M0101823-03 (en-us)
March 2021

Operation and Maintenance Manual

374 Excavator

TNX 1-UP (374)
JGP 1-UP (374)

Language: Original Instructions

Important Safety Information

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

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

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

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

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



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

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.

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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:

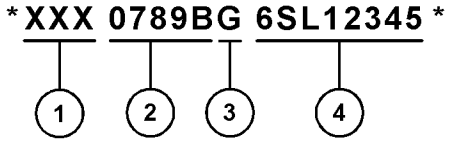


Illustration 1 g03891925

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

i08247763

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.

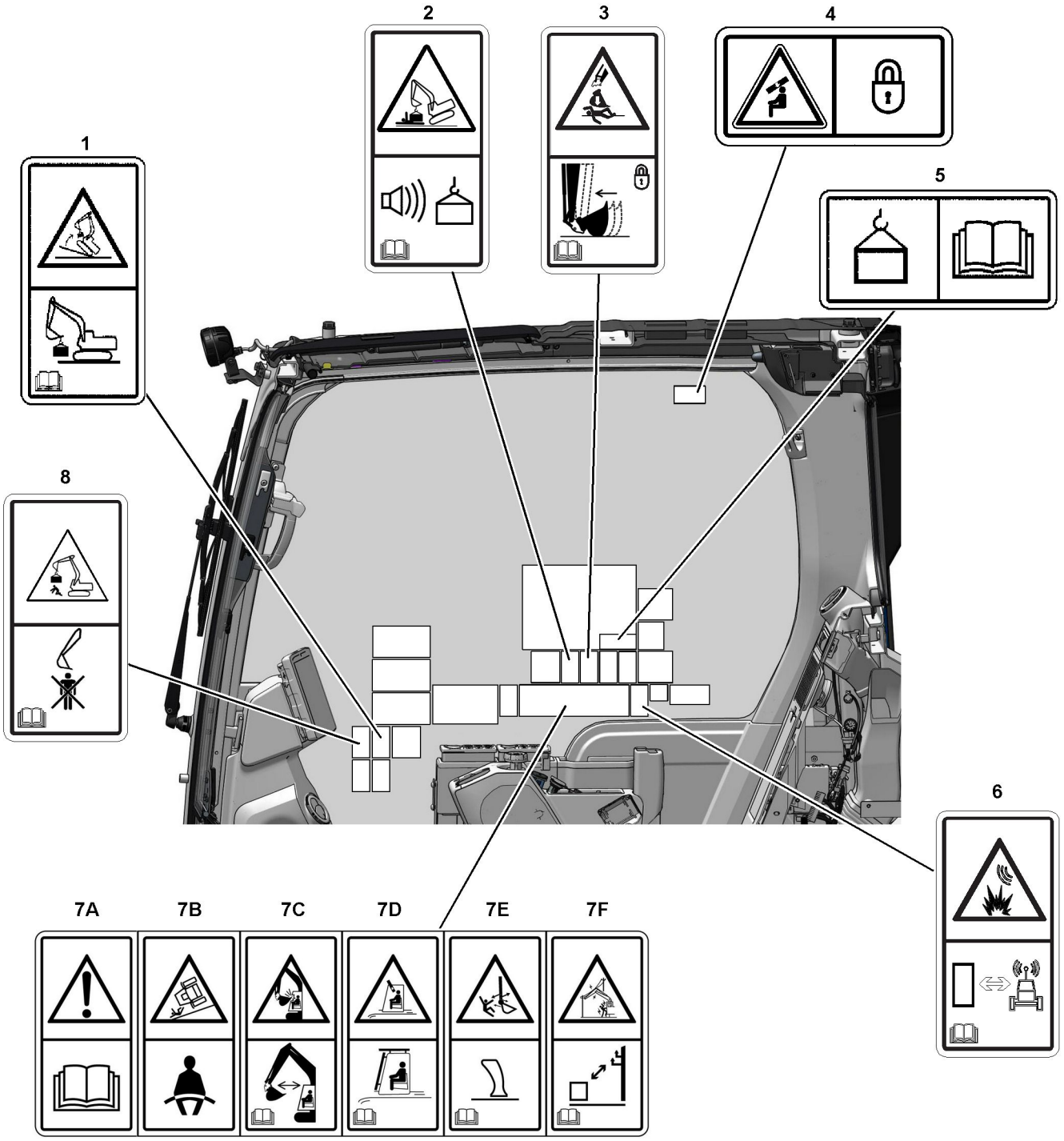


Illustration 2
g06532979

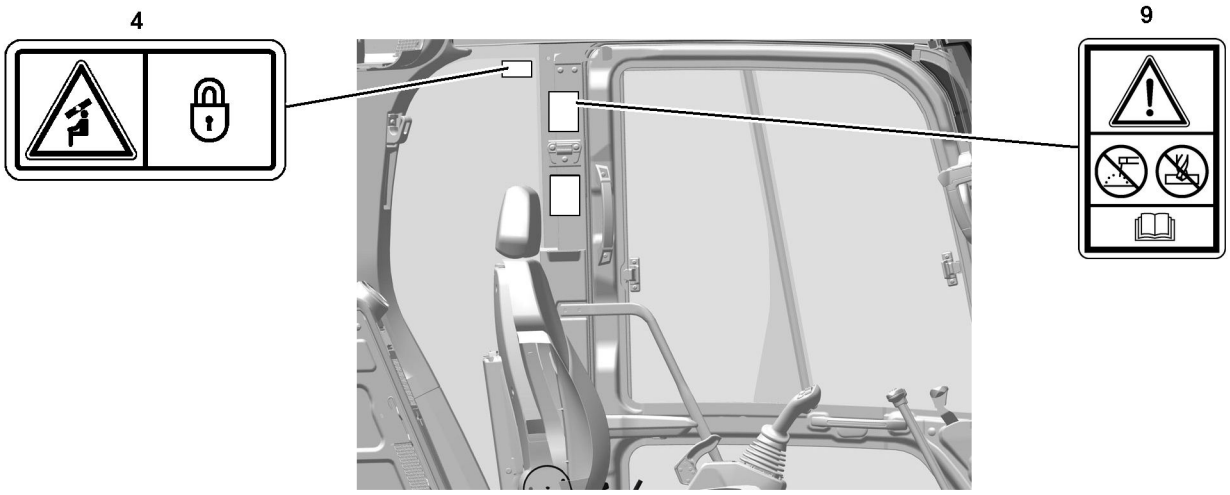


Illustration 3 g06601350

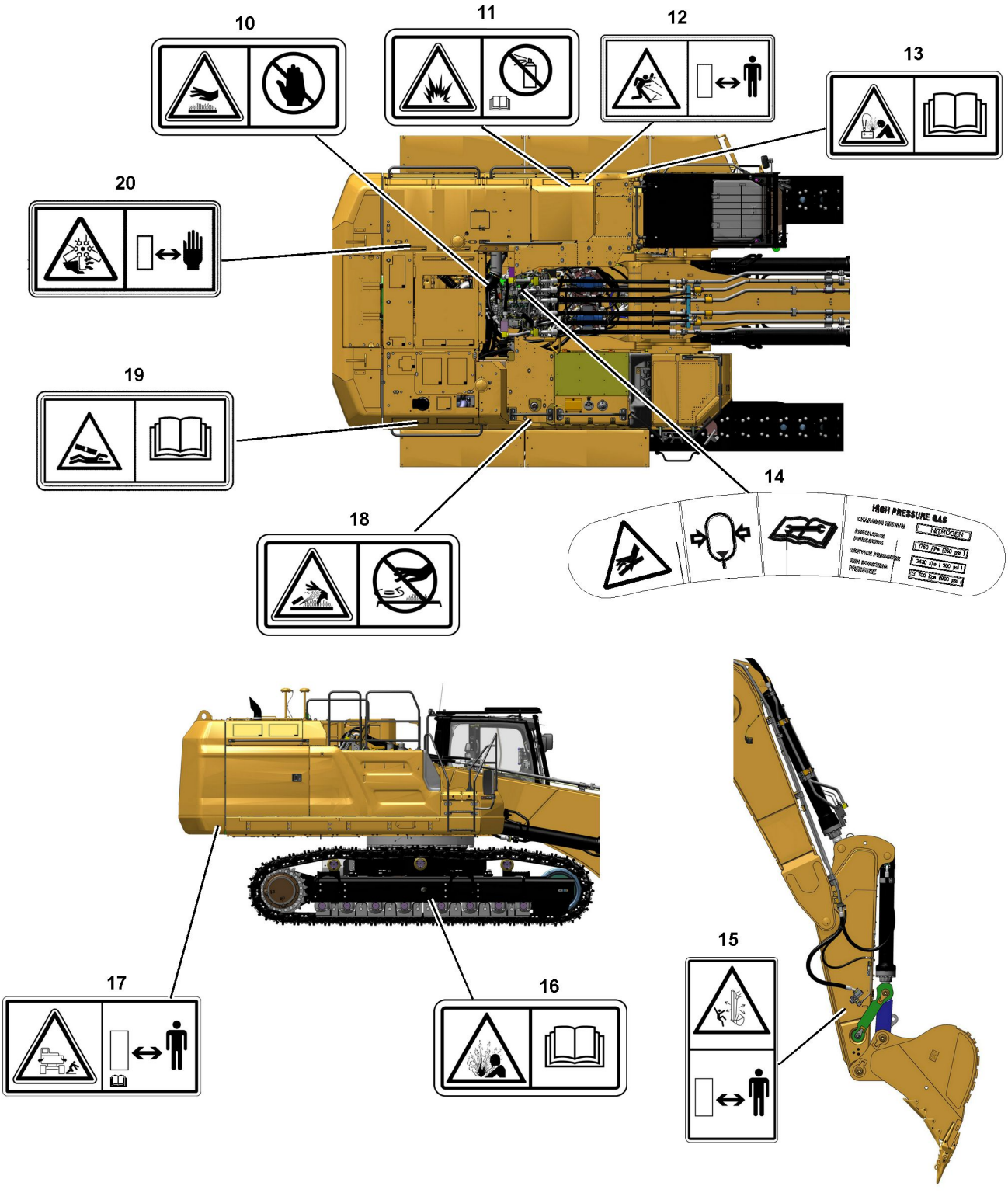


Illustration 4
g06598660



Illustration 5 g06598674

Lifting Level Warning (1)

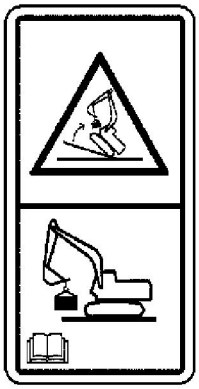


Illustration 6 g06289488

Overload Warning Device (2)

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

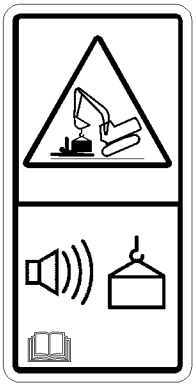


Illustration 7 g06224998

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 (3)

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

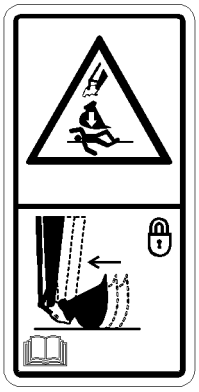


Illustration 8 g06188540

⚠ WARNING

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

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

Crushing Hazard (4)

These safety messages are on the left and right side cab windows.

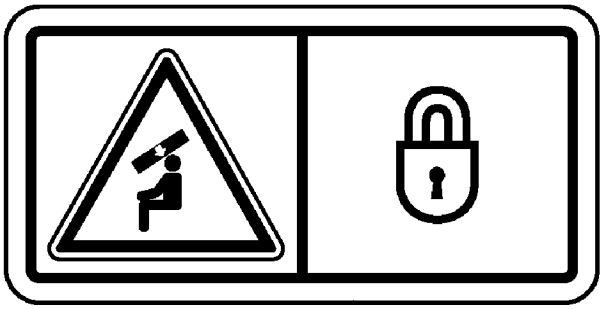


Illustration 9 g02061339

⚠ 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.

Lifting Notice (5)

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

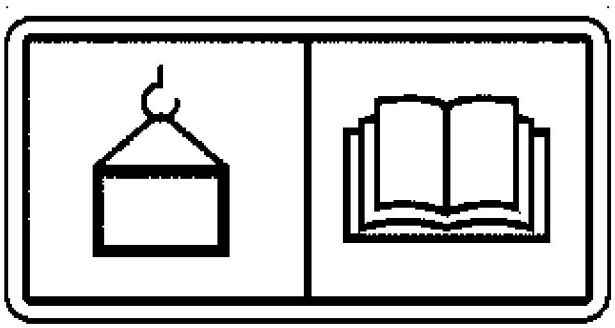


Illustration 10 g06289554

⚠ WARNING

When operating the machine's lift tool, read Operation and Maintenance Manual first for lifting capabilities.

Product Link (6)

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

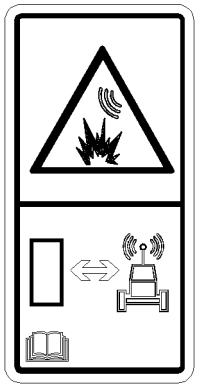


Illustration 11 g06188657

⚠ 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.

Do Not Operate (7A)

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

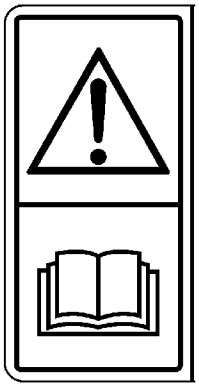


Illustration 12 g06188661

⚠ 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.

Seat Belt (7B)

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



Illustration 13 g06188642

⚠ 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 (7C)

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

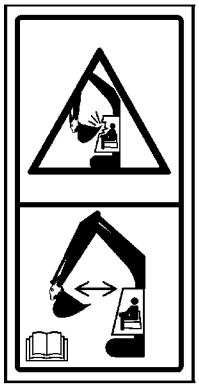


Illustration 14 g06188644

⚠ 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.

Crushing Hazard (7D)

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

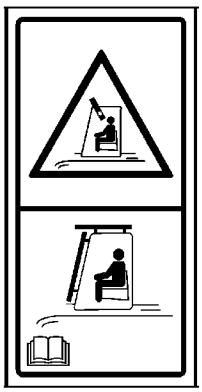


Illustration 15 g06188652

⚠ 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 (7E)

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

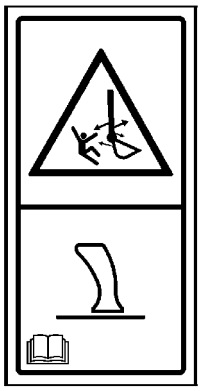


Illustration 16 g06188665

⚠ 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.

Electrical Power Lines (7F)

This safety message is located in the cab.

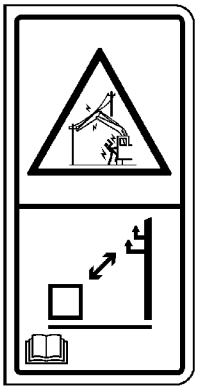


Illustration 17 g06188667

⚠ 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.

Do Not Lift Over Personnel (8)

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

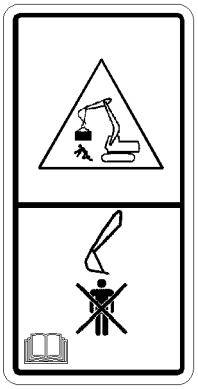


Illustration 18 g06188697

Do not lift

Do Not Weld or Drill on ROPS (9)

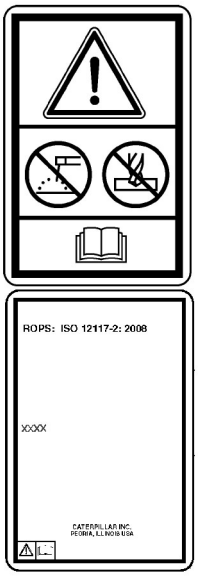


Illustration 19 g06207749

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

⚠ 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.

Hot Surface (10)

This message is on the outside of the engine hood and inside the engine hood.

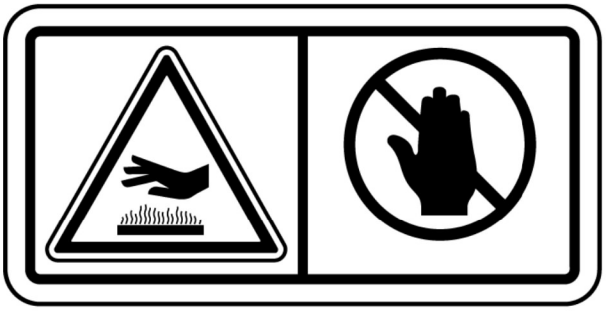


Illustration 20 g01372256

⚠ 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.

Aerosol Starting Aid (11)

This safety message is located near the precleaner. The following information is not applicable to machines that are equipped with an ether starting aid.



Illustration 21 g01372254

⚠ WARNING

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

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

Flying Debris (12)

This safety message is on the left side near the rear of the machine.

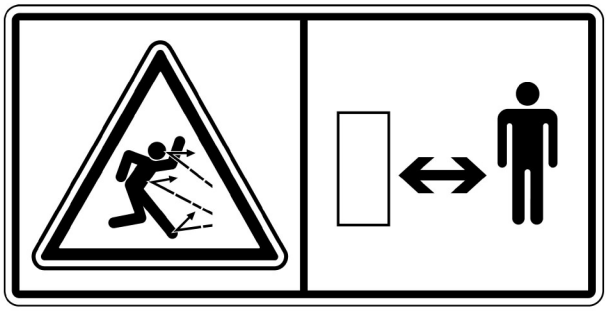


Illustration 22 g01404266

⚠ WARNING

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

Jump-Start Cables (13)

This safety message is positioned on the circuit breaker panel.

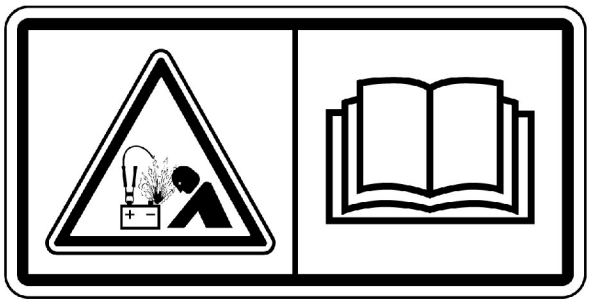


Illustration 23 g01370909

⚠ WARNING

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

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

High-Pressure Gas (14)

This safety message is positioned on the accumulator.

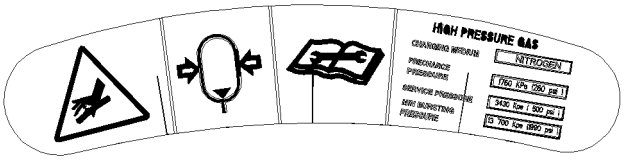


Illustration 24 g06188756

⚠ 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 (15)

This safety message is on both sides of the stick.

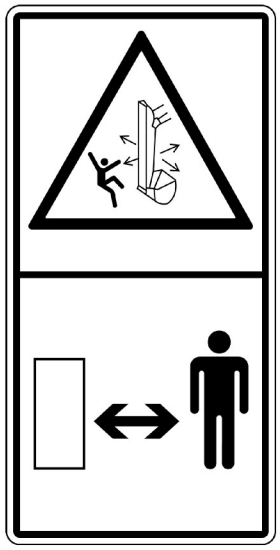


Illustration 25 g01385579

⚠ 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.

Vapor Explosion (16)

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

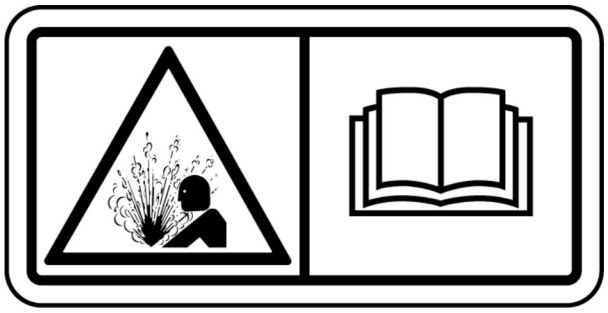


Illustration 26 g01407639

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.

Crushing Hazard (17)

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

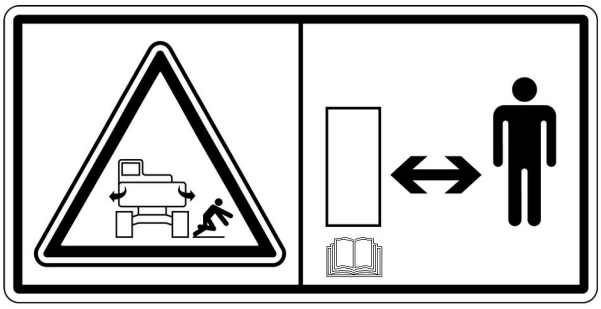


Illustration 27 g06219420

WARNING

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

Relieve Hydraulic Tank Pressure (18)

This safety message is on top of the hydraulic tank.



Illustration 28 g01371640

WARNING

Hot Fluid Under Pressure!

Do NOT remove pressure cap when hot. Hot oil could cause serious injury or death.

Crushing Hazard (Counterweight) (19)

If equipped, this safety message is on the right side of the machine inside the access door.

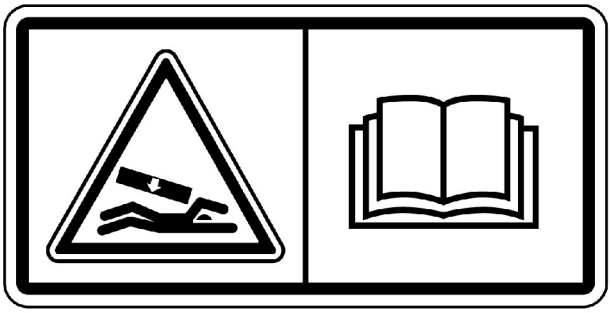


Illustration 29 g01435553

⚠ 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 Removal and Installation” for further information.

Rotating Fan (20)

This safety message is located near the engine fan.

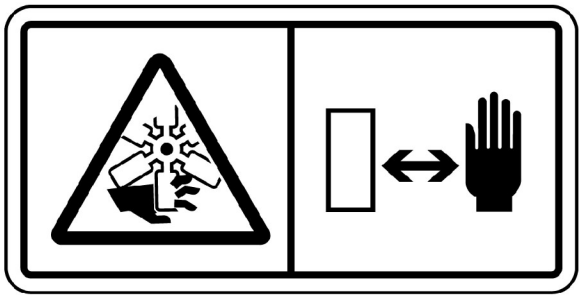


Illustration 30 g01385578

⚠ WARNING

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

Falling Object Guard Structure (21)

If equipped, 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.

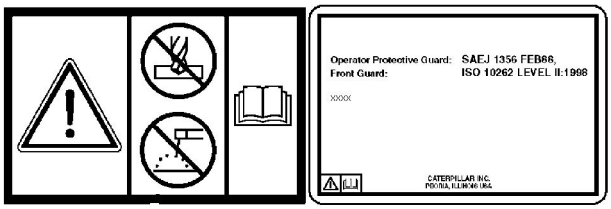


Illustration 31 g06289969

⚠ 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.

i08247984

Additional Messages

SMCS Code: 7000; 7405

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

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

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

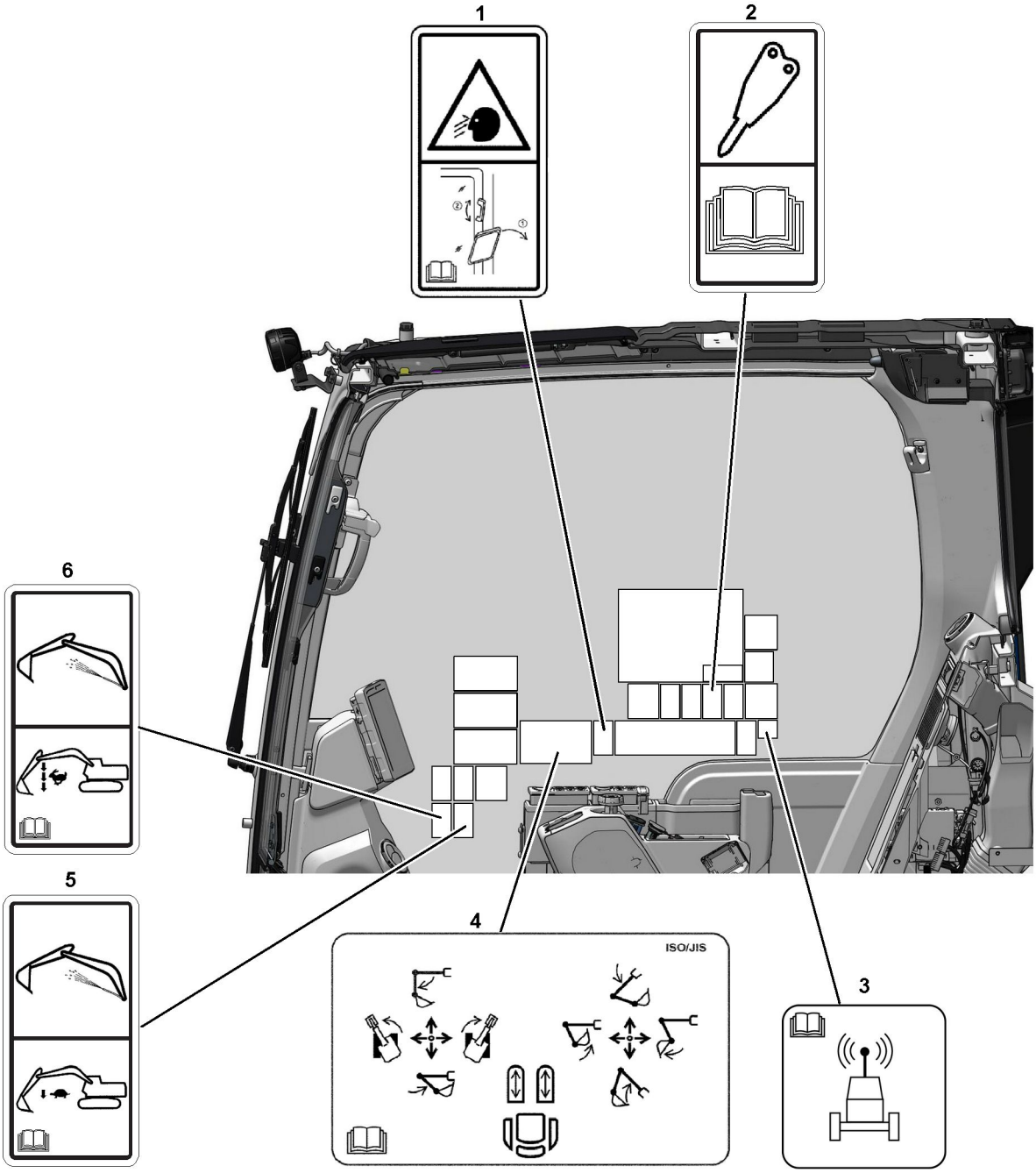


Illustration 32 g06187617

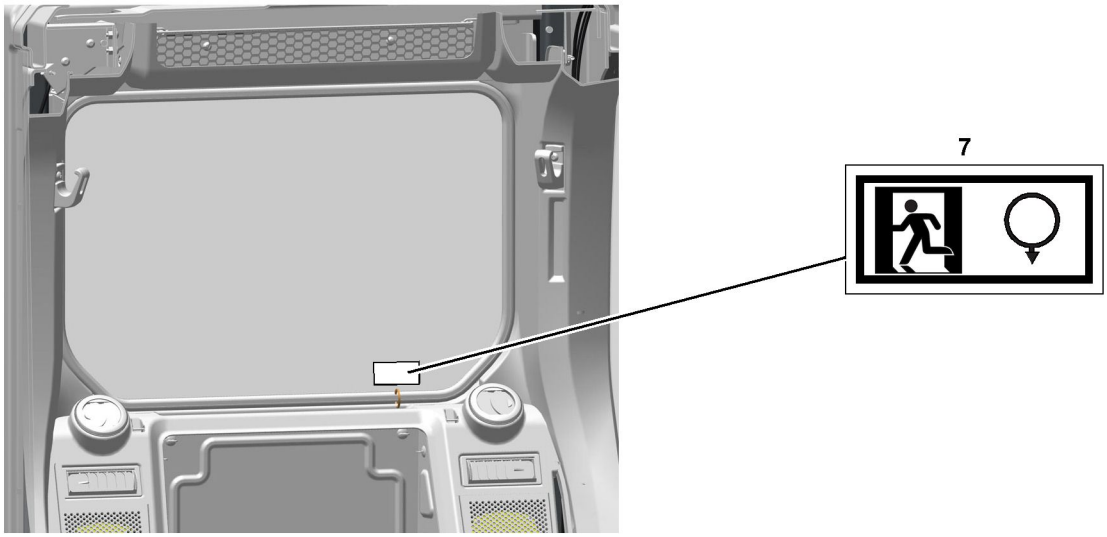


Illustration 33 g06189121

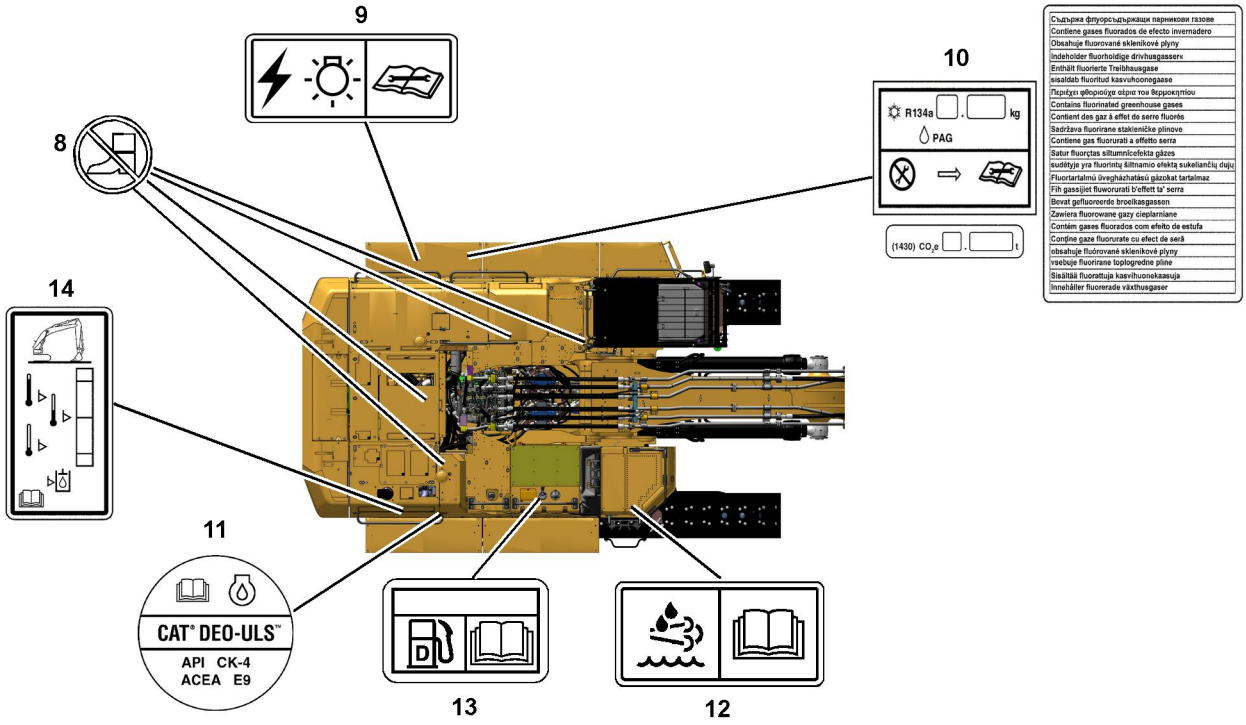


Illustration 34 g06598944

Front Window Usage (1)

For machines equipped with the Cat Grade monitor, the monitor must be moved downward before lifting or lowering the front window. The monitor is in the path of the window track when the monitor is in the normal position.

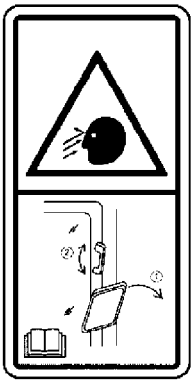


Illustration 35 g06214810

Hammer Operation (2)

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

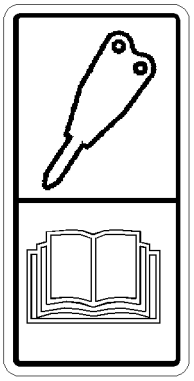


Illustration 36 g06189240

Refer to Operation and Maintenance Manual, “Hammer Operation” within Operation and Maintenance Manual, “Work Tool Control (One-Way Flow)” for instructions on hammer operation.

Also, refer to Operation and Maintenance Manual, “Hydraulic Hammer Control (Foot Switch)” within Operation and Maintenance Manual, “Work Tool Control (One-Way Flow)” for instructions on hammer operation.

Product Link (3)



Illustration 37 g01418953

The Product Link System is a satellite communication device that transmits information regarding the machine back to Caterpillar and Cat dealers and customers. All logged events and diagnostic codes that are available to the Cat 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 Cat products and Cat services.

Refer to “Product Link“ for more information.

Joystick Controls Alternate Patterns (4)

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

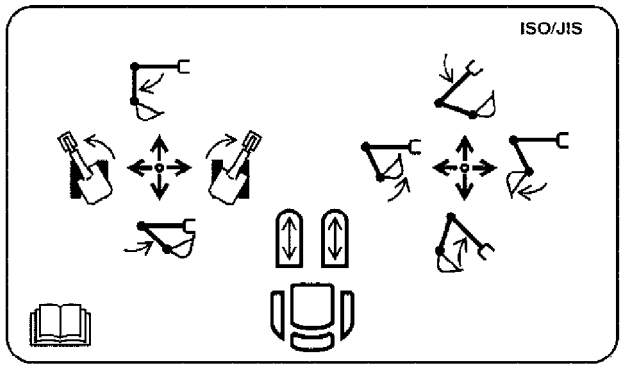


Illustration 38 g06214805

Refer to “Joystick Controls Alternate Patterns“ for further information.

Hose Burst (5)

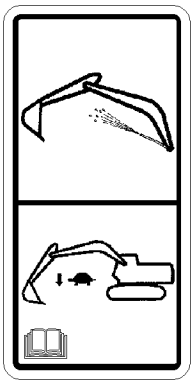


Illustration 39 g06189238

Hose Burst (6)

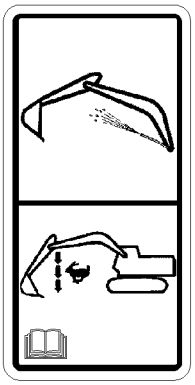


Illustration 40 g06189239

Alternate Exit (7)

If equipped, this message is on the rear window of the cab in the lower left-hand corner.

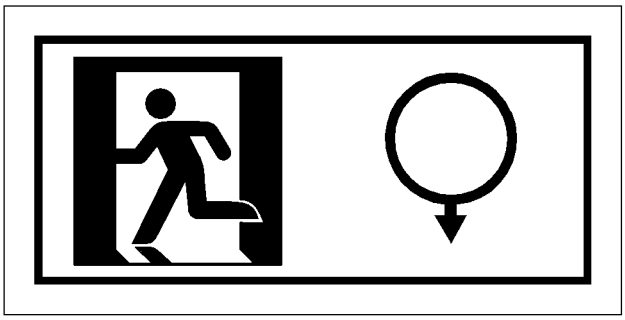


Illustration 41 g06189112

Pull the ring to pull out the seal. Push the window out of the cab and exit through the opening.

Refer to “Alternate Exit“ for further information.

No Step (8)

This message is on various places on the upper structure and covers. The message is also on the engine valve cover.

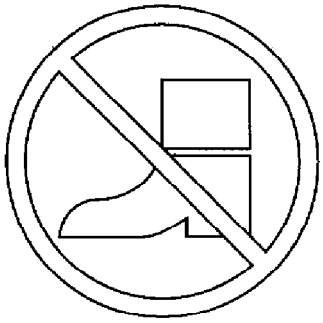


Illustration 42 g00911158

Do not step in this area.

DEF Purge Indicator Lamp (9)

This message is located behind the cab near the disconnect switch and pertains to the Diesel Exhaust Fluid (DEF) system.

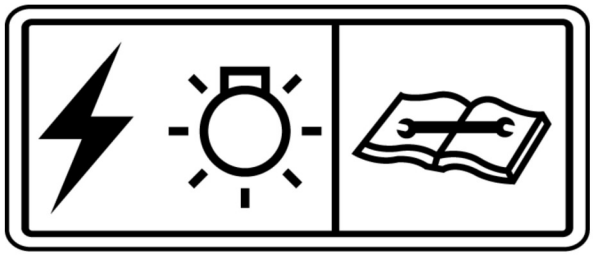


Illustration 43 g03796564

NOTICE
After the engine is shutdown apply the battery disconnect switch. Applying the battery disconnect too soon will prevent the DEF system from being purged and could cause DEF to freeze in the lines.

Note: This film is applicable only to machines equipped with Tier 4 engines.

Air Conditioner (10)

These messages are positioned on the left door behind the cab.

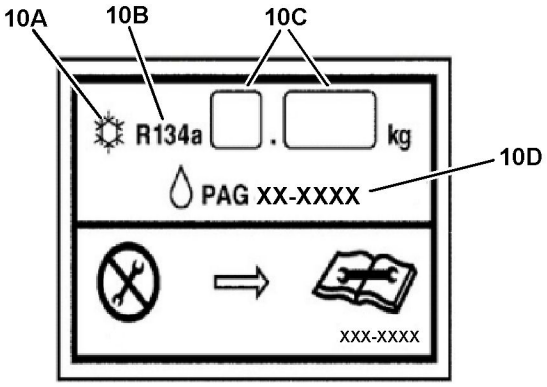


Illustration 44 g06214936

(10A) Air conditioning symbol
(10B) R134a (Refrigerant type common name)
(10C) Refrigerant quantity
(10D) PAG (polyalkylene glycol) lubricating oil part number

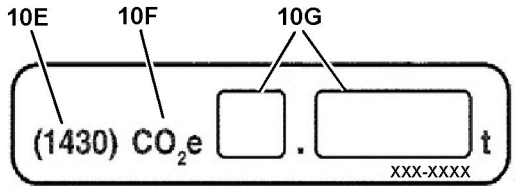


Illustration 45 g06214938

If equipped, this plate provides the below more European Union required greenhouse gas information.

(10E) (1430) - The Global Warming Potential of R134a
(10F) CO_2 equivalent
(10G) The system contains 1.430 metric tonne of CO_2 equivalent

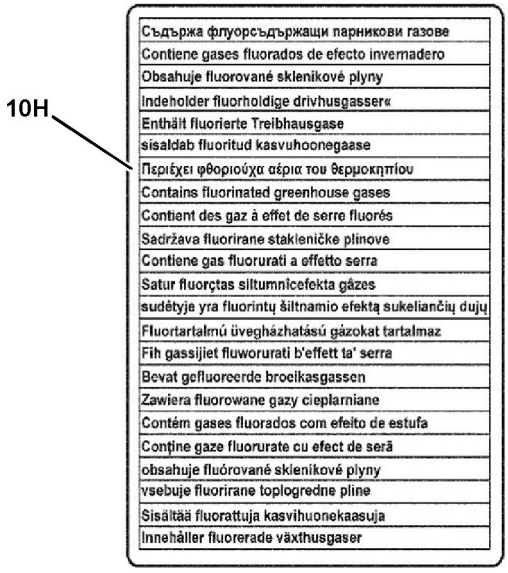


Illustration 46 g06214940

(10H) If equipped, this film provides the required language translations of the text "Contains fluorinated greenhouse gases" for the European Union greenhouse gas regulation.

These messages for the air conditioner system have the appropriate information for the following services: the air conditioner lubricant, the refrigerant charge, and the refrigerant capacity.

Engine Oil Requirements (11)

This message is on top of the engine.

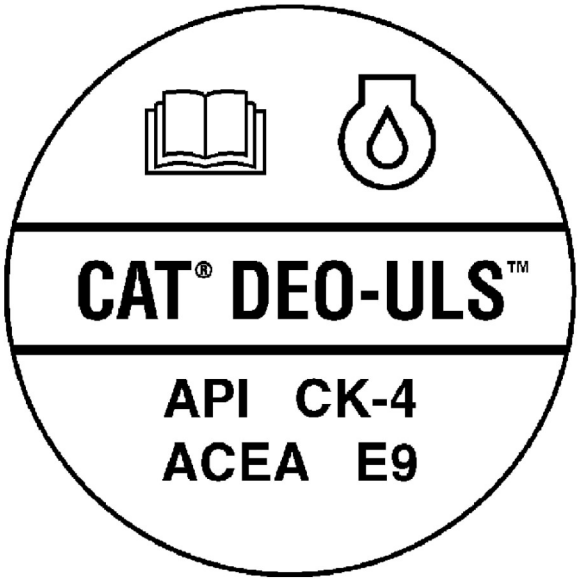


Illustration 47 g06208149

Tier 4 Engines

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

DEF (12)

This message is located by the DEF tank.

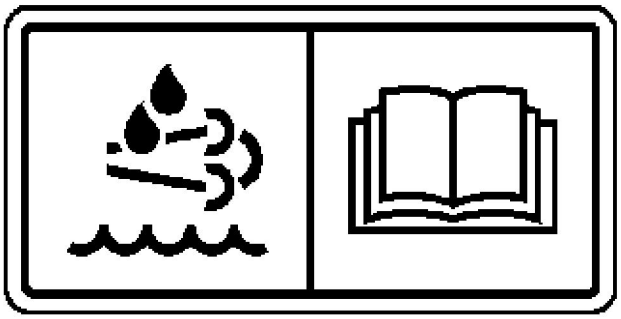


Illustration 48 g06289604

DEF is used in the SCR system. Refer to Operation and Maintenance Manual, “Lubricant Viscosities”.

Diesel Fuel Requirements (13)

This message is located by the fuel tank.

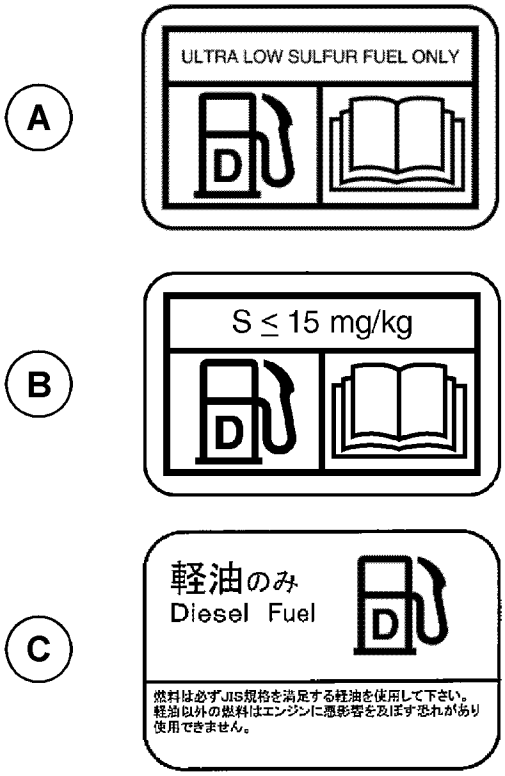


Illustration 49 g03218956

(A) North America film
(B) Europe, Africa, Middle East film
(C) Japan film

Hydraulic Oil Level Check (14)

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

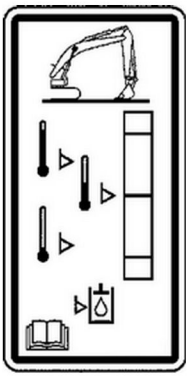


Illustration 50 g06586141

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

i08313103

General Hazard Information

SMCS Code: 7000

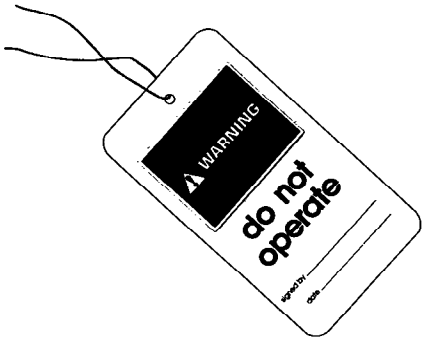


Illustration 51 g00104545

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.

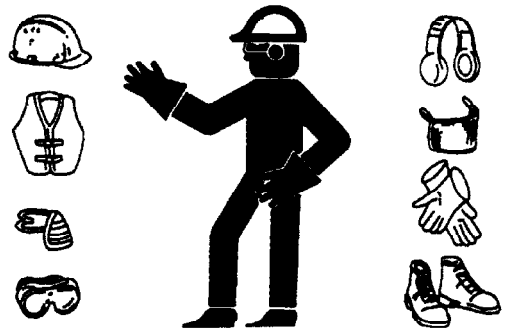


Illustration 52 g00702020

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.

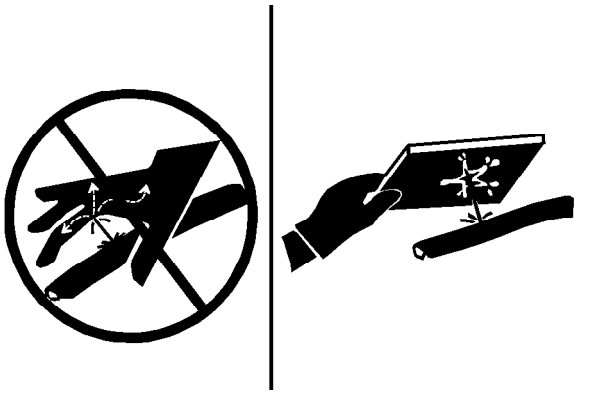


Illustration 53 g00687600

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 54 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.

Hexavalent Chromium Information

Cat equipment and replacement parts comply with applicable regulations and requirements where originally sold. Caterpillar recommends the use of only genuine Cat replacement parts.

Hexavalent chromium has occasionally been detected on exhaust and heat shield systems on Cat engines. Although lab testing is the only accurate way to know if hexavalent chromium is, in fact, present, the presence of a yellow deposit in areas of high heat (for example, exhaust system components or exhaust insulation) may be an indication of the presence of hexavalent chromium.

Use caution if you suspect the presence of hexavalent chromium. Avoid skin contact when handling items that you suspect may contain hexavalent chromium, and avoid inhalation of any dust in the suspect area. Inhalation of, or skin contact with, hexavalent chromium dust may be hazardous to your health.

If such yellow deposits are found on the engine, engine component parts, or associated equipment or packages, Caterpillar recommends following local health and safety regulations and guidelines, utilizing good hygiene, and adhering to safe work practices when handling the equipment or parts. Caterpillar also recommends the following:

- Wear appropriate personal protective equipment (PPE).
- Wash your hands and face with soap and water prior to eating, drinking, or smoking, and also during rest room breaks, to prevent ingestion of any yellow powder.
- Never use compressed air for cleaning areas suspected of containing hexavalent chromium.
- Avoid brushing, grinding, or cutting materials suspected of containing hexavalent chromium.
- Obey environmental regulations for the disposal of all materials that may contain or have come into contact with hexavalent chromium.
- Stay away from areas that might have hexavalent chromium particles in the air.

Dispose of Waste Properly

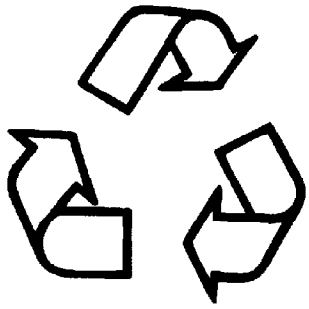


Illustration 55 g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07746334

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000



Illustration 56 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 57 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 58 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.

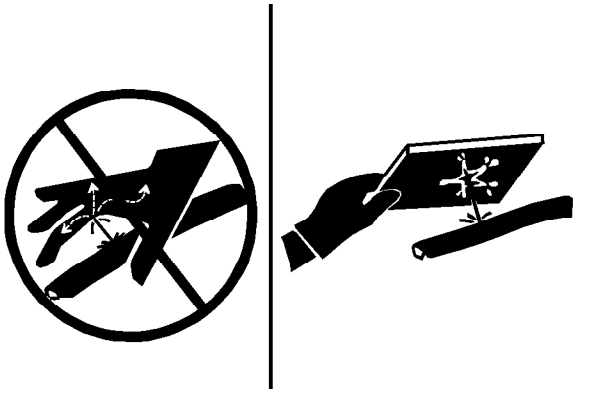


Illustration 59 g00687600

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.

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Fire Extinguisher Location

SMCS Code: 7000; 7419

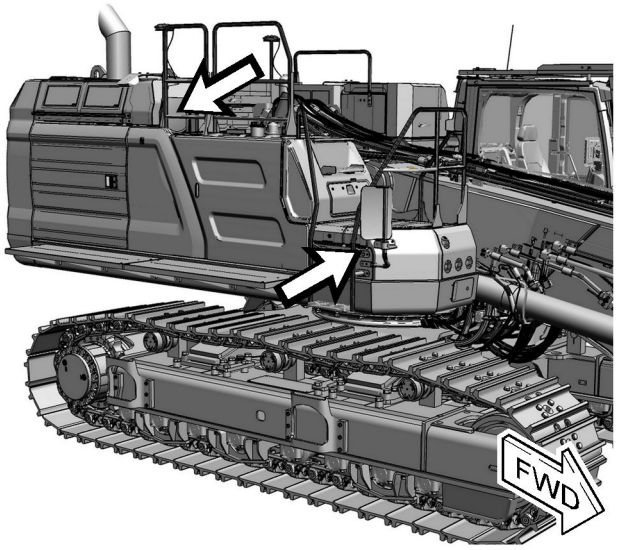


Illustration 60 g06600667

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. The fire extinguisher may also be mounted on the upper handrail on the right side of the machine.

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.

i02546320

High Pressure Fuel Lines

SMCS Code: 1000; 1274; 7000

⚠ WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

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

This is because of the following differences:

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

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

Do not check the high pressure fuel lines with the engine or the starting motor in operation. After the engine has stopped allow 10 minutes to pass in order to allow the pressure to be purged before any service or repair is performed on the engine fuel lines.

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

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

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

- Inspect the high pressure fuel lines for damage, deformation, a nick, a cut, a crease, or a dent.

- Do not operate the engine with a fuel leak. If there is a leak do not tighten the connection in order to stop the leak. The connection must only be tightened to the recommended torque. Refer to Disassembly and Assembly for your engine.
- If the high pressure fuel lines are torqued correctly and the high pressure fuel lines are leaking the high pressure fuel lines must be replaced.
- Ensure that all clips on the high pressure fuel lines are in place. Do not operate the engine with clips that are damaged, missing or loose.
- Do not attach any other item to the high pressure fuel lines.
- Loosened high pressure fuel lines must be replaced. Also removed high pressure fuel lines must be replaced. Refer to Disassembly and Assembly for your engine.

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.

i08201608

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 “Visibility Information“.

Illustrations 61 - 64 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 65 shows the position of the work tool in the travel position. The Cat ® authorized work tool that resulted in the largest visibility restriction was used.

Illustration 61 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.

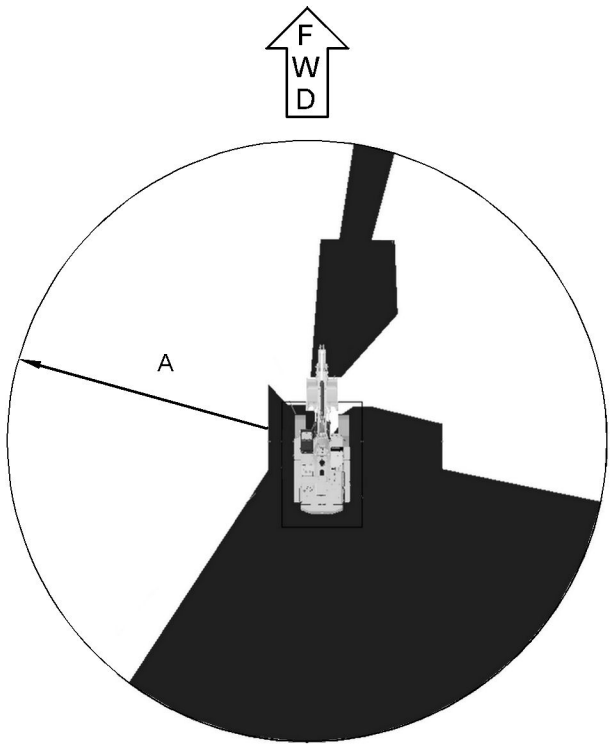


Illustration 61 g06586527

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 62 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 mirrors installed.

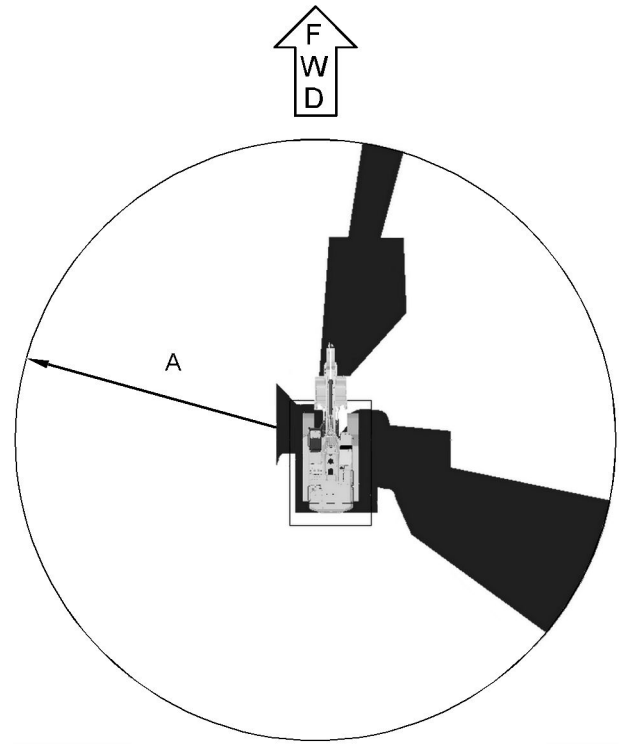


Illustration 62 g06586530

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

(A) 24 m (79 ft)

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

Illustration 63 indicates restricted visibility areas at ground level inside the shown radius from the operator with the use of available rear camera, right side camera (if equipped), left side mirrors installed.

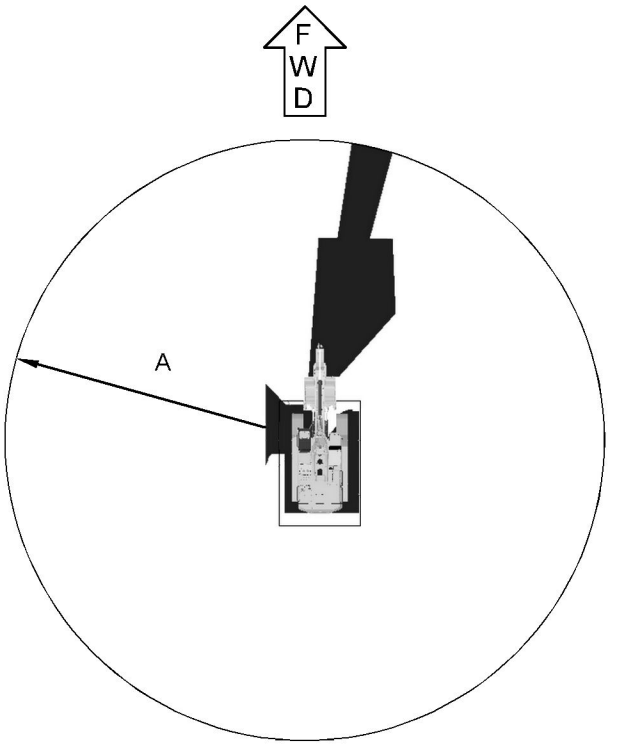


Illustration 63 g06586538

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

(A) 24 m (79 ft)

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

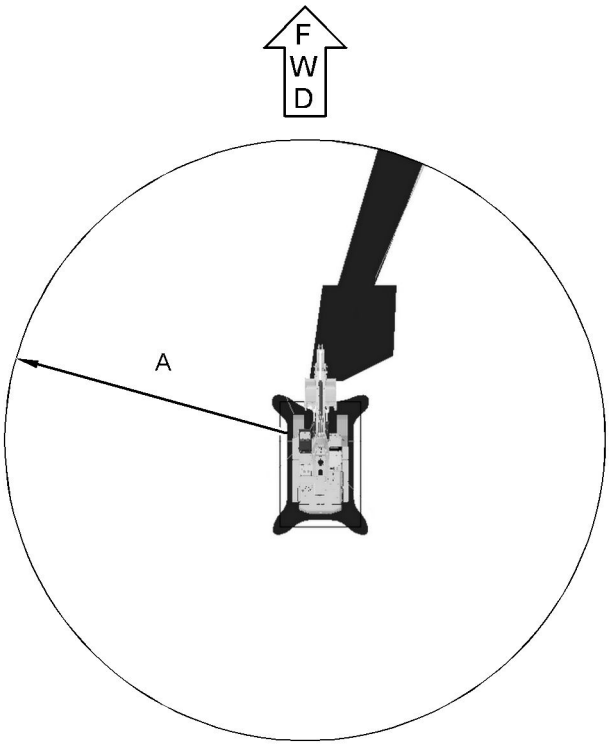


Illustration 64 g06586541

Top view of the machine, 360 visibility with available cameras.

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 65 shows the machine in the travel position.

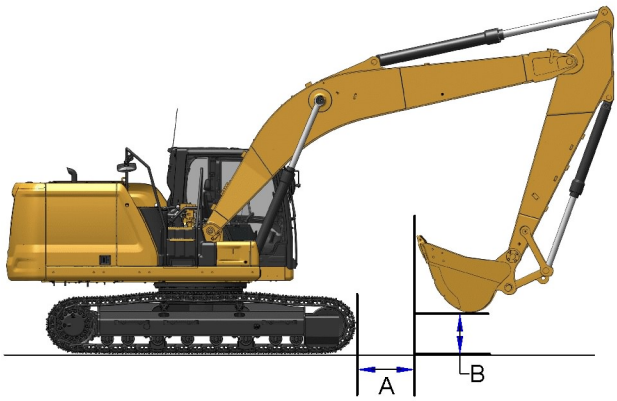


Illustration 65 g06181081

Typical example

(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.

i07199415

Assist and E-Fence

SMCS Code: 5050

⚠ WARNING

Personal Responsibility

When the Assist System is engaged, the Assist System will control various machine functions. The Assist System is not a substitute for the personal judgment of an operator for the present work site situation or work site conditions. Failure to pay attention to work site situations or work site conditions with the Assist System engaged could result in personal injury or death. Always be aware of the work site situation and work site conditions when operating the machine with the Assist System engaged.

⚠ WARNING

Be Alert

Due to system limitations with the Assist System, warnings from the Assist System may be issued late, improperly, or not at all. Failure to respond to warnings from the Assist System with appropriate action could result in personal injury or death. Always be alert when operating a machine with the Assist System engaged and be ready to intervene to prevent an accident.

Operation Guidance

- Ground personnel should maintain a safe distance from the machine. Remain out of the swing radius/ swing zone, and always check for ground personnel in the swing radius/swing zone. Do not operate with ground personnel in the swing radius/ swing zone.
- When setting height or load restrictions, make sure that any work tools that are attached are in the least favorable position.
- Check for the correct operation once the restriction has been set.
- Validate proper settings both initially and periodically during machine operation.
- Do not move the (machine) quickly when close to a restriction setting.
- Do not operate the machine in a reckless manner.
- Do not travel with the restriction set.
- Reset the load restriction if the machine is moved to a different location.
- Always check settings or reestablish desired settings after leaving the machine for any period to ensure desired performance.
- If the proper setting procedure has been followed, but the system does not appear to be functioning properly, consult your Cat dealer.

Hazard recommendations:

- Return the joysticks to the neutral position once a limit has been reached
- Operate the machine at a slow speed
- Do not travel

Lifting operations with the machine

- Ensure that Lift Mode is selected during lifting operations
- Operate the machine at a safe speed
- Take special care when traveling with a load attached
- Do not operate the machine in a reckless manner

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

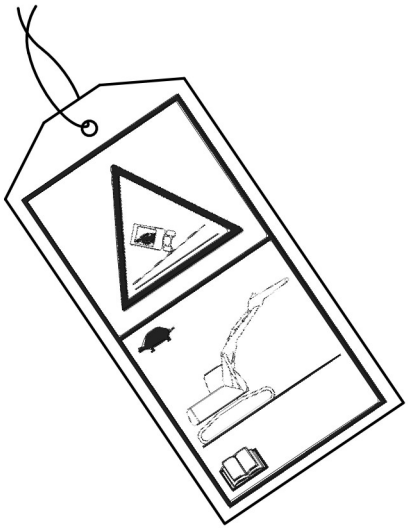


Illustration 66 g02202544

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

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

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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.

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Lifting Objects

SMCS Code: 7000

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

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

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

Consult 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.

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Parking

SMCS Code: 7000

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

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

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

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

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

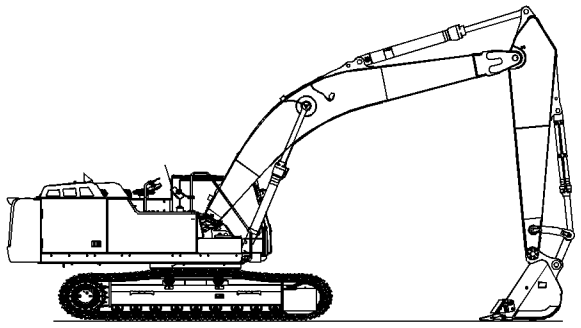


Illustration 67 g02280104

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.

Note: Do not turn the battery disconnect switch OFF until the “Wait to Disconnect Lamp” has turned off. If the battery disconnect switch is turned off before the lamp has shut off, the DEF system will not purge. DEF could freeze and damage the pump and lines.

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.

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

Hearing protection may be needed when the machine is operated with 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 pressure level is 108 dB (A) when the “ISO 6395 - Dynamic Test” procedure is used to measure the value for the standard machine. 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 declared sound levels listed above include both measurement uncertainty and uncertainty due to production variation.

Sound Level Information for Machines in Eurasian Economic Union Countries

The declared dynamic operator sound pressure level is 73 dB(A) when “ISO 6396:2008” is used to measure the value for an enclosed cab. The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed.

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

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

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

Vibration Data for Track Type 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 Cat ® 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 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 driving 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 are based on “ISO/TR 25398 Mechanical Vibration - Guideline for the assessment of exposure to whole body vibration of ride on operated earthmoving machines”. Harmonized data is measured by international institutes, organizations, and manufacturers.

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

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

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

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

Use the following web site to find your local dealer:

Caterpillar, Inc.
www.cat.com

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Operator Station

SMCS Code: 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

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

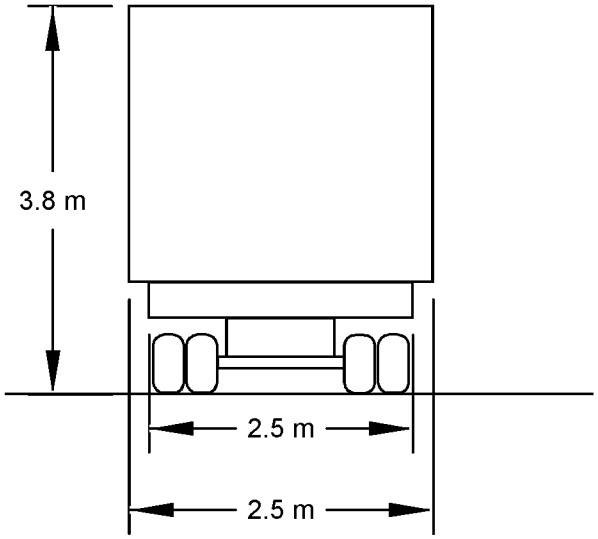


Illustration 68 g02698738

- 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.

Expected Life

The expected life, defined as total machine hours, of this machine is dependent upon many factors including the machine owner’s desire to rebuild the machine back to factory specifications. The expected life interval of this machine is 10,000 service hours. The expected life interval corresponds to the service hours to engine overhaul or replacement. Service hours to engine overhaul or replacement may vary based on overall machine duty cycle. At the expected life interval, remove the machine from operation and consult your Cat dealer for inspect, repair, rebuild, install remanufactured, install new components, or disposal options and to establish a new expected life interval. If a decision is made to remove this machine from service, refer to Operation and Maintenance Manual, “Decommissioning and Disposal”.

The following items are required to obtain an economical expected life of this machine:

- Perform regular preventive maintenance procedures as described in the Operation and Maintenance Manual.
- Perform machine inspections as described in the Operation and Maintenance Manual and correct any problems discovered.
- Perform system testing as described in the Operation and Maintenance Manual and correct any problems discovered.
- Ensure that machine application conditions comply with Caterpillar’s recommendations.
- Ensure that the operating weight does not exceed limits set by manufacturer.

- Ensure that all frame cracks are identified, inspected, and repaired to prevent further development.

Application/Configuration Restrictions

The maximum travel operating slope for machine lubrication is 35 degrees.

Specification Data

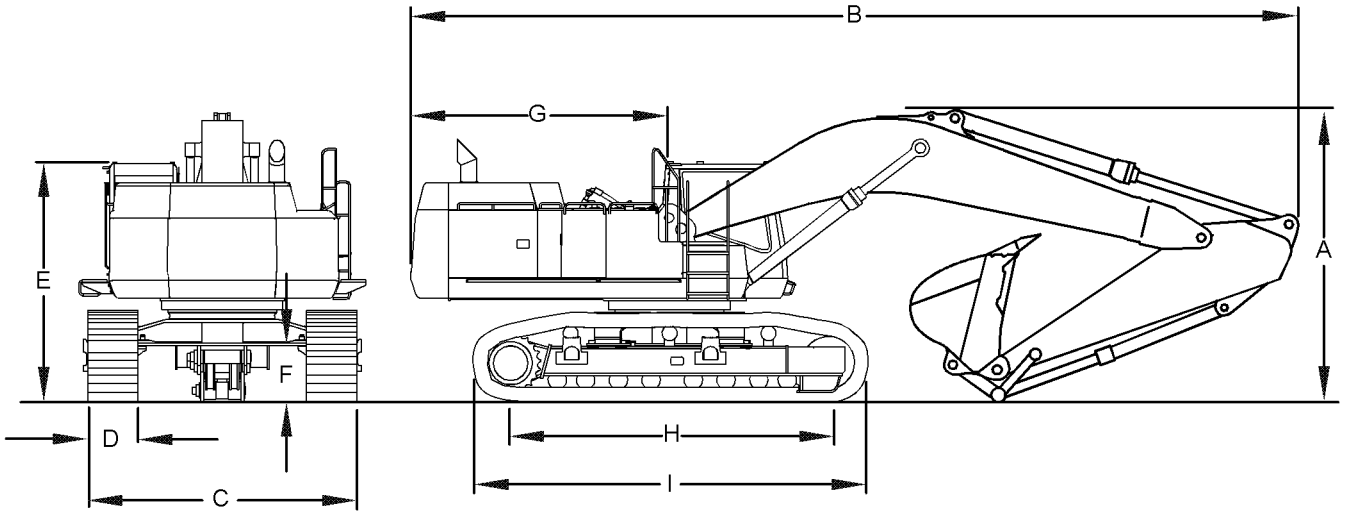


Illustration 69 g02150559

Table 4

374 Excavator				
	7.80 m (25 ft 7 inch) Reach Boom			
	4.67 m (15 ft 4 inch) Stick	4.15 m (13 ft 7 inch) Stick	3.60 m (11 ft 10 inch) Stick	2.84 m (9 ft 4 inch) Stick
Bucket	3.30 m^3 (4.32 yd^3)			
Approximate Weights	72100 kg (159000 lb)(1) 72800 kg (160500 lb)(2) 73800 kg (162700 lb)(3)	72000 kg (158700 lb)(3) 72700 kg (160200 lb)(2) 73700 kg (162500 lb)(1)	71700 kg (158200 lb)(3) 72400 kg (159700 lb)(2) 73400 kg (161900 lb)(1)	71600 kg (158200 lb)(3) 72300 kg (159700 lb)(2) 73300 kg (161900 lb)(1)
Shipping Height (A)	3.56 m (11 ft 8 inch)			
Shipping Length (B)	13.53 m (44 ft 6 inch)	13.54 m (44 ft 5 inch)	13.65 m (44 ft 9 inch)	13.59 m (44 ft 7 inch)
Shipping Width (C)	4.33 m (14 ft 3 inch)			
Track Shoe Width (D)	900 mm (36 inch) 750 mm (30 inch) 650 mm (26 inch)			
Cab Height (E)	3.55 m (11 ft 8 inch)			

(continued)

(Table 4, contd)

Ground Clearance (F)	0.78 m (2 ft 7 inch)
Tail Swing Radius (G)	4.17 m (13 ft 8 inch)
Length to Center of Rollers (H)	4.70 m (15 ft 5 inch)
Track Length (I)	5.87 m (19 ft 3 inch)
Track Gauge	3.41 m (11 ft 2 inch)(4) 2.75 m (9 ft 0 inch)(5)

(1) 650 mm (26 inch) double grouser track shoes
(2) 750 mm (30 inch) double grouser track shoes
(3) 900 mm (36 inch)double grouser track shoes
(4) Retracted (shipping) position
(5) Extended (working) position

Table 5

374 Excavator		
	7.0 m (23 ft) Mass Boom	
	3.0 m (9 ft 10 inch) Stick	**2.57 m (8 ft 5 inch) Stick**
Bucket	**4.40 m^3 (5.75 yd^3)**	
Approximate Weights	**71600 kg (158200 lb)(1)** **72300 kg (159700 lb)(2)** **73300 kg (161900 lb)(3)**	**74800 kg (164800 lb)(3)** **75400 kg (166300 lb)(2)** **76400 kg (168500 lb)(1)**
Shipping Height (A)	3.56 m (11 ft 8 inch)	
Shipping Length (B)	12.85 m (42 ft 2 inch)	12.97 m (42 ft 7 inch)
Shipping Width (C)	4.33 m (14 ft 3 inch)	
Track Shoe Width (D)	900 mm (36 inch) 750 mm (30 inch) 650 mm (26 inch)	
Cab Height (E)	3.55 m (11 ft 8 inch)	
Ground Clearance (F)	0.78 m (2 ft 7 inch)	
Tail Swing Radius (G)	4.17 m (13 ft 8 inch)	
Length to Center of Rollers (H)	4.70 m (15 ft 5 inch)	
Track Length (I)	5.87 m (19 ft 3 inch)	
Track Gauge	3.41 m (11 ft 2 inch)(4) 2.75 m (9 ft 0 inch)(5)	

(1) 650 mm (26 inch) track shoes
(2) 750 mm (30 inch) track shoes
(3) 900 mm (36 inch) track shoes
(4) Retracted (shipping) position
(5) Extended (working) position

Working Ranges

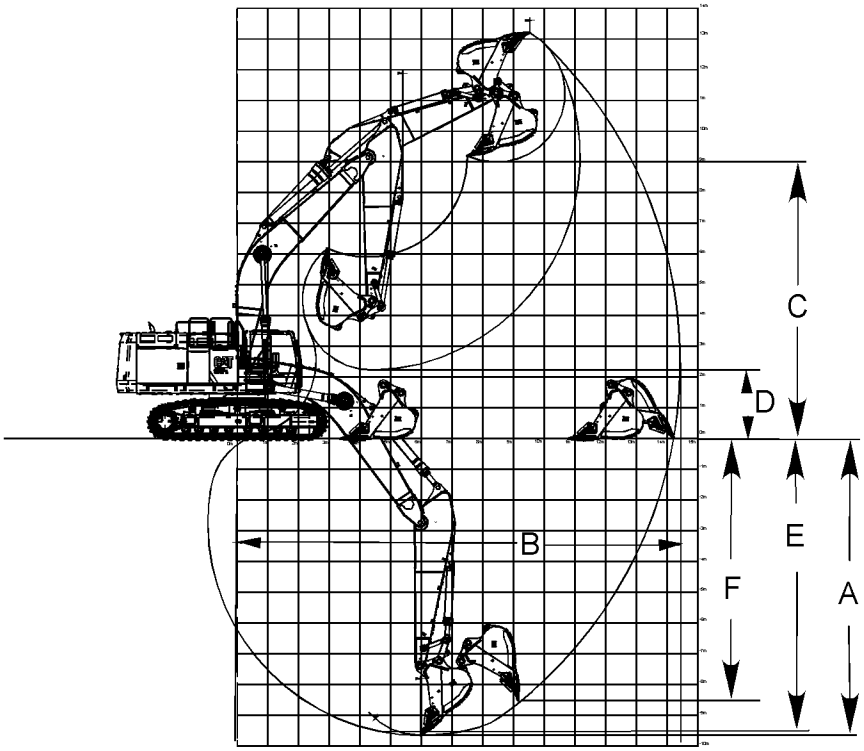


Illustration 70 g03570437

Table 6

374 Excavator				
	7.80 m (25 ft 7 inch) Reach Boom			
	4.67 m (15 ft 4 inch)Stick	4.15 m (13 ft 7 inch) Stick	3.6 m (11 ft 10 inch) Stick	2.84 m (9 ft 4 inch) Stick
Bucket	3.30 m^3 (4.32 yd^3)			
Maximum Digging Depth (A)	9.64 m (31 ft 8 inch)	9.12 (29 ft 11 inch)	8.57 (28 ft 1 inch)	7.81 (25 ft 7 inch)
Maximum Reach at Ground Level (B)	14.22 m (46 ft 8 inch)	13.68 (44 ft 11 inch)	13.16 (43 ft 2 inch)	12.58 (41 ft 1 inch)
Maximum Loading Height (C)	9.01 m (29 ft 7 inch)	8.66 m (28 ft 5 inch)	8.43 m (27 ft 5 inch)	8.26 m (27 ft 1 inch)
Minimum Loading Height (D)	2.25 m (7 ft 5 inch)	2.76 m (9 ft 1 inch)	3.31 m (10 ft 10 inch)	4.07 m (13 ft 4 inch)

(continued)

(Table 6, contd)

Maximum Cut Depth (E)(1)	9.53 m (31 ft 3 inch)	9.00 m (29 ft 6 inch)	8.44 m (27 ft 8 inch)	7.66 m (25 ft 2 inch)
Maximum Digging Depth (Vertical wall) (F)	8.30 m (27 ft 3 inch)	7.61 m (25 ft 0 inch)	6.91 m (22 ft 8 inch)	6.45 m (21 ft 2 inch)

(1) 2440 mm (8 ft) level bottom

Table 7

374 Excavator		
	7.0 m (23 ft) Mass Boom	
	3.0 m (9 ft 10 inch) Stick	**2.57 m (8 ft 5 inch) Stick**
Bucket	**4.40 m^3 (5.75 yd^3)**	
Maximum Digging Depth (A)	7.66 m (25 ft 4 inch)	7.24 m (23 ft 9 inch)
Maximum Reach at Ground Level (B)	11.86 m (38 ft 11 inch)	11.46 m (37 ft 7 inch)
Maximum Loading Height (C)	7.22 m (23 ft 8 inch)	7.05 m (23 ft 2 inch)
Minimum Loading Height (D)	3.05 m (10 ft 0 inch)	3.47 m (11 ft 5 inch)
Maximum Cut Depth (E)(1)	7.52 m (24 ft 8 inch)	7.08 m (23 ft 3 inch)
Maximum Digging Depth (Vertical wall) (F)	3.97 m (13 ft 0 inch)	3.62 m (11 ft 11 inch)

(1) 2440 mm (8 ft) level bottom

Basic Machine

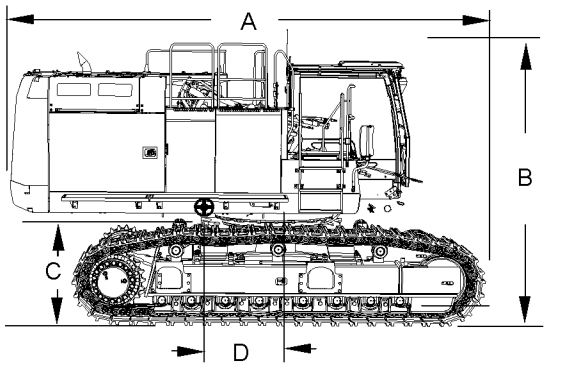


Illustration 71 g03377210

Table 8

374 Excavator(1)	
Weight	56025 kg (123514 lb)
Width	3900 mm (12 ft 10 inch)
Length (A)	7035 mm (23 ft 1 inch)
Height (B)	3560 mm (11 ft 8 inch)
Center of Gravity (C)	1506 mm (4 ft 11 inch)
Center of Gravity (D)	1131 mm (3 ft 8 inch)

(continued)

(Table 8, contd)

(1) These specifications are for machines that have 650 mm (26 inch) track shoes, a fully retracted track, and a 10 percent full fuel tank.

