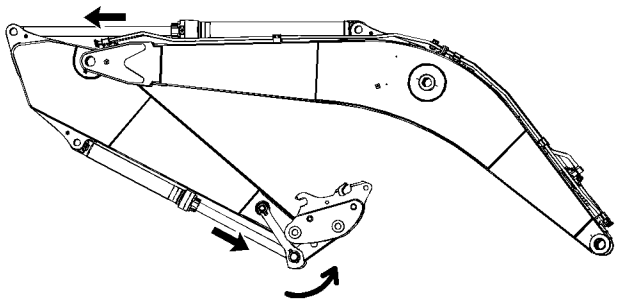


Illustration 223 g01231266

3. In order to prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the LOCK position to the UNLOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

4. Pull the switch outward and move the switch to the UNLOCK position. A buzzer will sound.

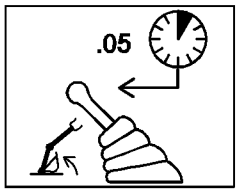


Illustration 224 g01231447

5. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been unlocked. The switch must remain in the UNLOCK position until the work tool is attached in order to prevent the blocking bar from jamming. The buzzer will continue to sound until the switch is moved to the LOCK position.

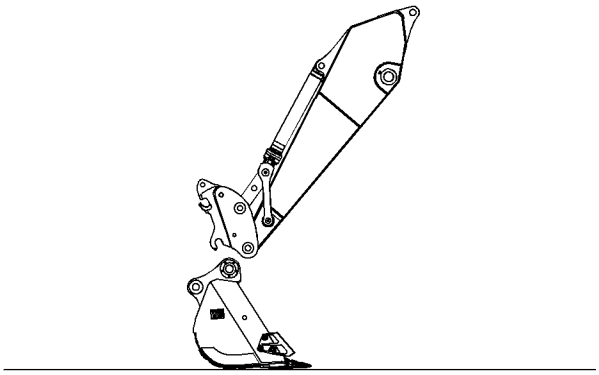


Illustration 225 g01231316

6. Align the quick coupler with the work tool.

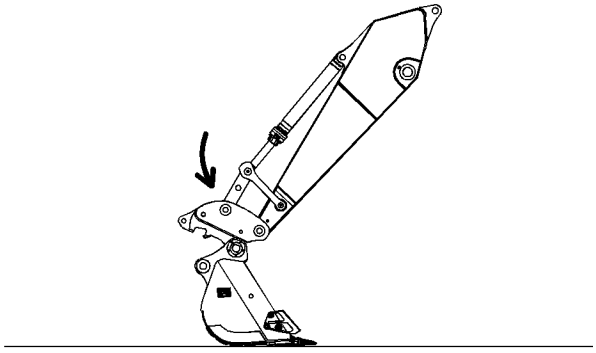


Illustration 226 g01231317

7. Rotate the quick coupler in order to grab the top pin.

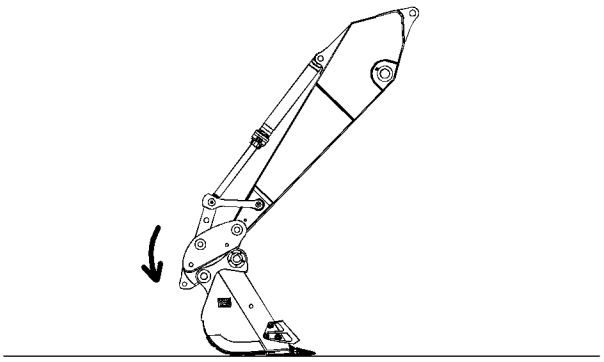


Illustration 227 g01231320

8. Rotate the quick coupler downward in order to grab the bottom pin.

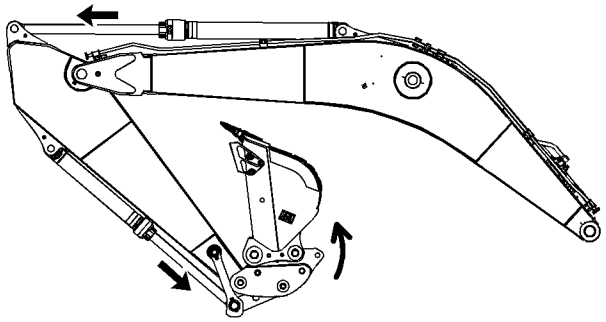


Illustration 228 g01231322

9. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position. This must be performed before you move the switch from the UNLOCK position to the LOCK position.

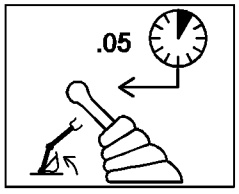


Illustration 229 g01231447

NOTICE
Hold the bucket cylinder control lever in the EXTEND position while the switch is moved into the LOCK position. Failure to do so may result in unwanted movement of the worktool.

10. Move the switch to the LOCK position. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds in order to lock the hook.

11. The “Work Tool Select” menu will be displayed on the monitor system. Scroll through the menu in order to select the desired work tool. Refer to this Operation and Maintenance Manual, “Monitoring System” for more information.

⚠ WARNING

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

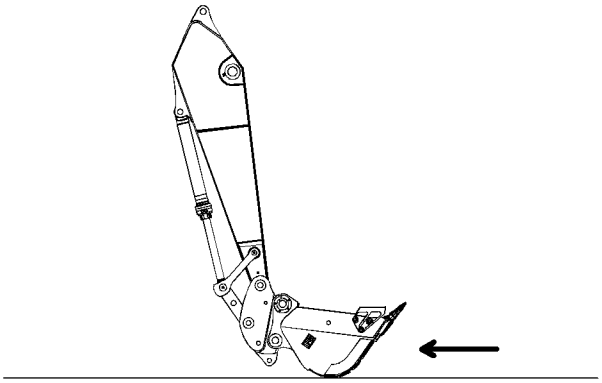


Illustration 230 g01231327

⚠ WARNING

Inspect the quick coupler engagement before operating the machine.

Verify that the quick coupler is engaged per the procedure in the Operation and Maintenance Manual. Verify prior to operating the machine, after every engine start, and after an extended time of inactivity.

Serious injury or death may result from improperly engaged coupler.

12. Verify that the quick coupler and the work tool are locked together.

a. Retract the bucket cylinder and place the work tool on the ground.

b. Apply pressure to the work tool against the ground.

c. Drag the work tool backward.

NOTICE
Back drag the work tool on the ground to ensure the quick coupler is properly locked.

Do Not strike the work tool on the ground to ensure the quick coupler is properly locked. Striking the work tool on the ground will result in damage to the coupler cylinder.

Uncoupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

NOTICE
Auxiliary hoses for work tools must be disconnected before the quick coupler is disengaged.

Pulling the work tool with the auxiliary hoses could result in damage to the host machine or the work tool.

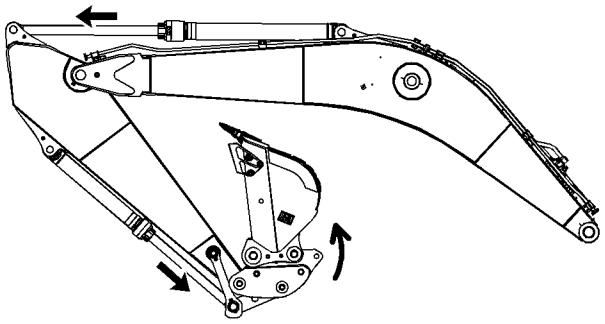


Illustration 231 g01231322

1. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position. This must be performed before you move the switch from the LOCK position to the UNLOCK position.

2. Pull the switch outward and move the switch to the UNLOCK position.

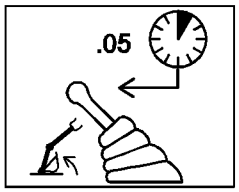


Illustration 232 g01231447

3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds in order to unlock the hook. A buzzer will sound until the switch is moved to the LOCK position. In order to lift objects with the lifting eye of the quick coupler, refer to “Coupler Lifting Eye Operation without Bucket”.

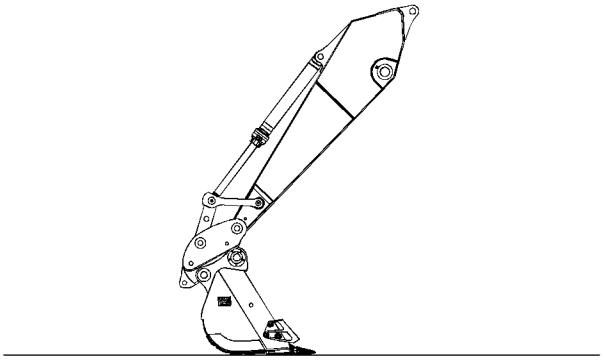


Illustration 233 g01231426

4. Move the boom and the stick until the tool or the bucket is in the storage position. Keep the tool close to the ground.

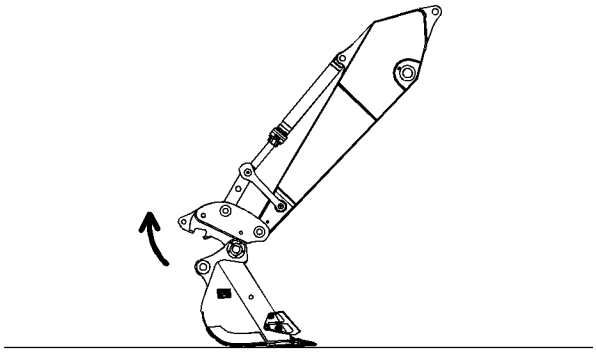


Illustration 234 g01231430

5. Rotate the quick coupler upward in order to release the bottom pin.

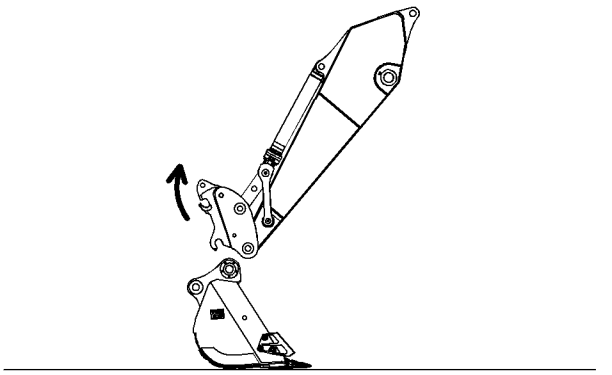


Illustration 235 g01231432

6. Continue to rotate the quick coupler upward in order to release the top pin and completely release the work tool from the quick coupler.

7. Move the stick to a position that is clear of the work tool.

Note: In order to lift objects with the lifting eye of the quick coupler, refer to “Coupler Lifting Eye Operation without Bucket”.

Coupling a Bucket that is Reversed

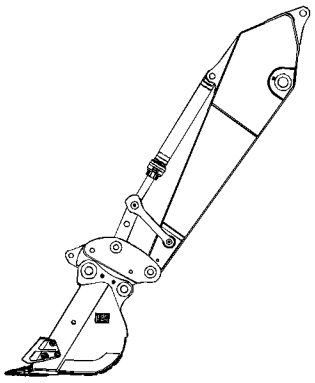


Illustration 236 g01231682

1. When you use a hydraulic pin grabber quick coupler, you can connect to a bucket that is in a reversed position. Refer to Illustration 236 for an example of connecting to a bucket that is in a reversed position.

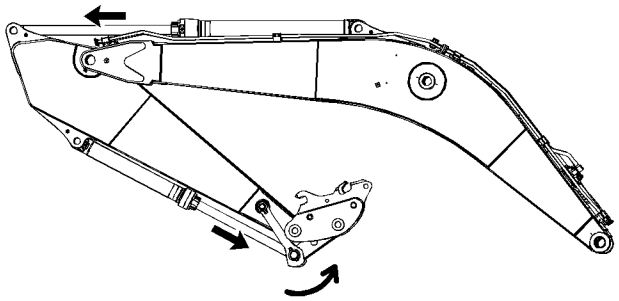


Illustration 237 g01231266

2. In order to prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the LOCK position to the UNLOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

3. Follow the same steps for coupling the work tool in order to couple the host machine to a bucket that is reversed. Refer to “Coupling the Work Tool” for the proper procedure.

NOTICE
When some Caterpillar buckets are used in the reverse position, it can be more difficult to couple the bucket and uncouple the bucket than in the normal position.

Care must be taken to ensure that the position of the boom, stick, and bucket are aligned to ensure smooth coupling. The coupler must be in position between the bucket bosses.

If the bucket is not fully engaged in the jaw of the coupler, the quick coupler can become snagged on the bucket bosses. The full weight of the bucket is then carried by the quick coupler sideplates, which can cause damage to the quick coupler.

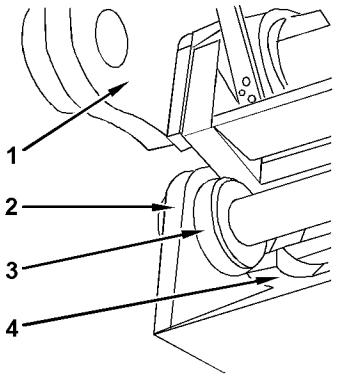


Illustration 238 g01231689

(1) Quick coupler
(2) Bucket
(3) Boss
(4) Hook

Coupler Lifting Eye Operation without Bucket

1. Remove the work tool. Refer to “Uncoupling the Work Tool” for the proper procedure.

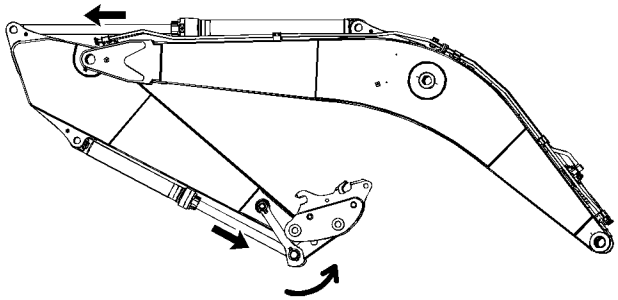


Illustration 239 g01231266

2. In order to prevent the blocking bar from jamming, the quick coupler must be curled past a vertical position before you move the switch from the UNLOCK position to the LOCK position. Extend the stick cylinder and extend the bucket cylinder until the quick coupler is curled past a vertical position.

3. Pull the switch outward and move the switch to the LOCK position. The buzzer will no longer sound.

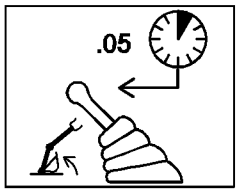


Illustration 240 g01231447

4. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds after the electric switch has been locked.

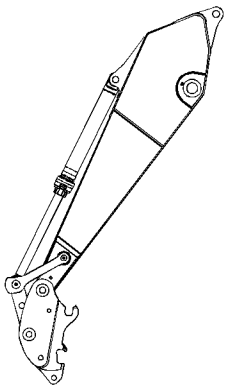


Illustration 241 g01231666

5. Rotate the quick coupler downward and move the stick to a position that is clear of the work tool.

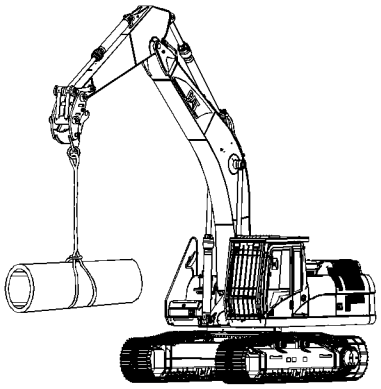


Illustration 242 g01187716

6. Use the lifting eye of the quick coupler, as needed.

7. In order to reinstall the bucket or the work tool, refer to “Coupling the Work Tool” for the proper procedure.

i05944562

Quick Coupler Operation (Circuit for Universal Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

Operation

This procedure describes the use of the hydraulic circuit with a Caterpillar dedicated quick coupler. If a different quick coupler is used, please contact your Caterpillar dealer for pressure adjustment and consult the documentation for the quick coupler for proper operation.

- The engine start switch is on.
- The engine is running.
- The hydraulic lockout control must be in the UNLOCKED position in order to operate the quick coupler controls.
- During the operation, the alarm will sound.

When the above conditions are achieved, the system will perform the desired operation. A warning alarm will sound if the switch for the quick coupler is turned to the LOCKED position or the UNLOCKED position as long as the hydraulic lockout control is in the UNLOCKED position.

Resetting the Quick Coupler Controls

Operation of the quick coupler may be interrupted by deactivating the hydraulic lockout control. The quick coupler controls will be disabled. Use the following procedure to reset the quick coupler control.

1. Return the quick coupler switch to the LOCKED position.

2. Turn the engine start switch to the OFF position and then turn the engine start switch to the ON position.

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

Securing the Work Tool

⚠ WARNING

Inspect the coupler wedge engagement before you operate the excavator.

Serious injury or death may result from an improperly engaged coupler.

Inspect coupler wedge engagement from the cab by rotating the bucket or the work tool inward. Extend the bucket cylinder to bring the coupler actuator into view and bring the stick in until the wedges are visible.

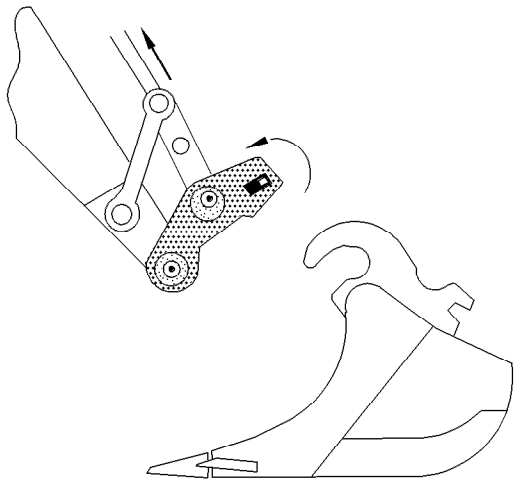


Illustration 243 g00104707

1. Position the work tool on a level surface.

2. Retract the bucket cylinder. Position the quick coupler in alignment between the hinges of the work tool.

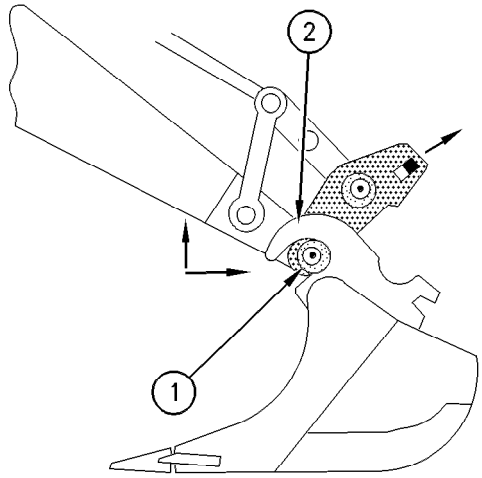


Illustration 244 g00104708

(1) Lower bosses
(2) Hinges

3. Move the stick forward and raise the stick until the lower bosses (1) engage the hinges (2) of the work tool.

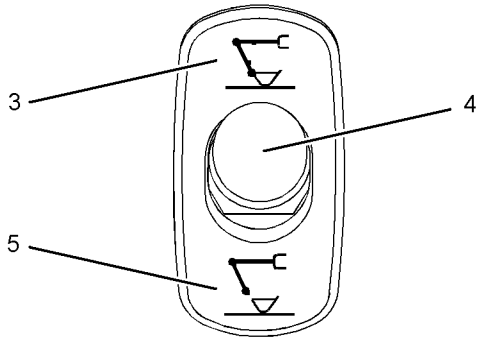


Illustration 245 g03733058

(3) Locked
(4) Quick coupler switch
(5) Unlocked

4. Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge. Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized for 10 seconds when the switch is in the UNLOCKED position.

Note: Whenever the switch is on the UNLOCKED position, a warning alarm will sound.

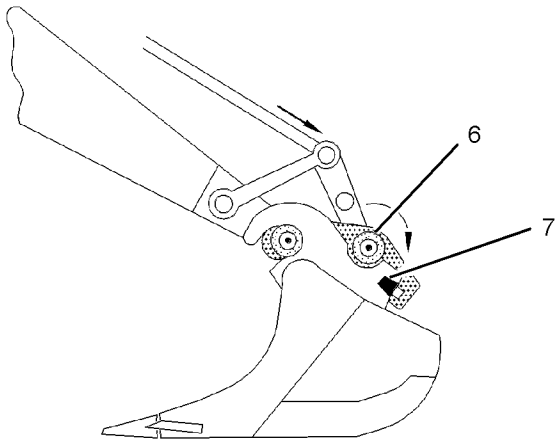


Illustration 246 g01620262

(6) Center bosses
(7) Locking area

5. Extend the bucket cylinder in order to rotate the quick coupler toward the work tool.

Center bosses (6) must engage with the cutout of the hinge.

6. Move the switch for the quick coupler to the LOCKED position in order to retract the wedge. The hydraulic system is pressurized for 10 seconds when the switch is in the UNLOCKED position.

The springs in the quick coupler will move the wedge into the locking area (7).

Note: The warning alarm will sound for 10 seconds.

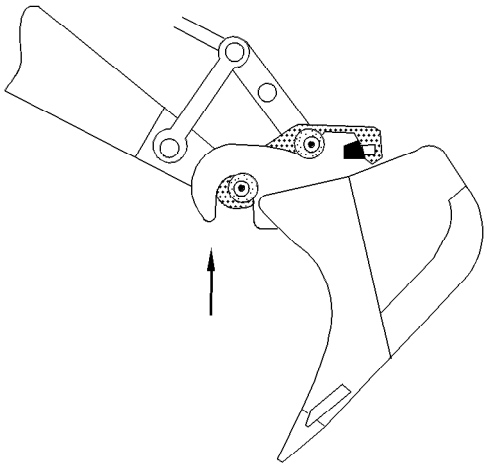


Illustration 247 g00104710

7. Raise the boom or raise the stick. Retract the bucket cylinder in order to confirm that the wedge is fully engaged. If the wedge is fully engaged, the work tool is locked in place. The work tool is ready to use.

Releasing the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

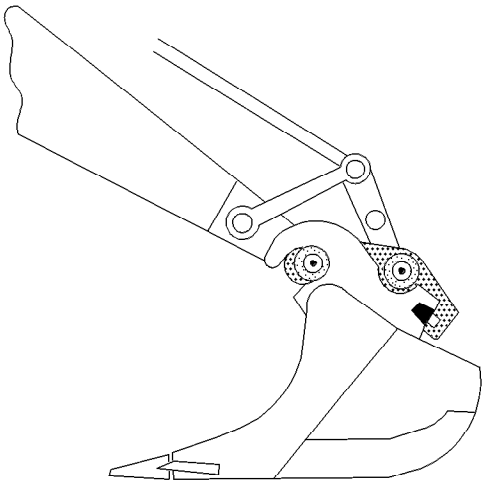


Illustration 248 g00104711

1. Level the bucket or level the work tool on the ground.

2. Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge. Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized for 10 seconds when the switch is in the UNLOCKED position.

Note: The warning alarm will sound.

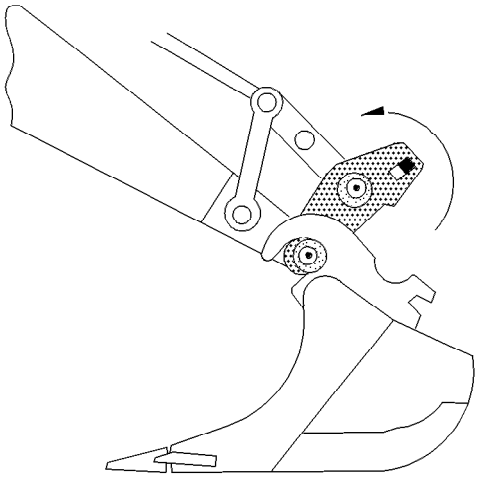


Illustration 249 g00104713

3. Retract the bucket cylinder in order to move the quick coupler toward the machine.

4. Move the switch for the quick coupler to the LOCKED position in order to retract the wedge.

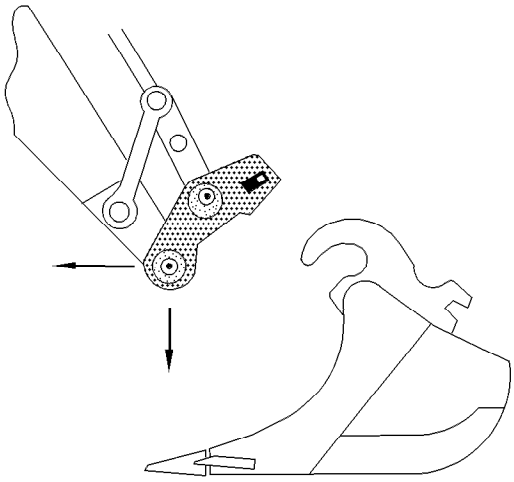


Illustration 250 g00104714

5. Lower the stick and move the stick toward the machine in order to disengage the quick coupler.

i04067162

Bucket - Remove and Install

SMCS Code: 6001; 6001-011; 6001-012; 6101; 6102; 6523

Captured Flag

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

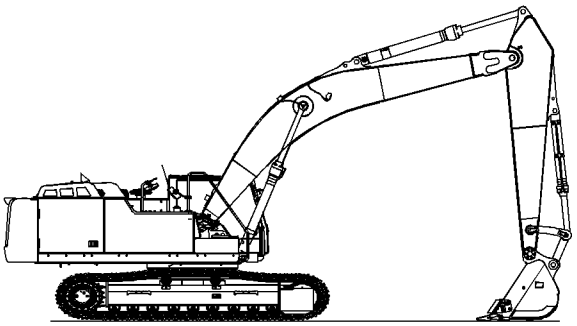


Illustration 251 g02280104

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

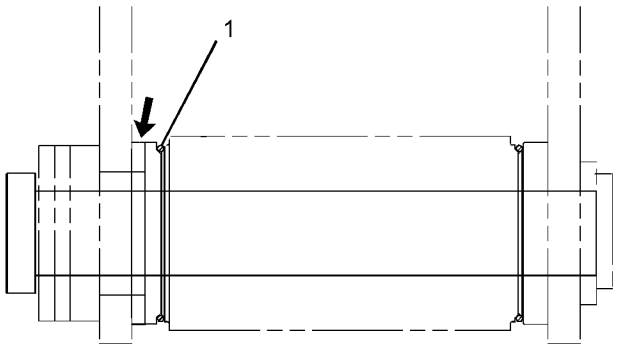


Illustration 252 g01303452

2. Slide O-ring seals (1) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

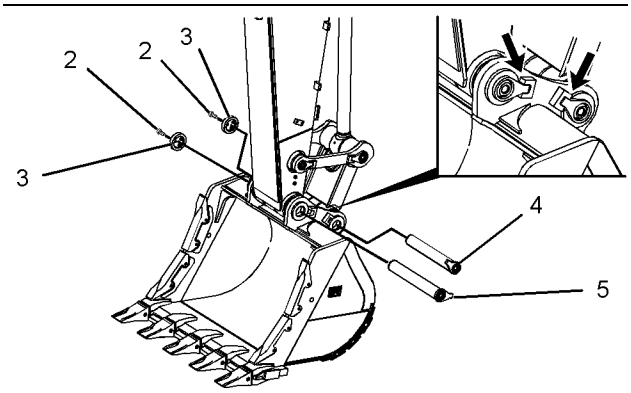


Illustration 253 g01303433

3. Remove bolts (2) and retaining plates (3). Then remove support pin (4) and support pin (5).

4. Start the engine and raise the stick out of the bucket.

5. Remove the O-ring seals (1) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

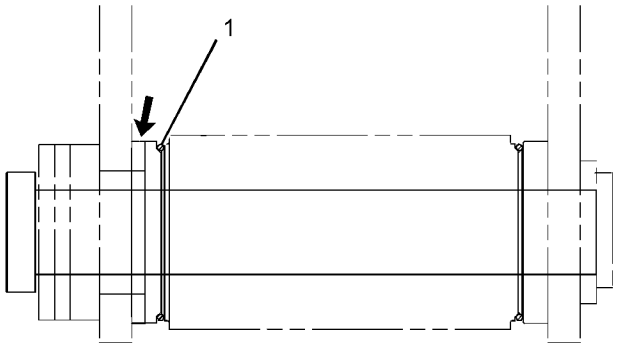


Illustration 254 g01303452

2. Position the O-ring seals (1) onto the flanges of the bucket.

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

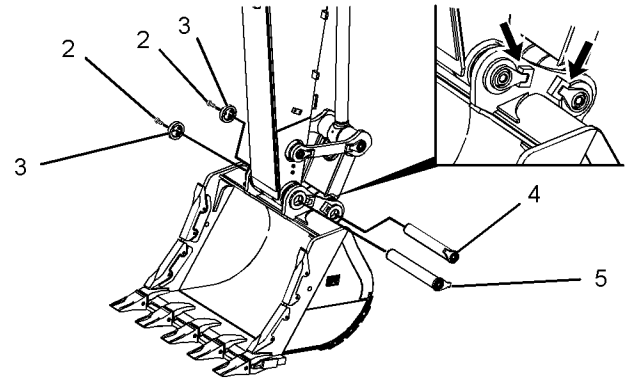


Illustration 255 g01303433

4. Insert support pin (5) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.

5. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

6. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.

7. Slide O-ring seals (1) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Insert support pin (4) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.

10. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.

11. Slide the O-ring seals (1) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

Bolted Flag

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

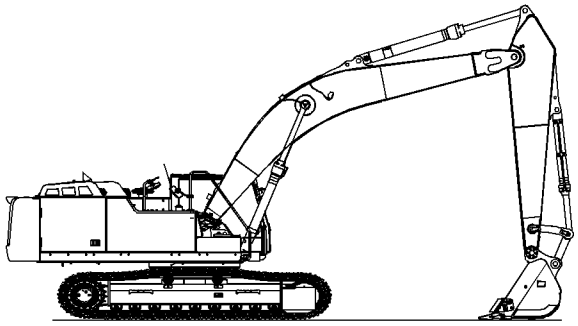


Illustration 256 g02280104

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

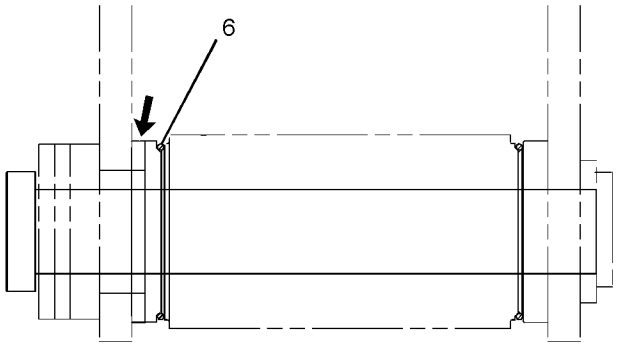


Illustration 257 g01303567

2. Slide O-ring seals (6) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

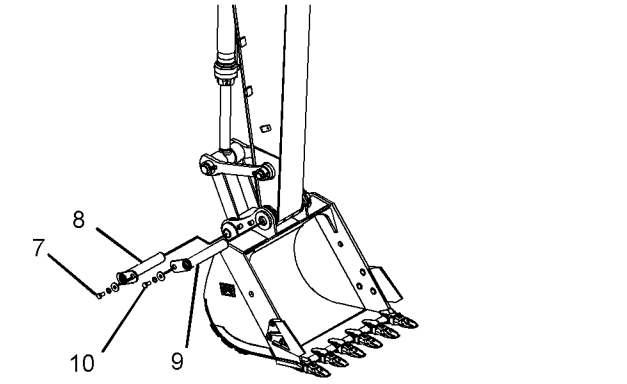


Illustration 258 g01303568

3. Remove bolt (7). Remove support pin (8).

4. Remove bolt (10). Remove support pin (9).

5. Start the engine and raise the stick out of the bucket.

6. Remove the O-ring seals (6) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

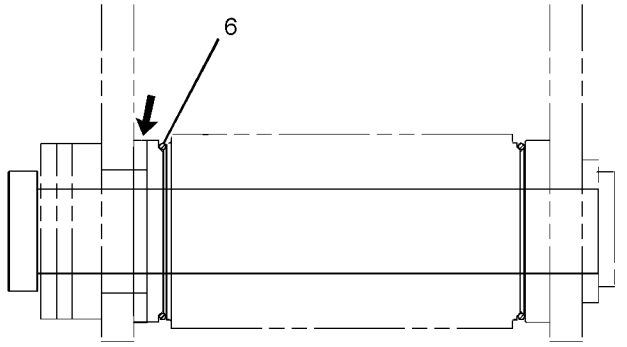


Illustration 259 g01303567

2. Position the O-ring seals (6) onto the flanges of the bucket.

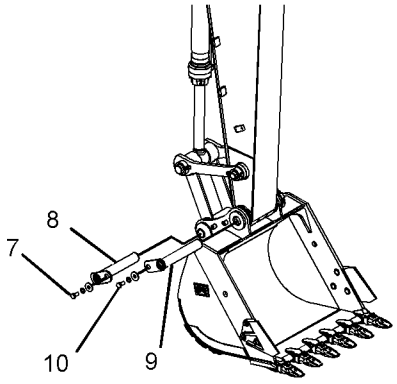


Illustration 260 g01303568

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

4. Install support pin (9) into the pin bore.

5. Install bolt (10).

6. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

7. Slide O-ring seals (6) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Install support pin (8) into the pin bore.

10. Install Bolt (7).

11. Slide the O-ring seals (6) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

Crossbolt

⚠ WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- **Confirm the verbal communication and the hand signals that will be used during the installation.**
- **Be alert for sudden movement of the front linkage and the work tool.**
- **Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.**

NOTICE
To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

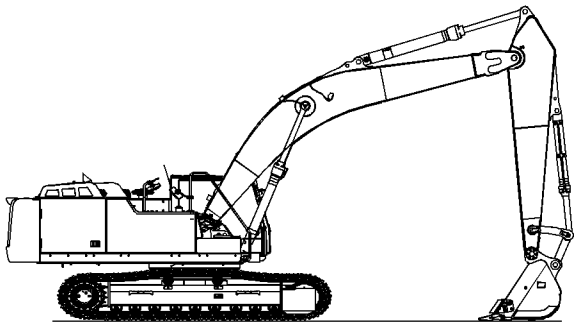


Illustration 261 g02280104

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

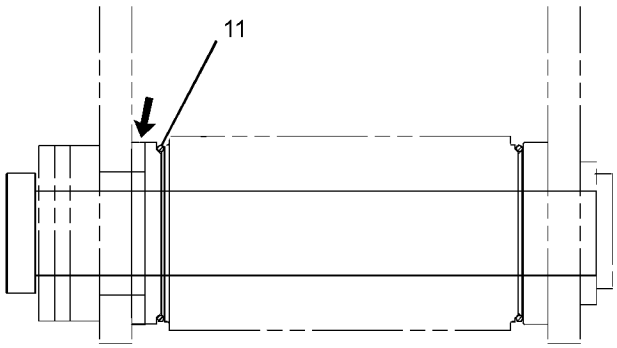


Illustration 262 g01303581

2. Slide O-ring seals (11) off the pin joints and onto the flanges of the bucket.

⚠ WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

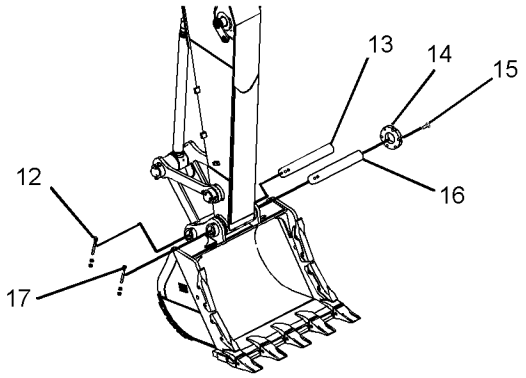


Illustration 263 g01303622

3. Remove nuts and retaining bolt (12) from support pin (13). Remove support pin (13).

4. Remove bolts (15) and adapter plate (14). Remove the shims.

5. Remove nuts and retaining bolt (17) from support pin (16). Remove support pin (16).

6. Start the engine and raise the stick out of the bucket.

7. Remove the O-ring seals (11) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

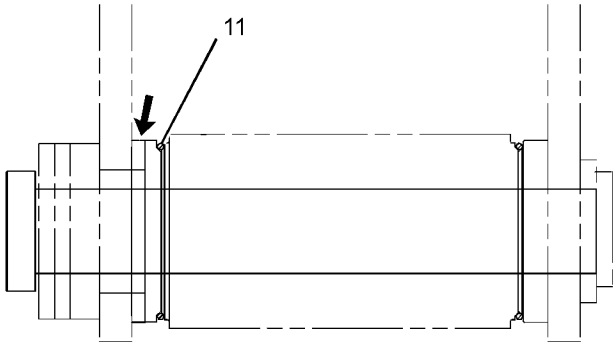


Illustration 264 g01303581

2. Position the O-ring seals (11) onto the flanges of the bucket.

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

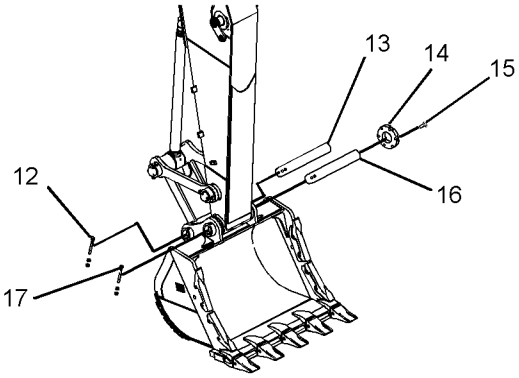


Illustration 265 g01303622

4. Install support pin (16). Put the retaining bolt hole that is in support pin (16) in alignment with the retaining bolt hole that is in the bucket.