Carbody

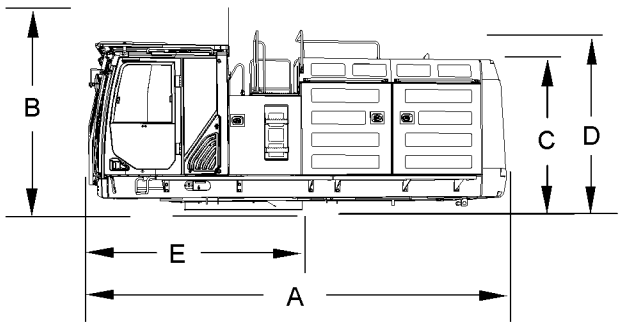


Illustration 72 g03435781

Table 9

374 Excavator	
Weight	22150 kg (48832 lb)
Length (A)	5500 mm (18 ft 1 inch)
Height (B)	2870 mm (9 ft 5 inch)

(continued)

(Table 9, contd)

374 Excavator	
Height (C)	2040 mm (6 ft 8 inch)
Height (D)	2190 mm (7 ft 2 inch)
Length (E)	2100 mm (6 ft 11 inch)

Track Frame

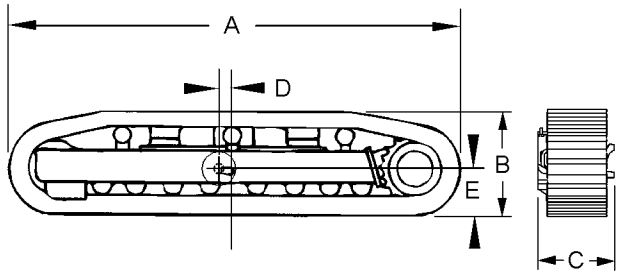


Illustration 73 g02571599

Table 10

374 Excavator(1) These specifications are for each track.	
Weight (Each Track Frame)	10280 kg (22663 lb)
Length (A)	5870 mm (19 ft 3 inch)
Height (B)	1360 mm (4 ft 6 inch)
Width (C)	1170 mm (3 ft 10 inch)
Center of Gravity (D)	24 mm (1 inch)
Center of Gravity (E)	600 mm (2 ft)

(continued)

(Table 10, contd)

(1) These specifications are for machines that have 650 mm (26 inch) triple grouser track shoes .

Counterweight

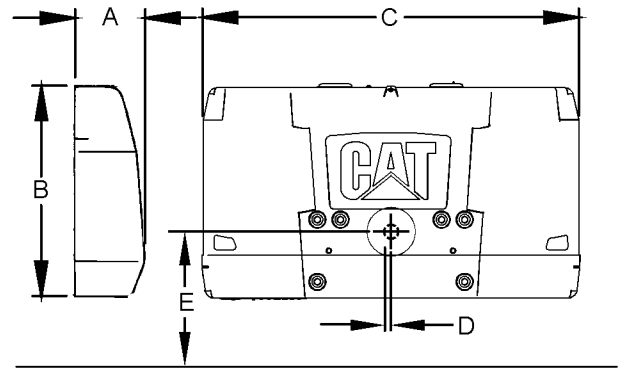


Illustration 74 g03629216

Table 11

Standard Counterweight	
Weight	11236 kg (24771 lb)
Length (A)	819 mm (2 ft 8 inch)
Height (B)	2110 mm (6 ft 11 inch)
Width (C)	3470 mm (11 ft 5 inch)

(continued)

(Table 11, contd)

Standard Counterweight	
Center of Gravity (D)	0 mm (0 inch)
Center of Gravity (E)	2378 mm (7 ft 10 inch)

Boom with Stick Cylinder

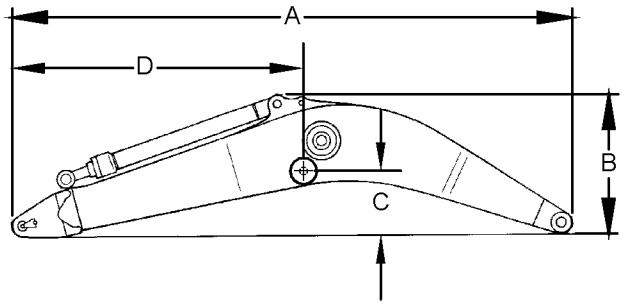


Illustration 75 g02765979

Table 12

	7.80 m (25 ft 7 inch) Reach Boom	6.59 m (21 ft 7 inch) Mass Boom
Weight	7050 kg (15542 lb)	7510 kg (16557 lb)
Width	1220 m (4 ft)	1220 m (4 ft)
Length (A)	8120 mm (26 ft 8 inch)	7320 mm (24 ft)
Height (B)	2170 mm (7 ft 1 inch)	2500 mm (8 ft 2 inch)

(continued)

(Table 12, contd)

	7.80 m (25 ft 7 inch) Reach Boom	6.59 m (21 ft 7 inch) Mass Boom
Center of Gravity (C)	930 mm (3 ft 1 inch)	1061 mm (3 ft 6 inch)
Center of Gravity (D)	3870 mm (12 ft 8 inch)	3478 mm (12 ft 5 ft)

Stick with Bucket Cylinder

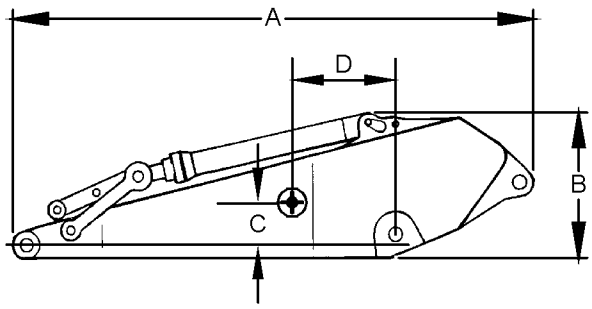


Illustration 76 g02765978

Table 13

	Long Stick (VB) for Reach Boom 4.67 m (15 ft 4 inch)	Medium Stick (VB) for Reach Boom 3.60 m (11 ft 10 inch)	Short Stick (VB) for Reach Boom 2.84 m (9 ft 4 inch)	Long Stick (WB) for Mass Boom 3.00 m (9 ft 10 inch)	Short Stick (WB) for Mass Boom 2.57 m (8 ft 5 inch)
Weight	4180 kg (9215 lb)	3790 kg (8355 lb)	3580 kg (7892 lb)	4370 kg (9634 lb)	4080 kg (8995 lb)
Width	745 mm (2 ft 5 inch)	745 mm (2 ft 5 inch)	740 mm (2 ft 5 inch)	825 mm (2 ft 5 inch)	825 mm (2 ft 5 inch)
Length (A)	6170 mm (20 ft 1 inch)	5100 mm (16 ft 9 inch)	4260 mm (14 ft)	4510 mm (14 ft 10 inch)	4180 mm (13 ft 9 inch)
Height (B)	1380 mm (4 ft 6 inch)	1370 mm (4 ft 6 inch)	1570 mm (5 ft 2 inch)	1640 mm (5 ft 5 inch)	1620 mm (5 ft 4 inch)

(continued)

(Table 13, contd)

	Long Stick (VB) for Reach Boom 4.67 m (15 ft 4 inch)	Medium Stick (VB) for Reach Boom 3.60 m (11 ft 10 inch)	Short Stick (VB) for Reach Boom 2.84 m (9 ft 4 inch)	Long Stick (WB) for Mass Boom 3.00 m (9 ft 10 inch)	Short Stick (WB) for Mass Boom 2.57 m (8 ft 5 inch)
Center of Gravity (C)	601 mm (2 ft)	601 mm (2 ft)	659 mm (2 ft 2 inch)	678 mm (2 ft 3 inch)	683 mm (2 ft 3 inch)
Center of Gravity (D)	1868 mm (6 ft 2 inch)	1307 mm (4 ft 3 inch)	814 mm (2 ft 8 inch)	1021 mm (3 ft 4 inch)	755 mm (2 ft 6 inch)

Bucket

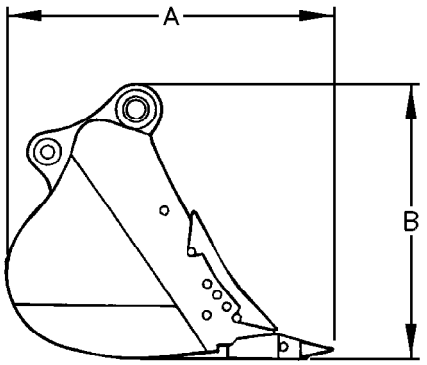


Illustration 77 g00612093

Table 14

Application	Capacity of Bucket	Bucket Family	Length (A)	Height (B)	Width	Weight
Heavy-Duty Rock	4.60 m^3 (6.00 yd^3)	WB	2600 mm (102 inch)	2070 mm (82 inch)	2220 mm (87 inch)	5444 kg (12002 lb)
Heavy-Duty	3.80 m^3 (5.00 yd^3)	VB	2490 mm (98 inch)	1935 mm (76 inch)	2000 mm (79 inch)	3923 kg (8649 lb)

Boom Cylinders

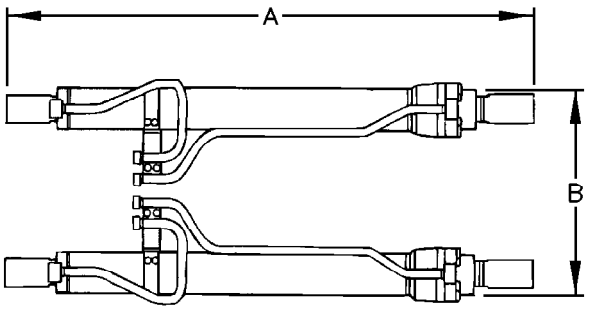


Illustration 78 g00589456

Table 15

Weight (Each Boom Cylinder)	698 kg (1539 lb)
Length (A)	2800 mm (9 ft 2 inch)
Height (B)	1300 mm (4 ft 3 inch)

Walkway

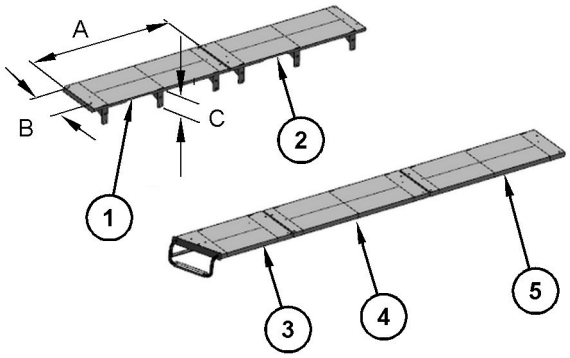


Illustration 79 g06600532

Table 16

	Walkway (1)	Walkway (2)	Walkway (3)	Walkway (4)	Walkway (5)
Weight	25 kg (55 lb)	25 kg (55 lb)	20 kg (44 lb)	25 kg (55 lb)	25 kg (55 lb)
Length (A)	1.68 m (5 ft 6 inch)	1.68 m (5 ft 6 inch)	1.2 m (3 ft 11 inch)	1.68 m (5 ft 6 inch)	1.68 m (5 ft 6 inch)
Width (B)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)
Height (C)	205 mm (8 inch)	205 mm (8 inch)	205 mm (8 inch)	205 mm (8 inch)	205 mm (8 inch)

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Boom/Stick/Bucket Combinations

SMCS Code: 6000; 6700

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

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

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.

Consult 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.

Without Coupler

Table 17

374 (without Coupler)										
Undercarriage			**Long VG**							
Emission			**Tier 4**							
Counter Weight			**11 m ton**				**10.1 m ton with counterweight removal**			
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**	**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket										
Type	**ISOCapacity**	**Width**								
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(3)	(3)		(2)	(3)	(3)	
General Duty Extra Large (GD-XL)	4.60 m^3 (6.02 y^3)	2050 mm (82 inch)	(3)	(4)	(4)		(5)	(6)	(4)	
Heavy Duty (HD)	2.20 m^3 (2.88 y^3)	1300 mm (52 inch)	(7)	(4)	(4)		(4)	(4)	(4)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(8)	(1)	(1)		(9)	(1)	(1)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(3)	(3)		2000 mm (79 inch)	(3)	(3)		
Severe Duty (SD)	1.90 m^3 (2.49 y^3)	1150 mm (47 inch)	(4)	(4)	(4)		(4)	(4)	(4)	
	2.90 m^3 (3.70 y^3)	1600 mm (64 inch)	(4)	(9)	(9)		(4)	(9)	(9)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(4)	(9)	(1)		(4)	(9)	(1)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(9)	(1)	(3)		(9)	(1)	(3)	

(continued)

(Table 17, contd)

374 (without Coupler)											
Undercarriage			**Long VG**								
Emission			**Tier 4**								
Counter Weight			**11 m ton**				**10.1 m ton with counterweight removal**				
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**	**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**	
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	
Bucket											
Type	**ISOCapacity**	**Width**									
Extreme Duty (XD)	3.84 m^3 (5.02 y^3)	2000 mm (79 inch)	(1)	(3)	(4)		(1)	(3)	(4)		
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)				(4)				(4)	
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)				(4)				(4)	
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)				(9)				(9)	
Extreme Duty Spade (XDS)	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)				(1)				(1)	

(1) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(4) 900 kg/m^3 (1500 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) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(8) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(9) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.

With Pin Grabber Coupler

Table 18

374with Pin Grabber Coupler										
Undercarriage			**Long VG**							
Emission			**Tier 4**							
Counter Weight			**11 m ton**				**10.1 m ton with counterweight removal**			
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**	**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket										
Type	**ISOCapacity**	**Width**								
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(2)	(1)		(1)	(2)	(2)	
General Duty Extra Large (GD-XL)	4.60 m^3 (6.02 y^3)	2050 mm (82 inch)	(2)	(3)	(1)		(2)	(1)	(1)	
Heavy Duty (HD)	2.20 m^3 (2.88 y^3)	1300 mm (52 inch)	(4)	(4)	(5)		(1)	(4)	(9)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(6)	(1)	(2)		(6)	(1)	(2)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(2)	(1)		(1)	(2)	(1)	

(continued)

(Table 18, contd)

374with Pin Grabber Coupler										
Undercarriage			**Long VG**							
Emission			**Tier 4**							
Counter Weight			**11 m ton**				**10.1 m ton with counterweight removal**			
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**	**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.15 m (14 ft 7 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket										
Type	**ISOCapacity**	**Width**								
Severe Duty (SD)	1.90 m^3 (2.49 y^3)	1150 mm (47 inch)	(4)	(4)	(4)		(4)	(4)	(4)	
	2.90 m^3 (3.79 y^3)	1600 mm (64 inch)	(5)	(6)	(1)		(5)	(6)	(1)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(6)	(1)	(2)		(6)	(1)	(2)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(2)	(2)		(1)	(2)	(2)	
Extreme Duty (XD)	3.84 m^3 (5.02 y^3)	2000 mm (79 inch)	(1)	(2)	(1)		(1)	(2)	(1)	

(1) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.
(2) 900 kg/m^3 (1500 lb/yd^3) is the maximum density of material.
(3) Not Recommended
(4) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(5) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(6) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

Without Coupler

Table 19

374 without Coupler				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7000 mm (276 inch) Mass Boom**	
Stick			**Mass Boom with2.57 m (8 ft 5 inch) Stick**	
Bucket				
Type	**ISOCapacity**	**Width**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)	(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(1)	(1)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(1)	(3)
Extreme Duty Spade (XDS)	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(3)	(4)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 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) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

With CW-70

Table 20

374 with CW-70				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7000 mm (276 inch) Mass Boom**	
Stick			**Mass Boom with2.57 m (8 ft 5 inch) Stick**	
Bucket				
Type	**ISOCapacity**	**Width**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Severe Duty Spade (SDS)	4.00 m^3 (5.23 y^3)	1950 mm (77 inch)	(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(4)	(3)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(4)	(1)

(1) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Without Coupler

Table 21

374 (without Coupler)								
Undercarriage			**Long VG**					
Emission			**Tier 4**					
Counter Weight			**11 m ton**			**10.1 m ton with counterweight removal**		
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**		**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**	
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket								
Type	**ISOCapacity**	**Width**						
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)			(1)		
Heavy Duty (HD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)			(1)		
General Duty (GD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)		(2)	(1)		(2)	(1)
Heavy Duty (HD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)		(2)	(1)		(2)	(1)
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)		(3)	(2)		(4)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)		(4)	(2)		(4)	(2)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)		(2)	(1)		(2)	(1)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)		(1)	(1)		(1)	(1)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)		(2)	(1)		(2)	(1)
	4.40 m^3 (6.02 y^3)	2150 mm (85 inch)		(1)	(1)		(1)	(1)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)		(1)	(4)		(1)	(6)

(1) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(3) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(4) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

With Pin Grabber Coupler

Table 22

374 (with Pin Grabber Coupler)								
Undercarriage			**Long VG**					
Emission			**Tier 4**					
Counter Weight			**11 m ton**			**10.1 m ton with counterweight removal**		
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**		**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**	
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**	**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket								
Type	**ISOCapacity**	**Width**						
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)			(1)		
Heavy Duty (HD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)			(1)		

(1) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

With CW-70

Table 23

374 (with CW-70)								
Undercarriage			Long VG					
Emission			Tier 4					
Counter Weight			11 m ton			10.1 m ton with counterweight removal		
Boom			7800 mm (307 inch) Reach Boom	7000 mm (276 inch) Mass Boom		7800 mm (307 inch) Reach Boom	7000 mm (276 inch) Mass Boom	
Stick			Reach Boom with 3.6 m (12 ft 10 inch) Stick	Mass Boom with2.57 m (8 ft 5 inch) Stick	Mass Boom with3.0 m (10 ft 10 inch) Stick	Reach Boom with 3.6 m (12 ft 10 inch) Stick	Mass Boom with2.57 m (8 ft 5 inch) Stick	Mass Boom with3.0 m (10 ft 10 inch) Stick
Bucket								
Type	ISOCapacity	Width						
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)	(1)	(2)			(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(2)	(2)			(2)	(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(2)	(3)			(2)	(5)

(1) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Without Coupler

Table 24

374 (without Coupler)						
Undercarriage			**Long VG**			
Emission			**Tier 3**			
Counter Weight			**11 m ton**			
Boom			**7800 mm (307 inch) Reach Boom**		**7000 mm (276 inch) Mass Boom**	
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(2)		
Heavy Duty (HD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(2)	(4)		
General Duty (GD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)			(3)	(2)
Heavy Duty (HD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)			(2)	(2)
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)			(4)	(6)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)			(6)	(6)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)			(6)	(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)			(2)	(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)			(6)	(2)
	4.40 m^3 (6.02 y^3)	2150 mm (85 inch)			(2)	(4)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)			(2)	(4)

(1) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(2) 1200 kg/m^3 (2000 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.

With CW-70

Table 25

374 (without Coupler)						
Undercarriage			**Long VG**			
Emission			**Tier 3**			
Counter Weight			**11 m ton**			
Boom			**7800 mm (307 inch) Reach Boom**		**7000 mm (276 inch) Mass Boom**	
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Reach Boom with 4.67 m (15 ft 4 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)			(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)			(2)	(3)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)			(2)	(5)

(1) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Without Coupler

Table 26

374 (without Coupler)						
Undercarriage			**Long VG**			
Emission			**Tier 3**			
Counter Weight			**11 m ton**		**10.1 m ton (with counterweight removal)**	
Boom			**7000 mm (276 inch) Mass Boom**		**7000 mm (276 inch) Mass Boom**	
Stick			**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
General Duty (GD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)				
Heavy Duty (HD)	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)				
General Duty (GD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)	(1)	(2)	(1)	(2)
Heavy Duty (HD)	5.00 m^3 (6.54 y^3)	2150 mm (85 inch)	(2)	(2)	(2)	(2)
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)	(3)	(1)	(3)	(1)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(1)	(1)	(1)	(1)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(1)	(2)	(1)	(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)	(2)	(2)	(2)	(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(1)	(2)	(1)	(2)
	4.40 m^3 (6.02 y^3)	2150 mm (85 inch)	(2)	(4)	(2)	(3)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)	(2)	(4)	(2)	(4)

(1) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(4) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

With CW-70

Table 27

374 (with CW-70)						
Undercarriage			**Long VG**			
Emission			**Tier 3**			
Counter Weight			**11 m ton**		**10.1 m ton (with counterweight removal)**	
Boom			**7000 mm (276 inch) Mass Boom**		**7000 mm (276 inch) Mass Boom**	
Stick			**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**	**Mass Boom with2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)	(1)	(2)	(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(2)	(3)	(2)	(3)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(2)	(3)	(2)	(3)

(1) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Without Coupler

Table 28

374 (without Coupler)				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7000 mm (276 inch) Mass Boom**	
Stick			**Mass Boom with 2.57 m (8 ft 5 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket				
Type	**ISOCapacity**	**Width**		
Severe Duty Spade (SDS)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)	(1)	(2)
	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(1)	(1)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(1)	(3)
	4.60 m^3 (6.02 y^3)	2200 mm (87 inch)	(1)	(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)	(2)	(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)	(1)	(2)
	4.40 m^3 (5.75 y^3)	2200 mm (87 inch)	(1)	(2)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(2)	(3)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)	(2)	(3)
Extreme Duty Spade (XDS)	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)	(2)	(4)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 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) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

Without Coupler

Table 29

374 (without Coupler)				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 2.84 m (9 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket				
Type	**ISOCapacity**	**Width**		
Severe Duty (SD)	3.00 m^3 (3.92 y^3)	1950 mm (77 inch)	(1)	
Severe Duty Spade (SDS)	4.60 m^3 (6.02 y^3)	2200 mm (87 inch)		(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)		(3)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2200 mm (87 inch)		(2)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

Without Coupler

Table 30

374 (without Coupler)				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 2.84 m (9 ft 4 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket				
Type	**ISOCapacity**	**Width**		
Severe Duty (SD)	3.00 m^3 (3.92 y^3)	1950 mm (77 inch)	(1)	
Severe Duty Spade (SDS)	4.60 m^3 (6.02 y^3)	2200 mm (87 inch)		(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)		(3)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2200 mm (87 inch)		(4)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

Without Coupler

Table 31

374 (without Coupler)				
Undercarriage			**Long VG**	
Emission			**Tier 3**	
Counter Weight			**11 m ton**	
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with 2.57 m (8 ft 5 inch) Stick**
Bucket				
Type	**ISOCapacity**	**Width**		
Severe Duty (SD)	3.00 m^3 (3.92 y^3)	1950 mm (77 inch)	(1)	
Severe Duty Spade (SDS)	4.60 m^3 (6.02 y^3)	2200 mm (87 inch)		(2)
	5.00 m^3 (6.54 y^3)	2250 mm (89 inch)		(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2200 mm (87 inch)		(2)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

Without Coupler

Table 32

374 (without Coupler)						
Undercarriage				**Long VG**		
Emission				**Tier 4**		
Counter Weight				**11 m ton**		
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with2.84 m (9 ft 4 inch) Stick**	**Reach Boom with3.6 m (12 ft 10 inch) Stick**	**Reach Boom with4.67 m (15 ft 4 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
Severe Duty (SD)	2.90 m^3 (3.79 y^3)	1600 mm (64 inch)	(1)	(1)	(2)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(1)	(1)	(3)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(1)	(2)	(4)	
Severe Duty Spade (SDS)	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)				(2)
	4.60 m^3 (6.02 y^3)	2200 mm (87 inch)				(2)
Extreme Duty Spade (XDS)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)				(2)
	4.60 m^3 (6.02 y^3)	2150 mm (85 inch)				(3)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 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) 1200 kg/m^3 (2000 lb/yd^3) is the maximum density of material.

With Pin Grabber Coupler

Table 33

374 (with Pin Grabber Coupler)						
Undercarriage				**Long VG**		
Emission				**Tier 4**		
Counter Weight				**11 m ton**		
Boom			**7800 mm (307 inch) Reach Boom**			**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with2.84 m (9 ft 4 inch) Stick**	**Reach Boom with3.6 m (12 ft 10 inch) Stick**	**Reach Boom with4.67 m (15 ft 4 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket						
Type	**ISOCapacity**	**Width**				
Severe Duty (SD)	2.90 m^3 (3.79 y^3)	1600 mm (64 inch)	(1)	(2)	(3)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(1)	(4)	(5)	
	3.80 m^3 (4.97 y^3)	2000 mm (79 inch)	(4)	(3)	(5)	

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(3) 1200 kg/m^3 (2000 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) 900 kg/m^3 (1500 lb/yd^3) is the maximum density of material.

Without Coupler

Table 34

374 (without Coupler)				
Undercarriage			**Long VG**	
Emission			**Tier 4**	
Counter Weight			**11 m ton**	
Boom			**7800 mm (307 inch) Reach Boom**	**7000 mm (276 inch) Mass Boom**
Stick			**Reach Boom with 3.6 m (12 ft 10 inch) Stick**	**Mass Boom with3.0 m (10 ft 10 inch) Stick**
Bucket				
Type	**ISOCapacity**	**Width**		
Severe Duty (SD)	2.50 m^3 (3.27 y^3)	1650 mm (65 inch)	(1)	
	3.00 m^3 (3.92 y^3)	1950 mm (77 inch)	(3)	
	3.30 m^3 (4.32 y^3)	1750 mm (70 inch)	(3)	
Severe Duty (SD)	4.10 m^3 (5.36 y^3)	1950 mm (77 inch)		(2)
Extreme Duty (XD)	4.40 m^3 (5.75 y^3)	2050 mm (81 inch)		(3)

(1) 2100 kg/m^3 (3500 lb/yd^3) is the maximum density of material.
(2) 1800 kg/m^3 (3000 lb/yd^3) is the maximum density of material.
(3) 1500 kg/m^3 (2500 lb/yd^3) is the maximum density of material.

i08201322

Lifting Capacities

SMCS Code: 7000

⚠ WARNING

Failure to comply to the rated load can cause possible personal injury or property damage. This includes the risk of unintended boom lowering. 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.

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

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.

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.

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

- Lift point: Stick nose without bucket
- Lubricants full
- Fuel tank full
- Steel track
- Complete cab with a 75 kg (165 lb) operator

Lifting capacities will vary with different work tools and attachments. The weight of a work tool attachment must be subtracted from the lift capacity. Consult your Cat dealer regarding the lifting capacities for specific work tools and attachments.

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.

Use the lifting eye that is provided on the stick nose in order to lift objects. When the lifting eye is used, the connection must be made with a sling or shackle.

Note: Japan regulations require a shovel crane configuration in order to lift certain objects. A shovel crane has a rated load capacity, therefore, the lift capacities discussed below do not apply to a shovel crane configuration. Contact your Cat dealer for additional information.

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

Symbols Found in the Lifting Capacity Charts

Below are symbols that are commonly found on lifting capacity charts for track excavators.

Note: Depending on the machine configuration, some symbols may not be used.

(mm)
(inch) **Measurements are provided in millimeters and inches**



Lift Capacities are provided in kilograms and pounds

* **Load is limited by hydraulic lifting capacity rather than by a tipping load**



Lift point radius



Lift point height



Lifting capacity over the front of the machine



Lifting capacity over the side of the machine



Heavy Lift ON

Reach Boom

Reach Boom with a 7800 mm (307 inch) Boom and 4670 mm (184 inch) Stick

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
kg / Lb																			(mm) (ft'inch")
10500											* 12350	* 12350					* 11400	* 11400	9210
35'0"																	* 25300	* 25300	29'8"
9000											* 13150	* 13150					* 10750	* 10750	10330
30'0"											* 28950	* 28950					* 23750	* 23750	33'6"
7500											* 13500	* 13500	* 12950	11800			* 10450	* 10450	11140
25'0"											* 29450	* 29450	* 28050	25300			* 23050	* 23050	36'4"
6000											* 14250	* 14250	* 13250	11600			* 10400	9550	11700
20'0"											* 31000	* 31000	* 28950	24900			* 22900	21150	38'3"
4500					* 28050	* 28050	* 21150	* 21150	* 17500	* 17500	* 15300	14450	* 13800	11300	* 10950	9000	* 10550	8900	12050
15'0"							* 45600	* 45600	* 37900	* 37900	* 33200	31150	* 30050	24250			* 23200	19700	39'5"
3000							* 24400	* 24400	* 19400	18250	* 16400	13850	* 14450	10950	12150	8800	* 10900	8550	12200
10'0"							* 52650	* 52650	* 41950	39300	* 35550	29850	* 31350	23500	* 24000	18850	* 23950	18850	40'0"
1500							* 26850	23950	* 20950	17350	* 17350	13300	14700	10600	12000	8600	* 11500	8450	12160
5'0"							* 58050	51650	* 45300	37350	* 37600	28650	31600	22750			* 25250	18600	39'10"
0					* 18250	* 18250	* 28050	23050	* 21850	16700	* 17950	12850	14400	10300			11950	8550	11930
0					* 42150	* 42150	* 60750	49550	* 47350	35900	* 38900	27700	31000	22200			26300	18850	39'1"
-1500			* 13200	* 13200	* 24000	* 24000	* 28000	22600	* 22050	16300	17750	12600	14200	10150			12550	8950	11500
-5'0"			* 29800	* 29800	* 54900	* 54900	* 60650	48550	* 47700	35050	38250	27100	30650	21850			27600	19750	37'8"
-3000	* 16250	* 16250	* 20800	* 20800	* 32550	* 32550	* 26750	22500	* 21300	16150	* 17350	12500	* 14050	10150			* 13200	9750	10850
-10'0"	* 36350	* 36350	* 46950	* 46950	* 74400	* 74400	* 57900	48350	* 46050	34800	* 37400	26950	* 29900	21900			* 29050	21550	35'5"
-4500			* 30050	* 30050	* 30750	* 30750	* 24200	22700	* 19400	16250	* 15500	12650					* 13000	11150	9920
-15'0"			* 68000	* 68000	* 66500	* 66500	* 52250	48800	* 41750	35050	* 33000	27250					* 28550	24750	32'4"
-6000			* 31350	* 31350	* 24850	* 24850	* 19900	* 19900	* 15700	* 15700							* 12250	* 12250	8640
-20'0"			* 67000	* 67000	* 53150	* 53150	* 42450	* 42450	* 33050	* 33050							* 26750	* 26750	27'11"

Illustration 80 g06585783

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
kg / Lb																			(mm) (ft'inch")
10500											* 12750	* 12750					* 11750	* 11750	9210
35'0"											* 26050	* 26050					* 26050	* 26050	29'8"
9000											* 13600	* 13600					* 11050	* 11050	10330
30'0"											* 29950	* 29950					* 24450	* 24450	33'6"
7500											* 13950	* 13950	* 13400	11800			* 10750	10550	11140
25'0"											* 30500	* 30500	* 28900	25300			* 23750	23500	36'4"
6000											* 14750	* 14750	* 13750	11600			* 10700	9550	11700
20'0"											* 32100	* 32100	* 30000	24900			* 23600	21150	38'3"
4500					* 29000	* 29000	* 21900	* 21900	* 18100	* 18100	* 15850	14450	* 14300	11300	* 11300	9000	* 10850	8900	12050
15'0"							* 47150	* 47150	* 39250	* 39250	* 34350	31150	* 31150	24250			* 23900	19700	39'5"
3000							* 25250	* 25250	* 20050	18250	* 17000	13850	* 14950	10950	12150	8800	* 11250	8550	12200
10'0"							* 54500	* 54500	* 43400	39300	* 36800	29850	32350	23500	* 24750	18850	* 24700	18850	40'0"
1500							* 27800	23950	* 21700	17350	* 18000	13300	14700	10600	12000	8600	11750	8450	12160
5'0"							* 60100	51650	* 46900	37350	* 38950	28650	31600	22750			25850	18600	39'10"
0					* 18800	* 18800	* 29050	23050	* 22650	16700	18050	12850	14400	10300			11950	8550	11930
0					* 43350	* 43350	* 62900	49550	* 49050	35900	38900	27700	31000	22200			26300	18850	39'1"
-1500			* 13600	* 13600	* 24700	* 24700	* 29000	22600	* 22850	16300	17750	12600	14200	10150			12550	8950	11500
-5'0"			* 30700	* 30700	* 56450	* 56450	* 62850	48550	* 49450	35050	38250	27100	30650	21850			27600	19750	37'8"
-3000	* 16700	* 16700	* 21400	* 21400	* 33450	* 33450	* 27750	22500	* 22100	16150	17650	12500	14250	10150			13650	9750	10850
-10'0"	* 37400	* 37400	* 48300	* 48300	* 76450	* 76450	* 60000	48350	* 47750	34800	38050	26950	30700	21900			30150	21550	35'5"
-4500			* 30900	* 30900	* 31900	* 31900	* 25100	22700	* 20150	16250	* 16100	12650					* 13500	11150	9920
-15'0"			* 69950	* 69950	* 68950	* 68950	* 54200	48800	* 43300	35050	* 34300	27250					* 29650	24750	32'4"
-6000			* 32600	* 32600	* 25800	* 25800	* 20700	* 20700	* 16300	* 16300							* 12750	* 12750	8640
-20'0"			* 69700	* 69700	* 55250	* 55250	* 44100	* 44100	* 34400	* 34400							* 27850	* 27850	27'11"

Illustration 81 g06585785

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
kg / Lb																			(mm) (ft'inch")
10500											* 12350	* 12350					* 11400	* 11400	9210
35'0"																	* 25300	* 25300	29'8"
9000											* 13150	* 13150					* 10750	* 10750	10330
30'0"											* 28950	* 28950					* 23750	* 23750	33'6"
7500											* 13500	* 13500	* 12950	11650			* 10450	10400	11140
25'0"											* 29450	* 29450	* 28050	24950			* 23050	* 23050	36'4"
6000											* 14250	* 14250	* 13250	11450			* 10400	9400	11700
20'0"											* 31000	* 31000	* 28950	24550			* 22900	20850	38'3"
4500					* 28050	* 28050	* 21150	* 21150	* 17500	* 17500	* 15300	14300	* 13800	11150	* 10950	8850	* 10550	8800	12050
15'0"							* 45600	* 45600	* 37900	* 37900	* 33200	30750	* 30050	23900			* 23200	19400	39'5"
3000							* 24400	* 24400	* 19400	18000	* 16400	13650	* 14450	10750	12000	8650	* 10900	8450	12200
10'0"							* 52650	* 52650	* 41950	38750	* 35550	29450	* 31350	23150	* 24000	18550	* 23950	18550	40'0"
1500							* 26850	23650	* 20950	17100	* 17350	13100	14450	10450	11800	8500	* 11500	8300	12160
5'0"							* 58050	50900	* 45300	36800	* 37600	28250	31100	22400			* 25250	18300	39'10"
0					* 18250	* 18250	* 28050	22700	* 21850	16450	17800	12650	14200	10150			11750	8450	11930
0					* 42150	* 42150	* 60750	48850	* 47350	35400	38300	27300	30500	21850			25900	18550	39'1"
-1500			* 13200	* 13200	* 24000	* 24000	* 28000	22250	* 22050	16050	17500	12400	14000	10000			12350	8850	11500
-5'0"			* 29800	* 29800	* 54900	* 54900	* 60650	47850	* 47700	34550	37650	26700	30150	21500			27200	19450	37'8"
-3000	* 16250	* 16250	* 20800	* 20800	* 32550	* 32550	* 26750	22150	* 21300	15900	* 17350	12300	14000	10000			* 13200	9600	10850
-10'0"	* 36350	* 36350	* 46950	* 46950	* 74400	* 74400	* 57900	47650	* 46050	34250	* 37400	26500	* 29900	21550			* 29050	21200	35'5"
-4500			* 30050	* 30050	* 30750	* 30750	* 24200	22350	* 19400	16000	* 15500	12450					* 13000	11000	9920
-15'0"			* 68000	* 68000	* 66500	* 66500	* 52250	48100	* 41750	34550	* 33000	26850					* 28550	24400	32'4"
-6000			* 31350	* 31350	* 24850	* 24850	* 19900	* 19900	* 15700	* 15700							* 12250	* 12250	8640
-20'0"			* 67000	* 67000	* 53150	* 53150	* 42450	* 42450	* 33050	* 33050							* 26750	* 26750	27'11"

Illustration 82 g06585786

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
																			(mm) (ft'inch")
10500											* 12750	* 12750					* 11750	* 11750	9210
35'0"											* 26050	* 26050					* 26050	* 26050	29'8"
9000											* 13600	* 13600					* 11050	* 11050	10330
30'0"											* 29950	* 29950					* 24450	* 24450	33'6"
7500											* 13950	* 13950	* 13400	11650			* 10750	10400	11140
25'0"											* 30500	* 30500	* 28900	24950			* 23750	23150	36'4"
6000											* 14750	* 14750	* 13750	11450			* 10700	9400	11700
20'0"											* 32100	31900	* 30000	24550			* 23600	20850	38'3"
4500					* 29000	* 29000	* 21900	* 21900	* 18100	* 18100	* 15850	14300	* 14300	11150	* 11300	8850	* 10850	8800	12050
15'0"							* 47150	* 47150	* 39250	* 39250	* 34350	30750	* 31150	23900			* 23900	19400	39'5"
3000							* 25250	25150	* 20050	18000	* 17000	13650	14850	10750	12000	8650	* 11250	8450	12200
10'0"							* 54500	54150	* 43400	38750	* 36800	29450	31900	23150	* 24750	18550	* 24700	18550	40'0"
1500							* 27800	23650	* 21700	17100	* 18000	13100	14450	10450	11800	8500	11550	8300	12160
5'0"							* 60100	50900	* 46900	36800	* 38950	28250	31100	22400			25450	18300	39'10"
0					* 18800	* 18800	* 29050	22700	* 22650	16450	17800	12650	14200	10150			11750	8450	11930
0					* 43350	* 43350	* 62900	48850	* 49050	35400	38300	27300	30500	21850			25900	18550	39'1"
-1500			* 13600	* 13600	* 24700	* 24700	* 29000	22250	* 22850	16050	17500	12400	14000	10000			12350	8850	11500
-5'0"			* 30700	* 30700	* 56450	* 56450	* 62850	47850	* 49450	34550	37650	26700	30150	21500			27200	19450	37'8"
-3000	* 16700	* 16700	* 21400	* 21400	* 33450	* 33450	* 27750	22150	* 22100	15900	17400	12300	14000	10000			13400	9600	10850
-10'0"	* 37400	* 37400	* 48300	* 48300	* 76450	76350	* 60000	47650	* 47750	34250	37450	26500	30200	21550			29650	21200	35'5"
-4500			* 30900	* 30900	* 31900	* 31900	* 25100	22350	* 20150	16000	* 16100	12450					* 13500	11000	9920
-15'0"			* 69950	* 69950	* 68950	* 68950	* 54200	48100	* 43300	34550	* 34300	26850					* 29650	24400	32'4"
-6000			* 32600	* 32600	* 25800	* 25800	* 20700	* 20700	* 16300	* 16300							* 12750	* 12750	8640
-20'0"			* 69700	* 69700	* 55250	* 55250	* 44100	* 44100	* 34400	* 34400							* 27850	* 27850	27'11"

Illustration 83 g06585789

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
kg / Lb																			(mm) (ft'inch")
10500											* 12350	* 12350					* 11400	* 11400	9210
35'0"																	* 25300	* 25300	29'8"
9000											* 13150	* 13150					* 10750	* 10750	10330
30'0"											* 28950	* 28950					* 23750	* 23750	33'6"
7500											* 13500	* 13500	* 12950	11550			* 10450	10300	11140
25'0"											* 29450	* 29450	* 28050	24700			* 23050	22950	36'4"
6000											* 14250	* 14250	* 13250	11350			* 10400	9300	11700
20'0"											* 31000	* 31000	* 28950	24350			* 22900	20600	38'3"
4500					* 28050	* 28050	* 21150	* 21150	* 17500	* 17500	* 15300	14150	* 13800	11050	* 10950	8750	* 10550	8700	12050
15'0"							* 45600	* 45600	* 37900	* 37900	* 33200	30450	* 30050	23700			* 23200	19200	39'5"
3000							* 24400	* 24400	* 19400	17800	* 16400	13550	* 14450	10650	11850	8550	* 10900	8350	12200
10'0"							* 52650	* 52650	* 41950	38400	* 35550	29150	* 31350	22900	* 24000	18350	* 23950	18350	40'0"
1500							* 26850	23400	* 20950	16900	* 17350	13000	14300	10300	11650	8400	11450	8200	12160
5'0"							* 58050	50450	* 45300	36450	* 37600	27950	30800	22200			25200	18100	39'10"
0					* 18250	* 18250	* 28050	22450	* 21850	16250	17600	12550	14050	10050			11650	8350	11930
0					* 42150	* 42150	* 60750	48350	* 47350	35050	37900	27000	30200	21600			25650	18350	39'1"
-1500			* 13200	* 13200	* 24000	* 24000	* 28000	22000	* 22050	15900	17300	12250	13850	9900			12200	8750	11500
-5'0"			* 29800	* 29800	* 54900	* 54900	* 60650	47350	* 47700	34200	37300	26400	29850	21300			26900	19250	37'8"
-3000	* 16250	* 16250	* 20800	* 20800	* 32550	* 32550	* 26750	21950	* 21300	15750	17250	12200	13850	9900			* 13200	9500	10850
-10'0"	* 36350	* 36350	* 46950	* 46950	* 74400	* 74400	* 57900	47150	* 46050	33900	37100	26250	* 29900	21350			* 29050	20950	35'5"
-4500			* 30050	* 30050	* 30750	* 30750	* 24200	22150	* 19400	15850	* 15500	12300					* 13000	10850	9920
-15'0"			* 68000	* 68000	* 66500	* 66500	* 52250	47600	* 41750	34200	* 33000	26550					* 28550	24150	32'4"
-6000			* 31350	* 31350	* 24850	* 24850	* 19900	* 19900	* 15700	* 15700							* 12250	* 12250	8640
-20'0"			* 67000	* 67000	* 53150	* 53150	* 42450	* 42450	* 33050	* 33050							* 26750	* 26750	27'11"

Illustration 84 g06585791

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"		12000 40'0"				
kg / lb																			(mm) (ft'inch")
10500											* 12750	* 12750					* 11750	* 11750	9210
35'0"																	* 26050	* 26050	29'8"
9000											* 13600	* 13600					* 11050	* 11050	10330
30'0"											* 29950	* 29950					* 24450	* 24450	33'6"
7500											* 13950	* 13950	* 13400	11550			* 10750	10300	11140
25'0"											* 30500	* 30500	* 28900	24700			* 23750	22950	36'4"
6000											* 14750	14700	* 13750	11350			* 10700	9300	11700
20'0"											* 32100	31650	* 30000	24350			* 23600	20600	38'3"
4500					* 29000	* 29000	* 21900	* 21900	* 18100	* 18100	* 15850	14150	* 14300	11050	* 11300	8750	* 10850	8700	12050
15'0"							* 47150	* 47150	* 39250	* 39250	* 34350	30450	* 31150	23700			* 23900	19200	39'5"
3000							* 25250	24900	* 20050	17800	* 17000	13550	14700	10650	11850	8550	* 11250	8350	12200
10'0"							* 54500	53700	* 43400	38400	* 36800	29150	31600	22900	* 24750	18350	* 24700	18350	40'0"
1500							* 27800	23400	* 21700	16900	* 18000	13000	14300	10300	11650	8400	11450	8200	12160
5'0"							* 60100	50450	* 46900	36450	38950	27950	30800	22200			25200	18100	39'10"
0					* 18800	* 18800	* 29050	22450	* 22650	16250	17600	12550	14050	10050			11650	8350	11930
0					* 43350	* 43350	* 62900	48350	* 49050	35050	37900	27000	30200	21600			25650	18350	39'1"
-1500			* 13600	* 13600	* 24700	* 24700	* 29000	22000	22750	15900	17300	12250	13850	9900			12200	8750	11500
-5'0"			* 30700	* 30700	* 56450	* 56450	* 62850	47350	48950	34200	37300	26400	29850	21300			26900	19250	37'8"
-3000	* 16700	* 16700	* 21400	* 21400	* 33450	* 33450	* 27750	21950	* 22100	15750	17250	12200	13850	9900			13300	9500	10850
-10'0"	* 37400	* 37400	* 48300	* 48300	* 76450	75600	* 60000	47150	* 47750	33900	37100	26250	29900	21350			29350	20950	35'5"
-4500			* 30900	* 30900	* 31900	* 31900	* 25100	22150	* 20150	15850	* 16100	12300					* 13500	10850	9920
-15'0"			* 69950	* 69950	* 68950	* 68950	* 54200	47600	* 43300	34200	* 34300	26550					* 29650	24150	32'4"
-6000			* 32600	* 32600	* 25800	* 25800	* 20700	* 20700	* 16300	16300							* 12750	* 12750	8640
-20'0"			* 69700	* 69700	* 55250	* 55250	* 44100	* 44100	* 34400	* 34400							* 27850	* 27850	27'11"

Illustration 85 g06585794

Lift Chart Above: 374, Reach boom with a 7800 mm (307 inch) boom and 4670 mm (184 inch) stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
kg / Lb																	(mm) (ft'inch")
10500 35'0"															* 13150 * 29200	* 13150 * 29200	8480 27'3"
9000 30'0"											* 14100 * 31100	* 14100 * 31100			* 12350 * 27350	* 12350 * 27350	9690 31'5"
7500 25'0"											* 14300 * 31250	* 14300 * 31250	* 12450	11650	* 12050 * 26550	11550 25700	10550 34'4"
6000 20'0"									* 16700 * 36200	* 16700 * 36200	* 15000 * 32650	14900 32000	* 13900 * 30450	11500 24700	* 12000 * 26450	10350 22950	11140 36'5"
4500 15'0"							* 22550 * 48600	* 22550 * 48600	* 18450 * 39900	* 18450 * 39900	* 15950 * 34650	14350 30900	* 14350 * 31300	11250 24150	* 12250 * 26950	9650 21250	11500 37'8"
3000 10'0"					* 65650	* 65650	* 25600 * 55200	25050 54050	* 20150 * 43650	18050 38900	* 17000 * 36800	13800 29700	* 14900 32300	10900 23450	12750 * 28000	9250 20350	11660 38'2"
1500 5'0"							* 27650 * 59800	23750 51200	* 21550 * 46600	17250 37150	* 17800 * 38600	13300 28600	14700 31650	10600 22800	12650 27800	9100 20050	11620 38'1"
0 0					* 17800 * 41150	* 17800 * 41150	* 28400 * 61500	23000 49500	* 22200 * 48100	16700 35950	18100 38950	12900 27800	14450 31150	10400 22350	12900 28400	9250 20400	11380 37'4"
-1500 -5'0"			* 14100 * 31900	* 14100 * 31900	* 25400 * 58150	* 25400 * 58150	* 27850 * 60400	22700 48850	* 22100 * 47800	16400 35300	17850 38500	12700 27350	14350 30950	10300 22150	13600 29950	9750 21500	10930 35'9"
-3000 -10'0"			* 23300 * 52650	* 23300 * 52650	* 33300 * 72250	* 33300 * 72250	* 26200 * 56650	22750 48900	* 21000 * 45350	16350 35200	* 17050 * 36650	12700 27350			* 14000 * 30800	10700 23700	10240 33'5"
-4500 -15'0"			* 34350 * 77750	* 34350 * 77750	* 28800 * 62200	* 28800 * 62200	* 23100 * 49800	23050 49550	* 18550 * 39850	16550 35650	* 14450 * 30350	12900 27950			* 13650 * 30000	12500 27800	9250 30'1"
-6000 -20'0"					* 22100 * 47050	* 22100 * 47050	* 18000 * 38100	* 18000 * 38100	* 13750 * 28300	* 13750 * 28300					* 12550 * 27350	* 12550 * 27350	7850 25'4"

Illustration 86 g06585796

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ																	(mm) (ft'inch")
10500															* 13500	* 13500	8480
35'0"															* 30050	* 30050	27'3"
9000											* 14600	* 14600			* 12750	* 12750	9690
30'0"											* 32150	* 32150			* 28150	* 28150	31'5"
7500											* 14800	* 14800	* 12800	11650	* 12400	11550	10550
25'0"											* 32350	* 32350			* 27350	25700	34'4"
6000									* 17250	* 17250	* 15550	14900	* 14400	11500	* 12400	10350	11140
20'0"									* 37450	* 37450	* 33800	32000	* 31550	24700	* 27250	22950	36'5"
4500							* 23300	* 23300	* 19050	19000	* 16550	14350	* 14900	11250	* 12600	9650	11500
15'0"					* 67850	* 67850	* 50200	* 50200	* 41250	40950	* 35900	30900	* 32450	24150	* 27750	21250	37'8"
3000							* 26500	25050	* 20900	18050	* 17600	13800	15000	10900	12750	9250	11660
10'0"							* 57150	54050	* 45150	38900	* 38150	29700	32300	23450	28050	20350	38'2"
1500							* 28650	23750	* 22300	17250	* 18450	13300	14700	10600	12650	9100	11620
5'0"							* 61900	51200	* 48250	37150	39850	28600	31650	22800	27800	20050	38'1"
0					* 18300	* 18300	* 29400	23000	* 23000	16700	18100	12900	14450	10400	12900	9250	11380
0					* 42350	* 42350	* 63700	49500	* 49850	35950	38950	27800	31150	22350	28400	20400	37'4"
-1500			* 14550	* 14550	* 26100	* 26100	* 28850	22700	* 22900	16400	17850	12700	14350	10300	13600	9750	10930
-5'0"			* 32850	* 32850	* 59800	* 59800	* 62550	48850	* 49550	35300	38500	27350	30950	22150	29950	21500	35'9"
-3000			* 24000	* 24000	* 34500	* 34500	* 27150	22750	* 21750	16350	* 17650	12700			* 14500	10700	10240
-10'0"			* 54150	* 54150	* 74900	* 74900	* 58750	48900	* 47000	35200	* 38000	27350			* 31950	23700	33'5"
-4500			* 35300	* 35300	* 29850	* 29850	* 24000	23050	* 19300	16550	* 15000	12900			* 14200	12500	9250
-15'0"			* 79950	* 79950	* 64550	* 64550	* 51700	49550	* 41350	35650	* 31550	27950			* 31200	27800	30'1"
-6000					* 22950	* 22950	* 18700	* 18700	* 14300	* 14300					* 13050	* 13050	7850
-20'0"					* 48900	* 48900	* 39600	* 39600	* 29450	* 29450					* 28450	* 28450	25'4"

Illustration 87 g06585797

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
																	(mm) (ft'inch")
10500 35'0"															* 13150 * 29200	* 13150 * 29200	8480 27'3"
9000 30'0"											* 14100 * 31100	* 14100 * 31100			* 12350 * 27350	* 12350 * 27350	9690 31'5"
7500 25'0"											* 14300 * 31250	* 14300 * 31250	* 12450	11500	* 12050 * 26550	11400 25350	10550 34'4"
6000 20'0"									* 16700 * 36200	* 16700 * 36200	* 15000 * 32650	14700 31600	* 13900 * 30450	11350 24350	* 12000 * 26450	10200 22600	11140 36'5"
4500 15'0"					* 65650	* 65650	* 22550 * 48600	* 22550 * 48600	* 18450 * 39900	* 18450 * 39900	* 15950 * 34650	14150 30500	* 14350 * 31300	11050 23800	* 12250 * 26950	9500 20950	11500 37'8"
3000 10'0"							* 25600 * 55200	24750 53350	* 20150 * 43650	17800 38400	* 17000 * 36800	13600 29300	14800 31850	10750 23100	12550 27650	9100 20050	11660 38'2"
1500 5'0"							* 27650 * 59800	23400 50450	* 21550 * 46600	17000 36650	* 17800 * 38600	13100 28200	14500 31150	10450 22450	12450 27400	8950 19750	11620 38'1"
0 0					* 17800 * 41150	* 17800 * 41150	* 28400 * 61500	22650 48800	* 22200 * 48100	16450 35400	17850 38400	12700 27400	14250 30650	10200 22000	12700 27950	9100 20100	11380 37'4"
-1500 -5'0"			* 14100 * 31900	* 14100 * 31900	* 25400 * 58150	* 25400 * 58150	* 27850 * 60400	22350 48100	* 22100 * 47800	16150 34750	17600 37900	12500 26950	14150 30450	10100 21800	13400 29500	9600 21150	10930 35'9"
-3000 -10'0"			* 23300 * 52650	* 23300 * 52650	* 33300 * 72250	* 33300 * 72250	* 26200 * 56650	22400 48150	* 21000 * 45350	16100 34650	* 17050 * 36650	12500 26900			* 14000 * 30800	10550 23300	10240 33'5"
-4500 -15'0"			* 34350 * 77750	* 34350 * 77750	* 28800 * 62200	* 28800 * 62200	* 23100 * 49800	22700 48850	* 18550 * 39850	16300 35150	* 14450 * 30350	12750 27550			* 13650 * 30000	12300 27350	9250 30'1"
-6000 -20'0"					* 22100 * 47050	* 22100 * 47050	* 18000 * 38100	* 18000 * 38100	* 13750 * 28300	* 13750 * 28300					* 12550 * 27350	* 12550 * 27350	7850 25'4"

Illustration 88 g06585798

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ																	(mm) (ft'inch")
10500															* 13500	* 13500	8480
35'0"															* 30050	* 30050	27'3"
9000											* 14600	* 14600			* 12750	* 12750	9690
30'0"											* 32150	* 32150			* 28150	* 28150	31'5"
7500											* 14800	* 14800	* 12800	11500	* 12400	11400	10550
25'0"											* 32350	* 32350			* 27350	25350	34'4"
6000									* 17250	* 17250	* 15550	14700	* 14400	11350	* 12400	10200	11140
20'0"									* 37450	* 37450	* 33800	31600	* 31550	24350	* 27250	22600	36'5"
4500							* 23300	* 23300	* 19050	18750	* 16550	14150	* 14900	11050	* 12600	9500	11500
15'0"					* 67850	* 67850	* 50200	* 50200	* 41250	40450	* 35900	30500	* 32450	23800	* 27750	20950	37'8"
3000							* 26500	24750	* 20900	17800	* 17600	13600	14800	10750	12550	9100	11660
10'0"							* 57150	53350	* 45150	38400	* 38150	29300	31850	23100	27650	20050	38'2"
1500							* 28650	23400	* 22300	17000	18250	13100	14500	10450	12450	8950	11620
5'0"							* 61900	50450	* 48250	36650	39250	28200	31150	22450	27400	19750	38'1"
0					* 18300	* 18300	* 29400	22650	* 23000	16450	17850	12700	14250	10200	12700	9100	11380
0					* 42350	* 42350	* 63700	48800	* 49850	35400	38400	27400	30650	22000	27950	20100	37'4"
-1500			* 14550	* 14550	* 26100	* 26100	* 28850	22350	* 22900	16150	17600	12500	14150	10100	13400	9600	10930
-5'0"			* 32850	* 32850	* 59800	* 59800	* 62550	48100	* 49550	34750	37900	26950	30450	21800	29500	21150	35'9"
-3000			* 24000	* 24000	* 34500	* 34500	* 27150	22400	* 21750	16100	17600	12500			* 14500	10550	10240
-10'0"			* 54150	* 54150	* 74900	* 74900	* 58750	48150	* 47000	34650	37900	26900			* 31950	23300	33'5"
-4500			* 35300	* 35300	* 29850	* 29850	* 24000	22700	* 19300	16300	* 15000	12750			* 14200	12300	9250
-15'0"			* 79950	* 79950	* 64550	* 64550	* 51700	48850	* 41350	35150	* 31550	27550			* 31200	27350	30'1"
-6000					* 22950	* 22950	* 18700	* 18700	* 14300	* 14300					* 13050	* 13050	7850
-20'0"					* 48900	* 48900	* 39600	* 39600	* 29450	* 29450					* 28450	* 28450	25'4"

Illustration 89 g06585799

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
kg / Lb																	(mm) (ft'inch")
10500 35'0"															* 13150 * 29200	* 13150 * 29200	8480 27'3"
9000 30'0"											* 14100 * 31100	* 14100 * 31100			* 12350 * 27350	* 12350 * 27350	9690 31'5"
7500 25'0"											* 14300 * 31250	* 14300 * 31250	* 12450	11400	* 12050 * 26550	11300 25100	10550 34'4"
6000 20'0"									* 16700 * 36200	* 16700 * 36200	* 15000 * 32650	14550 31300	* 13900 * 30450	11250 24100	* 12000 * 26450	10100 22400	11140 36'5"
4500 15'0"					* 65650	* 65650	* 22550 * 48600	* 22550 * 48600	* 18450 * 39900	* 18450 * 39900	* 15950 * 34650	14050 30200	* 14350 * 31300	10950 23550	* 12250 * 26950	9400 20750	11500 37'8"
3000 10'0"							* 25600 * 55200	24500 52850	* 20150 * 43650	17650 38050	* 17000 * 36800	13450 29000	14650 31500	10650 22850	12400 27350	9000 19800	11660 38'2"
1500 5'0"							* 27650 * 59800	23200 50000	* 21550 * 46600	16850 36250	* 17800 * 38600	12950 27900	14350 30850	10350 22250	12300 27100	8850 19550	11620 38'1"
0 0					* 17800 * 41150	* 17800 * 41150	* 28400 * 61500	22450 48300	* 22200 * 48100	16250 35050	17650 38000	12600 27100	14100 30350	10100 21750	12550 27650	9050 19850	11380 37'4"
-1500 -5'0"			* 14100 * 31900	* 14100 * 31900	* 25400 * 58150	* 25400 * 58150	* 27850 * 60400	22150 47650	* 22100 * 47800	16000 34400	17450 37500	12350 26650	14000 30150	10000 21600	13250 29200	9500 20950	10930 35'9"
-3000 -10'0"			* 23300 * 52650	* 23300 * 52650	* 33300 * 72250	* 33300 * 72250	* 26200 * 56650	22150 47700	* 21000 * 45350	15950 34300	* 17050 * 36650	12350 26650			* 14000 * 30800	10450 23100	10240 33'5"
-4500 -15'0"			* 34350 * 77750	* 34350 * 77750	* 28800 * 62200	* 28800 * 62200	* 23100 * 49800	22450 48350	* 18550 * 39850	16150 34800	* 14450 * 30350	12600 27250			* 13650 * 30000	12200 27100	9250 30'1"
-6000 -20'0"					* 22100 * 47050	* 22100 * 47050	* 18000 * 38100	* 18000 * 38100	* 13750 * 28300	* 13750 * 28300					* 12550 * 27350	* 12550 * 27350	7850 25'4"

Illustration 90 g06585800

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	1500 5'0"		3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ kg Lb																	(mm) (ft'inch")
10500															* 13500	* 13500	8480
35'0"															* 30050	* 30050	27'3"
9000											* 14600	* 14600			* 12750	* 12750	9690
30'0"											* 32150	* 32150			* 28150	* 28150	31'5"
7500											* 14800	* 14800	* 12800	11400	* 12400	11300	10550
25'0"											* 32350	32150			* 27350	25100	34'4"
6000									* 17250	* 17250	* 15550	14550	* 14400	11250	* 12400	10100	11140
20'0"									* 37450	* 37450	* 33800	31300	* 31550	24100	* 27250	22400	36'5"
4500							* 23300	* 23300	* 19050	18600	* 16550	14050	* 14900	10950	* 12600	9400	11500
15'0"					* 67850	* 67850	* 50200	* 50200	* 41250	40100	* 35900	30200	32200	23550	* 27750	20750	37'8"
3000							* 26500	24500	* 20900	17650	* 17600	13450	14650	10650	12400	9000	11660
10'0"							* 57150	52850	* 45150	38050	* 38150	29000	31500	22850	27350	19800	38'2"
1500							* 28650	23200	* 22300	16850	18050	12950	14350	10350	12300	8850	11620
5'0"							* 61900	50000	* 48250	36250	38850	27900	30850	22250	27100	19550	38'1"
0					* 18300	* 18300	* 29400	22450	* 23000	16250	17650	12600	14100	10100	12550	9050	11380
0					* 42350	* 42350	* 63700	48300	* 49850	35050	38000	27100	30350	21750	27650	19850	37'4"
-1500			* 14550	* 14550	* 26100	* 26100	* 28850	22150	22850	16000	17450	12350	14000	10000	13250	9500	10930
-5'0"			* 32850	* 32850	* 59800	* 59800	* 62550	47650	49150	34400	37500	26650	30150	21600	29200	20950	35'9"
-3000			* 24000	* 24000	* 34500	* 34500	* 27150	22150	* 21750	15950	17400	12350			* 14500	10450	10240
-10'0"			* 54150	* 54150	* 74900	* 74900	* 58750	47700	* 47000	34300	37500	26650			* 31950	23100	33'5"
-4500			* 35300	* 35300	* 29850	* 29850	* 24000	22450	* 19300	16150	* 15000	12600			* 14200	12200	9250
-15'0"			* 79950	* 79950	* 64550	* 64550	* 51700	48350	* 41350	34800	* 31550	27250			* 31200	27100	30'1"
-6000					* 22950	* 22950	* 18700	* 18700	* 14300	* 14300					* 13050	* 13050	7850
-20'0"					* 48900	* 48900	* 39600	* 39600	* 29450	* 29450					* 28450	* 28450	25'4"

Illustration 91 g06585803

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 4150 mm (163 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
kg Lb															(mm) (ft'inch")
10500													* 15650	* 15650	7760
35'0"													* 34900	* 34900	24'10"
9000									* 15200	* 15200			* 14650	* 14650	9070
30'0"													* 32350	* 32350	29'4"
7500							* 16350	* 16350	* 15150	* 15150			* 14200	12700	9980
25'0"							* 35550	* 35550	* 33150	32700			* 31350	28300	32'6"
6000					* 20750	* 20750	* 17650	* 17650	* 15750	14850	* 14600	11500	* 14200	11300	10610
20'0"					* 44800	* 44800	* 38250	* 38250	* 34250	32000			* 31250	25050	34'8"
4500					* 23900	* 23900	* 19300	18950	* 16600	14350	* 14900	11300	14300	10450	10990
15'0"					* 51450	* 51450	* 41750	40850	* 36050	30950	* 32500	24200	31650	23100	35'11"
3000					* 26700	24900	* 20900	18050	* 17500	13850	15150	11000	13800	10000	11150
10'0"					* 57550	53750	* 45150	38950	* 37950	29850	32550	23650	30400	22050	36'6"
1500					* 28300	23800	* 22000	17350	* 18150	13400	14850	10750	13650	9900	11110
5'0"					* 61150	51300	* 47650	37350	* 39350	28900	32000	23150	30100	21800	36'5"
0					* 28500	23250	* 22400	16900	18300	13100	14700	10600	14000	10100	10860
0			* 36600	* 36600	* 61700	50050	* 48550	36350	39450	28200	31600	22800	30850	22250	35'7"
-1500			* 26000	* 26000	* 27450	23100	* 21950	16700	* 17950	12950			* 14750	10700	10390
-5'0"			* 59700	* 59700	* 59550	49700	* 47500	35900	* 38750	27900			* 32500	23600	34'0"
-3000	* 25600	* 25600	* 31350	* 31350	* 25300	23250	* 20400	16700	* 16400	13000			* 14600	11900	9660
-10'0"	* 57850	* 57850	* 68100	* 68100	* 54750	50000	* 44100	36000	* 35150	28100			* 32150	26350	31'6"
-4500	* 31000	* 31000	* 26300	* 26300	* 21600	* 21600	* 17350	17050					* 14000	* 14000	8600
-15'0"	* 67100	* 67100	* 56800	* 56800	* 46500	* 46500	* 37000	36750					* 30700	* 30700	27'11"
-6000					* 15350	* 15350							* 12150	* 12150	7070
-20'0"					* 32050	* 32050							* 26250	* 26250	22'9"

Illustration 92 g06586353

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ kg lb															(mm) (ft'inch")
10500 35'0"													* 16100 * 35900	* 16100 * 35900	7760 24'10"
9000 30'0"									* 15650	15300			* 15050 * 33300	* 15050 * 33300	9070 29'4"
7500 25'0"							* 16900 * 36750	* 16900 * 36750	* 15650 * 34300	15250 32700			* 14650 * 32250	12700 28300	9980 32'6"
6000 20'0"					* 21450 * 46300	* 21450 * 46300	* 18250 * 39550	* 18250 * 39550	* 16300 * 35450	14850 32000	* 15150	11500	* 14600 * 32150	11300 25050	10610 34'8"
4500 15'0"					* 24700 * 53200	* 24700 * 53200	* 19950 * 43200	18950 40850	* 17200 * 37350	14350 30950	15400 33150	11300 24200	14300 31650	10450 23100	10990 35'11"
3000 10'0"					* 27600 * 59550	24900 53750	* 21600 * 46750	18050 38950	* 18150 * 39300	13850 29850	15150 32550	11000 23650	13800 30400	10000 22050	11150 36'6"
1500 5'0"					* 29300 * 63300	23800 51300	* 22800 * 49350	17350 37350	18650 40150	13400 28900	14850 32000	10750 23150	13650 30100	9900 21800	11110 36'5"
0 0			* 37650 * 63900	* 37650 * 63900	* 29500 * 63900	23250 50050	* 23200 * 50300	16900 36350	18300 39450	13100 28200	14700 31600	10600 22800	14000 30850	10100 22250	10860 35'7"
-1500 -5'0"			* 26750 * 61400	* 26750 * 61400	* 28450 * 61700	23100 49700	* 22750 * 49250	16700 35900	18150 39100	12950 27900			14900 32850	10700 23600	10390 34'0"
-3000 -10'0"	* 26300 * 59500	* 26300 * 59500	* 32500 * 70600	* 32500 * 70600	* 26200 * 56750	23250 50000	* 21150 * 45700	16700 36000	* 17050 * 36500	13000 28100			* 15150 * 33350	11900 26350	9660 31'6"
-4500 -15'0"	* 32200 * 69750	* 32200 * 69750	* 27300 * 58950	* 27300 * 58950	* 22450 * 48250	* 22450 * 48250	* 18000 * 38400	17050 36750					* 14550 * 31900	14200 31650	8600 27'11"
-6000 -20'0"					* 16000 * 33350	* 16000 * 33350							* 12650 * 27350	* 12650 * 27350	7070 22'9"

Illustration 93 g06586354

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
kg Lb															(mm) (ft'inch")
10500 35'0"													* 15650 * 34900	* 15650 * 34900	7760 24'10"
9000 30'0"									* 15200	15100			* 14650 * 32350	* 14650 * 32350	9070 29'4"
7500 25'0"							* 16350 * 35550	* 16350 * 35550	* 15150 * 33150	15050 32300			* 14200 * 31350	12550 27900	9980 32'6"
6000 20'0"					* 20750 * 44800	* 20750 * 44800	* 17650 * 38250	* 17650 * 38250	* 15750 * 34250	14650 31550	* 14600	11350	* 14200 * 31250	11150 24700	10610 34'8"
4500 15'0"					* 23900 * 51450	* 23900 * 51450	* 19300 * 41750	18700 40350	* 16600 * 36050	14200 30550	* 14900 * 32500	11100 23850	14100 31200	10300 22750	10990 35'11"
3000 10'0"					* 26700 * 57550	24600 53050	* 20900 * 45150	17800 38400	* 17500 * 37950	13650 29400	14900 32050	10850 23300	13600 29950	9850 21750	11150 36'6"
1500 5'0"					* 28300 * 61150	23450 50600	* 22000 * 47650	17100 36850	* 18150 * 39350	13200 28450	14650 31500	10600 22800	13450 29650	9750 21450	11110 36'5"
0 0			* 36600	* 36600	* 28500 * 61700	22950 49350	* 22400 * 48550	16650 35850	18050 38850	12900 27800	14450 31150	10400 22450	13800 30400	9950 21900	10860 35'7"
-1500 -5'0"			* 26000 * 59700	* 26000 * 59700	* 27450 * 59550	22750 49000	* 21950 * 47500	16450 35400	17900 38550	12750 27500			14650 32350	10550 23250	10390 34'0"
-3000 -10'0"	* 25600 * 57850	* 25600 * 57850	* 31350 * 68100	* 31350 * 68100	* 25300 * 54750	22900 49250	* 20400 * 44100	16450 35500	* 16400 * 35150	12800 27700			* 14600 * 32150	11750 25950	9660 31'6"
-4500 -15'0"	* 31000 * 67100	* 31000 * 67100	* 26300 * 56800	* 26300 * 56800	* 21600 * 46500	* 21600 * 46500	* 17350 * 37000	16800 36200					* 14000 * 30700	* 14000 * 30700	8600 27'11"
-6000 -20'0"					* 15350 * 32050	* 15350 * 32050							* 12150 * 26250	* 12150 * 26250	7070 22'9"

Illustration 94 g06586355

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ kg lb															(mm) (ft'inch")
10500 35'0"													* 16100 * 35900	* 16100 * 35900	7760 24'10"
9000 30'0"									* 15650	15100			* 15050 * 33300	14900 * 33300	9070 29'4"
7500 25'0"							* 16900 * 36750	* 16900 * 36750	* 15650 * 34300	15050 32300			* 14650 * 32250	12550 27900	9980 32'6"
6000 20'0"					* 21450 * 46300	* 21450 * 46300	* 18250 * 39550	* 18250 * 39550	* 16300 * 35450	14650 31550	* 15150	11350	* 14600 * 32150	11150 24700	10610 34'8"
4500 15'0"					* 24700 * 53200	* 24700 * 53200	* 19950 * 43200	18700 40350	* 17200 * 37350	14200 30550	15200 32650	11100 23850	14100 31200	10300 22750	10990 35'11"
3000 10'0"					* 27600 * 59550	24600 53050	* 21600 * 46750	17800 38400	* 18150 * 39300	13650 29400	14900 32050	10850 23300	13600 29950	9850 21750	11150 36'6"
1500 5'0"					* 29300 * 63300	23450 50600	* 22800 * 49350	17100 36850	18400 39600	13200 28450	14650 31500	10600 22800	13450 29650	9750 21450	11110 36'5"
0					* 29500	22950	* 23200	16650	18050	12900	14450	10400	13800	9950	10860
0			* 37650	* 37650	* 63900	49350	* 50300	35850	38850	27800	31150	22450	30400	21900	35'7"
-1500 -5'0"			* 26750 * 61400	* 26750 * 61400	* 28450 * 61700	22750 49000	* 22750 * 49250	16450 35400	17900 38550	12750 27500			14650 32350	10550 23250	10390 34'0"
-3000 -10'0"	* 26300 * 59500	* 26300 * 59500	* 32500 * 70600	* 32500 * 70600	* 26200 * 56750	22900 49250	* 21150 * 45700	16450 35500	* 17050 * 36500	12800 27700			* 15150 * 33350	11750 25950	9660 31'6"
-4500 -15'0"	* 32200 * 69750	* 32200 * 69750	* 27300 * 58950	* 27300 * 58950	* 22450 * 48250	* 22450 * 48250	* 18000 * 38400	16800 36200					* 14550 * 31900	14000 31200	8600 27'11"
-6000 -20'0"					* 16000 * 33350	* 16000 * 33350							* 12650 * 27350	* 12650 * 27350	7070 22'9"

Illustration 95 g06586356

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
kg Lb															(mm) (ft'inch")
10500													* 15650	* 15650	7760
35'0"													* 34900	* 34900	24'10"
9000									* 15200	15000			* 14650	* 14650	9070
30'0"													* 32350	* 32350	29'4"
7500							* 16350	* 16350	* 15150	14900			* 14200	12400	9980
25'0"							* 35550	* 35550	* 33150	32000			* 31350	27650	32'6"
6000					* 20750	* 20750	* 17650	* 17650	* 15750	14550	* 14600	11250	* 14200	11050	10610
20'0"					* 44800	* 44800	* 38250	* 38250	* 34250	31300			* 31250	24450	34'8"
4500					* 23900	* 23900	* 19300	18550	* 16600	14050	* 14900	11000	14000	10200	10990
15'0"					* 51450	* 51450	* 41750	39950	* 36050	30250	32350	23650	30850	22550	35'11"
3000					* 26700	24350	* 20900	17650	* 17500	13550	14750	10750	13450	9750	11150
10'0"					* 57550	52550	* 45150	38050	* 37950	29150	31750	23050	29650	21500	36'6"
1500					* 28300	23250	* 22000	16950	* 18150	13100	14500	10500	13350	9650	11110
5'0"					* 61150	50100	* 47650	36500	39200	28200	31200	22550	29350	21250	36'5"
0					* 28500	22700	* 22400	16450	17850	12750	14300	10300	13650	9850	10860
0			* 36600	* 36600	* 61700	48850	* 48550	35500	38450	27500	30850	22200	30100	21700	35'7"
-1500			* 26000	* 26000	* 27450	22550	* 21950	16250	17700	12650			14500	10450	10390
-5'0"			* 59700	* 59700	* 59550	48500	* 47500	35050	38150	27200			32000	23000	34'0"
-3000	* 25600	* 25600	* 31350	* 31350	* 25300	22700	* 20400	16300	* 16400	12700			* 14600	11600	9660
-10'0"	* 57850	* 57850	* 68100	* 68100	* 54750	48800	* 44100	35150	* 35150	27400			* 32150	25700	31'6"
-4500	* 31000	* 31000	* 26300	* 26300	* 21600	* 21600	* 17350	16600					* 14000	13850	8600
-15'0"	* 67100	* 67100	* 56800	* 56800	* 46500	* 46500	* 37000	35850					* 30700	* 30700	27'11"
-6000					* 15350	* 15350							* 12150	* 12150	7070
-20'0"					* 32050	* 32050							* 26250	* 26250	22'9"

Illustration 96 g06586357

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500 35'0"				
+ℓ kg Lb															(mm) (ft'inch")
10500 35'0"													* 16100 * 35900	* 16100 * 35900	7760 24'10"
9000 30'0"									* 15650 	15000 			* 15050 * 33300	14800 33250	9070 29'4"
7500 25'0"							* 16900 * 36750	* 16900 * 36750	* 15650 * 34300	14900 32000			* 14650 * 32250	12400 27650	9980 32'6"
6000 20'0"					* 21450 * 46300	* 21450 * 46300	* 18250 * 39550	* 18250 * 39550	* 16300 * 35450	14550 31300	* 15150 	11250 	* 14600 * 32150	11050 24450	10610 34'8"
4500 15'0"					* 24700 * 53200	* 24700 * 53200	* 19950 * 43200	18550 39950	* 17200 * 37350	14050 30250	15050 32350	11000 23650	14000 30850	10200 22550	10990 35'11"
3000 10'0"					* 27600 * 59550	24350 52550	* 21600 * 46750	17650 38050	* 18150 * 39300	13550 29150	14750 31750	10750 23050	13450 29650	9750 21500	11150 36'6"
1500 5'0"					* 29300 * 63300	23250 50100	* 22800 * 49350	16950 36500	18200 39200	13100 28200	14500 31200	10500 22550	13350 29350	9650 21250	11110 36'5"
0 0			* 37650 	* 37650 	* 29500 * 63900	22700 48850	* 23200 * 50300	16450 35500	17850 38450	12750 27500	14300 30850	10300 22200	13650 30100	9850 21700	10860 35'7"
-1500 -5'0"			* 26750 * 61400	* 26750 * 61400	* 28450 * 61700	22550 48500	* 22750 * 49250	16250 35050	17700 38150	12650 27200			14500 32000	10450 23000	10390 34'0"
-3000 -10'0"	* 26300 * 59500	* 26300 * 59500	* 32500 * 70600	* 32500 * 70600	* 26200 * 56750	22700 48800	* 21150 * 45700	16300 35150	* 17050 * 36500	12700 27400			* 15150 * 33350	11600 25700	9660 31'6"
-4500 -15'0"	* 32200 * 69750	* 32200 * 69750	* 27300 * 58950	* 27300 * 58950	* 22450 * 48250	* 22450 * 48250	* 18000 * 38400	16600 35850					* 14550 * 31900	13850 30900	8600 27'11"
-6000 -20'0"					* 16000 * 33350	* 16000 * 33350							* 12650 * 27350	* 12650 * 27350	7070 22'9"

Illustration 97 g06586358

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 3600 mm (142 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg / Lb													(mm) (ft'inch")
10500											* 18550	* 18550	6800
9000					* 17300	* 17300					* 17000	* 17000	8270
30'0"					* 38000	* 38000					* 37700	* 37700	26'8"
7500					* 17700	* 17700	* 16400	14800			* 16300	14050	9260
25'0"					* 38550	* 38550	* 36050	31700			* 36050	31350	30'1"
6000	* 30150	* 30150	* 22600	* 22600	* 18900	* 18900	* 16750	14500			* 16000	12350	9930
20'0"	* 64300	* 64300	* 48700	* 48700	* 40950	* 40950	* 36500	31200			* 35250	27350	32'5"
4500			* 25600	25550	* 20400	18450	* 17450	14050			15550	11350	10340
15'0"			* 55100	* 55100	* 44100	39750	* 37900	30300			34350	25050	33'10"
3000			* 27950	24100	* 21700	17600	* 18150	13600	14950	10850	14900	10850	10520
10'0"			* 60300	51950	* 47000	38000	* 39350	29300			32900	23900	34'5"
1500			* 28750	23300	* 22500	17000	18450	13250			14800	10750	10470
5'0"			* 62250	50150	* 48750	36700	39700	28500			32650	23600	34'4"
0			* 28150	23000	* 22450	16700	18200	13000			15250	11000	10210
0			* 61100	49500	* 48700	35950	39150	28050			33650	24250	33'5"
-1500	* 24950	* 24950	* 26450	23050	* 21500	16600	* 17500	12950			* 15600	11800	9700
-5'0"	* 57950	* 57950	* 57500	49500	* 46550	35800	* 37650	28000			* 34350	26050	31'9"
-3000	* 27850	* 27850	* 23650	23300	* 19300	16800					* 15100	13400	8910
-10'0"	* 60700	* 60700	* 51200	50100	* 41600	36200					* 33250	29700	29'1"
-4500	* 22200	* 22200	* 19000	* 19000	* 14750	* 14750					* 13800	* 13800	7750
-15'0"	* 47900	* 47900	* 40700	* 40700	* 30700	* 30700					* 30150	* 30150	25'2"

Illustration 98 g06585816

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg / Lb													(mm) (ft'inch")
10500											* 19150	* 19150	6800
9000 30'0"					* 17850 * 39250	* 17850 * 39250					* 17600 * 39000	17150 38750	8270 26'8"
7500 25'0"					* 18300 * 39850	* 18300 * 39850	* 16950 * 37300	14800 31700			* 16900 * 37300	14050 31350	9260 30'1"
6000 20'0"	* 31150 * 66400	* 31150 * 66400	* 23350 * 50350	* 23350 * 50350	* 19500 * 42350	19300 41600	* 17350 * 37750	14500 31200			* 16550 * 36500	12350 27350	9930 32'5"
4500 15'0"			* 26450 * 57000	25550 55150	* 21100 * 45600	18450 39750	* 18050 * 39200	14050 30300			15550 34350	11350 25050	10340 33'10"
3000 10'0"			* 28900 * 62400	24100 51950	* 22500 * 48650	17600 38000	* 18800 40550	13600 29300	14950	10850	14900 32900	10850 23900	10520 34'5"
1500 5'0"			* 29750 * 64450	23300 50150	* 23300 * 50450	17000 36700	18450 39700	13250 28500			14800 32650	10750 23600	10470 34'4"
0 0			* 29150 * 63250	23000 49500	* 23300 * 50450	16700 35950	18200 39150	13000 28050			15250 33650	11000 24250	10210 33'5"
-1500 -5'0"	* 25650 * 59550	* 25650 * 59550	* 27400 * 59550	23050 49500	* 22300 * 48250	16600 35800	* 18100 * 39050	12950 28000			* 16150 * 35600	11800 26050	9700 31'9"
-3000 -10'0"	* 28900 * 62950	* 28900 * 62950	* 24500 * 53050	23300 50100	* 20000 * 43100	16800 36200					* 15700 * 34500	13400 29700	8910 29'1"
-4500 -15'0"	* 23050 * 49800	* 23050 * 49800	* 19750 * 42300	* 19750 * 42300	* 15350 * 31900	* 15350 * 31900					* 14350 * 31350	* 14350 * 31350	7750 25'2"

Illustration 99 g06585817

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg Lb													(mm) (ft'inch")
10500											* 18550	* 18550	6800
9000 30'0"					* 17300 * 38000	* 17300 * 38000					* 17000 * 37700	16950 * 37700	8270 26'8"
7500 25'0"					* 17700 * 38550	* 17700 * 38550	* 16400 * 36050	14600 31250			* 16300 * 36050	13850 30950	9260 30'1"
6000 20'0"	* 30150 * 64300	* 30150 * 64300	* 22600 * 48700	* 22600 * 48700	* 18900 * 40950	* 18900 * 40950	* 16750 * 36500	14300 30800			* 16000 * 35250	12150 26950	9930 32'5"
4500 15'0"			* 25600 * 55100	25200 54450	* 20400 * 44100	18200 39200	* 17450 * 37900	13850 29850			15300 33850	11150 24700	10340 33'10"
3000 10'0"			* 27950 * 60300	23750 51250	* 21700 * 47000	17350 37450	* 18150 * 39350	13400 28900	14700	10700	14700 32400	10650 23500	10520 34'5"
1500 5'0"			* 28750 * 62250	22950 49450	* 22500 * 48750	16750 36150	18150 39100	13050 28100			14600 32150	10550 23250	10470 34'4"
0 0			* 28150 * 61100	22650 48750	* 22450 * 48700	16450 35450	17900 38600	12800 27600			15050 33150	10850 23900	10210 33'5"
-1500 -5'0"	* 24950 * 57950	* 24950 * 57950	* 26450 * 57500	22700 48800	* 21500 * 46550	16350 35250	* 17500 * 37650	12800 27550			* 15600 * 34350	11650 25650	9700 31'9"
-3000 -10'0"	* 27850 * 60700	* 27850 * 60700	* 23650 * 51200	22950 49400	* 19300 * 41600	16550 35650					* 15100 * 33250	13200 29250	8910 29'1"
-4500 -15'0"	* 22200 * 47900	* 22200 * 47900	* 19000 * 40700	* 19000 * 40700	* 14750 * 30700	* 14750 * 30700					* 13800 * 30150	* 13800 * 30150	7750 25'2"

Illustration 100 g06585818

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg / Lb													(mm) (ft'inch")
10500											* 19150	* 19150	6800
9000					* 17850	* 17850					* 17600	16950	8270
30'0"					* 39250	* 39250					* 39000	38250	26'8"
7500					* 18300	* 18300	* 16950	14600			* 16900	13850	9260
25'0"					* 39850	* 39850	* 37300	31250			* 37300	30950	30'1"
6000	* 31150	* 31150	* 23350	* 23350	* 19500	19050	* 17350	14300			* 16550	12150	9930
20'0"	* 66400	* 66400	* 50350	* 50350	* 42350	41050	* 37750	30800			* 36500	26950	32'5"
4500			* 26450	25200	* 21100	18200	* 18050	13850			15300	11150	10340
15'0"			* 57000	54450	* 45600	39200	* 39200	29850			33850	24700	33'10"
3000			* 28900	23750	* 22500	17350	18550	13400	14700	10700	14700	10650	10520
10'0"			* 62400	51250	* 48650	37450	39950	28900			32400	23500	34'5"
1500			* 29750	22950	* 23300	16750	18150	13050			14600	10550	10470
5'0"			* 64450	49450	* 50450	36150	39100	28100			32150	23250	34'4"
0			* 29150	22650	* 23300	16450	17900	12800			15050	10850	10210
0			* 63250	48750	50350	35450	38600	27600			33150	23900	33'5"
-1500	* 25650	* 25650	* 27400	22700	* 22300	16350	17900	12800			* 16150	11650	9700
-5'0"	* 59550	* 59550	* 59550	48800	* 48250	35250	38550	27550			* 35600	25650	31'9"
-3000	* 28900	* 28900	* 24500	22950	* 20000	16550					* 15700	13200	8910
-10'0"	* 62950	* 62950	* 53050	49400	* 43100	35650					* 34500	29250	29'1"
-4500	* 23050	* 23050	* 19750	* 19750	* 15350	* 15350					* 14350	* 14350	7750
-15'0"	* 49800	* 49800	* 42300	* 42300	* 31900	* 31900					* 31350	* 31350	25'2"

Illustration 101 g06585820

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg Lb													(mm) (ft'inch")
10500											* 18550	* 18550	6800
9000 30'0"					* 17300 * 38000	* 17300 * 38000					* 17000 * 37700	16800 * 37700	8270 26'8"
7500 25'0"					* 17700 * 38550	* 17700 * 38550	* 16400 * 36050	14450 30950			* 16300 * 36050	13750 30650	9260 30'1"
6000 20'0"	* 30150 * 64300	* 30150 * 64300	* 22600 * 48700	* 22600 * 48700	* 18900 * 40950	* 18900 40700	* 16750 * 36500	14200 30500			* 16000 * 35250	12050 26700	9930 32'5"
4500 15'0"			* 25600 * 55100	25000 53950	* 20400 * 44100	18000 38850	* 17450 * 37900	13750 29600			15150 33500	11050 24450	10340 33'10"
3000 10'0"			* 27950 * 60300	23500 50750	* 21700 * 47000	17200 37100	* 18150 * 39350	13300 28600	14600	10600	14550 32050	10550 23300	10520 34'5"
1500 5'0"			* 28750 * 62250	22700 48950	* 22500 * 48750	16600 35800	18000 38700	12900 27800			14450 31850	10450 23000	10470 34'4"
0 0			* 28150 * 61100	22450 48300	* 22450 * 48700	16300 35100	17750 38200	12700 27350			14900 32800	10750 23650	10210 33'5"
-1500 -5'0"	* 24950 * 57950	* 24950 * 57950	* 26450 * 57500	22450 48300	* 21500 * 46550	16200 34900	* 17500 * 37650	12650 27300			* 15600 * 34350	11500 25400	9700 31'9"
-3000 -10'0"	* 27850 * 60700	* 27850 * 60700	* 23650 * 51200	22750 48900	* 19300 * 41600	16350 35300					* 15100 * 33250	13100 28950	8910 29'1"
-4500 -15'0"	* 22200 * 47900	* 22200 * 47900	* 19000 * 40700	* 19000 * 40700	* 14750 * 30700	* 14750 * 30700					* 13800 * 30150	* 13800 * 30150	7750 25'2"

Illustration 102 g06585821

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"		10500				
kg / Lb +ℓ													(mm) (ft'inch")
10500											* 19150	* 19150	6800
9000 30'0"					* 17850 * 39250	* 17850 * 39250					* 17600 * 39000	16800 37950	8270 26'8"
7500 25'0"					* 18300 * 39850	* 18300 * 39850	* 16950 * 37300	14450 30950			* 16900 * 37300	13750 30650	9260 30'1"
6000 20'0"	* 31150 * 66400	* 31150 * 66400	* 23350 * 50350	* 23350 * 50350	* 19500 * 42350	18900 40700	* 17350 * 37750	14200 30500			16450 36450	12050 26700	9930 32'5"
4500 15'0"			* 26450 * 57000	25000 53950	* 21100 * 45600	18000 38850	* 18050 * 39200	13750 29600			15150 33500	11050 24450	10340 33'10"
3000 10'0"			* 28900 * 62400	23500 50750	* 22500 * 48650	17200 37100	18400 39600	13300 28600	14600	10600	14550 32050	10550 23300	10520 34'5"
1500 5'0"			* 29750 * 64450	22700 48950	* 23300 * 50450	16600 35800	18000 38700	12900 27800			14450 31850	10450 23000	10470 34'4"
0 0			* 29150 * 63250	22450 48300	23150 49850	16300 35100	17750 38200	12700 27350			14900 32800	10750 23650	10210 33'5"
-1500 -5'0"	* 25650 * 59550	* 25650 * 59550	* 27400 * 59550	22450 48300	* 22300 * 48250	16200 34900	17700 38150	12650 27300			16000 35350	11500 25400	9700 31'9"
-3000 -10'0"	* 28900 * 62950	* 28900 * 62950	* 24500 * 53050	22750 48900	* 20000 * 43100	16350 35300					* 15700 * 34500	13100 28950	8910 29'1"
-4500 -15'0"	* 23050 * 49800	* 23050 * 49800	* 19750 * 42300	* 19750 * 42300	* 15350 * 31900	* 15350 * 31900					* 14350 * 31350	* 14350 * 31350	7750 25'2"

Illustration 103 g06585823

Lift Chart Above: 374, Reach Boom with a 7800 mm (307 inch) Boom and 2840 mm (112 inch) Stick, 900 mm (35 inch) DG track shoes and Heavy lift function ON.

Mass Boom

Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 14650 * 32500	* 14650 * 32500	7350 23'7"
7500 25'0"							* 17250 * 37750	* 17250 * 37750			* 13850 * 30600	* 13850 * 30600	8450 27'5"
6000 20'0"					* 20750 * 44900	* 20750 * 44900	* 18050 * 39300	* 18050 * 39300	* 16650	14300	* 13650 * 30100	* 13650 * 30100	9180 29'11"
4500 15'0"			* 32200 * 68900	* 32200 * 68900	* 23600 * 50900	* 23600 * 50900	* 19450 * 42150	18650 40150	* 17100 * 37300	13950 30000	* 13900 * 30550	12500 27600	9620 31'6"
3000 10'0"					* 26300 * 56850	24750 53400	* 20900 * 45250	17800 38300	* 17750 * 38600	13500 29050	* 14550 * 31950	11800 26050	9810 32'1"
1500 5'0"					* 28000 * 60600	23600 50850	* 21950 * 47500	17100 36800	* 18200 * 39500	13100 28250	* 15650 * 34450	11650 25650	9760 32'0"
0 0			* 30850 * 71600	* 30850 * 71600	* 28250 * 61250	23000 49550	* 22200 * 48100	16650 35800	* 18100 39000	12850 27750	16850 37050	12000 26450	9480 31'0"
-1500 -5'0"	* 25400 * 57450	* 25400 * 57450	* 34800 * 75700	* 34800 * 75700	* 27050 * 58650	22850 49200	* 21400 * 46250	16500 35500			* 17000 * 37450	13000 28750	8930 29'2"
-3000 -10'0"	* 37450 * 81550	* 37450 * 81550	* 30550 * 66200	* 30550 * 66200	* 24200 * 52300	23100 49700	* 18850 * 40350	16700 36000			* 16750 * 36850	15200 33700	8060 26'3"
-4500 -15'0"			* 23600 * 50550	* 23600 * 50550	* 18550 * 39200	* 18550 * 39200					* 15500 * 33850	* 15500 * 33850	6750 21'10"

Illustration 104 g06585824

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg + 2 Lb													(mm) (ft'inch")
9000 30'0"											* 15050 * 33450	* 15050 * 33450	7350 23'7"
7500 25'0"							* 17850 * 39050	* 17850 * 39050			* 14250 * 31500	* 14250 * 31500	8450 27'5"
6000 20'0"					* 21450 * 46400	* 21450 * 46400	* 18700 * 40650	* 18700 * 40650	* 17200	14300	* 14050 * 31000	13800 30650	9180 29'11"
4500 15'0"			* 33300 * 71250	* 33300 * 71250	* 24400 * 52650	* 24400 * 52650	* 20100 * 43650	18650 40150	* 17700 * 38600	13950 30000	* 14300 * 31500	12500 27600	9620 31'6"
3000 10'0"					* 27250 * 58800	24750 53400	* 21650 * 46850	17800 38300	* 18400 * 39950	13500 29050	* 14950 * 32900	11800 26050	9810 32'1"
1500 5'0"					* 29000 * 62750	23600 50850	* 22700 * 49200	17100 36800	18350 39550	13100 28250	* 16150 * 35500	11650 25650	9760 32'0"
0 0			* 31750 * 73600	* 31750 * 73600	* 29250 * 63400	23000 49550	* 23000 * 49850	16650 35800	18100 39000	12850 27750	16850 37050	12000 26450	9480 31'0"
-1500 -5'0"	* 26150 * 59050	* 26150 * 59050	* 36050 * 78400	* 36050 * 78400	* 28050 * 60800	22850 49200	* 22200 * 47950	16500 35500			* 17650 * 38850	13000 28750	8930 29'2"
-3000 -10'0"	* 38850 * 84650	* 38850 * 84650	* 31650 * 68650	* 31650 * 68650	* 25100 * 54200	23100 49700	* 19600 * 41850	16700 36000			* 17400 * 38300	15200 33700	8060 26'3"
-4500 -15'0"			* 24550 * 52550	* 24550 * 52550	* 19250 * 40750	* 19250 * 40750					* 16100 * 35250	* 16100 * 35250	6750 21'10"

Illustration 105 g06585825

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 14650 * 32500	* 14650 * 32500	7350 23'7"
7500 25'0"							* 17250 * 37750	* 17250 * 37750			* 13850 * 30600	* 13850 * 30600	8450 27'5"
6000 20'0"					* 20750 * 44900	* 20750 * 44900	* 18050 * 39300	* 18050 * 39300	* 16650	14100	* 13650 * 30100	13600 * 30100	9180 29'11"
4500 15'0"			* 32200 * 68900	* 32200 * 68900	* 23600 * 50900	* 23600 * 50900	* 19450 * 42150	18400 39600	* 17100 * 37300	13750 29550	* 13900 * 30550	12300 27200	9620 31'6"
3000 10'0"					* 26300 * 56850	24450 52650	* 20900 * 45250	17550 37750	* 17750 * 38600	13300 28650	* 14550 * 31950	11650 25650	9810 32'1"
1500 5'0"					* 28000 * 60600	23300 50150	* 21950 * 47500	16850 36250	18100 38950	12900 27800	* 15650 * 34450	11450 25250	9760 32'0"
0 0			* 30850 * 71600	* 30850 * 71600	* 28250 * 61250	22700 48800	* 22200 * 48100	16400 35300	17850 38400	12700 27300	16600 36500	11800 26000	9480 31'0"
-1500 -5'0"	* 25400 * 57450	* 25400 * 57450	* 34800 * 75700	* 34800 * 75700	* 27050 * 58650	22550 48450	* 21400 * 46250	16250 35000			* 17000 * 37450	12800 28300	8930 29'2"
-3000 -10'0"	* 37450 * 81550	* 37450 * 81550	* 30550 * 66200	* 30550 * 66200	* 24200 * 52300	22750 49000	* 18850 * 40350	16450 35500			* 16750 * 36850	14950 33200	8060 26'3"
-4500 -15'0"			* 23600 * 50550	* 23600 * 50550	* 18550 * 39200	* 18550 * 39200					* 15500 * 33850	* 15500 * 33850	6750 21'10"

Illustration 106 g06585827

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 15050 * 33450	* 15050 * 33450	7350 23'7"
7500 25'0"							* 17850 * 39050	* 17850 * 39050			* 14250 * 31500	* 14250 * 31500	8450 27'5"
6000 20'0"					* 21450 * 46400	* 21450 * 46400	* 18700 * 40650	* 18700 * 40650	* 17200	14100	* 14050 * 31000	13600 30250	9180 29'11"
4500 15'0"			* 33300 * 71250	* 33300 * 71250	* 24400 * 52650	* 24400 * 52650	* 20100 * 43650	18400 39600	* 17700 * 38600	13750 29550	* 14300 * 31500	12300 27200	9620 31'6"
3000 10'0"					* 27250 * 58800	24450 52650	* 21650 * 46850	17550 37750	* 18400 39850	13300 28650	* 14950 * 32900	11650 25650	9810 32'1"
1500 5'0"					* 29000 * 62750	23300 50150	* 22700 * 49200	16850 36250	18100 38950	12900 27800	16050 35300	11450 25250	9760 32'0"
0 0			* 31750 * 73600	* 31750 * 73600	* 29250 * 63400	22700 48800	* 23000 * 49850	16400 35300	17850 38400	12700 27300	16600 36500	11800 26000	9480 31'0"
-1500 -5'0"	* 26150 * 59050	* 26150 * 59050	* 36050 * 78400	* 36050 77650	* 28050 * 60800	22550 48450	* 22200 * 47950	16250 35000			* 17650 * 38850	12800 28300	8930 29'2"
-3000 -10'0"	* 38850 * 84650	* 38850 * 84650	* 31650 * 68650	* 31650 * 68650	* 25100 * 54200	22750 49000	* 19600 * 41850	16450 35500			* 17400 * 38300	14950 33200	8060 26'3"
-4500 -15'0"			* 24550 * 52550	* 24550 * 52550	* 19250 * 40750	* 19250 * 40750					* 16100 * 35250	* 16100 * 35250	6750 21'10"

Illustration 107 g06585828

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 14650 * 32500	* 14650 * 32500	7350 23'7"
7500 25'0"							* 17250 * 37750	* 17250 * 37750			* 13850 * 30600	* 13850 * 30600	8450 27'5"
6000 20'0"					* 20750 * 44900	* 20750 * 44900	* 18050 * 39300	* 18050 * 39300	* 16650	14000	* 13650 * 30100	13500 29950	9180 29'11"
4500 15'0"			* 32200 * 68900	* 32200 * 68900	* 23600 * 50900	* 23600 * 50900	* 19450 * 42150	18200 39250	* 17100 * 37300	13650 29300	* 13900 * 30550	12200 26950	9620 31'6"
3000 10'0"					* 26300 * 56850	24200 52200	* 20900 * 45250	17350 37400	* 17750 * 38600	13200 28350	* 14550 * 31950	11500 25400	9810 32'1"
1500 5'0"					* 28000 * 60600	23050 49650	* 21950 * 47500	16650 35900	17950 38550	12800 27550	* 15650 * 34450	11350 25000	9760 32'0"
0 0			* 30850 * 71600	* 30850 * 71600	* 28250 * 61250	22450 48350	* 22200 * 48100	16200 34950	17650 38000	12550 27050	16400 36150	11700 25750	9480 31'0"
-1500 -5'0"	* 25400 * 57450	* 25400 * 57450	* 34800 * 75700	* 34800 * 75700	* 27050 * 58650	22300 48000	* 21400 * 46250	16100 34650			* 17000 * 37450	12700 28000	8930 29'2"
-3000 -10'0"	* 37450 * 81550	* 37450 * 81550	* 30550 * 66200	* 30550 * 66200	* 24200 * 52300	22550 48500	* 18850 * 40350	16300 35150			* 16750 * 36850	14800 32850	8060 26'3"
-4500 -15'0"			* 23600 * 50550	* 23600 * 50550	* 18550 * 39200	* 18550 * 39200					* 15500 * 33850	* 15500 * 33850	6750 21'10"

Illustration 108 g06585830

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg Lb													(mm) (ft'inch")
9000 30'0"											* 15050 * 33450	* 15050 * 33450	7350 23'7"
7500 25'0"							* 17850 * 39050	* 17850 * 39050			* 14250 * 31500	* 14250 * 31500	8450 27'5"
6000 20'0"					* 21450 * 46400	* 21450 * 46400	* 18700 * 40650	* 18700 * 40650	* 17200	14000	* 14050 * 31000	13500 29950	9180 29'11"
4500 15'0"			* 33300 * 71250	* 33300 * 71250	* 24400 * 52650	* 24400 * 52650	* 20100 * 43650	18200 39250	* 17700 * 38600	13650 29300	* 14300 * 31500	12200 26950	9620 31'6"
3000 10'0"					* 27250 * 58800	24200 52200	* 21650 * 46850	17350 37400	18350 39450	13200 28350	* 14950 * 32900	11500 25400	9810 32'1"
1500 5'0"					* 29000 * 62750	23050 49650	* 22700 * 49200	16650 35900	17950 38550	12800 27550	15850 34950	11350 25000	9760 32'0"
0 0			* 31750 * 73600	* 31750 * 73600	* 29250 * 63400	22450 48350	* 23000 * 49850	16200 34950	17650 38000	12550 27050	16400 36150	11700 25750	9480 31'0"
-1500 -5'0"	* 26150 * 59050	* 26150 * 59050	* 36050 * 78400	35900 76900	* 28050 * 60800	22300 48000	* 22200 * 47950	16100 34650			* 17650 * 38850	12700 28000	8930 29'2"
-3000 -10'0"	* 38850 * 84650	* 38850 * 84650	* 31650 * 68650	* 31650 * 68650	* 25100 * 54200	22550 48500	* 19600 * 41850	16300 35150			* 17400 * 38300	14800 32850	8060 26'3"
-4500 -15'0"			* 24550 * 52550	* 24550 * 52550	* 19250 * 40750	* 19250 * 40750					* 16100 * 35250	* 16100 * 35250	6750 21'10"

Illustration 109 g06585831

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2995 mm (118 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 17600 * 39150	* 17600 * 39150	6820 21'10"
7500 25'0"							* 18300 * 40150	* 18300 * 40150			* 16600 * 36650	* 16600 * 36650	8000 25'11"
6000 20'0"					* 21900 * 47400	* 21900 * 47400	* 18950 * 41250	* 18950 * 41250			* 16350 * 36050	14900 33100	8770 28'7"
4500 15'0"					* 24650 * 53250	* 24650 * 53250	* 20200 * 43850	18550 40000	* 17800 * 38800	13950 29950	* 16650 * 36650	13400 29600	9230 30'2"
3000 10'0"					* 27200 * 58700	24600 53050	* 21500 * 46600	17750 38300	* 18250 * 39700	13550 29200	* 17500 * 38450	12650 27900	9430 30'10"
1500 5'0"					* 28500 * 61650	23600 50850	* 22350 * 48450	17150 36950	18500 39800	13250 28500	17400 38350	12500 27500	9380 30'9"
0 0			* 28700 * 67250	* 28700 * 67250	* 28300 * 61350	23150 49850	* 22350 * 48400	16800 36150	* 18050	13050	* 17850 * 39300	12950 28450	9080 29'9"
-1500 -5'0"	* 58650	* 58650	* 33450 * 72850	* 33450 * 72850	* 26650 * 57800	23150 49750	* 21150 * 45700	16700 36050			* 17800 * 39250	14150 31250	8500 27'10"
-3000 -10'0"	* 32950 * 72000	* 32950 * 72000	* 28750 * 62400	* 28750 * 62400	* 23250 * 50100	* 23250 * 50100	* 17700	17100			* 17300 * 38100	16850 37400	7590 24'9"
-4500 -15'0"			* 20950 * 44600	* 20950 * 44600	* 16050	* 16050					* 15250 * 33250	* 15250 * 33250	6170 19'11"

Illustration 110 g06585833

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
													(mm) (ft'inch")
9000 30'0"											* 18100 * 40300	* 18100 * 40300	6820 21'10"
7500 25'0"							* 18900 * 41500	* 18900 * 41500			* 17050 * 37700	* 17050 * 37700	8000 25'11"
6000 20'0"					* 22650 * 49000	* 22650 * 49000	* 19600 * 42650	19350 41600			* 16850 * 37100	14900 33100	8770 28'7"
4500 15'0"					* 25500 * 55050	* 25500 * 55050	* 20900 * 45350	18550 40000	* 18400 * 40150	13950 29950	* 17150 * 37750	13400 29600	9230 30'2"
3000 10'0"					* 28150 * 60750	24600 53050	* 22250 * 48250	17750 38300	18850 40500	13550 29200	17550 38650	12650 27900	9430 30'10"
1500 5'0"					* 29500 * 63850	23600 50850	* 23150 * 50150	17150 36950	18500 39800	13250 28500	17400 38350	12500 27500	9380 30'9"
0 0			* 29500 * 69100	* 29500 * 69100	* 29300 * 63550	23150 49850	* 23150 * 50150	16800 36150	18300	13050	18100 39850	12950 28450	9080 29'9"
-1500 -5'0"	* 60300	* 60300	* 34650 * 75450	* 34650 * 75450	* 27650 * 59900	23150 49750	* 21950 * 47350	16700 36050			* 18500 * 40700	14150 31250	8500 27'10"
-3000 -10'0"	* 34200 * 74750	* 34200 * 74750	* 29850 * 64700	* 29850 * 64700	* 24100 * 51950	23450 50500	* 18350	17100			* 17950 * 39500	16850 37400	7590 24'9"
-4500 -15'0"			* 21800 * 46400	* 21800 * 46400	* 16700	* 16700					* 15900 * 34600	* 15900 * 34600	6170 19'11"

Illustration 111 g06585836

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 17600 * 39150	* 17600 * 39150	6820 21'10"
7500 25'0"							* 18300 * 40150	* 18300 * 40150			* 16600 * 36650	* 16600 * 36650	8000 25'11"
6000 20'0"					* 21900 * 47400	* 21900 * 47400	* 18950 * 41250	* 18950 41100			* 16350 * 36050	14700 32650	8770 28'7"
4500 15'0"					* 24650 * 53250	* 24650 * 53250	* 20200 * 43850	18300 39450	* 17800 * 38800	13750 29550	* 16650 * 36650	13200 29200	9230 30'2"
3000 10'0"					* 27200 * 58700	24250 52300	* 21500 * 46600	17500 37750	* 18250 * 39700	13350 28750	17300 38100	12450 27450	9430 30'10"
1500 5'0"					* 28500 * 61650	23250 50100	* 22350 * 48450	16900 36400	18200 39200	13050 28050	17150 37800	12300 27100	9380 30'9"
0 0			* 28700 * 67250	* 28700 * 67250	* 28300 * 61350	22800 49100	* 22350 * 48400	16550 35600	18050	12850	17850 39300	12750 28050	9080 29'9"
-1500 -5'0"	* 58650	* 58650	* 33450 * 72850	* 33450 * 72850	* 26650 * 57800	22800 49000	* 21150 * 45700	16450 35500			* 17800 * 39250	13950 30800	8500 27'10"
-3000 -10'0"	* 32950 * 72000	* 32950 * 72000	* 28750 * 62400	* 28750 * 62400	* 23250 * 50100	23150 49800	* 17700	16850			* 17300 * 38100	16600 36850	7590 24'9"
-4500 -15'0"			* 20950 * 44600	* 20950 * 44600	* 16050	* 16050					* 15250 * 33250	* 15250 * 33250	6170 19'11"

Illustration 112 g06585839

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg / Lb													(mm) (ft'inch")
9000 30'0"											* 18100 * 40300	* 18100 * 40300	6820 21'10"
7500 25'0"							* 18900 * 41500	* 18900 * 41500			* 17050 * 37700	* 17050 * 37700	8000 25'11"
6000 20'0"					* 22650 * 49000	* 22650 * 49000	* 19600 * 42650	19100 41100			* 16850 * 37100	14700 32650	8770 28'7"
4500 15'0"					* 25500 * 55050	* 25500 * 55050	* 20900 * 45350	18300 39450	* 18400 * 40150	13750 29550	* 17150 * 37750	13200 29200	9230 30'2"
3000 10'0"					* 28150 * 60750	24250 52300	* 22250 * 48250	17500 37750	18550 39950	13350 28750	17300 38100	12450 27450	9430 30'10"
1500 5'0"					* 29500 * 63850	23250 50100	* 23150 * 50150	16900 36400	18200 39200	13050 28050	17150 37800	12300 27100	9380 30'9"
0 0			* 29500 * 69100	* 29500 * 69100	* 29300 * 63550	22800 49100	* 23150 * 50150	16550 35600	18050	12850	17850 39300	12750 28050	9080 29'9"
-1500 -5'0"	* 60300	* 60300	* 34650 * 75450	* 34650 * 75450	* 27650 * 59900	22800 49000	* 21950 * 47350	16450 35500			* 18500 * 40700	13950 30800	8500 27'10"
-3000 -10'0"	* 34200 * 74750	* 34200 * 74750	* 29850 * 64700	* 29850 * 64700	* 24100 * 51950	23150 49800	* 18350	16850			* 17950 * 39500	16600 36850	7590 24'9"
-4500 -15'0"			* 21800 * 46400	* 21800 * 46400	* 16700	* 16700					* 15900 * 34600	* 15900 * 34600	6170 19'11"

Illustration 113 g06585840

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
kg Lb													(mm) (ft'inch")
9000 30'0"											* 17600 * 39150	* 17600 * 39150	6820 21'10"
7500 25'0"							* 18300 * 40150	* 18300 * 40150			* 16600 * 36650	* 16600 * 36650	8000 25'11"
6000 20'0"					* 21900 * 47400	* 21900 * 47400	* 18950 * 41250	18950 40750			* 16350 * 36050	14550 32350	8770 28'7"
4500 15'0"					* 24650 * 53250	* 24650 * 53250	* 20200 * 43850	18150 39100	* 17800 * 38800	13600 29250	* 16650 * 36650	13050 28900	9230 30'2"
3000 10'0"					* 27200 * 58700	24050 51850	* 21500 * 46600	17350 37400	* 18250 39550	13250 28500	17100 37750	12350 27200	9430 30'10"
1500 5'0"					* 28500 * 61650	23050 49650	* 22350 * 48450	16750 36050	18050 38800	12900 27800	17000 37400	12200 26800	9380 30'9"
0 0			* 28700 * 67250	* 28700 * 67250	* 28300 * 61350	22600 48650	* 22350 * 48400	16350 35250	17850	12750	17650 38900	12600 27750	9080 29'9"
-1500 -5'0"	* 58650	* 58650	* 33450 * 72850	* 33450 * 72850	* 26650 * 57800	22550 48550	* 21150 * 45700	16300 35150			* 17800 * 39250	13800 30500	8500 27'10"
-3000 -10'0"	* 32950 * 72000	* 32950 * 72000	* 28750 * 62400	* 28750 * 62400	* 23250 * 50100	22900 49300	* 17700	16650			* 17300 * 38100	16450 36500	7590 24'9"
-4500 -15'0"			* 20950 * 44600	* 20950 * 44600	* 16050	* 16050					* 15250 * 33250	* 15250 * 33250	6170 19'11"

Illustration 114 g06585842

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function OFF.

(mm) (ft'inch")	3000 10'0"		4500 15'0"		6000 20'0"		7500 25'0"		9000 30'0"				
+ℓ kg Lb													(mm) (ft'inch")
9000 30'0"											* 18100 * 40300	* 18100 * 40300	6820 21'10"
7500 25'0"							* 18900 * 41500	* 18900 * 41500			* 17050 * 37700	* 17050 * 37700	8000 25'11"
6000 20'0"					* 22650 * 49000	* 22650 * 49000	* 19600 * 42650	18950 40750			* 16850 * 37100	14550 32350	8770 28'7"
4500 15'0"					* 25500 * 55050	* 25500 * 55050	* 20900 * 45350	18150 39100	* 18400 * 40150	13600 29250	* 17150 * 37750	13050 28900	9230 30'2"
3000 10'0"					* 28150 * 60750	24050 51850	* 22250 * 48250	17350 37400	18400 39550	13250 28500	17100 37750	12350 27200	9430 30'10"
1500 5'0"					* 29500 * 63850	23050 49650	* 23150 * 50150	16750 36050	18050 38800	12900 27800	17000 37400	12200 26800	9380 30'9"
0 0			* 29500 * 69100	* 29500 * 69100	* 29300 * 63550	22600 48650	* 23150 * 50150	16350 35250	17850	12750	17650 38900	12600 27750	9080 29'9"
-1500 -5'0"	* 60300	* 60300	* 34650 * 75450	* 34650 * 75450	* 27650 * 59900	22550 48550	* 21950 * 47350	16300 35150			* 18500 * 40700	13800 30500	8500 27'10"
-3000 -10'0"	* 34200 * 74750	* 34200 * 74750	* 29850 * 64700	* 29850 * 64700	* 24100 * 51950	22900 49300	* 18350	16650			* 17950 * 39500	16450 36500	7590 24'9"
-4500 -15'0"			* 21800 * 46400	* 21800 * 46400	* 16700	* 16700					* 15900 * 34600	* 15900 * 34600	6170 19'11"

Illustration 115 g06585843

Lift Chart Above: 374, Mass Boom with a 7000 mm (276 inch) Boom and 2574 mm (101 inch) Stick, 650 mm (26 inch) DG track shoes and Heavy lift function ON.

Identification Information

i08254394

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.

Cat ® 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) Plate



Illustration 116 g06276619

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

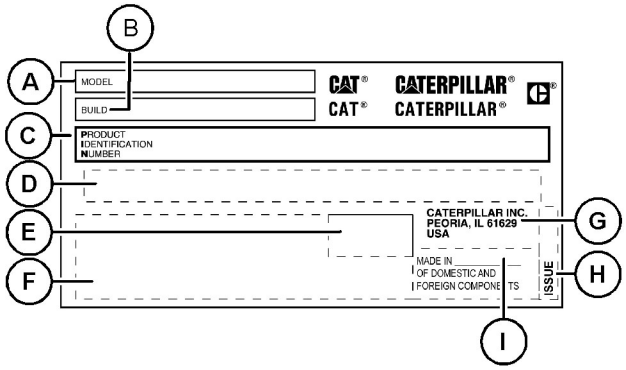


Illustration 117 g06201159

Manufacturer Name and Address _____

Model (A)_____

Build (B)_____

Product Identification Number (C)_____

Bar Code (D)_____

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

Regional Certification Plate (If Required) (F)_____

Address of Manufacturer (G)_____

Issue (H)_____

Country of Origin Info Plate (If Required) (I)_____

Local regulation may require documentation of the month and/or year of manufacture in the Operation and Maintenance Manual. Comply with these regulations

European Union

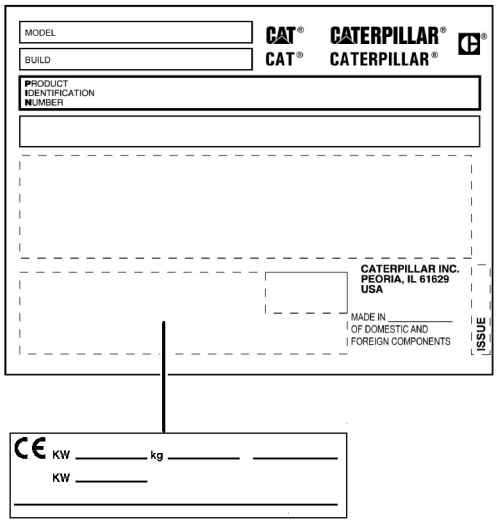


Illustration 118 g06201193

This plate is positioned on the bottom left side of the plate for the PIN.

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

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

- Engine Power Primary Engine (kW)_____
- Engine Power for Additional Engine (kW) (If Equipped) _____
- Typical Machine Operating Weight for European Market (kg)_____
- Year of Construction_____
- Machine Type _____

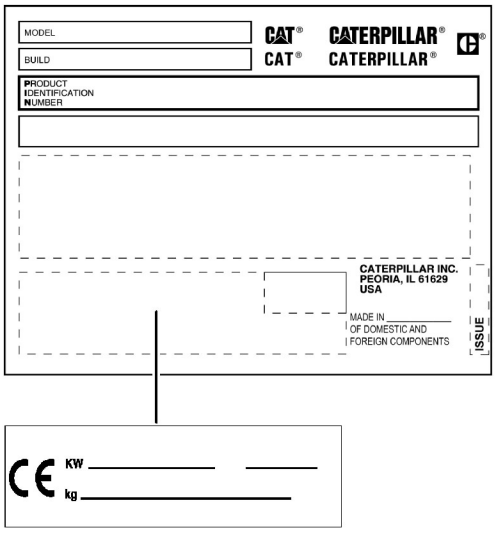


Illustration 119 g06201198

This plate is positioned on the bottom-left side of the plate for the PIN.

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

For machines compliant to 98/37/EC and 89/392/EEC, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

- Engine Power Primary Engine (kW)_____
- Typical Machine Operating Weight for European Market (kg)_____
- Year_____

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

China Pin Plate

Will be located next to the pin plate or on the pin plate.



Illustration 120 g03153576

European Union

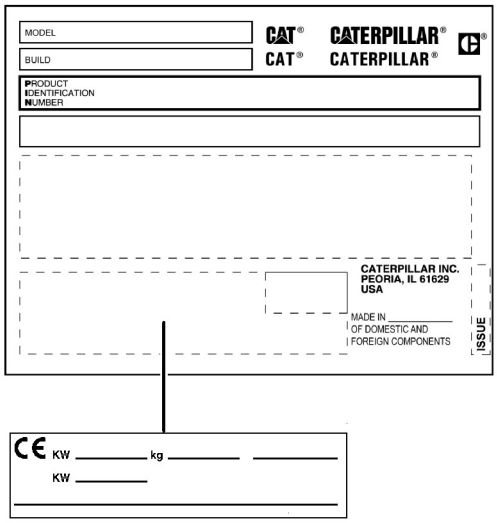


Illustration 121 g06201193

This plate is positioned on the bottom left side of the plate for the PIN.

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

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

- Engine Power Primary Engine (kW)
- Engine Power for Additional Engine (kW) (If Equipped)
- Typical Machine Operating Weight for European Market (kg)
- Year of Construction
- Machine Type

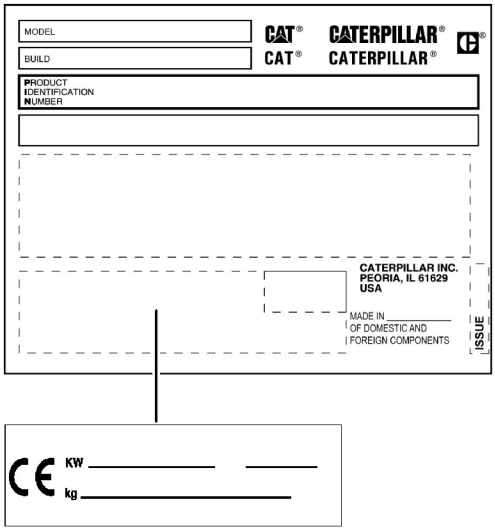


Illustration 122 g06201198

This plate is positioned on the bottom left side of the plate for the PIN.

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

For machines compliant to 98/37/EC and 89/392/EEC, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

- Engine Power Primary Engine (kW)
- Typical Machine Operating Weight for European Market (kg)
- Year

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

Eurasian Economic Union

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

Note: One of the below plates may be installed on the machine.



Illustration 123 g06094564

If equipped, the Month and Year of Manufacture are on the PIN plate.

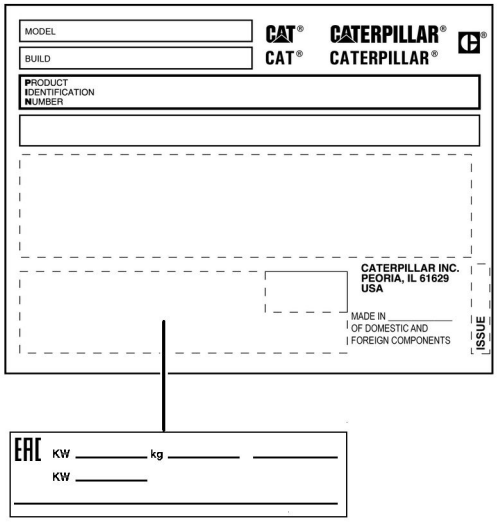


Illustration 124 g06532250

If equipped, the following information is stamped onto the EAC plate. For quick reference, record this information in the spaces provided below.

- Primary Engine Power (kW)_____
- Additional Engine Power (kW) _____
- Typical Machine Operating Weight for Eurasian Economic Union (kg)_____
- Month and Year of Manufacture_____
- Machine Type _____

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 on the cab door.



Illustration 125 g06178867
Typical example

Electromagnetic Emissions

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

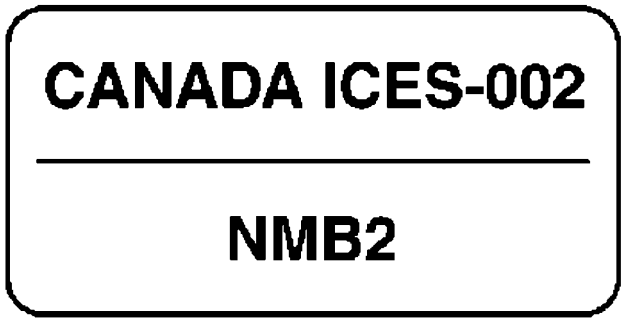


Illustration 126 g06063443

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

Engine Serial Number

This label is on the engine.

Engine Serial Number _____

Sound Certification Film

If equipped, this label is on the cab door.

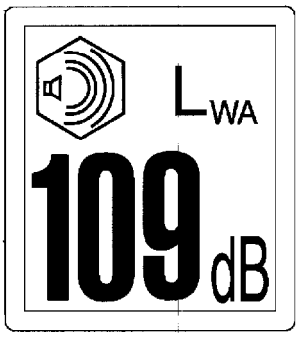


Illustration 127 g00933634

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

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

i05757951

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Note: This information is pertinent in Japan.



Illustration 128 g03654940

2014 certification label example

A certification label is located on the cab door.

The certification label verifies that the machine conforms to the 2014 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

Table 35

An 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 EU Declaration of Conformity provided with the machine. The extract shown below from an 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 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 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Hydraulic Excavator
	Model/Type:	374
	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	
2014/30/EU	N/A	

Note (1) Guaranteed Sound Power Level -_____dB (A) Annex VI
Representative Equipment Type Sound Power Level - _____dB (A)
[Engine Power per ISO 14396 -____ 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 **January 2019**, 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

i07103304

Mounting and Dismounting

SMCS Code: 6700; 7000



Illustration 129 g06224270
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”.

i07254776

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 50 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”

Daily Basis

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

- Operation and Maintenance Manual, “Cooling System Coolant Level - Check”
- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Fuel System Water Separator - Drain”
- Operation and Maintenance Manual, “Fuel Tank Water and Sediment - Drain”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Indicators and Gauges - Test”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Track Adjustment - Inspect”
- Operation and Maintenance Manual, “Travel Alarm - Test”
- Operation and Maintenance Manual, “Undercarriage - Check”

Refer to 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.

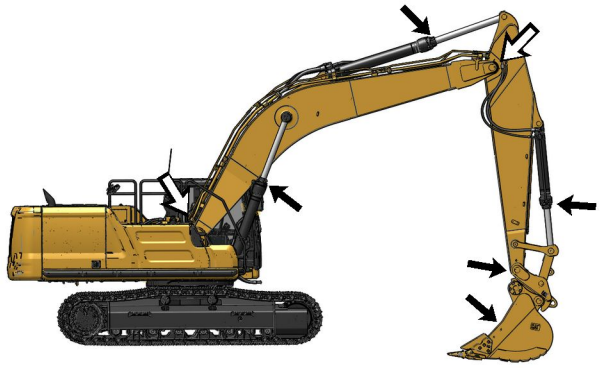


Illustration 130 g06267412

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

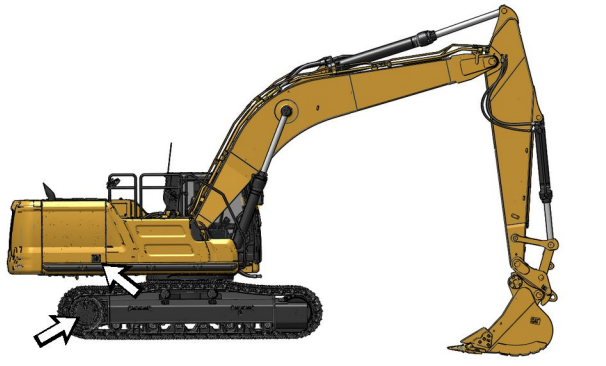


Illustration 131 g06267426

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.

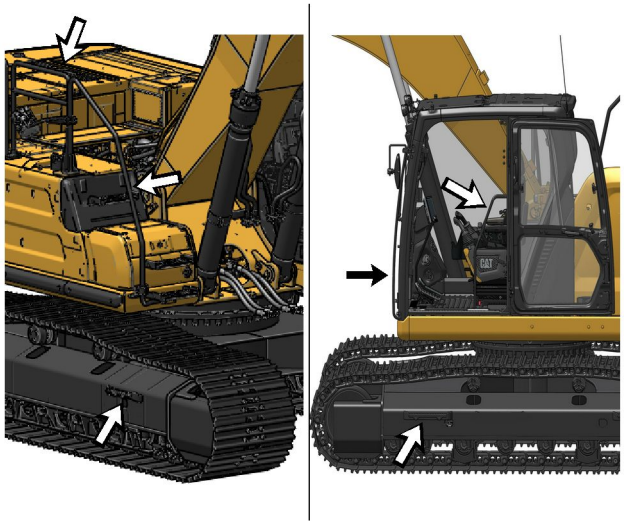


Illustration 132 g06267482

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 to achieve the best visibility.

Machine Operation

i06952448

Alternate Exit

SMCS Code: 7310

Rear Window with Ring Seal (If Equipped)

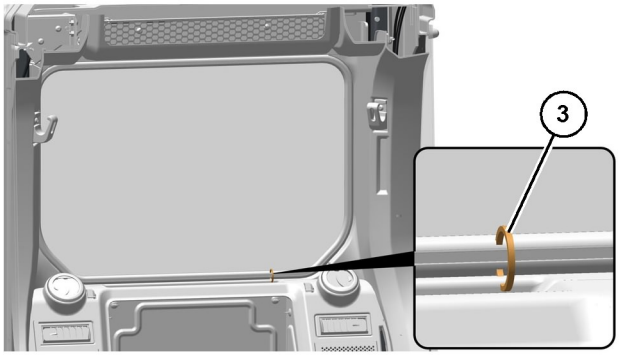


Illustration 133 g06187008

Alternate Exit – The rear window serves as an alternate exit.

To remove the rear window, pull ring (3) and completely remove the window seal, then push out the glass. Climb through the rear window opening to exit the cab.

Rear Window with Lever (If Equipped)

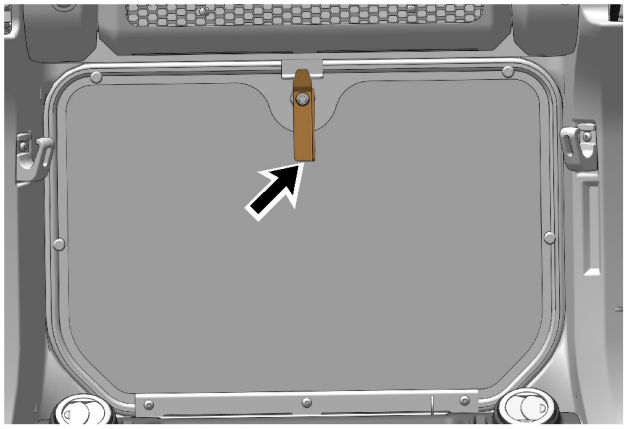


Illustration 134 g06213470

Inside lever in latched position

Alternate Exit – The rear window serves as an alternate exit.

To remove the rear window, rotate handle from its latched position, then push out the glass. Climb through the rear window opening to exit the cab.



Illustration 135 g06213471

The window is also equipped with an outside handle. If the operator is unable, outside personnel can rotate the outside handle and pull the window out.

i07383859

Seat

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

Comfort Level Seat (If Equipped)



Illustration 136 g06225151

(1) Headrest
(2) Backrest adjuster
(3) Seat and console fore and aft adjuster
(4) Indicator
(5) Seat height adjustment lever
(6) Seat fore and aft lever

The operator can adjust the height of headrest (1). 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.

Pull up on backrest adjuster (2) to release the lock. Move the backrest to the desired position and then release the adjuster.

Lift up on fore and aft adjuster (3) to release the seat from the locked position. Adjust the seat and console forward or rearward to the desired position and then release the lever to lock the seat.

Use seat height adjustment lever (5) to adjust the seat for the operator's height and weight. Move the adjuster switch to the “+” symbol to raise the height. Ratchet the seat upward without sitting in the seat. Then sit in the seat to check the color of indicator (4). When the indicator is showing green, the seat is in the right range for the operator. Further adjustment can be made as long as the indicator stays green.

To lower the seat, move the adjust switch to the “-” symbol. Ratchet the adjuster downward without sitting in the seat. Then sit in the seat to check the color of indicator (4). When the indicator is showing green, the seat is in the right range for the operator. Further adjustment can be made as long as the indicator stays green.

Pull upward on seat fore and aft lever (6) to release the cushion lock. Adjust the seat cushion forward or backward to the desired position and then release the lock to lock the cushion in place.

Deluxe Level Seat (If Equipped)

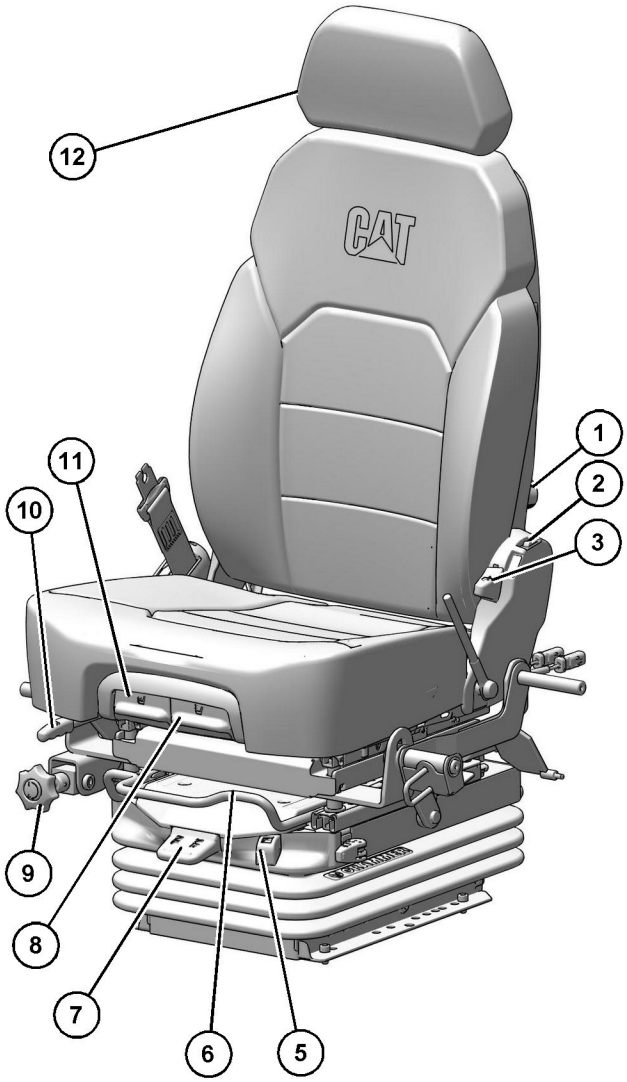


Illustration 137 g06303504

(1) Adjustment lever for the lumbar support
(2) Seat heater switch
(3) Adjustment lever for reclining the seat
(5) Indicator
(6) Seat and console fore and aft lever
(7) Seat height adjustment
(8) Seat cushion angle adjuster
(9) Console height adjustment
(10) Seat fore and aft adjuster
(11) Seat cushion fore and aft adjuster
(12) 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.

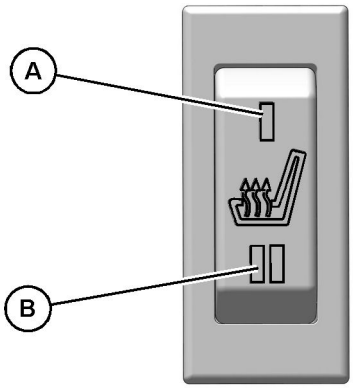


Illustration 138 g06251600

(A) Low heat
(B) High heat

Seat heater switch (2) is a three position switch. The middle position of the switch is off. Press the top position of the switch for low heat. Press the bottom of the switch for high heat.

⚠ 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.

Pull up lever (3) to change the angle of the backrest. With the backrest in the desired position. Release the lever.

Push in adjuster (11) to adjust the fore/aft position of the seat cushion.

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

Operate seat height adjustment (7) to adjust the seat and the console to the desired height. Pull up the lever to raise the height of the seat. Push down on the lever to lower the seat. Indicator (5) will turn green when the seat is at the optimum height for the operator's height and weight. If the indicator is yellow, further adjustment is required.

Note: Do not operate the seat compressor for over a minute or damage can result.

Use handle (9) 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.

To adjust the seat forward or backward, pull up lever (10) and hold the lever. Move the seat to the desired position. To lock the seat in the selected position, release the lever.

Push the adjuster (8) to adjust the tilt angle of the seat cushion.

The operator can adjust the height of headrest (12). 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.

Premium Level Seat (If Equipped)

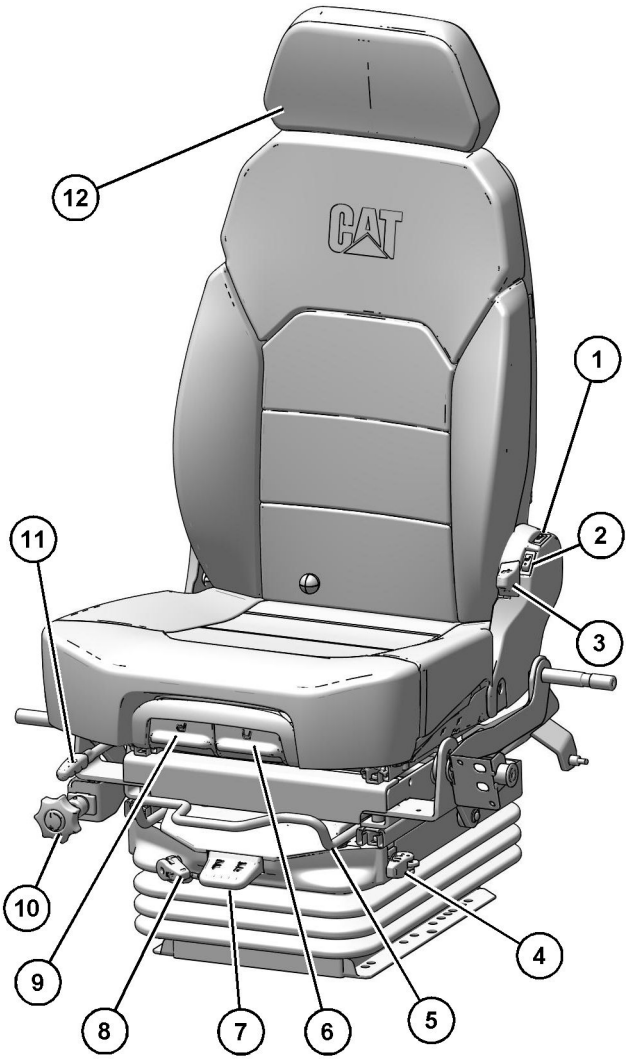


Illustration 139 g06251562

(1) Seat heater switch
(2) Cooling switch
(3) Adjustment lever for reclining the seat
(4) Fore/Aft isolator activate/deactivate lever
(5) Seat and console fore and aft lever
(6) Seat cushion angle adjuster
(7) Seat height adjustment
(8) Adjustable damper
(9) Seat cushion fore and aft adjuster
(10) Console height adjustment
(11) Seat fore and aft adjuster
(12) Headrest

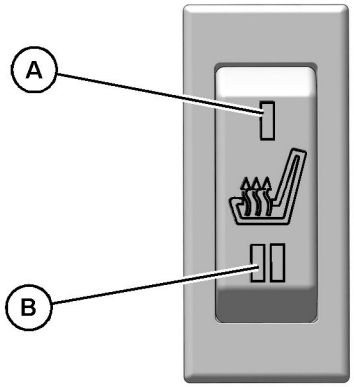


Illustration 140 g06251600

(A) Low heat
(B) High heat

Seat heater switch (1) is a three position switch. The middle position of the switch is off. Press the top position of the switch for low heat. Press the bottom of the switch for high heat.

⚠ 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.

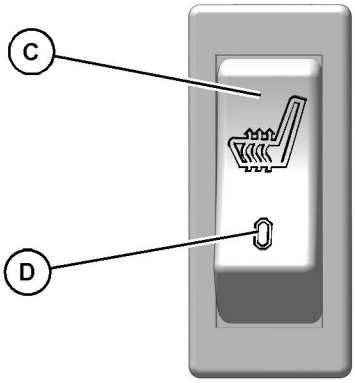


Illustration 141 g06251623

(C) Cooling on
(D) Cooling off

To cool the seat, press the top of cooling switch (2). Press the bottom of the switch to turn the cooling off.

Pull up lever (3) to change the angle of the backrest. With the backrest in the desired position. Release the lever.

Push in adjuster (9) to adjust the fore/aft position of the seat cushion.

Pull lever (5) to adjust the seat and the console forward and backward.

Fore/Aft isolator activate/deactivate lever (4) allows the operator to lock the seat and console or allow the seat and console to float with the movement of the machine. With the adjuster pointing to the front of the machine, the console is locked. Rotate the lever to the rear to unlock the console and allow it to float.

Operate seat height adjustment (7) to adjust the seat and the console to the desired height. Pull up the lever to raise the height of the seat. Push down on the lever to lower the seat.

Use adjustable damper (8) to stiffen or loosen the seat suspension.

Note: Do not operate the seat compressor for over a minute or damage can result.

Use handle (10) 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.

To adjust the seat forward or backward, pull up lever (11) and hold the lever. Move the seat to the desired position. To lock the seat in the selected position, release the lever.

Push adjuster (6) to adjust the tilt angle of the seat cushion.

The operator can adjust the height of headrest (12). 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.