5. Install the retaining bolt and nuts (17). Install adapter plate (14) without the shims, and without bolts (15) that hold adapter plate (14).

6. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” in order to adjust the bucket clearance.

7. Slide O-ring seals (11) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Install support pin (13). Put the retaining bolt hole that is in the bucket pin in alignment with the retaining bolt hole that is in the bucket.

10. Install the retaining bolt and nuts (12).

11. Slide the O-ring seals (11) over the pin joints between the bucket and the link assembly.

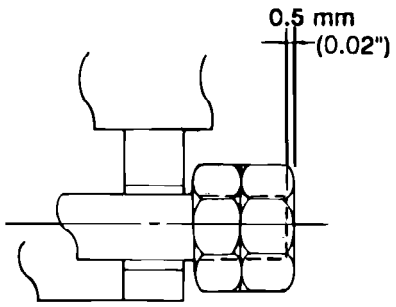


Illustration 266 g00510030

12. Tighten retaining nuts (12) and (17). Position the outside nut even with the end of the retaining bolt or 0.5 mm (0.02 inch) beyond the end of the retaining bolt. Tighten the inside nut against the outside nut.

13. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, “Bucket Linkage - Lubricate” or Operation and Maintenance Manual, “Boom, Stick, and Bucket Linkage - Lubricate”.

i03548680

Hammer Operation
(If Equipped)

SMCS Code: 5705-WTL

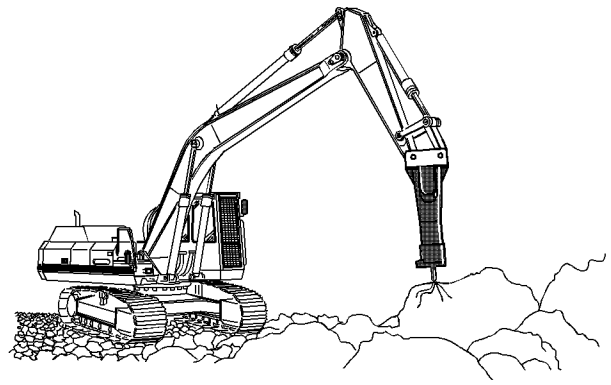


Illustration 267 g01876560

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 268 . 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”.

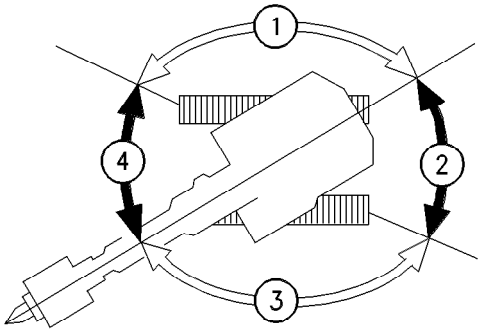


Illustration 268 g00101503

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

i03578566

Shear Operation
(If Equipped)

SMCS Code: 5705-WTL

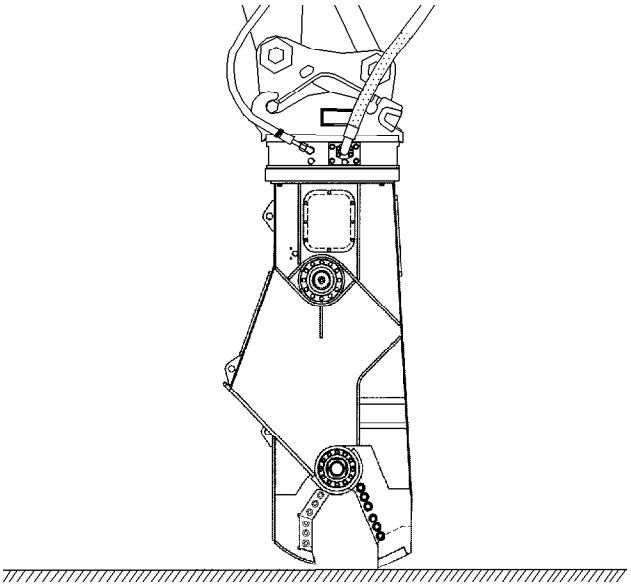


Illustration 269 g00763823

⚠ WARNING

Do not operate or work on this work tool unless you have read and understand the instructions and warnings in the Operation And Maintenance Manual for both the work tool and the host machine.

Failure to follow the instructions or heed the warnings could result in injury or death.

Contact your Caterpillar dealer for replacement manuals. Proper care is your responsibility.

NOTICE

Selection of a hydraulic shear must be done with extra care.

Use of a hydraulic shear not recommended by Caterpillar could result in structural damage to the machine.

Consult your Caterpillar dealer for hydraulic shear information.

Be sure that no one is near the work tool in order to prevent injury. Keep the work tool under control at all times in order to prevent injury. When a demolition tool is used, all personnel should maintain a minimum distance of 10 m (33 ft).

Close all windows. Make sure that all required guards are in place. Wear all required protective equipment. Follow the instructions in the Operation and Maintenance Manual for the work tool.

⚠ WARNING

Serious injury or death could occur from the demolition of pipes, vessels, tanks or other containers that may contain gas, flammable materials or hazardous chemicals.

Do not perform any demolition work on these items until all of their contents have been removed.

Follow all regulations for the removal and disposal of these materials.

NOTICE

Using the demolition tool to level the work site or push over standing structures may damage the machine or the demolition tool. Use appropriate equipment to do site preparation or maintenance operations.

NOTICE

To avoid structural damage to the machine, do not break road surfaces by placing the cutting edge of the hydraulic shear on the ground and moving the machine.

Parking

i04176310

Stopping the Machine

SMCS Code: 7000

⚠ WARNING

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

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

Park on a level surface. If the machine must be parked on a grade, chock the tracks securely.

Note: The swing parking brake is automatically applied when the machine is stopped. The swing parking brake is released when the engine is running and the joystick is activated.

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

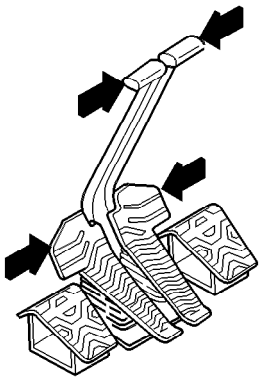


Illustration 270 g00560313

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

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

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

i01871055

Freezing Conditions

SMCS Code: 7000

If freezing temperatures are expected, remove the mud and the dirt from each track roller frame. Park the machine on wood planks. Use the following procedure to clean each track roller frame.

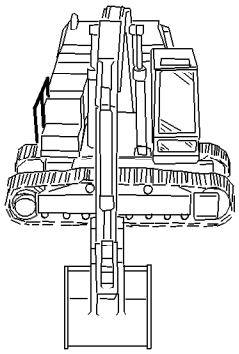


Illustration 271 g00101644

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.

i05906583

Stopping the Engine

SMCS Code: 1000; 7000

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

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

NOTICE
Never turn the battery disconnect switch to the OFF position while the engine is running. Serious damage to the electrical system may result.

1. Park the machine on level ground. Refer to Operation and Maintenance Manual, “Stopping the Machine” for the recommended procedure.

2. While the machine is stopped, run the engine for 5 minutes at low idle. Idling the engine allows hot areas of the engine to cool gradually.

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

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

Engine Stop Control

Turn the engine start switch to the OFF position. If the engine does not stop after a delayed engine shutdown cycle, perform the following procedure.

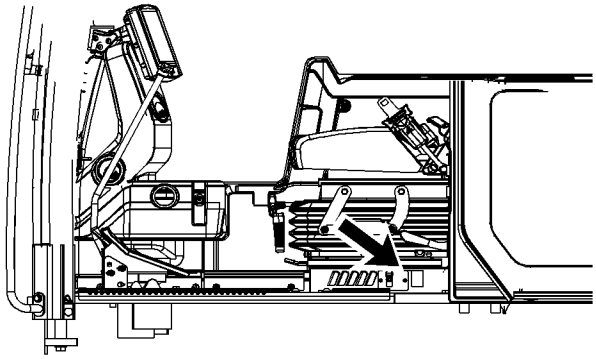


Illustration 272 g02038995

1. The switch is located below the left side of the operator seat.

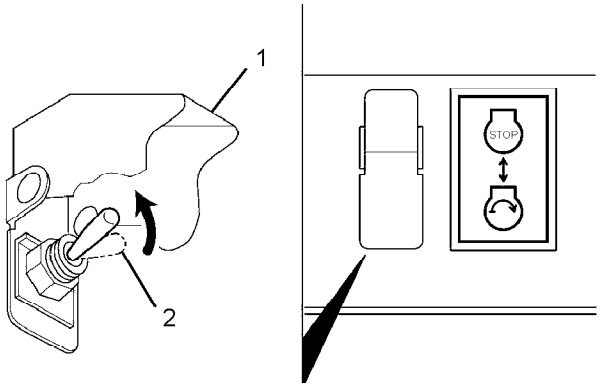


Illustration 273 g01048511

2. Lift cover (1).

3. Push switch (2) upward. This should stop the engine.

Note: Use the engine start switch to stop the engine first. Use the engine stop control as an alternate method to stop the engine.

4. Return the switch to the original position. The engine will be enabled to start.

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

5. Use the method that follows if the previous steps do not stop the engine.

Stop the Engine if an Electrical Malfunction Occurs

Turn the engine start switch to the OFF position. If the engine does not stop after a delayed engine shutdown cycle, perform the following procedure.

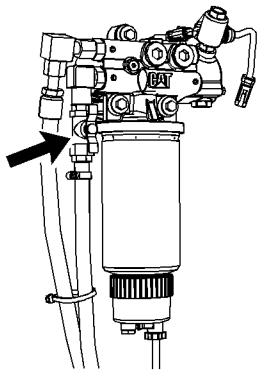


Illustration 274 g02368038

The fuel shutoff valve is located on the water separator.

Shut off the fuel supply by turning the fuel shutoff valve clockwise. The engine will stop after consuming the fuel in the fuel line. The engine may continue to run for a few minutes.

Repair the engine before you restart the engine. The fuel system may need to be primed. See Operation and Maintenance Manual, “Fuel System - Prime” for instructions.

i04581783

Leaving the Machine

SMCS Code: 7000

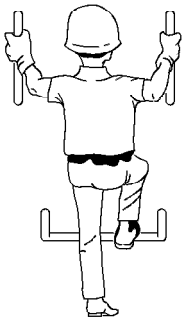


Illustration 275 g00037860

1. Use the steps and the handholds when you dismount. When you dismount, face the machine and use both hands.

2. Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire hazard.

3. Remove all flammable debris from the front bottom guard through the access doors in order to reduce a fire hazard. Discard the debris properly.

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

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

6. Lock all compartments and all vandalism covers (if equipped).

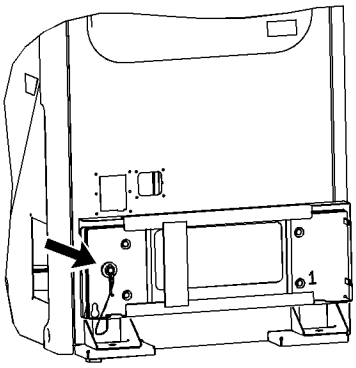


Illustration 276 g02038843

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

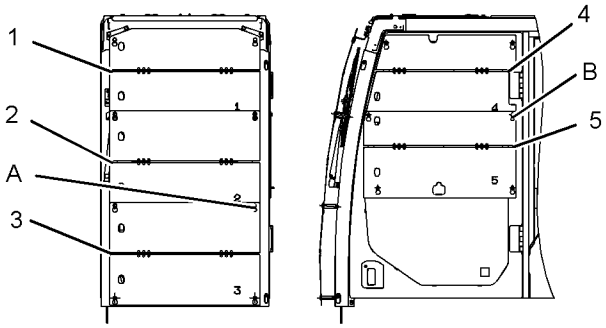


Illustration 277 g02148267

8. Install the vandalism guards on the front window and on the cab door. An identification number is stamped on each of the vandalism guards. Install the vandalism guards in the correct sequence. Use bolts (A) only for vandalism guard (3) and for vandalism guard (5).

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

Transportation Information

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.

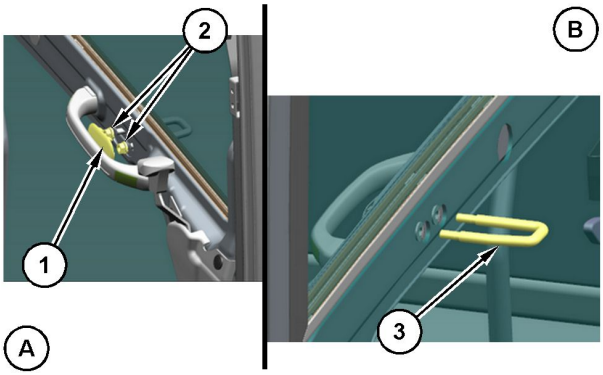


Illustration 278 g06516462

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

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

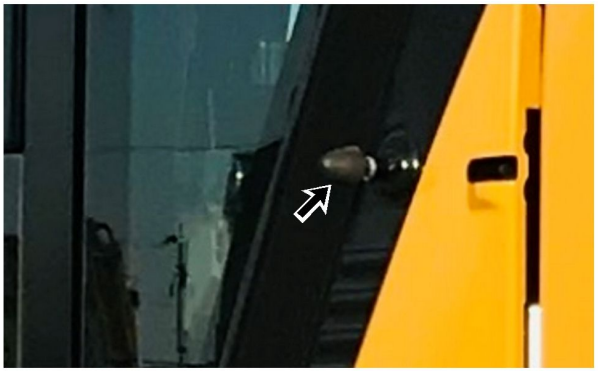


Illustration 279 g06516469

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.

i04261850

Securing the Machine

SMCS Code: 7000

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

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

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

3. Turn the battery disconnect switch to OFF and remove the disconnect switch key.

4. Remove the ether starting aid cylinder. See Operation and Maintenance Manual, “Ether Starting Aid Cylinder - Replace” for the removal procedure.

5. Lock the door and the access covers. Attach any vandalism protection.

6. The Product Link antenna (if equipped) may be repositioned in order to meet the regulations regarding height of some locations. The Product Link antenna is located on top of the cab. Perform the following procedure in order to move the Product Link antenna to the transport position.

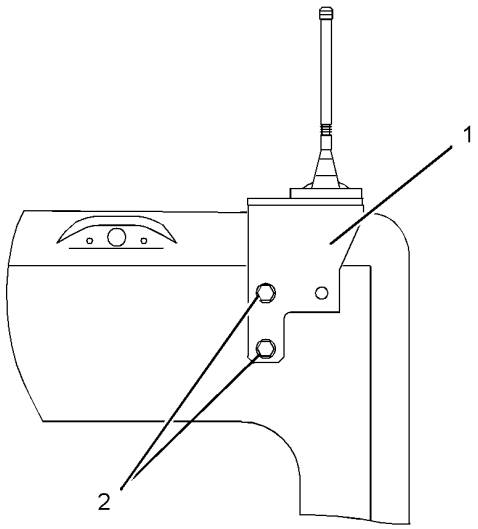


Illustration 280 g02263573
Bracket in normal operating position.

a. Remove bolts (2) from bracket (1).

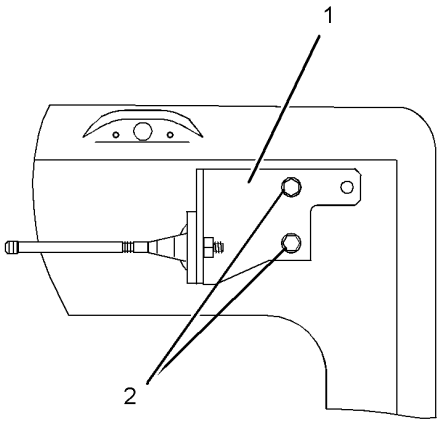


Illustration 281 g02270173
Bracket in position for transport

b. Reinstall bracket (1) with bolts (2) located in the top two holes of the bracket. Refer to Illustration 281 .

Note: The bracket for the Product Link antenna must be place back into the normal operating position before the machine can be placed back into service.

7. 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.

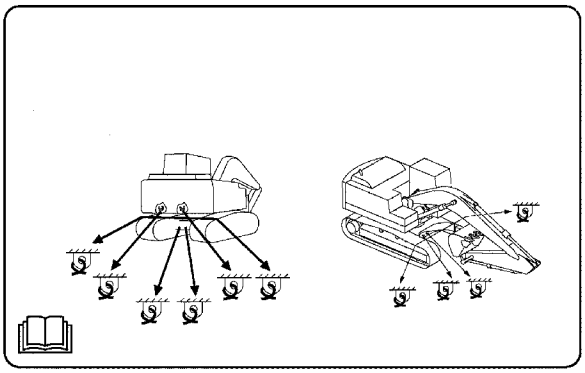


Illustration 282 g02432157

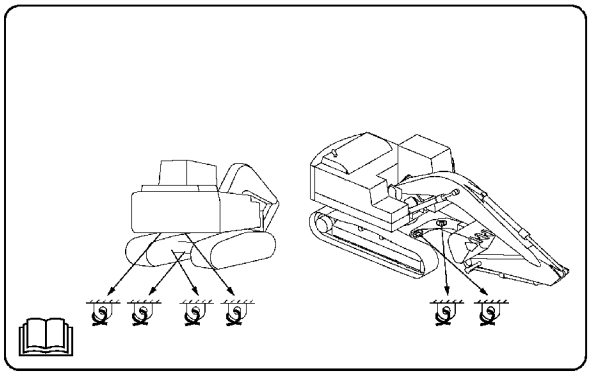


Illustration 283 g02104975

8. 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.

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.

i04743049

Mirror Installation

SMCS Code: 7319

Make sure that the right side mirrors are in the correct position before you operate the machine or transport the machine.

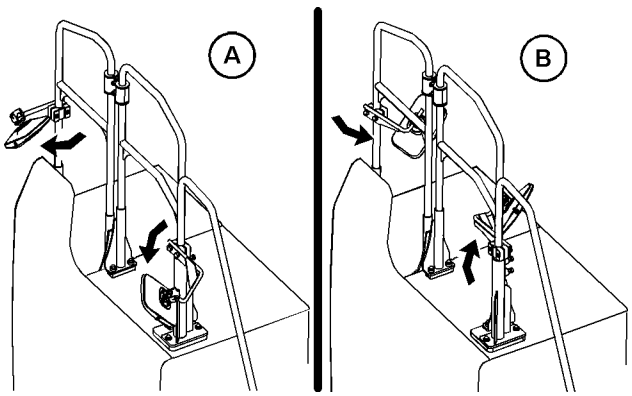


Illustration 284 g02841858

(A) Operating position
(B) Transport position

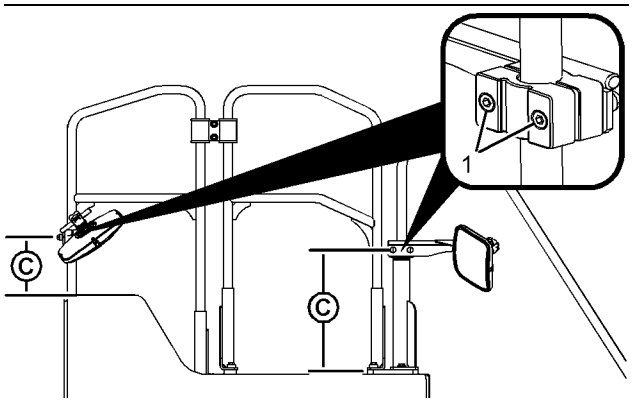


Illustration 285 g02842316

(1) Bolts
(C) Mirror height

Transport Position

In order to transport the machine, move the right side mirrors to transport position (B).

1. Loosen bolts (1) on the mirror support bracket and move the mirror to the transport position
2. Tighten bolts (1) on the mirror support bracket to a torque of 60 ± 12 N·m (44 ± 9 lb ft).

Operating Position

In order to operate the machine, move the right side mirrors to operating position (A).

1. Loosen bolts (1) on the mirror support bracket and return the mirrors to the operating position.
2. Adjust the mirrors to the correct mirror height (C) and tighten bolts (1) on the mirror support bracket to a torque of 60 ± 12 N·m (44 ± 9 lb ft).

Note: The dimensions for correct mirror height (C) are listed in the table below:

Table 104

Mirror Height (C)		
Model	**Front Mirror Height**	**Rear Mirror Height**
320E 324E 329E 336E	454 ± 3 mm (17.9 ± 0.1 inch)	589 ± 3 mm (23.2 ± 0.1 inch)
349E	1564 ± 3 mm (61.6 ± 0.1 inch)	NA

i03853332

Adjustable Gauge Undercarriage Frame

SMCS Code: 4150-VAR

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: KCN1–Up

S/N: KFX1–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.

⚠ WARNING

Do not operate the machine if both track frames are retracted. Do not operate the machine if one track frame is retracted. The machine is unstable if either track frame is retracted. If either track frame is retracted, the machine could rollover, resulting in serious injury or death. If the machine is unstable, damage could occur to bolts connecting the car body and the track frames.

Fully extend the track frames when the machine is operated. Retract the track frames when the machine is unloaded. Retract the track frames when the machine is loaded.

Do not operate the machine if both track frames are retracted. Do not operate the machine if one track frame is retracted. The machine is unstable if either track frame is retracted.

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.

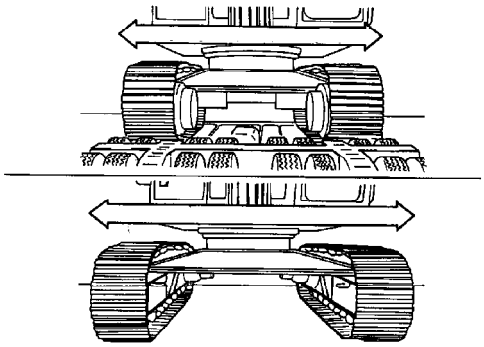


Illustration 286 g00285692

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

Retracting

Park the machine on a hard, level surface.

Retract the track frames one at a time.

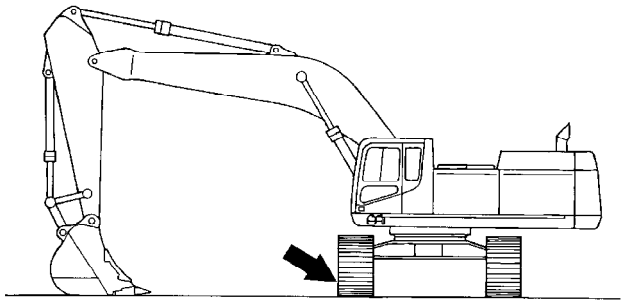


Illustration 287 g00581851

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.

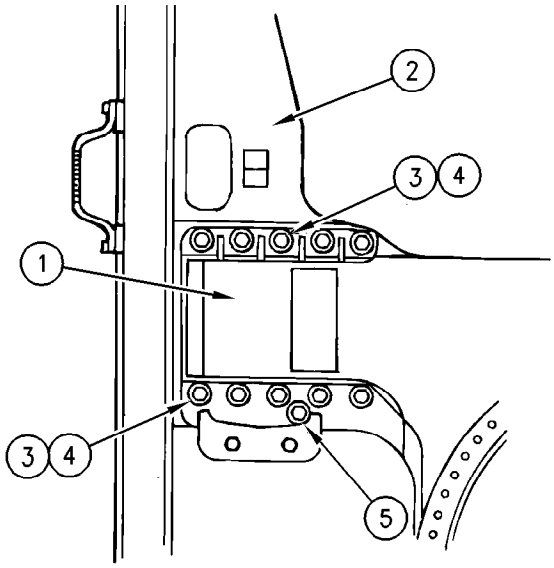


Illustration 288 g00697382

(1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolts

3. Remove 19 bolts (3) and 19 spacers (4). The bolts hold track frame (2) to carbody (1).

Note: When you move track frame (2) in order to retract the overall width, do not loosen two bolts (5) that are for the guide.

Note: Ten bolts (3) and spacers (4) are installed on the side with the idler. Nine bolts (3) and spacers (4) are installed on the side with the final drive .

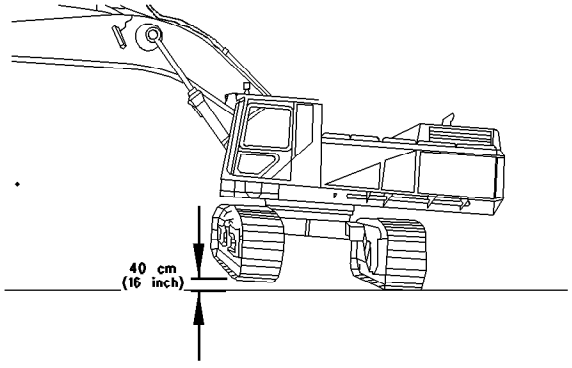


Illustration 289 g00697383

4. Start the engine. Apply downward pressure with the boom in order to raise the track approximately 40 cm (16 inch) above ground level.

5. 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 250 mm (10 inch).

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

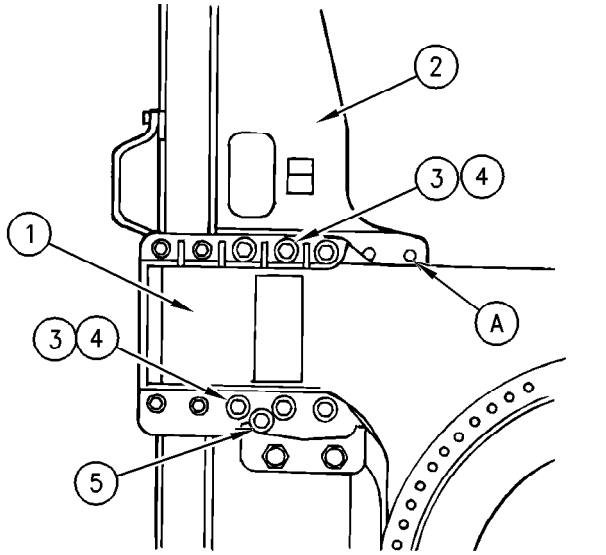


Illustration 290 g00697384

(1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolts

7. Align the bolt holes of carbody (1) and track frame (2). Install 11 bolts (3) and 11 spacers (4). 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).

Note: To protect the bolt holes that are in the track frame from debris and mud, insert corks into 5 bolt holes (A).

8. Repeat Steps 1 through 7 for the other track frame.

Note: Store the 16 bolts (3) and 16 spacers (4) that were removed in this procedure in the tool box.

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.

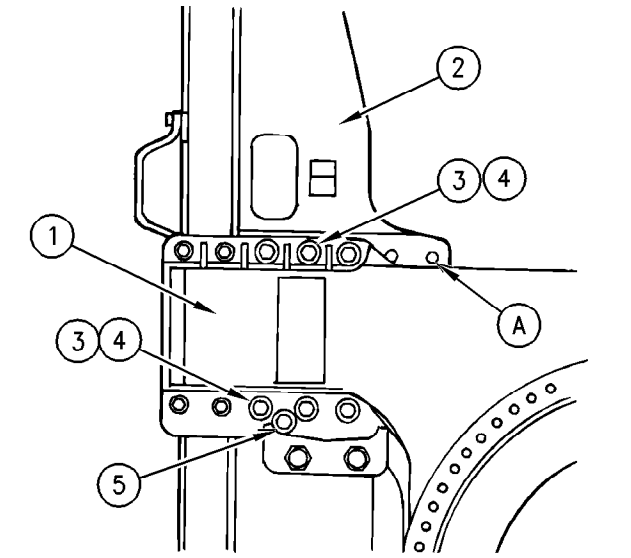


Illustration 291 g00697384

(1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolts

1. Remove the 5 corks that are in bolt holes (A).

2. Remove 11 bolts (3) and 11 spacers (4). The bolts hold track frame (2) to carbody (1).

Note: When you move track frame (2) in order to extend the overall width, do not loosen two bolts (5) that are for the guide.

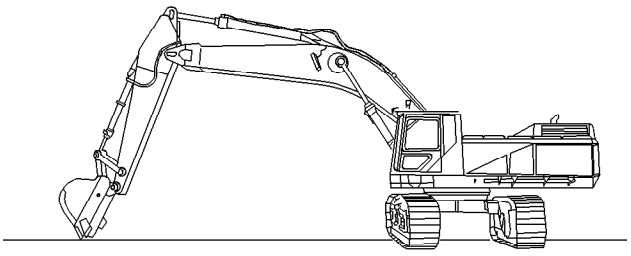


Illustration 292 g00286687

3. 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.

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

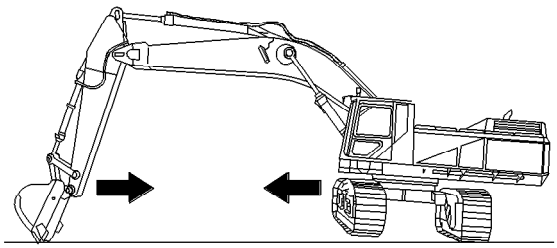


Illustration 293 g00286117

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

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

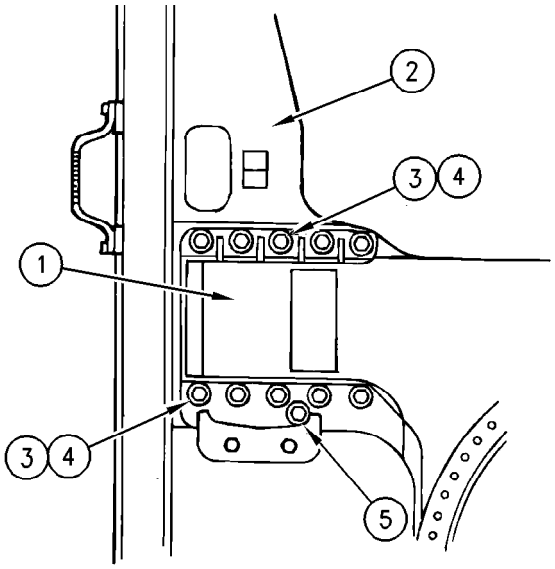


Illustration 294 g00697382

(1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolts

7. Align the bolt holes of carbody (1) and track frame (2). Install 19 bolts (3) and 19 spacers (4). 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).

8. Repeat Steps 1 through 7 for the other track frame.

i04236789

Camera Harness - Disconnect and Connect

SMCS Code: 1408; 7348

⚠ WARNING

Working on the wiring harness for the rear camera during the removal and installation of the counterweight could result in a crushing hazard. The counterweight could fall, and the falling of the counterweight could cause personal injury or death. Disconnect the wiring harness to the rear camera before the you remove the counterweight. Reconnect the wiring harness to the rear camera after you install the counterweight.

⚠ 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.

1. Park the machine on level ground.

2. Lower the work tool to the ground.

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

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

5. Turn the battery disconnect switch to OFF and remove the disconnect switch key.

Disconnection of the Harness for the Rear View Camera

Disconnect the harness for the rear view camera before removing the counterweight. Access to the harness for the rear view camera is underneath the counterweight.

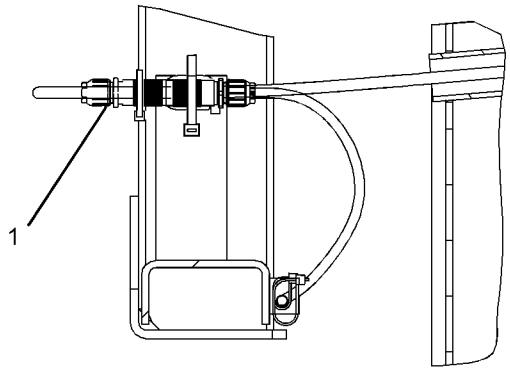


Illustration 295 g02410764

Located near the top of the machine if not equipped with the counterweight removal system.

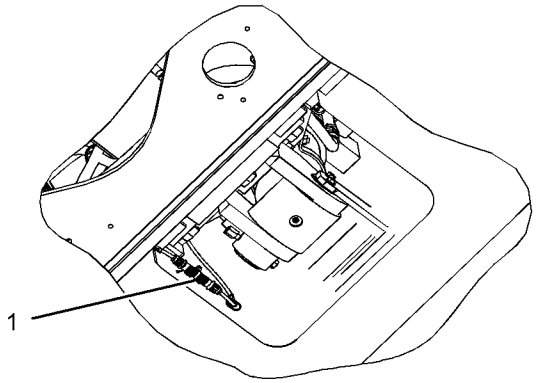


Illustration 296 g02104674

Located underneath the machine if equipped with the counterweight removal system.

1. Turn plug (1) and pull apart.

Connection of the Harness for the Rear View Camera

After the counterweight has been installed on the machine, reconnect the harness for the rear view camera.

i08109789

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.

Machines Equipped with Endless Links

Counterweight Removal

Note: Before you remove the counterweight, disconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, “Camera Harness - Disconnect and Connect” for more information.

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

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

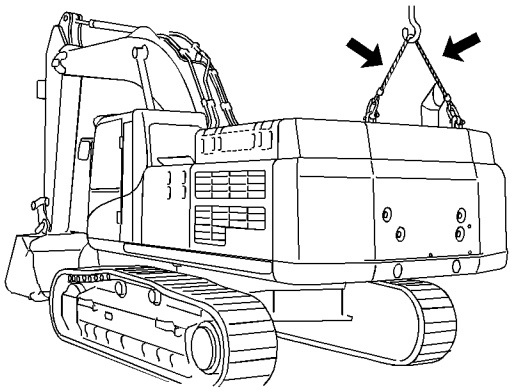


Illustration 297 g02102173

3. Fasten a proper rated cable with shackles to the brackets. Use an appropriate lifting device in order to tension the cable.

4. Lift the counterweight enough so that there is no load on the retaining bolts. Removing the bolts is difficult if the cable is too tight. Removing the bolts is difficult if the cable is too loose.

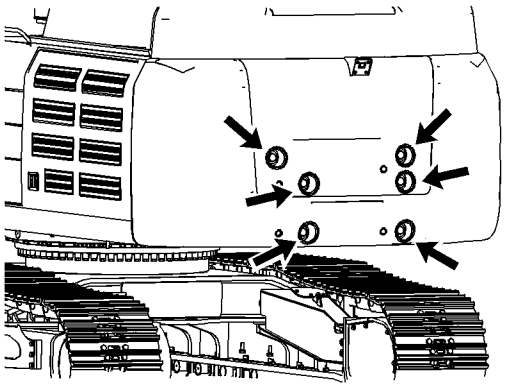


Illustration 298 g02102177

5. Remove the six counterweight mounting bolts and six washers. Inspect the bolts for damage. If the bolts are damaged, replace the bolts.

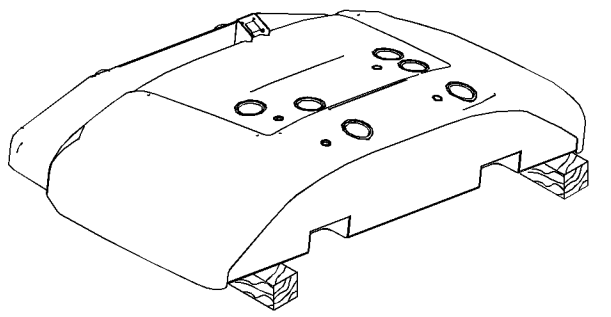


Illustration 299 g02102179

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

Counterweight Installation

Perform the installation 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 (1990 ± 220 lb ft).

Note: After the counterweight has been installed, reconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, “Camera Harness - Disconnect and Connect” for more information.

Counterweight Removal and Installation for Machines That Are Equipped with a System for the Removal of the Counterweight

⚠ 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

Note: Before you remove the counterweight, disconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, “Camera Harness - Disconnect and Connect” for more information.

1. Position the machine on a surface that is hard and level.

2. Position the upper structure parallel to the tracks. Lower the work tool to the ground.

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

Illustration 300 g00104545

4. Move 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.

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

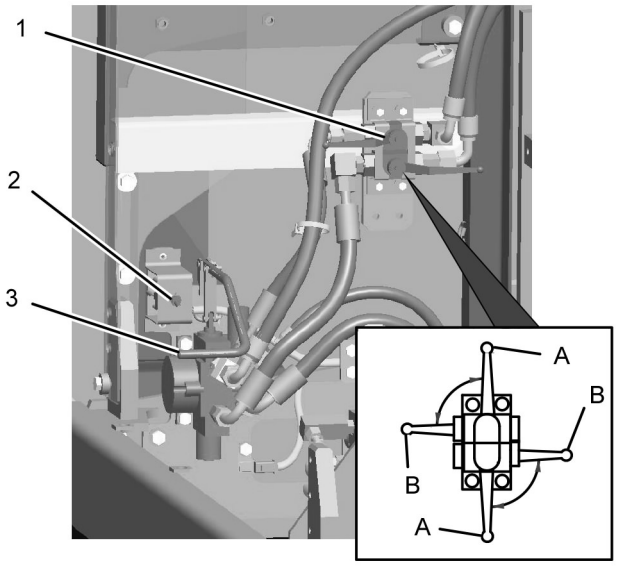


Illustration 301 g01430969

(1) Stop Valves
(2) Switch
(3) Control Lever
(A) CLOSED position
(B) OPEN position

6. Move switch (2) to the ON position.

7. Move both stop valves (1) to the OPEN position.

8. Move control lever (3) upward in order to support the counterweight and relieve the weight on the counterweight mounting bolts. This will keep the counterweight from possibly sliding off when the counterweight mounting bolts are removed. There should be a slight tension on the chains.

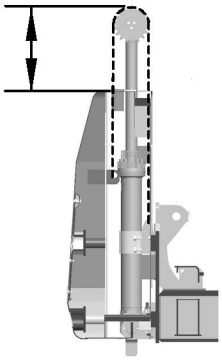


Illustration 302 g06510567

9. 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.

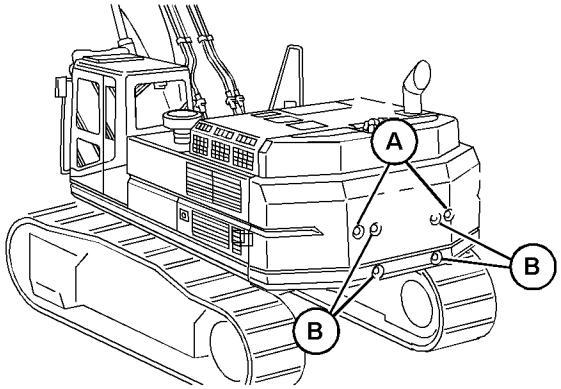


Illustration 303 g06547978

10. Remove bolts (A) from the counterweight.

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

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

12. Loosen bolts (A) two full revolutions.

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

13. Remove remaining bolts (B).

14. 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.

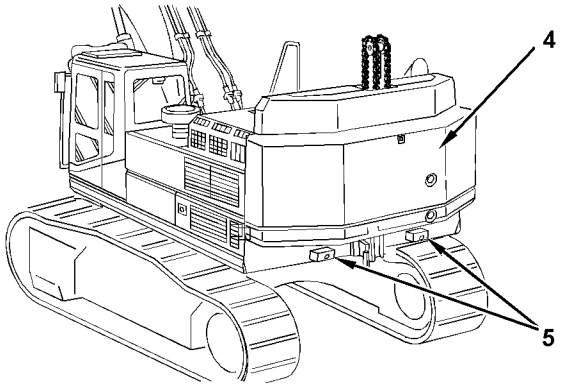


Illustration 304 g02103033

(4) Counterweight
(5) Retaining Pin

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

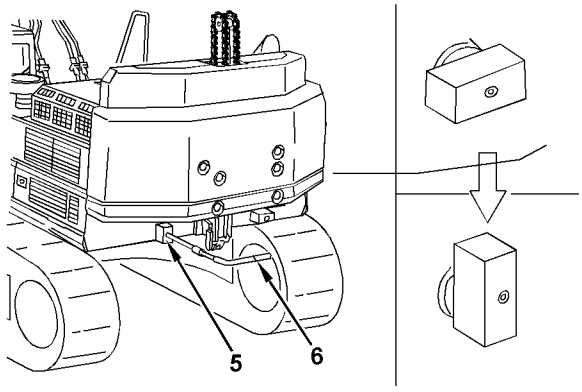


Illustration 305 g02103036

(5) Retaining Pin
(6) Extension

16. Use a ratchet wrench and an extension (6) in order to rotate each retaining pin (5). Retaining pins (5) require 90 degrees of rotation. The retaining pins are now in the UNLOCKED position.

⚠ 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.

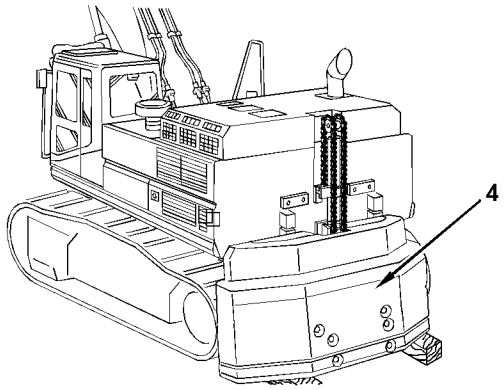


Illustration 306 g02103038

(4) Counterweight.

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

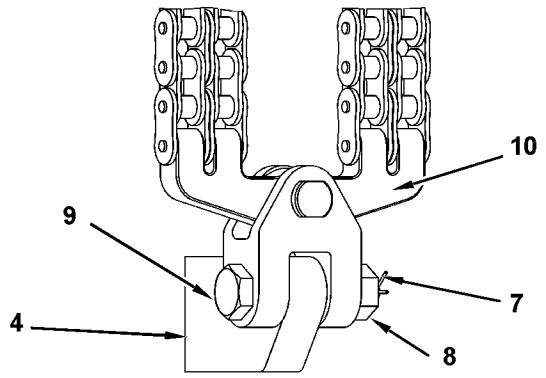


Illustration 307 g02103040

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

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

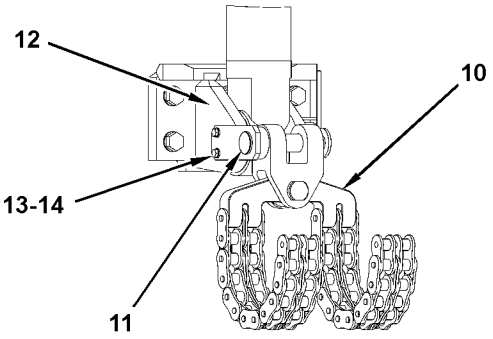


Illustration 308 g02103041

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

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

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

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

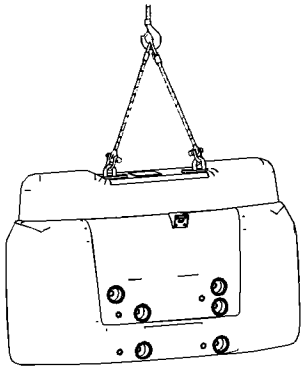


Illustration 309 g02097577

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

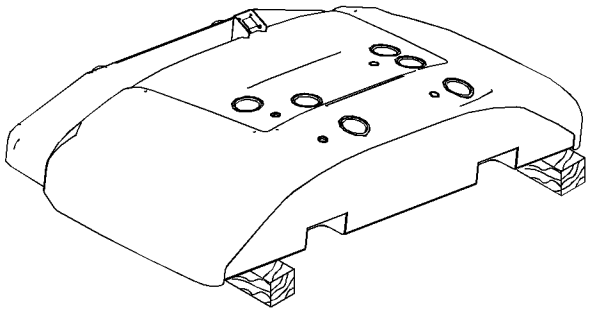


Illustration 310 g02102179

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

Counterweight Installation

Perform the installation procedure in reverse order.

Note: Make sure that you remove pin (11), bolt (13), and washer (14). Return these parts to the storage box.

Note: Before you install the counterweight mounting bolts, make sure that the retaining pins are in the LOCKED position and 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).

Note: After the counterweight has been installed, reconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, “Camera Harness - Disconnect and Connect” for more information.

i08119264

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

WARNING

Improper lifting and improper tie-downs can allow the load to shift or fail and cause injury or damage. Use only properly rated cables and slings with lift and tie down points provided.

Follow the instructions in Operation and Maintenance Manual, “Lifting and Tying Down the Machine” for the proper technique for securing the machine. Refer to Operation and Maintenance Manual, “Specifications” for specific weight information.

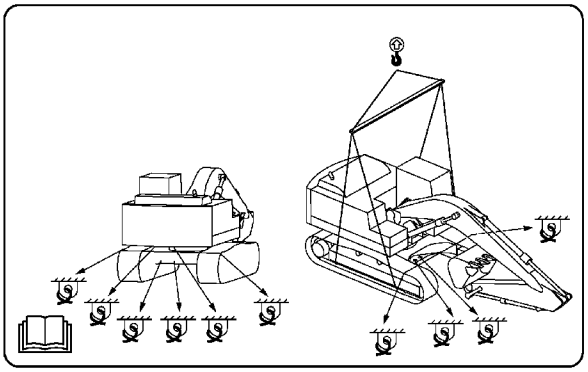


Illustration 311 g02444887

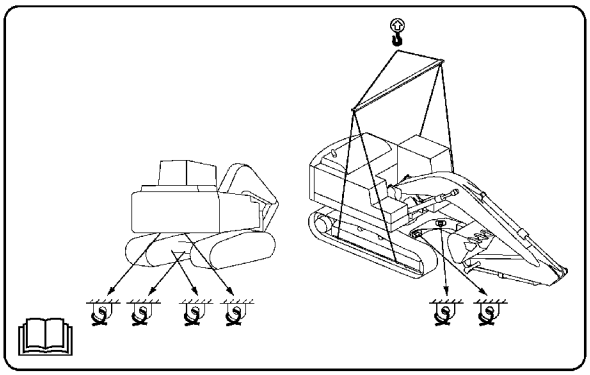


Illustration 312 g02097575

The lift and tie-down film is located near the base of the boom.

Lifting the machine

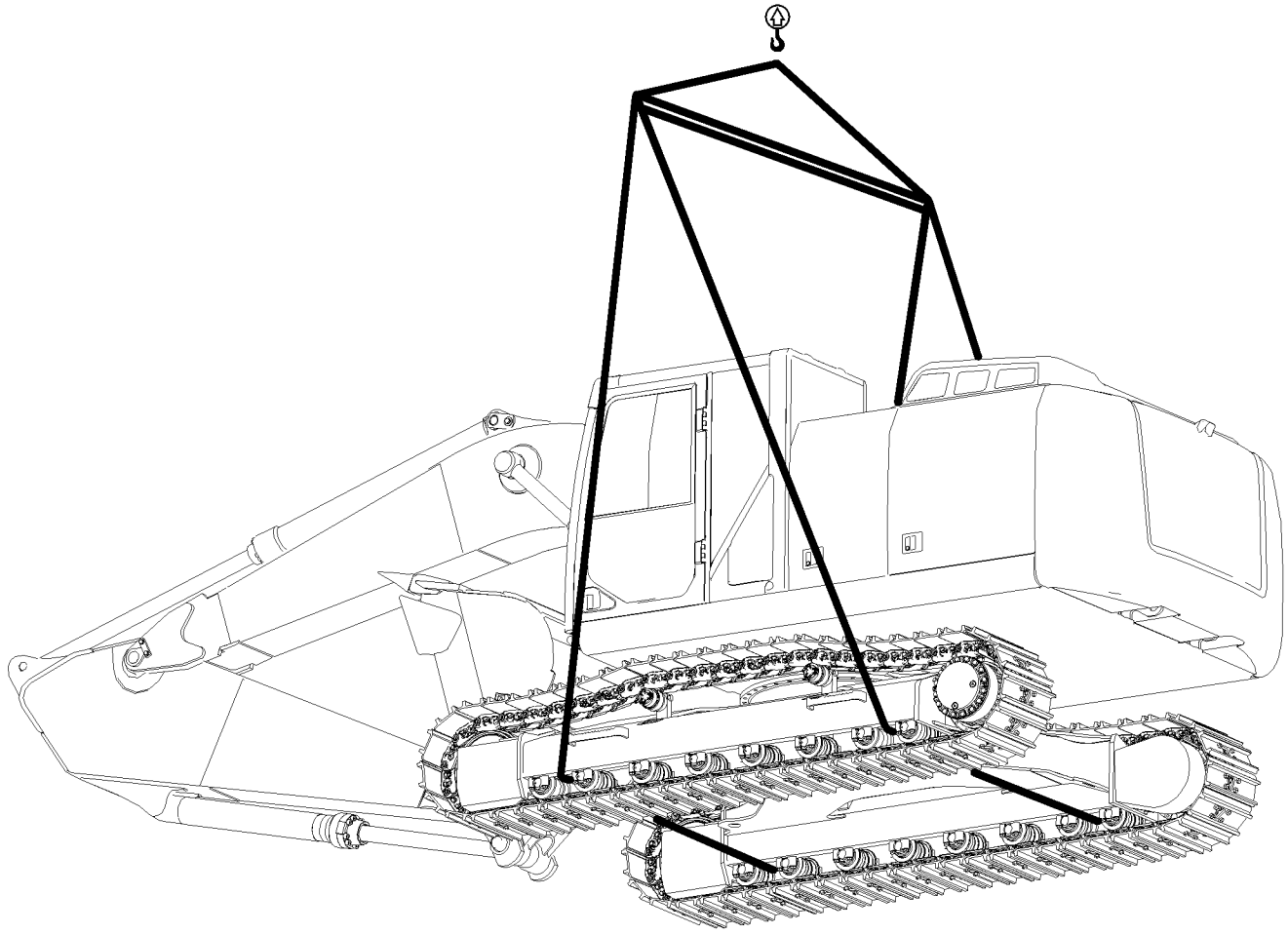


Illustration 313 g02793463

The machine center of gravity is at the center of the swing gear.

Lifting Point – To lift the machine, attach the lifting devices to the lifting points.

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.

Note: Only lift objects from approved lifting points and with approved lifting devices

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. Move the hydraulic lockout control to the LOCKED position.
4. Thread the cable between the first and second rollers at each end of the track.
5. Do not use the foot step as a lifting point.
6. If the full length roller guard is equipped,
   a. (Option 1) remove the guard and thread the lifting cables between the first and second rollers at each end of the track.
   b. (Option 2) pass the cables under the track making sure that the lifting cables are between the track grousers.

Note: if the machine weight is heavier than 54650 kg (120482 lb), use (Option 1) to prevent a potential risk of track bending or damage.

7. Apply the proper protector to prevent machine/wire damage and slippage. Make sure that the rollers are not affected by the load.

Tying Down the Machine

There are two methods that can be used to tie down a machine. Local and/or regional regulations will determine which method to use.

Note: Obey all local and regional governmental regulations.

Preferred Method

When allowed, a combination of frictional lashing and direct lashing is the preferred method to tie down a machine.

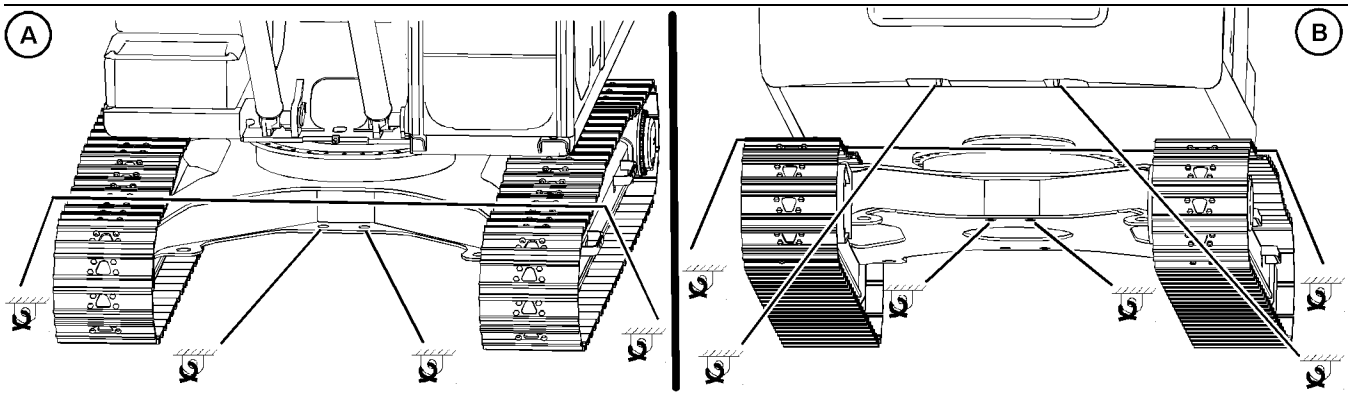


Illustration 314 g02793465

Frictional and direct lashing

(A) Front of the machine (B) Rear of the machine

Diagonal Lashing

In areas where frictional lashing is not allowed, diagonal lashing can be used as shown below.

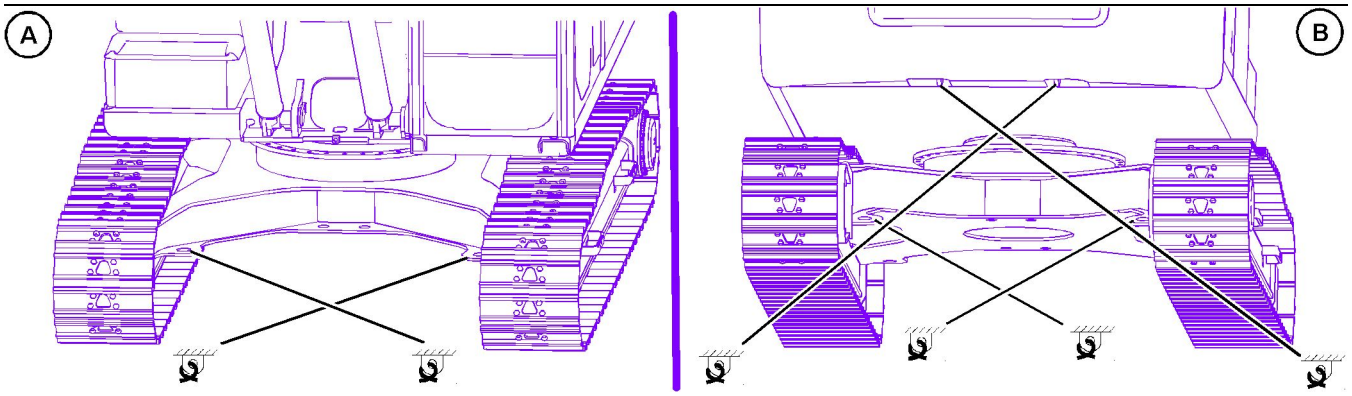


Illustration 315 g06553236

(A) Front of the machine (B) Rear of the machine

Tying Down the Machine

Tie Down Point – To tie down the machine, attach the tie-downs to the tie-down points.

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 shackles for tying down the machine.

2. 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.

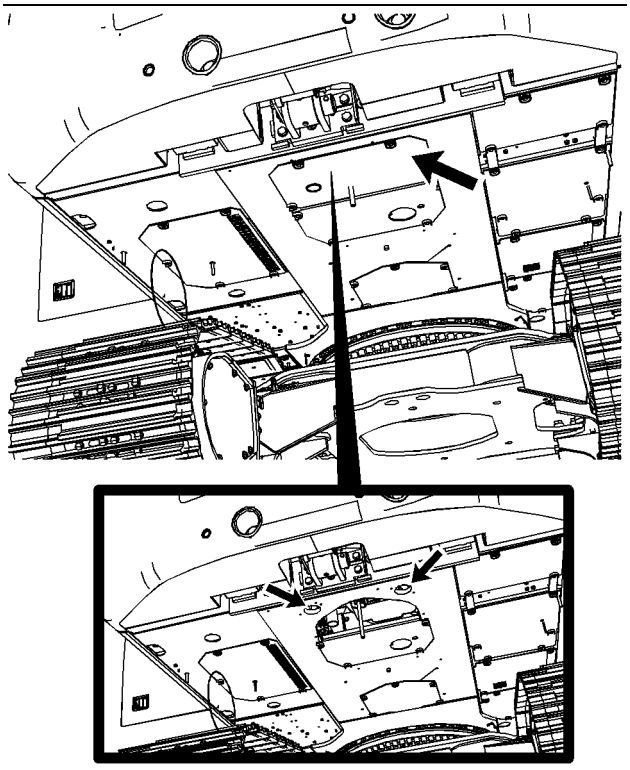


Illustration 316 g06011484

3. Two rear eyes on the upper frame are hidden by a bottom guard. Remove the bottom guard to access the two rear eyes on the upper frame. The approximate weight of the bottom guard is 16 kg (35 lb).

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

5. If there is a requirement of diagonal lashing for tying down, use the proper tie-down point on the lower frame. Set the lashing angle which is on the longitudinal axis of the machine and the cable, at 30 degrees to 50 degrees.

Lifting the Machine Segments

Bucket

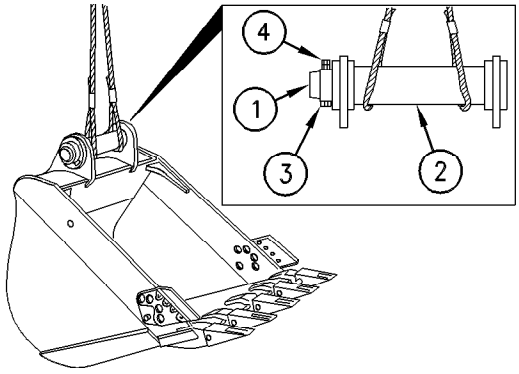


Illustration 317 g00115251

(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).

Counterweight

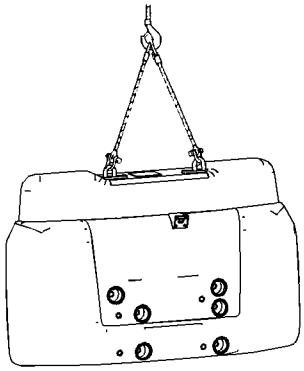


Illustration 318 g02097577

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

Towing Information

i05767775

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

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

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

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

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

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

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

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

Do not tow a loaded machine.

Consult your Cat dealer for the equipment that is necessary for towing a disabled machine.

Parking Brake Release

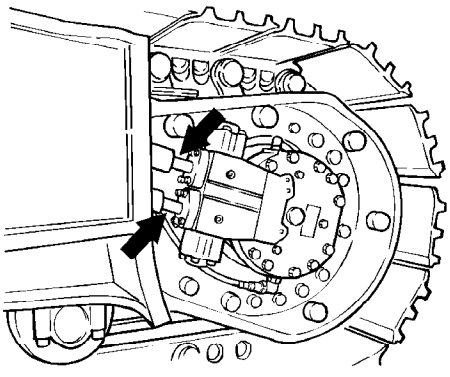


Illustration 319 g00692529

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 line.

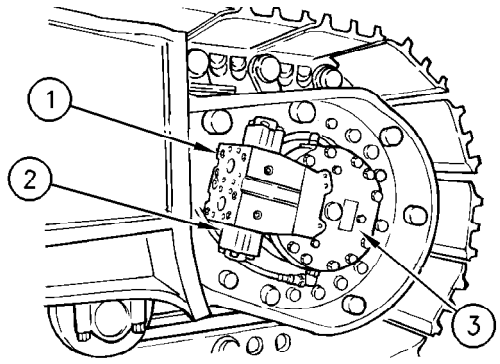


Illustration 320 g00692530

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

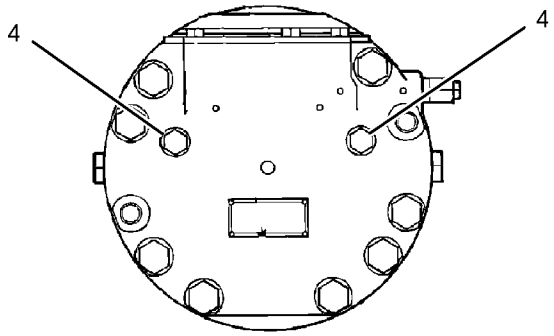


Illustration 321 g02409157

5. Remove plugs (4).

Table 105

Washer Dimensions			
Callout	Inner diameter (I.D.)	Outer Diameter (O.D.)	Thickness
(5)	11 mm (0.43 inch)	25 mm (0.98 inch)	3 mm (0.12 inch)
(6)	11 mm (0.43 inch)	19 mm (0.75 inch)	6 mm (0.24 inch)
Bolt			
(7)	M8 x 1.25 x 90 mm		

6. Install one washer (5) in each hole.

7. Install one washer (6) on top of each washer (5).

8. Insert one M8 x1.25 x 90 mm bolt (7) into each hole and tighten until snug against the washers and travel motor head.

9. Alternately turn each bolt one half turn until each bolt has been rotated two turns.

Note: If longer bolts are used, install the appropriate thicker washers in order to maintain required spacing.

⚠ 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).

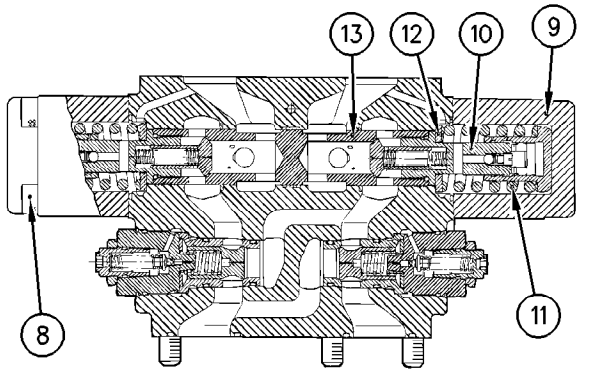


Illustration 322 g00692532

10. 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.

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

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

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

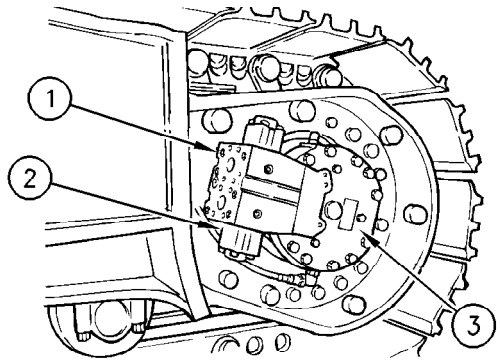


Illustration 323 g00692530

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

15. Repeat Steps 1 through 14 for the other travel motor.

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

16. 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 106

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

(continued)

(Table 106, contd)

Item Number	Part	Recommended Torque	
		N·m	lb ft
(8)			

Retrieval of Machine

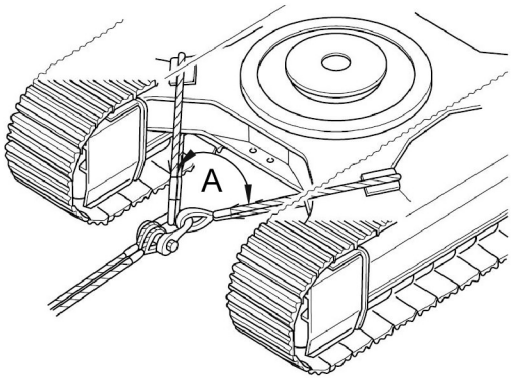


Illustration 324 g02533437

Note: Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. The permissible force for the lower frame is 100 percent of the gross weight of the towed machine.

Note: In order to prevent damage to the wire rope or the lower frame of the machines, use protective sleeves on the corners of the lower frame.

Retrieve the disabled machine carefully. The applied load for each wire rope should be equal. The angle (A) between each wire rope should be 60 degree maximum. Operate the machine at a low speed.

Lightweight Towing

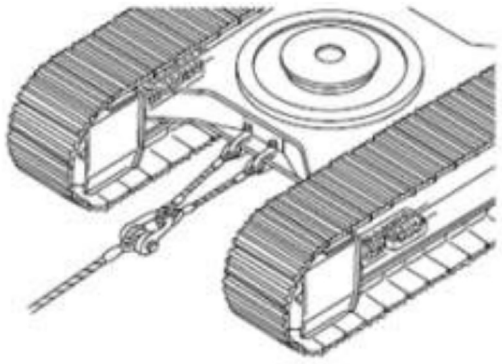


Illustration 325 g03204763

The maximum load for lightweight towing is 167000 N (123173 lb).

Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. Operate the machine at a low speed.

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.

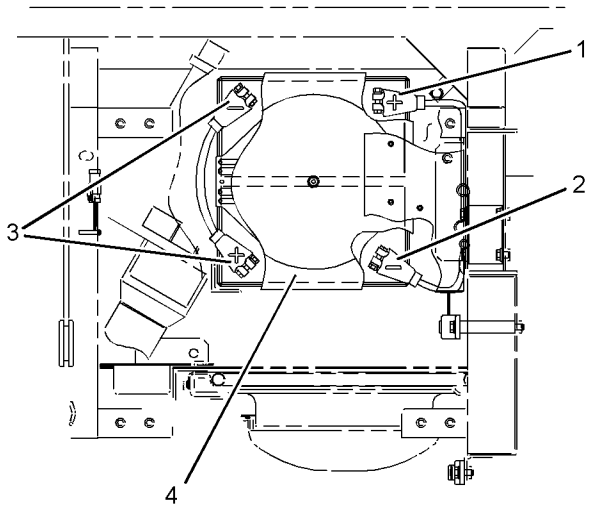


Illustration 326 g01226420

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.

i06698125

Engine Starting with Auxiliary Start Receptacle
(If Equipped)

SMCS Code: 1000; 7000

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: TFG1–Up

S/N: RGH1–Up

S/N: KCN1–Up

S/N: MZW1–Up

S/N: KFX1–Up

S/N: MPZ1–Up

S/N: WHZ1–Up

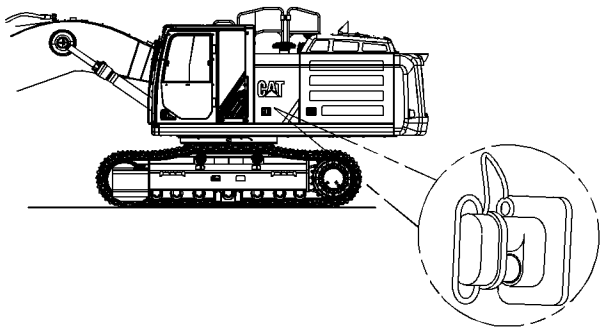


Illustration 327 g02027058

Typical location

Some Caterpillar products may be equipped with an auxiliary start receptacle as a standard part. If your machine is not equipped with an auxiliary start receptacle, the machine can be equipped with an auxiliary start receptacle from parts service. This will ensure that a permanent receptacle is always available in order to jump start the machine.

There are two cable assemblies that can be used to jump start the stalled machine. You can jump start the stalled machine from another machine that is equipped with an auxiliary start receptacle or with an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

1. Determine the reason that the engine will not start.

Reference: Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for more information.

2. Move the transmission direction control lever on the stalled machine to NEUTRAL. Engage the hydraulic lockout control. Engage the parking brake. Lower all work tools to the ground. Move all controls to HOLD.

3. Turn the engine start switch key on the stalled machine to the OFF position. Turn off all accessories.

4. Turn the battery disconnect switch on the stalled machine to ON.

5. Move the machine that is being used as a power source close to the stalled machine. The jump start cables should reach the batteries on both machines. **DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.**

6. Stop the engine on the machine that is being used as a power source. If you use an auxiliary power source, turn off the charging system.

7. Connect the appropriate jump start cable to the auxiliary start receptacle on the stalled machine.

8. Connect the other end of the jump start cable to the auxiliary start receptacle of the machine that is being used as a power source.

9. Start the engine on the machine that is being used as a power source or energize the charging system on the auxiliary power source.

10. Wait for a minimum of two minutes while the batteries in the stalled machine partially charge.

11. Attempt to start the stalled engine.

12. Immediately after the stalled engine starts, disconnect the jump start cable from the power source.

13. Disconnect the other end of the jump start cable from the stalled machine.

14. Conclude the failure analysis on the starting charging system of the stalled machine, as required. Check the machine while the engine is running and the charging system is in operation.

Maintenance Section

Maintenance Access

i06954982

Access Door and Cover Locations

SMCS Code: 726A-CH

Engine Hood

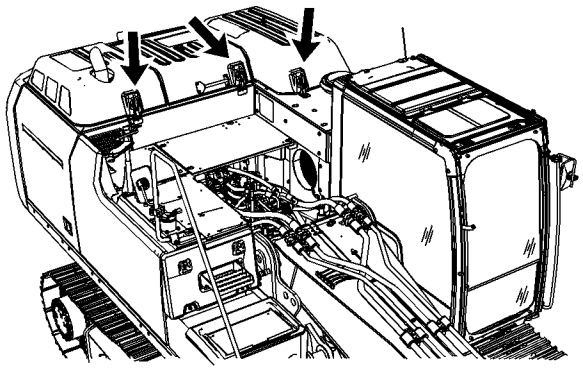


Illustration 328 g02016615

Allows access to the engine and coolant tank.

1. Unlatch the engine hood.

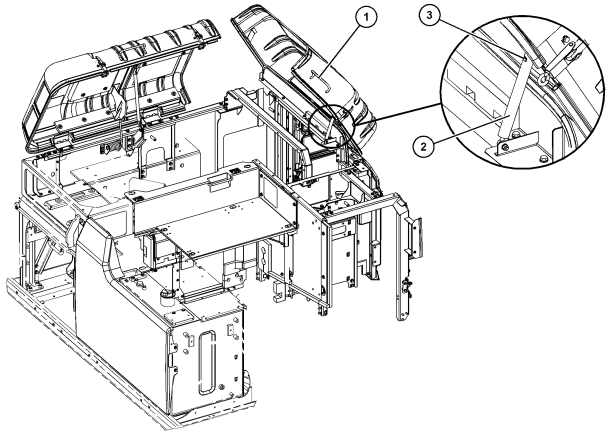


Illustration 329 g06175095

2. Use handle (1) to open the engine hood.

3. Fully open engine hood. Gas spring (2) will lock in place to hold the engine hood open.

WARNING

Operation of the Push Button Release for the Engine Hood

When closing the engine hood, only operate the push-button release by hand.

Failure to remove hands from the push-button release before closing the engine hood could result in personal injury.

Be sure to remove hands from the push-button release before completely closing the engine hood.

NOTICE
Do not add pressure to the engine hood when open.

WARNING

When closing the engine hood, Do Not operate the push-button release by foot.

Operation of the push-button release by foot could result in damage to the gas spring of the closing mechanism and/or personal injury.

Only operate the push-button release for closing the engine hood by hand.

4. To close the engine hood, support the engine hood with handle (1). Press the push-button release (3) to unlock gas spring (2). Release the push button and slowly close the engine hood.

5. Latch the engine hood.

Left Rear Access Door

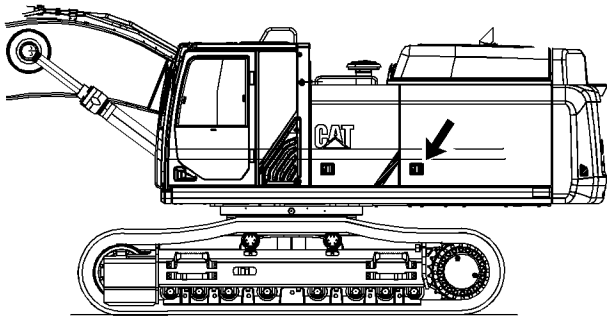


Illustration 330 g02108657

Left Front Access Door

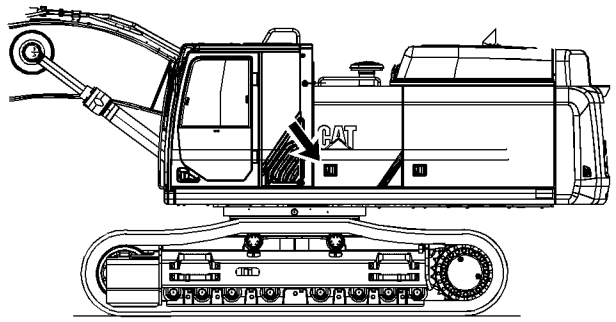


Illustration 331 g02108659

Right Access Door

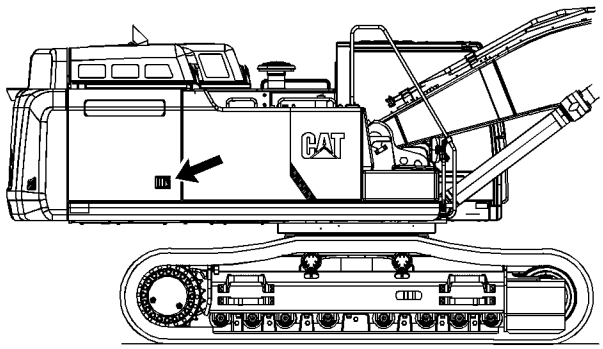


Illustration 332 g02108660

Lubricant Viscosities and Refill Capacities

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Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 7581

General Information for Lubricants

When you are operating the machine in temperatures below −20°C (−4°F), refer to Special Publication, SEBU5898, “Cold Weather Recommendations”. This publication is available from your Cat dealer.

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

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

Selecting the Viscosity

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

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

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

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

Engine Oil

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

Cat DEO-ULS or oils that meet the Cat ECF-3 specification and the API CJ-4 are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification and the API CJ-4 and ACEA E9 oil categories have been developed with limited sulfated ash, phosphorus, and sulfur. These chemical limits are designed to maintain the expected aftertreatment devices life, performance, and service interval. If oils meeting the Cat ECF-3 specification and the API CJ-4 specifications are not available, oils meeting ACEA E9 may be used. ACEA E9 oils meet the chemical limits designed to maintain aftertreatment device life. ACEA E9 oils are validated using some but not all ECF-3 and API CJ-4 standard engine performance tests. Consult your oil supplier when considering use of an oil that is not Cat ECF-3 or API CJ-4 qualified.

Failure to meet the listed requirements will damage aftertreatment-equipped engines and can negatively impact the performance of the aftertreatment devices. The Diesel Particulate Filter (DPF) will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)
- Selective Catalytic Reduction (SCR)
- Lean NOx Traps (LNT)

Other systems may apply.