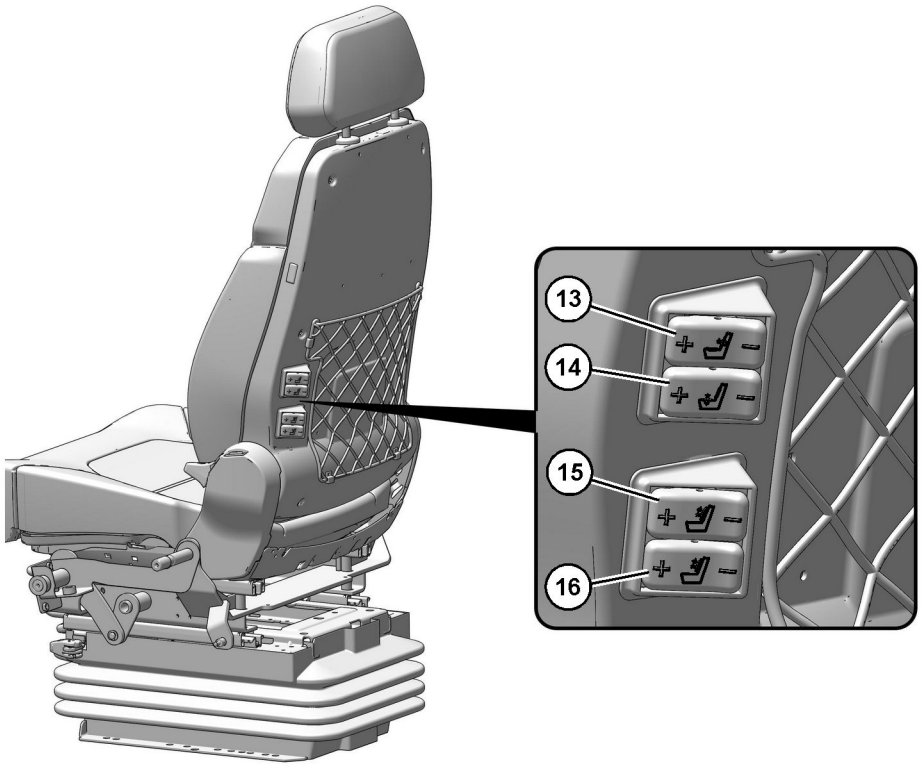


Illustration 142 g06251575

(13) Seat back side bolster control
(14) Seat cushion side bolster control
(15) Upper lumbar control
(16) Lower lumbar control

The lumbar controls on the back of the seat back all use two position switches. Press the + symbol to increase lumbar support. Press the - symbol to decrease lumbar support.

i07092308

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 Retractable Seat Belts

Fastening The Seat Belt

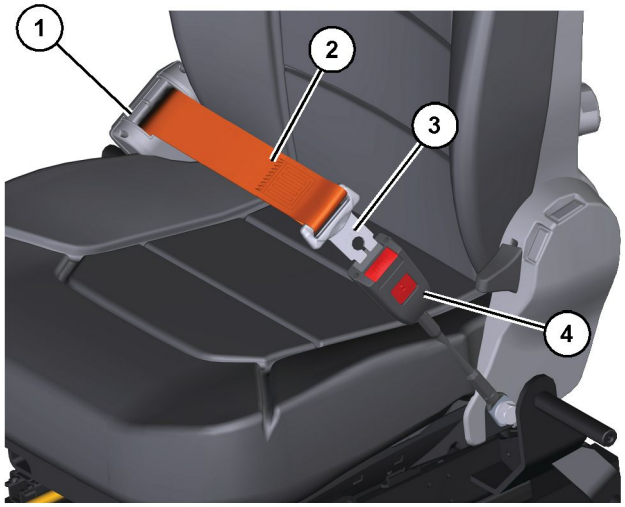


Illustration 143 g06223891

Pull seat belt (2) out of retractor (1) in a continuous motion.

Fasten seat belt catch (3) into buckle (4). 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 144 g06223894

Push the release button on the buckle 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.

i07561838

Diesel Particulate Filter Regeneration

SMCS Code: 108F

Regeneration

Regeneration is the process of increasing exhaust temperatures to remove soot from the DPF. Regeneration also reduces hydrocarbons across the DOC & DPF, reduce sulfur from SCR, and remove DEF deposits from the DEF injector.

The DPF traps both soot and ash. The ash is removed through a manual cleaning process. Refer to Operation and Maintenance Manual, "Diesel Particulate Filter - Clean" for more information on the service of the DPF.

Regeneration Indicators



Regeneration Active – When illuminated, this indicator shows that the system 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 to show that a regeneration is required. This indicator will illuminate when “Time to Regen” is less than a pre-determined amount of time.



Regeneration Disabled – This indicator will illuminate to show that a regeneration has been disabled.

Regeneration Switch



Force Regeneration – Press in the top switch for 2 seconds to begin regeneration.



Disable Regeneration – Press in the bottom switch for 2 seconds to disable regeneration.

Note: If equipped with a rocker style switch, the MIDDLE position of the regeneration switch is the default position for automatic regeneration.

Note: If the engine start switch key is cycled or the “Force Regeneration” switch is pressed for longer than 2 seconds the system will no longer be disabled. When the “Force Regeneration” switch is pressed and “Time to Regen” is less than 8 hours, 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 via the “Disable Regeneration” switch, press and hold the “Disable Regeneration” switch for 2 seconds to reinitiate.

Modes of Regeneration

Automatic: The Electronic Control Module (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, it is permissible to press the “Disable Regeneration” switch.

Note: Automatic adjustments of engine speed may be noticed during regenerations. If a regeneration is taking place and the engine is taken to low idle, the engine speed may remain elevated to maintain the regeneration.

Note: If the machine returns to work while an automatic regeneration is active, the regeneration may be stopped. The 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 will only be allowed if the “Time to Regen” is less than 8 hours. If the “Force Regeneration” switch is pressed before “Time to Regen” is less than 8 hours, then “Regen not Required” will be displayed. The machine must be stationary, the parking brake must be applied, and the engine must be at low idle to perform a manual regeneration.

Disabled: When the regeneration system is in disabled mode, automatic regenerations will not be performed. The DPF indicator will illuminate if a manual regeneration is required. The “Time to Regen” displayed on the performance screen will indicate the time until the next regeneration will be required. However, the DPF indicator may illuminate with time remaining on the display. When the DPF indicator illuminates, the operator must perform a manual regeneration.

Regeneration Triggers

A regeneration may be required for the following reasons:

Soot: The DPF will collect soot produced by the engine. An automatic regeneration will become active to reduce soot level.

Start-Up Regeneration: A start-up regeneration is initiated by the ECM after a cold engine start. This regeneration is performed to heat the system to a required temperature for Diesel Exhaust Fluid (DEF) dosing to begin.

SCR Maintenance: A regeneration is performed to maintain the SCR system.

ARD Maintenance: A regeneration is performed to maintain the ARD system.

Regeneration System Warning Indicators



Illustration 145 g02117258

The DPF Indicator will illuminate when a regeneration is required. A regeneration should be performed as soon as possible.

Note: In some situations, the DPF indicator may stay illuminated after a regeneration ends. The illuminated DPF indicator indicates that a complete regeneration has **not** been performed. A complete regeneration is when the soot has been depleted or all the criteria for one of the other regeneration types have been met. If the DPF indicator stays illuminated, perform a regeneration without interruption. The DPF indicator will shut off when a regeneration is complete.

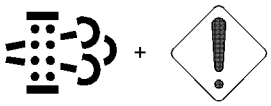


Illustration 146 g02117259

If the soot load is above a threshold or “Time to Regen” is 0 hours, then a regeneration is required. The DPF indicator and an action indicator will be illuminated. Engine power will be slightly derated. If the machine continues to operate without a regeneration, derate will eventually reach 100%. Stop the machine and apply the parking brake. With the engine at low idle, initiate a manual regeneration.



Illustration 147 g03676115

Once the amount of soot collected in the DPF has reached a threshold or “Time to Regen” has been at 0 hours for a pre-determined time, the DPF indicator and an action indicator will be illuminated and an audible alarm will sound.

10 minutes after the illumination of the DPF indicator, action indicator, and audible alarm, the engine will shut down. The engine can be restarted by cycling the engine start switch key. The engine will return to the previous derate state before shutdown.

Once the amount of soot collected reaches a threshold level or 6.4 hours of run time has passed since the action indictor was illuminated without a successful regeneration, the engine will have a 100% derate.

Once the amount of soot collected reaches a critical threshold level, the regeneration will be locked out. At this time, a regeneration can only be done through Cat Electronic Technician (ET), by an authorized Cat dealer. The engine may be restarted, but will only run for 30 seconds before shutting down again.

A fault code will be active for any DPF system-related issue. Follow the troubleshooting guide to rectify the issue.

If the DPF loses function, or is tampered with in any way, the check engine lamp, and an amber action lamp (if equipped) will illuminate. A fault code will also annunciate. The lamps and fault code will remain active until the problem is rectified.

NOTICE
The engine and emissions control system shall be operated, used, and maintained in accordance with the instructions provided. Failure to follow the instructions could result in emissions performance that does not meet the requirements applicable to the category of the engine. No deliberated tampering with, or misuse of the engine emissions control system should take place. Prompt action is critical to rectify any incorrect operation, use, or maintenance of the emissions control system.

Carbon Dioxide (CO_2) Emissions Statement

Emissions regulations require that the value of the CO_2 emissions be reported to the end user. For the engines listed below, the g/kWh was determined to be the CO_2 value during the EU type approval process. This value was recorded in EU type approval certificate. This CO_2 measurement results from testing over a fixed test cycle, under laboratory conditions, with a parent engine representative of the engine family. This value shall not imply or express any guarantee of the performance of a particular engine.

Table 36

Engine	CO_2 Value
C9.3B	696 g/kWh
C9.3	730 g/kWh
C13	717 g/kWh
C15 & C18	760 g/kWh
C18 > 560 kW	703 g/kWh

i06301373

Selective Catalytic Reduction Warning System

SMCS Code: 1091-WXX; 7400

The selective catalytic reduction (SCR) system is a system used to reduce NOx emissions from the engine. Diesel exhaust fluid (DEF) is pumped from the DEF tank and is sprayed into the exhaust stream. The DEF reacts with the SCR catalyst to reduce NOx and leaves a nitrogen and water vapor. The Exhaust Gas Recirculation (EGR) system cools, measures, and introduces recalculated exhaust gas into the intake manifold to aid in NOx reduction.

NOTICE
Stopping the engine immediately after the engine has been working under load can result in overheating of SCR components.

Refer to the Operation and Maintenance Manual, “Engine Stopping” procedure to allow the engine to cool and to prevent excessive temperatures in the turbocharger housing and the DEF injector.

Note: With the operator key in the OFF position, the purge system will activate.

Definitions

Observe the following definitions.

Self-correct – Fault condition no longer exists. An active fault code will no longer be active.

Notification – Action taken by the system to alert the operator of pending Inducement.

Inducement – Engine derates, vehicle speed limits, or other actions intended to prompt the operator to repair or maintain the emission control system.

Inducement Trigger – Fault conditions that result in activation of the inducement strategy. DEF level inducement faults have a diagnostic fault code. DEF quality fault, SCR tampering fault, SCR system fault, and EGR system faults will all have a related diagnostic fault code along with an inducement diagnostic fault code.

First occurrence – A DEF quality fault, SCR tampering fault, SCR system fault, or an EGR system fault becomes active for the first time.

Repeat occurrence – If any DEF quality fault, SCR tampering fault, SCR system fault, or an EGR system fault becomes active again within 40 hours of the first occurrence.

Safe Harbor Mode – Safe harbor mode is a 20 minute engine run time period. The engine can be operated with full power after reaching a level 3 inducement. Once in level 3 inducement, the operator can perform a key cycle and the engine will enter safe harbor mode. Safe harbor mode can only be implemented once. Safe harbor mode is not allowed for DEF level inducements.

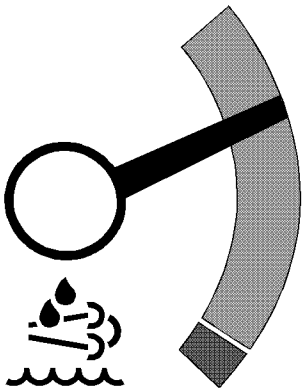


Illustration 148 g03684888

DEF Level Normal

Inducement Strategy for DEF Level

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

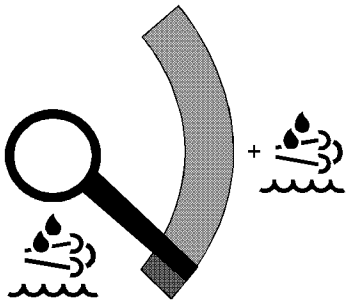


Illustration 149 g03681105

DEF Level Low

If the DEF level falls below 20%, “DEF Level Low” message will be displayed on the monitor. To avoid further inducements, turn the key to the OFF position and add DEF to the DEF tank.

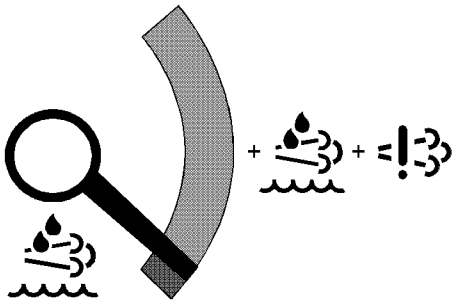


Illustration 150 g03681073

DEF Level Low and Emission Fault

If the DEF level falls below 13.5%, a level 1 inducement event will occur. a “DEF Level Low” message and an “Emission Fault” message will appear on the monitor.

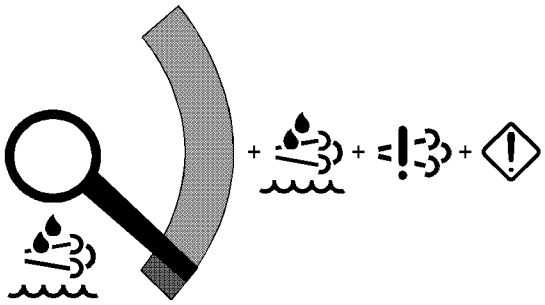


Illustration 151 g03681077

DEF Level Low, Emission Fault, and Flashing Action Lamp

If the DEF level is below 7.5%, a level 2 inducement event will occur. a “DEF Level Low” message and an “Emission Fault” message will appear on the monitor. The action lamp on the monitor will flash. If the ECM is configured to “Reduced Performance” and the DEF level has reached 1%, the machine will be limited to 75% torque.

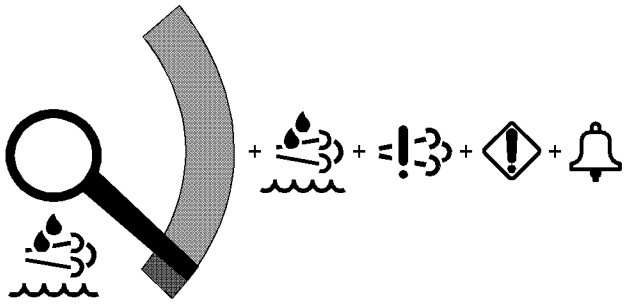


Illustration 152 g03681078

DEF Level Low, Emission Fault, Flashing Action Lamp, and Audible Alarm

If the ECM is configured to “Reduced Performance” and the DEF tank has been emptied of all DEF, the engine will be in a level 3 final inducement. If the ECM is configured to “Reduced Time” and the DEF level is 3%, the engine will be in a level 3 final inducement. Prior to final inducement a “DEF Level Low” message, and an “Emission Fault” message will appear on the monitor. The action lamp on the monitor will flash and an audible alarm will sound 20 seconds prior to the final inducement. The engine will be taken to low idle or will be shut down. Once shut down, the engine can be restarted for 5 minute periods at reduced speed and torque. If set to idle, the engine will idle indefinitely at reduced torque. The amber indicator next to the DEF level gauge on the dash will remain lit.

Note: Turn the key to the OFF position and add DEF to the DEF tank to reset the DEF level inducement.

Inducement Strategy for DEF Quality, Tampering, SCR System Fault, and Impeded EGR

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

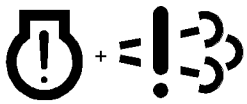


Illustration 153 g03623190

A “Engine Fault Check Engine” message and an “Emission Fault” message will appear on the monitor for a fault resulting from poor DEF quality, SCR system tampering, SCR system fault, or an EGR system fault. If the fault is the result of poor DEF quality, SCR system tampering, or SCR system fault, a first occurrence will result in a level 1 inducement for a duration of 2.5 hours. The level 1 inducement will also illuminate the check engine lamp. Repeat occurrences will result in a level 1 inducement duration of 5 minutes. If the fault is the result of an EGR system fault, a first occurrence will result in a level 1 inducement for a duration of 35 hours. Repeat occurrences will result in a level 1 inducement duration of 48 minutes.



Illustration 154 g03623191

If a fault condition exists for the entire duration of inducement level 1, the strategy advances to inducement level 2. A “Engine Fault Check Engine” message, and an “Emission Fault” message will appear on the monitor and the action lamp on the monitor will flash for a fault resulting from poor DEF quality, SCR system tampering, SCR system fault, or an EGR system fault. For poor DEF quality, SCR system tampering, and SCR system faults, the duration for a level 2 inducement is 70 minutes for the first occurrence. For EGR system faults, the duration for a level 2 inducement is 60 minutes for the first occurrence. Repeat occurrences for poor DEF quality, SCR system tampering, and SCR system faults will result in a level 2 inducement of 5 minutes. Repeat occurrences for EGR system faults will result in a level 2 inducement of 60 minutes.

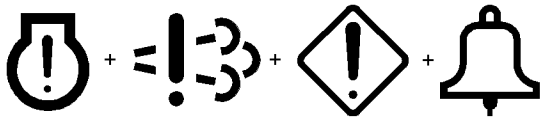


Illustration 155 g03623193

If a fault condition exists for the entire duration of inducement level 2, the strategy advances to inducement level 3. A “Engine Fault Check Engine” message, and an “Emission Fault” message will appear on the monitor, the action lamp will flash, and an audible alarm will sound 20 seconds prior to the level 3 inducement. The engine will be taken to low idle or will be shut down. After the level 3 inducement you may cycle the key, which will allow 20 minutes of engine run time with full torque. After 20 minutes, the engine will be in level 3 final inducement and will allow idle only or be shut down until the issue has been resolved. Once shut down, the engine can be restarted for 5 minute periods at reduced speed and torque. If set to idle, the engine will idle indefinitely at reduced torque.

Note: Contact your Cat dealer for repairs if a fault occurs.

Inducement Emergency Override for Cat Engines Equipped with Selective Catalytic Reduction Systems (If Equipped)

Note: The inducement emergency override will only be allowed on a select number of machines that may be used in emergency situations. Contact your Cat dealer to find out if your machine is allowed to have this feature.

Inducement emergency override can only be enabled using Caterpillar supplied passwords. The feature is disabled by default. The feature will be enabled at the factory if allowed. If the customer wants the feature enabled after delivery of engine, they will need to contact their Cat dealer. Inducement emergency override is regulated by the Environmental Protection Agency (EPA) and only allowed in the United States. The European Union and Japan do not allow the feature to be used. For detailed information on activating, deactivating, or resetting override, contact your Cat dealer. Before you attempt the procedures documented in this manual, make sure that you have read and understand the information in this document.

The United States EPA requires the limiting of engine speed and/or power (derate) in certain conditions, to help ensure proper functioning of the engines emission control system. The EPA allows the temporary disabling of these limits (restoration of full engine speed and power capability) during a qualified emergency situation. The EPA defines a qualified emergency situation as a significant direct or indirect risk to human life. Below are examples of direct versus indirect risks.

Direct – An emission control condition that inhibits performance of an engine being used to rescue a person from life-threatening situation.

Indirect – An emission control condition that inhibits performance of an engine being used to provide electrical power to a data center that routes 911 emergency response communications.

The emissions-related derate can be disabled for up to 120 hours of engine operation. The temporary disabling of emissions-related derate is referred to as “Inducement Emergency Override” and must be reported to the United States EPA. The override can only be enabled or disabled by an authorized Cat dealer using Caterpillar supplied passwords. Once enabled, the override can be activated thru the electronic display menu in the cab (if equipped). Upon activation, the check engine and action lamps will be illuminated until and the override is reset. A code indicating that the inducement emergency override is active will also be active until the override is reset. The override can only be reset by the engine manufacturer, Caterpillar. A Cat dealer can reset the override using Caterpillar supplied passwords. Improper use of the override, failure to deactivate the override when the emergency has ended, and failure to report use of the override is prohibited under federal regulations and subject to penalties imposed by the United States EPA. The civil penalty per day operated in violation can be severe.

NOTICE

When the inducement emergency override is active, damage to aftertreatment and engine components can occur. Never use the override longer than necessary and always fix the root cause of the inducement as soon as possible. There will always be a diagnostic code indicating root cause of the inducement. Refer to the troubleshooting guide for how to fix inducement related failures.

Override Activation Method

There are two options for setting the override, using Cat Electronic Technician (ET) or thru the electronic display menu in the cab (if equipped). If the override has already been enabled by an authorized Cat dealer, then the operator can turn on the override without further input from Caterpillar. Upon activation, the check engine and action lamps will illuminate to alert the operator that the override is active. The override must be paused by the operator if the emergency ends before the 120 hours of override operation has expired. While paused, the equipment will be subject to derates. Once paused, the override can be activated again if the 120 hour time period has not expired and if an emergency situation still exists. Per federal regulations, the operator must fill out the Override Usage Report below and provide the report to Caterpillar within 60 days of activating the override.

Setting the Override through Cat Electronic Technician (ET)

- Go to “Configuration Parameters”
- Select “Aftertreatment Configuration”
- Select “Operator Inducement Emergency Override Activation” to activate the override
- The “Value” field should be switched to “Activated” (to pause the override change the “Value” field to “Not Activated”)

Setting the Override through Electronic Display Menu

Machine applications will be able to activate or deactivate the override thru the electronic display menu in the cab. The override will only be available when engine is already in inducement (derated). Operators must be trained properly to understand where override is located and that there could be severe penalties as mentioned above for misusing the override. There will be a warning on display stating: “EMERGENCY USE ONLY. SEE OWNERS MANUAL. PENALTIES APPLY FOR MISUSE” .

Resetting the Override

The override needs to be reset through Cat Electronic Technician (ET) whenever the override has expired. The override cannot be used again until the override is reset. The override should also be reset whenever the emergency has ended, regardless if the override has expired or not (i.e. accumulated 120 hours). The check engine and action lamps will continue to be illuminated until the override is reset. The code indicating that the inducement emergency override is active will also continue to be active until the override is reset. The override may be reset at any point after the initial activation. The override can only be reset by the engine manufacturer, Caterpillar, or an authorized Cat dealer using Caterpillar supplied passwords.

Override Usage Report

To comply with federal regulations, the operator must report usage of the override to Caterpillar Inc. within 60 days of activating the override. Failure to meet this reporting requirement may subject the operator to penalties under 40 CFR 1068.101. Caterpillar Inc. will in turn report override usage annually to the United States EPA. Although submitted to Caterpillar Inc., the override usage reports are deemed to be submissions to the United States EPA. Federal regulations prohibit submitting false information. The following information must be included in the report:

- Contact name, mail and e-mail addresses, and telephone number for the responsible company or entity
- A description of the emergency situation, the location of the engine during the emergency, and the contact information for an official who can verify the emergency situation (such as a county sheriff, fire marshal, or hospital administrator)
- The reason for the activation of the override during the emergency situation, such as the lack of DEF, or the failure of an emission-related sensor when the engine was needed to respond to an emergency situation
- The engine serial number (or equivalent)
- A description of the extent and duration of the engine operation while the override was active, including a statement describing whether the override was manually deactivated (paused) after the emergency situation ended

The Override Usage Report may be sent via e-mail or regular mail to one of the following addresses:

Email :

Emissions_Compliance@cat.com

Regular Mail :

Caterpillar Inc.
P.O. Box 600
Mossville, IL 61552-0600
Attention: Emissions Compliance Manager

i07952218

Operator Controls

SMCS Code: 7300; 7301; 7451

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

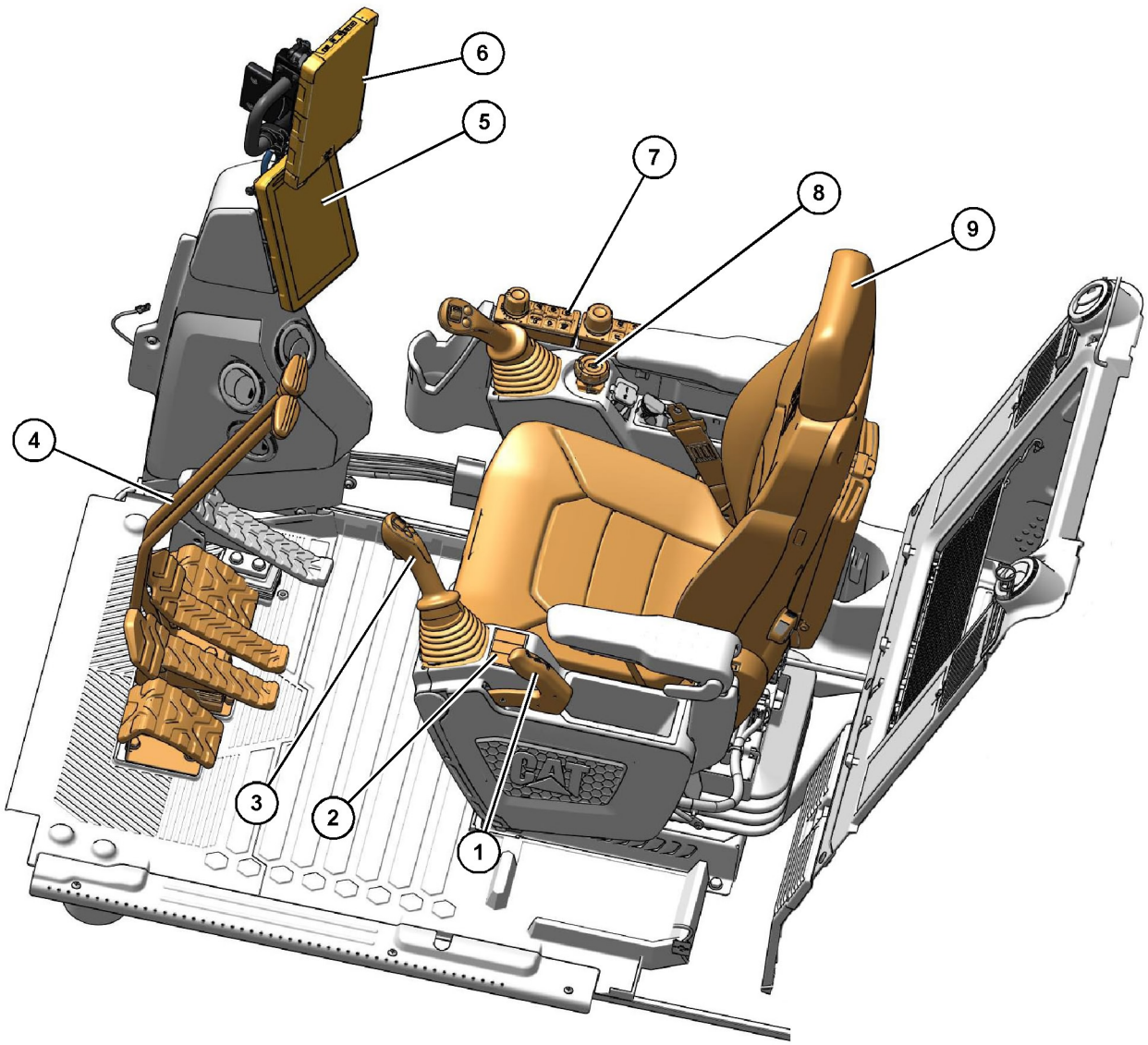


Illustration 156 g06178344

(1) Hydraulic lockout control
(2) Left side switch panel
(3) Joystick controls
(4) Travel controls
(5) Monitor
(6) Cat Grade Monitor
(7) Right side switch panel
(8) Engine start switch
(9) Operator seat

Hydraulic Lockout Control (1)

The lever for the hydraulic lockout control is 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 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 the factory installed hydraulic controls will become operable.

Tilt – For machines equipped with the tilt-up console, pull the lever to the rearmost position to release the console lock and tilt the console upward for easier exit and entry.

Left Side Switch Panel (2)

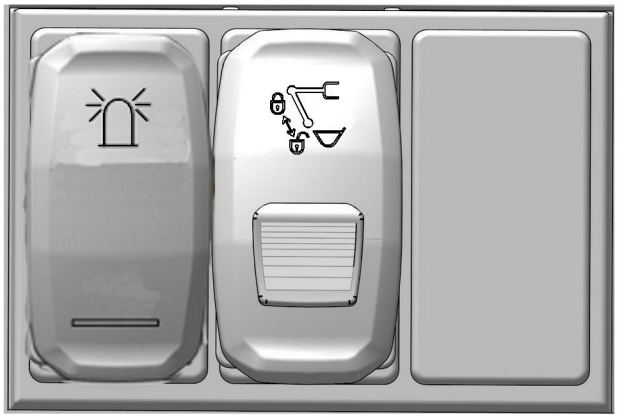


Illustration 157 g06219690

Beacon Light Switch (2A) (If equipped)

Beacon Light Switch – Push the top of the switch to turn on the beacon light. Push the bottom of the switch to turn off the beacon light.

Quick Coupler Control (2B) (If equipped)

If equipped, the switch for the quick coupler control is on the left console. The switch is equipped with a spring loaded lock button. To operate the switch, the lock button must be pushed forward to release the switch. With the lock held forward, press the rear of the switch downward to uncouple the bucket or work tool. Press the button again to attach the bucket or work tool.

Note: An alarm will sound whenever the switch has been activated to lock or unlock a work tool.

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

Joystick Controls (3)

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

Travel Control (4)



Illustration 158 g06178249

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 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 to travel straight.

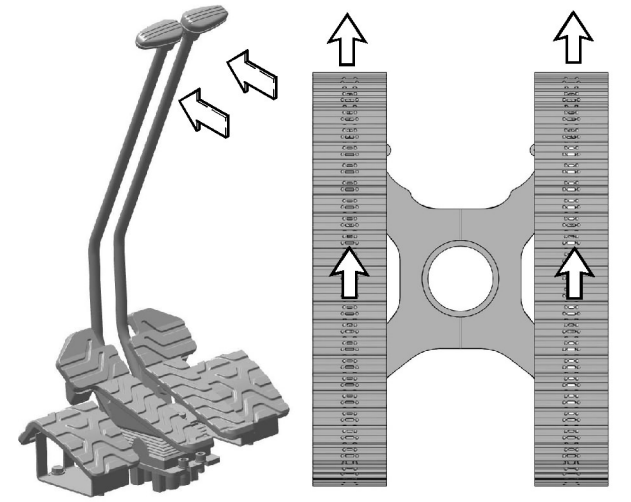


Illustration 159 g06178269

FORWARD travel

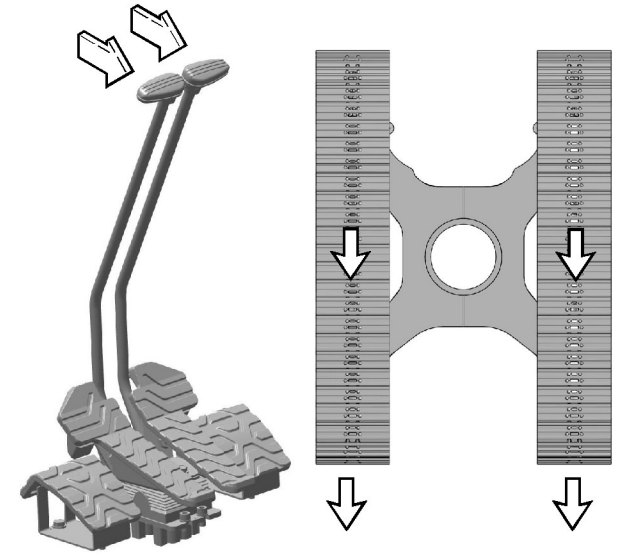


Illustration 160 g06178283

REVERSE travel

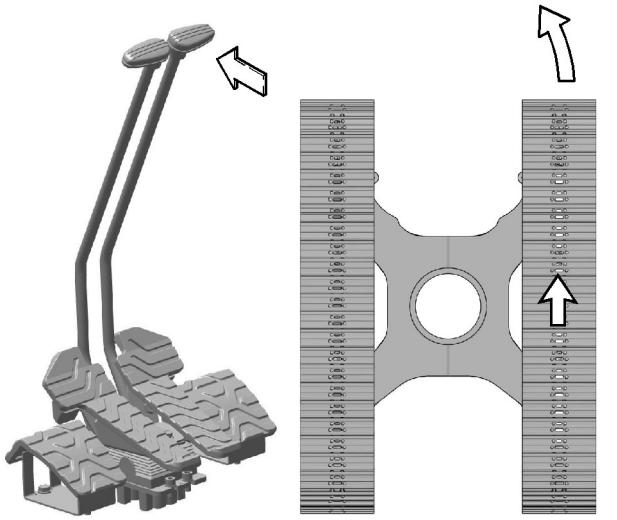


Illustration 161 g06178288
Pivot left turn (FORWARD)

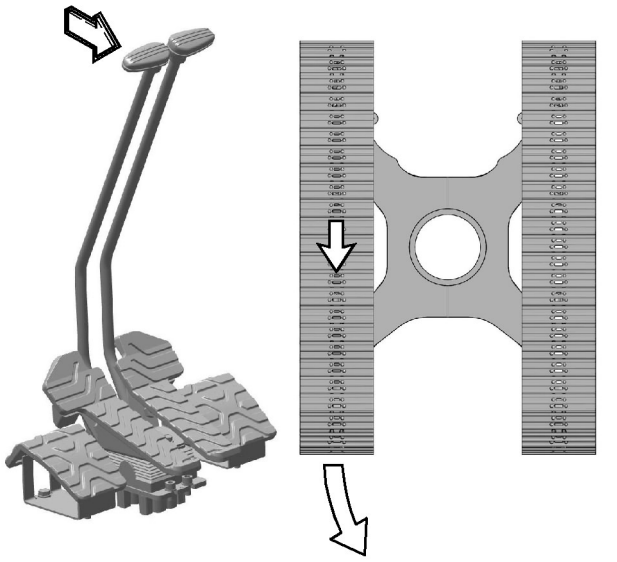


Illustration 162 g06178294
Pivot Left Turn (REVERSE)

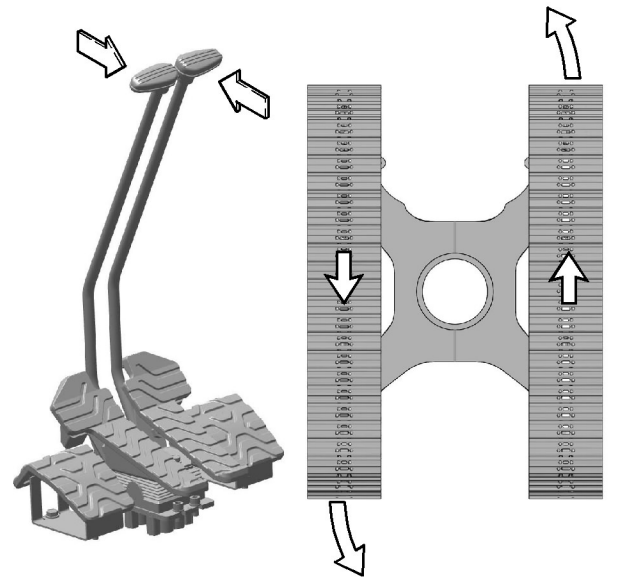


Illustration 163 g06178300
Counterrotate turn (LEFT)

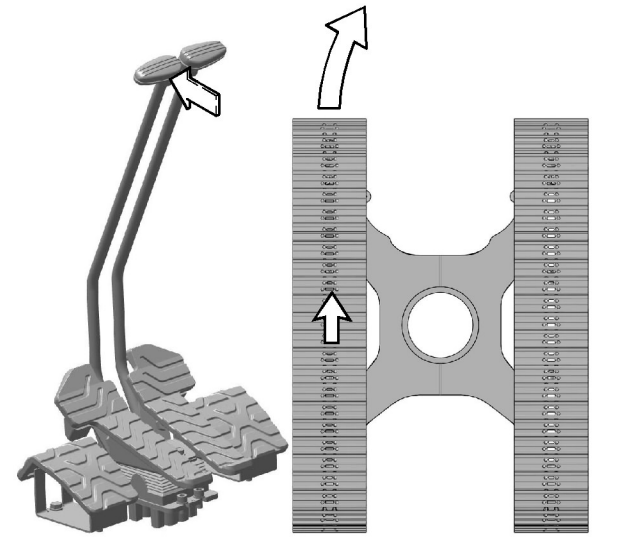


Illustration 164 g06178305
Pivot right turn (FORWARD)

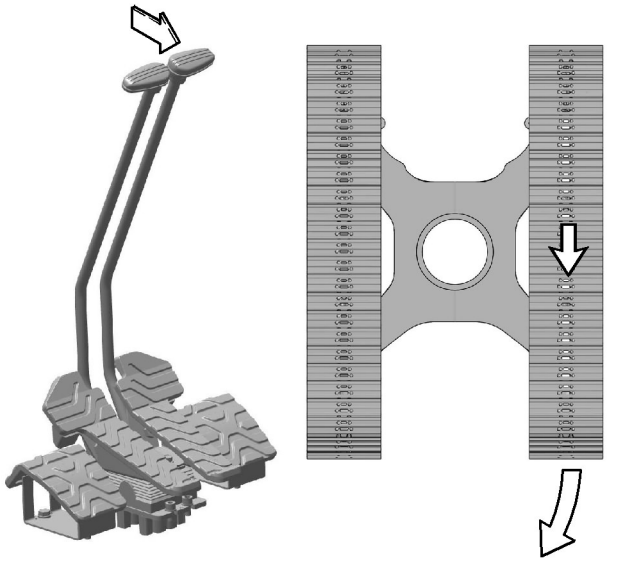


Illustration 165 g06178308
Pivot right turn (REVERSE)

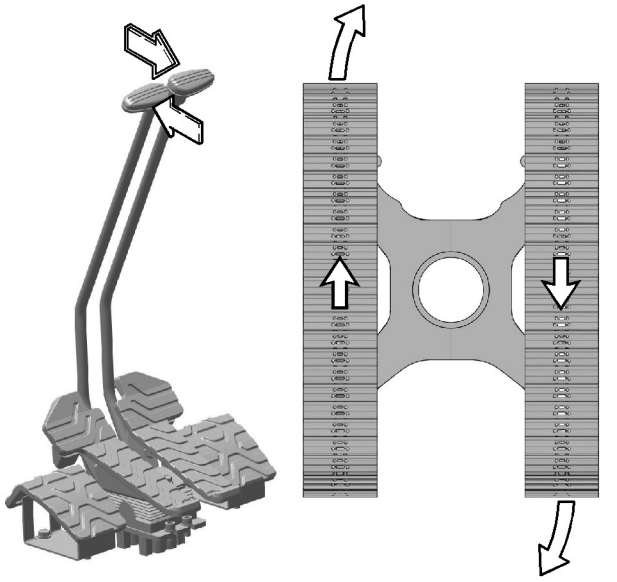


Illustration 166 g06178313
Counterrotate turn (RIGHT)

Monitor (5)

The monitor is used 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”.

Cat Grade Monitor (6) (if equipped)

Monitor (6) is used to display Cat Grade operating information. Cat Grade 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 more information on the operation of the monitor, refer to Operation and Maintenance Manual, M0082987, “Cat 2D and 3D GRADE System for Next Gen Hydraulic Excavators”.

Engine Start Switch (Machines equipped with Delayed Engine Shutdown 8)

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.

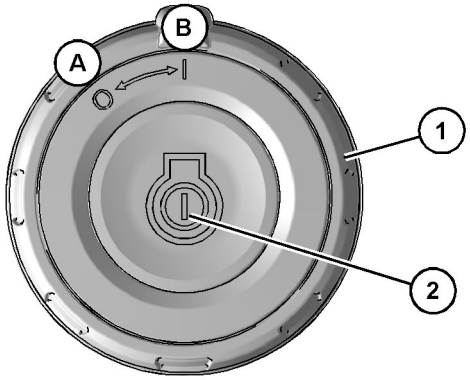


Illustration 167 g06180554

(A) Off
(B) On
(1) Engine start ring
(2) Start button

The Delayed Engine Shutdown is a feature that automatically determines when idle state cool down is needed to prevent engine and aftertreatment component damage.

When the engine start switch key is turned to the OFF position, the engine may continue to run for an additional few minutes. This is normal. When the delayed engine shutdown feature is complete, the product will automatically shut itself off.

Engine Stop (Shutdown) – Push Start Button for 2 seconds to disable the delayed engine shutdown (DES). The engine will be shut down immediately.

Note: Shutting down the engine using this method is considered a hard shutdown which disables the DES.

Note: A warning message and/or Audible alarm will be initiated. A fault code will be logged for improper engine shutdown if exhaust temperature is above limit.

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

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

OFF – Turn the engine start ring (1) to the OFF position (A) to stop the engine.

ON – To activate the electrical circuits in the cab and enable engine starting, turn the engine start ring (1) clockwise to the ON position (B).

START – To start the engine, enter the code on the monitor. Press start button (2). After the engine starts, release the button.

Note: Pressing the start button with the engine on will also turn off the engine.

Engine Start Switch (Machines not equipped with Delayed Engine Shutdown 8)

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.

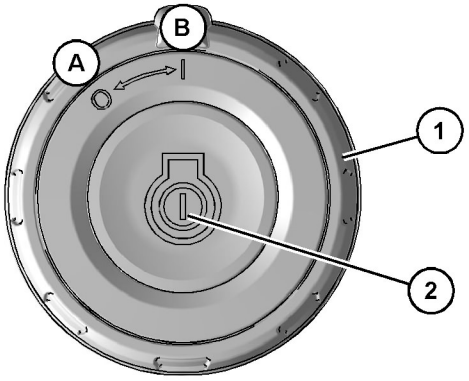


Illustration 168 g06180554

(A) Off
(B) On
(1) Engine start ring
(2) Start button

OFF – Turn the engine start ring (1) to the OFF position (A) to stop the engine.

ON – To activate the electrical circuits in the cab and enable engine starting, turn the engine start ring (1) clockwise to the ON position (B).

START – To start the engine, enter the code on the monitor. Press start button (2). After the engine starts, release the button.

Note: Pressing the start button with the engine on will also turn off the engine.

Engine Idle Shutdown

If the operator has not operated the machine for aperiodof time, this function shuts down the engine. Engine Idle Shutdown 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 levers are 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 Back Pressure Valve (BPV) 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.

Operator's Seat (9)

There are different options for operators seats. Each operator seat and console have various adjustments to meet a wide range of operators. For more information, refer to Operation and Maintenance Manual, “Seat”.

Tilt-Up Console (9A)

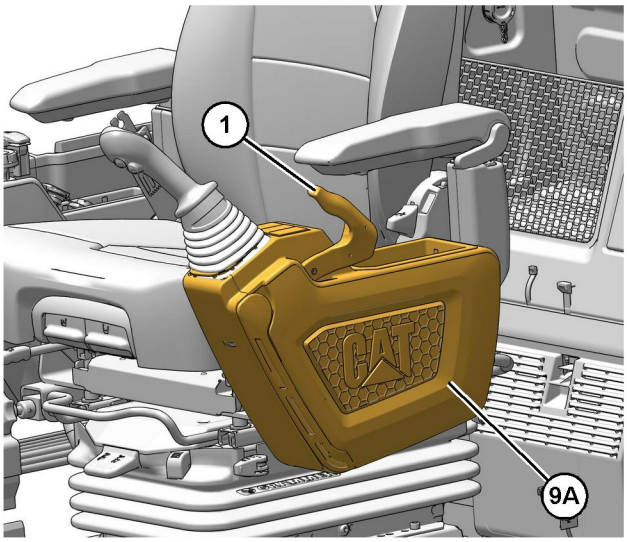


Illustration 169 g06226523

(1) Hydraulic lockout control
(2) Tilt-up console

Some optional seats are equipped with a tilt-up console. The console can be tilted upward for easier exit and entry. The console is unlocked by pulling the hydraulic lockout control (1) to the rearmost position. The console will then tilt upward. Simply push the console downward until the console locks into place when ready for use.

Right Side Switch Panel (7)

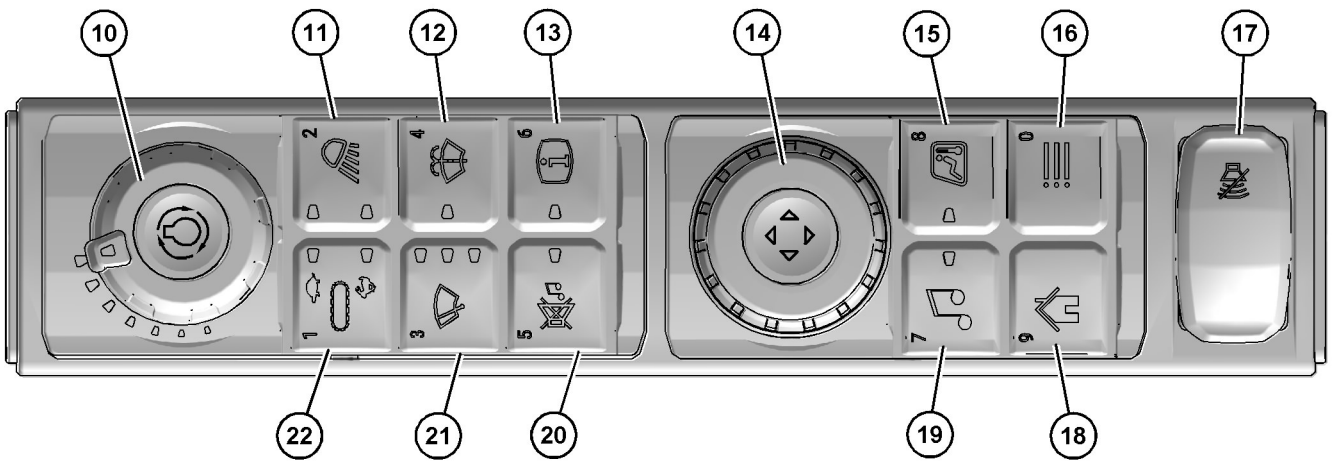


Illustration 170 g06178333

Right side switch panel

(10) Engine speed / power mode control
(11) Light switch
(12) Window washer
(13) Operator Information
(14) Jog dial
(15) Heating and air conditioning
(16) Next menu
(17) Travel alarm mute
(18) Home
(19) Radio control
(20) Radio mute switch
(21) Window wiper
(22) Travel speed control

Note: In addition to the intended functions, the buttons on the switch panel are numbered from 0-9. The numbered buttons can be used to enter numbers into the monitor for screens such as the passcode screen.

Engine Speed / Power Mode Control (10)

Engine Speed Control – Turn the dial to control the engine speed (engine rpm). Select the desired position from the seven available positions. Turn the dial counterclockwise to decrease the engine speed (engine rpm). Turn the dial clockwise to increase the engine speed (engine rpm).

Power Mode Control – Push in the dial to change the power mode settings. The Power Mode Control allows the operator to choose what power mode to operate the engine. The modes that can be selected are: “ECONOMY” , “SMART” , and “POWER” .

Note: The default power mode setting can be set within the monitor. For more information, refer to Operation and Maintenance Manual, “Monitoring System”.

Note: “ECONOMY” mode is not available on GC models.

Light Switch (11)

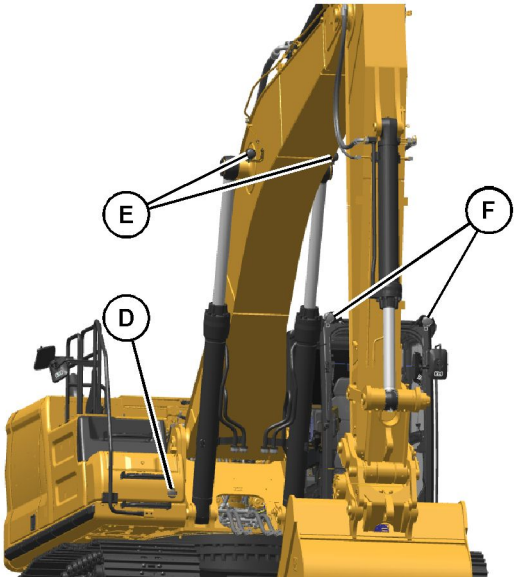


Illustration 171 g06278042

Light Switch – Push the switch 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 the work lights are off.

Note: Your machine may be equipped with a Premium Surrounding Lighting package with left side, right side and rear lights. Refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”, Function List Screen, Work Light Control for more information.

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 minutes to 5 minutes. For further details, consult your Cat dealer.

Window Washer (12)

Window Washer (12) – Push the switch 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.

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.

Operator Information (13)

Operator Information Button (13) – Press and hold this button to view the operator information screen. The indicator light will illuminate when the button is pressed.

Jog Dial (14)

The jog dial can be used to select items displayed on the monitor screen. The dial can be rotated 360 degrees. The dial can also be moved left, right, up, and down. The dial can be pushed in to make a selection.

Air Conditioning and Heating (15)

Air Conditioning and Heating (15) – Press this button to bring up the air conditioning and heating menu. The indicator light will illuminate when the heating and cooling system is active. The jog dial (13) can be used to make selections. If equipped with a touch screen, the selections can be made by touching the monitor.

Refer to Air Conditioning and Heating Control for more information.

Next Menu(16)



Next Menu (16) – Press the next menu button to access the next higher menu. If there is not a menu above the current screen being viewed, the button will not do anything.

Refer to Monitoring System for more information.

Travel Alarm Mute Switch (17)



Travel Alarm Mute Switch (17) – Press travel alarm mute switch (17) to mute the travel alarm.

Note: The travel alarm will sound when the travel levers or the travel pedals are activated.

Home (18)



Home Key (18) – Press the home key to return to the default display at any time.

Refer to Monitoring System for more information.

Radio Control (19)



Radio Control (19) – Press this button to display the radio controls on the monitor. The indicator light on the button will illuminate when the radio is turned on. Use jog dial (14) to make selections. If equipped with a touch screen display, touch the icons on the screens to make a selection.

Refer to Radio for more information.

Radio Mute (20)



Radio Mute (20) – Press radio mute switch (20) to mute the radio. The indicator light will illuminate when mute is activated. Press the button again to unmute the radio.

Window Wiper (21)



Window Wiper (21) – Push the switch 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.

Travel Speed Control (22)

⚠ 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 (22) – Press the travel speed control switch 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. The indicator lights illuminate to show which speed selection is active.



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.

USB/Aux Ports (23)

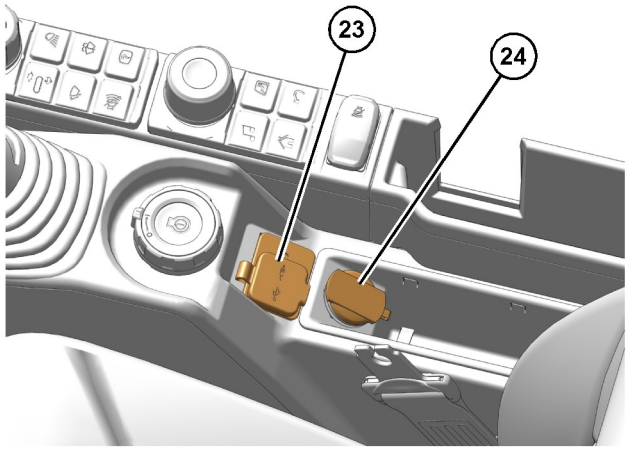


Illustration 172 g06204950

(23) USB/AUX/MIC port
(24) 12 V socket

USB – The USB port is used to play music from a portable device. The USB symbol on the radio screen on the monitor must be selected.

AUX – The AUX port is used to play music from a portable device. AUX must be selected on the radio screen on the monitor.

12V Power Receptacle (24) & (25)

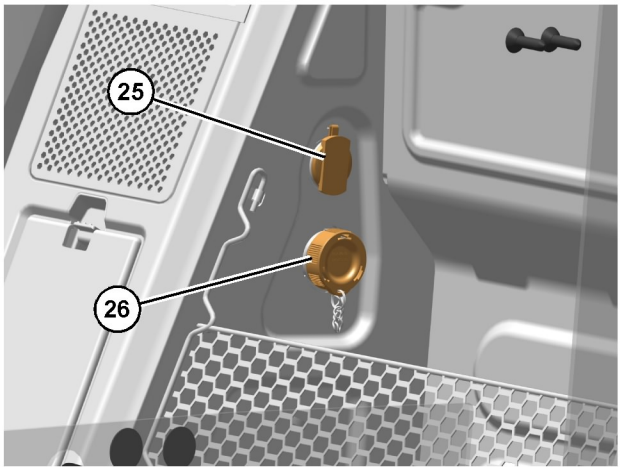


Illustration 173 g06178354

Electronic Technician service port

12V Power Receptacle – The power receptacles can be used to power automotive electrical equipment or accessories. The power receptacle only operates when the engine start switch is in the ON position.

Service Port (26)

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 to diagnose machine and engine systems.

Contact your Cat dealer for additional information.

Dome Light (27)

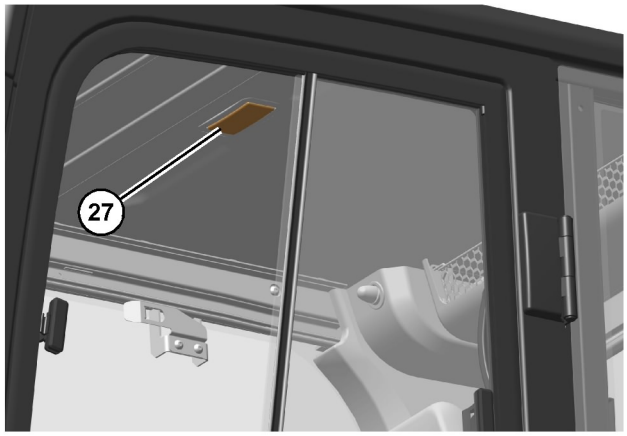


Illustration 174 g06208645

The dome light has three different positions. When the dome light is in the center position (horizontal), the light will come on when the door is open and shut off when the door is closed.

When the left side of the light is pressed, the lamp will be inoperable.

When the right side of the light is pressed, the lamp will be illuminated until the lamp is switched to another position.

i08233123

Battery Disconnect Switch

SMCS Code: 1411-B11

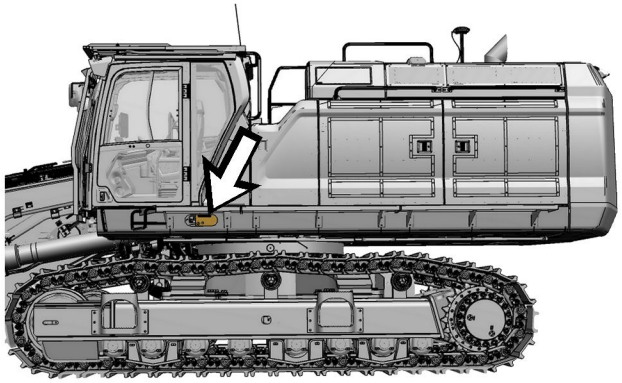


Illustration 175 g06592385

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

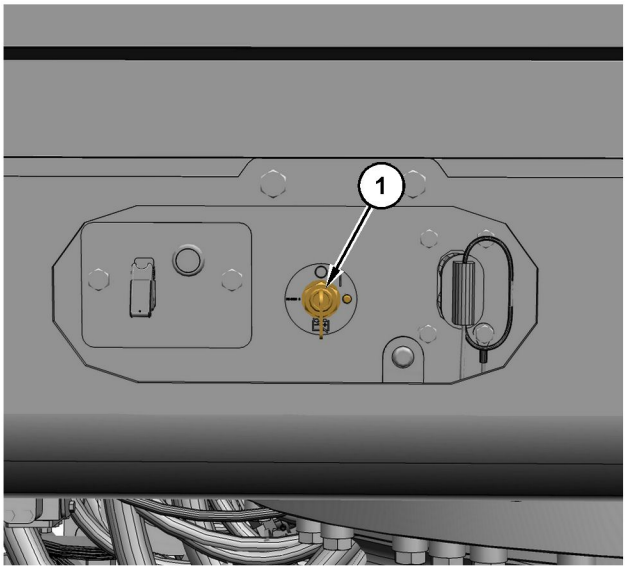


Illustration 176 g06592388

(1) Battery disconnect switch

Battery Disconnect Switch – The battery disconnect switch can be used to disconnect the battery from the machines electrical system. The key must be inserted into the battery disconnect switch before the battery disconnect switch can be turned.

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 to enable battery power to 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. If installed with a cover lock, close the cover and install a padlock.

It is also good practice to use the disconnect switch after you operate the machine. This will prevent the battery from being discharged. The following problems can cause battery discharge:

- short circuits
- current draw via some components
- vandalism

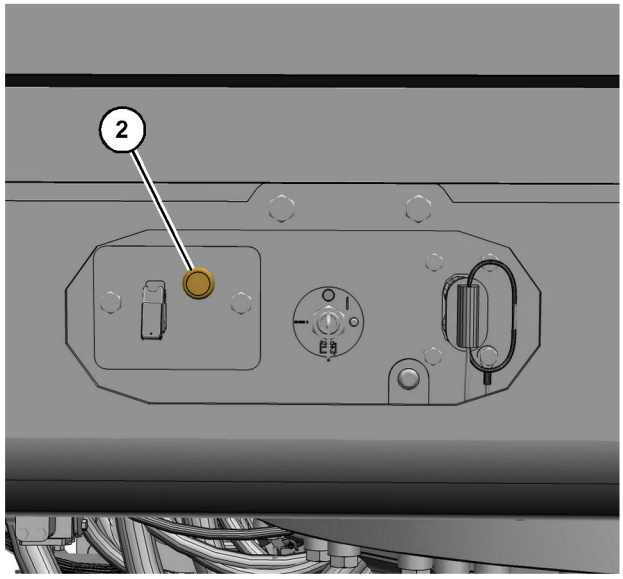


Illustration 177 g06592390

(2) DEF purge indicator lamp

Note: If DEF purge indicator lamp (2) is illuminated, wait for the light to turn off before turning the disconnect switch to the OFF position. Waiting for the light to turn off allows the DEF system to fully purge the exhaust fluid and prevents damage to engine components.

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”

i07785958

Machine Security System

SMCS Code: 7631

General Information

NOTICE
This machine may be equipped with a Cat ® Machine Security System (MSS) and may not start under certain conditions.



Illustration 178 g06223917

Machines that are equipped with Cat MSS can be identified by a decal in the operator station Read the following information and know your machines settings. Your Cat dealer can identify your machine settings.

The Cat Machine Security System (MSS) discourages unwanted operation of a machine. When armed, the MSS requires operator login to start the engine. The following methods of operator login to disarm the security system are available:

- Cat Bluetooth® key fob
- Cat App: Fleet Management
- Passcode

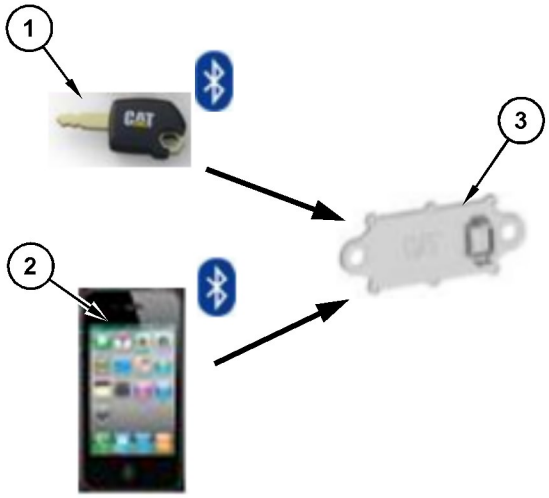


Illustration 179 g06212167

Bluetooth Connections

(1) Cat Bluetooth key fob (CATBTFOB)
(2) Cat App: Fleet Management mobile application
(3) Cat Bluetooth transceiver (CATBTNT)

The Cat Bluetooth key fob (1) contains an electronic chip. The electronic chip has a unique identification number (ID). A Bluetooth transceiver is mounted in the cab to read the ID of the key. The Bluetooth transceiver module translates the information received from the key fob into a J1939 message. This message is sent to the Electronic Control Module (ECM) that is connected to the MSS. The ECM is typically the Machine ECM. The ECM is set up with the ID of the keys of the intended users.

When the MSS is armed, the ECM validates the ID of the key fob. If the key ID is on the list of authorized keys in the ECM and the key is valid, the machine will operate normally. If the key ID is not on the list of authorized keys in the ECM or is not valid, the MSS will keep the critical machine functions disabled.

Note: A Bluetooth enabled phone can disarm MSS if the phone is on the list. Operator Management System (OMS) is necessary to be able to add phones to the vehicle ID list. After the phone is added, OMS is no longer needed for the Cat App: Fleet management mobile application to function as a valid key.

If the MSS is not installed, the operator can skip the login and the machine will operate normally.

Components

The Machine Security System (MSS) consists of the following components:

- Electronic Control Module (ECM)

- Cat Bluetooth key fob (CATBTFOB)
- Machine display
- Bluetooth transceiver module (CATBTNT)
- Engine start switch

System Overview

The Machine Security System (MSS) is designed to restrict operation of a machine. A list of the authorized electronic keys and passcodes for a machine is contained in the ECM for the MSS. A valid Bluetooth key fob, mobile application, or passcode can disarm the MSS. If the MSS is disabled or not installed, any operator may access critical machine functions.

The Cat ® Electronic Technician (Cat ET) Service Tool can be used to program the ECM with the authorized keys and passcodes. Bluetooth devices and passcodes can be registered using the in-cab display if the operator is logged in to the system using a master access account.

When the engine start switch is turned to the ON position, the display boots up. If Bluetooth detection is enabled, the transceiver will receive a signal from any Bluetooth key that is present or from the mobile application. The ECM will then compare this ID to the list of authorized keys.

Note: If multiple devices are present, the first valid device detected by the transceiver will be read.

If the ID of the key matches an authorized key, the status indicator on the engine start switch will turn a green color and the MSS will disarm. This disarming will allow the operator access to critical functions of the machine.

If the ID of the key that is read does not match the list in the ECM, the status indicator will remain a red color. The MSS remains in the “armed” state and the machine will remain disabled.

If the MSS is disabled and the ID of the key matches an authorized key, the operator will be identified and allowed access to the critical machine functions. The operator will be able to save configurations and start the machine.

If the MSS is disabled and the ID of the key that is read does not match an authorized key, the operator must log in as a guest. The operator will not be able to save custom configurations but will have access to starting the engine.

Activating Bluetooth Functionality

For shipping purposes, Bluetooth functionality is deactivated. Ensure that Bluetooth functionality is active on your machine using the following procedure:

1. Ensure that the function is active from the radio screen:

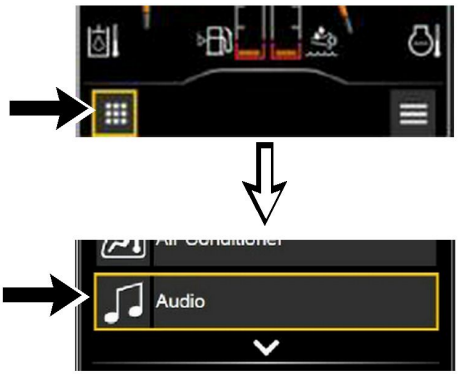


Illustration 180 g06319669

a. From the home screen, press the navigation button in the lower left corner, then select “Audio” .

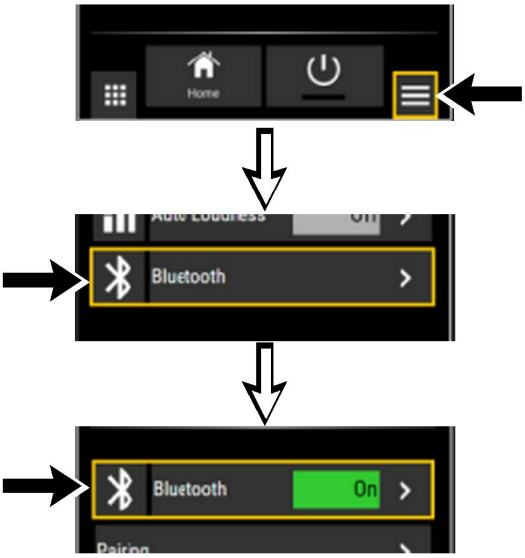


Illustration 181 g06319667

b. Press the radio function list menu button in the lower right corner, then select “Bluetooth” . Ensure that “Bluetooth” is set to “ON” .

Pairing Your Device to the Machine

Use to following procedure to pair your device to the machine:

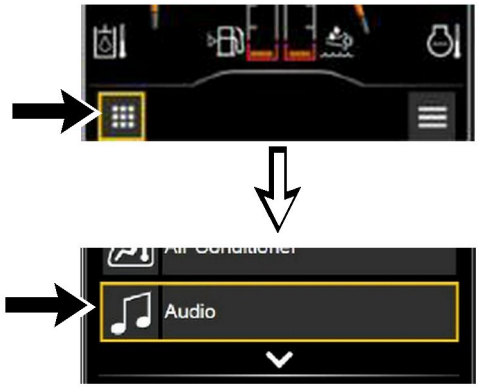


Illustration 182 g06319669

1. From the home screen, press the navigation button in the lower left corner, then select “Audio” .

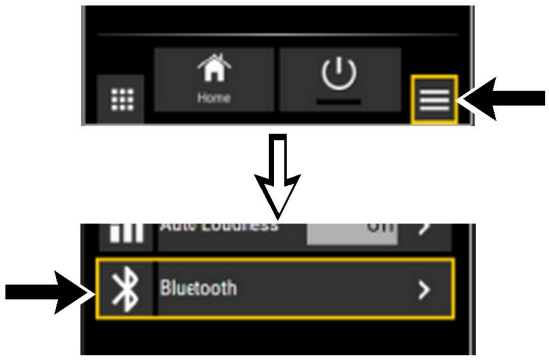


Illustration 183 g06319672

2. Press the radio function list menu button in the lower right corner, then select “Bluetooth” .

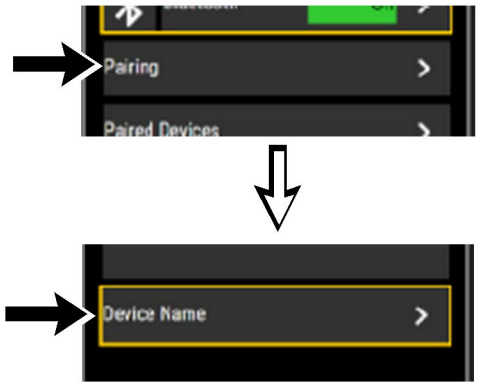


Illustration 184 g06319676

3. Select “Pairing” , then “Device Name” .

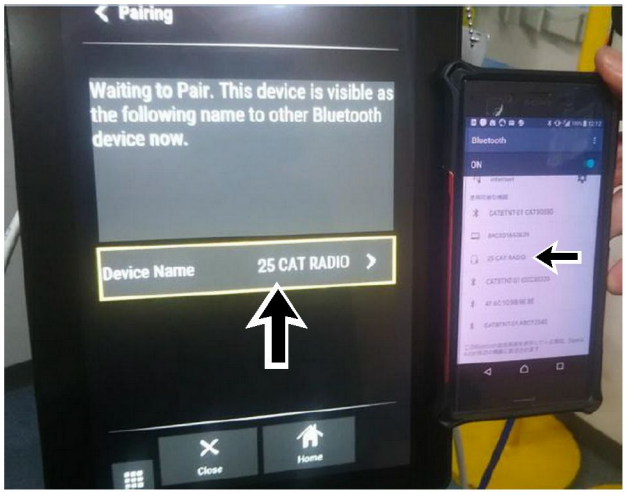


Illustration 185 g06319681

Machine name on monitoring system and operator device

4. Find your device on the list and pair the devices. Ensure that the devices are paired on your phone as well.

Note: The device name on your phone should be “## CAT RADIO” , with the number being from “00” to “99” .

Reading the ID of a Key

The Machine Security System (MSS) must identify a valid passcode, Bluetooth key fob ID, or Cat App: Fleet management mobile application ID.

When the engine start switch ring is turned to the ON position, the MSS will check the ID of any key fob or mobile application. If the ID matches a key ID stored in the machine ECM, the critical ECM functions are enabled. An enable message is also sent via the Cat® data link or J1939 data link to the other ECMs on the machine. The machine will operate normally.

Note: If the machine ECM has failed or has been removed, the critical machine operations controlled by the other electronic control modules will not operate.

Armed

When the MSS is armed, critical machine functions are disabled. The MSS disables the power that is supplied to each component that is powered by the output drivers. The machine will not be able to operate normally.

There are two states of operation within the “armed” mode:

Engine Start Switch Ring Position OFF – When no power is applied to the MSS, the MSS will default to “armed” state. When power is applied to the MSS and the grace period has expired, the MSS will return to the “MSS Armed” .

Engine Start Ring Switch Position ON – When the engine start switch ring is first moved to the ON position, the display boots up and the system attempts to detect a Bluetooth key ID or mobile application ID. The ECM will continue reading until a valid key ID is read or a passcode is entered. If a valid key ID or passcode is not read, the MSS status indicator will remain red and the MSS remains armed.

Disarmed

When the MSS is disarmed, normal machine operation is allowed. A message is sent to the other machine ECMs over the Cat data link. or J1939 data link. The machine will be able to start. The green LED on the status indicator will illuminate.

There are multiple ways to disarm the machine:

- Use a valid passcode
- Use a valid Bluetooth key fob
- Use the Cat App: Fleet management mobile application
- Use the Cat ® Electronic Technician (Cat ET) Service Tool to configure the MSS bypass schedule to allow machine operations during scheduled periods of time during the week.

Grace Period

After a machine has been started successfully, the operator will have a grace period after the machine is turned off before the MSS is automatically armed. The operator is not required to arm the system manually.

During the grace period an operator can start the machine without a key ID or passcode. When the grace period expires, the MSS will rearm automatically.

If the MSS is unable to read a key ID, the system will remain armed. When the MSS identifies a key with an invalid key ID, the system will remain armed.

The grace period for a machine can be configured with Cat ET if a factory password or master level account is available.

Navigating the User Interface Touchscreen Display

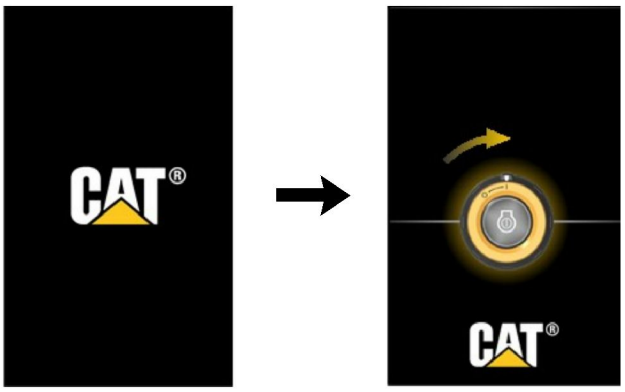


Illustration 186 g06210561
Startup sequence screens

The display will start up automatically after turning the battery disconnect switch to the ON position. The screen will prompt the operator to turn the engine start ring to the ON position. When the engine start ring is turned to the ON position, the display will navigate to the passcode entry screen.

If the operator has not turned the engine start ring to the ON position, the display will time out after 1 minute.

If the battery disconnect switch is already on and the display is off, the display will startup automatically after the engine start ring is powered on. The Cat screen will appear for a short time and then login keypad will appear.

Note: Avoid touching the screen with sharp objects.

The access level assigned to the operator can limit or expand the amount of freedom the user has to manage the system. The following paragraphs explain access levels.

There are three levels of operator access recognized by the touchscreen display. The following levels are available:

- Guest
- Standard
- Master

Guest – If an operator does not have an authenticated key or passcode, the user is able to bypass log in as a guest. Some menu features will not be available such as the options for saving

configurations and operator management. If the Machine Security System (MSS) is enabled, guest operators cannot start the machine.

Standard – A standard operator is a registered user of the machine. Operators with this access level can start the engine whether or not the MSS is installed. This user may save a control configuration for future application.

Master – Master accounts can perform operator management in addition to all standard level functions.

Any “Standard” or “Master” account may be created or removed by a “Master” level operator.

Table 37

Selections and Access for the Touchscreen Display	
Access Level	**Operator Setting**
Guest	“Operator Input Configuration” “Response” “Change Operator”
Standard	“Operator Input Configuration” “Response” “Controls Setup” “Change Operator”
Master	“Operator Input Configuration” “Response” “Controls Setup” “Change Operator” “Manage Operator”

Operation of Status Indicator



Illustration 187 g06215426

Engine start switch with integrated MSS indicator

The Machine Security System (MSS) uses a status indicator that is integrated into the engine start switch in the cab. This indicator provides a visible alert for the security system.