Table 107

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	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS	SAE 15W-40	−9.5	50	15	122
Pump Coupling	**Cat DEO-ULS**	SAE 10W-30	−18	40	0	104

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 follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. 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 intervals 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 108

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 Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

Other Fluid Applications

Table 109

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 SYN Cold Weather commercial TO-4**	SAE 0W-20	-40	0	-40	32
	Cat TDTO	SAE 10W	−30	0	-22	32
		SAE 30	−30	35	−22	95
		SAE 50	-15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−25	25	-13	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
Track Idlers and Track Rollers	**Cat DEO (single grade) 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

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 110

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
	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

Diesel Fuel Recommendations

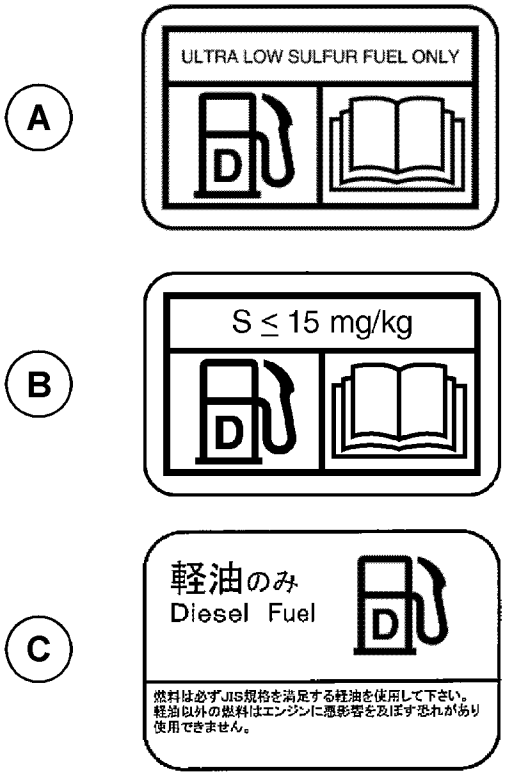

Illustration 333 g03218956

(A) NACD film
(B) EAME film
(C) Japan film

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.

NOTICE
Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤10ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

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

- **Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)**
- **Adversely impact the performance and life of aftertreatment devices (cause loss of performance)**
- **Reduce regeneration intervals of aftertreatment devices**
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

Failures that result 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. For Tier 4/Stage IIIB/Stage IV certified engines always follow operating instructions. Fuel tank inlet labels are installed to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels, lubricants, and Tier 4 requirements. This manual may be found on the Web at Safety.Cat.com.

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.

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (15 ppm sulfur or less, per “ASTM D975”). In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel (10 ppm sulfur or less, per “EN 590”). The final blend must have 15 ppm sulfur or less.

This machine has not been certified to use biodiesel inside Japan. Contact your Cat dealer for additional information.

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

When biodiesel fuel is used, certain guidelines must be followed. Biodiesel fuel can influence the engine oil, aftertreatment devices, non-metallic, fuel system components, and others. Biodiesel fuel has limited storage life and has limited oxidation stability. Follow the guidelines and requirements for engines that are seasonally operated and for standby power generation engines.

To reduce the risks associated with the use of biodiesel, the final biodiesel blend and the biodiesel fuel used must meet specific blending requirements.

All the guidelines and requirements are provided in the latest revision of Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”. This manual may be found on the Web at Safety.Cat.com.

Coolant Information

The information provided in this “Coolant Recommendation” section should be used with the “Lubricants Information” provided in the latest revision of Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”. This manual may be found on the Web at Safety.Cat.com.

The following two types of coolants may be used in Cat diesel engines:

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/ Coolant)

NOTICE
Never use water alone as a coolant. Water alone is corrosive at engine operating temperatures. In addition, water alone does not provide adequate protection against boiling or freezing.

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Capacities (Refill)

SMCS Code: 1000; 7000

Table 111

Approximate Refill Capacities			
Component or System	**Liters**	**US gal**	**Recommended Type**
Fuel Tank	720	190	Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
Cooling System	50	13	
Engine Crankcase with Filter	38	10	
Hydraulic System(1)	257	67.9	
Each Swing Drive	10	2.6	
Each Final Drive	15	4	
Pump Coupling	0.75	0.20	Cat DEO SAE 10W-30
	kg	**lbs**	
Swing Gear	40	88.2	Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.
Refrigerant(2)	0.9	2.0	R-134a
	mL	**oz**	
Refrigerant Oil(2)	240	8.2	Polyalkylene Glycol (PAG) Oil

(1) The amount of hydraulic fluid that is needed to refill the hydraulic system after performing Operation and Maintenance Manual, “Hydraulic System Oil - Change”
(2) Refer to Service Manual, “Air Conditioning and Heating R-134a for All Caterpillar Machines” for additional information

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

i04158662

Service Interval Chart

SMCS Code: 7000

The service interval chart is located inside the cab and on the window.

Refer to this Operation and Maintenance Manual, “Maintenance Interval Schedule” for the correct maintenance intervals and procedures that are specific to your machine.

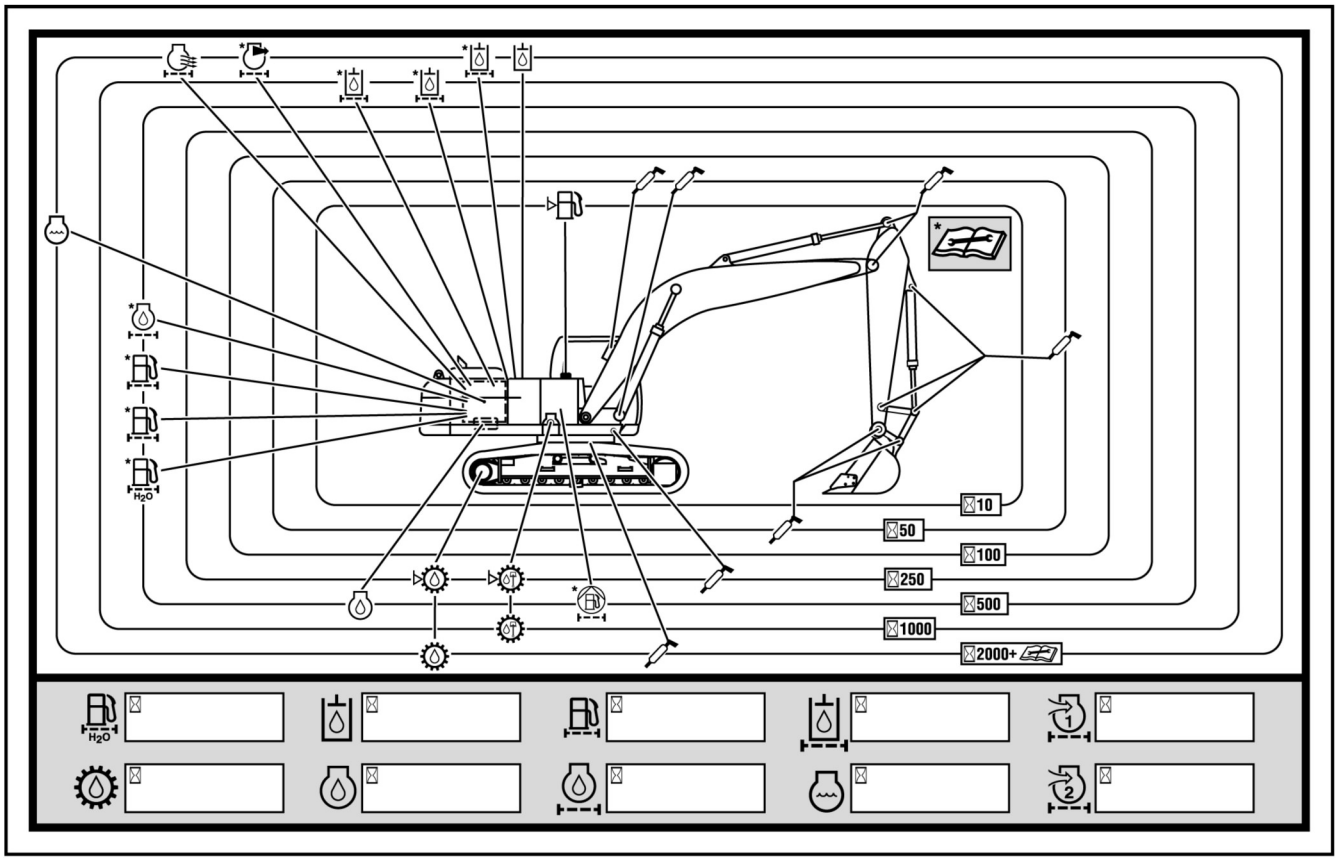

Illustration 334 g02352806

Service hour interval – Hourly interval in which a maintenance procedure should be performed.

Coolant level – Check the coolant level.

Cooling system coolant – Change the ELC (Extended Life Coolant) .

Engine air filter primary element – Clean or replace the primary air filter element.

Engine air filter secondary element – Replace the secondary air filter element.

Engine oil level – Check the engine oil level.

Engine oil – Change the engine oil.

Engine oil filter – Change the engine oil filter.

Final drive oil level – Check the final drive oil level.

Final drive oil – Change the final drive oil.

Fuel level – Check the fuel level.

Fuel system filter – Replace the fuel system filters.

Fuel system water separator – Drain the water separator.

Fuel system water separator element – Replace the fuel system water separator element.

Fumes Disposal Filter Element – Replace the fumes disposal filter element.

Grease zerk – Lubricate the designated locations.

Hydraulic oil level – Check the hydraulic oil level.

Hydraulic oil – Change the hydraulic oil.

Hydraulic oil filter – Change the hydraulic oil filter.

Swing drive oil level – Check the swing drive oil level.

Swing drive oil – Change the swing drive oil.

i07327201

System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

⚠ WARNING

Personal injury or death can result from sudden machine movement.

Sudden movement of the machine can cause injury to persons on or near the machine.

To prevent injury or death, make sure that the area around the machine is clear of personnel and obstructions before operating the machine.

Coolant System

⚠ WARNING

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

To relieve the pressure from the coolant system, turn off the machine. Allow the cooling system pressure cap to cool. Remove the cooling system pressure cap slowly to relieve pressure.

Hydraulic System

The release of hydraulic pressure in a hydraulic circuit is required before service is performed to that hydraulic circuit. Release the pressure in the following hydraulic circuits before any service associated with that hydraulic circuit is performed.

- Boom hydraulic circuit
- Stick hydraulic circuit
- Bucket hydraulic circuit
- Swing hydraulic circuit
- Travel hydraulic circuit
- Attachment hydraulic circuits (if equipped)
- Pilot hydraulic circuit
- Return hydraulic circuit

Note: Refer to the Disassembly and Assembly Manual for additional information concerning service of the components of specific hydraulic circuits.

Release of Hydraulic Pressure from the Main Hydraulic System

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the work tools have been lowered to the ground, and the oil is cool before performing any service. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

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

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

Dispose of all fluids according to local regulations and mandates.

Perform the following steps to release the hydraulic system pressure from the main hydraulic system. For information on any fluids and capacities, refer to this Operation and Maintenance Manual, "Lubricant Viscosities" and "Capacities (Refill)" for more information.

Note: For additional safety, wrap hydraulic joint with material that could absorb/reduce any residual pressure of oil when released. Loosen the joint slowly, pause, and carefully check hydraulic joint for tensions indicating presence of pressure or spring force in lines or components.

1. Position the machine on level ground.

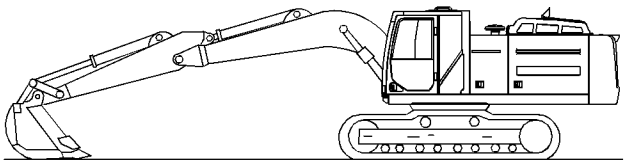

Illustration 335 g02137969

2. Fully retract the stick cylinder rod. Adjust the position of the linkage so that the work tool is parallel to the ground. Lower the boom until the work tool is flat on the ground. Refer to Illustration 335 .

3. Release the system pressure from the implement and swing hydraulic circuits.

a. Shut off the engine.

Note: Perform Step 3b through Step 3d immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

b. Turn the engine start switch to the ON position without starting the engine.

c. Place the hydraulic activation control lever in the UNLOCKED position.

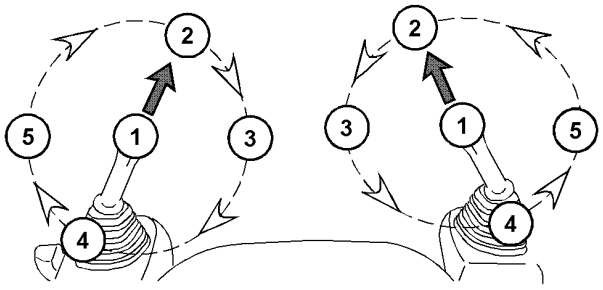

Illustration 336 g03315377

d. Move both joysticks in a circular motion to the FULL STROKE positions multiple times until the pilot accumulator has been exhausted.

Note: Pilot pressure is required to relieve hydraulic system pressure.

e. Place the hydraulic activation control lever in the LOCKED position.

f. Start the engine to recharge pilot accumulator.

Note: Do not activate any levers when recharging pilot accumulator.

g. Shut off the engine.

h. Repeat Step 3b through Step 3g until the high-pressure lines have been released.

Each time the accumulator is recharged, start the joysticks at different positions or rotate in the reverse direction. Doing so will ensure that the same circuit is not being relieved each time.

Note: Pressure could build on these circuits after pressure is released due to linkage settling or bucket rolling.

Note: To release pressure in a single circuit, move the joysticks or pedals of the hydraulic circuit that requires service to the full stroke positions after moving joysticks in a circular motion. Moving the joysticks or pedals to the full stroke position will release the high pressure only in that single hydraulic circuit. Moving the joysticks or pedals to the full stroke position will also release any pressure that might be present in the pilot hydraulic circuit.

4. Release hydraulic system pressure in the attachment circuits, if equipped.

a. Start the engine to charge pilot accumulator.

b. Shut off the engine.

Note: Perform Step 4c through Step 4e immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

c. Turn the engine start switch to the ON position without starting the engine.

d. Place the hydraulic activation control lever in the UNLOCKED position.

e. Activate the switch or pedal for the attachment circuit.

f. Place the hydraulic activation control lever in the LOCKED position.

g. Start the engine to recharge pilot accumulator.

Note: Do not activate any pedals or switches when recharging pilot accumulator.

h. Shut off the engine.

i. Repeat Step 4a through Step 4h for each attachment circuit.

5. After releasing the hydraulic pressure in each of the desired hydraulic circuits, place the hydraulic activation control lever in the LOCKED position.

6. Turn the engine start switch to the OFF position.

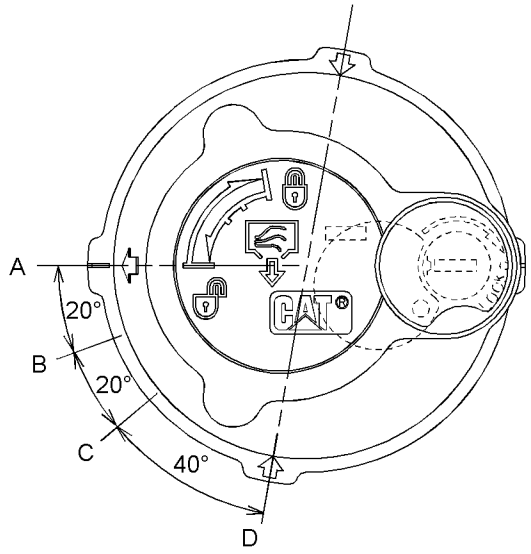

Illustration 337 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

7. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 337 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push down the filler cap and move the arrow from position (C) to position (D).

Note: The travel hydraulic circuit is open to the hydraulic tank. Pressure from the travel circuit is released by releasing pressure from the return circuit.

8. Release the pressure that may be present in the boom circuit to remove the risk of residual pressure in the line. Make sure that the engine start switch is in the OFF position and the pressure in the hydraulic tank has been released.

For machines equipped with a boom lowering control valve, there is a manual valve located near the base of the boom or a valve on the load control valve on the boom cylinder. Refer to Operation and Maintenance Manual, Equipment Lowering with Engine StoppedMachine with a Boom Lowering Control Valve for more information.

For machines **NOT** equipped with a boom lowering control valve, refer to Operation and Maintenance Manual, Equipment Lowering with Engine StoppedMachine without a Boom Lowering Control Valve for more information.

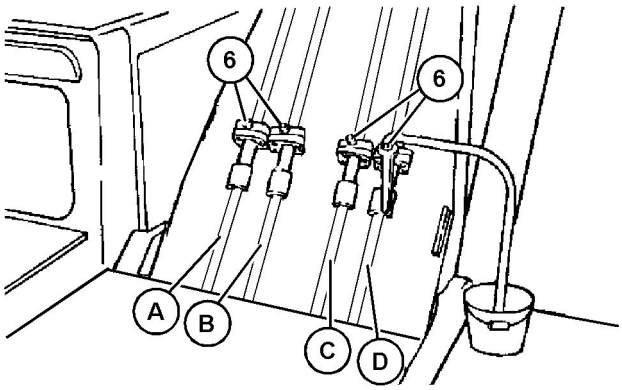

Illustration 338 g06234927

Stick and Bucket circuit locations

(6) Purge Screws (If Equipped)
(A) Circuit A
(B) Circuit B
(C) Circuit C
(D) Circuit D

9. If the purge screws are equipped, perform the following pressure release procedure for each Stick and Bucket circuit. Refer to Illustration 338 and Table 112 for the stick and bucket circuit locations.

Table 112

Stick and Bucket Circuit Locations				
Sales Model	**Circuits**			
	A	**B**	**C**	**D**
326 / 329 / 330	Stick In	None	Stick Out	None
336 / 340	Bucket Close	Stick In	Stick Out	Bucket Open
349 / 352	Stick Out	Stick In	Bucket Close	Bucket Open

a. Connect one end of a drain hose to purge screw (6). Insert the other end of the drain hose into an empty container.

b. Loosen purge screw (6) by 1/2 turn. Hydraulic oil will be drained from the drain hose to the container.

Note: Dispose of drained fluid according to local regulations.

c. Tighten purge screw (6) to a torque of 13 +/- 2 Nm (9 +/- 1 lb ft) after all the hydraulic oil has been drained from the line.

d. Repeat Steps 9a through 9c for all circuits.

e. Remove the drain hose and install hydraulic tank fill cap.

10. The pressure in the multiple hydraulic circuits that require service is now released and lines and components can be disconnected or removed from those hydraulic circuits.

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.

i04807435

Severe Service Application

SMCS Code: 1000

An engine which operates outside of normal conditions is operating in a severe service application.

An engine that operates in a severe service application may need more frequent maintenance intervals in order to maximize the following conditions:

- Reliability
- Service life

The number of individual applications cause the impossibility of identifying all of the factors which may contribute to severe service operation. Consult your Caterpillar dealer for the unique maintenance that may be necessary for your engine.

An application is a severe service application if any of the following conditions apply:

Severe Environmental Factors

- Frequent operation in dirty air
- Frequent operation at an altitude which is above 1525 m (5000 ft)
- Frequent operation in ambient temperatures which are above 32° C (90° F)
- Frequent operation in ambient temperatures which are below 0° C (32° F)

Severe Operating Conditions

- Frequent operation with inlet air which has a corrosive content
- Operation with inlet air which has a combustible content
- Operation which is outside of the intended application
- Operation with a plugged fuel filter
- Extended operation at low idle (more than 20% of hours)
- Frequent cold starts at temperatures below 0° C (32° F)
- Frequent dry starts (starting after more than 72 hours of shutdown)
- Frequent hot shutdowns (shutting down the engine without the minimum of 2 minutes to 5 minutes of cool down time)
- Operation above the engine rated speed
- Operation below the peak torque speed
- Operating with fuel which does not meet the standards for distillate diesel fuel as stated in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Distillate Diesel Fuel”
- Operating with a blend of distillate fuel which contains more than 20 percent biodiesel

Improper Maintenance Procedures (Maintenance Procedures Which May Contribute to a Severe Service Application)

- Inadequate maintenance of fuel storage tanks from causes such as excessive water, sediment, and microorganism growth.
- Extending maintenance intervals beyond the recommended intervals
- Using fluids which are not recommended in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Extending maintenance intervals for changing the engine oil and engine coolant without S·O·S validation

- Extending maintenance intervals for changing air filters, oil filters, and fuel filters
- Failure to use a water separator
- Using filters which are not recommended by Special Publication, PEWJ0074, “2008 Cat Filter and Fluid Application Guide”
- Storing the engine for more than 3 months but less than 1 yr (For information about engine storage, refer to Special Publication, SEHS9031, “Storage Procedure for Caterpillar Products”)

i08106401

Maintenance Interval Schedule

SMCS Code: 7000

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

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

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

Note: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

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

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 6000 hours. S·O·S services after 3000 hours is strongly recommended. Consult your Cat dealer for details.

When Required

Every 10 Service Hours or Daily for First 100 Hours

Every 10 Service Hours or Daily

Every 10 Service Hours or Daily for Machines Used in Severe Applications

Every 50 Service Hours

Every 100 Service Hours of Continuous Hammer Use

Initial 250 Service Hours

Every 250 Service Hours

Every 250 Service Hours for Machines Used in Severe Applications

Every 250 Service Hours of Partial Hammer Use (50% of Service Hours)

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

Every 500 Service Hours

Every 600 Service Hours of Continuous Hammer Use

Every 1000 Service Hours

Every 1000 Service Hours of Partial Hammer Use (50% of Service Hours)

Every 2000 Service Hours

Every Year

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

Every 5000 Service Hours

Every 6000 Service Hours or 3 Years

Every 12 000 Service Hours or 6 Years

i05985684

ARD Spark Plug - Clean

SMCS Code: 1555-070

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

NOTICE
If the engine is running or the key is in the ON position the ARD plug will continue to fire. Turn the key to the OFF position before servicing the ARD plug.

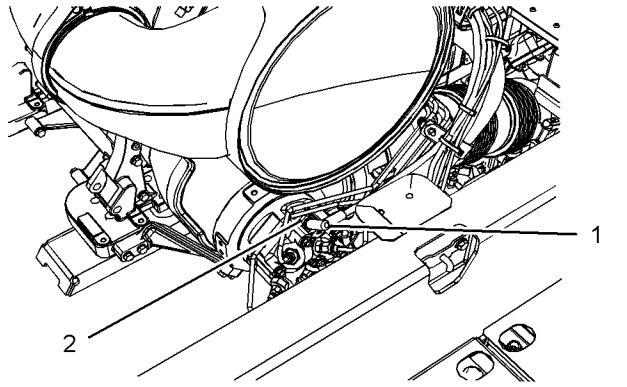

Illustration 339 g02113380

(1) Wiring harness
(2) Spark plug

1. Position the machine on a level surface and lower the bucket to the ground.
2. Move the hydraulic lockout control to the LOCKED position. Stop the engine.
3. Allow the exhaust system to cool before performing this procedure.
4. Unlatch the engine hood and raise the engine hood.
5. Remove any dirt or debris from the area around the spark plug.
6. Remove wire harness (1) from spark plug (2).
7. Use a deep well socket and a breaker bar to loosen the spark plug. If necessary, see your Caterpillar dealer for the part number of the socket. After the spark plug has been loosened, use the socket to remove the spark plug by hand in order to detect problems with the threads.
8. After removing spark plug, clean the ground probe inside the ARD combustion head by running a Plug Bore Brush through the hole in the ARD combustion head. Run the brush through the hole several times.
9. Carefully clean the spark plug using a nonmetallic cleaning pad. If the probe appears to be bent, replace the spark plug. Otherwise, install the original spark plug.

Note: The spark plug may be damaged if the spark plug is dropped. Do not install a spark plug that has been dropped.

NOTICE
Do not overtighten the spark plug. The shell can be cracked and the gasket can be deformed. The metal can deform and the gasket can be damaged. The shell can be stretched. This will loosen the seal that is between the shell and the insulator, allowing combustion pressure to blow past the seal. Serious damage to the engine can occur.

Use the proper torque.

10. Install the spark plug by hand until the spark plug contacts the ARD. Tighten the spark plug to a torque of 43.4 N·m (32 lb ft) to 51.5 N·m (38 lb ft).
11. Connect the wiring harness.
12. Close the engine hood and latch the engine hood.

i04004709

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.

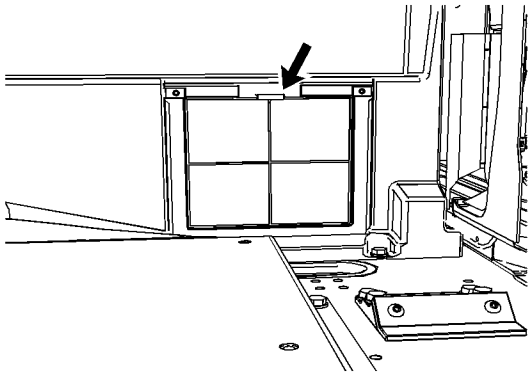

Illustration 340 g02017613

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

1. Slide the operator seat forward.

2. Slide the filter element upward.

3. Tap the air filter in order to remove the dirt. Do not use compressed air to clean the filter.

4. 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.

5. Install the filter element.

NOTICE
Failure to reinstall the filter element for the air conditioning system will contaminate and damage the system components.

i00934864

Battery - Clean

SMCS Code: 1401-070

Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the terminal post with petroleum jelly.

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

i06019968

Battery Electrolyte Level - Check

SMCS Code: 1401-535-FLV; 1401-535; 1401

⚠ WARNING

All lead-acid batteries contain sulfuric acid which can burn the skin and clothing. Always wear a face shield and protective clothing when working on or near batteries.

Note: If the machine is operated in extreme temperatures, check the electrolyte level Every 500 Service Hours or 3 months.

When the engine is not run for long periods of time or when the engine is run for short periods, the batteries may not fully recharge. Ensure a full charge in order to help prevent the battery from freezing.

1. Clean the battery surface with a clean cloth. Clean the terminals and the cable clamps. Coat the clamps and the terminals with silicone lubricant or petroleum jelly. Install the post cover.

2. Inspect the electrolyte level in each battery cell. Maintain the electrolyte level to the bottom of the filler openings. Use distilled water. If distilled water is not available, use clean drinking water.

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; 1401-510; 1401-561; 1401; 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.

i03865109

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-025; 1357-040; 1357-510; 1397-025; 1397-510; 1397-040

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

Note: This engine is equipped with a belt tightener that automatically adjusts the belt to the correct tension.

1. Unlatch the engine hood and raise the engine hood.
2. Inspect the belt for wear and for cracking.
3. If the belt requires replacement, perform Step 3a through Step 3c.

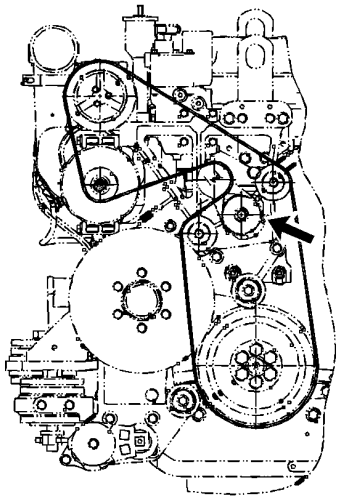

Illustration 341 g02108953

a. Turn the belt tensioner in order to release the tension from the belt.

b. Remove the belt.

c. Install a new belt.

Variable Fan (If Equipped)

1. Unlatch the engine hood and raise the engine hood.

2. Inspect the belt for wear and for cracking.

3. If the belt requires replacement, perform Step 3a through Step 3c.

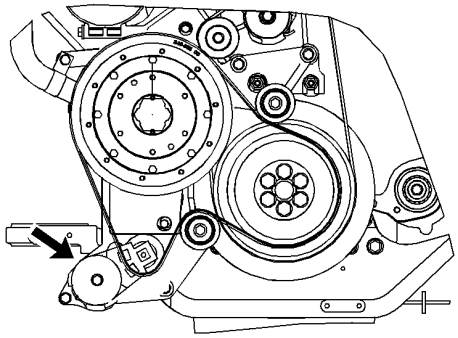

Illustration 342 g02108955

a. Turn the belt tensioner in order to release the tension on the belt.

b. Remove the belt.

c. Install a new belt.

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.

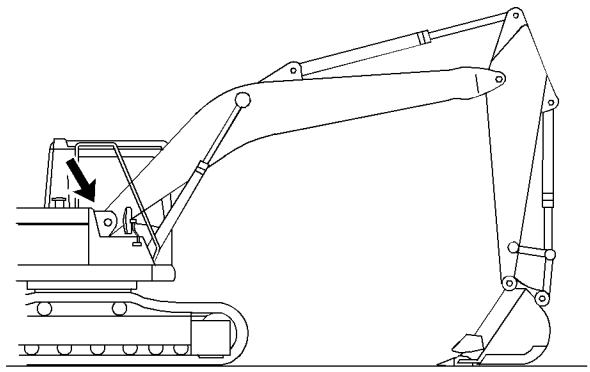

Illustration 343 g02108998

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

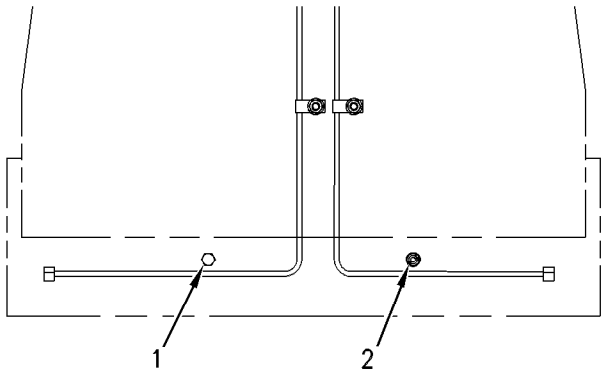

Illustration 344 g00537172

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).

i03865613

Boom, Stick and Bucket Linkage - Lubricate

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

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.

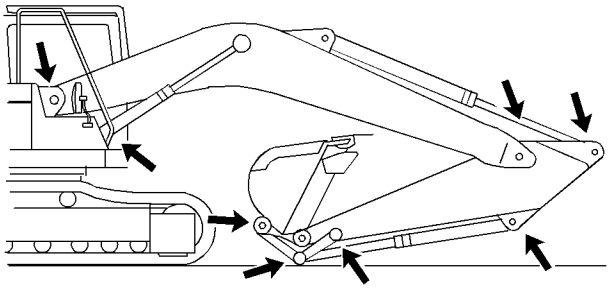

Illustration 345 g02109428

Wipe all fittings before you apply lubricant.

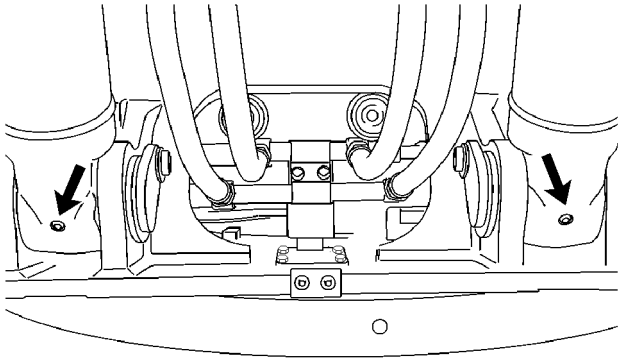

Illustration 346 g01122104

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

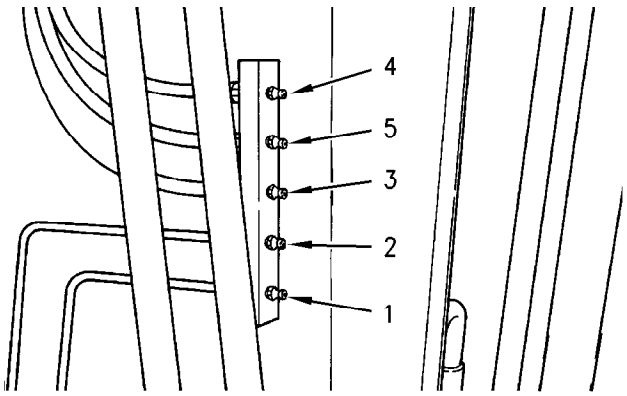

Illustration 347 g00685798

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.

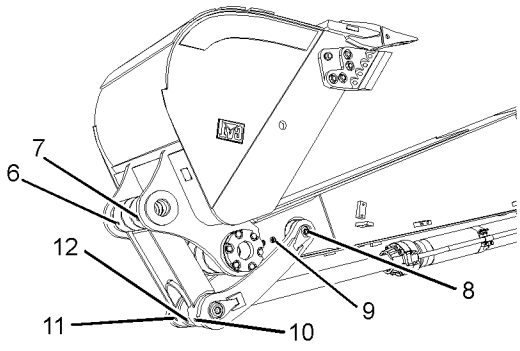

Illustration 348 g01396856

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.

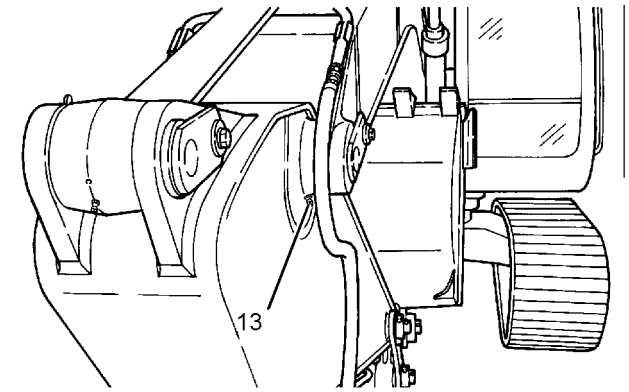

Illustration 349 g01122102

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

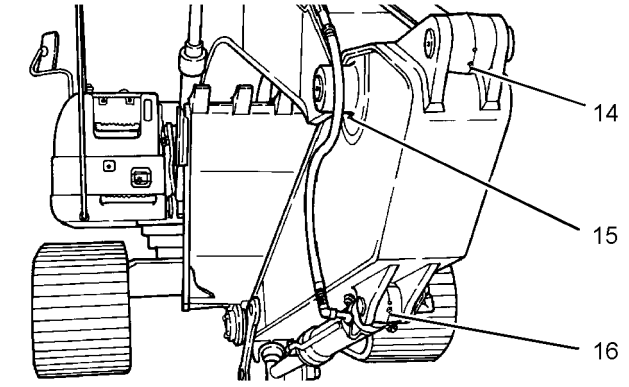

Illustration 350 g01122103

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

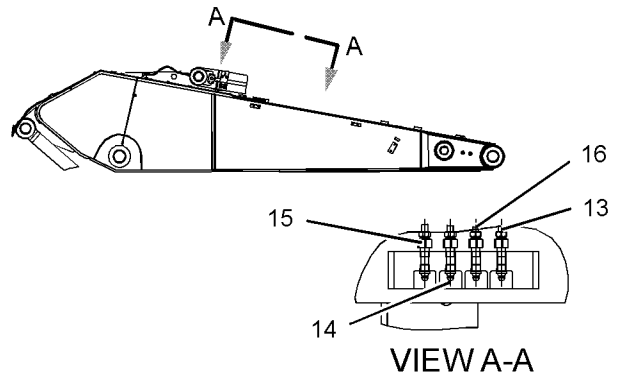

Illustration 351 g01396894

(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: 6513-040; 6513-025

⚠ WARNING

Unexpected machine movement can cause injury or death.

To avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, "Do Not Operate" or similar warning tag to the hydraulic lockout control.

NOTICE
Improperly adjusted bucket clearance could cause galling on the contact surfaces of the bucket and stick, resulting in excessive noise and/or damaged O-ring seals.

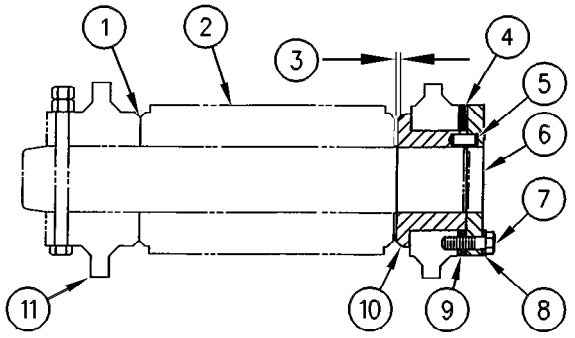

Illustration 352 g00101687

(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).

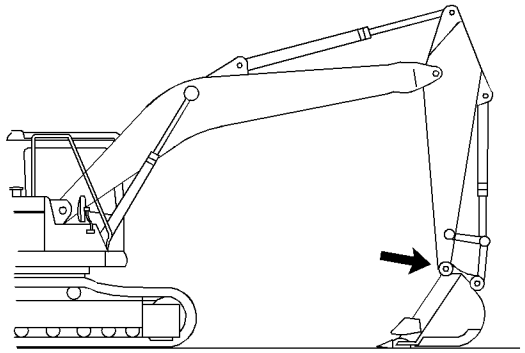

Illustration 353 g02109636

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.

i03574841

Bucket Tips - Inspect/Replace

SMCS Code: 6805-510; 6805-040

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Note: In order to maximize the life of the bucket tip and the penetration of the bucket tip, the bucket tip can be rotated.

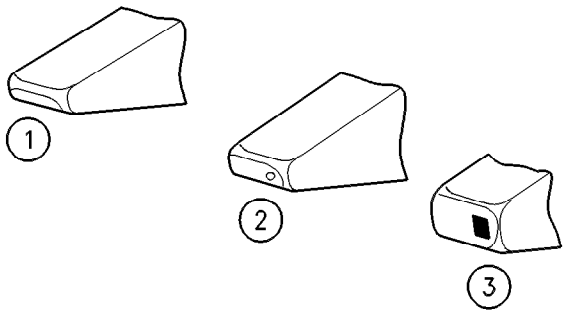

Illustration 354 g00101352

(1) Usable
(2) Replace
(3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

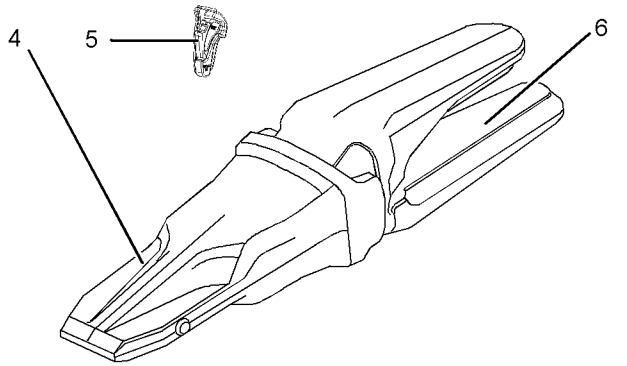

Illustration 355 g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

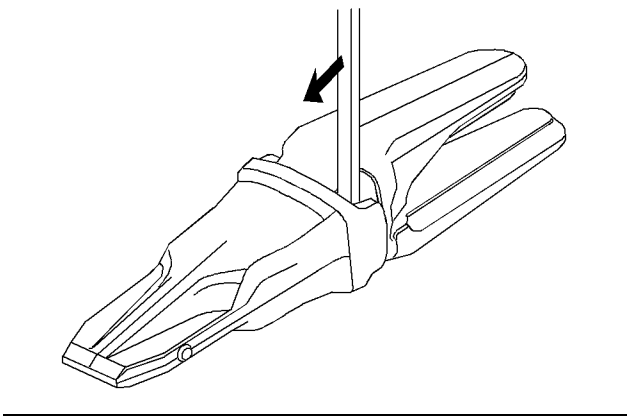

Illustration 356 g01175361

1. Use a pry bar in order to disengage retainer (5).

2. Use the pry bar in order to remove retainer (5) from bucket tip (4).

3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.

4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.

2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

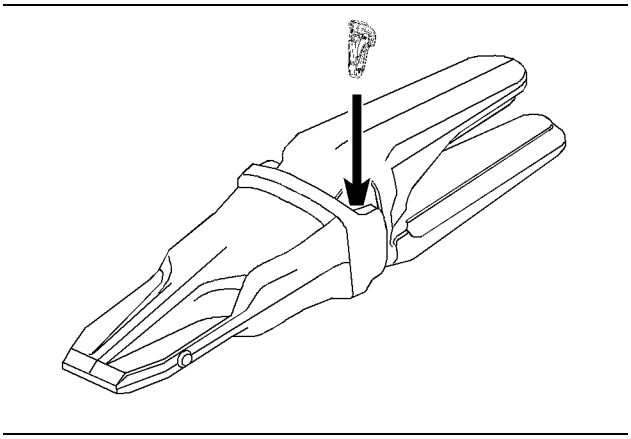

Illustration 357 g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.

4. Make sure that the latch is properly seated by trying to remove the bucket tip.

Side Cutters (If Equipped)

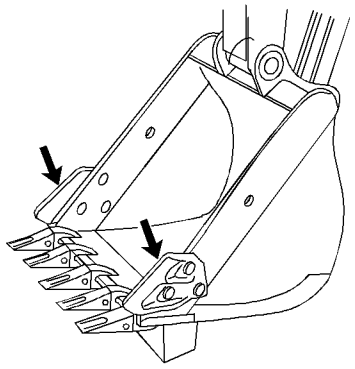

Illustration 358 g01389740

Bucket with side cutters

Side cutters

1. Remove the mounting bolts and the side cutters.

2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

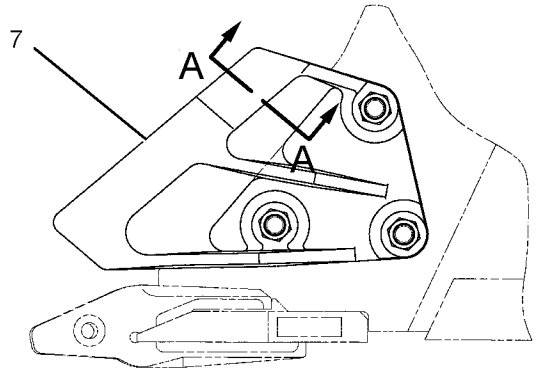

Illustration 359 g01389456

(7) Side cutter

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

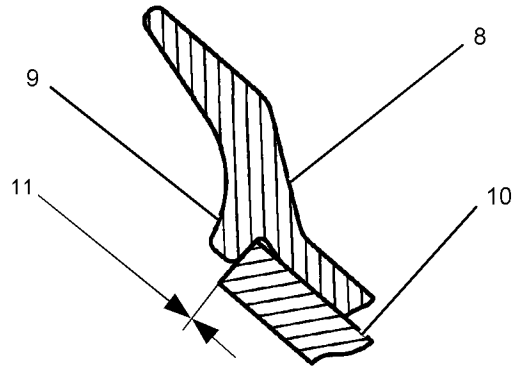

Illustration 360 g01389457

Section A-A From Illustration 359

(8) Side cutter
(9) Shear ledge on a side cutter
(10) Side plate on a bucket
(11) 0.0 mm (0.0 inch)

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.

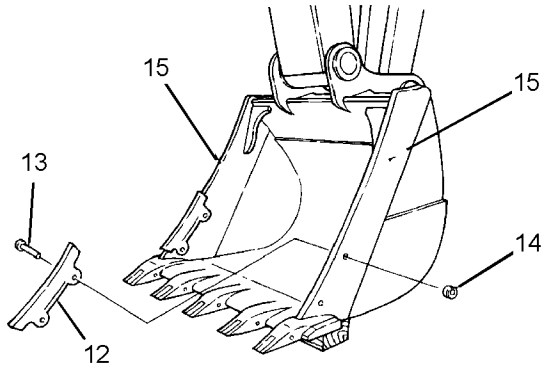

Illustration 361 g01389458

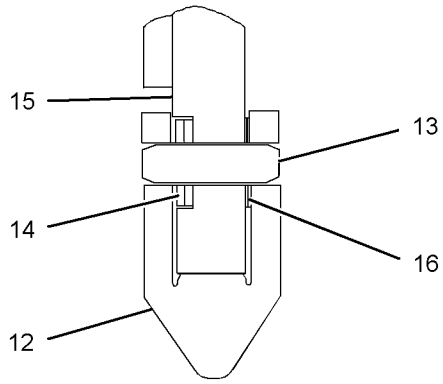

Illustration 362 g01903698

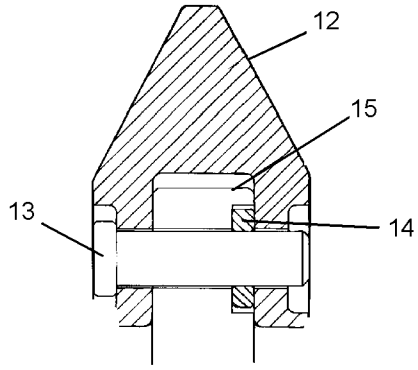

Illustration 363 g01389459

(12) Side protector
(13) Pin
(14) Retainer
(15) Side plate
(16) Shim

1. Hit pin (13) from the side of the bucket without the retainer in order to remove side protector (12) from side plate (15).

2. Clean side protector (12), pin (13), retainer (14) and side plate (15) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims (16) may be required in order to decrease the lateral clearance which will decrease movement. Install the shims(16) between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (14) in side plate (15).

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.

i03901495

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-070; 7342-510

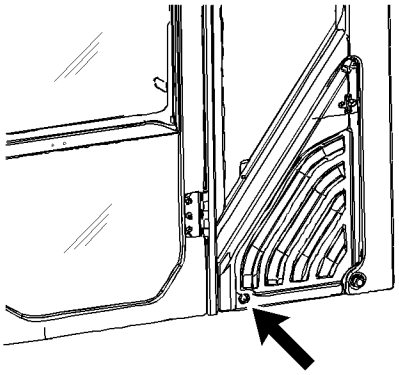

Illustration 364 g01973174

The cab air filter is located on the left side of the cab.

1. Use the ignition key in order to open the access panel.

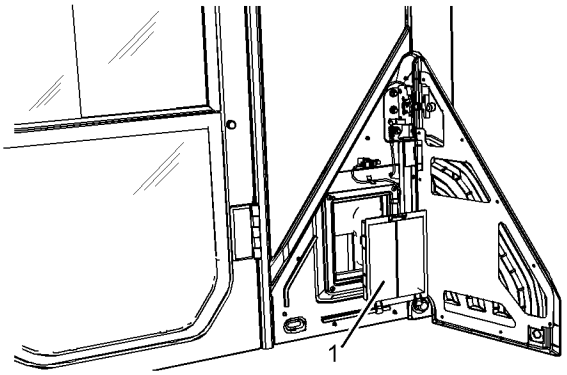

Illustration 365 g02144326

(1) Air filter

2. Remove air filter (1).

3. Clean the air filter with a maximum of 200 kPa (30 psi) pressure air.

4. After you clean the air filter, inspect the air filter. If the air filter is damaged or badly contaminated, use a new air filter.

5. Install the air filter and the filter cover.

i04281350

Cab Door Latch - Inspect/ Adjust/Replace

SMCS Code: 7308-LX

Cab Door Latch Inspect

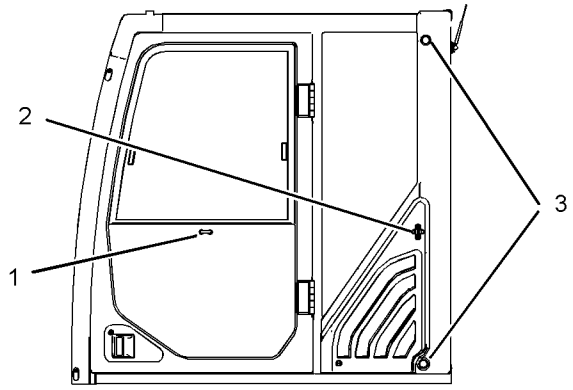

Illustration 366 g02449296

(1) Cab Door Striker
(2) Cab Door Latch
(3) Cab Door Stop

1. Open the cab door and latch the door in the open position.

2. Inspect door stops (3) for proper adjustment. The cab door should contact the door stops and slightly compress the rubber stoppers.

Note: Refer to “Cab Door Stop Adjust” if the door stops require adjustment.

3. Inspect the operation of the door latch. The latch should not release the door unless you pull down on one of the door release levers located in the cab. When the door is closed, the door should release from the latch smoothly.

Note: If needed, spray an appropriate lubricant throughout the latch in order to clean and lubricate the latch mechanism

4. Inspect the cab door striker (1) and the cab door latch (2). Ensure that the striker is properly aligned with the latch.

5. Close the cab door.

Note: If the door does not latch properly or if the door does not release from the latch properly, refer to “Cab Door Latch Adjust” for the adjustment procedure.

Cab Door Stop Adjust

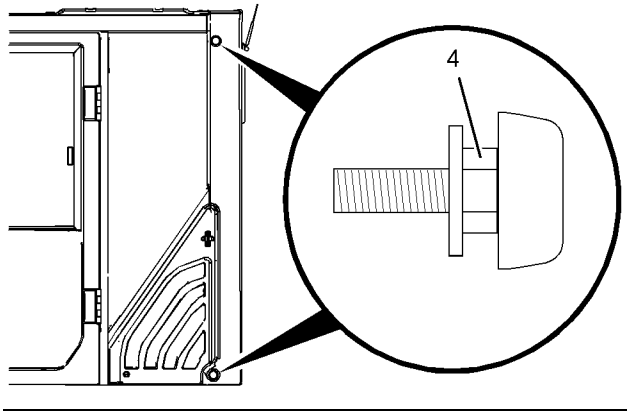

Illustration 367 g02449162

1. Completely loosen nut (4) and rotate the door stop clockwise.

2. Carefully open the cab door and latch the door in the open position.

3. Rotate the door stop counter clockwise until the door stop contacts the door.

4. Close the cab door.

5. Rotate the door stop counter clockwise an additional 1 to 1 1/4 revolutions and tighten nut (4).

Cab Door Latch Adjust

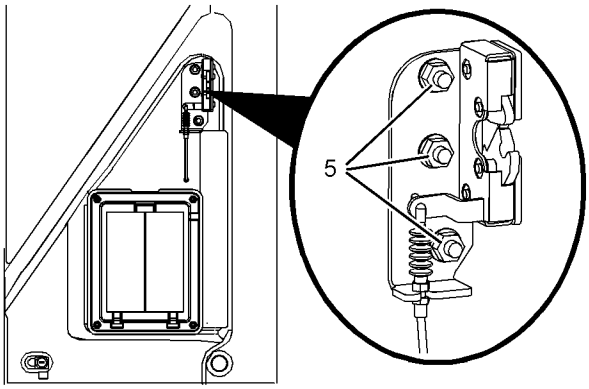

Illustration 368 g02449164

1. Use the ignition key in order to open the access panel for the cab air filter.

2. Loosen bolts (5) and align the striker on the cab door with the latch mechanism.

3. Tighten bolts (5) and close the access panel.

Cab Door Latch Replace

Cab Door Latch Removal

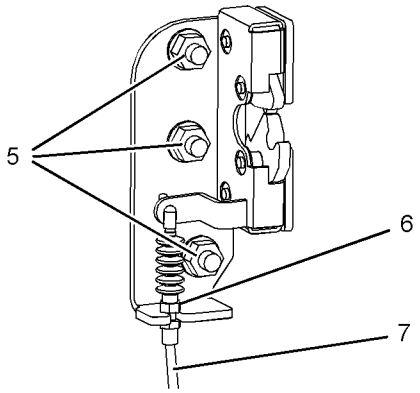

Illustration 369 g02449166

1. Use the ignition key in order to open the access panel for the cab air filter.

2. Loosen nut (6) and disconnect cable (7) from the latch assembly.

3. Remove bolts (5) in order to remove the entire latch assembly.

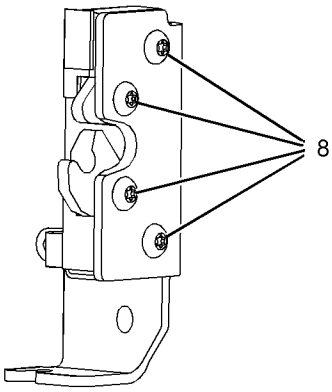

Illustration 370 g02449276

4. Remove bolts (8) and remove the latch mechanism from the assembly.

Cab Door Latch Installation

1. Perform the installation procedure in reverse order.

Note: Make sure that the striker and the latch are properly aligned. Refer to “Cab Door Latch Adjust”.

i06583996

Camera - Clean
(If Equipped)

SMCS Code: 7348-070

S/N: FJB1–Up

S/N: ETC1–Up

S/N: DGE1–Up

S/N: SPG1–Up

S/N: RGH1–Up

S/N: KCN1–Up

S/N: MZW1–Up

S/N: KFX1–Up

S/N: MPZ1–Up

S/N: WHZ1–Up

⚠ WARNING

Failure to use an appropriate external ladder or an appropriate platform for direct access to the cameras could result in slipping and falling which could result in personal injury or death. Be sure to use an appropriate external ladder or an appropriate platform for direct access to the cameras.

The counterweight of the machine and the engine hood of the machine are not approved as maintenance platforms.

⚠ WARNING

Unexpected machine movement can cause injury or death.

In order to avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, “Do Not Operate” or similar warning tag to the hydraulic lockout control.

Note: When you access the cameras for cleaning, be sure to observe safe procedures for access. Maintain a three-point contact and/or use a body harness.

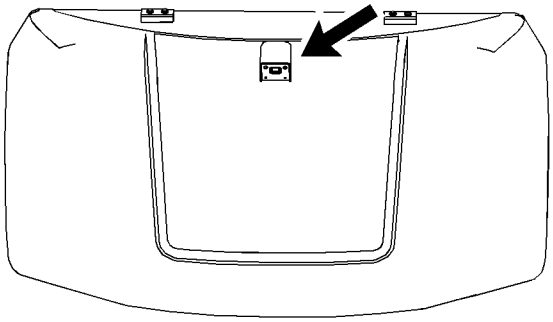

Illustration 371 g02158495

The rear view camera is located on top of the counterweight.

If necessary, use a damp cloth in order to clean the glass of the camera. The camera is sealed. The camera is not affected by a wash with high-pressure spray.

Note: Alternatively, cameras may be cleaned from ground level by using a wash with a high-pressure spray or a damp rag on a wand.

i04481112

Circuit Breakers - Reset

SMCS Code: 1420-529

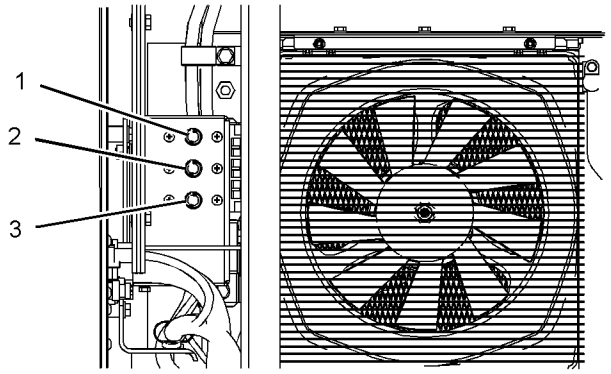

Illustration 372 g02025211

The circuit breaker is located behind the front left access door.

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.

Spare (3) – Spare circuit breaker.

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.

i03741442

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.

1. Open the front access door on the left side of the machine. The condenser is located behind the cab.

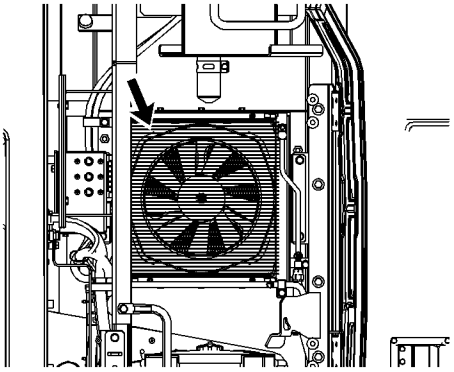

Illustration 373 g02020571

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.

i06906695

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

⚠ 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.

NOTICE
Do not change the coolant until you read and understand the cooling system information in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

Failure to do so could result in damage to the cooling system components.

NOTICE
Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for premixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

If the coolant in the machine is changed to Extended Life Coolant from another type of coolant, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

1. Unlatch the engine hood and raise the engine hood.

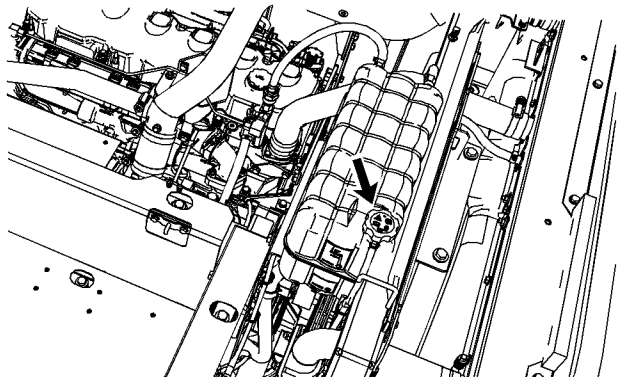

Illustration 374 g02019833

2. Slowly loosen the pressure cap that is on the coolant reservoir to release pressure from the cooling system.

3. Remove the pressure cap.

4. Inspect the o-ring of the cooling system pressure cap. If the o-ring is damaged, replace the pressure cap.

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

5. Open the rear access door on the left side of the machine.

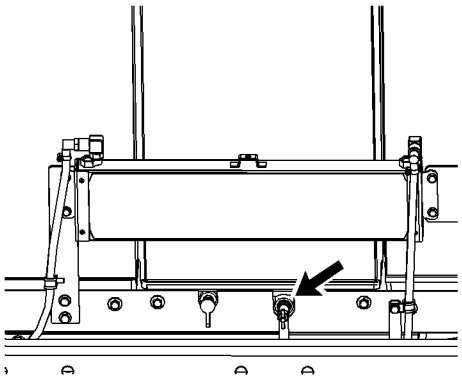

Illustration 375 g02019836

6. Open the drain valve and allow the coolant to drain into a suitable container. The drain valve is on the bottom of the radiator.

7. Flush the cooling system. Follow Step 7a through Step 7h to flush the cooling system.

a. Close the drain valve.

b. Fill the cooling system with clean water.

c. Install the pressure cap.

NOTICE
Do not run the engine with plain water in the cooling system for more than 5 min. The water may vaporize and trapped air may damage the NRS cooler.

d. Start the engine and run the engine until the engine reaches operating temperature.

e. Stop the engine and allow the engine to cool.

f. Loosen the pressure cap slowly to relieve any pressure in the cooling system.

g. Open the drain valve that is on the bottom of the radiator and allow the coolant to drain into a suitable container.

h. Flush the radiator with clean water until the draining water is transparent.

8. Close the drain valve.

9. Add the Extended Life Coolant. Refer to the following topics:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

10. After the cooling system has been filled, perform the following procedures during initial start-up:

a. Start the engine without the filler cap.

b. Run the engine at low idle for 10 minutes.

c. Then, increase the engine speed to a high idle until the water temperature regulator is open and the coolant level is stabilized.

d. Maintain the coolant at the proper level as the water temperature regulator opens, and the air is purged from the cooling system and NRS cooler. Refer to Operation and Maintenance Manual, “Cooling System Coolant Level - Check”.

11. Install the cooling system pressure cap.

12. Stop the engine.

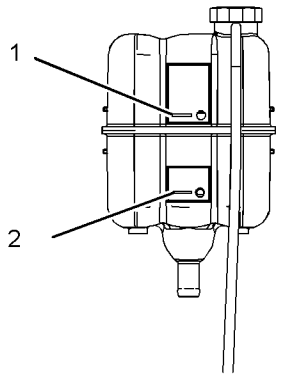

Illustration 376 g02019838

(1) “FULL”
(2) “LOW”

13. Check the coolant reservoir. Maintain the coolant level between “FULL” mark (1) and “LOW” mark (2).

14. If additional coolant is necessary, remove the pressure cap and add the appropriate coolant solution.

15. Install the pressure cap.

16. Close the engine hood and latch the engine hood. Close the left access door.

i04054670

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

Use Caterpillar Extended Life Coolant (ELC) when you add coolant to the cooling system. See Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for all cooling system requirements.

Use a Coolant Conditioner Test Kit in order to check the concentration of the coolant.

NOTICE

Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for premixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

1. Park the machine on level ground.

2. Stop the engine.

3. Unlatch the engine hood and raise the engine hood.

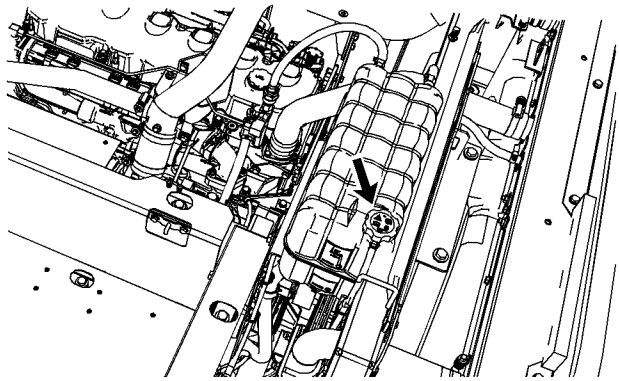

Illustration 377 g02019833

4. Make sure that the cooling system has cooled down. Loosen the cooling system pressure cap slowly in order to relieve system pressure. Remove the pressure cap.

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

5. It may be necessary to drain some coolant from the radiator so that Caterpillar Extender can be added to the cooling system.

Note: Always discard drained fluids according to local regulations.

6. Add Caterpillar Extended Life Coolant (ELC) to the cooling system. Refer to the following topics for the proper amount of Caterpillar Extender:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

7. Inspect the o-ring of the cooling system pressure cap. If the o-ring is damaged, replace the pressure cap.

8. Install the cooling system pressure cap.

9. Close the engine hood and latch the engine hood.

i05196273

Cooling System Coolant Level - Check

SMCS Code: 1350-040; 1350-535-FLV; 1395-535-FLV

WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

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.

Note: Your machine may be equipped with an automated function for checking fluid levels. Refer to Operation and Maintenance Manual, “Monitoring System” regarding the automated system.

1. Unlatch the engine hood and raise the engine hood.

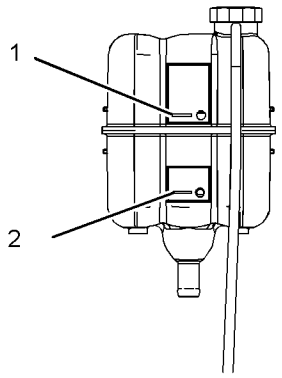

Illustration 378 g02019838

(1) “FULL” level
(2) “LOW” level

2. Check the coolant level of the coolant reservoir when the engine is cold. Maintain the coolant level between the “FULL” mark and the “LOW” mark. If the coolant reservoir is empty, follow Steps 2a through 2g.

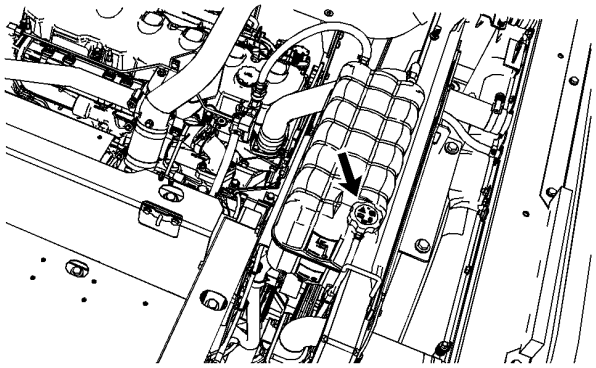

Illustration 379 g02019833

a. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the pressure cap.

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

b. Add the appropriate coolant solution to the cooling system. Refer to the following topics:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

c. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

d. Inspect the condition of the o-ring on the pressure cap. If the o-ring is damaged, replace the pressure cap.

e. Install the cooling system pressure cap.

f. Stop the engine.

g. Close the engine hood and latch the engine hood.

i04381184

Cooling System Coolant Sample (Level 1) - Obtain

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

⚠ WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove filler cap slowly to relieve pressure only when engine is stopped and radiator cap is cool enough to touch with your bare hand.

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

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

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

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

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

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

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

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

Dispose of all fluids according to local regulations and mandates.

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

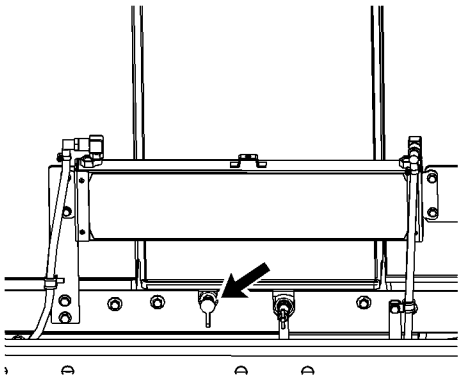

Illustration 380 g02020754

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

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.

- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Obtain the coolant sample while the engine is running.
- Obtain the coolant sample while the coolant is at operating temperature.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

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

i07349178

Cooling System Coolant Sample (Level 2) - Obtain

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

i03591653

Counterweight Removal Chain - Clean
(If Equipped)

SMCS Code: 7056-070-CX

S/N: ETC1–Up

S/N: DGE1–Up

S/N: MPZ1–Up

⚠ 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.

i03481843

Counterweight Removal Chain - Inspect
(If Equipped)

SMCS Code: 7056-040-CX

S/N: ETC1–Up

S/N: DGE1–Up

S/N: MPZ1–Up

⚠ 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.

i03591620

Counterweight Removal Chain - Lubricate
(If Equipped)

SMCS Code: 7056-086-CX

S/N: ETC1–Up

S/N: DGE1–Up

S/N: MPZ1–Up

⚠ 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.

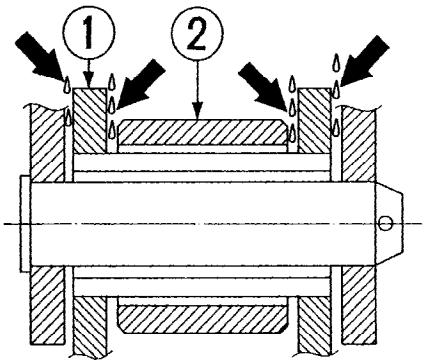

Illustration 381 g00115489

(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.

i07400083

Diesel Particulate Filter - Clean
(Emission Related Component)

SMCS Code: 108F-070; 1091-070

Consult your Cat dealer when the DPF needs to be cleaned.

The approved Caterpillar DPF maintenance procedure requires that one of the following actions be taken when the DPF needs to be cleaned:

- The DPF from your machine can be replaced with a new DPF
- The DPF from your machine can be replaced with a remanufactured DPF
- The DPF from your machine can be cleaned by your local authorized Cat dealer, or a Caterpillar approved DPF cleaning machine, and reinstalled

Note: To maintain emissions documentation, the DPF that is removed from the machine when the DPF is cleaned must be reinstalled on the same machine.

Note: A specific ash service regeneration must be performed before removing a DPF that will be cleaned. All three scenarios listed above require a reset of the ash monitoring system in the engine ECM.

i05770381

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070; 1054-510

Check the primary filter if a message or a warning is displayed on the monitor display.

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

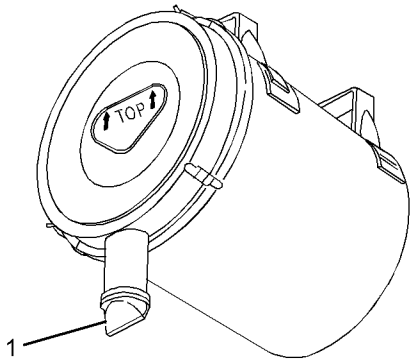

Illustration 382 g01266485

2. Squeeze the outlet tube (1) slightly in order to purge the dirt from the outlet tube.

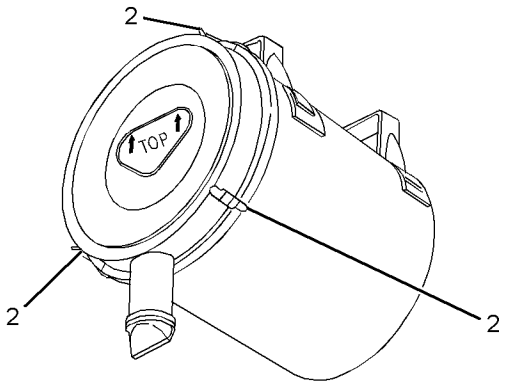

Illustration 383 g01266486

3. Loosen the cover latches (2) and remove the air cleaner cover.

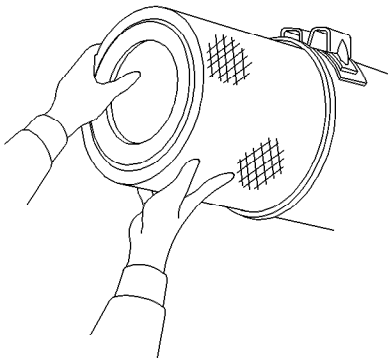

Illustration 384 g00101415

4. Remove the primary filter element from the air cleaner housing.

5. Clean the air cleaner cover and the inside of the air cleaner housing.

6. Inspect the O-ring seal on the air cleaner cover. Replace the O-ring seal if the O-ring seal is worn or damaged.

7. Install the clean primary filter.

Note: Refer to “Cleaning Primary Air Filter Elements”.

8. Install the air cleaner cover and close the latches securely.

Illustration 385 g00101416

Note: Install the air cleaner cover properly. The arrows must point upward.

9. Replace the filter if the “Restricted Air Filter ” indicator on the monitor display still comes on.

10. Close the access door.

Cleaning Primary Air Filter Elements

NOTICE
Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

When the primary air filter element is cleaned, check for rips or tears in the filter material. Replace the primary air filter element after the primary air filter element has been cleaned six times. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless how many times the filter was cleaned.

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).

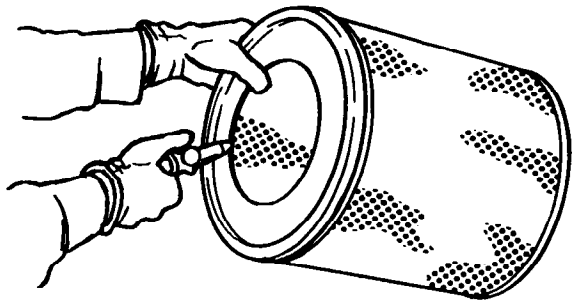

Illustration 386 g00281692

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

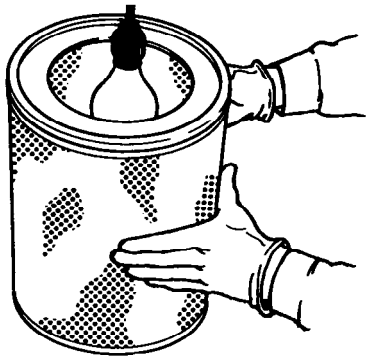

Illustration 387 g00281693

Inspect the clean, dry primary air filter element. Use a 60 W 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 necessary, 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.

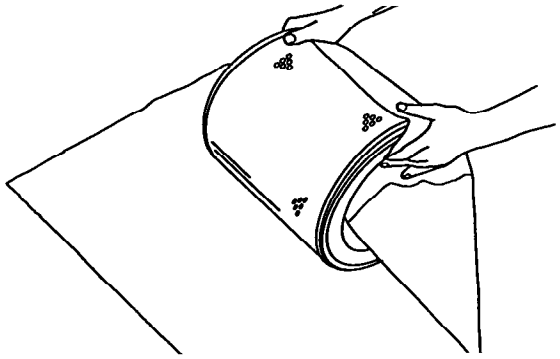

Illustration 388 g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An air flow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- The date that the filter was cleaned
- Number of times the filter has been cleaned

Store the box in a dry location.

i05770379

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510

NOTICE
Always replace the secondary filter element. Never attempt to reuse the secondary filter element by cleaning the element.

When the primary filter element is replaced, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the air filter restriction warning appears on the message display after the installation of a clean primary filter element.

1. Open the access door on the front left side of the machine.
2. See Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/Replace”. Remove the air cleaner cover from the air cleaner housing. Remove the primary filter element from the air cleaner housing.

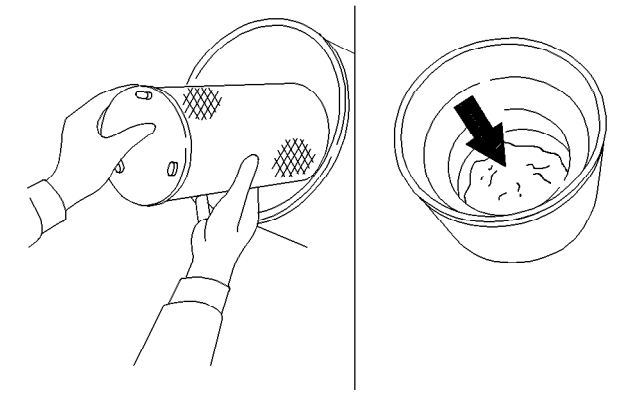

Illustration 389 g00101451

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.

i03866257

Engine Oil Level - Check

SMCS Code: 1000-535

WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

WARNING

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

NOTICE
Do not overfill the crankcase. Engine damage can result.

Note: This machine is equipped with both an automated function for checking fluid levels and a dipstick. Refer to Operation and Maintenance Manual, “Monitoring System” regarding the automated system. If the machine is on an incline or the engine has been stopped only for a short time, then the engine oil does not return to the crankcase and the fluid level cannot be properly checked by either method. Park the machine on level ground and check the oil level after the engine has been stopped for at least 30 minutes.

Check the oil level while the engine is stopped. Do not check the oil level while the engine is running.

1. Open the engine hood.

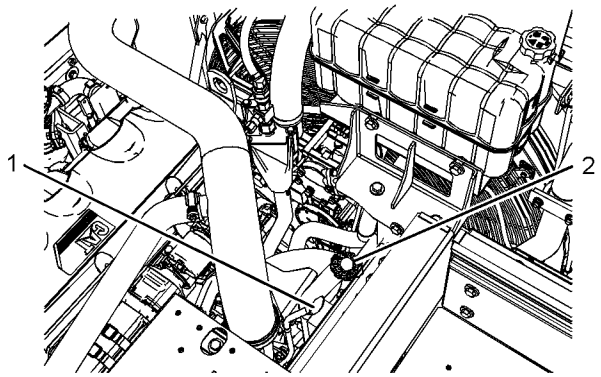

Illustration 390 g02109834

(1) Dipstick
(2) Oil filler plug

2. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

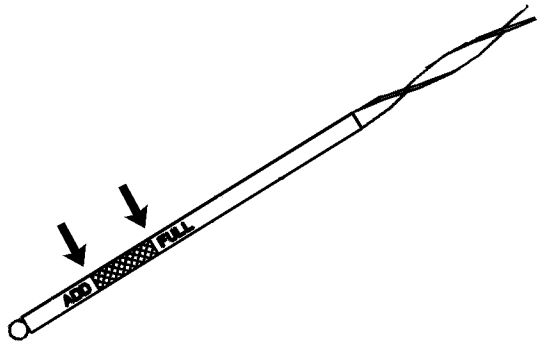

Illustration 391 g02109835

3. Remove the dipstick and check the dipstick. The oil level should be between the “FULL” mark and the “ADD” mark.

NOTICE
Do not fill above the “FULL” mark on the dipstick.

If the oil level is above the “FULL” Mark, the crankshaft might dip into the oil during engine operation. This will lead to excessively high oil temperatures. High oil temperatures can reduce the lubricating characteristics of oil.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

4. Remove oil filler plug (2) in order to add oil, if necessary. See Operation and Maintenance Manual, “Lubricant Viscosities”.

Note: If the oil is deteriorated or badly contaminated, change the oil regardless of the maintenance interval.

5. Clean the oil filler plug. Install the oil filler plug.

6. Close the engine hood.

i03866334

Engine Oil Sample - Obtain

SMCS Code: 1000; 1000-008; 1348-554-SM; 1348-008; 7542-554-SM; 7542-554-OC; 7542-008

Open the access door on the right side of the machine in order to access the sampling valve.