The operator can use the status indicator to determine the status of the system or for troubleshooting.



Illustration 188 g06226442

Status indicator when the MSS is armed

When the MSS is armed, the status indicator will be red. The red light warns the operator that the machine is armed with the security system and that an operator login is required. The red LED will remain ON until a valid key is read while the key switch or engine start switch ring is in the ON position.



Illustration 189 g06226444

Status indicator when the MSS is disarmed or uninstalled

When the MSS is disarmed, the status indicator will be green. The green light notifies the operator that an operator is logged on the machine and the security system has been disarmed. The status indicator will be green if the MSS is not installed on the machine. Also, the green LED will remain ON after power down for the duration of the grace period. After the grace period, the MSS automatically returns to the “armed” mode.

For machines with a standard key switch, a separate status indicator will be available.

Operator Login

Any user may start the engine if the Machine Security System (MSS) is disabled.

If the MSS is active, only a “Standard” or “Master” account can start the machine engine. Before starting the machine engine, the security system must identify a registered operator. An operator can access the machine display using one of the following methods:

- Passcode
- Cat Bluetooth key
- Cat App: Fleet management mobile application

Passcode Entry

To log in using a passcode, refer to the following steps:

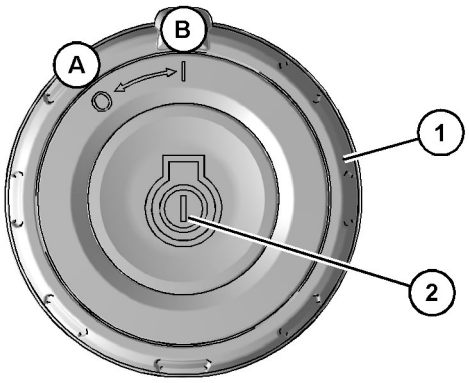


Illustration 190 g06180554

(A) Off
(B) On
(1) Engine start switch ring
(2) Engine start button

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

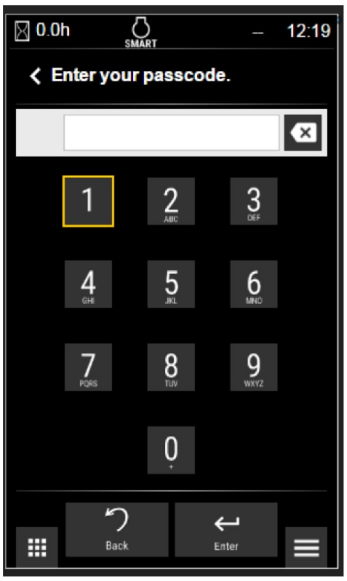


Illustration 191 g06209470

2. Enter a registered passcode using the monitor keypad and then press “Enter” .

Note: The jog dial or the numbered buttons on the right-side switch panel can also be used to enter the code.

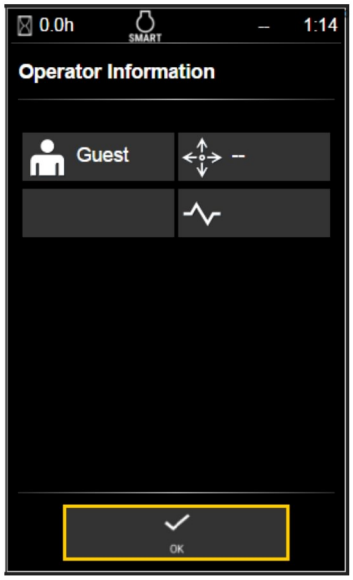


Illustration 192 g06211194

3. Select “Enter” to confirm the passcode. If a registered passcode is recognized, the operator information screen will appear on the display. If the MSS is not installed, the passcode screen will be bypassed automatically after 10 seconds. The operator will be logged in to the system as a guest. Refer to Illustration 192 .
4. Select “OK” to continue to the display homescreen.

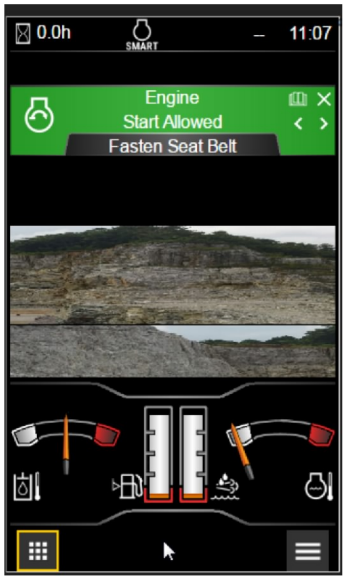


Illustration 193 g06209482

5. After an operator logs in to the system successfully, an “Engine Start Allowed” message will appear across the top of the monitor. Refer to Operation and Maintenance Manual, Engine Starting for instructions on starting the engine.

Invalid Passcode



Illustration 194 g06209472

Invalid passcode screen

If a passcode is not recognized, the display will notify the user with an “Invalid code” message. Refer to Illustration 194 .

The operator has five tries to enter a valid passcode successfully. After a fifth unsuccessful attempt, a lockout screen will appear and remain on the display for a duration of 5 minutes.

Note: If the Machine Security System (MSS) is not active, the user can select the “Skip Login” button to avoid the lockout period. Refer to the “Bypass login” section for further information.

Bypass login

Operator login can be bypassed if the user selects the “Skip Login” button on the display. The operator will be logged in to the machine with “Guest” level access.

If the MSS is inactive, the operator will be able to start the engine as normal and view all display screens.

If the MSS is active on the machine, the operator is able to view all display screens but will not have access to starting the engine.

Bluetooth Entry

Alternatively, a Bluetooth Operator ID can be used to log in to the machine. For a Bluetooth key to be detected by the system, ensure that the following qualifications are met:

- The key must be registered with the machine
- The key must be within the cab
- Bluetooth setting must be enabled on the display

Refer to the following steps when logging in to a machine using the Bluetooth key:

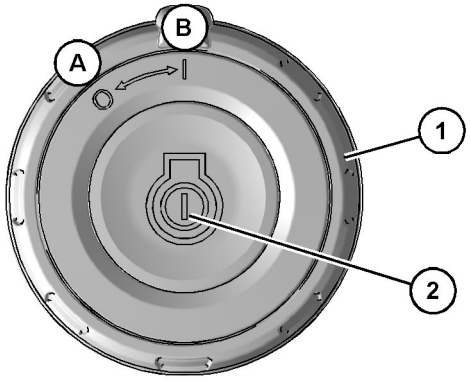


Illustration 195 g06180554

(A) Off
(B) On
(1) Engine start switch ring
(2) Engine start button

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

2. Wait several seconds for the system to detect the key when the passcode dialog appears. Once the key is detected, the “Operator Information” screen will display.

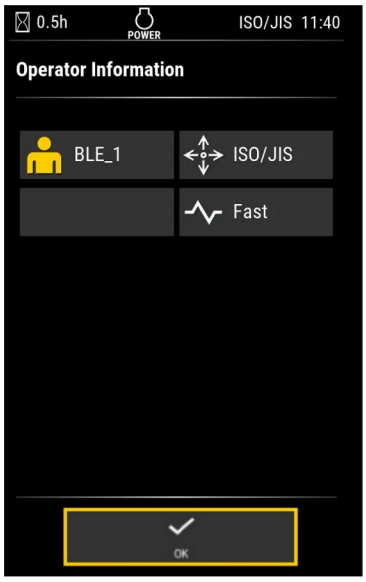


Illustration 196 g06209615

Bluetooth operator information screen

3. Select the “OK” button if the proper operator has been displayed.

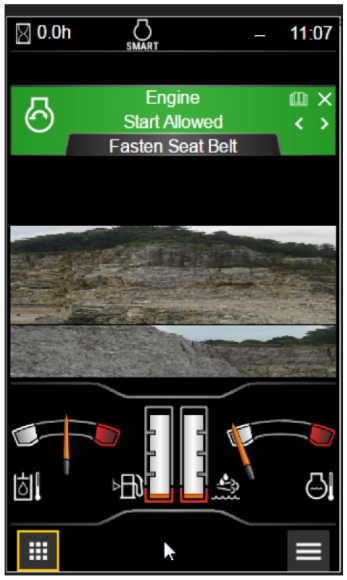


Illustration 197 g06209482

4. After an operator logs in to the system successfully, an “Engine Start Allowed” message will appear across the top of the monitor. Refer to Operation and Maintenance Manual, Engine Starting for instructions on starting the engine.

NOTICE
The access level will change to a “Guest” account automatically if the key is removed from the cab at any time. If the MSS is enabled and the engine is on when the key is removed from the cab, the operator will not be able to start the engine if turned off. To turn on the engine again without the Bluetooth key, the operator will need to log in a registered account using either the smart phone application or passcode.

Note: If multiple Bluetooth devices are within the cab, the system will select the first device detected by the Bluetooth transceiver as the active operator.

Cat ®Fleet Management Mobile Application

Operators can also log in to a machine using the Cat App: Fleet management mobile application. For the application to be detected by the system, ensure that the following qualifications are met:

- The Mobile Device ID (MDID) of the mobile application must be assigned to the machine in the Operator Management System (OMS)

Note: It is not possible to assign mobile devices through the MSS interface.

- The mobile device must be within the cab
- “Operator Management Bluetooth Device Enabled Status” is enabled (Cat ET Configuration)

Note: For adding an operator, adding MDID to the machine key list, and pushing the machine key list from the OMS to the machine refer to the OMS documentation at:

https://myoperators.cat.com/

Mobile Device / Operating Software Compatibility

Table 38

Mobile Device / Operating Software Compatibility		
Make	**Model**	**Operating Software**
Android	Varies	Android 8.x Oreo and up (Preferably Android 9.x Pie)
Apple	iPhone 6/ iPhone 6 Plus and up	iOS 11.0 and up (Preferably 12)

Note: Android mobile hardware support for Bluetooth can vary, so it is possible that a mobile device running Android 8.x software or higher could have hardware that does not support Bluetooth 4.1.

Mobile Application Entry (Android Devices)

To log in using the Cat App: Fleet management mobile application, refer to the following steps:

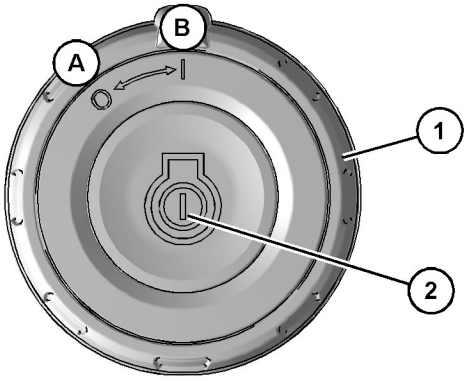


Illustration 198 g06180554

(A) Off
(B) On
(1) Engine start switch ring
(2) Engine start button

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



Illustration 199 g06400799

2. Open the Cat App: Fleet management mobile application on the mobile device.

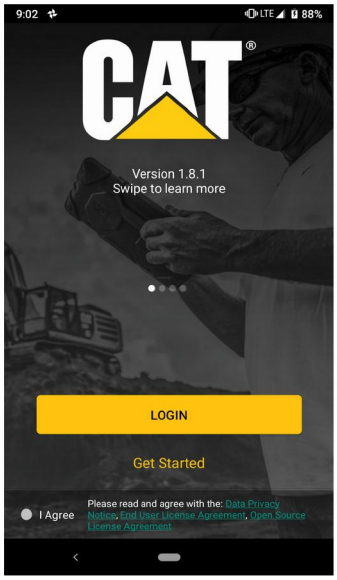


Illustration 200 g06433500

3. Click “I Agree” to agree with the End-User License Agreement and sign in with Cat eCustomer account credentials.

Note: If you do not have a Cat eCustomer account, click “Get Started” to create one.

4. Select “Login” .

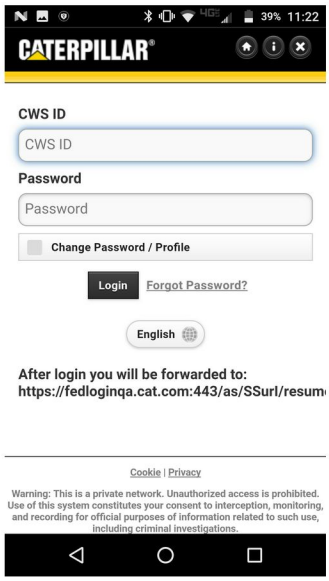


Illustration 201 g06214518

CWS login screen

5. Enter Cat eCustomer account credentials.

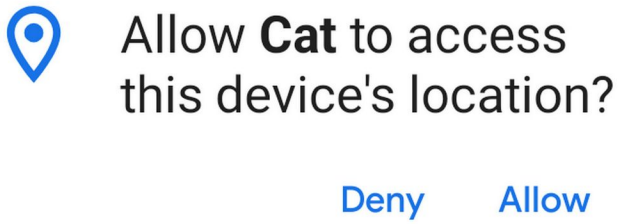


Illustration 202 g06400826

6. Click “Allow” to enable the Cat App: Fleet management mobile application to work as designed.

Note: Cat App: Fleet management requires access to the mobile device location to use Bluetooth radio to connect to Cat machines.

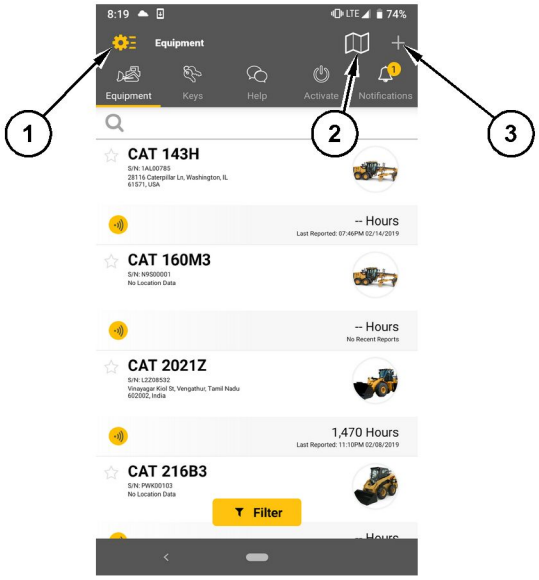


Illustration 203 g06433507

(1) Menu Icon
(2) Map Icon
(3) Add Equipment Icon

7. Upon login, the Cat App: Fleet management mobile application will open onto the equipment tab.

Note: The “Equipment” tab will be empty on the first login.

The Menu Icon (1) includes “Preferences” , “Notifications and Alerts” , along with various documents covering the end-user license agreement, and privacy notice.

By tapping the Map Icon (2), the operator will be able to see the location of each vehicle on their “Equipment” tab on a map.

If a vehicle is not equipped with a telematics device, or the vehicle is a non-caterpillar machine it may be necessary to add it manually using the Add Equipment Icon (3).

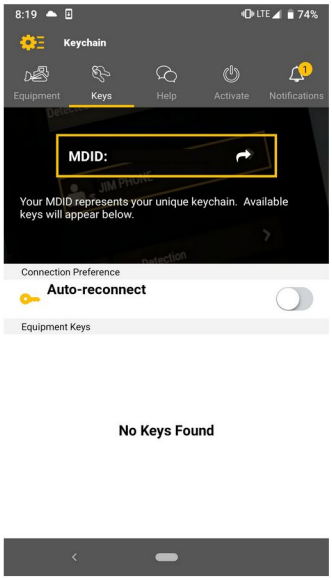


Illustration 204 g06433513

8. Go to the keys tab.

Keys are necessary to connect to vehicles. If no keys are given, the screen in Illustration 204 will be displayed. The MDID is necessary to assign keys to the user account. The MDID of Android devices is linked to the app.

Note: Uninstalling the Cat App: Fleet management mobile application will result in the MDID and keys being deleted. The Sim card of the phone contains the MDID information, damage to the Sim card may result in keys being lost, if the phone is replaced transfer the Sim card to avoid key loss.

9. Pull the “Equipment Keys” down to refresh the list once the Fleet/Key configuration process has finished. Wait up to 30 seconds until the keys populate. If the keys do not populate, check that the MDID is correct and that the list was pushed properly through OMS.

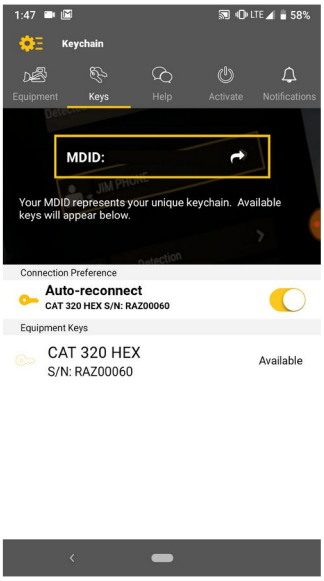


Illustration 205 g06433520

10. Ensure that the machine is ON to connect to a machine.

The machine display should prompt the operator for a password. In the “Keys” tab in the Cat App: Fleet management mobile application and tap the key that matches the machine. If a vehicle is OFF, currently occupied, or too far away the key will be grayed out and say “Out of range” .

Note: If the machine has a user signed in that is not in the cab and it has become necessary for a different user to operate the machine, change the operator in operator setting.

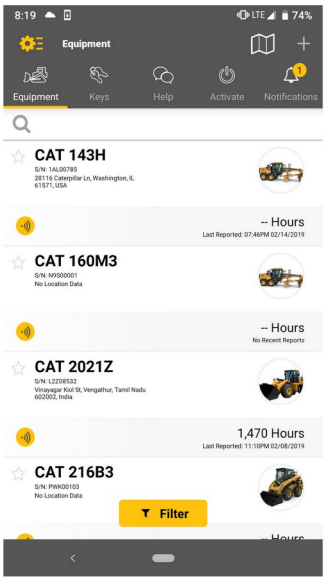


Illustration 206 g06433521

11. Access the “Equipment” tab by tapping it. The machines associated with the keys should have populated. To learn more about a machine, tap it.

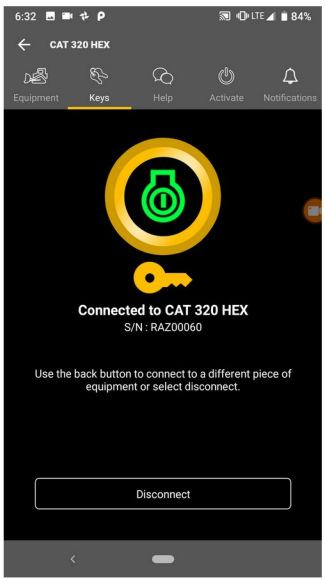


Illustration 207 g06433525

12. Press the “Disconnect” button if the user wishes to disconnect. If the user wants to switch machines, tap the arrow in the upper left then tap the machine the operator wants to be switched to.

Note: Disconnect from vehicles if the user is not going to be using a vehicle again within a short time.

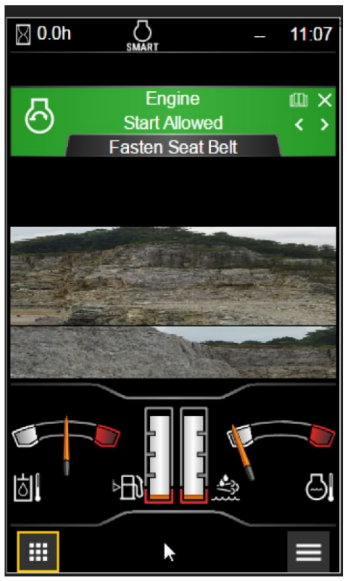


Illustration 208 g06209482

13. After an operator logs in to the system successfully, an “Engine Start Allowed” message will appear across the top of the monitor. Refer to Operation and Maintenance Manual, Engine Starting for instructions on starting the engine.

Mobile Application Entry (iOS Devices)

To log in using the Cat App: Fleet management mobile application, refer to the following steps:

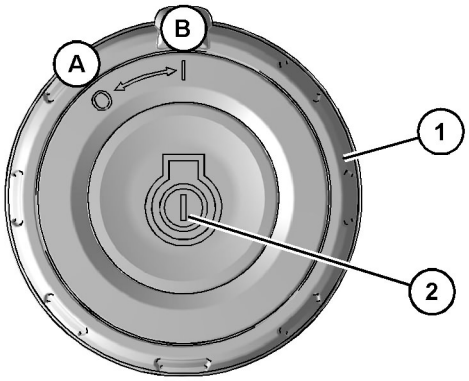


Illustration 209 g06180554

(A) Off
(B) On
(1) Engine start switch ring
(2) Engine start button

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

2. Ensure that Bluetooth detection is enabled on the in-cab display.



Illustration 210 g06400799

Cat App: Fleet management mobile application icon

3. Open the Cat App: Fleet management mobile application on the mobile device.

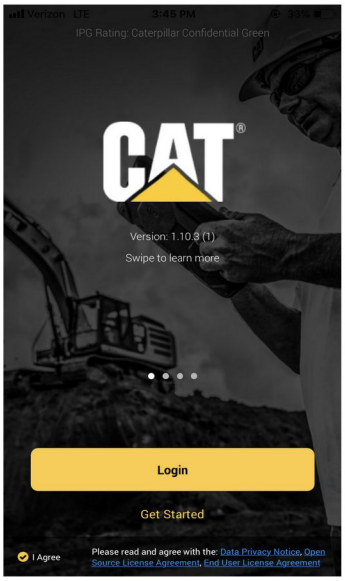


Illustration 211 g06433528

4. Click “I Agree” to agree with the End-User License Agreement and sign in with Cat eCustomer account credentials.

Note: If you do not have a Cat eCustomer account, click “Get Started” to create one.

5. Select “Login” .

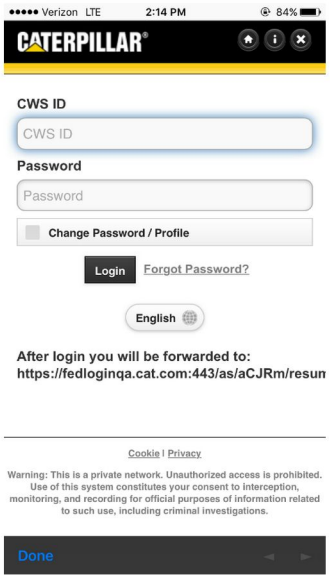


Illustration 212 g06214875

6. Enter eCustomer account credentials to log in.

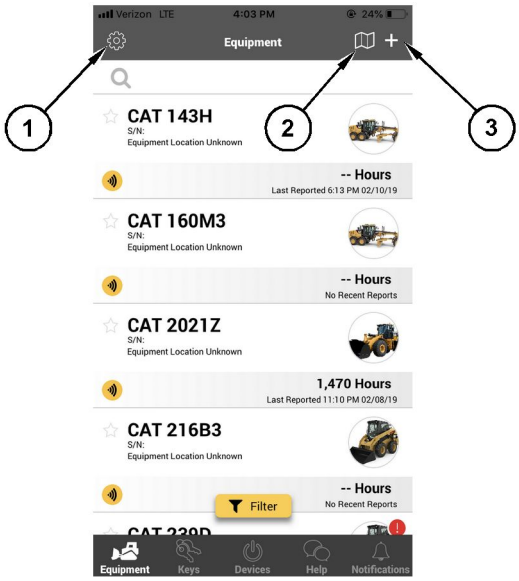


Illustration 213 g06433533

(1) Menu Icon
(2) Map Icon
(3) Add Equipment Icon

7. Upon login the Cat App: Fleet management mobile application will open onto the equipment tab.

Note: The equipment tab will be empty on the first login.

The Menu Icon (1) includes “Preferences” , “Notifications and Alerts” , along with various documents covering the end-user license agreement, and privacy notice.

By tapping the Map (2), the operator will be able to see the location of each vehicle on the equipment tab on a map.

When using this for the first time, the Cat App: Fleet management mobile application will ask if it can use the location feature. Allow the location feature to use the map.

If a vehicle is not equipped with a telematics device, or the vehicle is a non-caterpillar machine it may be necessary to add it manually using the add equipment button (3).

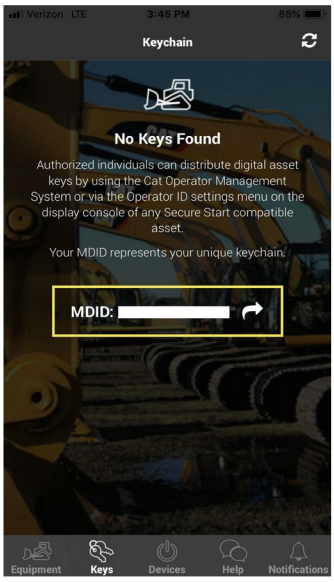


Illustration 214 g06433536

8. Access the “Keys” tab. Keys are necessary to connect to vehicles. If no keys are given, the screen in Illustration 214 will be displayed. The MDID is necessary to assign keys to the user account. The MDID of IOS devices is linked to the user account.

9. Once the Fleet/Key configuration process has finished, tap the refresh button in the Cat App: Fleet management mobile application top right. Wait up to 30 seconds until the keys populate. If the keys do not populate, check that the MDID is correct and that the list was pushed properly in OMS.

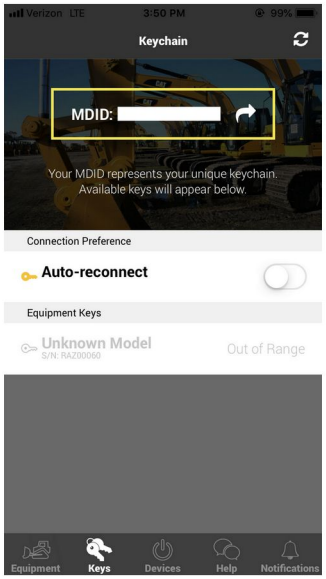


Illustration 215 g06433538

10. To connect to a machine, ensure that the machine is ON. The machine display should prompt the operator for a password. At this point on the Cat App: Fleet management mobile application go to the “Keys” tab and tap the key that matches the machine. If a vehicle is OFF, currently occupied, or too far away the key will be grayed out and say “Out of range” .

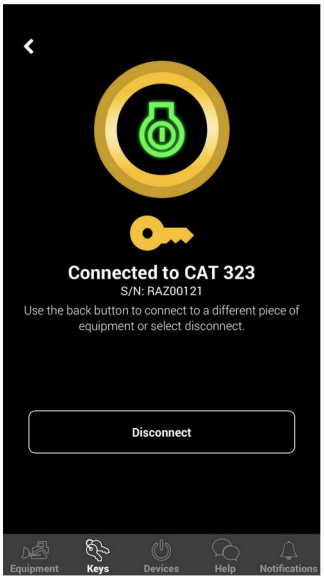


Illustration 216 g06433540

11. Press the disconnect button if the user wishes to disconnect. If the user wants to switch machines tap the arrow in the upper left, then tap the key of the machine to switch to.

Note: Disconnect from vehicle if the user will not be using the vehicle again within a short time.

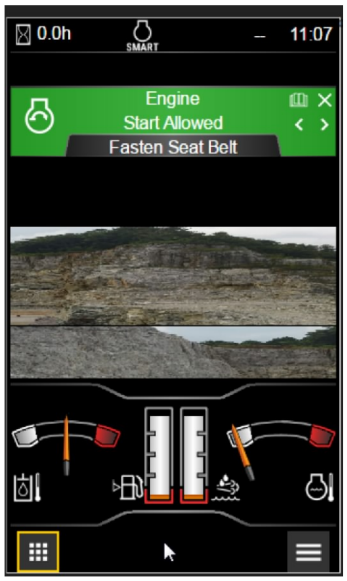


Illustration 217 g06209482

12. After an operator logs in to the system successfully, an “Engine Start Allowed” message will appear across the top of the monitor. Refer to Operation and Maintenance Manual, Engine Starting for instructions on starting the engine.

Engine Start Switch Troubleshooting

Table 39

Switch Status	Possible Cause	Resolution
Engine startswitch is not illuminated	Engine start accessory power not on	Turn engine start switch ring to ON position
	Power management triggered	Cycle engine start switch ring and try to restart
Engine start switch is green	Starting component failure	Contact your Cat dealer
Engine start switch is red	Machine interlock conditions not met	Hydraulic lock in LOCKED position
	Engine shut down without cycling start switch ring	Cycle engine start switch ring and try restart
	Operator not authenticated (Passcode login)	Add operator to machine authorized user list
		Switch operator from guest mode using display
	Operator not authenticated (Bluetooth key)	Add operator to machine authorized user list
		Replace key fob battery
		Ensure more than 4.5 m (15 ft) from other Bluetooth equipped machine
		Alternately login with display passcode or contact local Cat dealer

(continued)

(Table 39, contd)

Switch Status	Possible Cause	Resolution
	Operator not authenticated (Cat Fleet management app)	Add operator to machine authorized user list
		Ensure more than 4.5 m (15 ft) from other Bluetooth equipped machine
		Enable phone Bluetooth and connect Cat Fleet management app
		Change Bluetooth system enable status to enabled (Cat dealer)
		Contact local Cat dealer if unable to see machine Bluetooth device

i08251204

Camera

SMCS Code: 7347; 7348

Rear View Camera

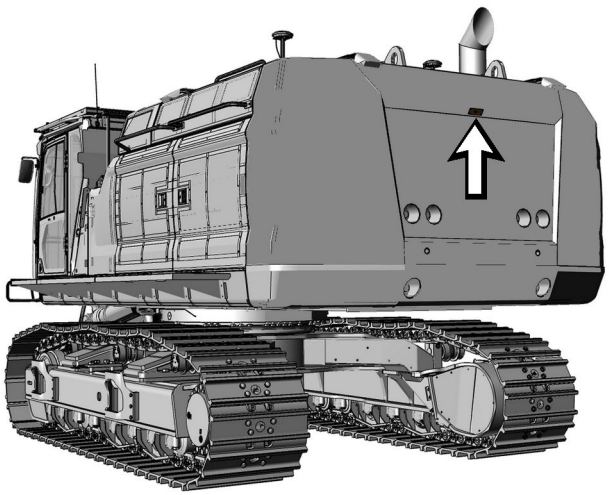


Illustration 218 g06592468

The rear view camera system consists of a camera that is located in the middle of the top of the counterweight.

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”.

Right Side View Camera (If Equipped)

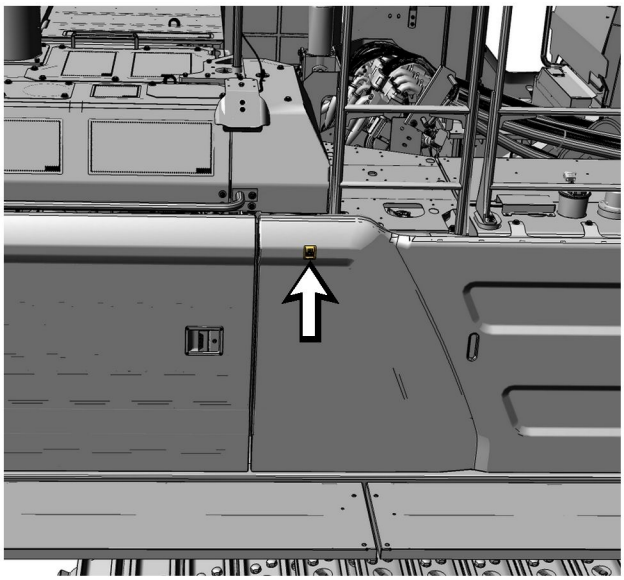


Illustration 219 g06592490

The side view camera system consists of a camera mounted on the panel next to the pump compartment.

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

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

i08257805

Monitoring System

SMCS Code: 7451; 7490

⚠ WARNING

Do not operate the machine if the monitor is not functioning (for example, monitor has a black screen or is not responding) when the key switch is in the ON position.

The monitor provides images from the camera system and other information for safe machine operation. Operating the machine without a properly functioning monitor may result in injury or death. If the monitor is not functioning, place the machine in a safe state by following the procedures for stopping and parking the machine. Determine the cause of the monitor malfunction and correct before returning the machine to service.

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.

General Information

Reference: For complete monitoring system information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

The monitoring system is an input and an output of the Machine Control System. The monitor has a multi-touch 8 inch or 10 inch display. The Machine Control System communicates back and forth on the data link. The monitoring system consists of the following components:

- Display (with numerous screens and menus)
- Indicators
- Gauges
- Soft Switch Panel
- Jog Dial



Illustration 220 g06397192

(1) Action Lamps
(2) Status Information Area
(3) Event Indicator Area
(4) Camera View Area
(5) Gauge Area
(6) Navigation Area
(7) Function List
(8) Shortcuts

The monitoring system displays various warnings and information about the condition of the machine, and the machines surrounding with various camera views. There are gauges and several alert indicators included on monitoring system display. Each gauge is dedicated to a parameter within a machine system. The monitoring system will allow the user to do the following:

- View Surroundings
- Interpret status information
- Interpret parameters
- View OMM
- View service intervals
- Perform calibrations

- Troubleshoot machine systems

Action Lamps (1)

The action lamps illuminate to show that a problem has occurred with the machine.

Status Information Area (2)

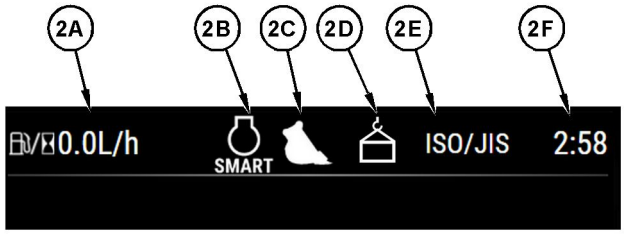


Illustration 221 g06464039

(2A) Multi Status Information
(2B) Seatbelt Switch Status (if equipped) / Power Mode
(2C) Work tool
(2D) Heavy Lift / Cat ® Dig Boost (if equipped)
(2E) Lever Pattern / Fuel Level
(2F) Clock

Reference: For complete status information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Event Indicator Area (3)

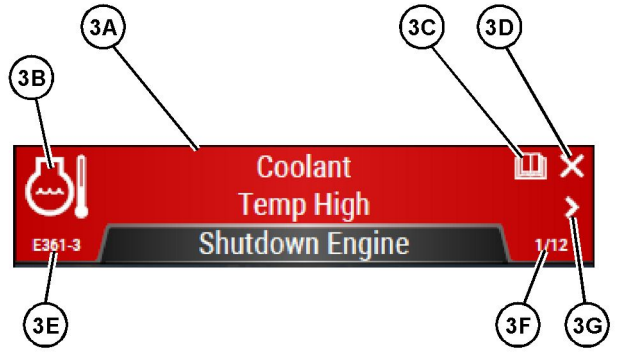


Illustration 222 g06223056

(3A) Event Description
(3B) Event Symbol
(3C) e-OMM
(3D) Close
(3E) Event ID
(3F) Order Number / Total Number
(3G) Arrow (Next)

Event Description (3A) – This area will display the description of pop-up message of the impending problem.

- Line 1 : System
- Line 2 : Condition
- Line 3 : Action to be taken

Event Symbol (3B) – This area will display the symbol of the problem

e-OMM (3C) – This area will indicate that the e-OMM is available for this event. If e-OMM is not available for this event, the area will be blank.

Close (3D) – Select this to hide the pop-up message and display the event icon list.

Event ID (3E) – The identification number for the event will be shown here.

Priority Number / Total Number (3F) – The priority number of the pop-up message is displayed next to the total number of messages. The messages are ordered from the highest to the lowest priority.

Arrow (3G) – The arrow is shown when there is a next or previous message. Select the arrow to display the next or previous message.

Camera View (4)

This area on the monitor displays the view of the cameras. A rear view camera mounted on top of the counterweight and an optional side view camera mounted in the side panel next to the hydraulic tank.

If both rear view camera and side view camera are equipped, the monitor screen can be toggled to show:

- Rear only
- Side only
- Split vertically
- Split horizontally

The camera view can be toggled when the cursor is on the camera view area and the area is touched or the jog dial is turned.

Gauge Area (5)

Fuel Level – This gauge indicates the amount of fuel that is remaining in the fuel tank. When the fuel gauge 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 is in the white range, the engine and machine warm-up is required. Refer to Operation and Maintenance Manual, “Engine and Machine Warm-up”. 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 is in the white range, the engine and machine warm-up is required. Refer to Operation and Maintenance Manual, “Engine and Machine Warm-up”. If the gauge reaches the red range, stop the machine and investigate the cause of the problem.

Diesel Exhaust Fluid (DEF) Gauge – This gauge indicates the level of DEF fluid in the DEF tank. When the DEF gauge is in the red range, add DEF immediately.

Navigation Bar (6)

Apps Key – Allows you to display different information in the gauge area related to operation. Also contains air conditioner and audio controls. This key includes the settings screen allowing change of a multitude of parameters, some password protected.

Function List Key – Allows you to turn on and off various functions related to the active screen. This icon only appears in certain screens where additional settings are necessary.

Shortcuts – Allows you to set certain shortcuts on the navigation bar.

Machine Warnings

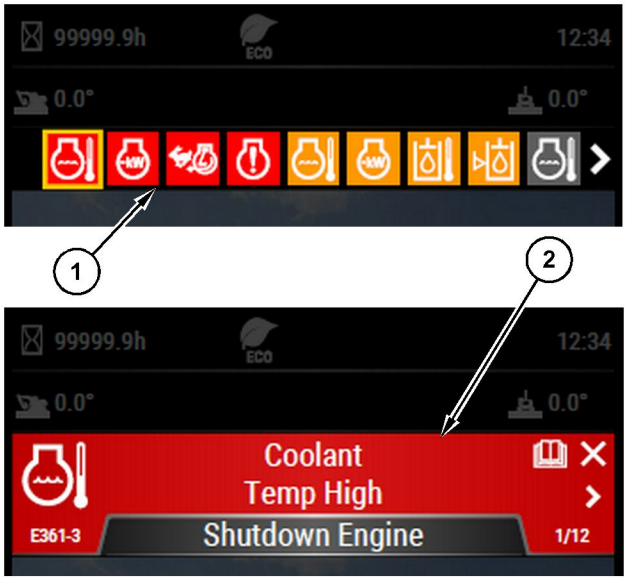


Illustration 223 g06223766

Event Indicator Area

(1) Event Icon List
(2) Pop-up Event Message

The Monitor will display warnings, and log events for machine conditions that are not within normal operating parameters.

The event warnings are classified into three warning levels. Warning Level 1 represents the least severe problem and Warning Level 3 represents the most severe problem. The warning levels, monitor response, and the required operator actions are given below.

Warning Level 1 (Gray) – Requires operator awareness. The icon and pop-up message will both appear gray.

Warning Level 2 (Amber) – Requires a change in the operation of the machine or a change in the maintenance of the machine to correct the condition. The icon and pop-up message will both appear amber and the action lamp will blink.

Warning Level 3 (Red) – Requires immediate shutdown of the machine to prevent damage to the machine or personnel. The icon and pop-up message will both appear red, the action lamp will blink, and the buzzer will sound.

When multiple warnings are present in the system, the highest warning is shown first. Press the right or left key to view all the logged warnings. If no keys are pressed within a few seconds, the display will return to the highest warning.

Reference: For complete machine warning information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Logging In

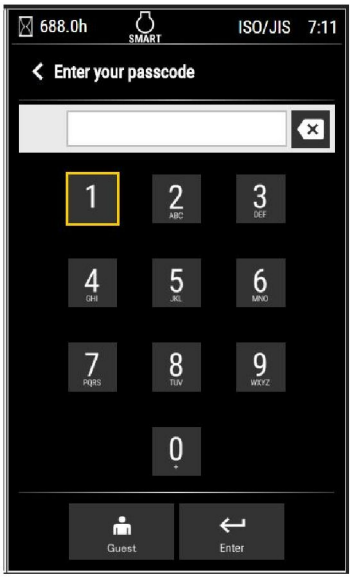


Illustration 224 g06242074

There are different ways to access the monitor which include:

- Guest access
- Passcode access
- Bluetooth access
- Cat ® Fleet Management app

For more information on logging in, refer to Operation and Maintenance Manual, Machine Security System - Operator Login.

Navigation

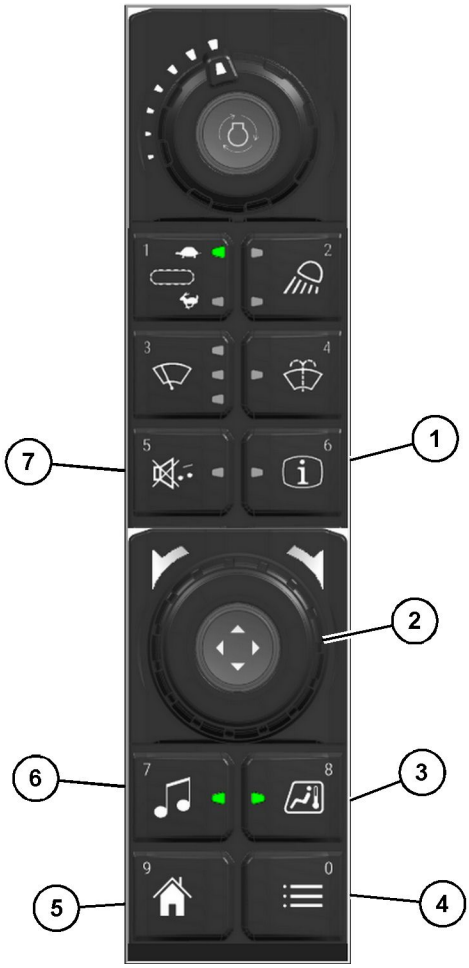


Illustration 225 g06464384

Right side switch panel

(1) Operator information button
(2) Jog dial
(3) Air conditioner button
(4) Next menu button
(5) Home button
(6) Audio button
(7) Mute button

The monitor can be navigated by touch screen or the switch panel. Switch panel components can be used to interface with the monitor in the following ways:

Operator information button (1) – Press and hold this button to access the operator information screen. This screen shows information such as operator settings.

Jog dial (2) – Rotate the jog dial to highlight menu items in the monitor. Push the jog dial down to select the highlighted item.

Air conditioner button (3) – Press the button to access the air conditioner controls.

Next menu button (4) – This button is equivalent to the function list key on the monitor. This button can only be used on screens where the function list key is shown.

Home button (5) – Press this button to return to the main screen.

Audio button (6) – Press this button to access the audio controls.

Mute button (7) – Press this button to mute the audio. Press the button again to unmute the audio.

Each of the buttons is also assigned a number which is imprinted in the top corner of the button. These buttons can be used to enter the numerical passcodes used to log in to the monitor.

Application Menu

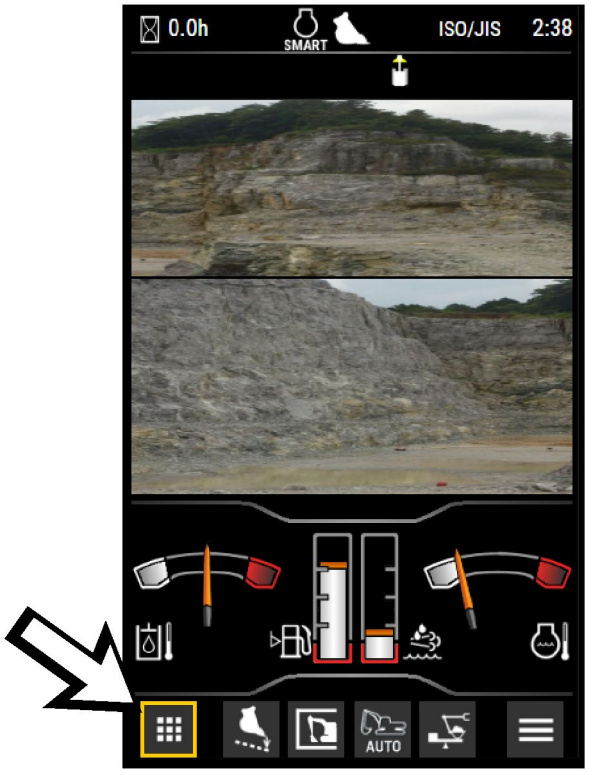


Illustration 226 g06391692

Press the application menu button to access the Application menu.

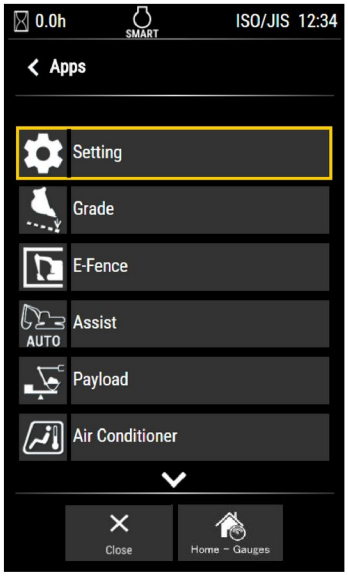


Illustration 227 g06247445

The Application menu “(Apps)” contains the list of applications. The available applications may differ depending on the machine configuration or software version.

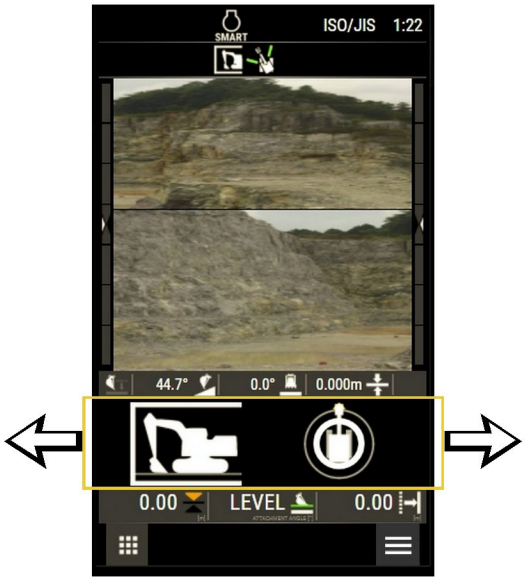


Illustration 228 g06263058

Once an “App” has been selected, an operator can sort through the available “Apps” by swiping the selected area left or right.

Reference: For complete application menu information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Setting Menu

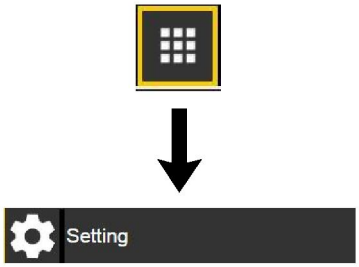


Illustration 229 g06213909

From the main screen, press the application menu button. In the Application menu, select “Setting” .

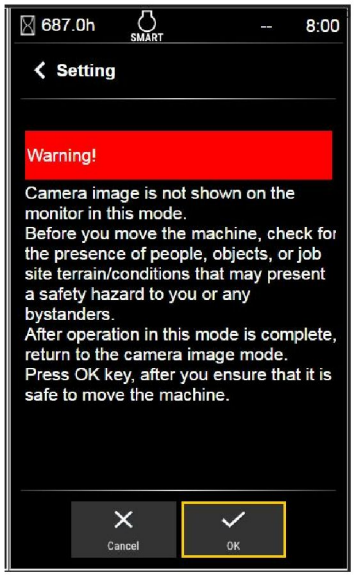


Illustration 230 g06217518

A warning will appear notifying the operator that the camera is not visible in the Setting menu. After you have read the warning and understand the content, press the “OK” button.

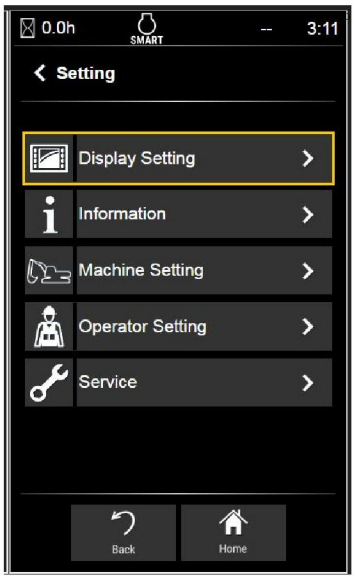


Illustration 231 g06213929

The Setting menu contains the following menu items:

- Display Setting
- Information
- Machine Setting
- Operator Setting
- Service

Note: A dealer password is necessary to access the Service menu.

Machine Setting

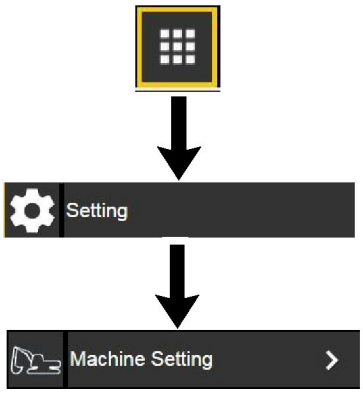


Illustration 232 g06217583

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Machine Setting” .

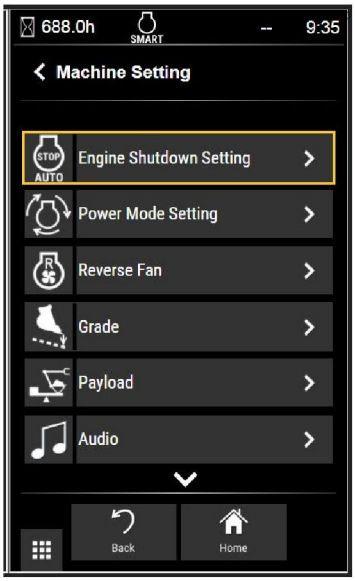


Illustration 233 g06261306

The Machine Setting menu may differ depending on the machine configuration or software version. Basic settings are described below.

Reference: For complete machine settings information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Audio

The Audio screen allows the user to choose the radio region, enable Bluetooth, pair devices, and scan for Digital Audio Broadcast (DAB) channels.

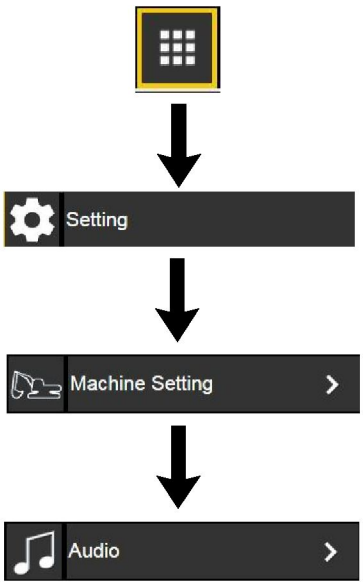


Illustration 234 g06261319

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Machine Setting” , and then “Audio” .

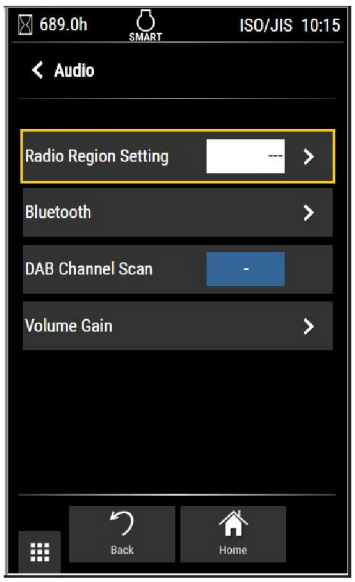


Illustration 235 g06241515

The Audio screen contains the following menu items:

- Radio Region Setting - Choose the radio region from the list of locations around the world.
- Bluetooth - Allows the operator to enable Bluetooth and pair a phone. This menu is also available through the main Audio screen. Refer to Operation and Maintenance Manual, Monitoring System - Bluetooth for information on the Bluetooth screen.

- DAB Channel Scan - Start a scan to find DAB channels in the area with good reception.
- Volume Gain - Allows the user to individually adjust the gain on various outputs such as the AM radio, FM radio, and the phone.

Auto Warm Up

The Auto Warm Up screen allows the user to enable and set the auto warm-up feature. This feature automatically starts a warm-up period when the engine is started and the hydraulic oil is below the set temperature.

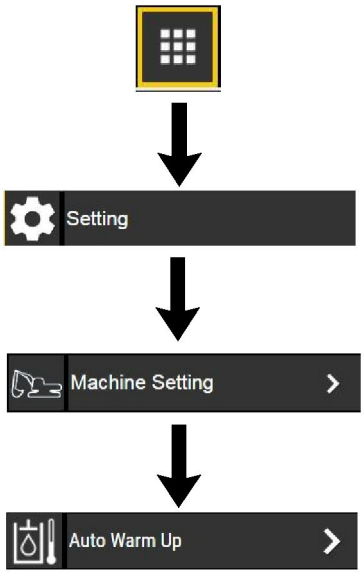


Illustration 236 g06261321

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Machine Setting” , and then “Auto Warm Up” .



Illustration 237 g06219830

To set the auto warm-up temperature, press the “Auto Warm Up Target Temp” window, then enter the temperature. If the hydraulic oil is below the set temperature, the auto warm-up feature will activate after the engine is started.

Sleep Time

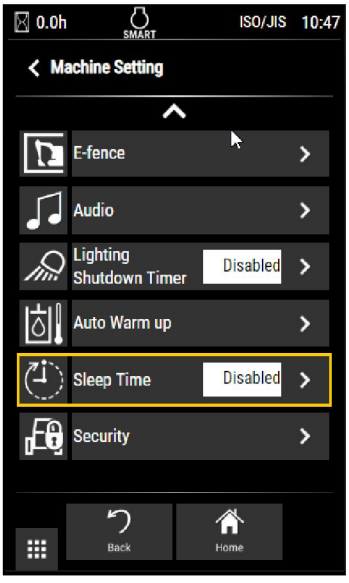


Illustration 238 g06360101

The Sleep time Setting feature allows the user to set a sleep timer for the engine start switch. If the start switch is left in the ON position, power will automatically shut off once the chosen timer interval has elapsed.

Security

Note: Master level access is required to adjust security settings.

The Security screen allows the user to set the operator lockout time. The lockout time is the amount of time after engine shutdown that an operator can start the engine without logging back in to the monitor.

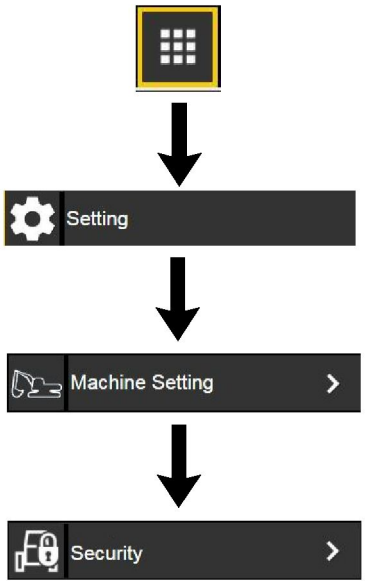


Illustration 239 g06261324

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Machine Setting” , and then “Security” .

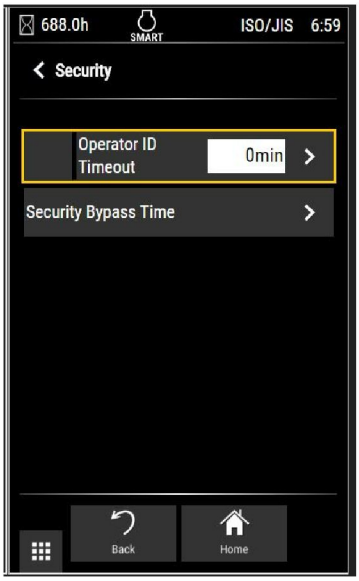


Illustration 240 g06242069

Select “Operator ID Timeout” to select the amount of time before the operators passcode times out after engine shutdown. To block out periods of time throughout the week to bypass security, select “Security Bypass Time” .

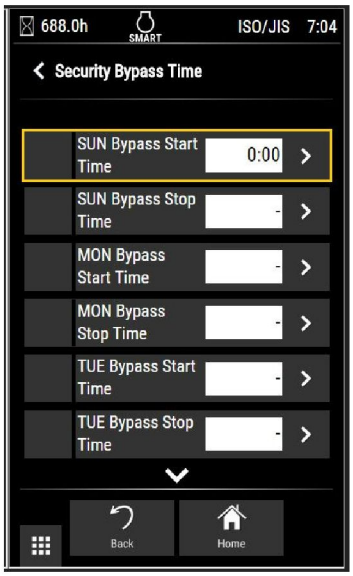


Illustration 241 g06242071

Enter the times and the days to bypass the security system.

Operator Setting

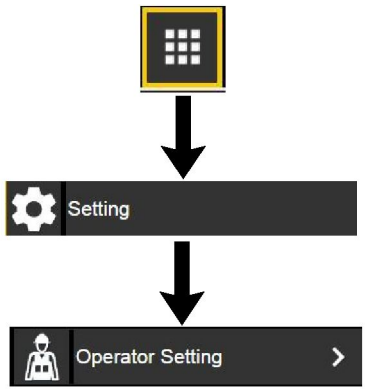


Illustration 242 g06217328

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Operator Setting” .

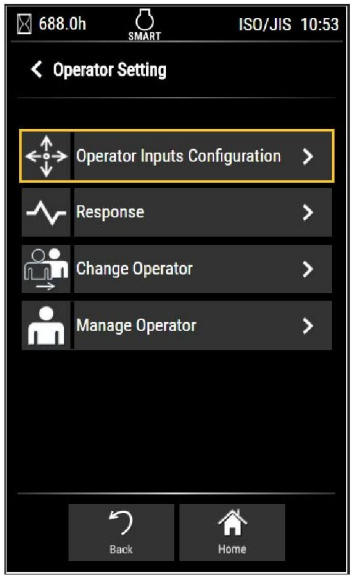


Illustration 243 g06261330

The Operator Setting menu contains the following menu items:

- Operator Inputs Configuration
- Response

Reference: For complete operator settings information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Operator Inputs Configuration

The operator inputs configuration screen allows the operator to configure the joystick buttons for personal preference. The settings will be stored in the preferences for that login ID.

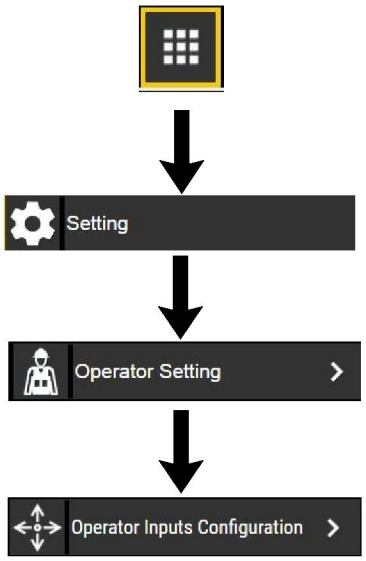


Illustration 244 g06261334

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Operator Setting” , then “Operator Inputs Configuration” .

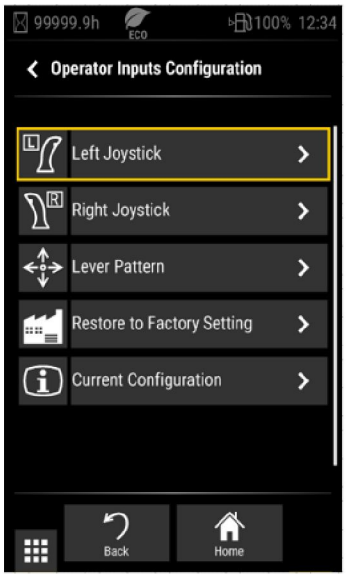


Illustration 245 g06222026

Choose the operator input to configure.

Lever Pattern

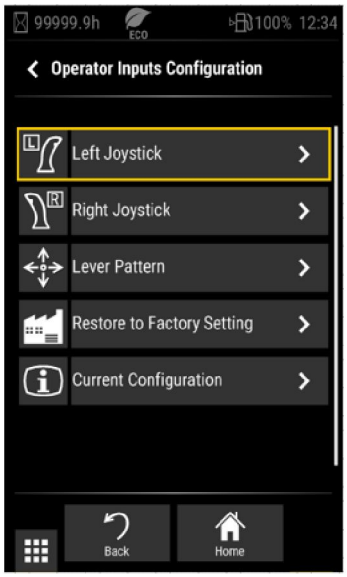


Illustration 246 g06222026

From the Operator Inputs Configuration screen, select “Lever Pattern” .

Select the desired lever pattern from the menu items. Press the “Home” button to return to the main screen.

Restore to Factory Setting

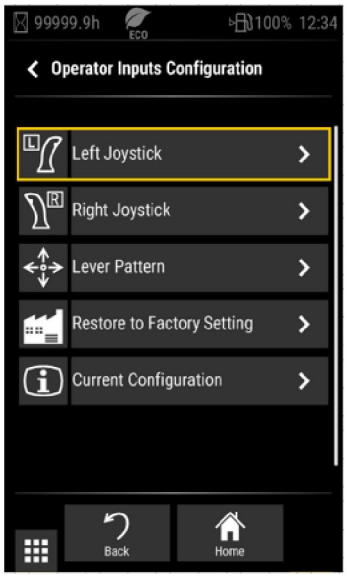


Illustration 247 g06222026

From the Operator Inputs Configuration screen, select “Restore to Factory Setting” .

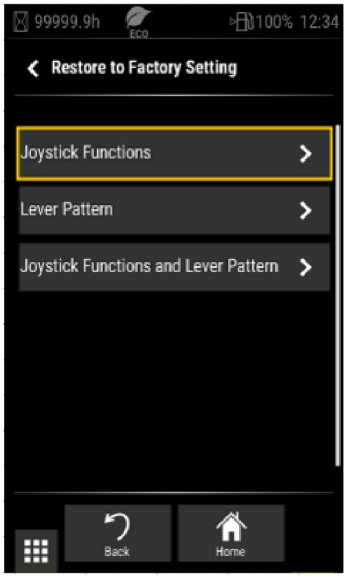


Illustration 248 g06222053

Select the item from the list to be restored.

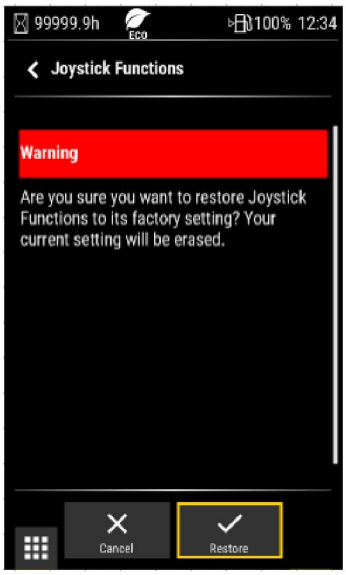


Illustration 249 g06222061

A warning will appear asking if you want to proceed. Press “Restore” to restore the settings or press “Cancel” to abort. After pressing “Restore” , the operator information screen will appear to show the new button assignments. Press the “OK” button to return to the main screen.

Air Conditioner

Refer to Operation and Maintenance Manual, Air Conditioning and Heating Control for coverage of the air conditioner screen in the monitor.

Audio

Refer to Operation and Maintenance Manual, Radio for coverage of the audio screen in the monitor.

Phone

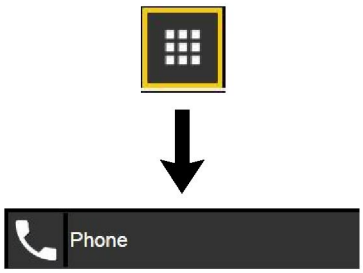


Illustration 250 g06213901

From the main screen, press the application menu button. In the Application menu, select “Phone” .

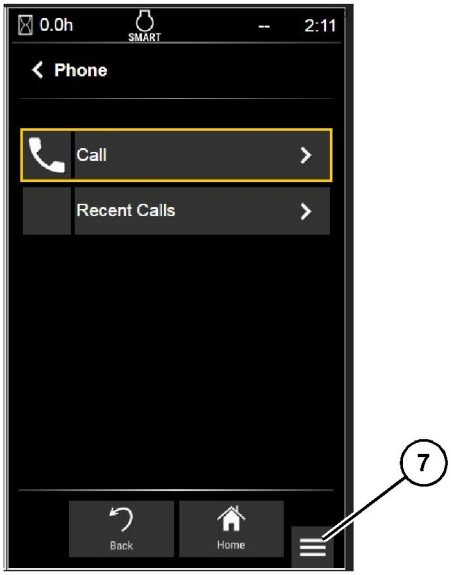


Illustration 251 g06340470

To make a call, select “Call” , then use the keypad to dial the number.

Note: There must be a paired phone in the cab and Bluetooth enabled to make a call.

Reference: For phone and Bluetooth settings, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Bucket/Work Tool Setting

The Bucket/Work Tool Setting screen allows the operator to choose the tool being used for work.

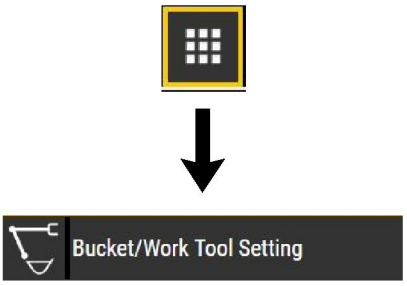


Illustration 252 g06220041

From the main screen, press the application menu button. In the Application menu, select “Bucket/Work Tool Setting” .

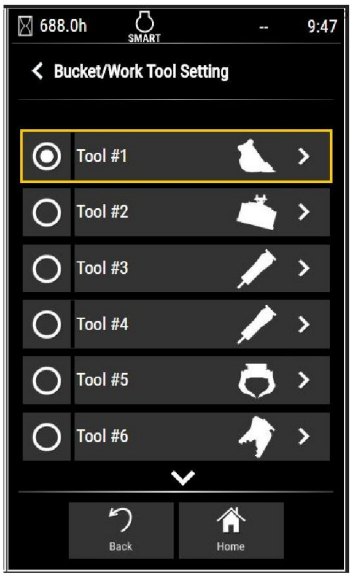


Illustration 253 g06220034

Select the desired tool.

Reference: For complete Bucket/Work Tool settings, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

Electronic OMM

The Electronic OMM screen allows the operator to view the Operation and Maintenance Manual (OMM) for the machine.

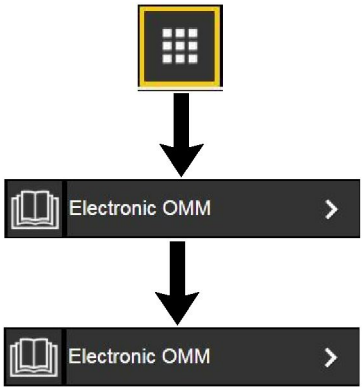


Illustration 254 g06261340

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Information” and then “Electronic OMM” .

Note: Contact your Cat Dealer for information to update the electronic OMM.

Function List Screen

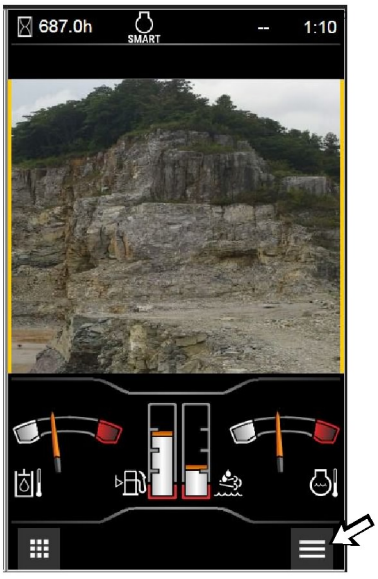


Illustration 255 g06213511

Press the Function List icon to access the Function List screen.

The Function List screen allows the user to turn on or off the available functions on the machine. Tap or select with the jog dial the item to turn on or off.

The Function list menu may differ depending on the machine configuration or software version.

Reference: For complete function list information, refer to M0109053, “Next Generation Hydraulic Excavator Monitoring System Supplement”.

i08251212

Fuel Transfer Pump (Refueling)
(If Equipped)

SMCS Code: 1256

Use the following procedure to pump fuel and store the hose.

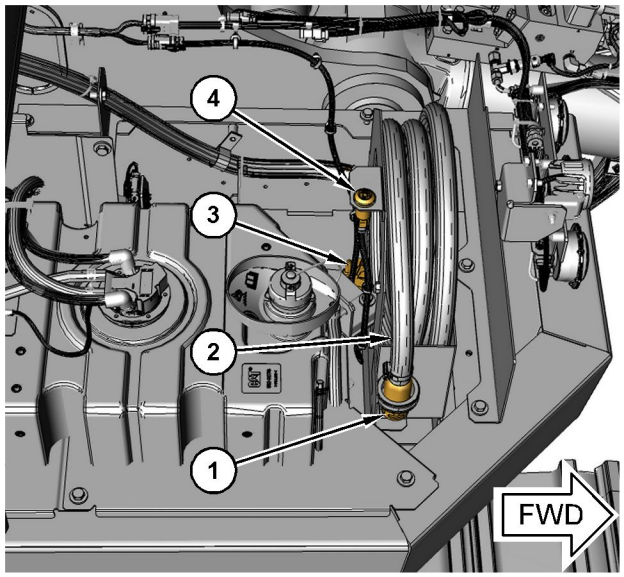


Illustration 256 g06600665

(1) Suction valve
(2) Suction hose
(3) Electric refueling pump
(4) ON/OFF switch

ON/OFF Switch – Push the ON/OFF switch to activate or deactivate the fuel transfer pump. A red indicator on the switch will illuminate when the fuel transfer pump is activated.

If one of the following conditions occurs, the fuel transfer pump will not activate and/or stop operating:

- Battery disconnect switch is in the OFF position
- Engine is operating
- Engine start switch is moved to the START position.
- Engine start switch is in the OFF position
- Hydraulic lockout control is not in the LOCKED position

- Fuel tank level is full
- Fuel is not detected at the suction valve.
- 30 seconds following a detection of no fuel at the suction valve.

Use the following procedure to pump fuel and store the hose.

1. Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“. Move the hydraulic lockout control to the LOCKED position. Stop the engine

2. Turn the engine start switch to the ON position without starting the engine. Refer to “Engine Starting“.

3. Remove the fuel tank cap from the fuel tank.

4. Open the right access door. Refer to “Access Door and Cover Locations“.

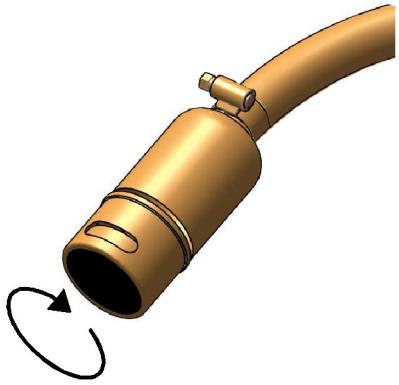


Illustration 257 g06180748

Suction valve (1) is at the end of hose (2).

Turn the end of the suction valve clockwise to open the valve

5. Uncoil the hose and turn the end of the suction valve clockwise to open the suction valve.

6. Properly insert the end of the suction valve into a container of fuel.

7. Push switch (4) to activate the fuel transfer pump and supply the fuel to the tank. A red indicator on the switch will illuminate when the fuel transfer pump is activated.

When the fuel tank is full, the fuel transfer pump will automatically stop.

When the fuel container is empty, push the switch again to stop refueling. If additional fuel is needed, wait 30 seconds and return to step 6.

Note: The red indicator on the switch will no longer illuminate when the fuel transfer pump has stopped refueling.

Note: The fuel transfer pump will not activate for 30 seconds following a detection of no fuel at the suction valve.

8. Push the switch at any time to deactivate the fuel transfer pump.

Note: The red indicator on the switch will no longer illuminate when the fuel transfer pump has stopped refueling.

9. Drain excess fuel from the hose and turn the end of the suction valve counter-clockwise to close the suction valve.

10. Wind the hose and store in the hose container.

NOTICE
To prevent hose damage, do not coil the hose in a tight radius.

11. Close the access door.

12. Install the fuel tank cap onto the fuel tank.

13. Turn the engine start switch to the OFF position.

i07092848

Radio

SMCS Code: 7338

The radio is integrated into the monitoring system. All the radio controls are adjusted using the monitor. The actual radio is mounted in the right rear console behind the operator seat.



Illustration 258 g06213193

(1) Jog dial
(2) Home button
(3) Radio button

The audio menu can be directly accessed by pressing radio button (3) on the right side switch panel. Input selections can be made using jog dial (1) or using the monitor touch screen. Home button (2) can be used to return to the main screen.