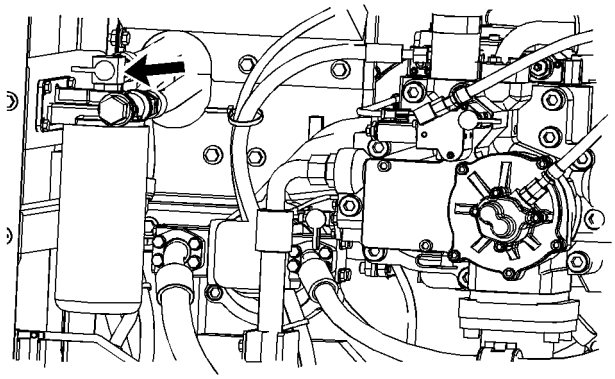

Illustration 392 g01129870

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, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining a sample of the engine oil.

i05066669

Engine Oil and Filter - Change

SMCS Code: 1318-510

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

⚠ WARNING

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

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.

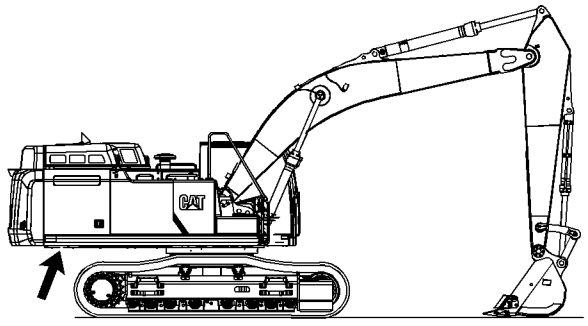

Illustration 393 g02114034

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.

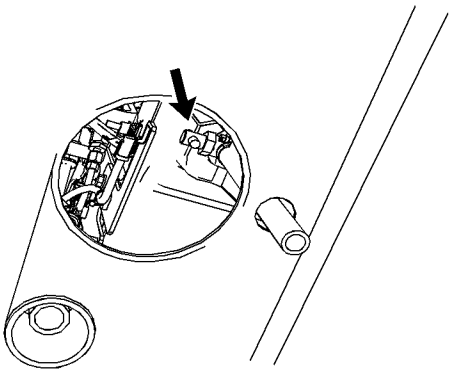

Illustration 394 g02114173

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.

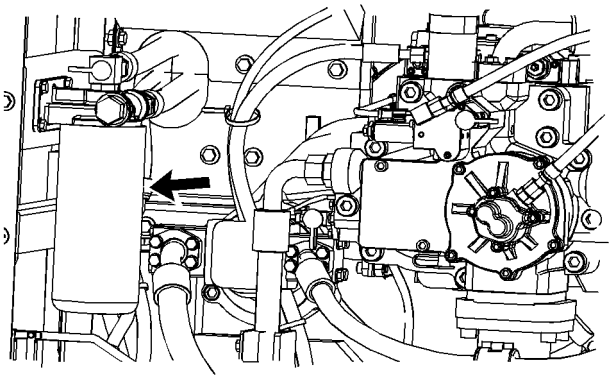

Illustration 395 g01129934

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.

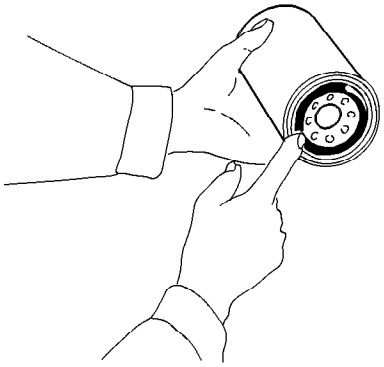

Illustration 396 g00101634

7. Apply a thin coat of engine oil to the gasket of the new filter.

8. Install the new filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

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.

12. Unlatch the engine hood and raise the engine hood.

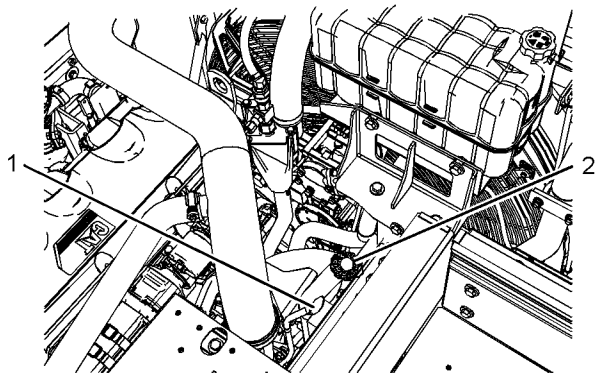

Illustration 397 g02109834

(1) Dipstick
(2) Oil filler plug

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.

15. Wait for fifteen minutes so that the oil can drain back into the crankcase, before you check the oil.

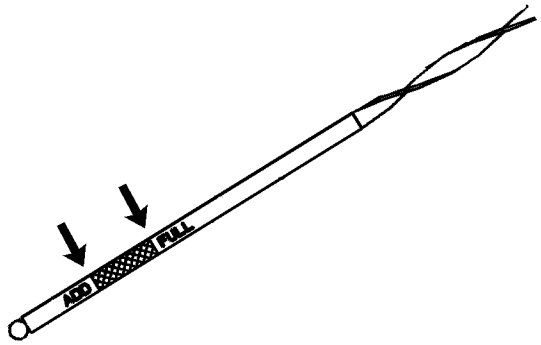

Illustration 398 g02109835

16. Remove 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.

Fast Fill

If your machine is equipped with a deluxe service center, you may drain the engine oil through the fast fill port or you may add the engine oil through a fast fill port.

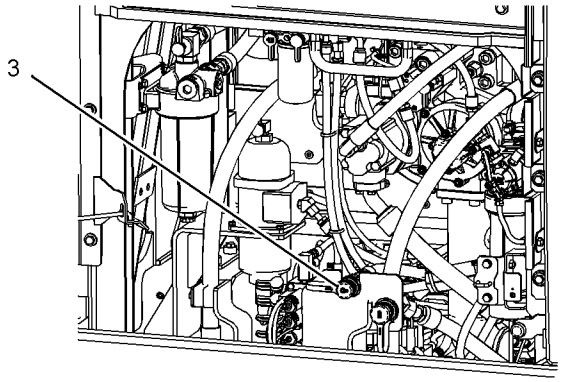

Illustration 399 g02114193

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

2. Remove the dust cover (3).

3. Attach the hose to the coupling.

Note: Make sure that the coupling and receiver are free from debris before attaching. Reinstall the dust covers when done.

4. Drain the oil or add the oil, as needed.

5. Install the dust cover.

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.

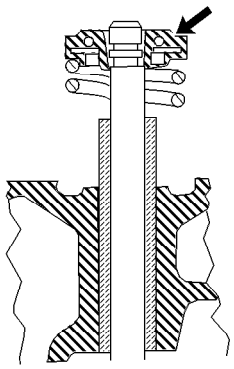

Illustration 400 g00102025

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.

i07051358

Ether Starting Aid Cylinder - Replace
(If Equipped)

SMCS Code: 1456-510-CD

⚠ WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

The ether cylinder is located inside the rear access door on the left side of the machine.

Refer to Operation and Maintenance, “Fire Prevention and Explosion Prevention” before you replace the ether cylinder.

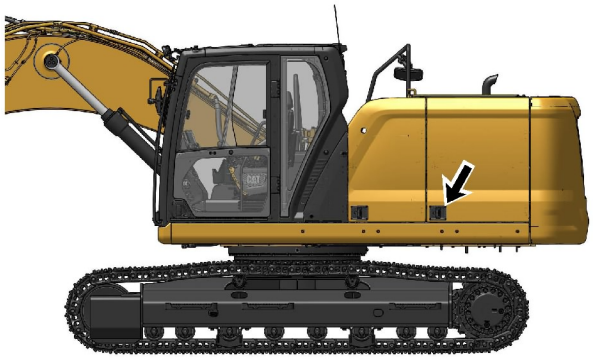

Illustration 401 g06179792

1. Open the rear access door at the left side of the machine.

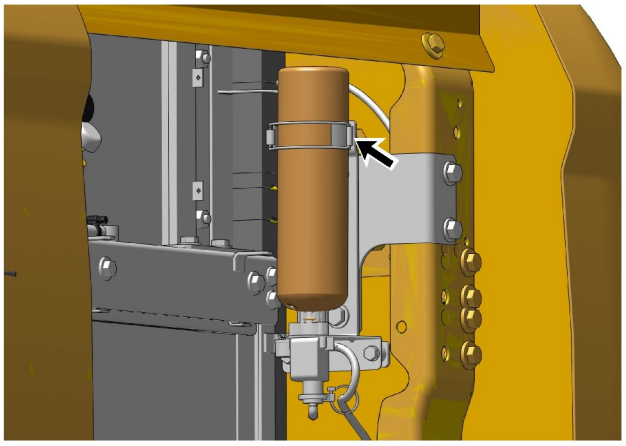

Illustration 402 g06211094

2. Loosen the cylinder retaining clamp.

3. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.

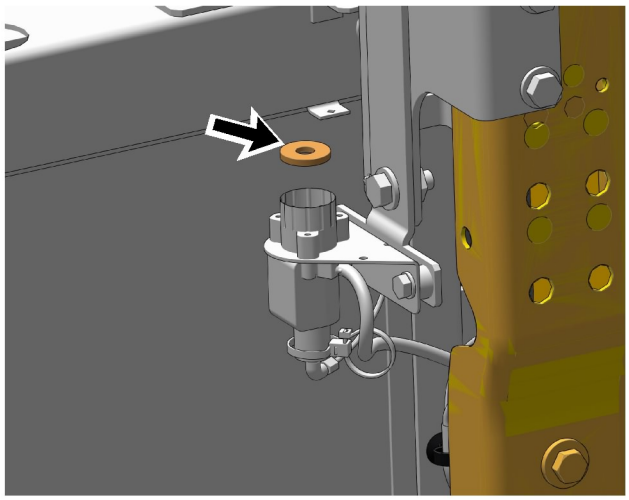

Illustration 403 g06211096

4. Remove the used gasket.

5. Install a new gasket.

Note: A new gasket and O-ring is provided with each new ether starting aid cylinder.

6. Install the new ether starting aid cylinder.

7. Tighten the ether starting aid cylinder hand tight.

8. Tighten the cylinder retaining clamp securely.

9. 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.

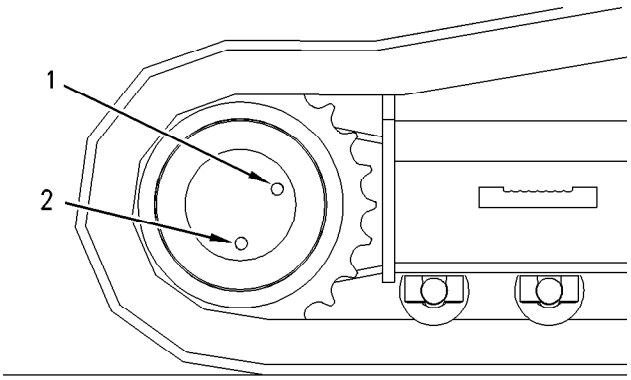

Illustration 404 g00822278

(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.

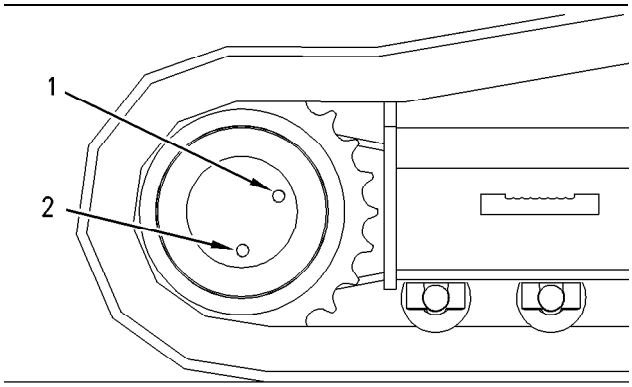

Illustration 405 g00822278

(1) Oil level plug
(2) Oil drain plug

1. Position one final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove oil level plug (1).

3. Check the oil level. The oil should be near the bottom of the level plug opening.

4. Add oil through the level plug opening, if necessary. See Operation and Maintenance, “Lubricant Viscosities”.

Note: If the oil fills slowly, the fill hole may be blocked by the planetary gear. Rotate the final drive in order to move the planetary gear away from the fill hole.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive. The final drive may become contaminated.

5. Clean oil level plug (1). Inspect the O-ring seal. Replace the O-ring seal if the O-ring seal is worn or damaged.

6. Install oil level plug (1).

7. Repeat the procedure for the other final drive.

i03756611

Final Drive Oil Sample - Obtain

SMCS Code: 4011-008; 4050-SM; 4050-008; 7542-008

WARNING

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

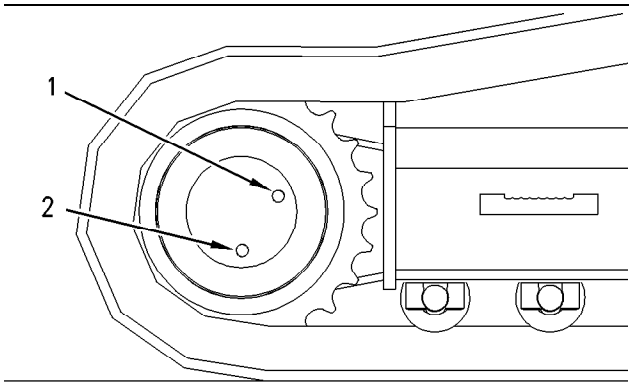

Illustration 406 g00822278

(1) Oil level plug
(2) Oil drain plug

1. Position the final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove oil level plug (1).

3. Obtain a sample of the final drive oil through the hole for the oil level plug.

4. Install oil level plug (1).

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” for more information on obtaining a sample of the final drive oil. For additional information about taking an oil sample, refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample”.

i04104869

Fuel Priming Pump - Replace

SMCS Code: 1258-510

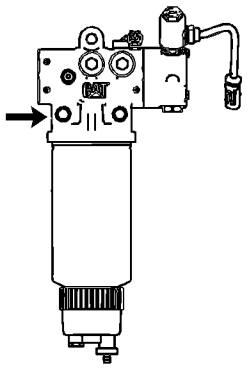

Illustration 407 g02308773

A replacement kit is available for the electronic fuel priming pump. Contact your Cat dealer for the correct part number and details for your application.

i07318401

Fuel System - Prime

SMCS Code: 1250-548

⚠ WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE
Do not loosen the fuel lines at the fuel manifold. The fittings may be damaged and/or a loss of priming pressure may occur when the fuel lines are loosened.

NOTICE
Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.

Prime the fuel system to fill the fuel filter, and prime the fuel system to purge trapped air. The fuel system should be primed under the following conditions:

- The fuel tank is running low.
- The machine has been stored.
- The fuel filter is being replaced.
- The fuel system has been repaired.

1. Turn the engine start switch to the ON position. Leave the engine start switch in the ON position for 4 minutes.
2. Verify that the water separator is full of fuel.
3. If the water separator is not full of fuel, turn the engine start switch OFF and then turn the engine start switch ON. Turning the engine start switch off and on will cycle the fuel priming pump again.
4. When the water separator is full of fuel, attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate at low idle until the engine is running smoothly. If the engine cannot be started, or if the engine continues to misfire or smoke, repeat Step 1.

i03901456

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

⚠ 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.

The primary filter/water separator is located behind the access door on the right side of the machine.

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

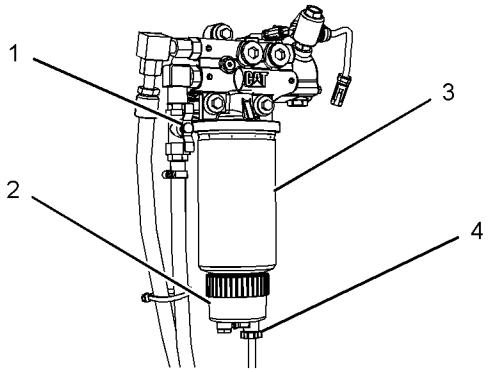

Illustration 408 g02144267

(1) Shutoff valve
(2) Bowl
(3) Filter
(4) Drain valve

2. Turn off the fuel supply to the fuel filter by turning shutoff valve (1) clockwise.

3. Turn drain valve (4) 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” for information that pertains to containing fluid spillage.

4. Drain the water and the sediment into a suitable container.

Note: Dispose of used fluids according to local regulations.

5. Close drain valve (4).

6. Remove filter (3) from the filter base. A filter wrench may be used to loosen the filter.

7. Remove filter (3) from bowl (2). Discard the used filter.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

8. Clean the inside surfaces of filter base and bowl (2).

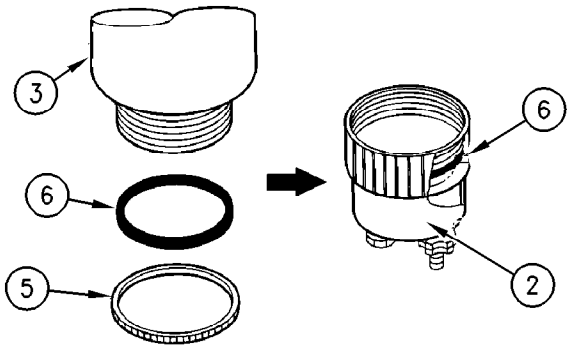

Illustration 409 g00752055

(2) Bowl
(3) Filter
(5) Cap
(6) Seal

9. Remove cap (5) from the bottom of new filter (3). Remove seal (6) from cap (5) and inspect the seal for damage. Replace the seal if the seal is damaged.

10. Lubricate the seal (6) for the bowl (2) with clean diesel fuel or lubricate the seal with clean motor oil. Place the seal in the groove in the bowl.

11. Install the bowl (2) onto the new filter by hand until the bowl is snug. Tighten the bowl to 10 N·m (7 lb ft) to approximately 1/6 of a turn. Do not use tools to tighten the bowl to the new filter.

12. Lubricate the seal on the new filter with clean diesel fuel or lubricate the seal with clean motor oil.

13. Install the new filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

Note: Do not start the engine until all service to the fuel system is complete. For instructions about priming the fuel system, refer to Operation and Maintenance Manual, “Fuel System - Prime”.

14. Close the access door.

i05736554

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510

⚠ 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.

NOTICE
Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.

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

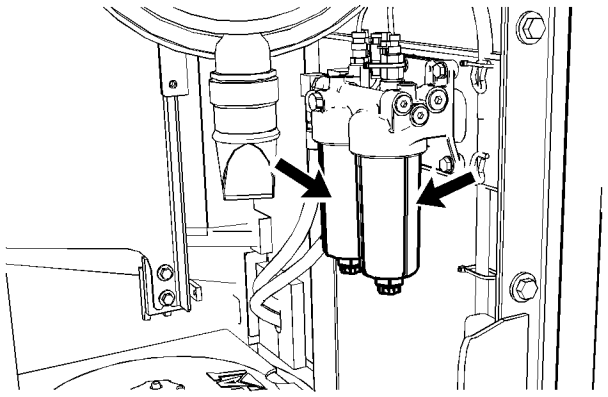

Illustration 410 g03645124

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

2. Remove the two secondary fuel filters.

Note: The fuel filter has not been drained. The filter contains fuel. When you remove the filter, use caution in order to avoid spilling the fuel.

3. Inspect the fuel filter for debris by cutting the fuel filter open.

4. Clean the mounting base of the fuel filter. Make sure that all of the old seal is removed from the mounting base.

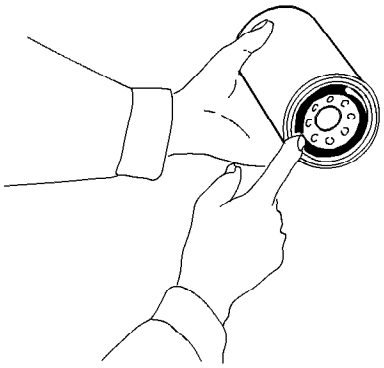

Illustration 411 g00101318

5. Apply a thin coat of clean diesel fuel to the sealing surface of the new fuel filter.

6. Install the new filter by hand.

   Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

7. Prime the fuel system. See Operation and Maintenance Manual, “Fuel System - Prime” for instructions.

8. Close the access door on the left side of the machine.

i03743908

Fuel System Water Separator - Drain

SMCS Code: 1263

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

2. Provide a suitable container for used fluid.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

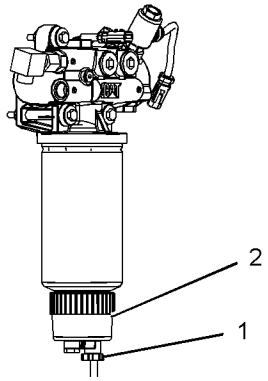

Illustration 412 g02022485

(1) Drain valve
(2) Bowl

3. Check bowl (2) in the bottom of the water separator. Open drain valve (1). Drain the water and sediment in the bowl.

Note: Dispose of used fluids according to local regulations.

4. Close drain valve (1).

5. Close the access door.

i04421489

Fuel Tank Cap Filter - Replace

SMCS Code: 1273-510-FI; 1273-510-Z2

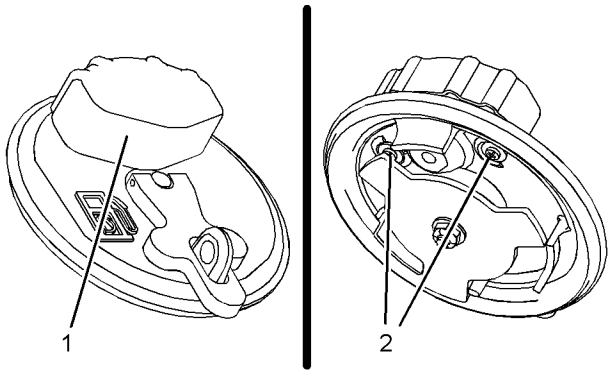

Illustration 413 g02612539

1. Remove the fuel cap.

2. Remove filter element screws (2) from the underside of the fuel cap and remove old filter element (1).

3. Wash the fuel tank cap in a clean, nonflammable solvent.

4. Install a new fuel cap filter element.

5. Install filter element screws (2) in order to secure filter element (1) to the fuel cap.

6. Install the fuel tank cap

i04462462

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

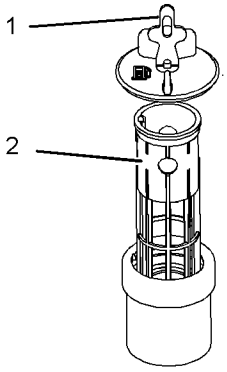

Illustration 414 g02609604

1. Remove fuel tank cap (1).

2. Remove strainer (2) from the filler opening.

3. Wash the strainer in a clean, nonflammable solvent.

4. Install the strainer into the filler opening.

5. Install the fuel tank cap.

i04363385

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

Refer to this Operation and Maintenance Manual, “Fuel Tank Shutoff and Drain Control” for the exact location of the fuel tank drain valve

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

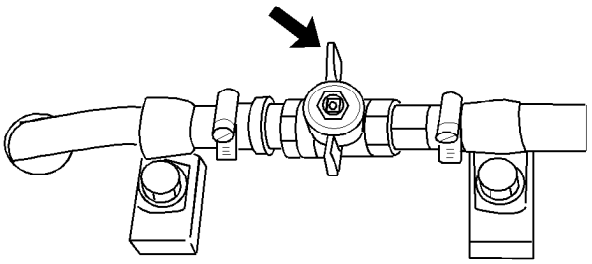

Illustration 415 g01043694

Typical example

1. Open the drain valve by turning the valve counterclockwise. Allow the water and the sediment to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

2. Close the drain valve by turning the valve clockwise.

i05059390

Fumes Disposal Filter Element - Replace

(If Equipped)

SMCS Code: 1074

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

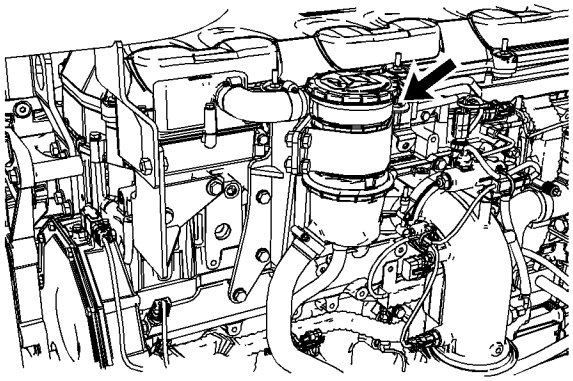

Illustration 416 g02109947

Note: Perform the maintenance while the engine is off.

1. Open the engine hood.
2. Remove the lid that holds the canister to the filter base assembly.
3. Remove the filter element. Dispose of the used element properly.
4. Install the new filter.
5. Install the lid.
6. Close the engine hood.

i05819424

Fuses - Replace

SMCS Code: 1417-510

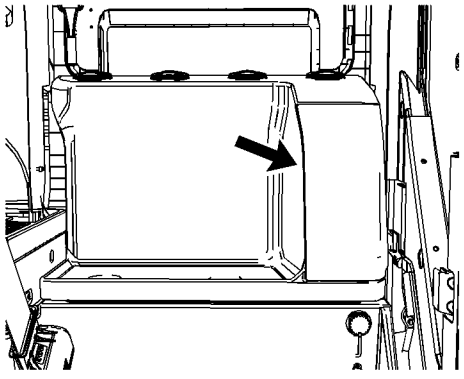

Illustration 417 g02110353

The fuse panel is located on the left side of the interior storage box. Remove the cover in order to access the fuses.

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 Cat dealer.

To replace a fuse, use the puller that is stored in the fuse panel.

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

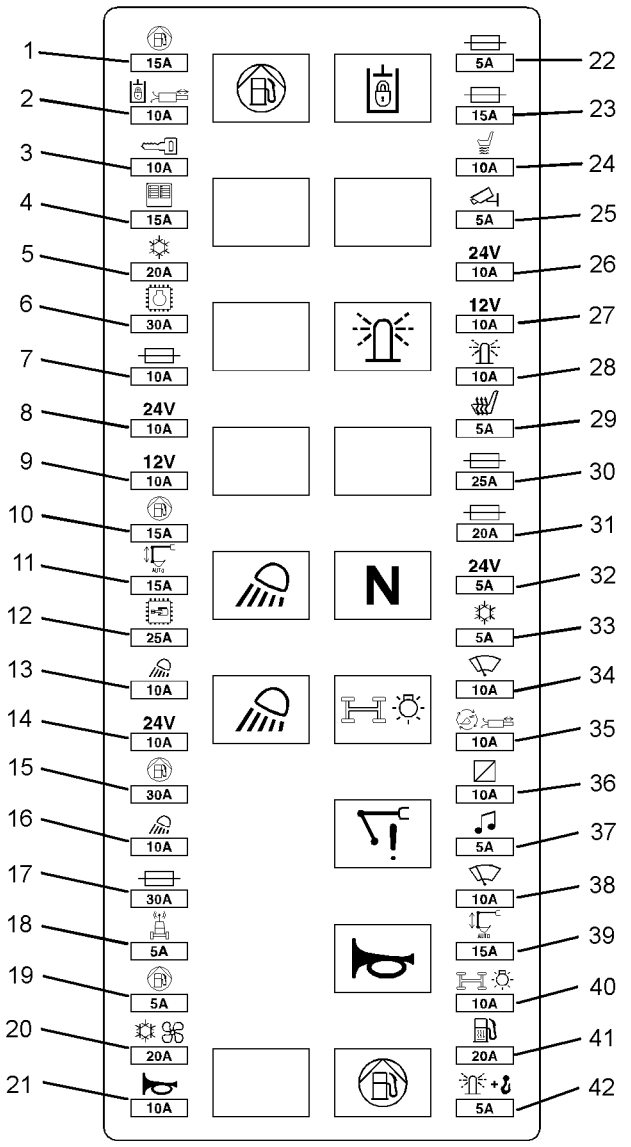

Illustration 418 g03304156

(1) Priming Pump – 15 Amp

(2) Hydraulic Lock – 10 Amp

(3) Engine Start Switch – 10 Amp

(4) Monitor – 15 Amp

(5) Air Conditioner Condenser Blower – 20 Amp

(6) Engine Control Module (ECM) – 30 Amp

(7) Spare – 10 Amp

(8) Auxiliary Hydraulic Circuit – 10 Amp

(9) 12V Radio – 10 Amp

(10) Electric Refueling Pump – 15 Amp

(11) Cat Grade Control – 15 Amp

(12) Machine Control Module – 25 Amp

(13) Cab Light – 10 Amp

(14) Auxiliary Hydraulic Circuit – 10 Amp

(15) Electric Refueling Pump – 30 Amp

(16) Boom Light – 10 Amp

(17) Spare – 30 Amp

(18) Product Link – 5 Amp

(19) Lifting Pump – 5 Amp

(20) Heater and Air Conditioner Blower Fan – 20 Amp

(21) Horn – 10 Amp

(22) Spare – 5 Amp

(23) Spare – 15 Amp

(24) Air Suspension Seat – 10 Amp

(25) Camera – 5 Amp

(26) Auxiliary Hydraulic Circuit – 10 Amp

(27) 12V Radio – 10 Amp

(28) Beacon – 10 Amp

(29) Seat Heater – 5 Amp

(30) Spare – 25 Amp

(31) Spare – 20 Amp

(32) Alternator – 5 Amp

(33) Air Conditioner – 5 Amp

(34) Lower Window Wiper – 10 Amp

(35) Attachment Solenoid – 10 Amp

(36) 12V Converter – 10 Amp

(37) Radio – 5 Amp

(38) Window Wiper – 10 Amp

(39) Cat Grade Control – 15 Amp

(40) Chassis Light – 10 Amp

(41) Clean Emissions Module (CEM) – 20 Amp

(42) Shovel Crane Beacon – 5 Amp

Relays

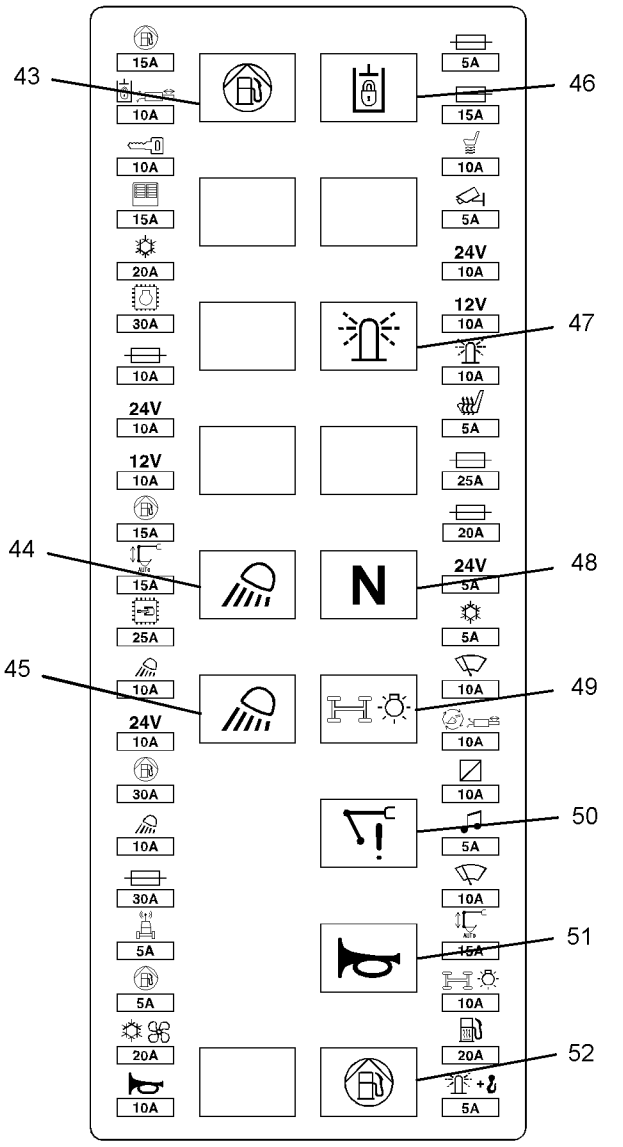

Illustration 419 g03304336

(43) Priming Pump – Relay

(44) Cab Light – Relay

(45) Boom Light – Relay

(46) Hydraulic Lock – Relay

(47) Beacon – Relay

(48) Neutral Start – Relay

(49) Chassis Light – Relay

(50) Warning Light – Relay

(51) Horn – Relay

(52) Lifting Pump – Relay

i08067436

High Intensity Discharge Lamp (HID) - Replace
(If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE
Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.
2. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least 5 minutes, to ensure that the bulb is cool.
3. Disassemble the housing for the HID lamp to have access to the bulb.

Note: On some HID lamps, the bulb is a part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

4. Remove the bulb from the HID lamp.
5. Install the replacement bulb in the HID lamp.

   If the bulb is a part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: To avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

6. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly for the HID lamp's mounting position on the machine.
7. Reattach the electrical power to the HID lamp.
8. Check the HID lamp for proper operation.

Note: Consult your Cat dealer for additional information on HID lamps.

i04118182

Hydraulic System Filter Element (Fine Filtration) - Replace
(If Equipped)

SMCS Code: 5068-510

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

WARNING

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

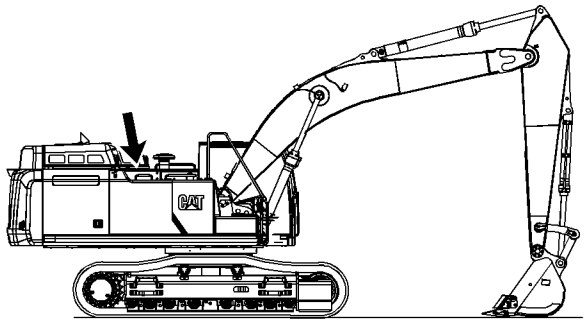

Illustration 420 g02111809

1. Place the machine in the servicing position.
2. Move the hydraulic lockout control to the LOCKED position. Stop the engine.

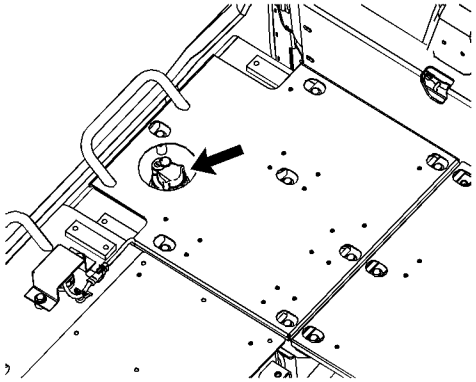

Illustration 421 g02111812

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

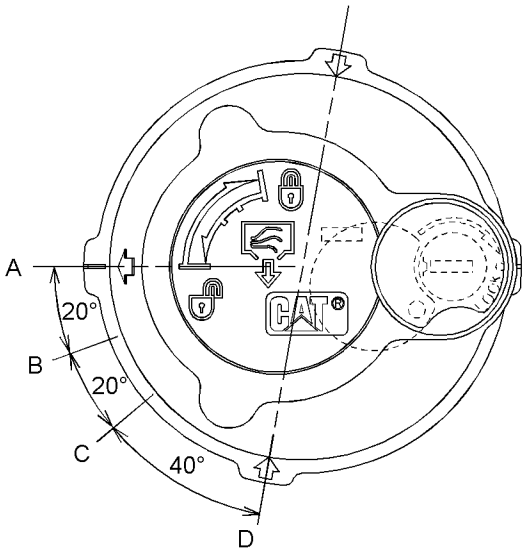

Illustration 422 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

3. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 422 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, tighten the filler cap on the hydraulic tank to position (A).

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

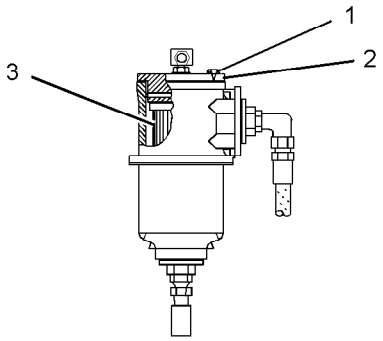

Illustration 423 g01090728

5. Remove four bolts (1) and cover (2) from the fine filtration filter.

6. Remove element (3) from the filter assembly.

7. Install a new filter element.

8. Install cover (2) and 4 bolts (1).

9. Close the access door.

i03872173

Hydraulic System Oil (If Equipped with Fine Filtration Filter) - Change

SMCS Code: 5056-044

S/N: ETC1–Up

S/N: MZW1–Up

S/N: KFX1–Up

5000 Hour Oil Change Interval

A 5000 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 3000 hour maintenance interval must be used.

Machines with hammers are not included in the 5000 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 5000 hour maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Oil Change

Refer to Operation and Maintenance Manual, “Hydraulic System Oil - Change” for the procedure to change the hydraulic oil.

i05984275

Hydraulic System Oil - Change

SMCS Code: 5056-044

Cat HYDO Advanced 10 Oil Change interval

The standard Cat HYDO Advanced 10 oil change interval is every 6000 service hours or 3 years.

The 6000 service hour or 3 year maintenance interval for hydraulic oil (change) is strongly recommended with S·O·S monitoring of the hydraulic oil after 3000 service hours. The interval for S·O·S monitoring is every 500 hours. An oil change is strongly recommended when oil deterioration or contamination is detected. The maintenance interval for the hydraulic oil filter is not changed.

Machines with hammers are not included in the 6000 service hour or 3 year maintenance interval. Machines with hammers must use the intervals that are listed in the Maintenance Interval Schedule. Machines that are used in severe conditions are not included in the 6000 service hour or 3 year maintenance interval. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Procedure to Change the Hydraulic Oil

⚠ WARNING

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

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

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

Dispose of all fluids according to local regulations and mandates.