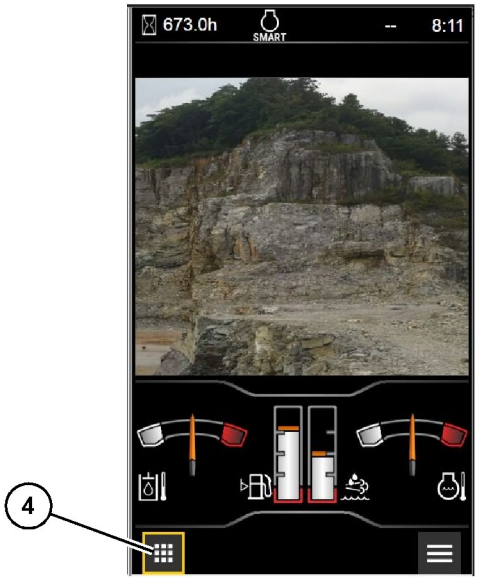


Illustration 259 g06213076

Press radio button (3) to go directly to the radio screen. To navigate to the radio screen from the main screen, press application menu button (4).

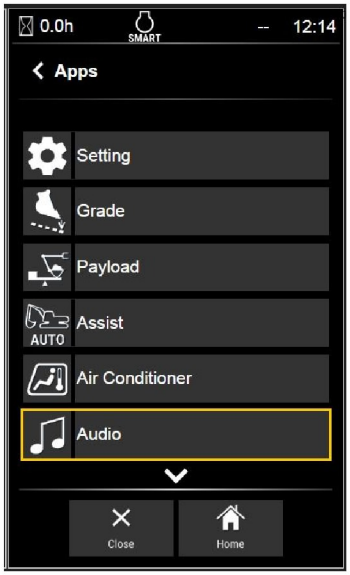


Illustration 260 g06213198

Use jog dial (1) to highlight “Audio” and then press the jog dial downward to select the entry. You may also access the screen by simply touching the “Audio” box on the touch screen.

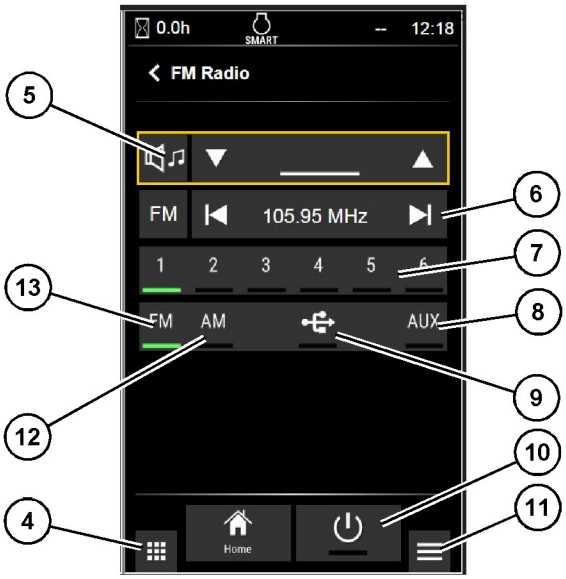


Illustration 261 g06213200

Radio screen

(4) Application menu button
(5) Volume control
(6) Tuner
(7) Preset stations
(8) Auxiliary button
(9) USB button
(10) Power button
(11) Radio Function List menu
(12) AM button
(13) FM button

Application menu button (4) – Use this button to return to the application menu.

Volume control (5) – The volume control is used to raise or lower the audio volume.

Tuner (6) – The tuner is used to tune the radio to the desired station.

Preset stations (7) – The preset stations store favorite radio stations for the operator. To set a station, tune to the desired station. Press and hold the preset number you want to assign to that station. Once a beep is heard, release the button. The indicator light for the active preset station will illuminate.

Auxiliary button (8) – When a device is plugged into the auxiliary port, press the auxiliary button to connect the device to the radio. The indicator light will illuminate when this mode is active.

USB button (9) – When a device is plugged into the USB port, press the USB button to connect the device to the radio. The indicator light will illuminate when this mode is active.

Power button (10) – Pressing this button turns the radio on and off. The indicator light on the monitor and on button (3) will illuminate when the power is on.

Radio function list menu button (11) – Pressing this button leads to the radio function list menu.

AM button (12) – Press this button to access AM radio. The indicator light will illuminate when this mode is active.

FM button (13) – Press this button to access FM radio. The indicator light will illuminate when this mode is active.

Radio Function List

To access the radio function list, press the function list button (11) in the lower right corner of the radio screen.

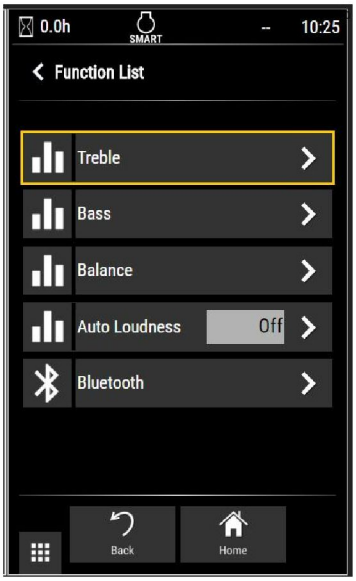


Illustration 262 g06223378

The function list menu consists of the following items:

Treble – Allows the user to adjust the treble.

Bass – Allows the user to adjust the bass.

Balance – Allows the user to adjust the balance between speakers.

Auto Loudness – When on, this feature automatically adjust treble and bass levels when reducing the volume setting. This effect allows the user to hear more clearly at a lower volume.

Bluetooth – Allows the user to pair a phone, view paired devices, and edit device names.

Refer to Operation and Maintenance Manual, Monitoring System - Bluetooth for information on the Bluetooth screen.

Selection Method

All settings can be made using the touch screen or by using the jog dial. The method depends on the preference of the operator. When using the touch screen, simply touch the icon you want to select. When using the jog dial, rotate the dial to switch to different selections within the screen. Press the jog dial downward to choose a selection.

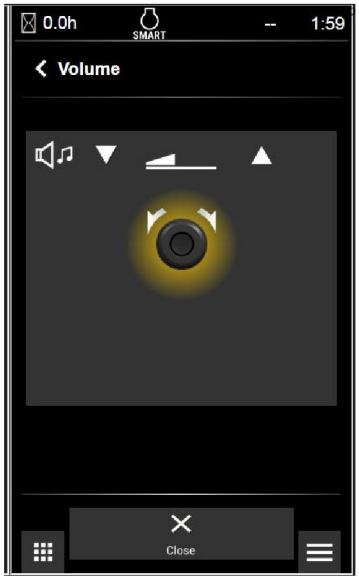


Illustration 263 g06213233

When using the jog dial to set the volume or tuner, rotate the dial clockwise to increase and counter-clockwise to decrease. Press downward on the dial to enter the desired setting.

Radio Operation

1. To operate the system, press power button (10).
2. Select between the AM button for AM stations or select the FM button for FM stations.
3. Use tuner (6) to adjust to the desired station. If presets stations (7) are set, press the desired preset station.
4. Use volume control (5) to adjust the volume.
5. When the machine is in operation turn down the volume of the radio.

USB/AUX Operation

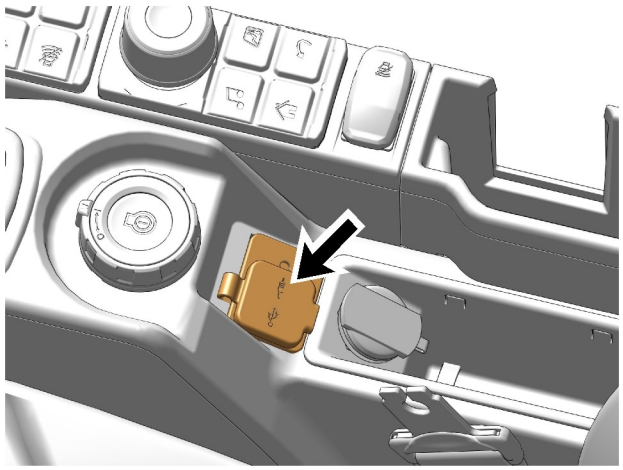


Illustration 264 g06213245

1. To play music from a device such as an MP3 player or a phone, connect the device using an auxiliary cable or a USB cable. Depending on the cable being used, plug the cable into the appropriate port on the console.
2. Select either USB or AUX depending on which type of cable was used. Play the music from the device. The music should be playing over the radio speakers if properly connected. Adjust the volume as necessary.

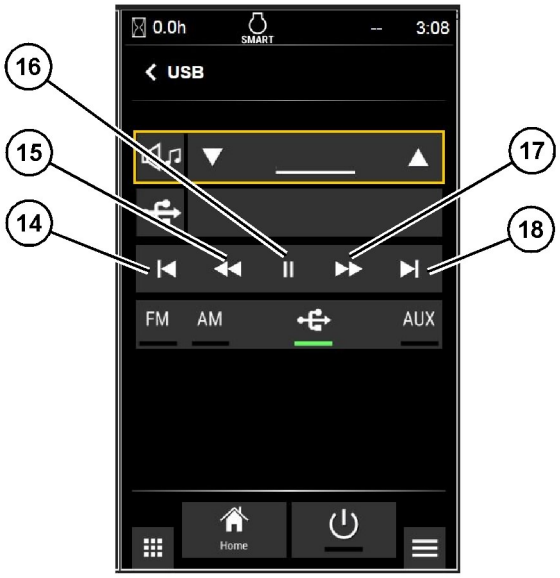


Illustration 265 g06213254

Note: If USB is selected, extra controls appear on the screen for playing music. They include the following:

14 – Skip to the beginning of the track

15 – Rewind the track

16 – Pause/Play the track

17 – Fast forward the track

18 – Skip to the end of the track

i08031142

Air Conditioning and Heating Control

SMCS Code: 7304; 7320; 7337

Consult with your Cat dealer for periodic maintenance of the heating and air conditioning system.

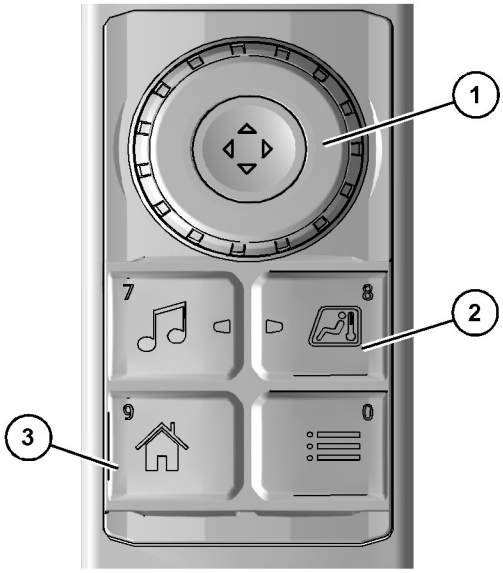


Illustration 266 g06178710

(1) Jog dial
(2) Heating and air conditioning button
(3) Home button

Air conditioning and heating functions are controlled through the monitor. The heating and cooling menu can be directly accessed by pressing button (2) on the right side switch panel. Input selections can be made using jog dial (1) or using the monitor touch screen. Home button (3) can be used to return to the main screen.

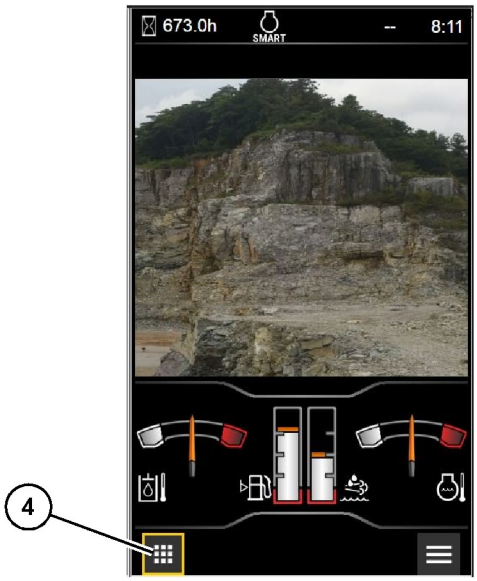


Illustration 267 g06213076

Press the Air Conditioning and Heating button (2) to go directly to the air conditioner screen. To navigate to the air conditioner screen from the main screen, press application menu button (4).



Illustration 268 g06213088

Use jog dial (1) to highlight “Air Conditioner” and then press the jog dial downward to select the entry. You may also access the screen by simply touching the “Air Conditioner” box on the touch screen.

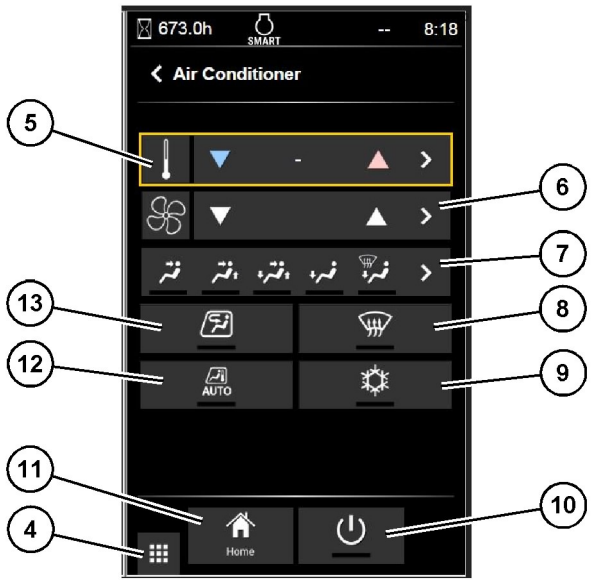


Illustration 269 g06213092

Air conditioner screen

(4) Application menu button
(5) Temperature control
(6) Fan blower speed control
(7) Air outlet settings
(8) Defroster
(9) Compressor ON/OFF
(10) Power
(11) Home button
(12) Auto
(13) Recirculation

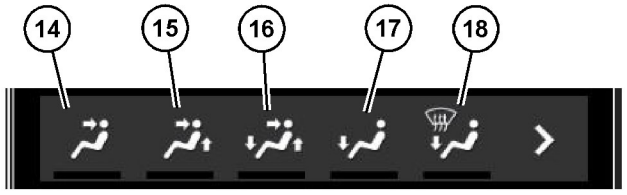


Illustration 270 g06213104

(14) Front vents
(15) Front and rear vents
(16) Front, foot, and rear vents
(17) Foot vents
(18) Defrost and foot mode

Application menu button (4) – Use this button to return to the application menu.

Temperature control (5) – The temperature control is used to raise or lower the desired temperature.

Fan blower speed control (6) – The blower control is used to increase or decrease the desired blower speed.

Air outlet settings (7) – The desired air outlet setting can be chosen from this panel. The indicator light will illuminate to show the active setting.

Defroster (8) – Pressing this button activates and deactivates the defroster. Use the defroster to remove steam and frost from the windows. The indicator light will illuminate when this mode is active.

Compressor ON/OFF (9) – Pressing this button activates and deactivates the air conditioner. The indicator light will illuminate when this mode is active.

Power (10) – Pressing this button turns the heating and cooling system on and off. Push and hold the power button for 3 seconds to turn OFF the HVAC system. The indicator light on the monitor and on button (2) will turn green when power is on.

Home button (11) – Use this button to return to the main screen.

Auto (12) – Select this option to hold the system at the desired temperature. The system will modulate to keep the cab at the temperature that the system is set to. The indicator light will illuminate when this mode is active.

Recirculation (13) – This option recirculates air from the cab instead of pulling air from the outside. This mode is more efficient because the system is recycling conditioned air from the cab. However, no fresh air is coming into the cab when in this mode. The indicator light will illuminate when this mode is active.

Front vents (14) – In this mode, air will only circulate from the front vents.

Front and rear vents (15) – In this mode, air will circulate from the front vents and rear vents.

Front, foot, and rear vents (16) – In this mode, air will circulate from the front vents, rear vents, and foot vents.

Foot vents (17) – In this mode, air will only circulate from the foot vents.

Defrost and foot mode (18) – In defrost mode, air will circulate from the defrost vents and foot vents.

Selection Method

All settings can be made using the touch screen or by using the jog dial. The method depends on the preference of the operator. When using the touch screen, simply touch the icon you want to select. When using the jog dial, rotate the dial to switch to different selections within the screen. Press the jog dial downward to choose a selection.

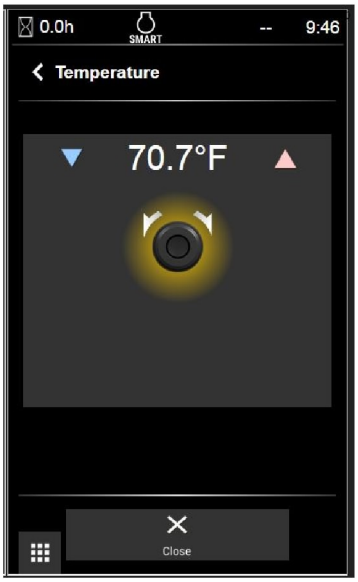


Illustration 271 g06213141

When using the jog dial to set the temperature or blower speed, rotate the dial clockwise to increase and counter-clockwise to decrease. Press downward on the dial to enter the desired setting.

Operation

1. To operate the system, press power button (10).
2. Use temperature control (5) to adjust to the desired temperature.
3. Select the desired mode and outlet vents.
4. Use fan blower speed control (6) to adjust the blower. If the system is in “Auto” mode, the blower fan speed and air outlet setting will automatically be adjusted. But recirculation air intake is not changed automatically.

Note: In cold ambient temperature condition, fan speed is stopped or restricted depend on coolant temperature.

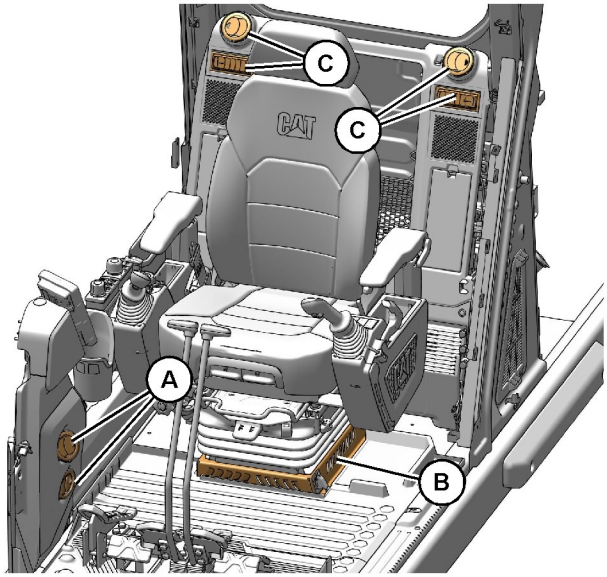


Illustration 272 g06178705

(A) Defrost vent (front window)
(B) Foot air vents
(C) Rear air vents

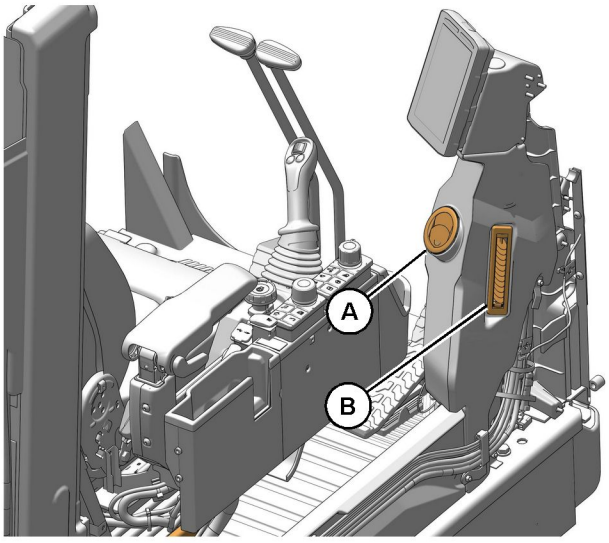


Illustration 273 g06287632

(A) Front vent
(B) Defrost vent (RH window)

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

i08233128

Mirror

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.

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

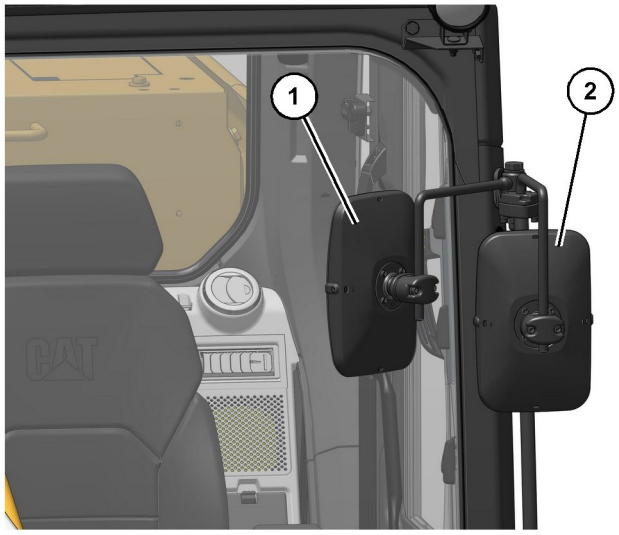


Illustration 274 g06220616

(1) Right Side View Mirror on the Cab
(2) Left Side View Mirror on the Cab

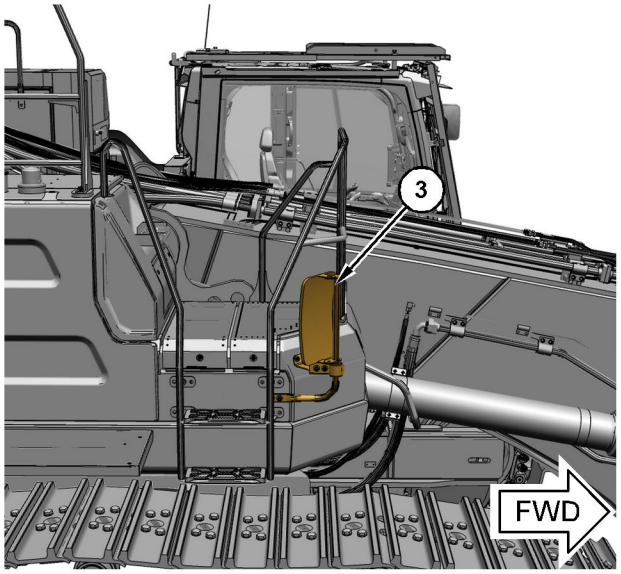


Illustration 275 g06600648

(3) Front tank mirror

Mirrors provide more 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.

Modified machines or machines that have more 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 to provide visibility behind the machine at a maximum distance of 30 m (98 ft) from the rear corners of the machine.

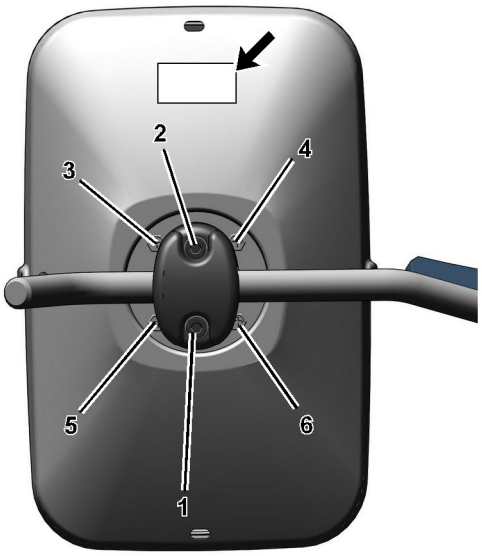


Illustration 276 g06220634

Tightening sequence

After adjustment of the mirror angle, make sure that the CAT logo is at the top.

It may be necessary to tighten the mirror mounting bolts periodically. If the bolts are loose, tighten the bolts in the sequence shown in Illustration 276 . Tighten bolts (1) and (2) to 11 ± 2 N·m (97.36 ± 17.70 lb in).

Tighten the bolts (3) through (6) to 2.0 ± 0.4 N·m (17.70 ± 3.54 lb in).

Right Side View Mirror on the Cab (1)



Illustration 277 g06594985

Adjust the right side view mirror on the cab (1) so the front of the right track can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the right front of the machine should be seen from the operator seat.

Left Side View Mirror on the Cab (2)

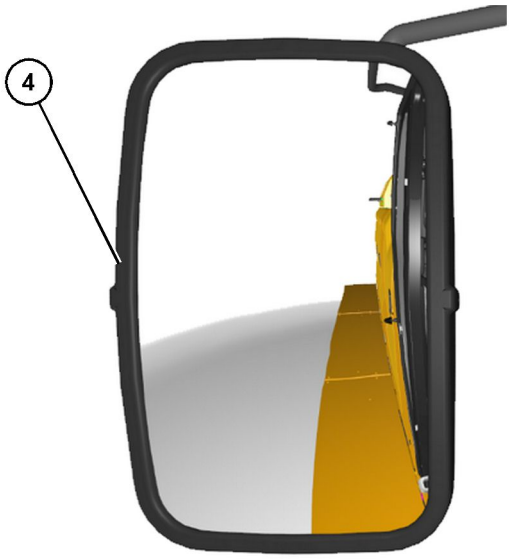


Illustration 278 g06594991

Adjust the left side view mirror on the cab (4) so the left side of the cab, access door, and rear of left track can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat. Additionally, provide as much visibility to the rear as possible.

Right Side View Mirror (3)

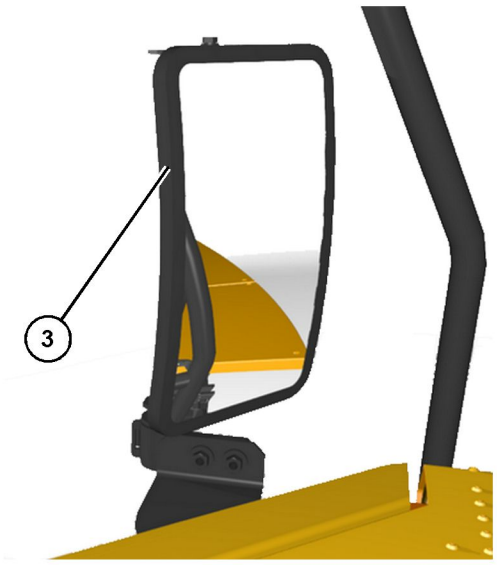


Illustration 279 g06595001

Adjust the right side view mirror (3) so the right access door and the counterweight can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat. Additionally, provide as much visibility to the rear as possible.

i07427990

Window (Front)

SMCS Code: 7310-FR

To provide full ventilation inside the cab, the upper window and the lower window can be fully opened.

⚠ WARNING

When opening or closing the windows, be extra careful to prevent any personal injury. The hydraulic lockout control must be in the LOCKED position in order to prevent any possibility of sudden movement of the machine due to inadvertent contact with the hydraulic control(s).

Do not change the position of the window until the following items have been done:

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position.
- Stop the engine.

Perform Step 1 through Step 3 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.

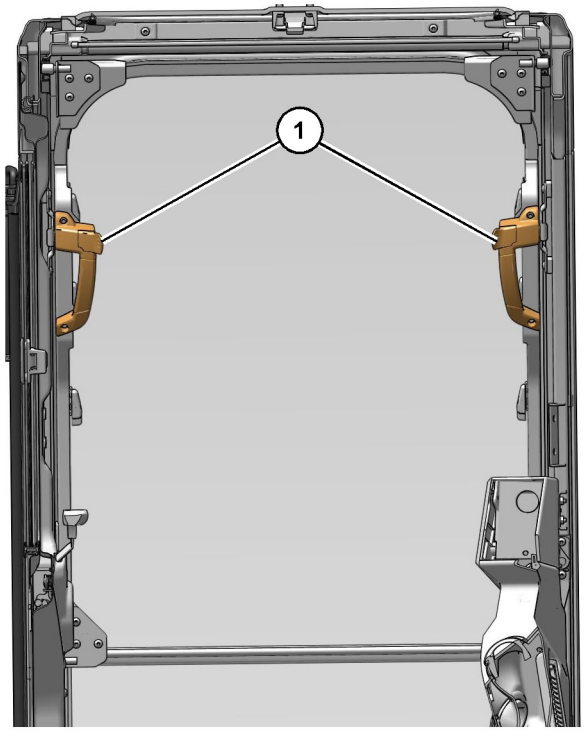


Illustration 280 g06185052

(1) Release lever

1. Release the auto-lock latches by pressing release levers (1) on the window handles.
2. Holding both handles on the window frame, pull the window upward.
3. Hold both grips that are provided on the window frame and move the window into the storage position until the auto-lock latches near the ceiling are 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. Release the auto-lock latches by pressing release levers (1) on the window handles.
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.

6. Raise the lower window out of the window frame.

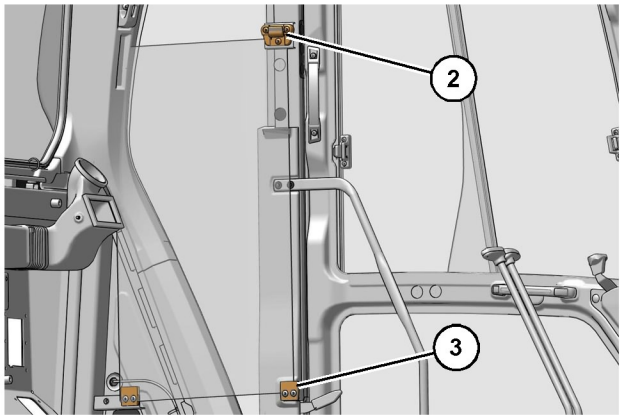


Illustration 281 g06185076

(2) Catch
(3) Brackets

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 (2).
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.

i07538754

Sun Screen

SMCS Code: 7165-ZZ

⚠ 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).

NOTICE
Do not change the position of the sun screen without performing the following actions:

- 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.

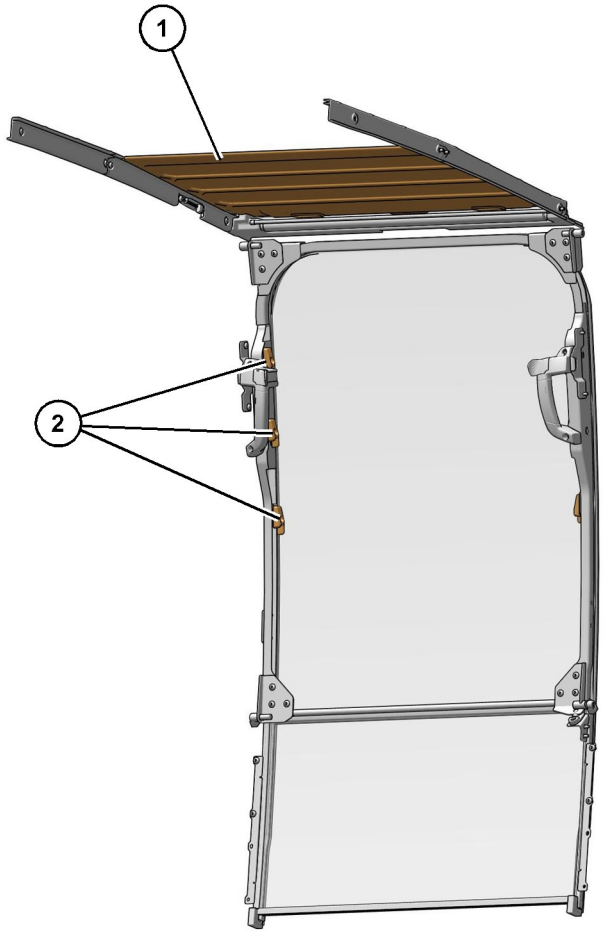


Illustration 282 g06179846

Pull sun screen (1) down from the ceiling. Hook the sun screen to the brackets (2) at both sides of the front window. The sun screen may be positioned at two different heights.

i07538807

Roof Hatch

SMCS Code: 7303

⚠ 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).

NOTICE
Do not change the position of the roof hatch without performing the following actions:

- 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.

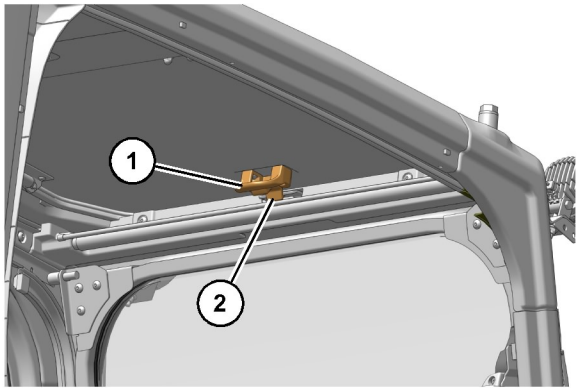


Illustration 283 g06179871

(1) Grip
(2) Lock

To open the roof hatch, release lock (2). Hold grip (1) and push the roof hatch upward.

To close the roof hatch, hold grip (1) and pull the roof hatch downward. Engage lock (2) securely.

NOTICE
Do not stand or walk on the hatch or the roof of the cab. Serious damage may occur.

i06949447

Cab Door

SMCS Code: 7308



Illustration 284 g06180275

To open the cab door from the outside of the cab, pull outward on the door handle.

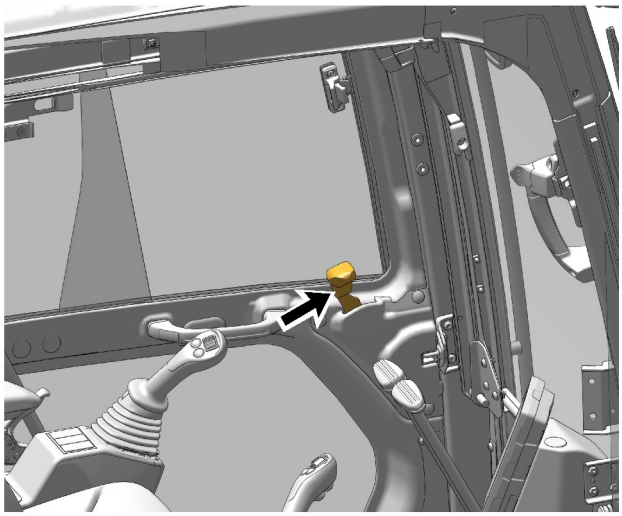


Illustration 285 g06179959

To open the cab door while inside the cab, push forward on the lever for the cab door latch.

For additional ventilation, open the cab door all the way to engage the catch on the exterior wall of the cab.

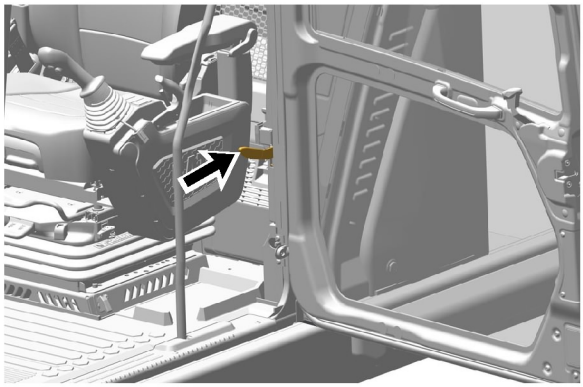


Illustration 286 g06180267

To release the cab door from the catch, pull downward on the cab door release lever.

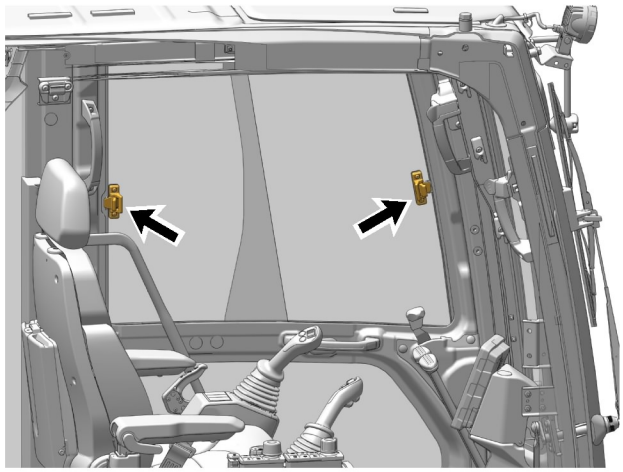


Illustration 287 g06179957

To open a window, release the window latch, and then slide the window to the desired position.

i06946782

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 288 g06178249

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.

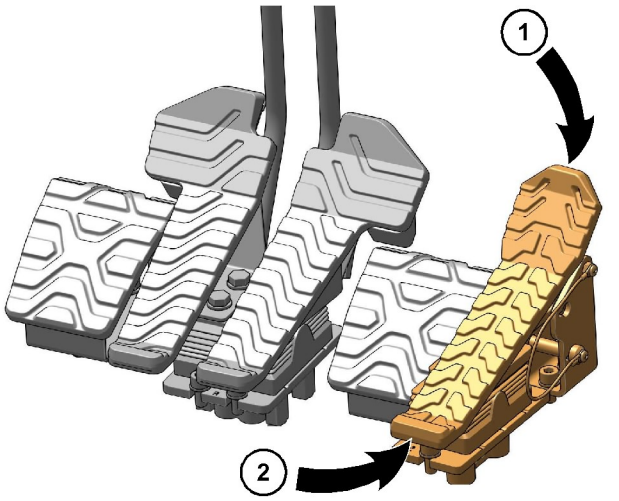


Illustration 289 g06178758

(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.

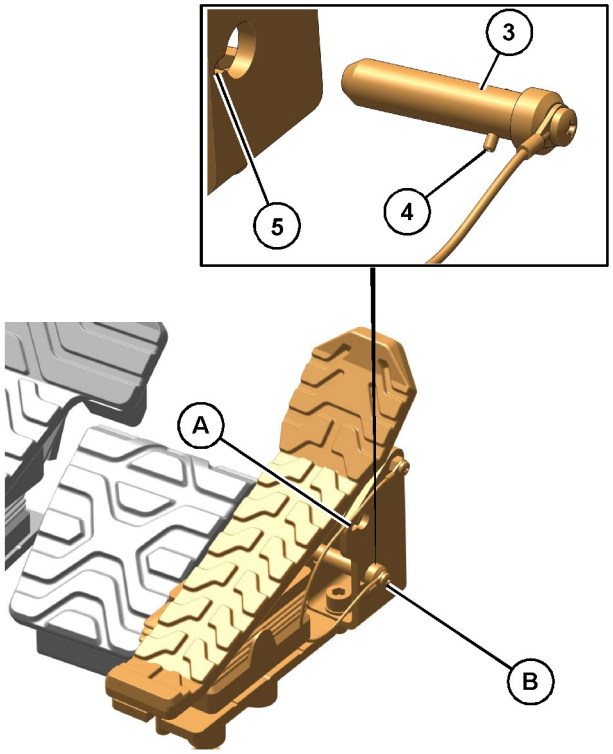


Illustration 290 g06178798

(3) Lock pin
(4) Pin
(5) Notch
(A) LOCKED position
(B) UNLOCKED position

When the machine is not operated with the third pedal, install lock pin (3) at the LOCKED position 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.

i08034255

Joystick Controls

SMCS Code: 5705

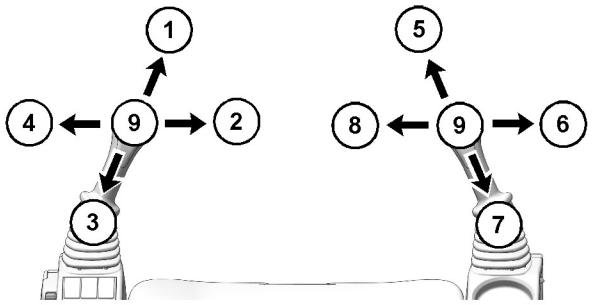


Illustration 291 g06180324

(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

WARNING

The joystick and controls on the joystick can be configured with different functions. Always make sure to check the joystick configuration on the monitor before using the machine to avoid unexpected machine movement. These unexpected machine movements could cause a hazard resulting in serious injury or death.

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.

Manual Low Idle – Activate the manual low idle to reduce the engine speed to approximately 1000 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. Manual low idle is useful when the operator wants to reduce the engine speed to talk to someone or while the operator is waiting for a truck.

Vertical Slider Joystick Controls



Illustration 292 g06224200

Vertical Slider Joystick Controls

(1) Left joystick switch 3
(2) Left joystick switch 4
(3) Left joystick switch 1
(4) Left joystick switch 2
(5) Left joystick thumbwheel
(6) Right joystick thumbwheel
(7) Right joystick switch 2
(8) Right joystick switch 1
(9) Right joystick switch 4
(10) Right joystick switch 3

Table 40

Joystick Configurations					
Switch Location	Machine Configuration				Joystick With Tool Control Sliders
	Grade	Grade Assist	Grade Payload	Grade Assist Payload	
1(1)	Hammer	Hammer	Hammer	Hammer	Hammer
2	Standby / Weigh	Standby / Weigh	Standby / Weigh	Standby / Weigh	Configurable
3	Horn	Horn	Horn	Horn	Horn
4	Store	Store	Store	Store	Configurable
5(1)	Work Tool Rotation	Work Tool Rotation	Work Tool Rotation	Work Tool Rotation	Work Tool Rotation
6(1)	Work Tool Open / Close	Work Tool Open / Close	Work Tool Open / Close	Work Tool Open / Close	Work Tool Open / Close
7	Bucket Recall and Store	Bucket Recall and Store	Bucket Recall and Store	Bucket Recall and Store	Configurable
8	Bench Mark	Bench Mark	Bench Mark	Bench Mark	Configurable
9	Grade and Bucket Assist Activation	Grade and Bucket Assist Activation	Grade and Bucket Assist Activation	Grade and Bucket Assist Activation	Configurable
10	Laser and Touch Point	Laser and Touch Point	Laser and Touch Point	Laser and Touch Point	Configurable

(1) Button is configurable on machines without tool control.

Note: The following functions can be assigned to the configurable buttons: radio mute, one-touch low idle, work tool select, and HVAC.

Dual Slider Joystick Controls (If Equipped)

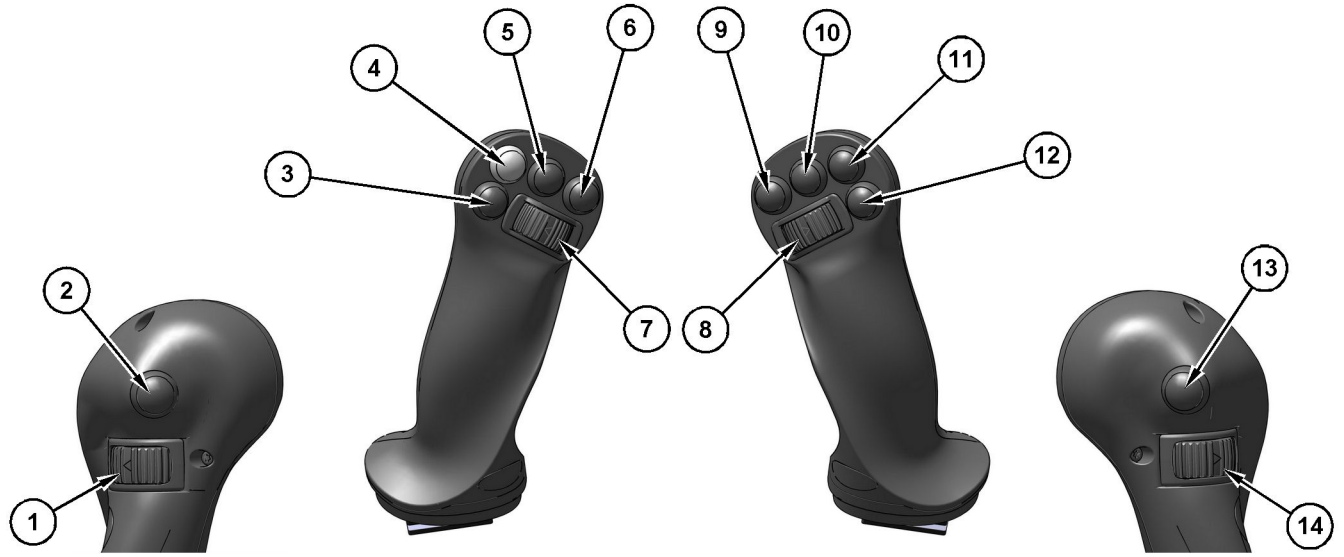


Illustration 293 g06516923

(1) Left Thumbwheel 2
(2) Left Switch 4
(3) Left Switch 2
(4) Left Switch 1 (Horn)
(5) Left Switch 5
(6) Left Switch 3

(7) Left Thumbwheel 1
(8) Right Thumbwheel 1
(9) Right Switch 3
(10) Right Switch 5
(11) Right Switch 1
(12) Right Switch 2
(13) Right Switch 4
(14) Right Thumbwheel 2

Table 41

Default Functions		
Switch	**Function**	**Category**
Left Thumbwheel 2 (1)	-	Configurable
Left Switch 4 (2)	Standby/Weigh	Payload
Left Switch 2 (3)	Store	
Left Switch 1 (4)	Horn	Mandatory
Left Switch 5 (5)	-	Configurable
Left Switch 3 (6)	One-Way ATT	TCS
Left Thumbwheel 1 (7)	Mid-Pressure ATT	
Right Thumbwheel 1 (8)	High-Pressure ATT	
Right Switch 3 (9)	Laser and Tough Point	Grade
Left Switch 5 (10)	-	Configurable
Left Switch 1 (11)	Bench Mark	Grade

(continued)

(Table 41, contd)

Default Functions		
Switch	**Function**	**Category**
Left Switch 2 (12)	Bucket Recall and Store	Assist
Left Switch 4 (13)	Grade and Bucket Assist Activation	
Left Thumbwheel 2 (14)	-	Configurable

Medium Pressure (If Equipped)

Rotating Tool Control

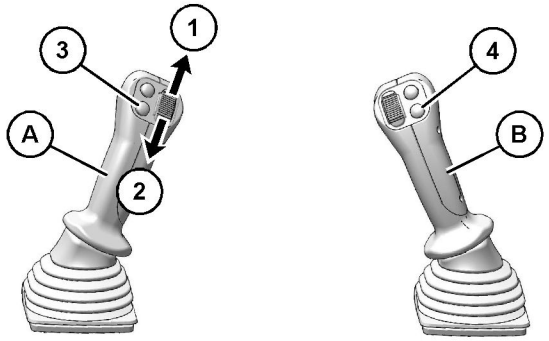


Illustration 294 g06260903

(A) Left joystick
(B) Right joystick
(1) Thumb wheel (Clockwise)
(2) Thumb wheel (Counterclockwise)
(3) Horn switch
(4) AEC switch

(1) ROTATE CLOCKWISE – Move the thumb wheel upward to rotate the work tool clockwise.

(2) ROTATE COUNTERCLOCKWISE – Move the thumb wheel downward to rotate the work tool counterclockwise.

(3) HORN – Press the horn switch on the left joystick to activate the horn.

(4) AEC SWITCH – Press the AEC switch on the right joystick to activate low engine speed. Press the switch again to activate high engine speed.

i06951419

SmartBoom Control
(If Equipped)

SMCS Code: 5461-ZS; 7332

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.

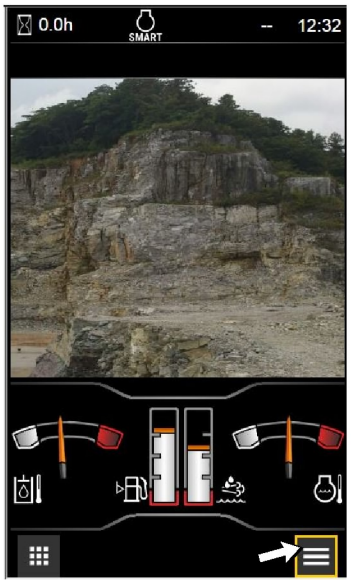


Illustration 295 g06210059

From the home screen, press the function list button.

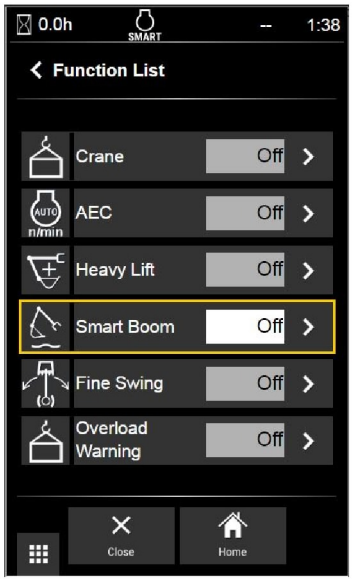


Illustration 296 g06210090

Tap the smart boom option, or if using the jog dial, select the smart boom option and press down on the dial.

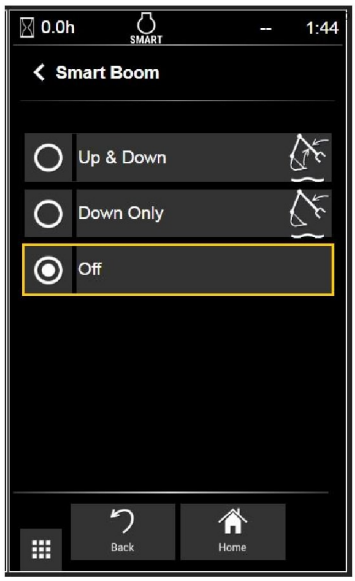


Illustration 297 g06210095

Select either “Up & Down” or “Down Only” from the list. The two options work as follows:

“Up & Down” mode: When the joystick is moved to the BOOM DOWN position, the boom will lower by the weight of the boom. The boom can move upward freely.

“Down Only” 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.

Press the home button when finished.

During operation of the SmartBoom function, the operator may wish to apply downward force to the boom. 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. The SmartBoom disable switch is a configurable switch.

i08222281

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

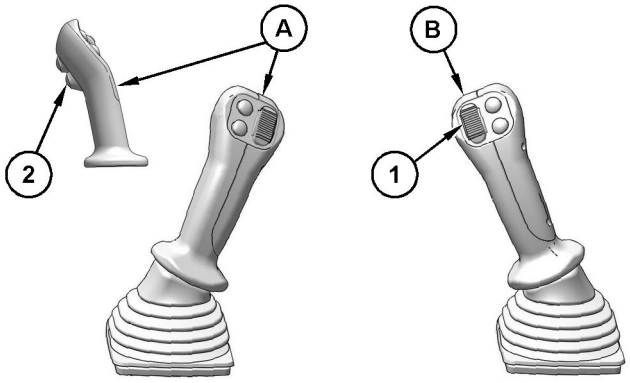


Illustration 298 g06588792

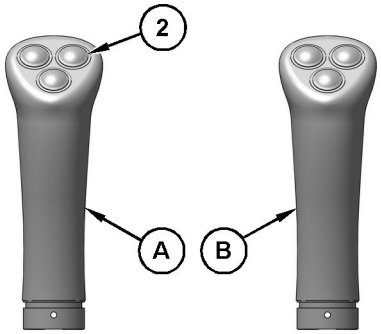


Illustration 299 g06588793

(A) Left joystick
(B) Right joystick

(1) Variable Speed – Move the thumb wheel downward to activate the work tool. Move the thumb wheel further to increase the speed of the work tool.

(2-1) On/Off (Momentary) – While pressing this switch, the work tool will remain activate at a constant rate. Release the switch to turn off the work tool.

(2-2) On/Off (Toggled) – Press the switch once to activate the work tool. Press the switch again 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 installed on either side of the travel pedals. The work tool pedal allows the operator to modulate the speed of the work tool.

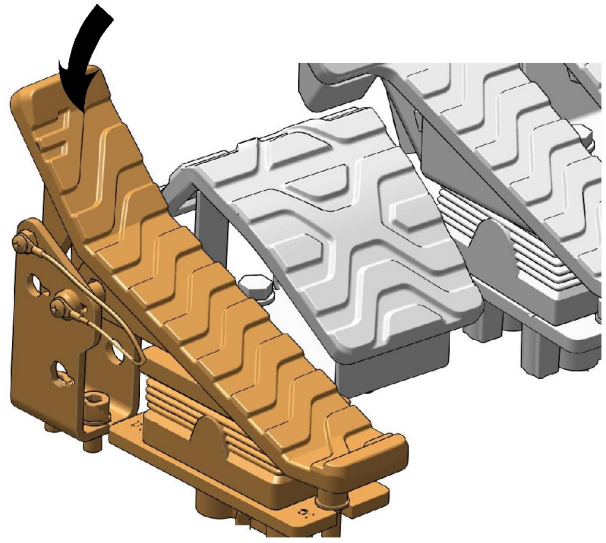


Illustration 300 g06180447

Variable Speed – Push down on the front of the pedal to activate the work tool. Move the pedal further to increase the speed of the work tool. Release the pedal to turn off the work tool.

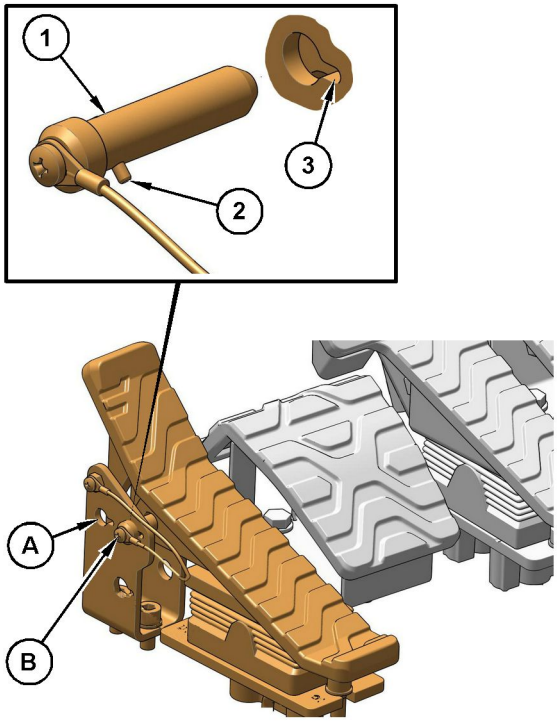


Illustration 301 g06591307

(1) Lock pin
(2) Pin
(3) Notch
(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 to prevent any unexpected operation of the work tool.

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.

i07243676

Work Tool Control (Two-Way Flow)
(If Equipped)

SMCS Code: 6700

⚠ WARNING

The joystick and controls on the joystick can be configured with different functions. Always make sure to check the joystick configuration on the monitor before using the machine to avoid unexpected machine movement. These unexpected machine movements could cause a hazard resulting in serious injury or death.

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

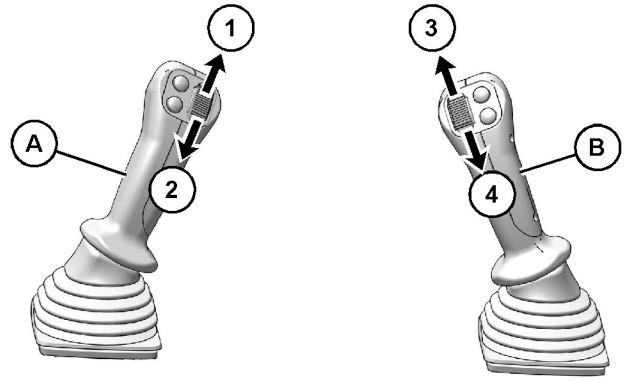


Illustration 302 g06180488

(A) Left joystick
(B) Right joystick

(1) ROTATE CLOCKWISE – Move the thumb wheel upward to rotate the work tool clockwise.

(2) ROTATE COUNTERCLOCKWISE – Move the thumb wheel downward to rotate the work tool counterclockwise.

(3) CLOSE – Move the thumb wheel upward to close the work tool.

(4) OPEN – Move the thumb wheel downward 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 installed on either side of the travel pedals. The work tool pedal allows the operator to vary the speed of the work tool.

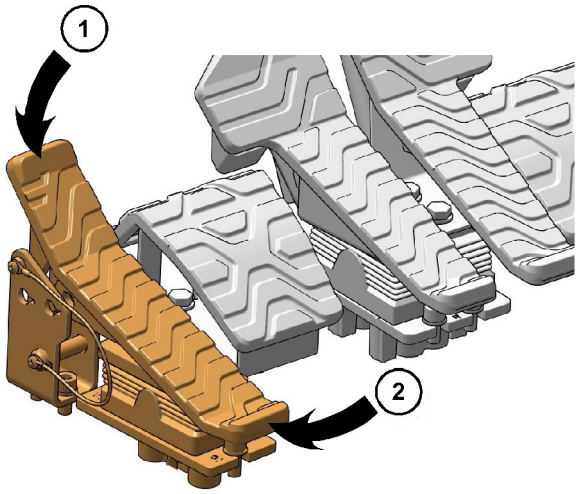


Illustration 303 g06180510

(1) CLOSE – Push down on the front of the pedal to close the work tool.

(2) OPEN – Push down on the rear of the pedal to open the work tool.

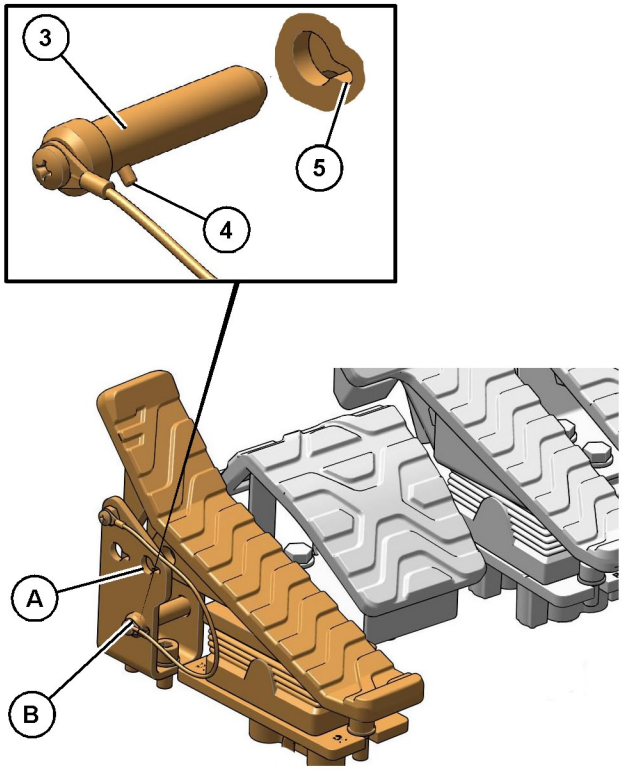


Illustration 304 g06180514

(3) Lock pin
(4) Pin
(5) Notch
(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 to prevent any unexpected operation of the work tool.

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.

i08209549

Joystick Controls Alternate Patterns

SMCS Code: 5059; 5137

Changing Machine Control Pattern (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 be changed to the ISO/JIS pattern, BHL pattern, MHI pattern, KOBE pattern, or the former SCM pattern. To change the joystick controls between the patterns, refer to Operation and Maintenance Manual, Monitoring System for more information.

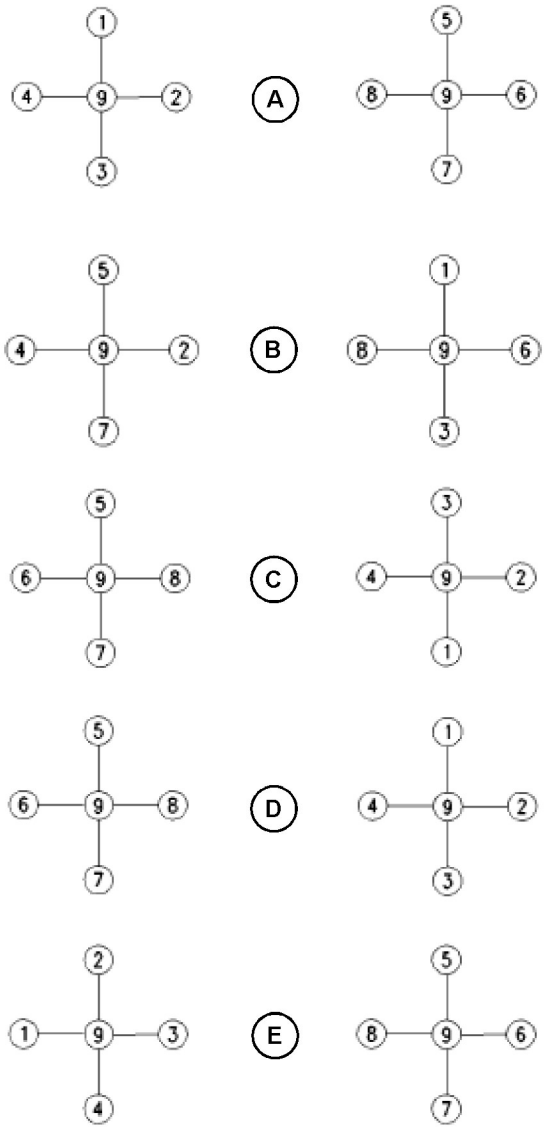


Illustration 305 g06136699

(A) ISO/JIS machine control pattern
(B) BHL machine control pattern
(C) MHI machine control pattern
(D) KOBE machine control pattern
(E) 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 to move the stick outward.

SWING RIGHT (2) – Move the control lever to this position to swing the upper structure to the right.



STICK IN (3) – Move the control lever to this position to move the stick inward.



SWING LEFT (4) – Move the control lever to this position to swing the upper structure to the left.



BOOM LOWER (5) – Move the control lever to this position to lower the boom.



BUCKET DUMP (6) – Move the control lever to this position to dump the bucket.



BOOM RAISE (7) – Move the control lever to this position to raise the boom.



BUCKET CLOSE (8) – Move the control lever to this position 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 to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position to lower the hydraulic hammer.

If the machine is equipped with a grapple, the function of position (6) and of position (8) is different.

GRAPPLE OPEN (6) – Move the control lever to this position to open the grapple arms.

GRAPPLE CLOSE (8) – Move the control lever to this position to close the grapple arms.

If the machine is equipped with a clamshell, the function of position (6) and of position (8) is different when in “Clamshell” mode.

Note: When in “Clamshell” mode, the work tool can only be operated if Work Tool Select also has clamshell selected.

CLAMSHELL OPEN (6) – Move the control lever to this position to open the clamshell.

CLAMSHELL CLOSE (8) – Move the control lever to this position to close the clamshell.

i08233103

Fuel Tank Shutoff and Drain Control

SMCS Code: 1273

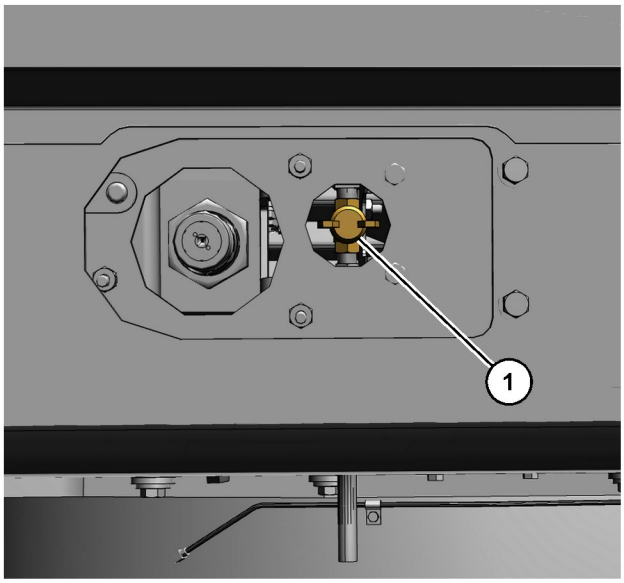


Illustration 306 g06595542

Fuel tank drain valve

Fuel Tank Drain Valve (1) – The drain valve for the fuel tank is located behind the right side access door. 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.

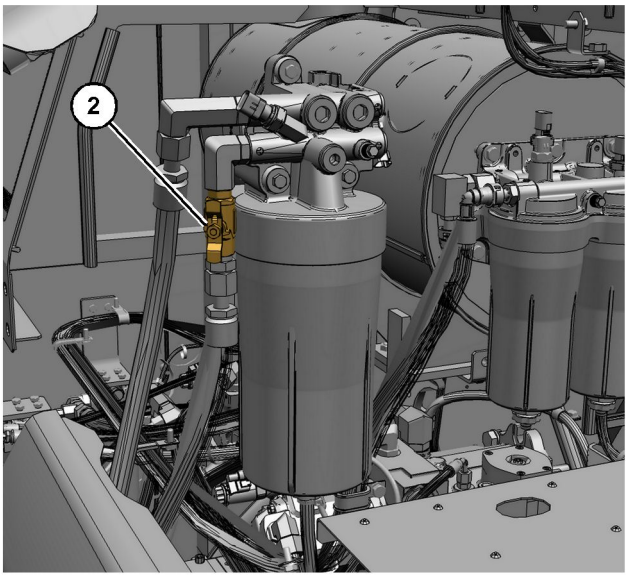


Illustration 307 g06595548

Fuel shutoff valve

Fuel Shutoff Valve (2) – The fuel shutoff valve is located behind the right side access door. 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

i08185791

Engine Starting

SMCS Code: 1000; 1090; 1456; 7000

NOTICE
This machine is equipped with a Cat ® Machine Security System (MSS) and may not start under certain conditions.

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.

Note: The engine can start in areas that have temperatures as low as −18°C (0°F). For areas that are colder, a starting kit for cold weather is available.

1. 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.

2. Ensure that the joysticks and travel controls are in the HOLD position.

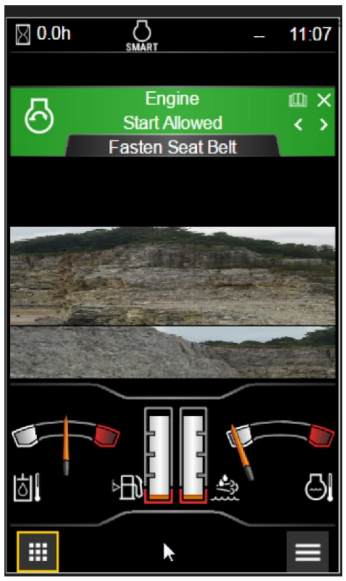


Illustration 308 g06209482

3. The operator passcode, Bluetooth key or Cat App: Fleet management app must be authenticated before starting the engine. Once authenticated, an “Engine Start Allowed” message will appear across the top of the monitor and the start switch LED will turn green.

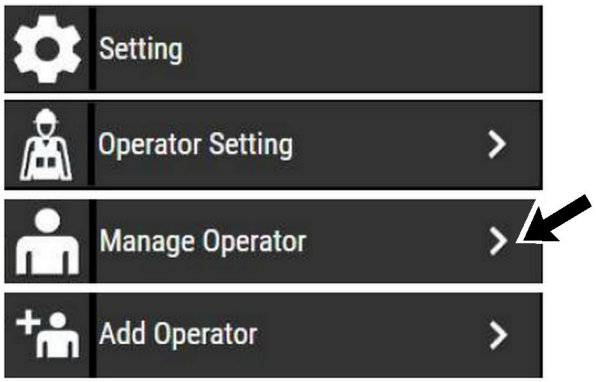


Illustration 309 g06579150

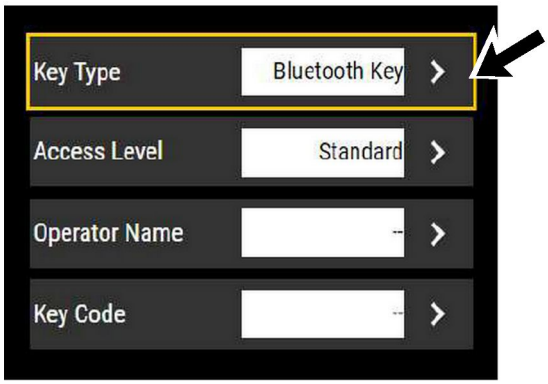


Illustration 310 g06579155

4. Bluetooth devices and passcodes can be registered using the in-cab display if the operator is logged in to the system using a master access account. Contact your Cat dealer for additional information.

Reference: Refer to Operation and Maintenance Manual, Machine Security System, Operator Login for instructions.

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.

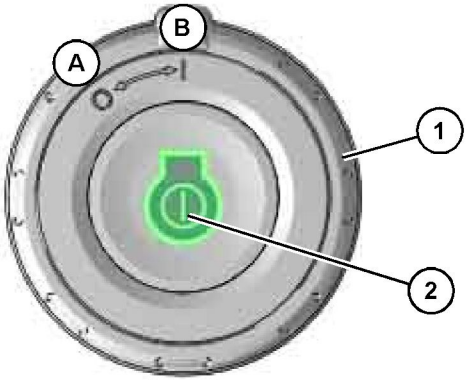


Illustration 311 g06226447

(A) Off
(B) On
(1) Engine start ring
(2) Engine start button

6. Turn the engine start ring(1) to the ON position, then press and hold start button (2) to start the engine. Release the button after the engine has started.

If the engine is having trouble starting, do not crank the engine for more than 30 seconds. Cranking the engine for more than 30 seconds can damage starting system components.

i08251853

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.

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.

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.

4. Turn the engine speed dial to the maximum engine speed and repeat Step 3.
5. Cycle all controls 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 low speed 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.

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

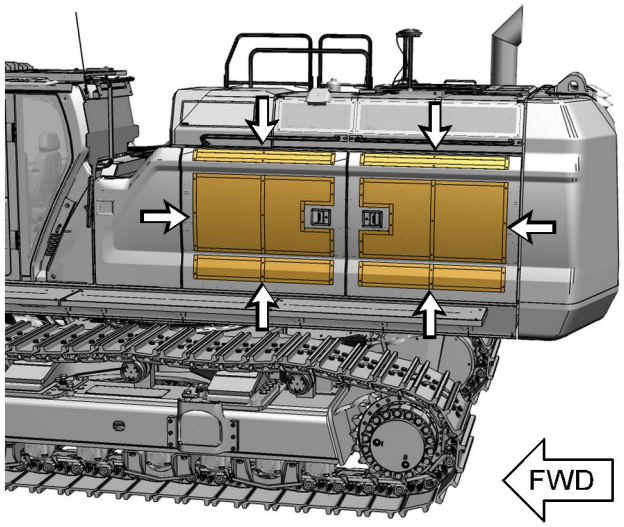


Illustration 312 g06600697
Vent locations on the radiator compartment door

1. Clean the surface of the radiator compartment door.

2. Install the covers in the locations shown in Illustration 312 . The covers should fully cover the door vents.

Operation

i07348768

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 Cat dealer for additional information on special configurations of your machine.

Make sure that no personnel are on the machine or near the machine to prevent any personal injury. Keep the machine under control at all times 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 313 g06181515

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

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

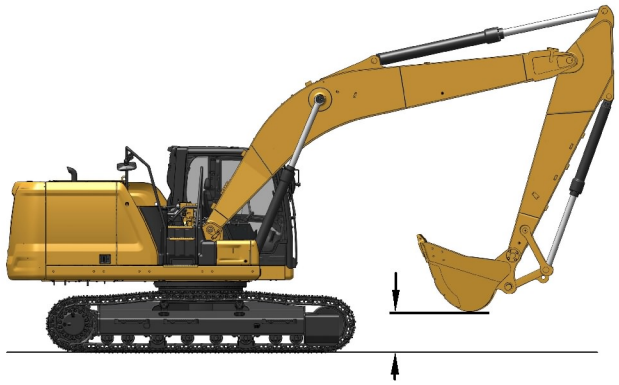


Illustration 314 g06181525

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

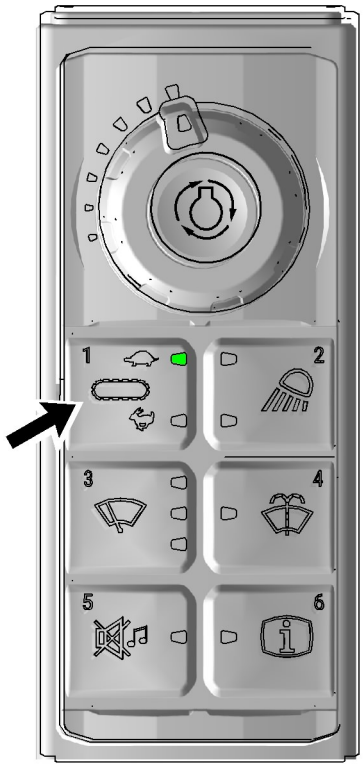


Illustration 315 g06181517

6. Select the desired travel speed by operating the travel speed control switch. The indicator will light to display the active mode.