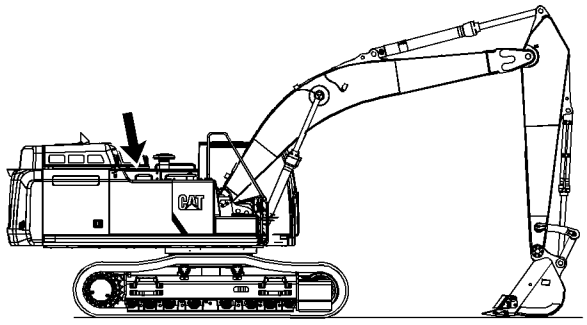

Illustration 424 g02111809

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

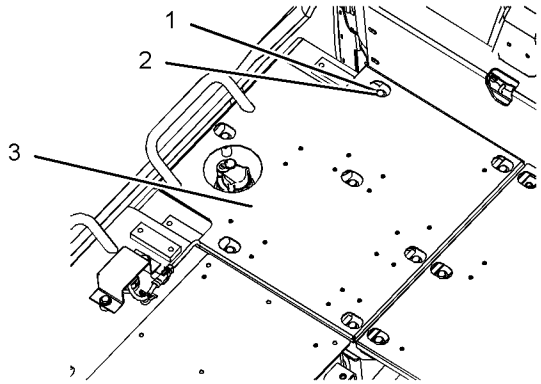

Illustration 425 g02112656

(1) Bolts
(2) Washers
(3) Cover

2. Remove bolts (1), washers (2) and cover (3) from the top of the hydraulic tank.

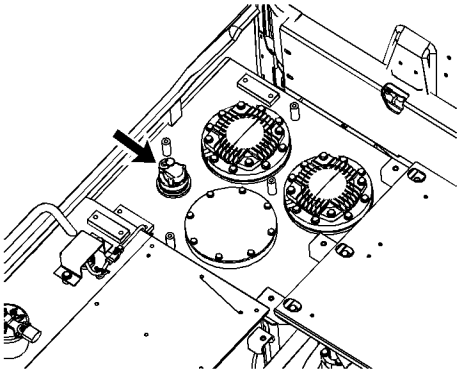

Illustration 426 g02112657

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.

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

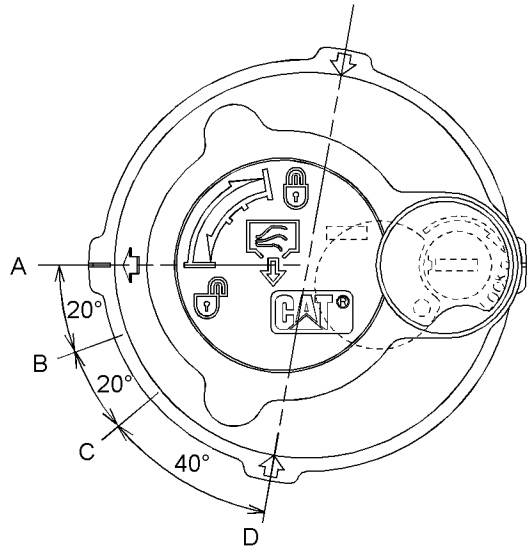

Illustration 427 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

4. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 427 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, remove the filler cap.

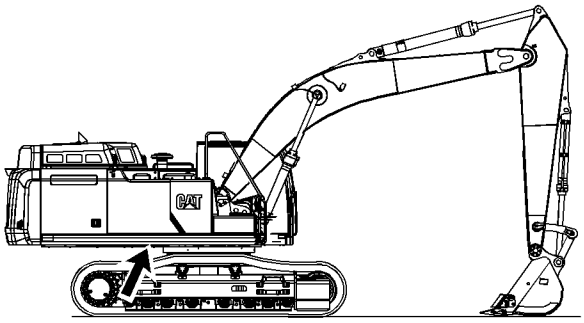

Illustration 428 g02112823

The oil drain valve is located under the hydraulic tank.

5. Remove the hydraulic tank access cover that is located under the upper structure. Removing the cover will allow access to the drain valve.

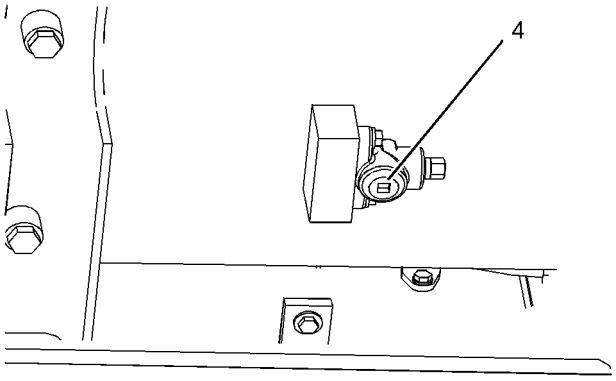

Illustration 429 g01124017

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

6. Remove plug (4).

7. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

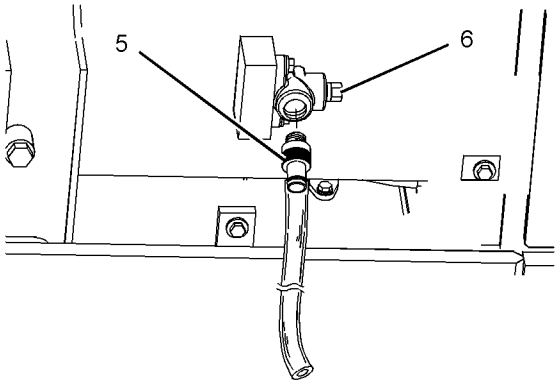

Illustration 430 g01124018

8. Install swivel hose (5) with clear plastic tubing.

9. Loosen drain plug (6) in order to drain the oil.

10. Drain the oil into a suitable container.

11. After the oil has been drained, tighten drain plug (6) to a torque of 110 ± 15 N·m (81 ± 11 lb ft).

12. Remove the swivel hose.

13. Clean plug (4) and install the plug. Tighten the plug to 90 ± 8 N·m (66 ± 6 lb ft).

14. Open the access door that is located on the right side of the machine.

15. Clean the pump, the hydraulic lines, and the hydraulic tank.

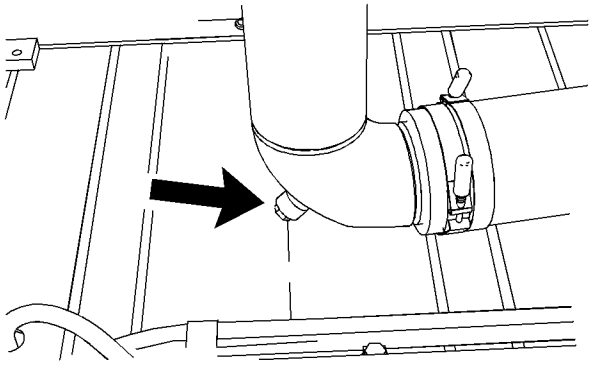

Illustration 431 g02022854

16. 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.

17. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

18. Clean the plug. Install the plug and the O-ring into the drain port.

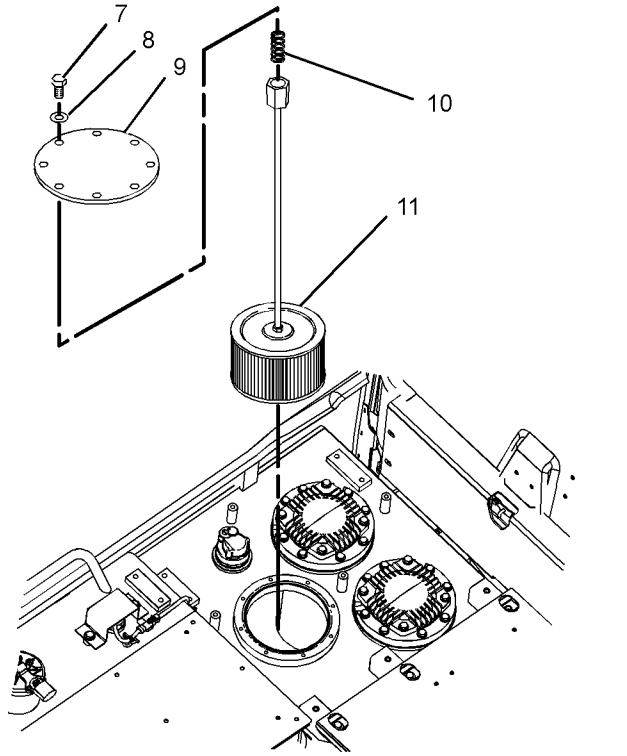

Illustration 432 g02112827

(7) Bolts
(8) Washers
(9) Cover
(10) Spring
(11) Screen

19. Remove bolts (7), washers (8) and cover (9).

Note: Dispose of used filters and used fluids according to local regulations.

Note: Do not allow spring (10) to fall back into the tank.

20. Remove spring (10) and screen (11).

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

21. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

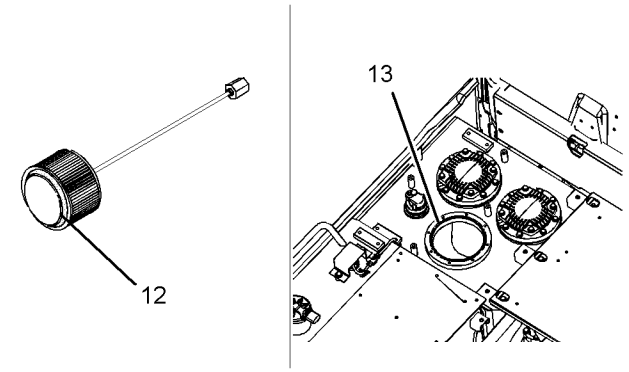

Illustration 433 g02112829

(12) O-ring seal
(13) O-ring seal

22. Inspect O-ring seals (12) and (13). Replace the O-ring seals if wear or damage is evident.

23. Install screen (11) and spring (10). Then install cover (9), washers (8), and bolts (7).

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

24. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

25. Inspect the O-ring seal on the filler cap for damage. Replace the O-ring, if necessary. Clean the filler cap. Install the filler cap.

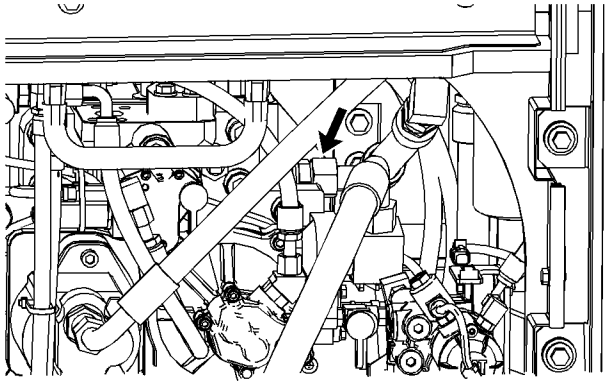

Illustration 434 g02112831

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.

26. 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, loosen the hose coupling on the side of the pump. Leave the hose coupling unattached for several minutes until the pump is filled with hydraulic oil. After the pump is filled with hydraulic oil, tighten the hose coupling. 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. The hydraulic tank will pressurize.

c. Slowly loosen the hose coupling until the hydraulic oil flows out of the hose coupling. This process indicates that the air has been released from the pump. Tighten the hose coupling.

27. Close the access door.

28. Start the engine. Operate the engine at idling speed for 5 minutes.

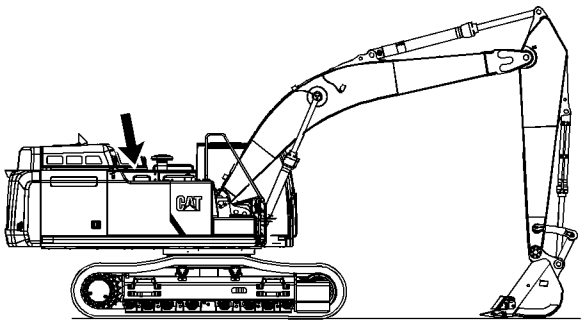

Illustration 435 g02111809

29. 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.

30. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

31. Close the access door.

Fast Fill

If your machine is equipped with a deluxe service center, you may drain the hydraulic oil through the fast fill port. You may also add the hydraulic oil through a fast fill port.

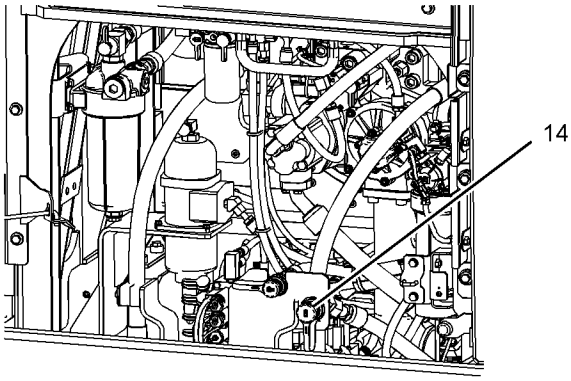

Illustration 436 g02114333

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

2. Remove the dust cover (14).

3. Attach the hose to the male coupling.

Note: Make sure that the coupling and receiver are free from debris before attaching. Reinstall the dust covers when done.

4. Drain the oil or add the oil, as needed.

5. Install the dust cover.

i04119333

Hydraulic System Oil Filter (Case Drain) - Replace

SMCS Code: 5068-510; 5091-510

⚠ WARNING

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

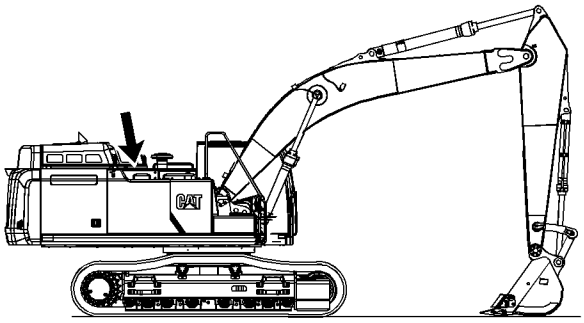

Illustration 437 g02111809

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

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

3. Turn the engine start switch to the ON position.

4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the pilot lines.

5. Turn the engine start switch to the OFF position and return the lever for the hydraulic lockout control to the LOCKED position.

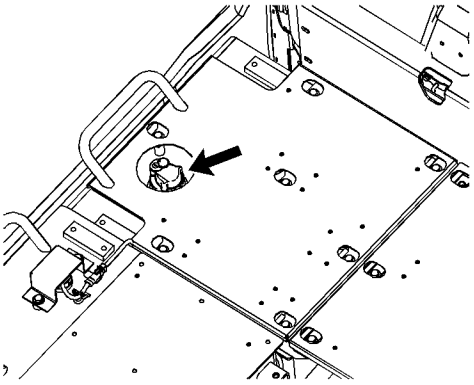

Illustration 438 g02111812

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

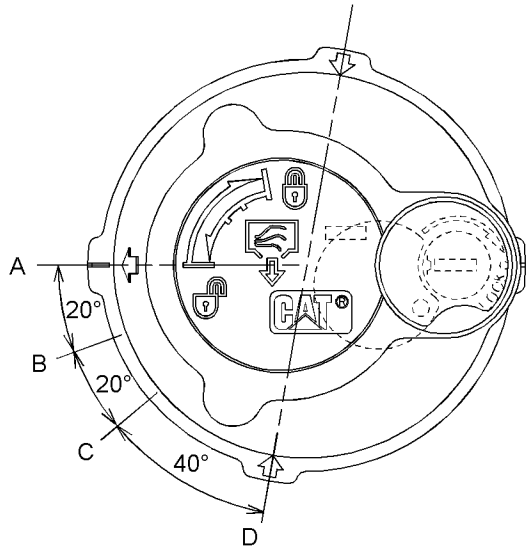

Illustration 439 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

6. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 439 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, tighten the filler cap on the hydraulic tank to position (A).

7. After the pressure is relieved, tighten the filler cap.

8. Open the access door on the right side of the machine.

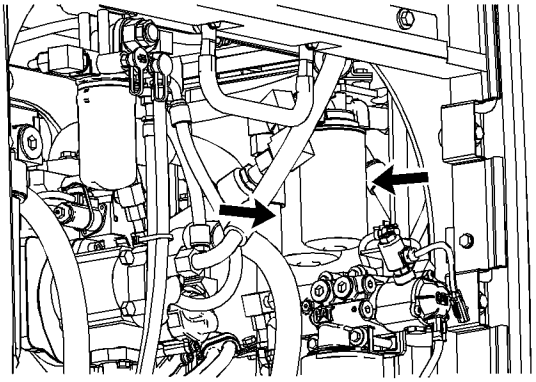

Illustration 440 g02112364

9. Clean the area in order to keep dirt out of the filter base.

10. Remove the used case drain filter from the filter base.

Note: Dispose of used filters according to local regulations.

11. Clean the filter base.

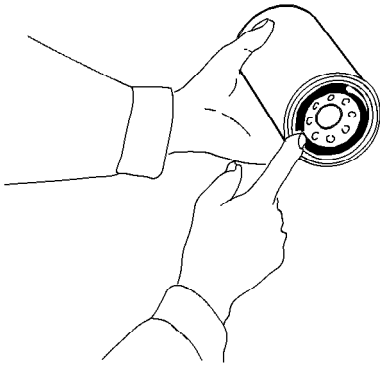

Illustration 441 g00101502

12. Coat the seal of a new case drain filter with clean hydraulic oil.

13. Install the new case drain filter by hand.

Instructions for the installation of the filter are printed on the side of each Cat spin-on filter. For filters that are not Cat branded, refer to the installation instructions that are provided by the supplier of the filter.

14. Start the engine and operate the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles.

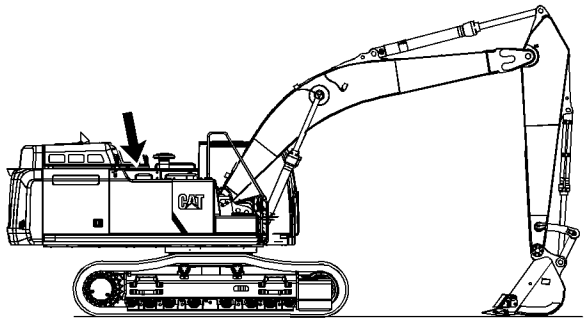

Illustration 442 g02111809

15. Return the machine to the position that is shown above. Check the machine for oil leaks.

16. Stop the engine.

17. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

18. Close the access door.

i04119429

Hydraulic System Oil Filter (Pilot) - Replace

SMCS Code: 5068-510; 5068-510-PS; 5092-510

⚠ WARNING

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

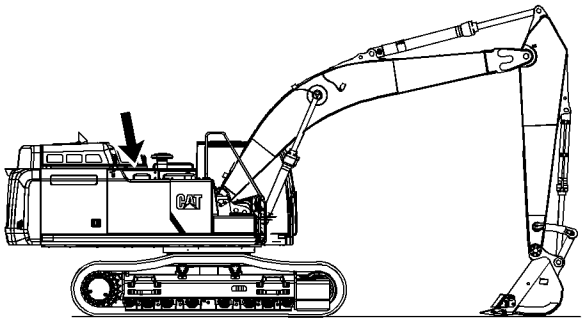

Illustration 443 g02111809

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

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

3. Turn the engine start switch to the ON position.

4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the pilot lines.

5. Turn the engine start switch to the OFF position and return the lever for the hydraulic lockout control to the LOCKED position.

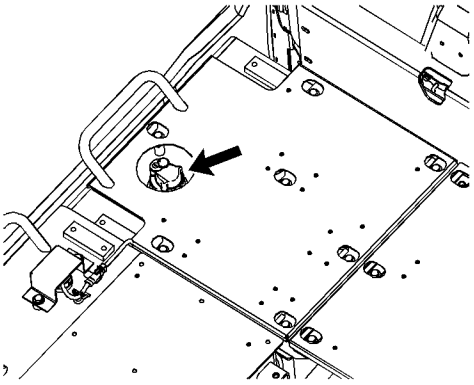

Illustration 444 g02111812

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

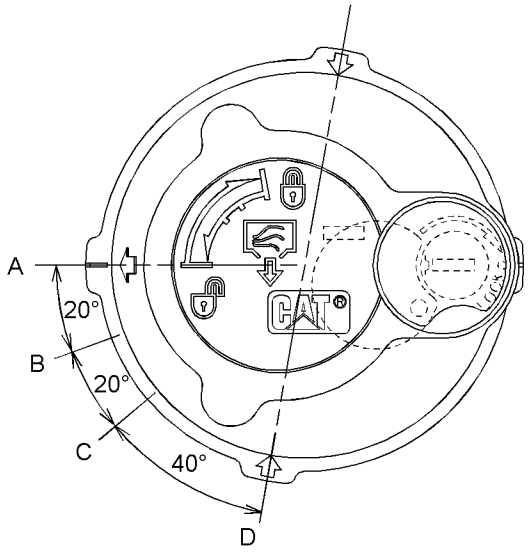

Illustration 445 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

6. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 445 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, tighten the filler cap on the hydraulic tank to position (A).

7. Open the access door on the right side of the machine.

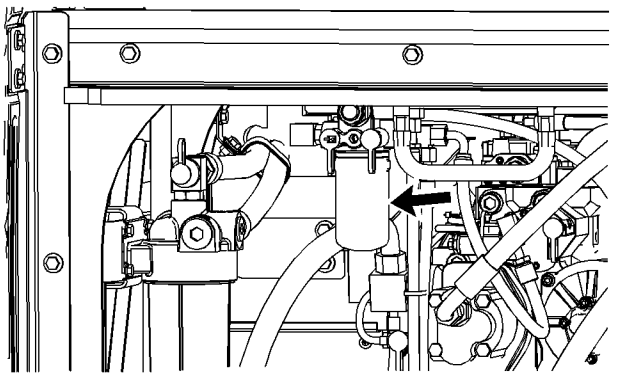

Illustration 446 g02112538

8. Clean the area in order to keep dirt out of the filter base.

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

9. Remove the used pilot filter element from the filter base.

Note: Used filters should always be disposed of according to local regulations.

10. Clean the filter base.

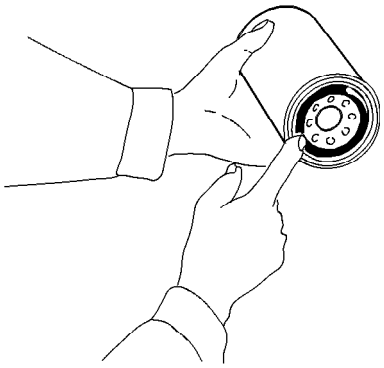

Illustration 447 g00101502

11. Coat the seal of a new pilot filter with clean hydraulic oil.

12. Install the new oil filter by hand.

Instructions for the installation of the filter are printed on the side of each Cat spin-on filter. For filters that are not Cat branded, refer to the installation instructions that are provided by the supplier of the filter.

13. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

14. Close the access door.

i04766136

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

⚠ WARNING

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

The return filter is a cartridge type filter. The amount of foreign material that enters the hydraulic system is reduced when the filter element is replaced.

Two different filters are available for the return filter. One filter is used for standard applications such as digging and normal use of a hammer. The second filter is used for an application such as demolishing a ceiling in a tunnel with a hammer.

Note: If the message display shows that the hydraulic return filter is plugged, turn off the machine. After you make sure that the warning has disappeared, start the machine and run the machine on level ground for approximately 10 minutes. If the warning still appears in the message display, inspect the filter and replace the filter, if necessary.

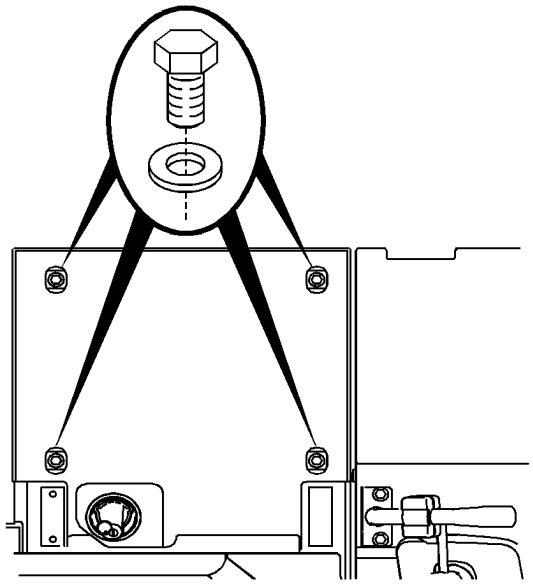

Illustration 448 g02515157

1. Remove the bolts, washers, and the cover from the top of the hydraulic tank.

2. Clean the area thoroughly in order to keep dirt out of the return filter. Clean the area thoroughly in order to keep dirt out of the filler cap.

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

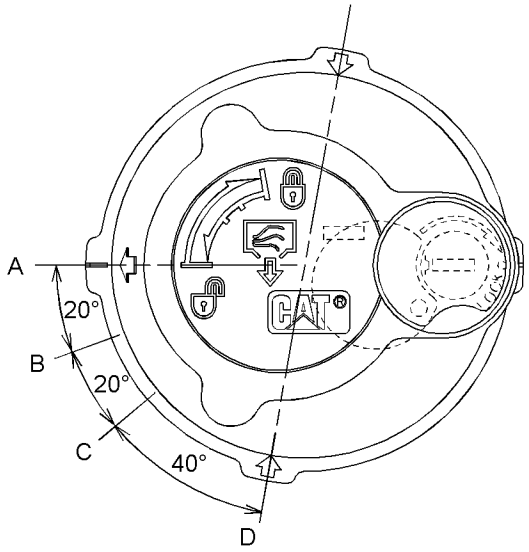

Illustration 449 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

3. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 449 for filler cap positions.

a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).

d. The hydraulic tank pressure is relieved. The filler cap can now be removed if needed.

e. Tighten the filler cap on the hydraulic tank to position (A).

4. Check the hydraulic system oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

5. Remove the filter cartridge. Perform the following steps in order to remove the filter cartridge.

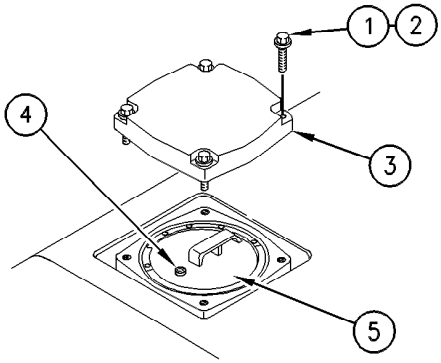

Illustration 450 g00102211

(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).

Note: When plug (4) is removed the oil level in the return filter drops to the level of the hydraulic tank.

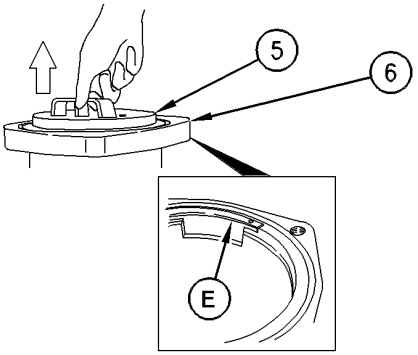

Illustration 451 g02515262

(5) Filter cartridge
(6) Filter case
(E) Guide

c. Pull up the handle at the top of filter cartridge (5) until the filter cartridge contacts guide (E) on filter case (6).

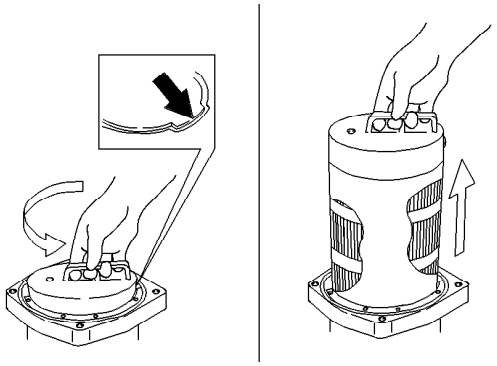

Illustration 452 g00102214

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.

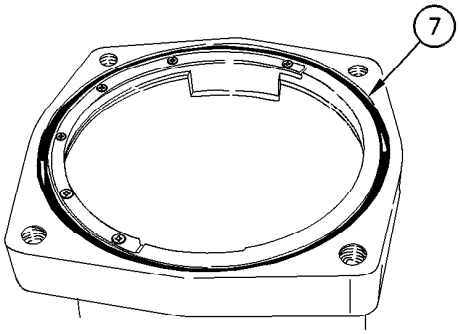

Illustration 453 g00102219

(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.

6. Remove the filter element. Perform Step 6a through Step 6f in order to remove the filter element.

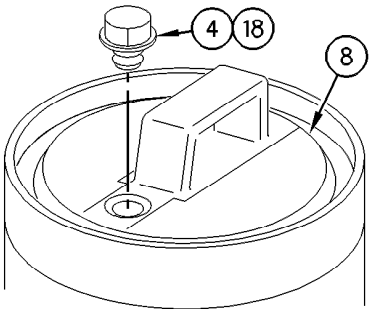

Illustration 454 g00104507

(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).

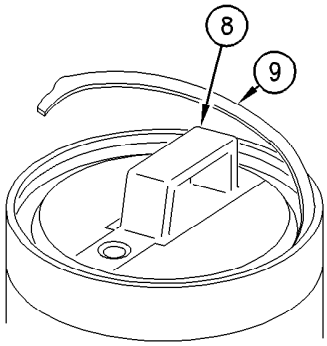

Illustration 455 g00918893

(8) Plate
(9) Spiral retaining ring

b. Remove spiral retaining ring (9).

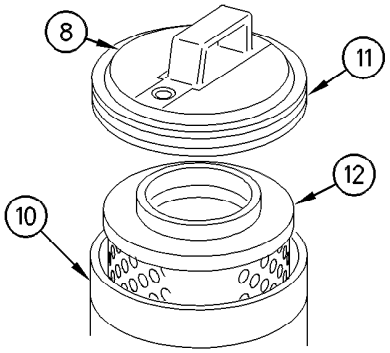

Illustration 456 g00104510

(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 6a through Step 6f for the other filter groups.

7. Clean the shell of the filter cartridge. Perform Step 7a through Step 7d in order to clean the shell of the filter cartridge.

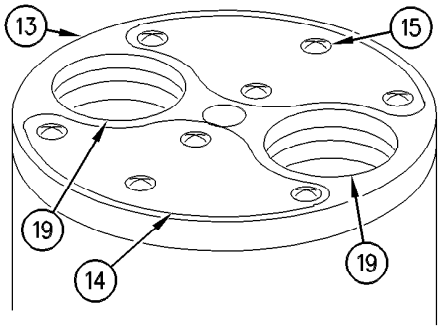

Illustration 457 g00104511

(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.

8. Install the filter elements. Perform Step 8a through Step 8k 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 the screws to a torque of 0.4 N·m (3.5 lb in).

f. Apply spray type oil into the clearance between shell (10) and slide plate (13).

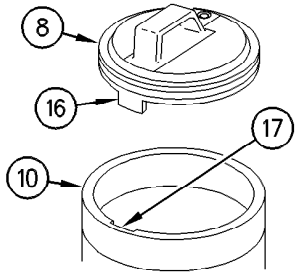

Illustration 458 g00104512

(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).

9. Install the filter cartridge. Perform Step 9a through Step 9e in order to install the filter cartridge.

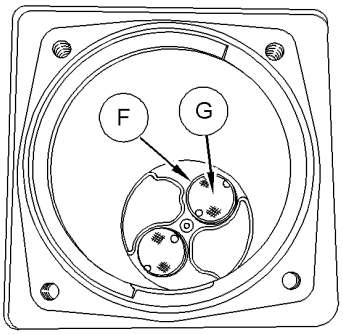

Illustration 459 g02515259

(F) Port
(G) Slide plate

a. Check that ports (F) at the bottom of the filter case are closed.

Note: If the ports are open, rotate slide plate (G) 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.

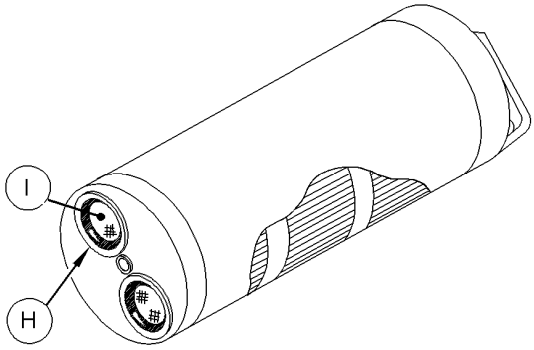

Illustration 460 g02515258

(I) Slide plate
(H) Port

b. Check that ports (H) 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 (I) counterclockwise to the stopper in order to fully close the ports.

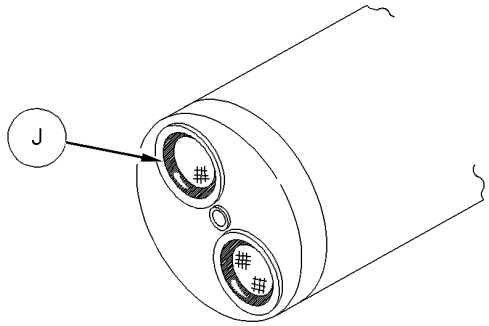

Illustration 461 g02515257

(J) O-rings

c. Check that O-rings (J) have been installed and that oil has been applied to O-rings (J).

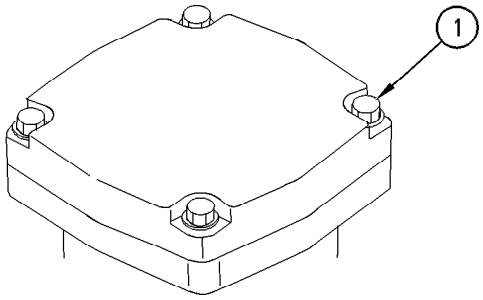

Illustration 462 g00102225

(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 (E).

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).

10. Check the hydraulic system oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

i04119541

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

⚠ WARNING

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

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.

The hydraulic oil tank is on the right side of the machine.

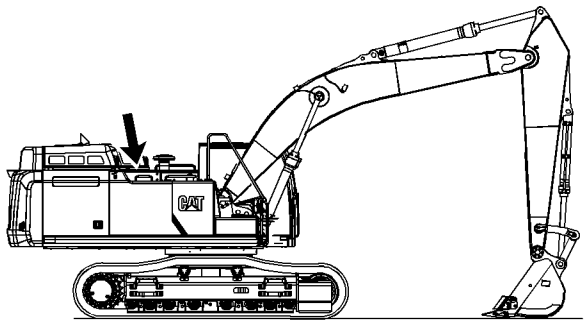

Illustration 463 g02111809

1. Park the machine on level ground. Lower the bucket to the ground with the stick in a vertical position, as shown.

2. Open the access door on the right side of the machine.

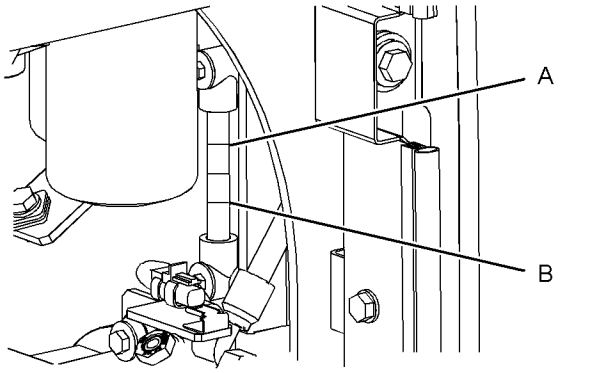

Illustration 464 g02111810

(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. Add oil, if necessary. See Operation and Maintenance, “Lubricant Viscosities”.

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

Note: Perform Step 5 through Step 7 if the oil level is low.

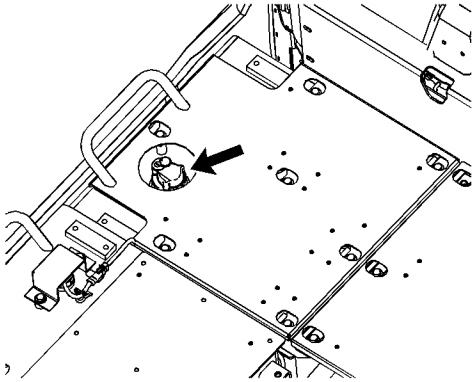

Illustration 465 g02111812

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

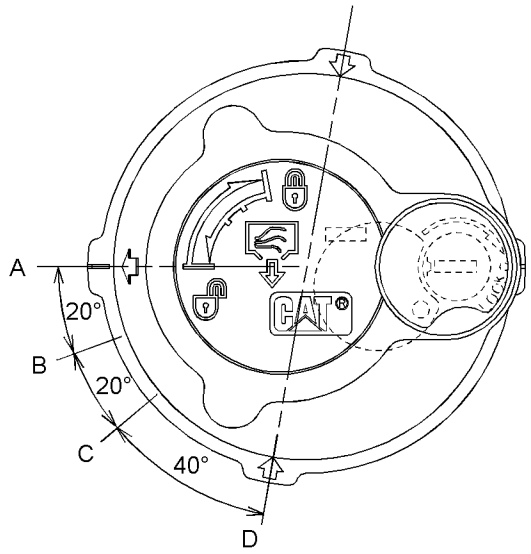

Illustration 466 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

5. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 466 for filler cap positions.

a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the filler cap down and move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, remove the filler cap.

6. Check the O-ring seal of the filler cap. Replace the O-ring seal if the O-ring seal is damaged.

7. Clean the filler cap and install the filler cap.

8. Close the access door.

i05984310

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-SM; 5095-008; 7542-008; 7542

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 6000 hours. S·O·S services after 3,000 hours is strongly Recommended. Consult your Cat dealer for details.

⚠ WARNING

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

Open the access door on the right side of the machine in order to access the sampling valve.

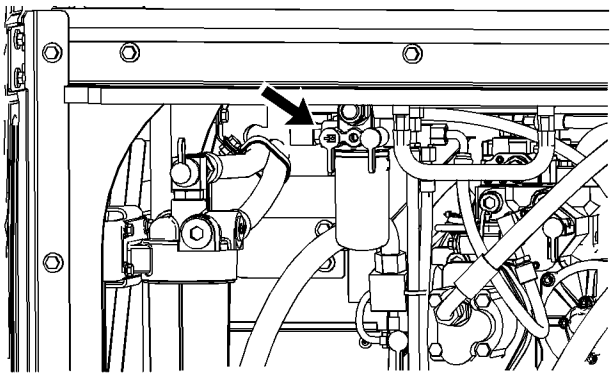

Illustration 467 g02110935

The hydraulic oil sampling valve is located on the housing of the pilot filter.

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, PEGJ0047, “How To Take A Good Oil Sample”.

i03753191

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

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.

i04882709

Oil Filter (Hydraulic Hammer) - Replace

SMCS Code: 5068-510

⚠ WARNING

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

1. Park the machine on level ground in the service position.

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

3. Turn the engine start switch to the ON position.

4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the hydraulic lines.

5. Turn the engine start switch to the OFF position and return the lever for the hydraulic lockout control to the LOCKED position.

⚠ WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

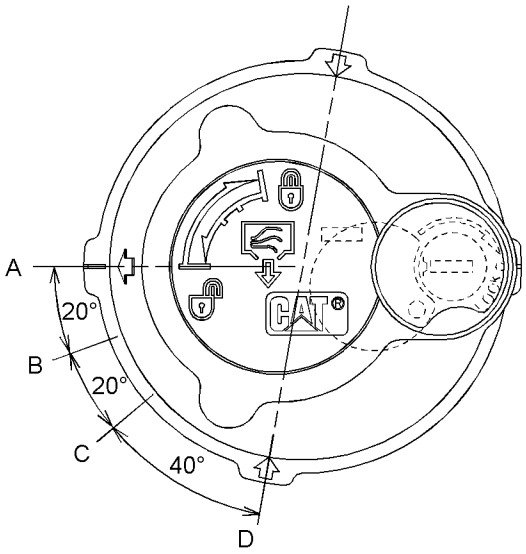

Illustration 468 g02275615

Filler cap

(A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

6. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 468 for filler cap positions.

a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).

b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).

d. The hydraulic tank pressure is relieved. Tighten the filler cap on the hydraulic tank to position (A).

7. The oil filter for the hammer is located near the base of the boom.

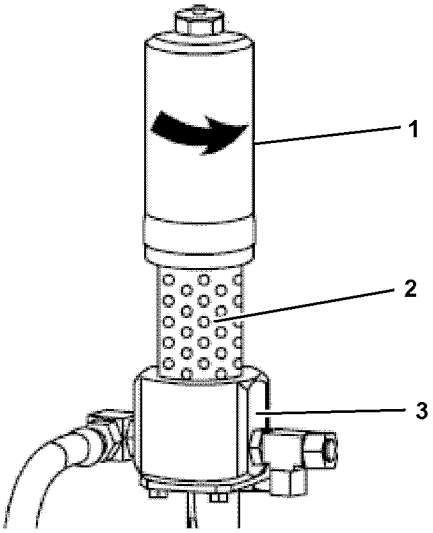

Illustration 469 g02902799

(1) Filter case
(2) Filter element
(3) Filter base

8. Position a suitable container in order to contain the oil.

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

9. Loosen filter case (1).

10. Lift filter case (1) in order to remove filter element (2).

11. Remove the used filter element from filter base (3).

Note: The element cannot be reused.

Note: Used filter elements should always be disposed of according to local regulations.

12. Clean filter case (1) and inspect the O-ring for damage. Replace the O-ring if necessary.

13. Install the new filter element.

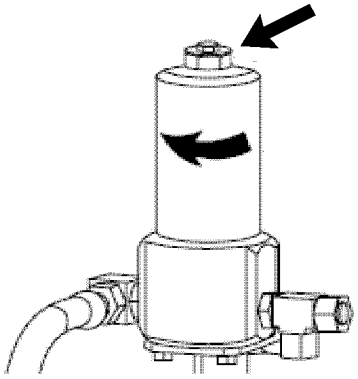

Illustration 470 g02909599

14. Assemble filter case (1). Tighten the nut on the filter case to a torque of 100 ± 10 N·m (74 ± 7 lb ft).

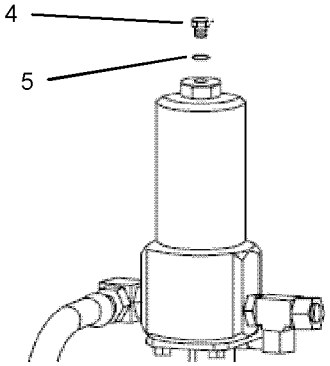

Illustration 471 g02909737

15. Remove plug (4) and inspect O-ring (5) for damage. Replace the O-ring if necessary. Tighten plug (4) to a torque of 13 ± 2 N·m (10 ± 1.5 lb ft)

16. Start the engine and operate the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles and operate the hammer.

17. Return the machine to the service position. Check the machine for oil leaks.

18. Stop the engine.

19. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris

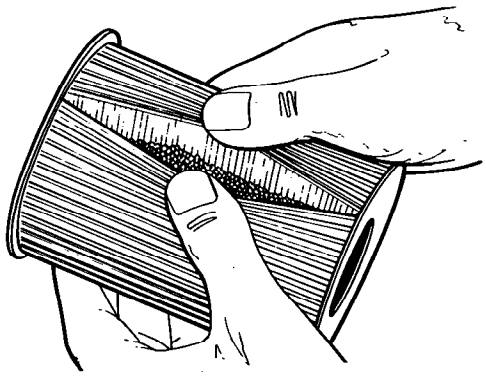

Illustration 472 g00100013

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.

i05097269

Pump Coupling Oil - Change

SMCS Code: 5062-044

⚠ WARNING

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

Note: If the machine is parked on an incline or the engine has been stopped for a short period of time, the oil in the pump coupling will not return to the housing. Park the machine on level ground and drain the oil after the engine has been stopped for at least 15 minutes.

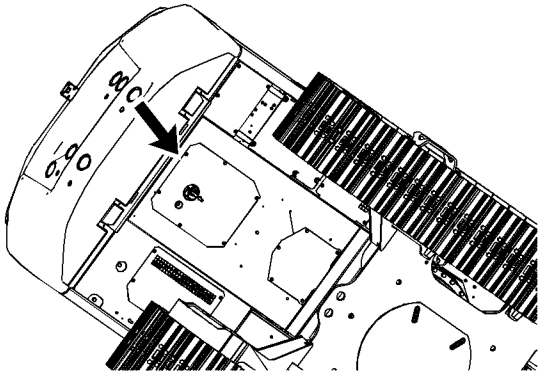

Illustration 473 g02110864

1. Remove the cover plate in order to gain access to the drain plug.

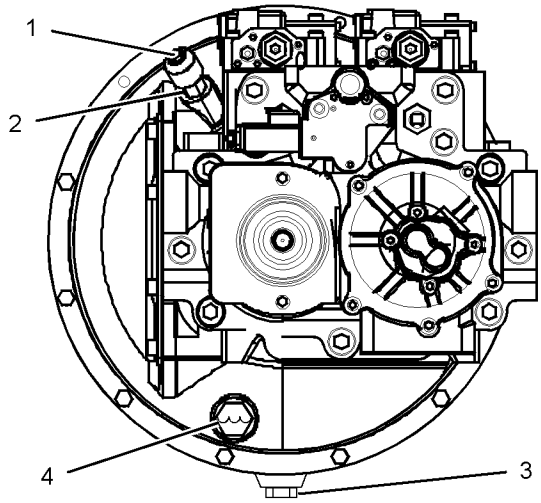

Illustration 474 g01513294

(1) Breather cap
(2) Adapter
(3) Oil drain plug
(4) Oil level sight gauge

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information on Containing Fluid Spillage.

2. Remove drain plug (3). Allow the oil to drain into a suitable container.

3. Clean the drain plug and inspect the O-ring seal. If wear or damage is evident, replace the drain plug and/or the O-ring seal.

4. Install drain plug (3).

5. Open the access door on the right side of the machine.

NOTICE
Do not overfill the housing for the pump coupling. Overfilling will the cause the engine oil to overheat and engine damage can result.

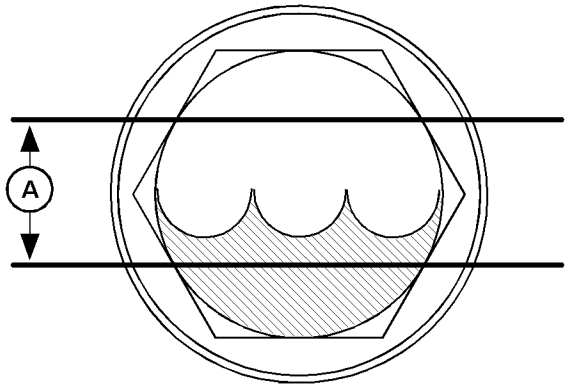

Illustration 475 g03208836
Sight Gauge

6. Remove breather cap (1) and adapter (2). Fill the housing with new oil to area (A) of sight gauge (4). See Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill) ”.

7. Clean the breather cap and the adapter. Inspect the O-ring seal. If wear or damage is evident, replace the damaged part.

8. Install the breather cap and the adapter.

9. Check for leaks.

10. Close the access door on the right side of the machine.

11. Install the cover plate.

i05097229

Pump Coupling Oil Level - Check

SMCS Code: 5062-535

⚠ WARNING

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

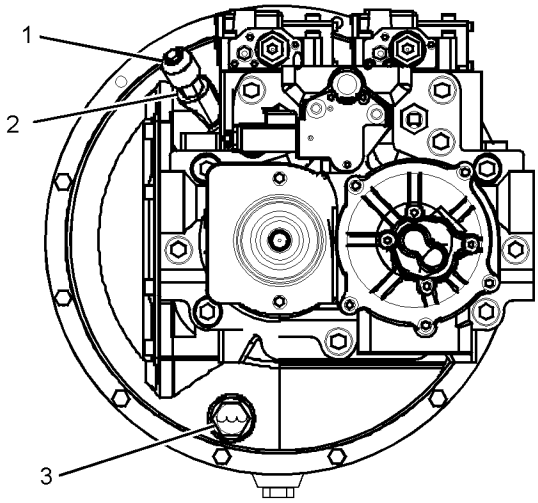

Illustration 476 g01513216
(1) Breather
(2) Adapter
(3) Sight Gauge

Note: Check the oil level for the pump coupling with the machine on a level surface. If the machine is parked on an incline or the engine has been stopped for a short period, the oil in the pump coupling will not return to the housing. The fluid level cannot be checked properly. Park the machine on level ground and check the oil level after the engine has been stopped for at least 15 minutes.

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

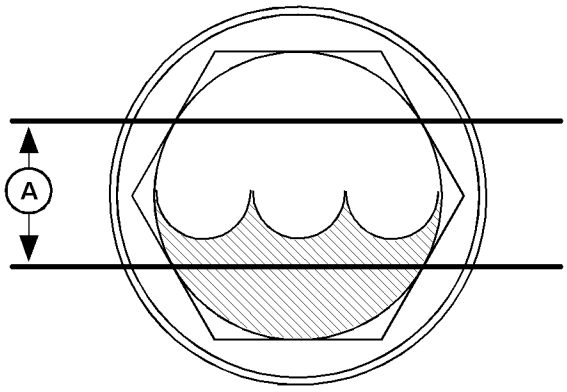

Illustration 477 g03208836
Sight Gauge

2. Maintain the oil level in area (A) of sight gauge (3). If the oil level is low, then add oil. See Operation and Maintenance Manual, “Lubricant Viscosities”.

NOTICE
Do not overfill the housing for the pump coupling. Overfilling will the cause the engine oil to overheat and engine damage can result.

3. Remove breather cap (1) and adapter (2) and fill to the recommended oil level.
4. Clean the breather cap and the adapter. Inspect the O-ring seal. If wear or damage is evident, replace the damaged part.
5. Replace the breather cap and the adapter.
6. Close the right side access door.

i03753236

Radiator Core - Clean

SMCS Code: 1353-070

⚠ WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

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

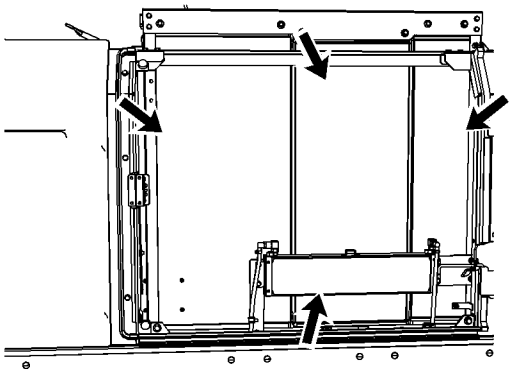

Illustration 478 g02024540

2. Check all of the core fins for debris.
3. Remove dust and debris from all of the core fins and from the screens.

   Compressed air is preferred, but high pressure water or steam can be used to remove dust and general debris from a core.

   See Special Publication, SEBD0518, “Know Your Cooling System” for more detailed information about cleaning core fins.
4. Close the access doors.

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.

i05252968

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

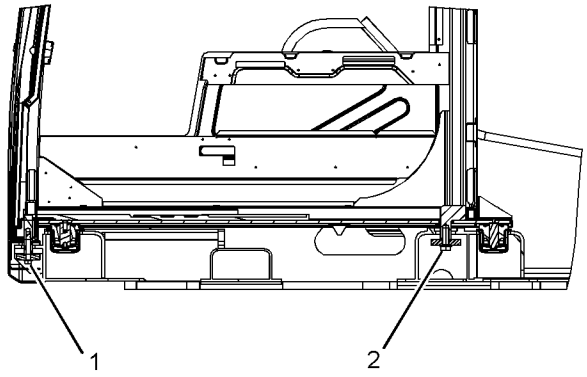

Illustration 479 g02008734

Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

- Tighten the M16 bolt (1) to125 ± 20 N·m (92 ± 15 lb ft).
- Tighten the M24 bolt (2) to 425 ± 50 N·m (315 ± 40 lb ft).

Do not straighten the ROPS. Do not repair the ROPS by welding reinforcement plates to the ROPS.

Consult your Cat dealer for inspection of any potential damage or repair of any damage to any operator protective structure. (Including ROPS, FOPS, TOPS, OPS, and OPG) Refer to Special Instruction, SEHS6929 , “Inspection, Maintenance, and Repair of Operator Protective Structures (OPS) and Attachment Installation Guidelines for All Earthmoving Machinery”

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

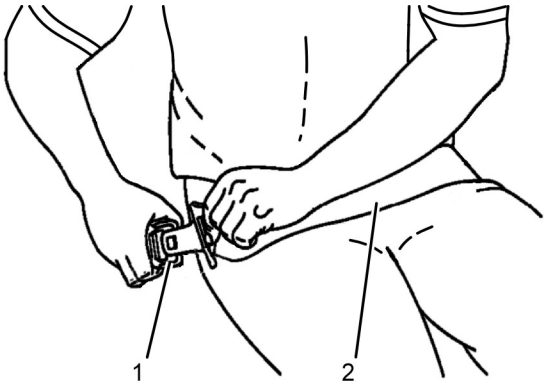

Illustration 480 g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i06891605

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

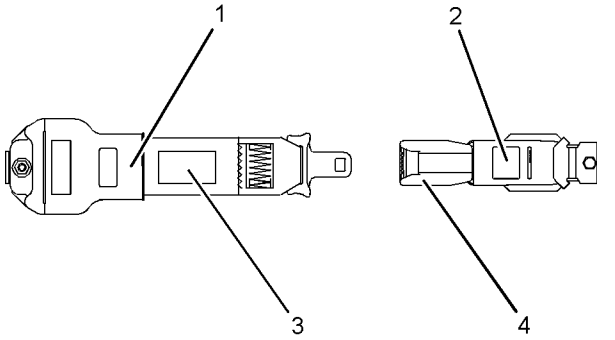

Illustration 481 g01152685

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.

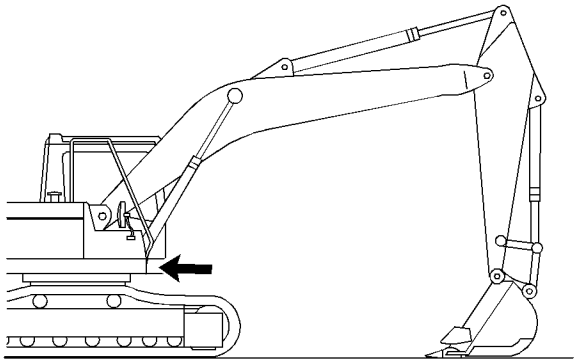

Illustration 482 g02110713

The swing bearings are under the base of the boom.

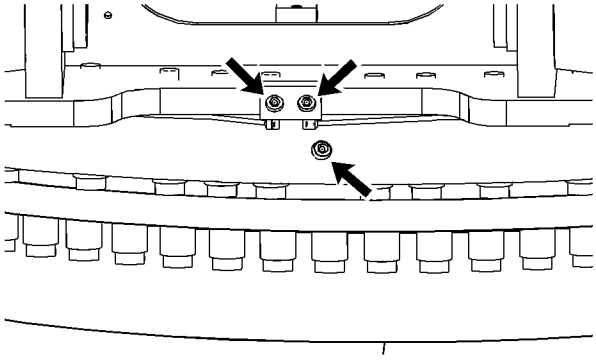

Illustration 483 g01106319

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

i03867537

Swing Drive Oil - Change

SMCS Code: 5459-044

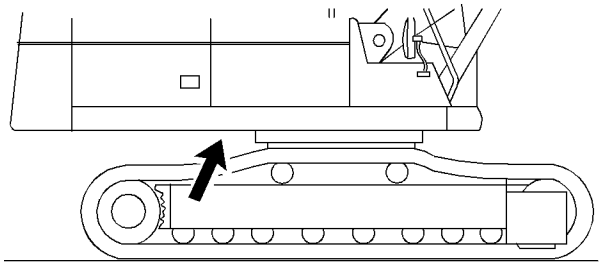

Illustration 484 g02110675

The oil drain hose is under the center of the upper structure.

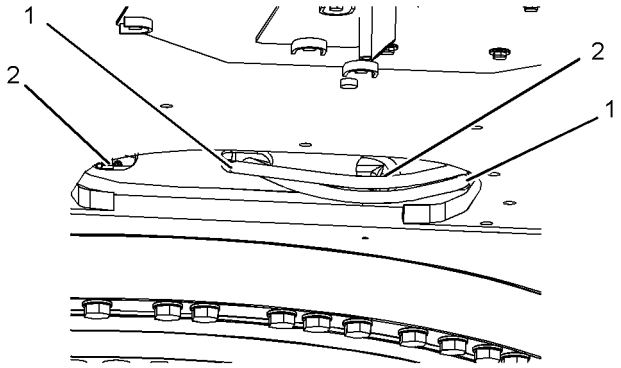

Illustration 485 g01106606

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

1. Remove drain hose (1) from the hole in the upper frame. Face the end of the hose toward the container.

2. Loosen the drain valve in hole (2). Drain the oil into a suitable container.

Note: 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.

3. Tighten the drain valve. Replace the drain hose (1) into the hole in the upper frame.

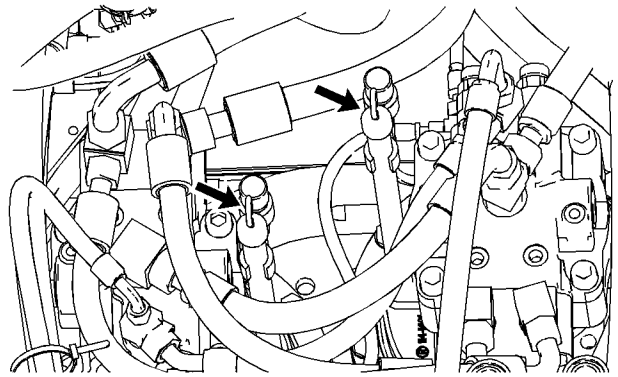

Illustration 486 g01106264

4. Remove the dipstick.

5. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, “Capacities (Refill)”.

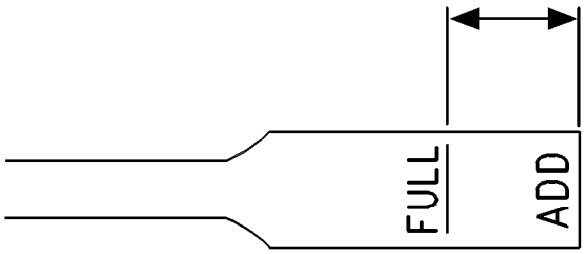

Illustration 487 g01049757

6. Make sure that the oil level is maintained between the marks 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

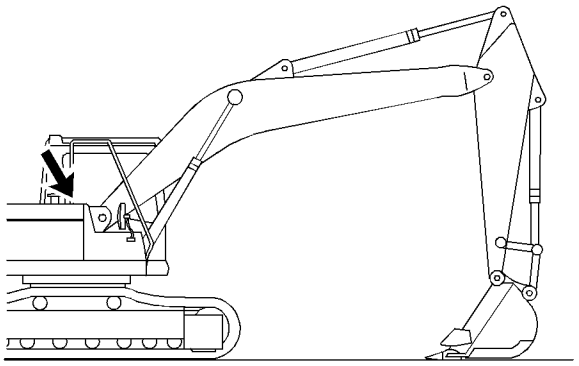

Illustration 488 g02110464

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.

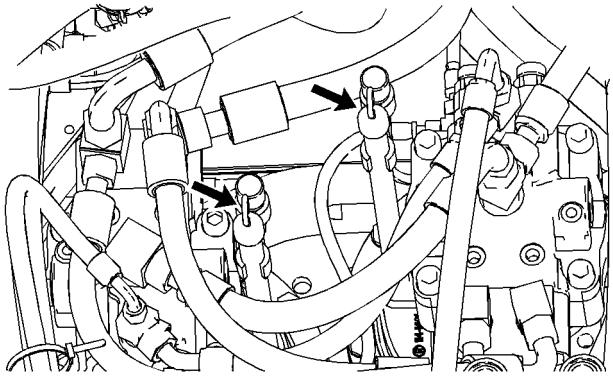

Illustration 489 g01106264

1. Remove the dipstick.

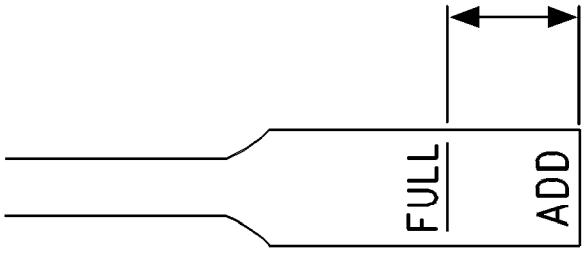

Illustration 490 g01049757

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-OC; 5459-554-OC; 5459-008; 7542-008

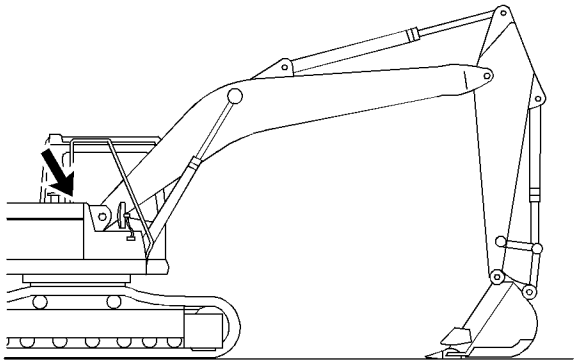

Illustration 491 g02110464

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.

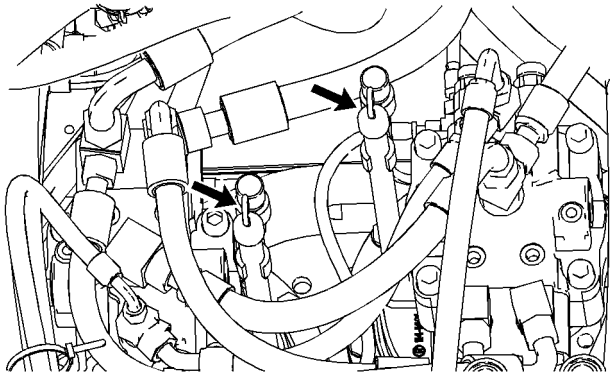

Illustration 492 g01106264

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.

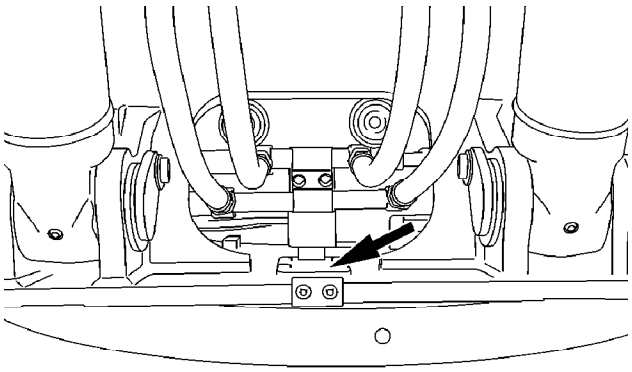

Illustration 493 g00834990

Remove the inspection cover that is located near the boom base. Inspect the grease.

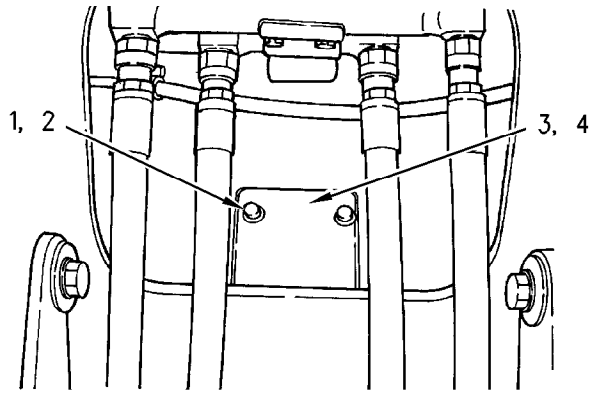

Illustration 494 g00688056

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).

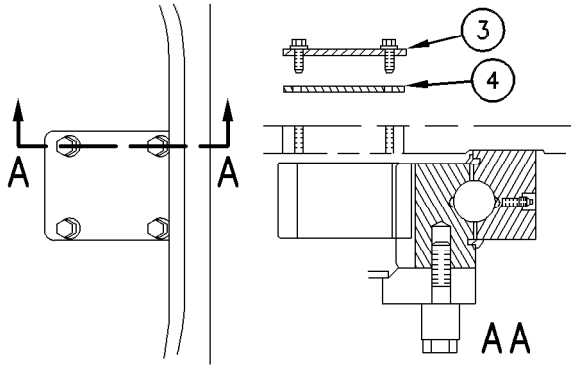

Illustration 495 g00115464

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.

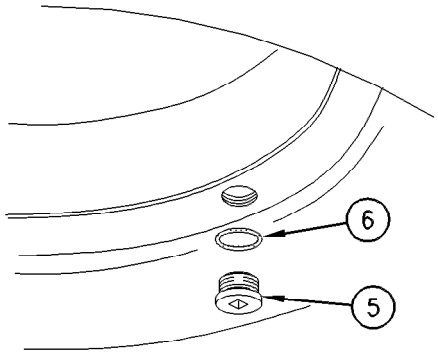

Illustration 496 g00101653

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.

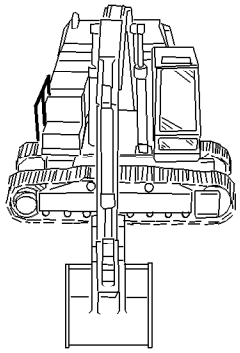

Illustration 497 g00101644

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.

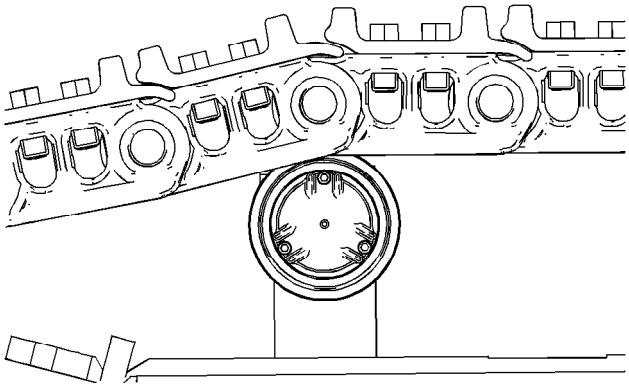

Illustration 498 g01103855

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.

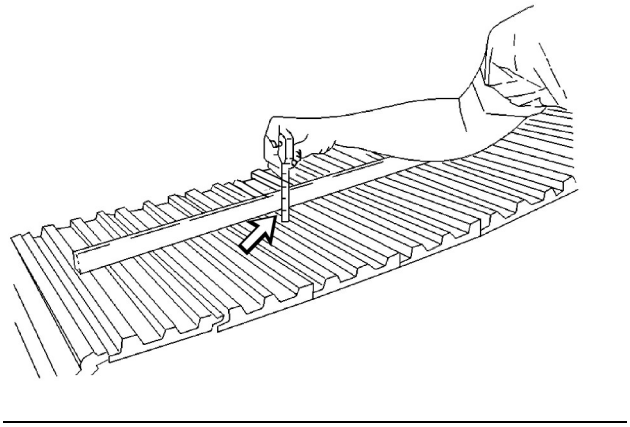

Illustration 499 g03472827

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

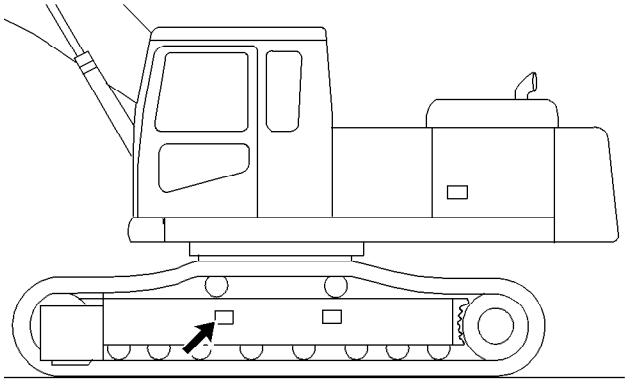

Illustration 500 g00270405

Typical example

The track adjuster is located on the track frame.

Tightening the Track

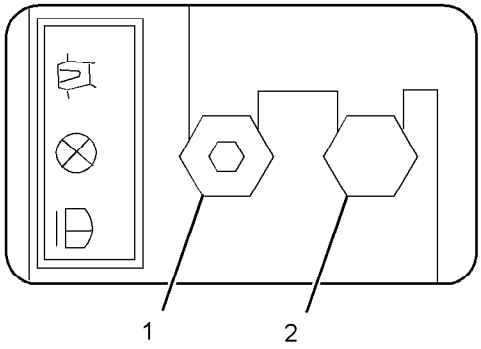

Illustration 501 g01091134

(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

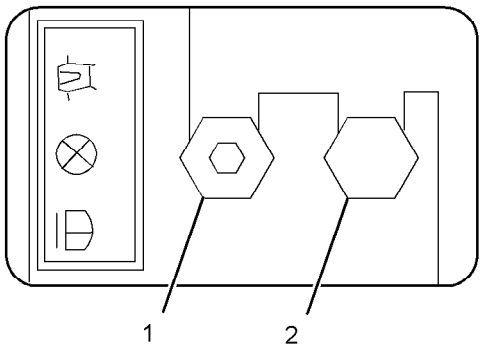

Illustration 502 g01091134

(1) Grease fitting
(2) Relief valve

1. Loosen relief valve (2) carefully until the track begins to loosen. One turn should be the maximum.

2. Tighten relief valve (2) to 34 ± 5 N·m (25 ± 4 lb ft) when the desired track tension is reached.

3. Operate the machine back and forth in order to equalize the pressure.

4. Check the amount of sag. Adjust the track, as needed.

i01590290

Track Adjustment - Inspect

SMCS Code: 4170-040

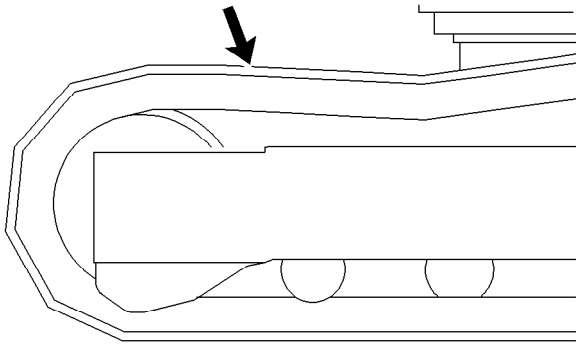

Illustration 503 g00824541

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

If the track appears to be too tight or too loose, refer to Operation and Maintenance Manual, “Track Adjustment - Adjust”.

i04571216

Travel Alarm - Test
(If Equipped)

SMCS Code: 7429-081

Move the machine in order to test the travel alarm.

1. Start the engine. Move the hydraulic lockout control to the UNLOCKED position.

2. Raise the work tool in order to avoid any obstacles. Make sure that there is adequate overhead clearance.

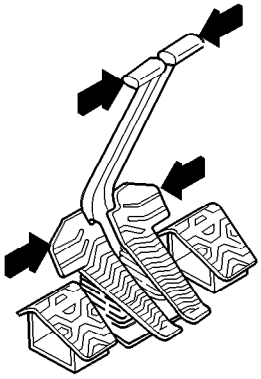

Illustration 504 g00560313

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.

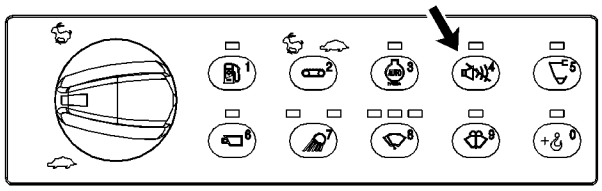

Illustration 505 g02730938

6. Push the alarm cancel switch. The travel alarm should shut off.

7. Stop the machine. Lower the work tool to the ground. Move the hydraulic lockout control to the LOCKED position. Stop the engine.

i03934011

Undercarriage - Check

SMCS Code: 4150-535

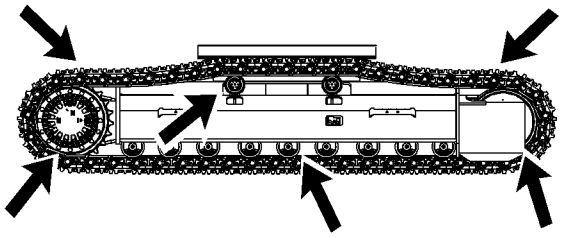

Illustration 506 g02154815

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.

i03898951

Window - Check

SMCS Code: 7310-535

Check the polycarbonate windows of the cab for the following conditions.

- yellow or haze
- scratches on either side of the window that can be felt with a fingernail
- small cracks that come from the edges or mounting holes
- contact with fluids that result in haze or clouds on the window such as brake fluid

When any of the above conditions exist, contact your Caterpillar dealer for replacement.

i02186587

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.

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

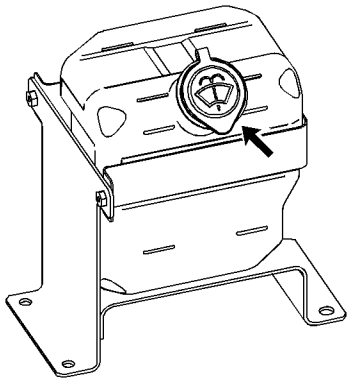

Illustration 507 g01105820

2. Remove the filler cap.

3. Fill the window washer reservoir with washer fluid through the filler opening.

4. Install the filler cap.

5. Close the access door.

i01258249

Window Wiper - Inspect/ Replace

SMCS Code: 7305-510; 7305-040

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i05867976

Windows - Clean

SMCS Code: 7310-070; 7340-070

Clean the outside of the windows from the ground, unless handholds are available.

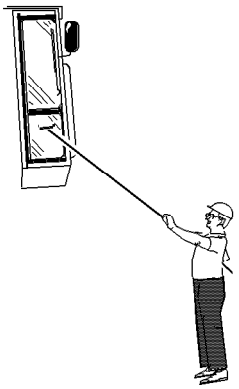

Illustration 508 g00566124

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)

Special care is needed in order to clean polycarbonate windows.

Wash polycarbonate windows with mild soap and warm water that does not exceed 50° C (122° F). Use 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 cold water.

Note: Naphtha or kerosene can be used in order to remove labels, films, paint, or marking pen from polycarbonate windows.

Note: Do not use abrasive, or highly alkaline cleaners. Do not use sharp instruments, such as squeegees or razor blades on polycarbonate windows. Do not clean polycarbonate windows in the hot sun or at elevated temperatures.

Warranty Section

Warranty Information

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).

b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems (“emission related components”), are:

a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.

b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i07422648

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting publications.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

publications.cat.com

i07743978

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

Improperly disposing of waste can threaten the environment. Obey all local regulations for the decommissioning and disposal of materials.

Utilize appropriate personal protective equipment when decommissioning and disposing product.

Consult the nearest Cat dealer for additional information. Including information for component remanufacturing and recycling options.

Index

O

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:	_____	_____	_____