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 to increase the engine speed (rpm) to the desired speed.

9. Push both travel levers forward at the same time 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 Cat 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 to clear the tracks.

12. Slowly move both of the travel levers or both of the travel pedals to the CENTER position 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 a boom lowering control valve, a stick lowering control valve, and an overload warning device.

A fit for purpose test was completed 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.

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Frozen Ground Conditions

SMCS Code: 7000

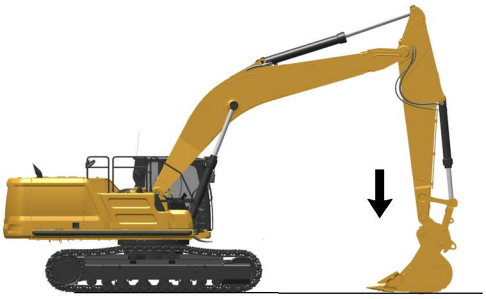


Illustration 316 g06279284

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.

i08233129

Equipment Lowering with Engine Stopped

SMCS Code: 7000

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 to lower the boom.

Machines Equipped with Boom Lowering Control Valves

⚠ 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.

The boom lowering control valve is at the back of the base of the boom. The boom lowering control valve allows the operator to manually lower the boom if the engine is stopped.

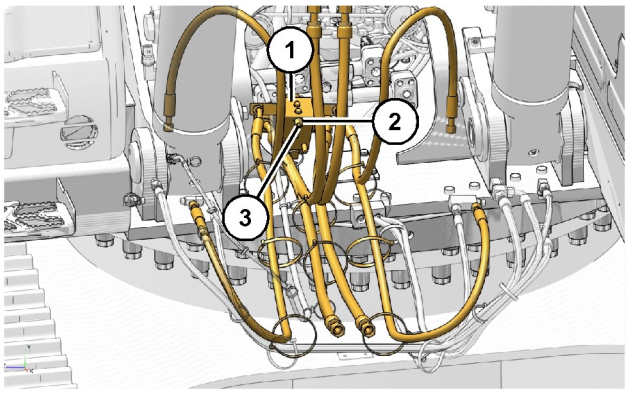


Illustration 317 g06209514

(1) Boom lowering control valve
(2) Locknut
(3) Check valve

1. Release the pressure in the hydraulic system. Refer to Operation and Maintenance Manual, System Pressure Release for instructions.
2. Loosen locknut (2) on the boom lowering control valve (1).
3. Slowly turn check valve (3) counterclockwise until the check valve stops. The boom will lower to the ground.
4. Make sure that the work tool is resting on the ground. Tighten check valve to 2.25 ± 0.25 N·m (20 ± 3 lb in).
5. Tighten the locknut (2) to 4 ± 0.5 N·m (35 ± 4 lb in).
6. 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.

Use the following procedure to manually lower the boom due to an engine malfunction.

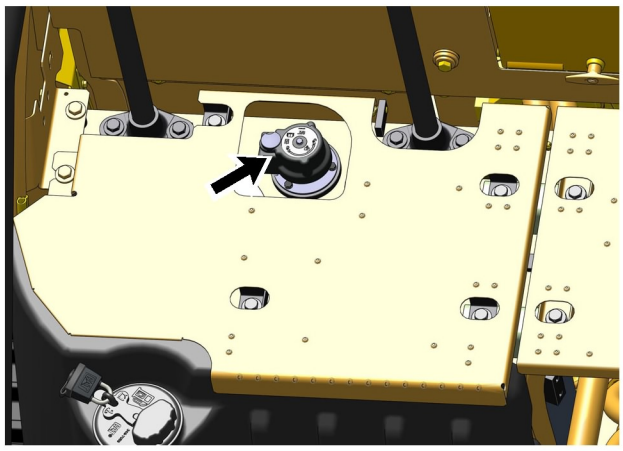


Illustration 318 g06184080

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. Relieve pressure by slowly turning the cap until the cap reaches the secondary stop.

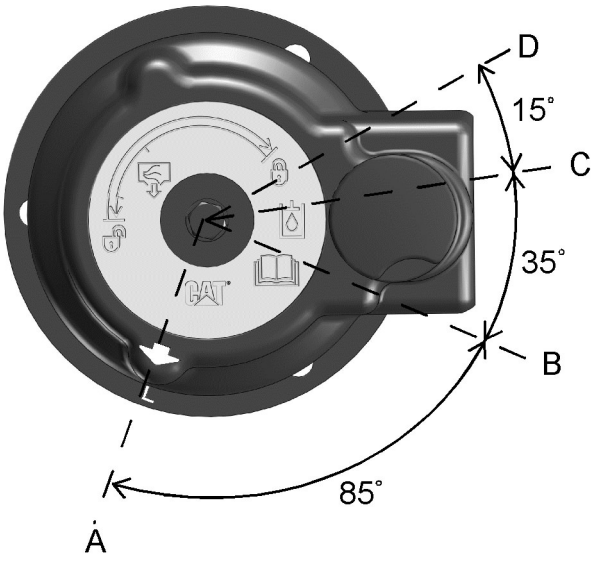


Illustration 319 g06184990

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 319 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. Move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, remove the filler cap.

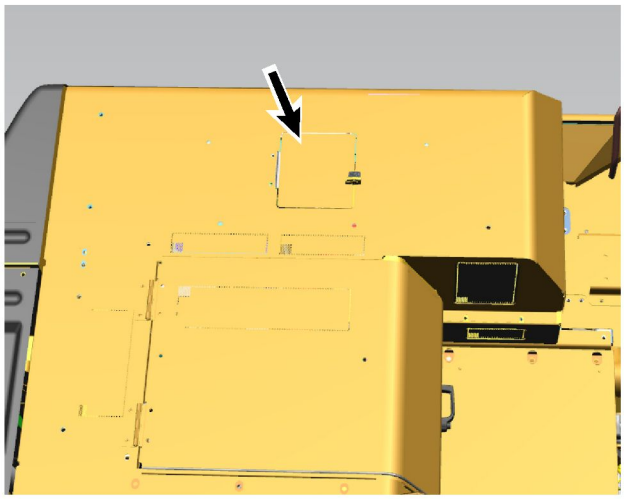


Illustration 320 g06283966

2. Open the engine hood.

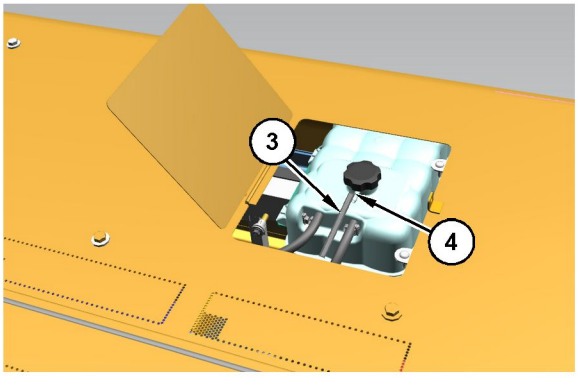


Illustration 321 g06283977

(3) Hose
(4) Clamp

3. Loosen clamp (4) and disconnect hose (3) from the reservoir. Remove the clamps and the cable straps that secure the hose to the machine.

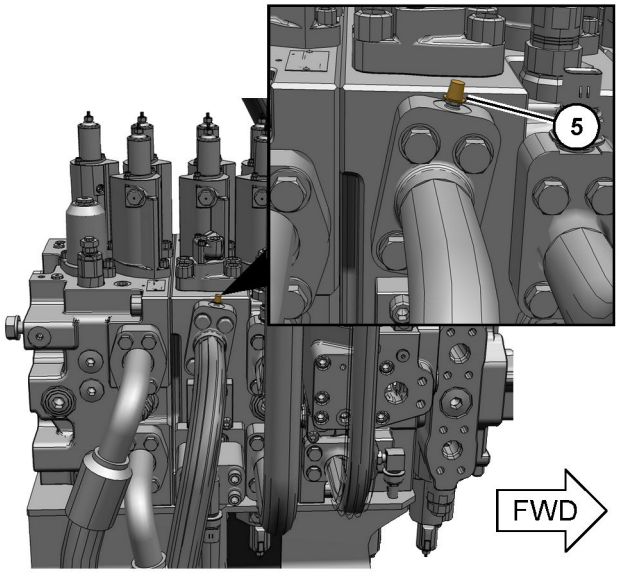


Illustration 322 g06593900

Main control valve

(5) Screw

4. Connect one end of the radiator hose to screw (5). Put the other end of the hose into the hydraulic tank opening. The screw is at the front, right side of the main control valve.

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 13 ± 2 N·m (9 ± 1 lb ft).

7. Disconnect the hose from the screw. Do not allow the oil that is contained in the hose to spill. Drain the oil into a suitable container.

8. Connect the hose to the original position on the radiator and install the 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 in the UNLOCKED 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 LOCKED 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

i08069554

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 Cat 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 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.

Coaching Tips

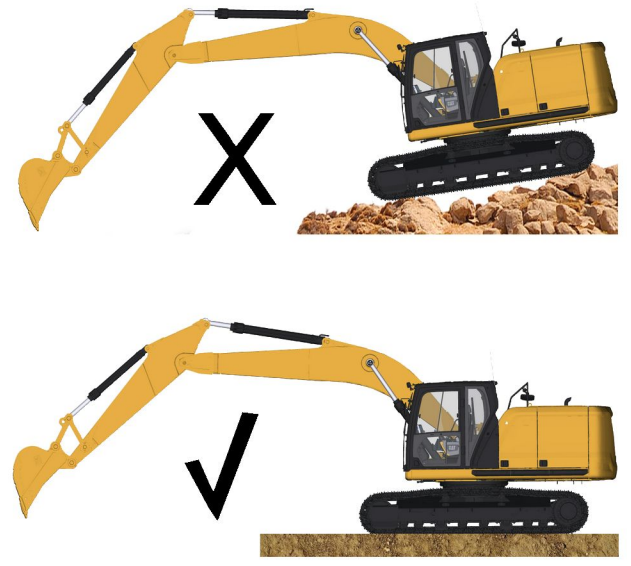


Illustration 323 g06223763

Digging with a stable machine increases productivity. Create a stable work platform.

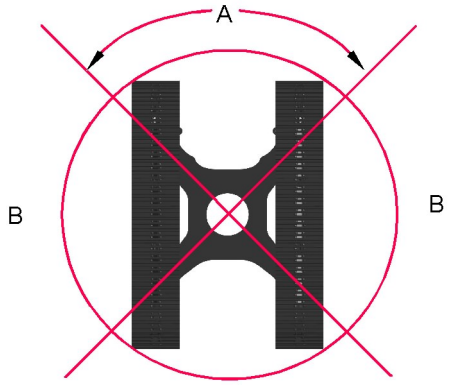


Illustration 324 g06210141

(A) Most stable dig
(B) Dump

For improved stability: Do not dig over the drives or perpendicular to the tracks.

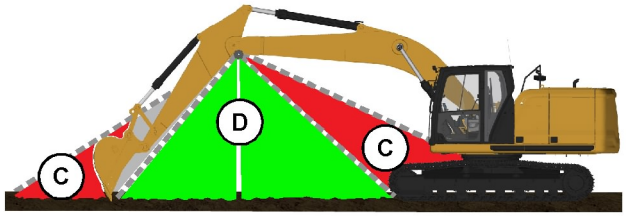


Illustration 325 g06212328

(C) Weak crowd force
(D) Ideal crowd force

Dig from the top down in layers. Try to have a full bucket by the time the stick is vertical, but do not reach too far with the stick. The most crowd force is generated with the stick +/- 30 degrees from vertical.

Minimize unneeded movement. Only curl/dump the bucket as much as required to hold/dump material.

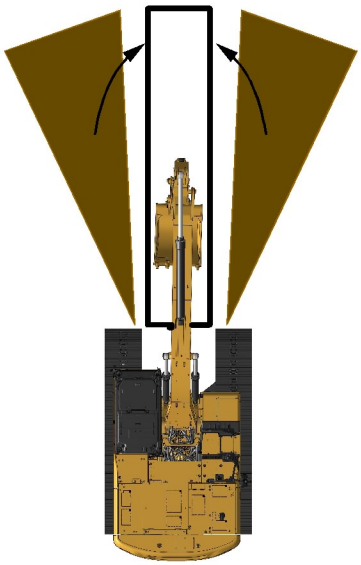


Illustration 326 g06210334

Minimize unneeded movement. During backfilling, start with the material closest to the trench.



Illustration 327 g06210343

Watch your surroundings. Swing left to dump material for better visibility.

Watch the bucket. The bucket can contact the tracks or the cab.

Concentrate on being smooth, speed will come with practice.

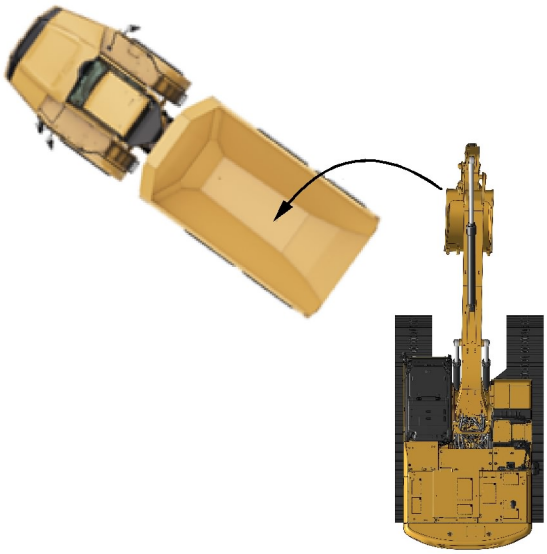


Illustration 328 g06212604

Truck placement will affect efficiency: 45 degree truck loading is more efficient than 90 degree. Spotting the truck too far from the excavator causes excessive motion.

Load from a bench when possible. Bench loading is more efficient.

Restricted Operation



Illustration 329 g06222487

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 330 g06212594

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 331 g06222492

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.

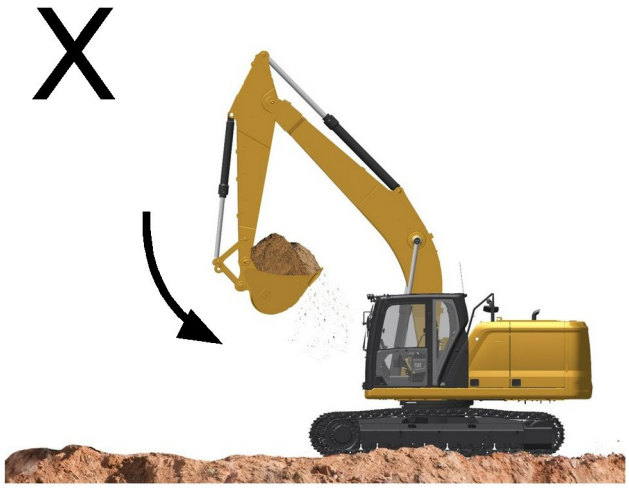


Illustration 332 g06222498

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 333 g06222500

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 334 g06222505

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

Operating Precaution



Illustration 335 g06222507

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 336 g06222509

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.

Grade and Assist Operating Tips

The following image displays proper stick speeds for accurate grading. One of the factors to accuracy is the grade assist speed setting. The setting can be set to Quick, Normal, or Fine. The settings are found in the Grade Assist screen on the monitor.

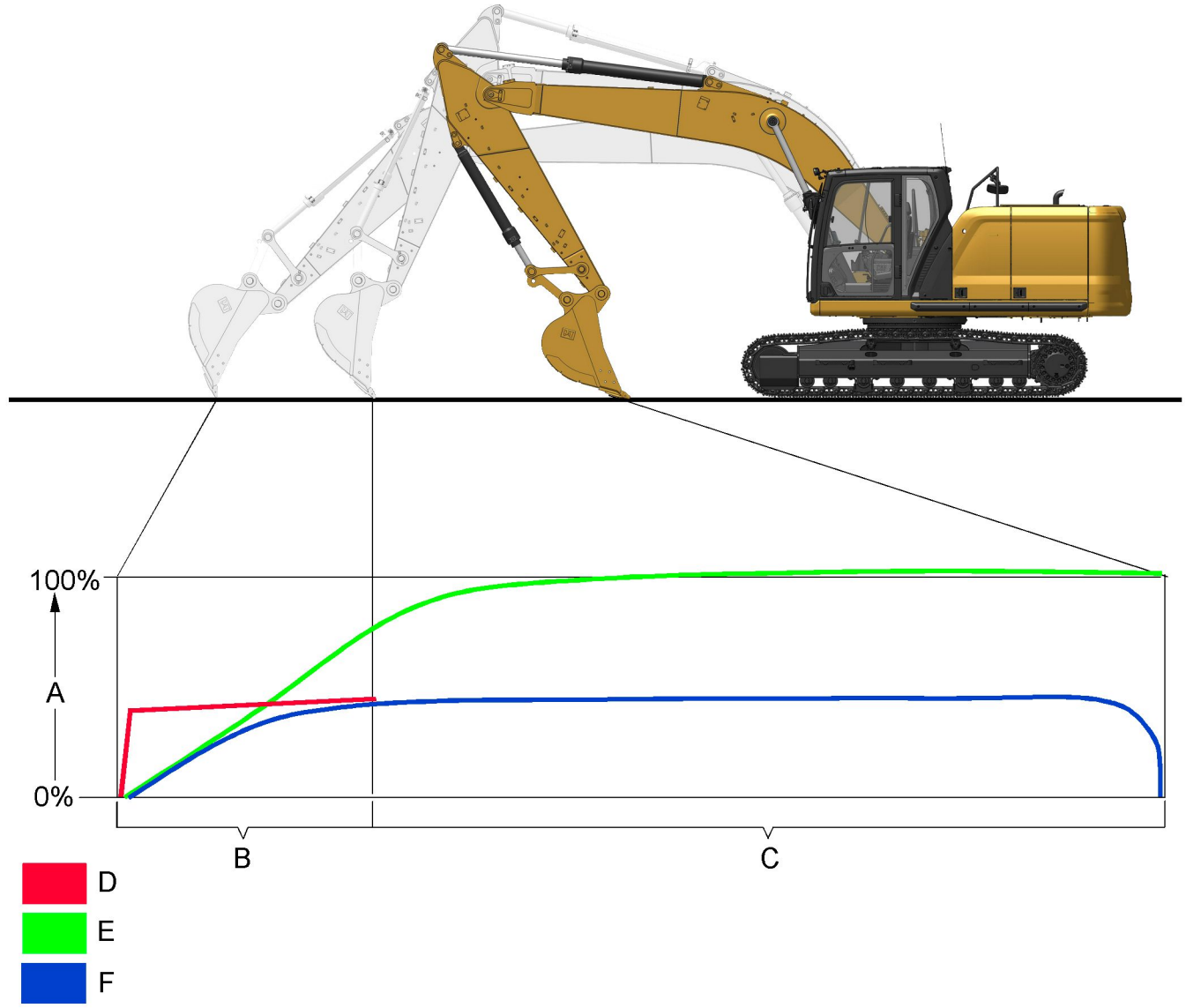


Illustration 337 g06250472

Stick speed vs. accuracy

(A) Stick joystick movement
(B) Joystick movement must be gradual
(C) In fine or normal mode, joystick input can be at 100 percent.
(D) Joystick movement too fast
(E) Good for fine or normal mode
(F) Good in any mode

For best results using Cat Grade, it is important to be cognizant of stick speed in order to obtain accurate results. When the bucket touches the ground before digging, the initial dig movement must be gradual. If operating in Fine or Normal mode, joystick speed can be increased to 100 percent after the slow initial engagement. Approximately 50 percent stick speed is necessary to maintain accuracy when in Quick mode after the slow initial engagement.

Cut/fill error can be minimized if the work tool is properly calibrated and the operator maintains a deliberate speed of operation.

Smart Boom

When using the smart boom function, it is necessary to slow down stick speed. Smart boom cannot keep up when the stick is operating at a rapid pace. This is particularly noticeable when the boom is at the raise/lower transition point and the stick is near vertical.

i07058371

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 338 g06223764

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 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 339 g06222519

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 340 g06222525

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 341 g06212337

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 to remove the mud and the gravel.

i07058860

Boom, Stick and Bucket Operation

SMCS Code: 7000

Digging



Illustration 342 g06212506

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



Illustration 343 g06212513

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 344 g06222533

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



Illustration 345 g06222535

4. If the stick stops due to the load, raise the boom and/or perform a curl 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 346 g06222538

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



Illustration 347 g06223077

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



Illustration 348 g06223078

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 a shovel crane configuration to lift certain objects.

Contact your Cat dealer for additional information.

Short slings will prevent excessive load swing.

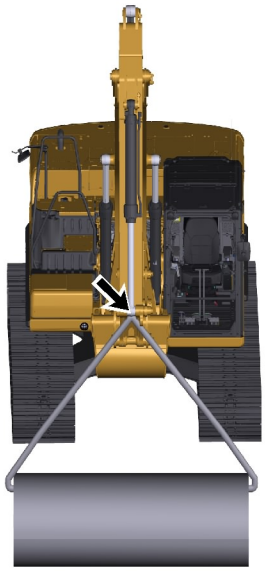


Illustration 349 g06212526

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 350 g06212532

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 351 g06212530

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

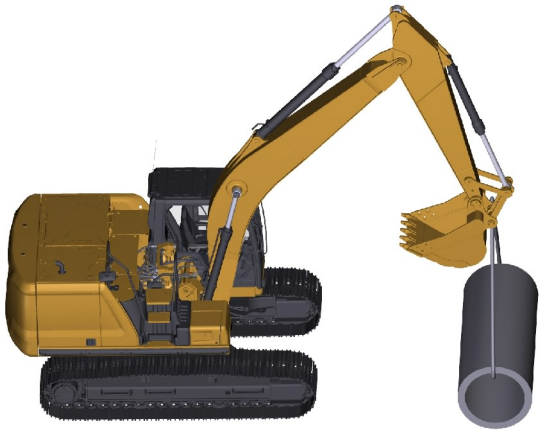


Illustration 352 g06212535

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

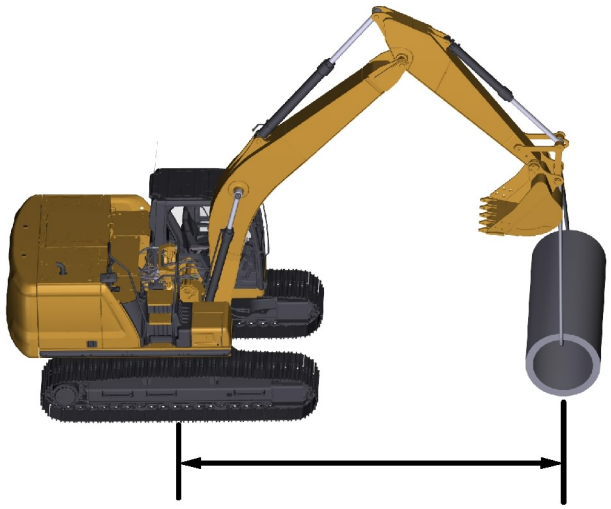


Illustration 353 g06212539

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

⚠ 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.

i06978374

Bucket - Remove and Install

SMCS Code: 6001; 6001-011; 6001-012; 6101; 6102; 6523

Removal Procedure

⚠ 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.

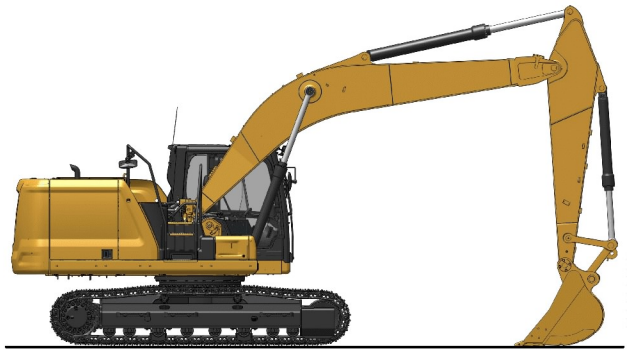


Illustration 354 g06181120

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.

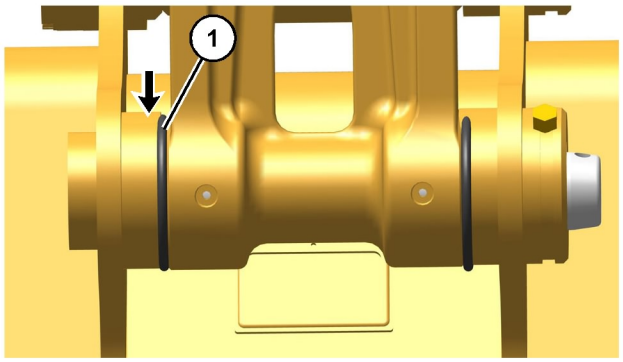


Illustration 355 g06192508

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.

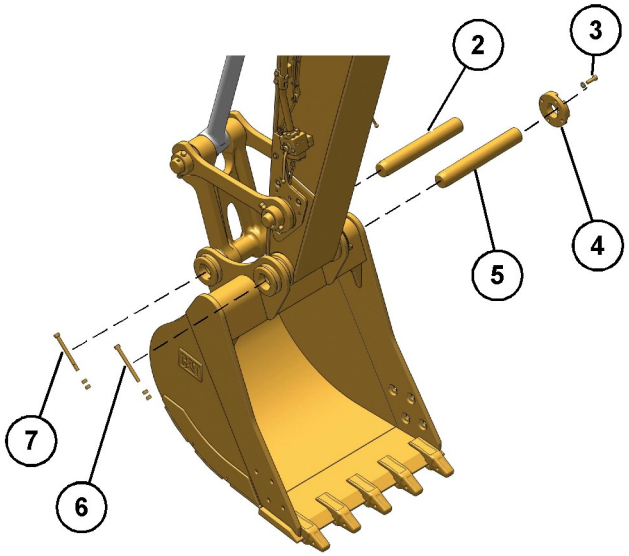


Illustration 356 g06186090

3. Remove nuts and retaining bolt (7) from support pin (2). Remove the support pin .
4. Remove bolts (3) and adapter plate (4). Remove the shims.
5. Remove nuts and retaining bolt (6) from support pin (5). Remove the support pin.
6. Start the engine and raise the stick out of the bucket.
7. 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.

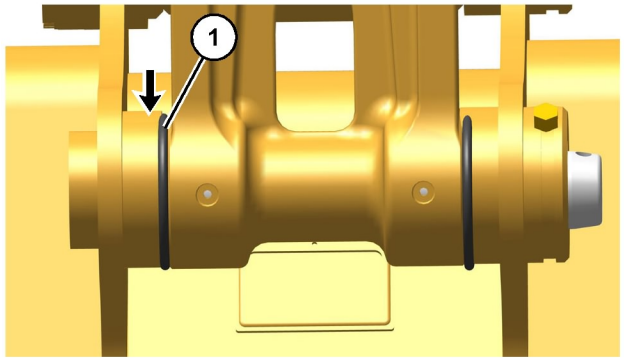


Illustration 357 g06192508

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.

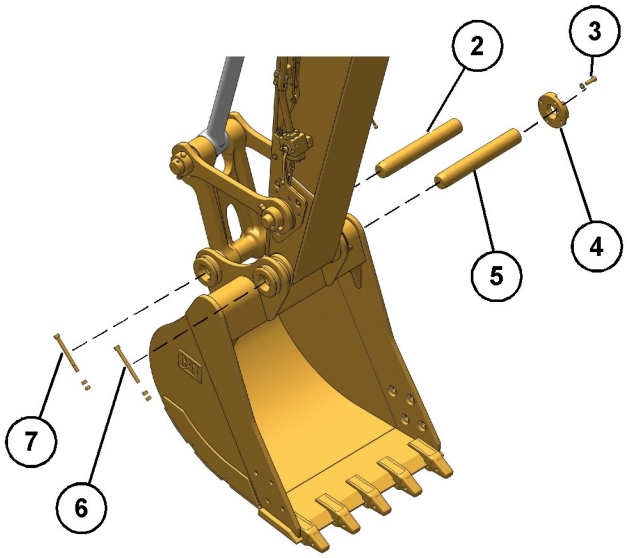


Illustration 358 g06186090

4. Install support pin (5). Align the retaining bolt hole in the support pin with the retaining bolt hole in the bucket.
5. Install the retaining bolt and nuts (6). Install adapter plate (4) without the shims, and without bolts (3) that hold the adapter plate.
6. Refer to Operation and Maintenance Manual, “Bucket Linkage - Inspect/Adjust” to adjust the bucket clearance.
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. Install support pin (2). Align the retaining bolt hole in the bucket pin with the retaining bolt hole in the bucket.

10. Install retaining bolt and nuts (7).

11. Slide the O-ring seals (1) over the pin joints between the bucket and the link assembly.

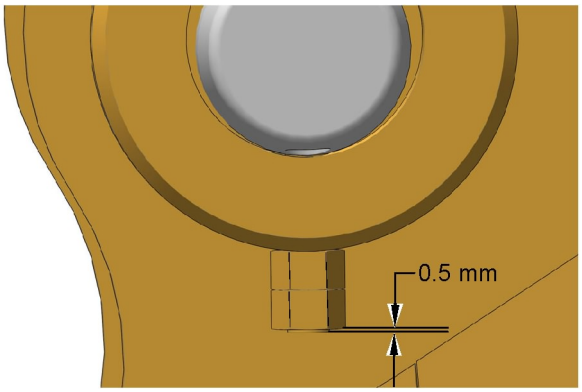


Illustration 359 g06192530

12. Tighten retaining nuts (6) and (7). 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”.

i07757775

Quick Coupler Operation (Circuit for CW Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

NOTICE
The Cat Quick Coupler (CW Coupler) 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 locking bar keeps the work tool locked with the force of built-in springs. Ensure that the hydraulic system and the blocking bar are working properly before using the quick coupler.

A lifting eye is included on the quick coupler. Release the work tool from the quick coupler to use the lifting eye to pick up loads. To lift a load with the lifting eye, extend the bucket cylinder until the quick coupler is in a VERTICAL position. Do not exceed the rated load for the machine.

NOTICE
Once the work tool has been properly attached to the coupler, no loosening of the work tool should occur. Refer to the “Quick Coupler Installation and Removal” section of the quick coupler Operation and Maintenance Manual for additional information. If at any point after the proper attachment and back drag testing of the work tool, should the work tool then become loose or if the rear pin of the work tool detaches from the movable hook, stop work immediately and safely ground and detach the work tool. Consult your Cat dealer to inspect the coupler prior to putting the coupler back into service. This situation could indicate potential coupler damage that may not be readily visible to the customer or operator of the machine and coupler.

Electric Switch Operation

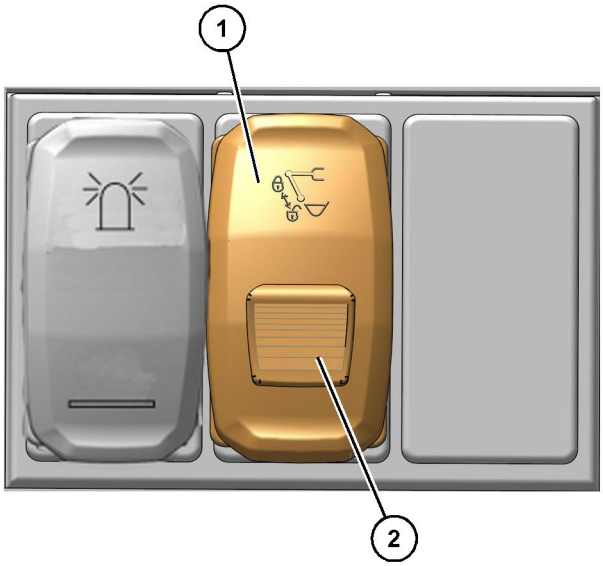


Illustration 360 g06184557

Quick coupler switch (1) is located inside the cab on the switch panel to the left of the operator's seat. The electric switch has only one position for coupling the work tool and uncoupling the work tool. The switch is equipped with a safety lock (2). The locking tab must be pushed forward before the switch can be pressed.

Coupling 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.

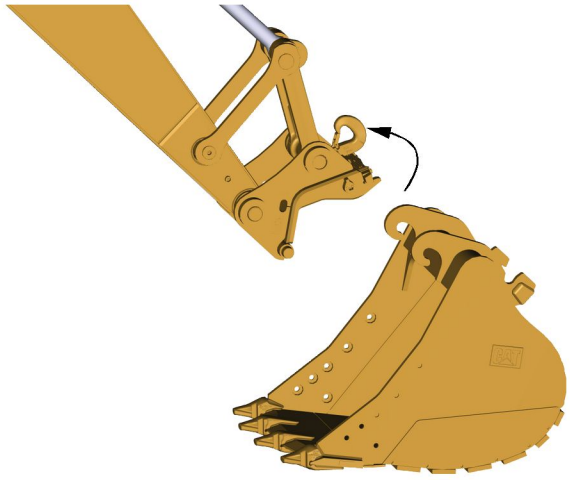


Illustration 361 g06220881

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.

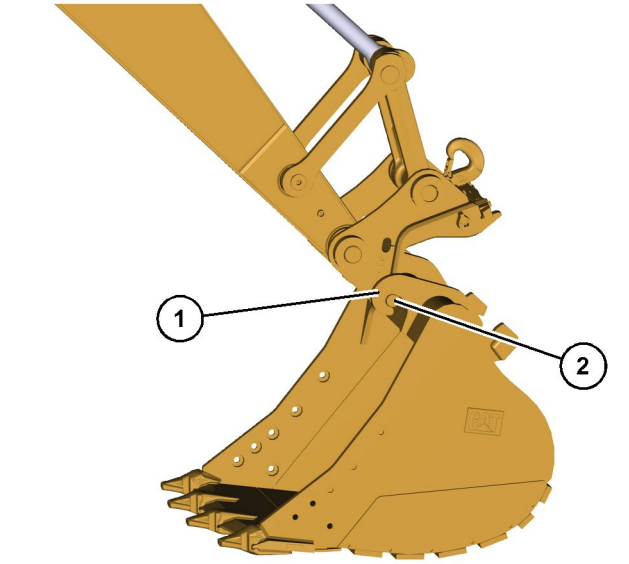


Illustration 362 g06220883

(1) Hinges
(2) Lower bosses

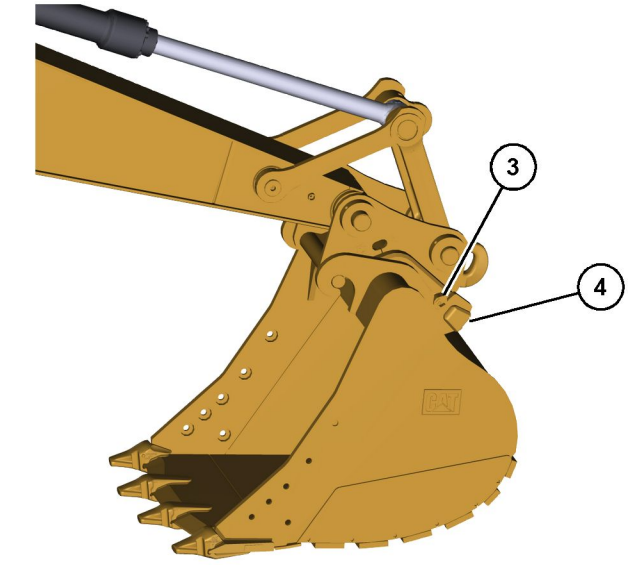


Illustration 363 g06220887

(3) Center bosses
(4) Locking area

3. Move the stick forward and raise the stick until the lower bosses (2) engage the hinges (1) of the work tool.

4. There are two possible settings for locking the quick coupler in Cat ET, "Alarm" and "Hold to Run". For the "Hold to Run" setting, push the locking tab on the switch forward and then depress and hold the rear of the switch until the quick coupler engages the work tool. The message “Quick Coupler Locking” will display on the monitor. For the "Alarm" setting, push the locking tab on the switch forward and then depress, but do not hold, the rear of the switch until the quick coupler engages the work tool. The message “Quick Coupler Locking” will display on the monitor.

5. Extend the bucket cylinder to rotate the quick coupler toward the work tool.

Center bosses (3) must engage with the cutout of the hinge.

6. Release the quick coupler switch to lock the work tool.

The springs in the quick coupler will move the wedge into the locking area (4).

The monitor will display the message “Verify Tool Locking” .

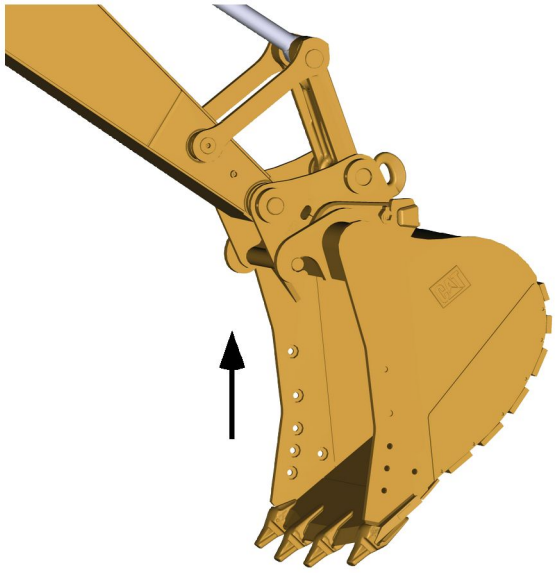


Illustration 364 g06220888

7. Raise the boom or raise the stick. Retract the bucket cylinder 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.

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.

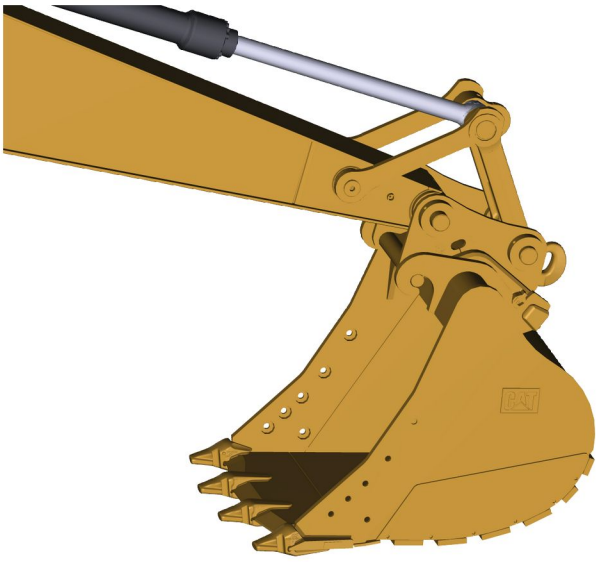


Illustration 365 g06220889

1. Level the bucket or level the work tool on the ground.
2. Push the locking tab on the switch forward and then depress the rear of the switch until the quick coupler releases the work tool. The message “Quick Coupler Unlock” will display on the monitor. For the "Alarm" setting, push the locking tab on the switch forward and then depress, but do not hold, the rear of the switch until the quick coupler engages the work tool. The message “Quick Coupler Locking” will display on the monitor.



Illustration 366 g06220891

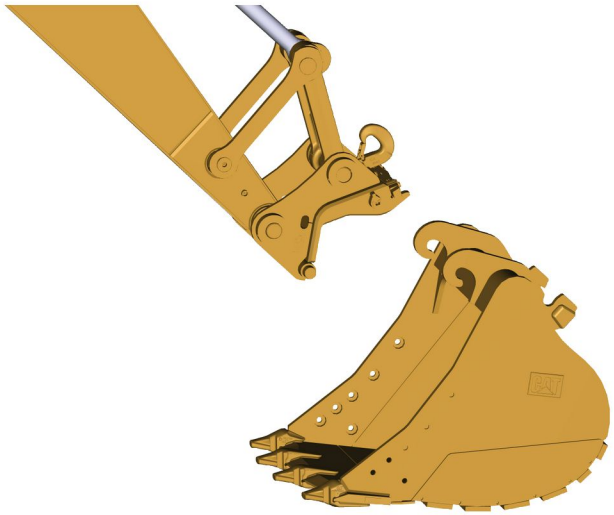


Illustration 367 g06220892

3. Retract the bucket cylinder to move the quick coupler toward the machine.

4. Release the quick coupler switch to retract the wedge.

5. Lower the stick and move the stick toward the machine to disengage the quick coupler.

i07852525

Quick Coupler Operation (Hydraulic Pin Grabber Quick Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

NOTICE
The Cat 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. Ensure that the hydraulic system is working properly before using the quick coupler.

A lifting eye is included on the quick coupler. Release the work tool from the quick coupler to use the lifting eye to pick up loads. To lift a load with the lifting eye, extend the bucket cylinder until the quick coupler is in a VERTICAL position. Do not exceed the rated load for the machine.

NOTICE
Once the work tool has been properly attached to the coupler, no loosening of the work tool should occur. Refer to the “Quick Coupler Installation and Removal” section of the quick coupler Operation and Maintenance Manual for additional information. If at any point after the proper attachment and back drag testing of the work tool, should the work tool then become loose or if the rear pin of the work tool detaches from the movable hook, stop work immediately and safely ground and detach the work tool. Consult your Cat dealer to inspect the coupler prior to putting the coupler back into service. This situation could indicate potential coupler damage that may not be readily visible to the customer or operator of the machine and coupler.

Quick Coupler Operation

Electric Switch Operation

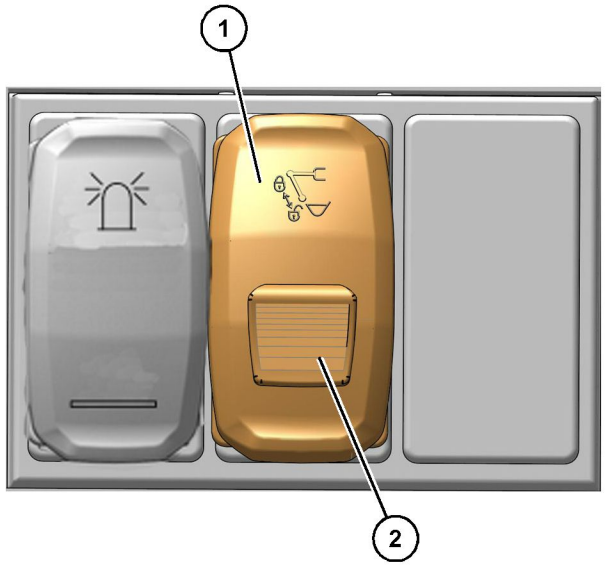


Illustration 368 g06184557

Quick coupler switch (1) is located inside the cab on the switch panel to the left of the operator's seat. The electric switch has only one position for coupling the work tool and uncoupling the work tool. The switch is equipped with safety lock (2). The locking tab must be pushed forward before the switch can be pressed.

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 alarm will go off when the coupler is locked and the monitor will display a message. These assurances do not confirm that 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.

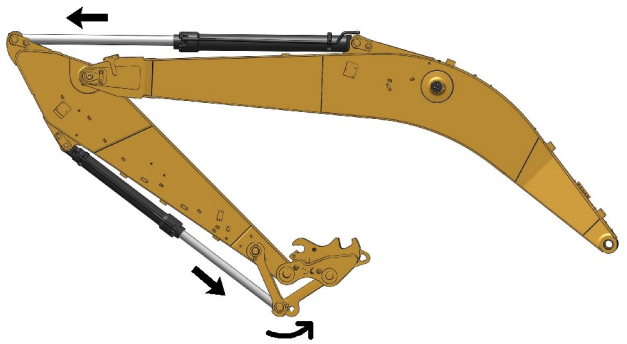


Illustration 369 g06187057

3. Extend the stick cylinder and fully extend the bucket cylinder until the quick coupler is curled past a vertical position. This action must be performed before pressing the switch.



Illustration 370 g06300078

4. Push the lock mechanism on the switch forward and then depress the rear of the switch. The alarm will sound continuously and the message “Quick Coupler Unlock” will display on the monitor.

5. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to unlock the hook.

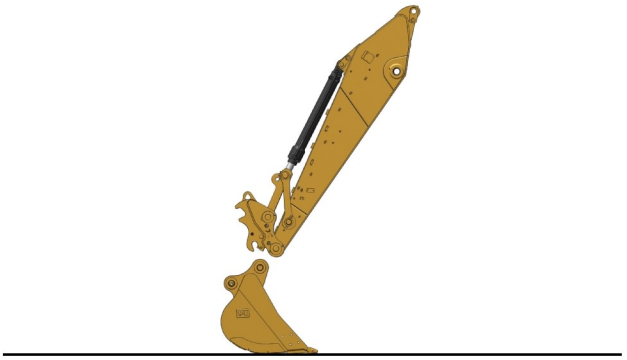


Illustration 371 g06187063

6. Align the quick coupler with the work tool.

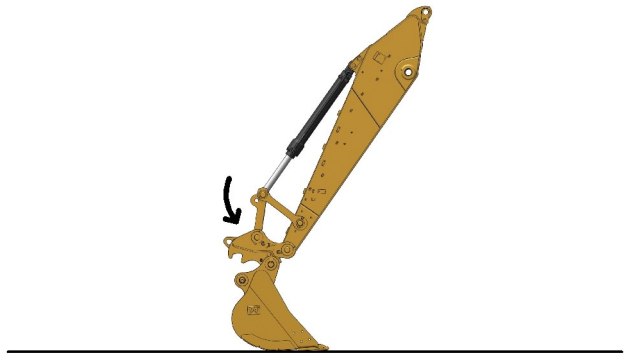


Illustration 372 g06187068

7. Rotate the quick coupler to grab the top pin.

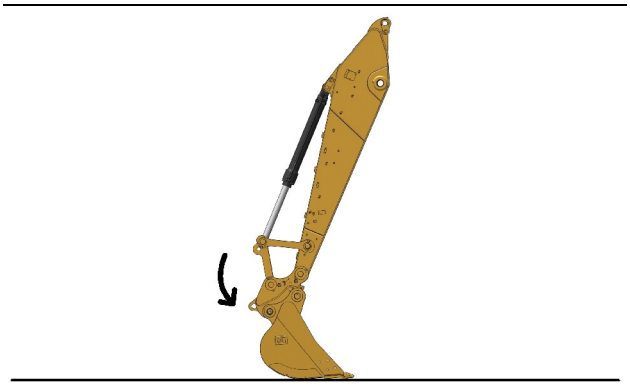


Illustration 373 g06187086

8. Rotate the quick coupler downward to grab the bottom pin.

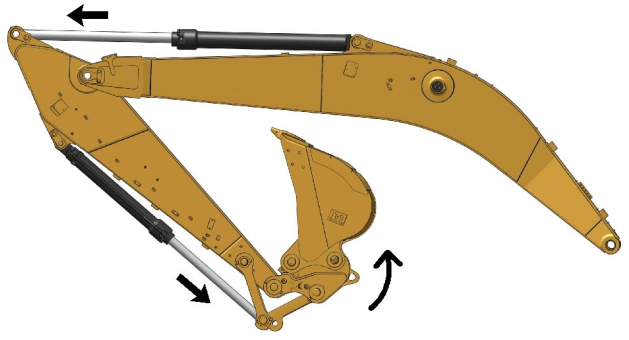


Illustration 374 g06187108

9. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.



Illustration 375 g06300088

10. Push the lock mechanism on the switch forward and then depress the rear of the switch. The alarm will sound continuously and the message “Quick Coupler Locking” will display on the monitor.

11. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to lock the hook. The monitor will display the message “Verify Tool Locking” and the alarm will stop.

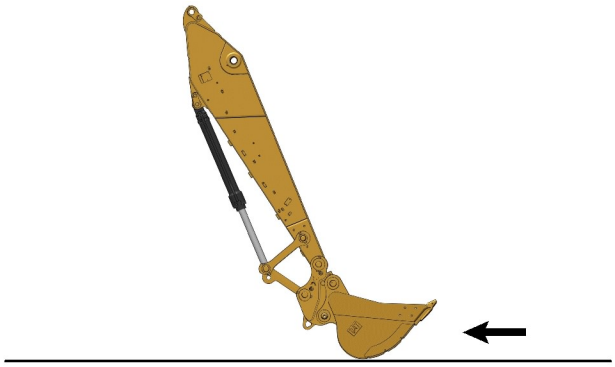


Illustration 376 g06187115

⚠ 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.

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.

c. Drag the work tool backward.

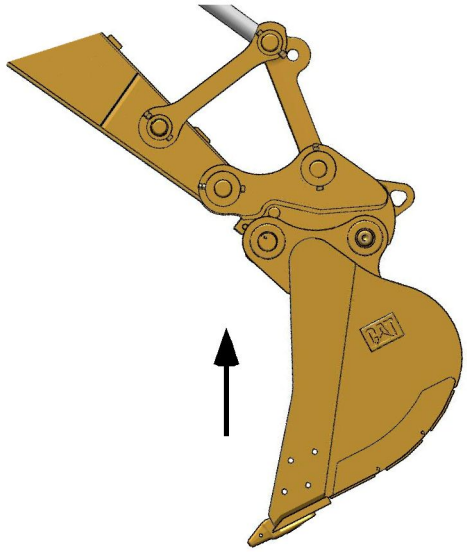


Illustration 377 g06458083

13. Raise the boom or raise the stick. Retract the bucket cylinder to confirm that the coupler is fully engaged. If the coupler is fully engaged, the work tool is locked in place. The work tool is ready to use.

Uncoupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

NOTICE
Auxiliary hoses for work tools must be disconnected before the Hydraulic Quick Coupler is disengaged.

Pulling the work tool with the auxiliary hoses could result in damage to the host machine or the work tool.

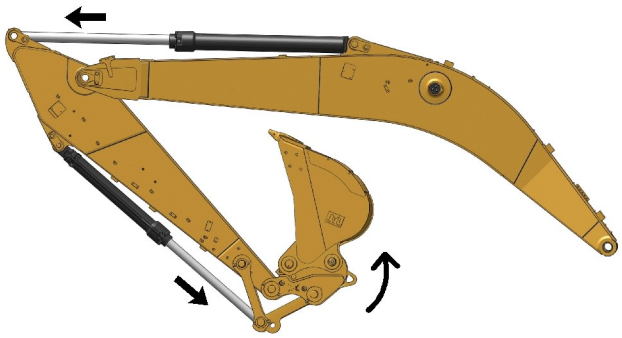


Illustration 378 g06187108

1. Extend the stick cylinder and fully extend the bucket cylinder until the work tool is curled past a vertical position. This action must be performed before pressing the switch.

2. Push the lock mechanism on the switch forward and then depress the rear of the switch to unlock the work tool. The alarm will sound continuously and the message “Quick Coupler Unlock” will display on the monitor.

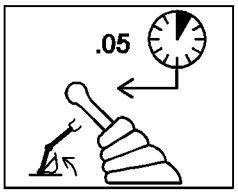


Illustration 379 g01231447

3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to unlock the hook.

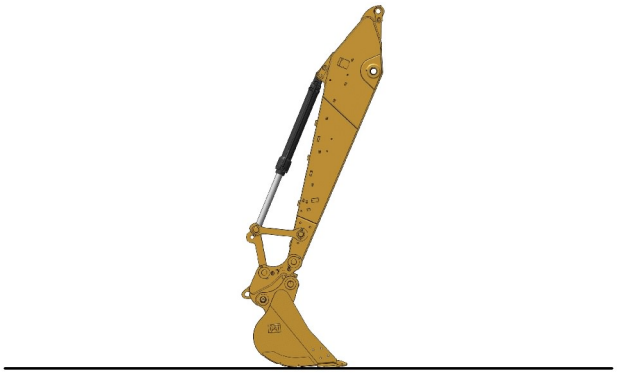


Illustration 380 g06187142

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.

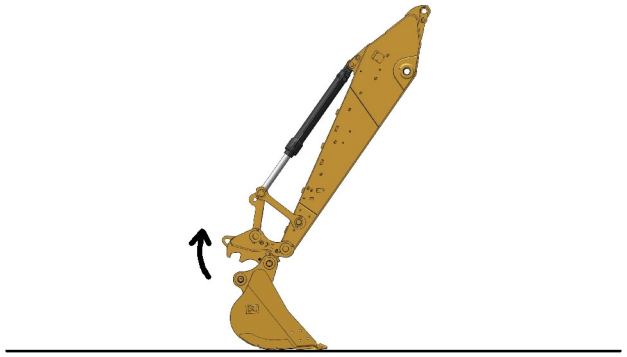


Illustration 381 g06187151

5. Rotate the quick coupler upward to release the bottom pin.

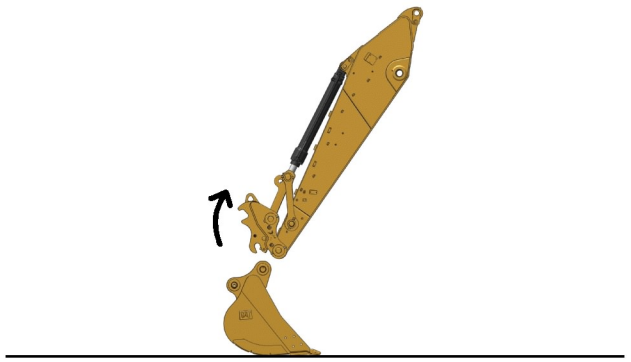


Illustration 382 g06187156

6. Continue to rotate the quick coupler upward to release the top pin and completely release the work tool from the quick coupler.

7. Move the stick to a position that is clear of the work tool.

Note: To lift objects with the lifting eye of the quick coupler, refer to “Coupler Lifting Eye Operation without Bucket” later in this chapter.

Coupling a Bucket that is Reversed

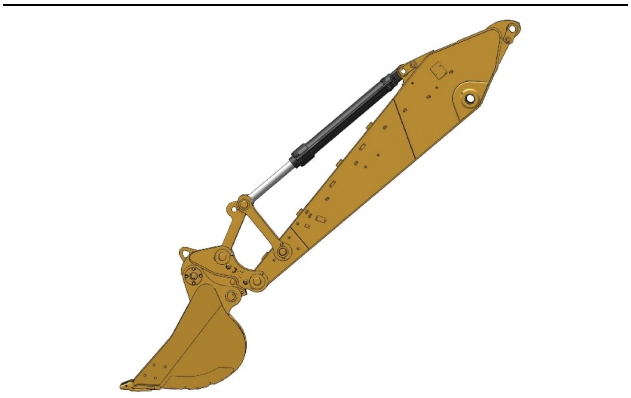


Illustration 383 g06187159

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 383 for an example of connecting to a bucket that is in a reversed position.

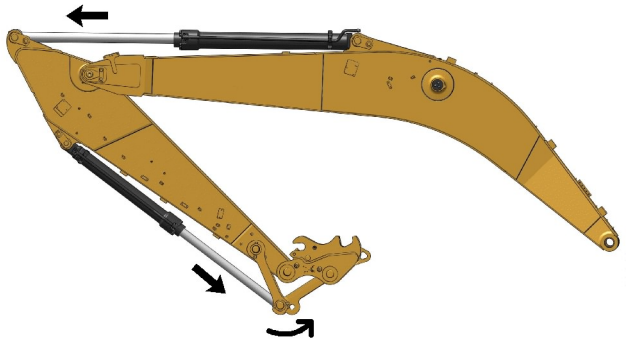


Illustration 384 g06187057

2. Extend the stick cylinder and fully extend the bucket cylinder until the quick coupler is curled past a vertical position. This action must be performed before pressing the switch.

3. Follow the same steps for coupling the work tool to couple the host machine to a bucket that is reversed. Refer to “Coupling the Work Tool” for the proper procedure.

NOTICE
When some Caterpillar buckets are used in the reverse position, it can be more difficult to couple the bucket and uncouple the bucket than in the normal position.

Care must be taken to ensure that the position of the boom, stick, and bucket are aligned to ensure smooth coupling. The coupler must be in position between the bucket bosses.

If the bucket is not fully engaged in the jaw of the coupler, the quick coupler can become snagged on the bucket bosses. The full weight of the bucket is then carried by the quick coupler sideplates, which can cause damage to the quick coupler.

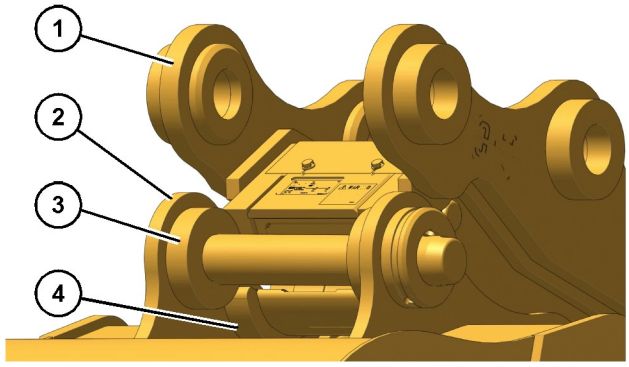


Illustration 385 g06187418

(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.

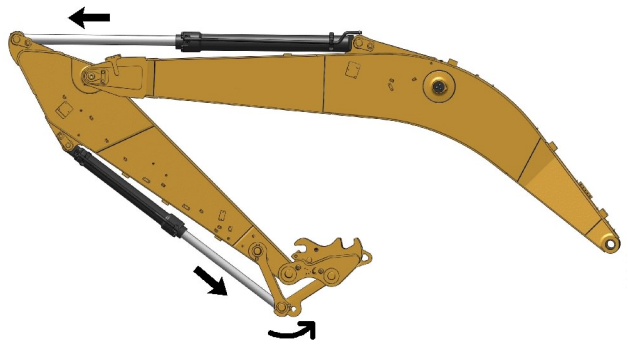


Illustration 386 g06187057

2. The quick coupler must be curled past a vertical position before depressing the switch. Extend the stick cylinder and fully extend the bucket cylinder until the quick coupler is curled past a vertical position.



Illustration 387 g06300088

3. Push the lock mechanism on the switch forward and then depress the rear of the switch to lock the quick coupler. The alarm will sound continuously and the message “Quick Coupler Locking” will display on the monitor.

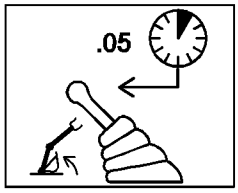


Illustration 388 g01231447

4. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to lock the hook. The monitor will display the message “Verify Tool Locking” and the alarm will stop.



Illustration 389 g06187164

5. Rotate the quick coupler downward and move the stick to a position that is clear of the work tool.



Illustration 390 g06223888

6. Use the lifting eye of the quick coupler, as needed.

7. To reinstall the bucket or the work tool, refer to “Coupling the Work Tool” for the proper procedure.

i07349163

Work Tool Operation (If Equipped)

SMCS Code: 6700; 7000

Hammer Operation (If Equipped)



Illustration 391 g06222793

NOTICE
Use only a hydraulic hammer that is recommended by Caterpillar.

The use of a hydraulic hammer that is not recommended by Caterpillar could result in structural damage to the host machine.

Consult your Cat 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 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 damage 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 Cat 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 to keep the hydraulic hammer 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 damage the machine hydraulic system. Consult your Cat 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 392 . 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 Cat hydraulic hammer:

- Operation and Maintenance Manual, SEBU7346, “Hydraulic Hammers”
- The Operation and Maintenance Manual specific to your machine

An operation and maintenance decal, SMEU7397, is available for all hydraulic hammers. The decal provides procedures for operation and maintenance of the hydraulic hammers. The decal can be placed on the machine or the hammer. The decal can be obtained through the normal literature ordering channels.

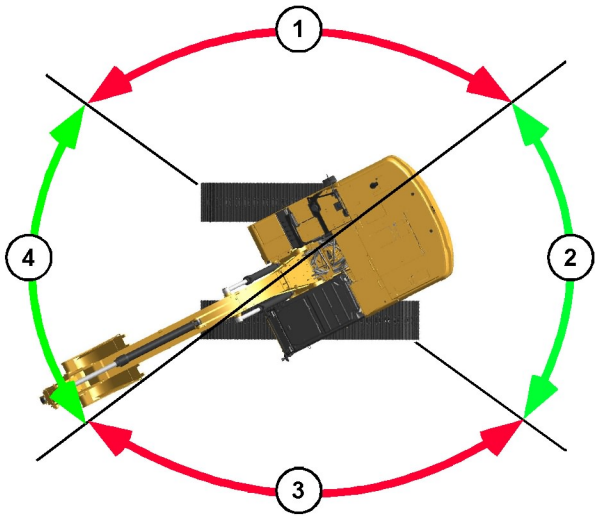


Illustration 392 g06192837

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

Shear Operation (If Equipped)



Illustration 393 g06222798

⚠ 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 host machine.

Consult your Cat dealer for hydraulic shear information.

⚠ 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.

Be sure that no one is near the work tool to prevent injury. Keep the work tool under control at all times to prevent injury. When a demolition tool is used, all personnel must 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.

Crusher Operation (If Equipped)

⚠ WARNING

Improper operation and maintenance of the crusher could cause personal injury or death. Observe the following procedures for safe operation of the crusher.

Consult your Cat dealer for more information on the operation and maintenance of the crusher.

Do not operate the host machine with the work tool unless you have read and understood the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in machine or work tool damage, and/or serious injury or death. Contact your Cat dealer for a replacement manual, if needed.

When the crusher is installed on the host machine, always make sure that the protective guarding is in place.

Using the crusher in an incorrect manner can damage the machine and/or cause personal injury or death.

Always ensure that the work area is clear of ground personnel, due to the potential crush hazards with falling debris and machine movement.

Resting or placing your foot on the work tool pedal could result in unexpected movement of the machine / work tool which could result in personal injury or death. Always lock the crusher when not in use.

NOTICE

Selection of a hydraulic crusher must be done with extra care.

Use of a hydraulic crusher not recommended by Caterpillar could result in structural damage to the host machine.

Consult your Cat dealer for hydraulic crusher information.

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.



Illustration 394 g06222800

Demolition work on the roof of a building could lead to serious personal injury if the building were to collapse and the excavator turned over or fell off the roof. The demolition work must be started ONLY AFTER surveying the building for its structural integrity.

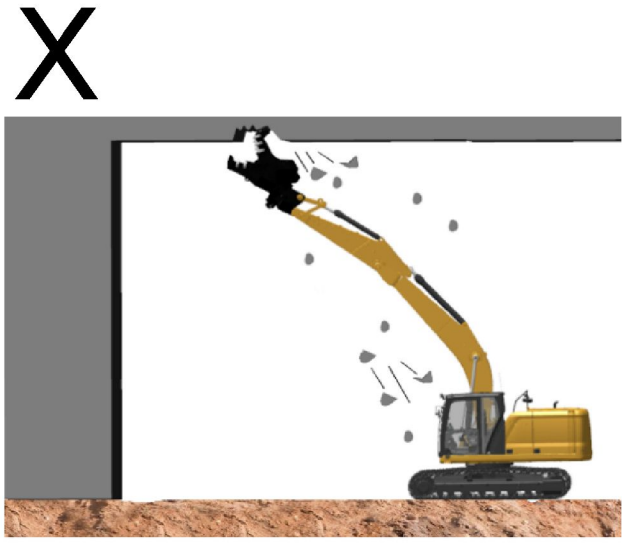


Illustration 395 g06222803

Crushing work above your head must be avoided because objects can fall and damage the machine.

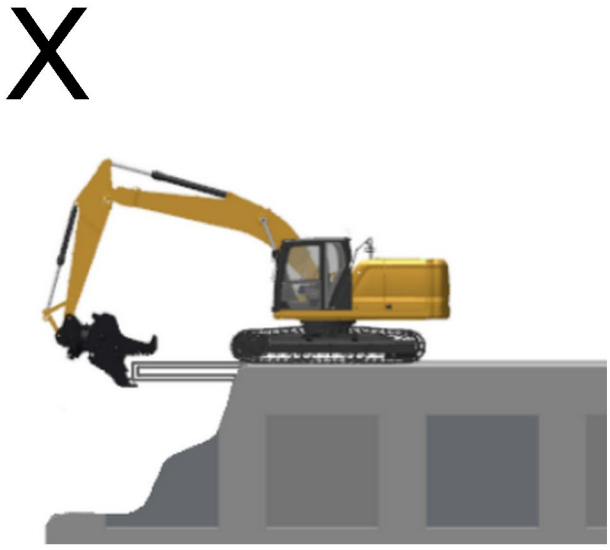


Illustration 396 g06222806

Do not perform demolition work at the base of the machine, because the ground could be unstable and cause the machine to fall.



Illustration 397 g06222809

Do not suddenly lower or stop the work tool, otherwise the excavator could turn over.

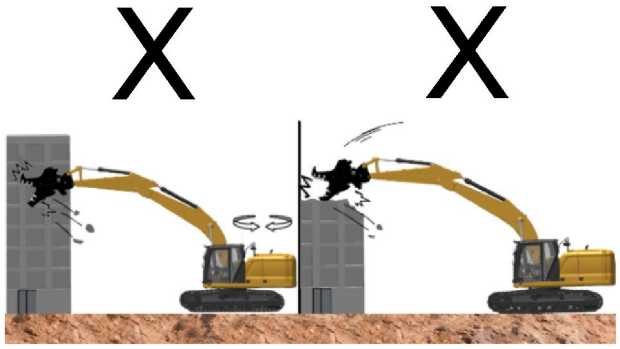


Illustration 398 g06222813

Crushing work using impact, swing, or dropping forces of the excavator could cause damages to the machine and also could lead to personal injury. As such, NEVER perform such an operation.

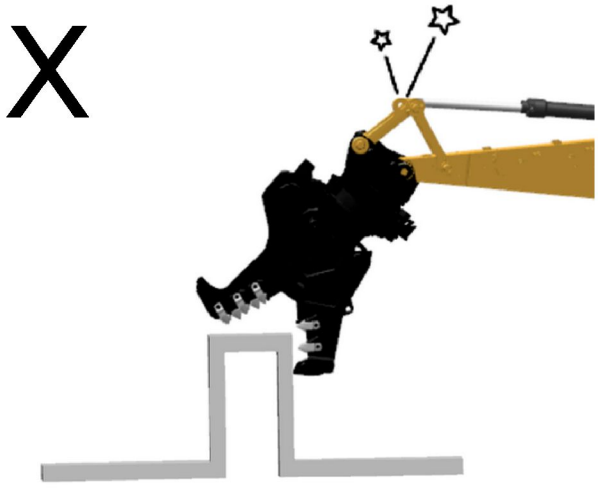


Illustration 399 g06222817

Crushing work with hydraulic cylinder at stroke end position could damage the excavator, resulting in shortening of lifespan. Also, as it could lead to unexpected personal injury due to breakage of the machine, do not perform any work at stroke end.

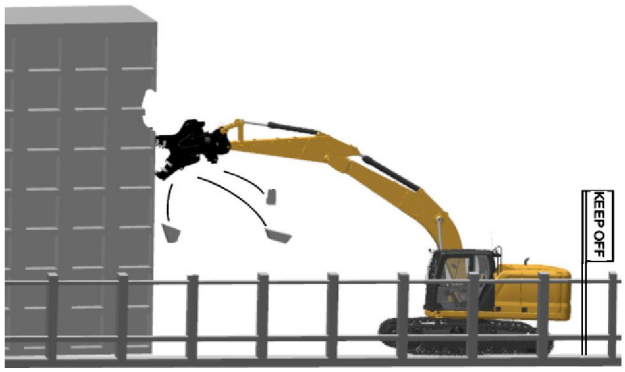


Illustration 400 g06222821

When performing work at elevated positions, always use care for the surroundings as well as for falling objects to avoid personal injury. Use guide personnel and signs as required.



Illustration 401 g06222829

When working sideways, the track can lift. Avoid abrupt operation and operate slowly.



Illustration 402 g06222831

Crushers could interfere with the boom and the cab depending on the type and method of usage. Know the working range of the crusher being used.

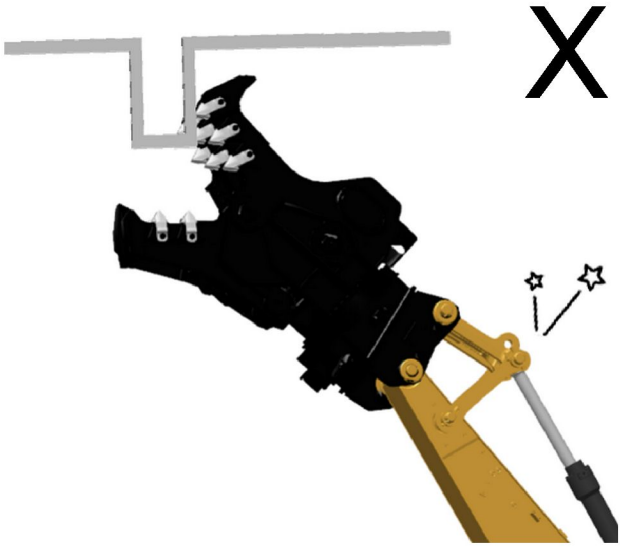


Illustration 403 g06222833

If the tooth of the crusher engages an object at a slant, excessive forces could be applied to the front regions. As such move the crusher to the front.



Illustration 404 g06222836

Never extend the boom cylinder suddenly. Sudden extension of the boom could cause tip backwards.



Illustration 405 g06222831

Sudden extension of the bucket cylinder, or sudden extension of the stick cylinder could cause damages at the stroke end position, resulting in personal injury. Operations that cause sudden extension of the cylinders is PROHIBITED!

Parking

i07868085

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 to reduce engine speed.

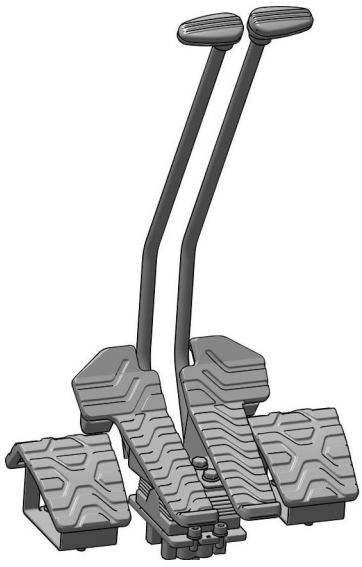


Illustration 406 g06181402

2. Release the travel levers/pedals 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.

i07088536

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 407 g06188791

1. Position the boom over one side of the machine.
2. Use boom down pressure 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 to prevent the work tool from touching the ground.

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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 ring to the OFF position or press button to stop the engine.

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 Shutdown Switch

NOTICE
Perform a walk around inspection after actuation of a shutdown device.

Take necessary corrective action to resolve the cause of the shutdown.

Ensure that no additional damage has been done or could occur before returning to operation.

Turn the engine start ring to the OFF position or press button to stop the engine. If the engine does not stop, perform the following procedure.

Note: Always use the engine start switch to stop the engine. Use the secondary engine stop control as an alternate method to stop the engine if the start switch fails.

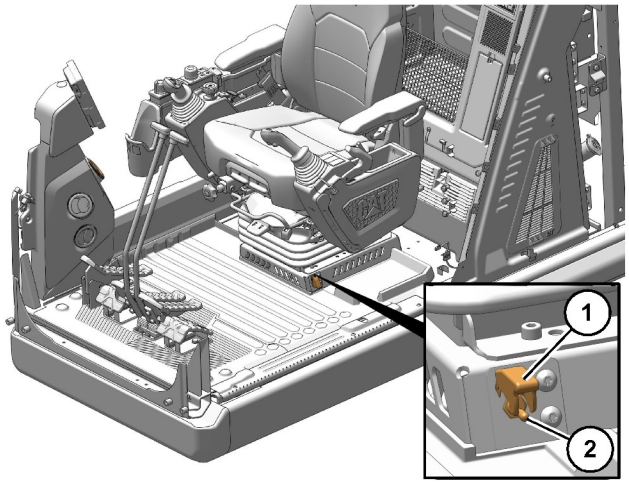


Illustration 408 g06181487

1. The switch is located below the left side of the operator seat.
2. Lift cover (1).
3. Push switch (2) upward. This should stop the engine and prevent the engine from being started again.
4. Return the switch to the original position. The engine will be enabled to start.

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

5. Use the method that follows if the previous steps do not stop the engine.

Stop the Engine if an Electrical Malfunction Occurs

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

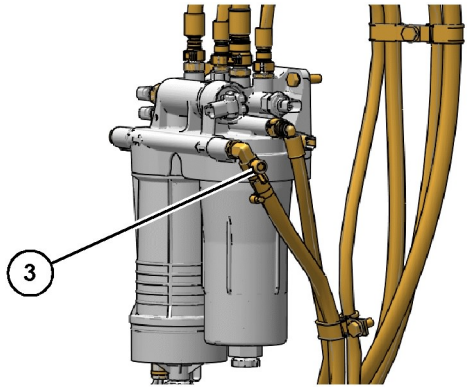


Illustration 409 g06209639

The fuel shutoff valve is on the fuel system water separator.

Shut off the fuel supply by turning the fuel shutoff valve (3) 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.

i07103299

Leaving the Machine

SMCS Code: 7000



Illustration 410 g06224270

1. Use the steps and the hand holds when you dismount. When you dismount, face the machine and use both hands.
2. Inspect the engine compartment for debris. Clean out any debris to avoid a fire hazard.
3. Remove all flammable debris from the front bottom guard through the access doors 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).

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Machine Storage and Specified Storage Period

SMCS Code: 7000

Machine Storage

The Safety Section of this Operation and Maintenance Manual contains storage information for fuels, lubricants, and ether (if equipped).

The Operation Section of this Operation and Maintenance Manual contains information for short-term storage of this machine, including engine shutdown, parking, and instructions for leaving the machine.

For detailed steps on long-term storage refer to Special Instruction, SEHS9031, “Storage Procedure for Caterpillar Products”.

Specified Storage Period

The specified storage period of this machine is 1 year.

After the specified storage period has expired, consult your Cat dealer for inspect, repair, rebuild, install remanufactured, or install new components, and disposal options, and to establish a new specified storage period.

If a decision is made to remove the machine from service, refer to Decommissioning and Disposal for further information.

Transportation Information

i08163556

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.

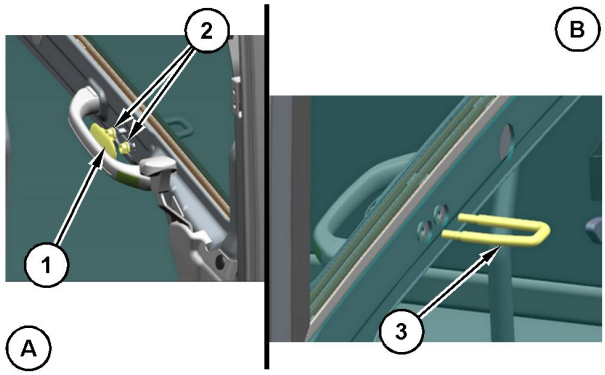


Illustration 411 g06516462

Typical example of door hook

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

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

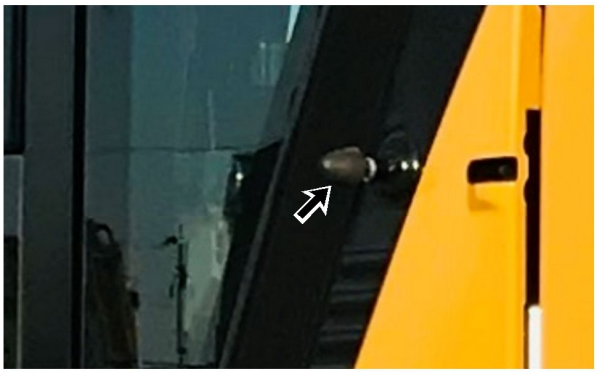


Illustration 412 g06516469

Typical example of cab bumper

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.

i07539618

Securing the Machine

SMCS Code: 7000

⚠ WARNING

Do not transport the machine if there is a malfunction of the swing parking brake system.

The machine may swing during transportation if the swing parking brake system is not functioning properly which could result in injury or death.

Contact your Cat dealer for service.

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 ring to the OFF position or press button to stop engine.
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.

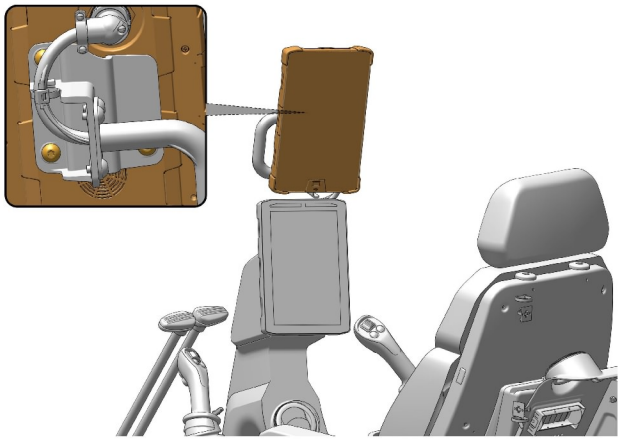


Illustration 413 g06181075

Note: Caterpillar strongly recommends removing the Cat Grade Control monitor (if equipped) before transporting the machine to protect the monitor from damage or theft.

6. Disconnect the wiring harness from the Cat Grade Control monitor. Remove the three screws that secure the monitor to the mounting bracket and remove the monitor. Remove the monitor from the cab and store in the monitor carrying case.
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 unload the excavator from the transport machine, remove the protective covering from the exhaust opening.

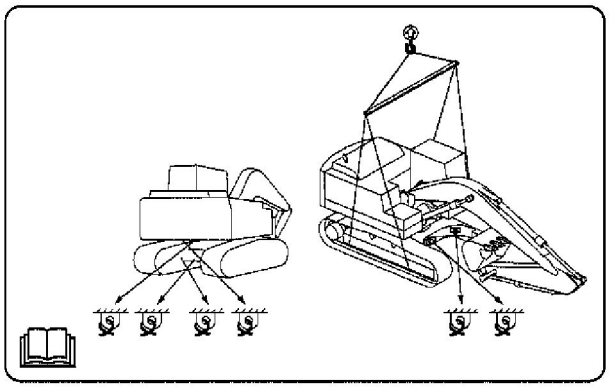


Illustration 414 g06289667

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. The swing brake prevents the upper structure from rotating.

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.

i06241206

Adjustable Gauge Undercarriage Frame

SMCS Code: 4150-VAR

⚠ 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.

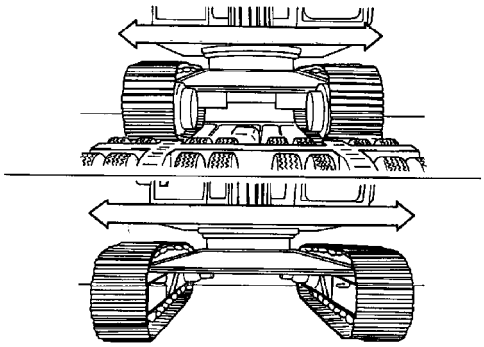


Illustration 415 g00285692

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.

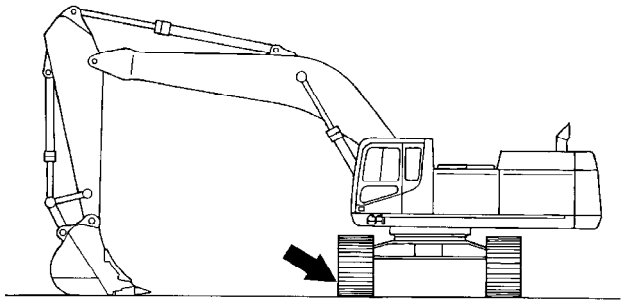


Illustration 416 g00581851

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.

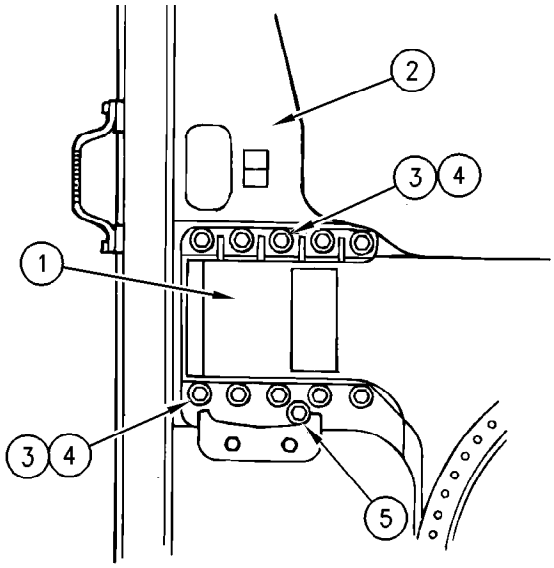


Illustration 417 g00697382

(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 .

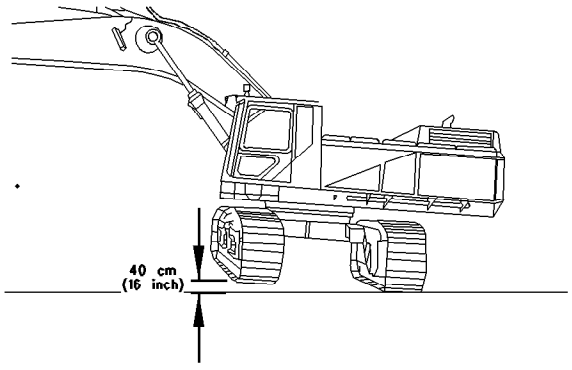


Illustration 418 g00697383

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.

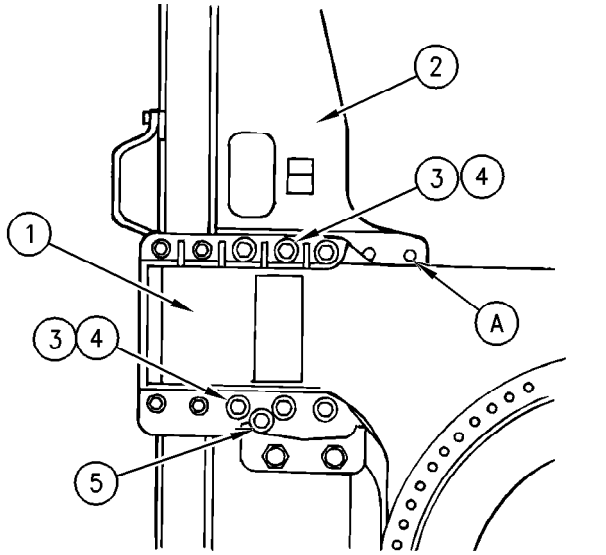


Illustration 419 g00697384

(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 2800 ± 350 N·m (2065 ± 258 lb ft).

Note: To protect the bolt holes that are in the track frame from debris and mud, insert corks into 8 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.

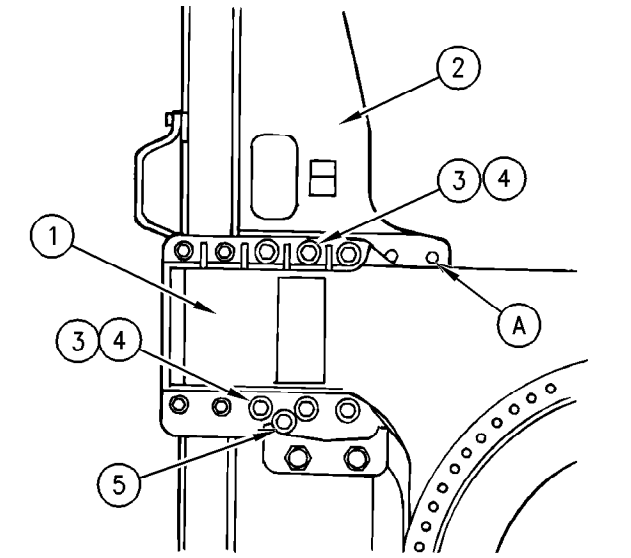


Illustration 420 g00697384

(1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolts

1. Remove the 8 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.

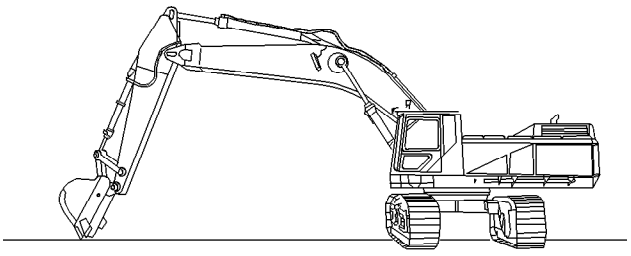


Illustration 421 g00286687

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.

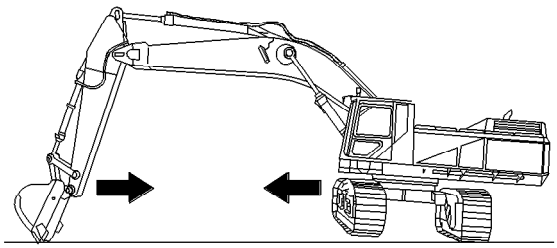


Illustration 422 g00286117

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.

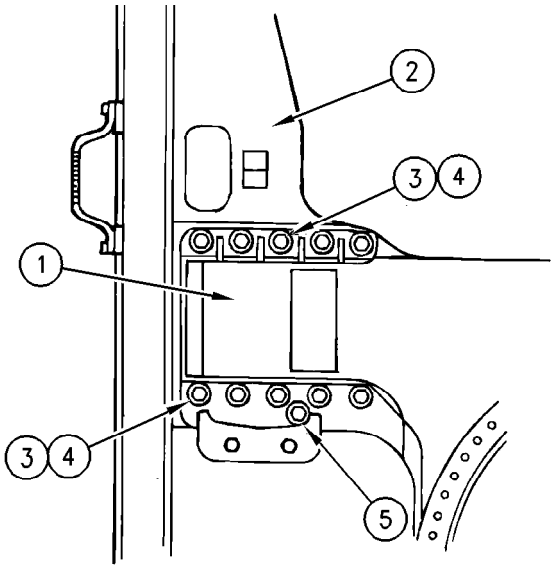


Illustration 423 g00697382

(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 2800 ± 350 N·m (2065 ± 258 lb ft).

8. Repeat Steps 1 through 7 for the other track frame.

i08323983

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.

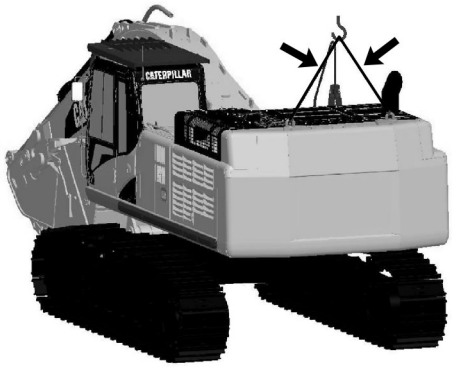


Illustration 424 g02809156

3. Fasten a proper rated cable with shackles to the links. Use an appropriate lifting device to tension the cable.

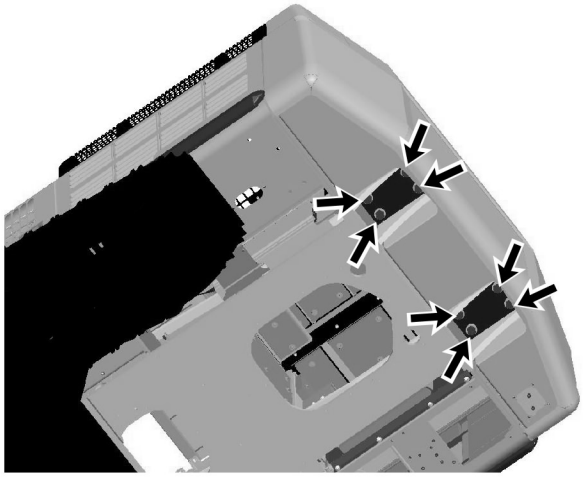


Illustration 425 g02809157

4. The counterweight mounting bolts are on the bottom of the counterweight. Remove the eight counterweight mounting bolts and eight washers.

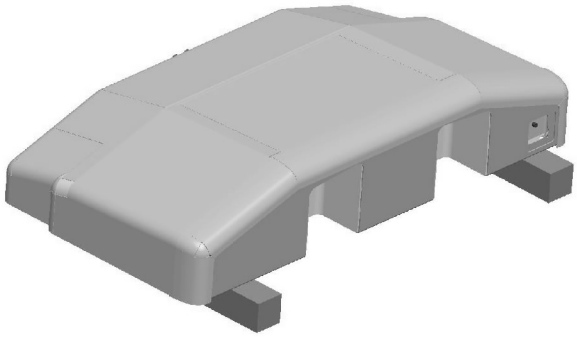


Illustration 426 g02809158

5. 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 eight counterweight mounting bolts. Decrease the tension on the lifting cable. Make sure that the counterweight is correctly positioned on the retaining plates. Tighten the bolts to a torque of 3100 ± 350 N·m (2286 ± 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.

Machines Equipped with Counterweight Removal System

WARNING

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

WARNING

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

WARNING

Inadequate linkage cylinder pressure can cause the counterweight to lower quickly. This may result in personal injury or death.

Before removing bolts, make certain the lamp and system are working properly by following the established procedure.

Contact your Cat dealer for service.

Counterweight Removal

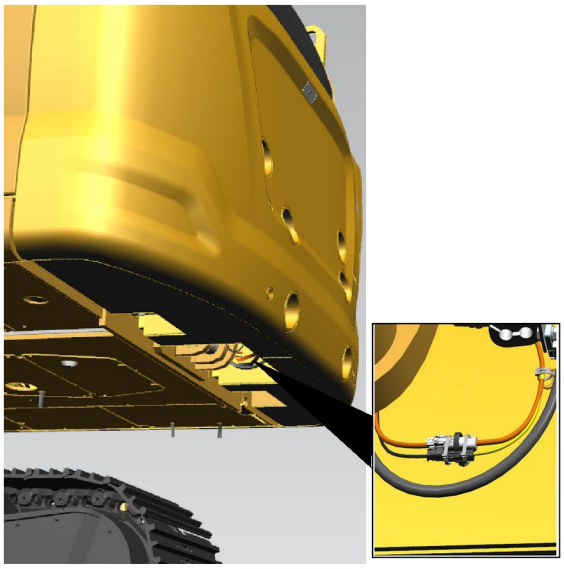


Illustration 427 g06285785

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. Set engine speed dial to "1".



Illustration 428 g06284701

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

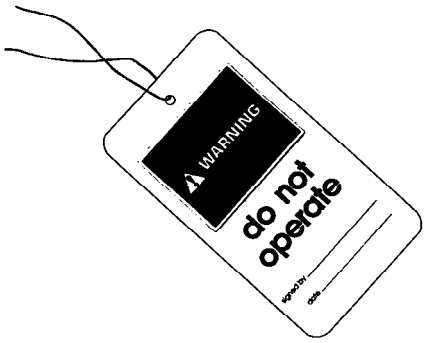


Illustration 429 g00104545

5. Attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls.

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

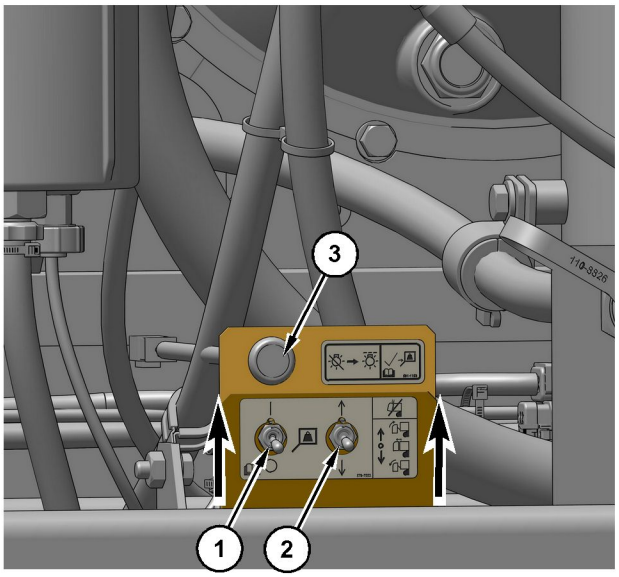


Illustration 430 g06506722

(1) Main Switch
(2) Up/Down Switch
(3) Lamp

7. To ensure the lamp (3) is working properly, move Main switch (1) to the ON position and verify the lamp (3) illuminates for 1 second before it turns off.

8. To ensure the system is working properly, hold UP on the Up/Down switch (2) until the lamp (3) starts to flash.

Note: Consult a Cat dealer if the lamp does not start to flash as the system may not work properly which could result in personal injury.

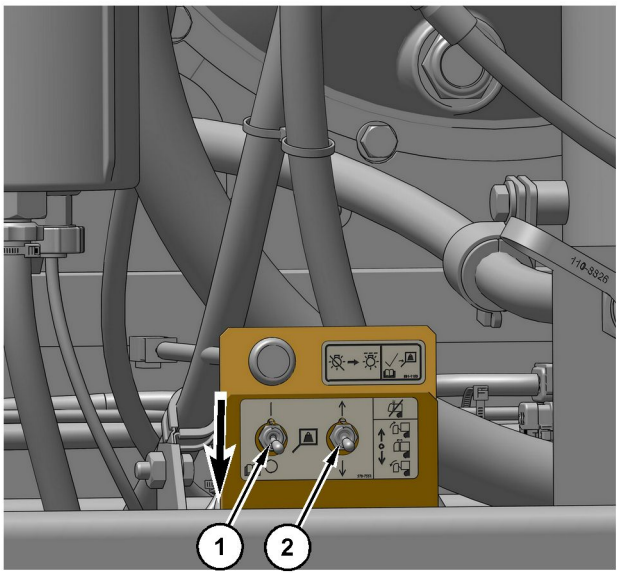


Illustration 431 g06506709

(1) Main Switch
(2) Up/Down Switch

9. Move Main switch (1) to the OFF position.



Illustration 432 g06285793

10. If equipped, remove the place from the counterweight.

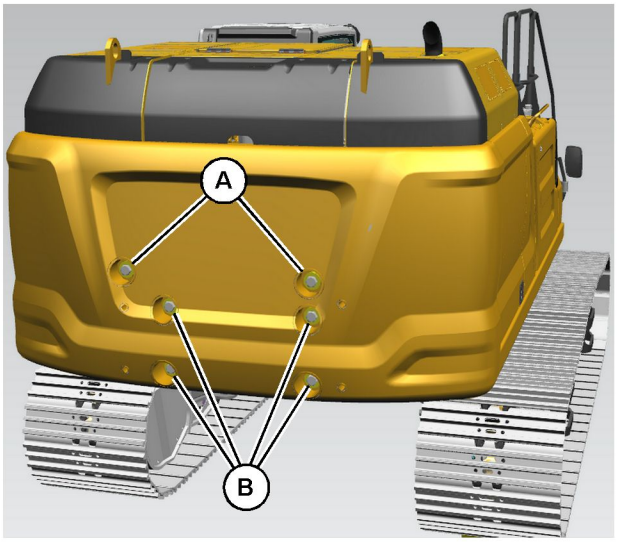


Illustration 433 g06628116

11. Remove bolts (A) from the counterweight.

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

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

13. Loosen bolts (A) two full revolutions.

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

14. Remove remaining bolts (B).

15. 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.

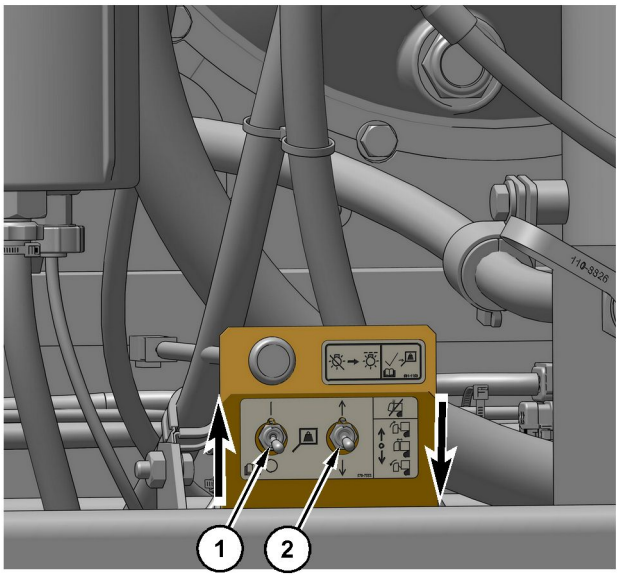


Illustration 434 g06506713

(1) Main Switch
(2) Up/Down Switch

16. Move Main switch (1) to the ON position.

17. Use the Up/Down switch (2) to lower counterweight onto supports on the ground.

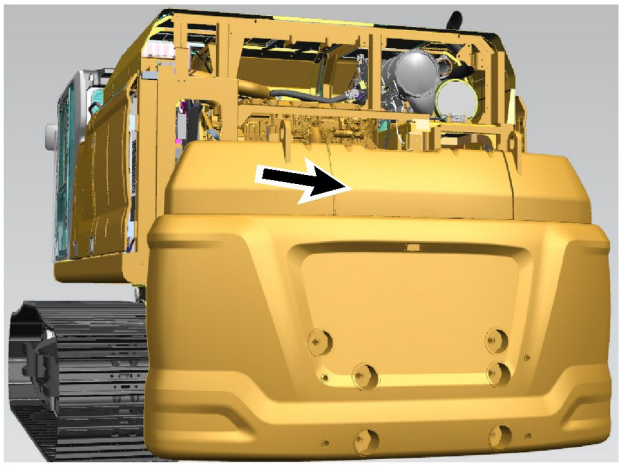


Illustration 435 g06285844

18. Remove the counterweight hood after the counterweight is lowered onto supports on the ground.

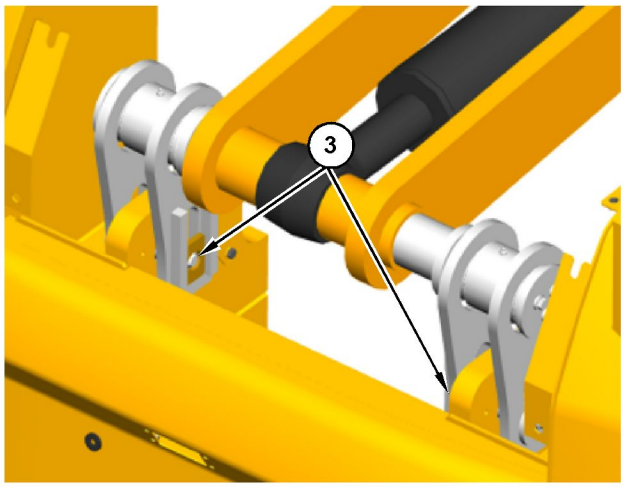


Illustration 436 g06285861

19. Unbolt the two pins (3), and remove them from the block.

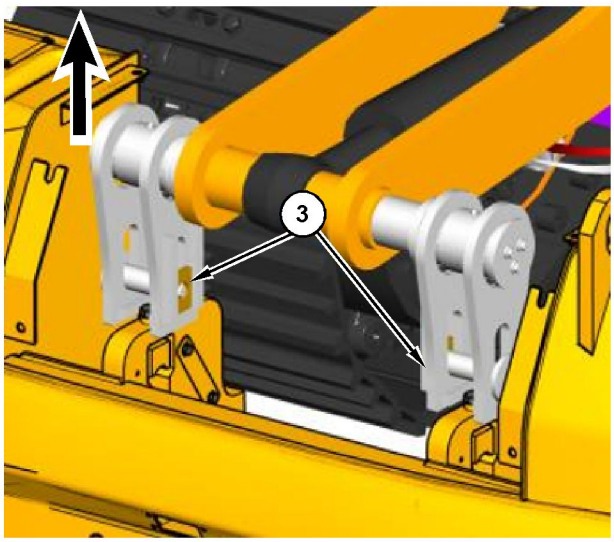


Illustration 437 g06285883

20. Lift the linkage up a little and move two pins (3) back to the linkage.

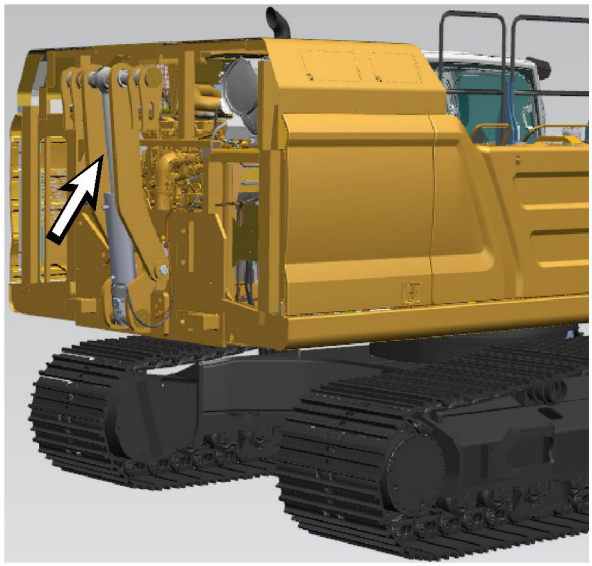


Illustration 438 g06285897

21. Move the linkage back to the machine.

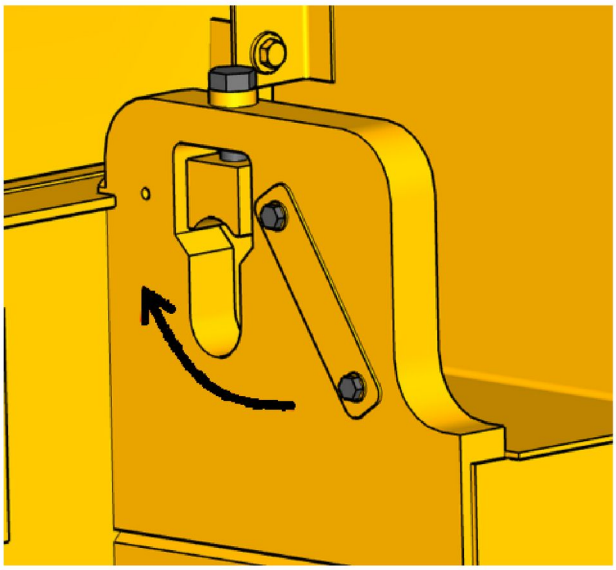


Illustration 439 g06285901

22. Move the plate to lock the adjustment bolt and block.

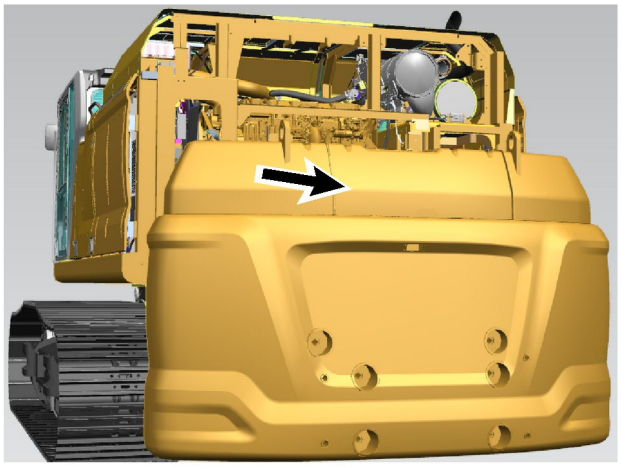


Illustration 440 g06285844

23. Install the counterweight hood back.

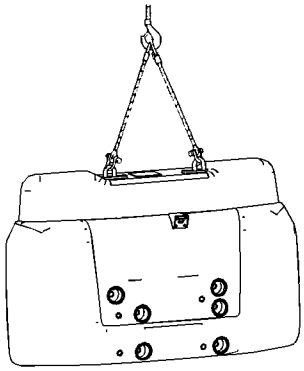


Illustration 441 g02097577

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

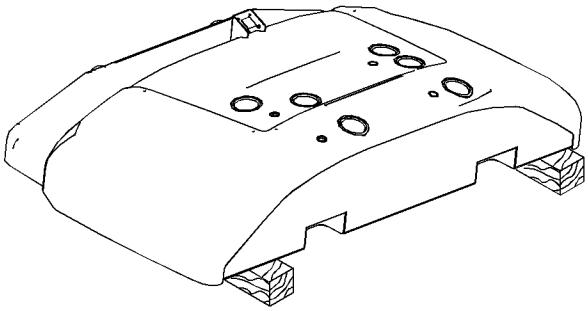


Illustration 442 g02102179

25. Use an appropriate lifting device to put the counterweight on suitable supports.

Counterweight Installation

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.

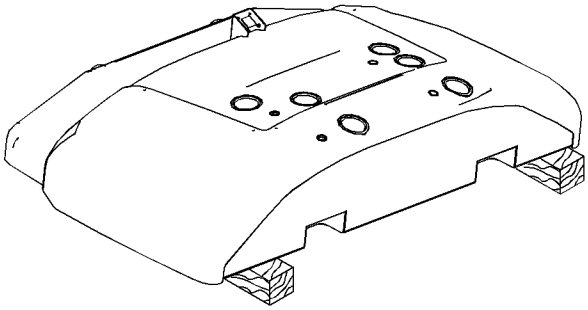


Illustration 443 g02102179

3. Use an appropriate lifting device to lift the counterweight from supports.

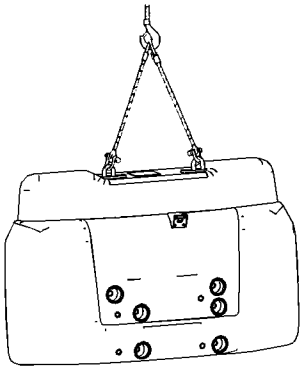


Illustration 444 g02097577

4. Fasten a proper rated cable with shackles to the lifting eyes on the counterweight and bring it near the machine.

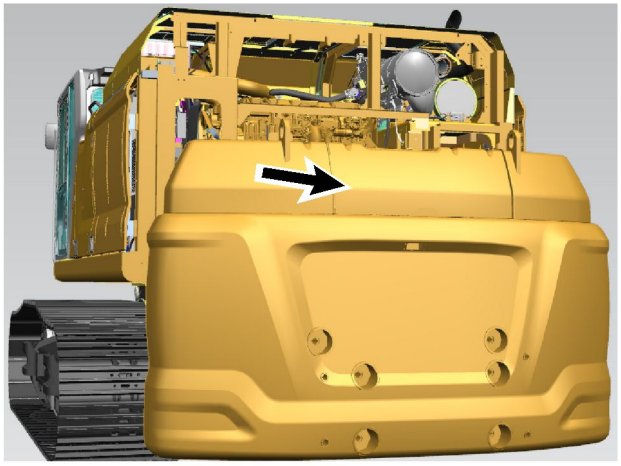


Illustration 445 g06285844

5. Remove the counterweight hood.

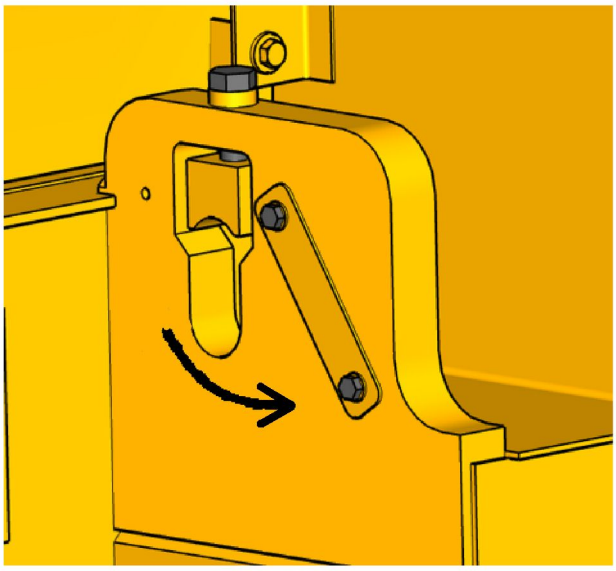


Illustration 446 g06415618

6. Move the plate to unlock the adjustment bolt and block.

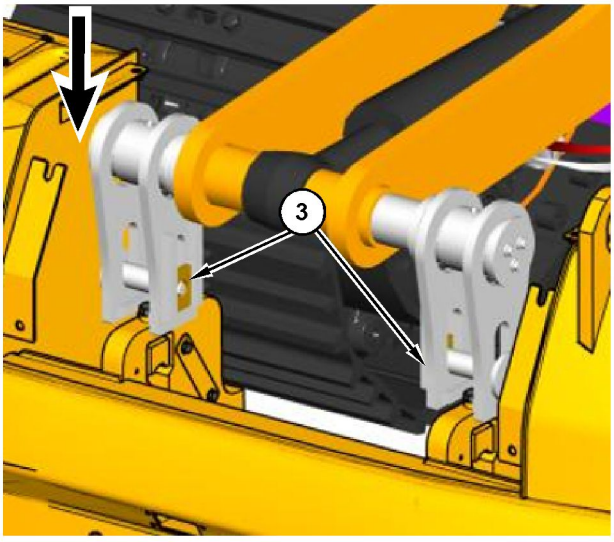


Illustration 447 g06415657

(3) Through Pin

7. Bring down the linkage and remove the two pins (3) from the linkage.

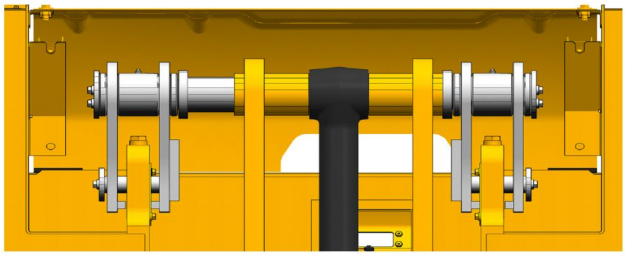


Illustration 448 g06415680

8. Set the linkage plate at the groove of the sleeve.

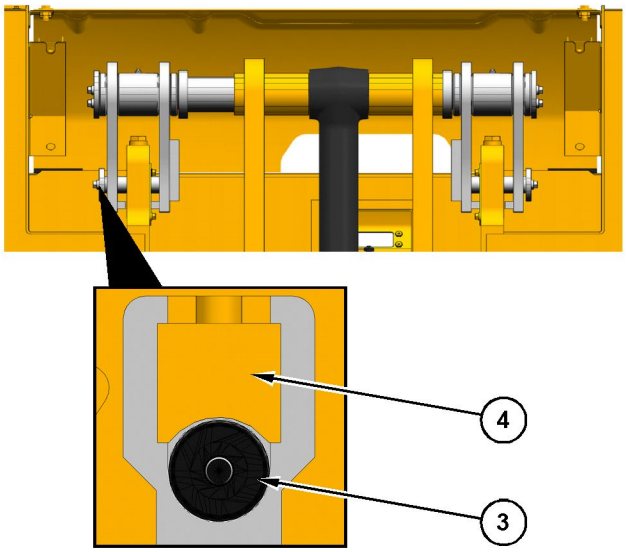


Illustration 449 g06415701

(3) Through Pin
(4) Block

9. Put the pin (3) through slot holes of the linkage plates and counterweight pin plate and under the block (4) as shown in illustration 449 .

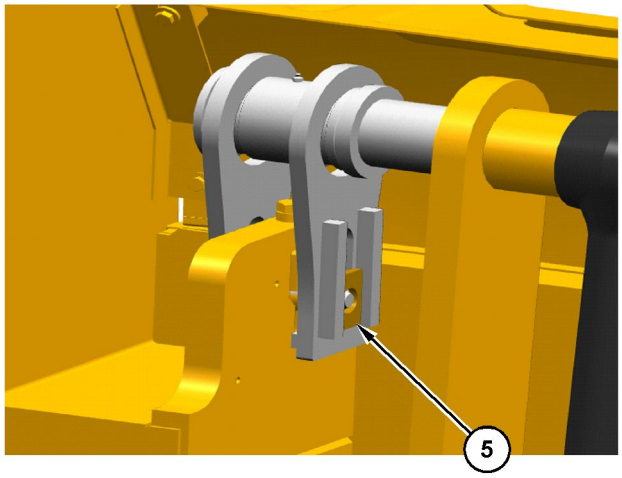


Illustration 450 g06415747

(5) plate

10. Insert the plate (5) between the bar of the linkage plate.

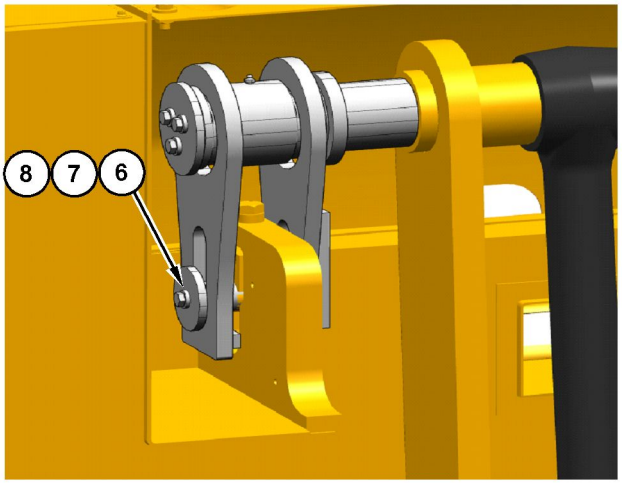


Illustration 451 g06415751

(6) Plate
(7) Bolt
(8) Washer

11. Set the plate (6), washer (7), and bolt (8). Tighten the bolt (8) by a torque of 100 N·m (74 lb ft).

12. Start the machine and set engine speed dial to "1".



Illustration 452 g06284701

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

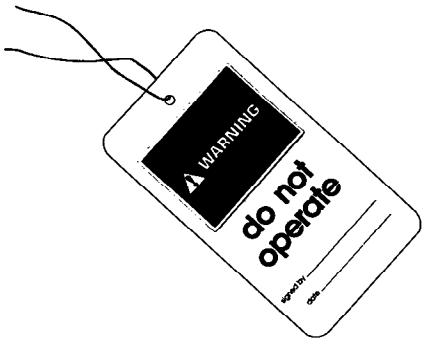


Illustration 453 g00104545

14. Attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls.

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

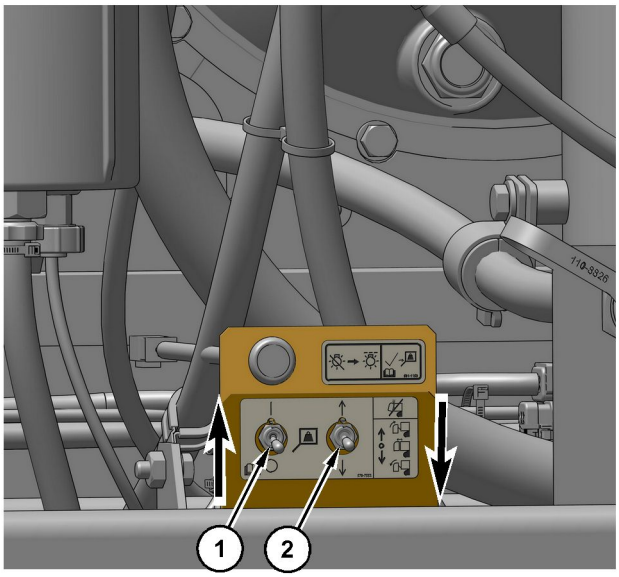


Illustration 454 g06506713

(1) Main Switch
(2) Up/Down Switch

16. Move Main switch (1) to the ON position.

17. Use the Up/Down switch (2) to Lift the linkage.

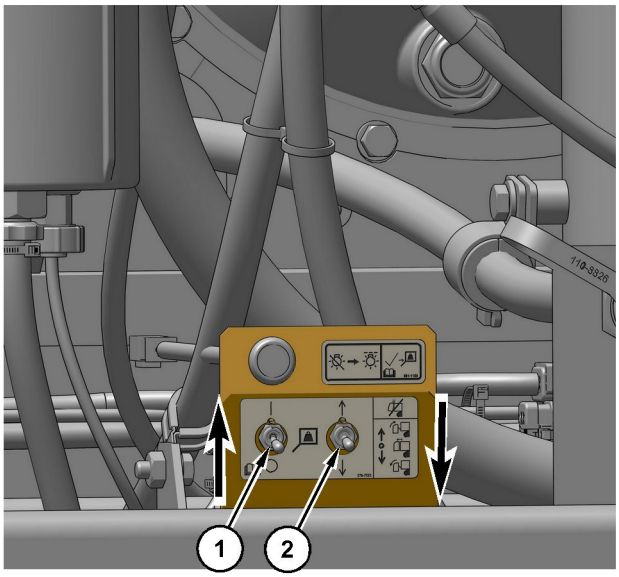


Illustration 455 g06506713

(1) Main Switch
(2) Up/Down Switch

18. Move Main switch (1) to the OFF position before tightening the counterweight mounting bolts.

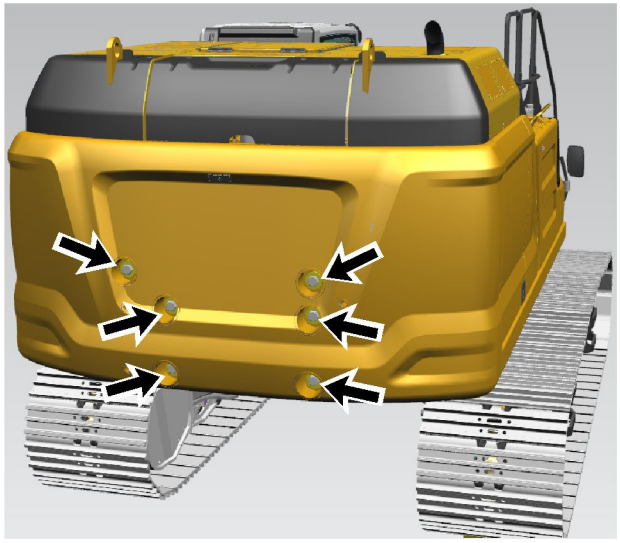


Illustration 456 g06284903

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



Illustration 457 g06285793

20. Install the plate.

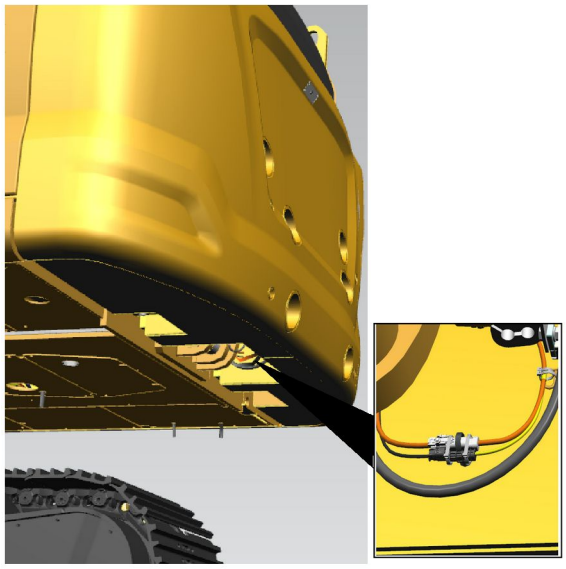


Illustration 458 g06285785

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.

Adjust Position of Counterweight

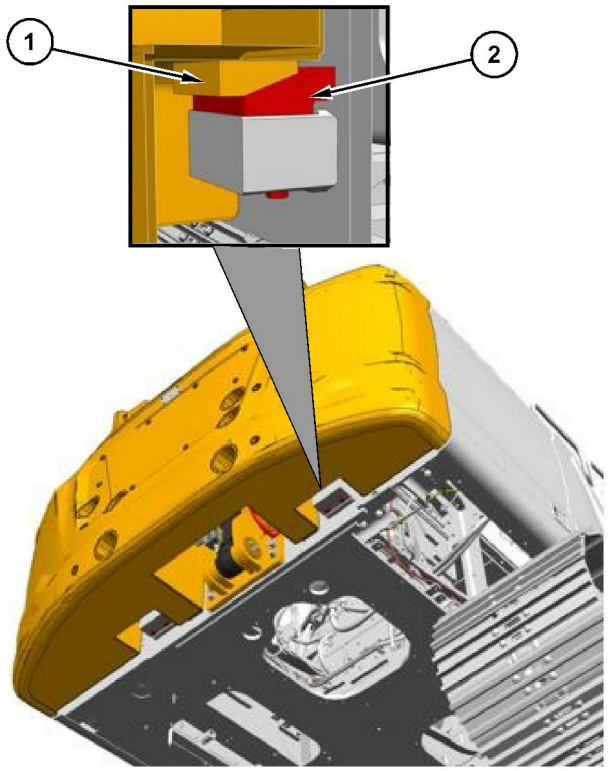


Illustration 459 g06380366

(1) Counterweight
(2) Plate

1. Check the contact status between Counterweight (1) and UF Plate (2) and readjust Block (3) position to eliminate clearance when Counterweight is installed again.
2. After adjusting Block (3), check the alignment of the bolt holes between Counterweight (1) and UF Plate (2) from Counterweight rear side. IF there is a gap between Counterweight (1) holes and UF Plate (2) thread holes, let down Counterweight and readjust Block (3) position.

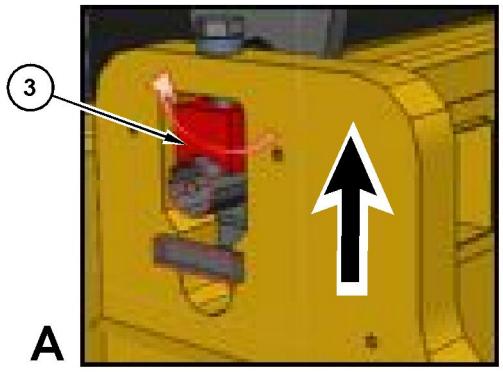


Illustration 460 g06380426

(A) Counterweight is moved up by turning the Block (3) clockwise

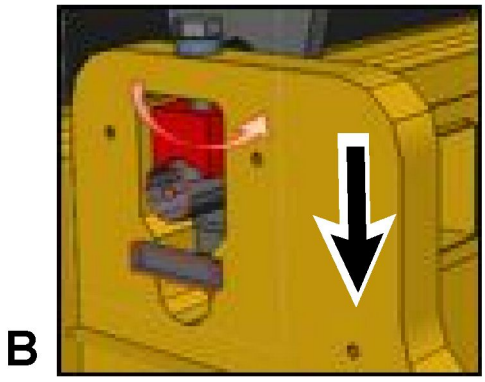


Illustration 461 g06380447

(B) Counterweight Is moved down by turning the Block (3) counterclockwise.

Release Linkage Cylinder Load

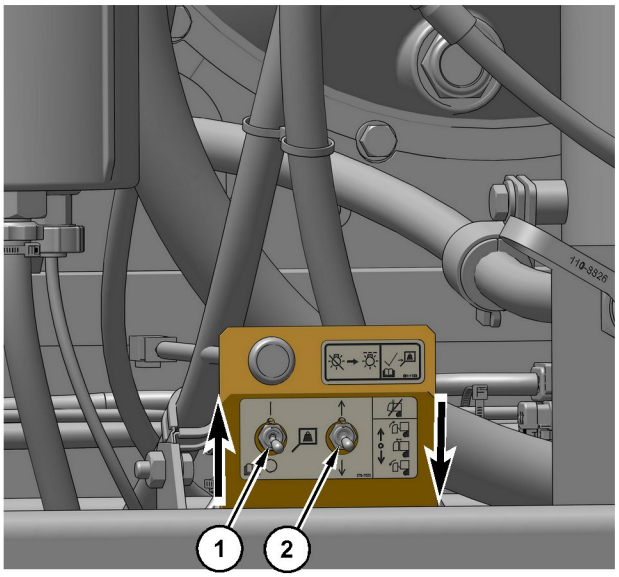


Illustration 462 g06506713

(2) Up/Down Switch

Press down on the Up/Down (2) switch for less than 1 second to release cylinder load from the linkage support.

i07539775

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

WARNING

Improper lifting and tie-down techniques can allow the load to shift or fail resulting in personal injury or property damage. Use only properly rated cables and slings with lift and tie down points provided on the machine. Keep the deck of the transport vehicle clean and use anti-slip mats on steel decks.

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.

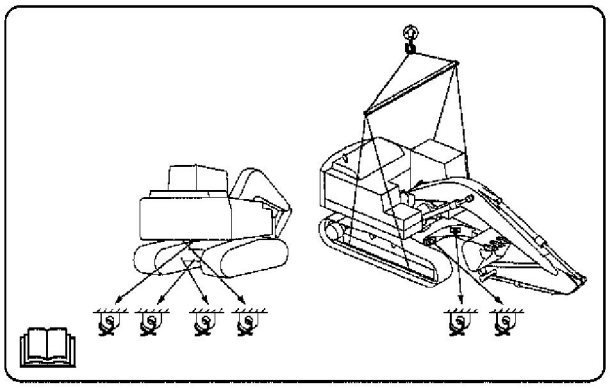


Illustration 463 g06289667

The lift and tie-down film is located near the base of the boom.

Lifting the machine



Illustration 464 g06184026

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.

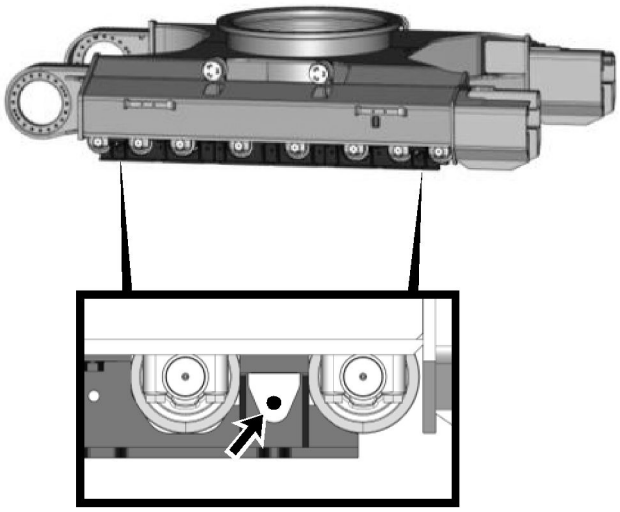


Illustration 465 g06279536

6. If the full length roller guard is equipped, there are holes at the ends of the guard for lifting cables. Refer to Illustration 465 .
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

Note: Obey all local and regional governmental regulations.

Diagonal Lashing

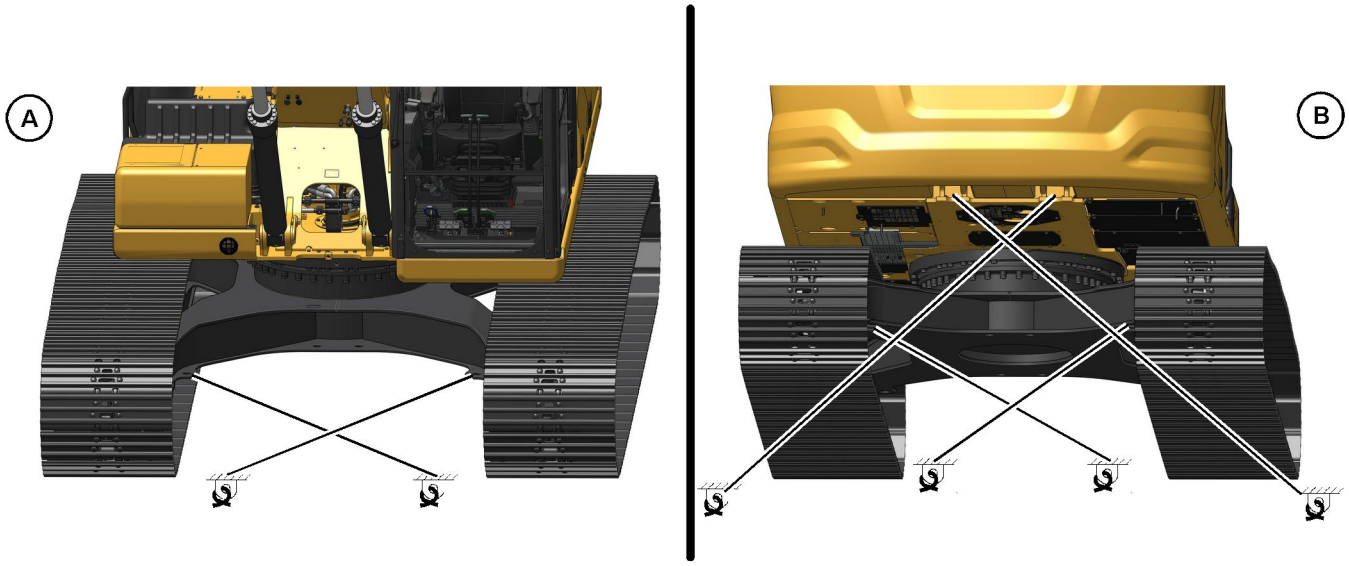


Illustration 466 g06320399

(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.
3. Move the hydraulic lockout control to the LOCKED position.
4. Set the lashing angle, which is on the longitudinal axis of the machine and the cable, at 30 to 50 degrees.
5. Keep the transport vehicle surface clean (for example, trailer deck).
6. For steel deck transport vehicles use skid-inhibiting or anti-slip mats (for example, rubber mats) with a friction coefficient of at least 0.3.

Lifting the Machine Segments

Bucket

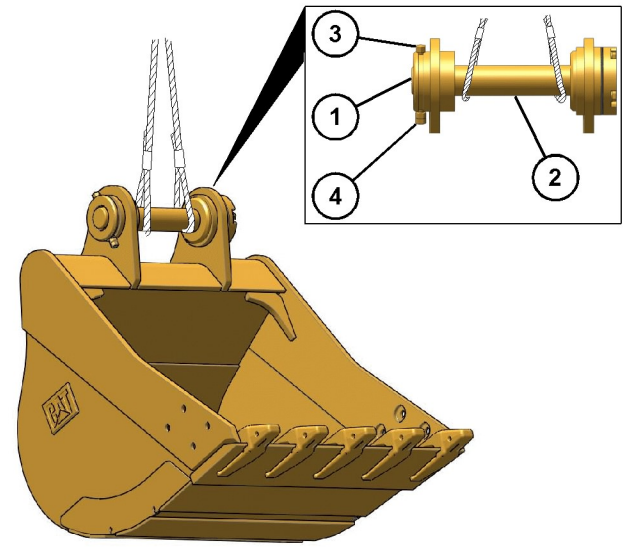


Illustration 467 g06184591

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

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

Towing Information

i07348733

Towing the Machine

SMCS Code: 7000

⚠ WARNING

Personal injury or death could result when towing a disabled machine incorrectly.

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

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

Relieve the hydraulic tank and line pressure before any disassembly.

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

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

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

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

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

Do not allow an operator to be on the machine that is being towed.

Before you tow the machine, make sure that the tow line or the tow bar is in good condition. Do not use a wire rope that is kinked, twisted, or damaged. Make sure that the tow line or the tow bar has enough strength for the towing procedure that is involved. The strength of the tow line or of the tow bar should be at least 150 percent of the gross weight of the towed machine. This requirement is for a disabled machine that is stuck in the mud and for being towed on a grade.

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

During towing, do not allow anyone to step between the towing and the towed machines.

Do not allow the wire rope to be straddled while the machine is being towed.

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

Avoid towing the machine on a slope.

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

Prior to releasing the brake of the final drive, firmly lock both tracks to prevent the machine from moving suddenly. When the machine is ready to be towed, release the brake of the final drive. Refer to Operation and Maintenance Manual, “Final Drive Sun Gear Removal”.

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

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

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. Maximum towing machine capacity is required on an incline or on a surface that is in poor condition.

Do not tow a loaded machine.

Consult your Cat dealer for the equipment that is necessary for towing a disabled machine.

Retrieval and Towing of Machine

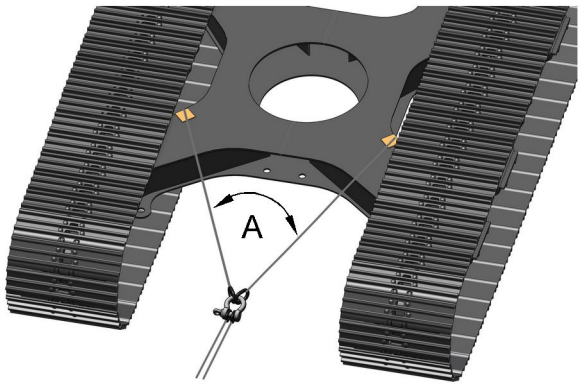


Illustration 468 g06289671

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: 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

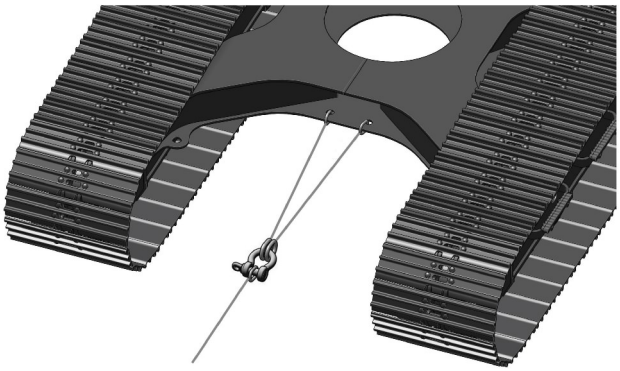


Illustration 469 g06186106

The maximum load for lightweight towing is 102900 N (75895 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.

i06954175

Final Drive Sun Gear Removal

SMCS Code: 4050

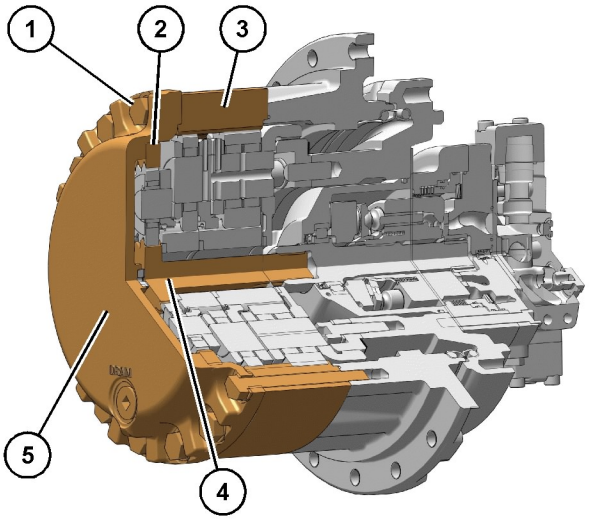


Illustration 470 g06188195

(1) Bolt
(2) Ring gear
(3) Ring gear
(4) Sun gear
(5) Final drive cover

⚠ WARNING

Without the sun gear in place, the brakes are ineffective. Personal injury or death could result. Provide other means to hold or stop the machine.

1. Thoroughly clean the area around the final drive. Make sure that you also clean the track shoes that are positioned above the final drive.

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

2. Drain the final drive oil into a suitable container. See Operation and Maintenance Manual, “Final Drive Oil - Change” for the procedure.

3. Remove 14 of 16 cover bolts (1) from final drive cover (5). Do not leave a bolt in the top hole of the cover.

4. Insert an alignment dowel through the top hole of the cover and into the threads in the final drive housing. This is necessary to support ring gear (2) and ring gear (3) while you are removing the final drive cover.

5. Remove one track shoe to allow access to the face between final drive cover (5) and ring gear (2).

6. Loosen remaining two cover bolts (1).

7. Use a hammer and a wedge to separate final drive cover (5) and ring gear (2). Make sure that ring gear (2) and ring gear (3) stay in place.

8. Remove remaining two cover bolts (1) and final drive cover (5).

9. Remove sun gear (4) from final drive.

10. Install final drive cover (5) and 16 cover bolts (1).

11. Fill the final drive with new oil. See Operation and Maintenance Manual, “Final Drive Oil - Change” for the procedure.

12. Repeat Steps 1 through 11 for the other final drive.

13. Refer to the Service Manual for information on the installation of the final drive sun gear.

Engine Starting (Alternate Methods)

i08251220

Engine Starting with Jump Start Cables
(If Equipped)

SMCS Code: 1000; 7000

⚠ WARNING

Failure to properly service the batteries may cause personal injury.

Prevent sparks near the batteries. They could cause vapors to explode. Do not allow the jump start cable ends to contact each other or the machine.

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts 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. Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“. 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 engine start switch on the stalled machine to the OFF position. Refer to “Engine Starting“. Turn off all accessories.
3. Turn the battery disconnect switch on the stalled machine to the ON position. Refer to “Battery Disconnect Switch“.
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.

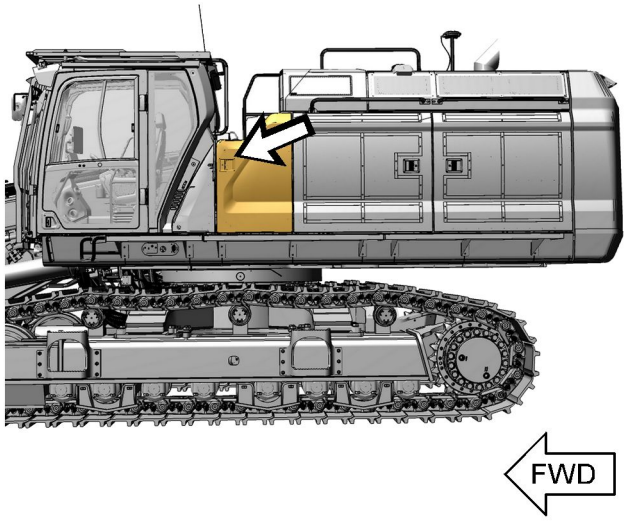


Illustration 471 g06600608

Battery is located behind the left front access door

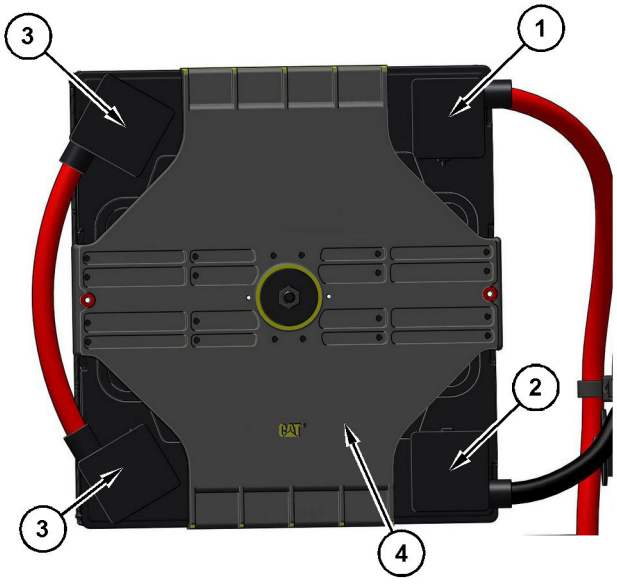


Illustration 472 g06600679

(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

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.

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. Refer to “Engine Starting“ for the correct starting procedure.

14. Immediately after you start the stalled engine, disconnect the jump-start cables in reverse order.

i08233130

Engine Starting with Auxiliary Start Receptacle
(If Equipped)

SMCS Code: 1000; 7000

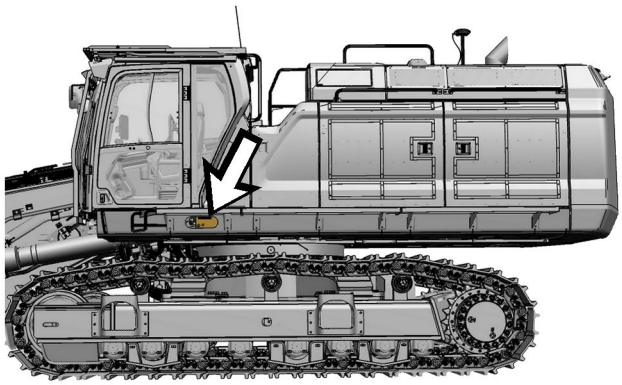


Illustration 473 g06592385

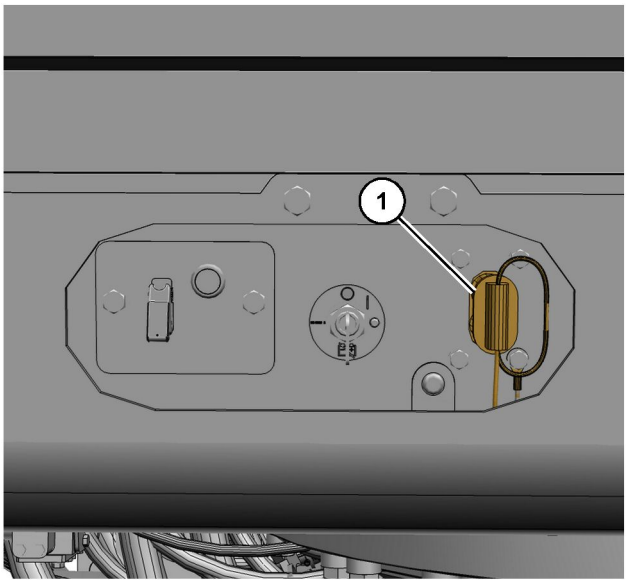


Illustration 474 g06592402

(1) Receptacle

Some Caterpillar products may be equipped with an auxiliary start receptacle as a standard part. If your machine is not equipped with an auxiliary start receptacle, the machine can be equipped with an auxiliary start receptacle from parts service. This will ensure that a permanent receptacle is always available to jump-start the machine.

There are two cable assemblies that can be used to jump-start the stalled machine. You can jump-start the stalled machine from another machine that is equipped with an auxiliary start receptacle or with an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

1. Determine the reason that the engine will not start.

Reference: Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for more information.

2. Ensure that the travel control levers on the stalled machine are in the CENTER position. 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 2 minutes while the batteries in the stalled machine partially charge.

11. Attempt to start the stalled engine.

12. Immediately after the stalled engine starts, disconnect the jump-start cable from the power source.

13. Disconnect the other end of the jump-start cable from the stalled machine.

14. Conclude the failure analysis on the starting charging system of the stalled machine, as required. Check the machine while the engine is running and the charging system is in operation.

Maintenance Section

Maintenance Access

i08233131

Access Door and Cover Locations

SMCS Code: 726A-CH

Engine Hood

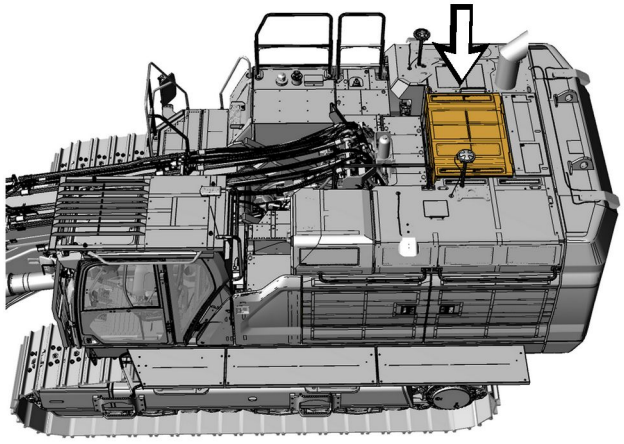


Illustration 475 g06592425

Left Front Access Door

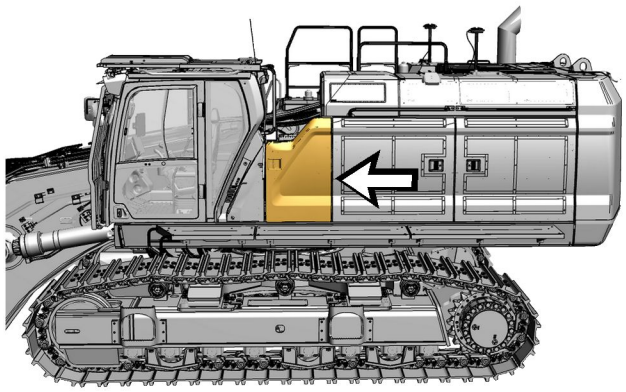


Illustration 476 g06592427

Left Middle Access Door

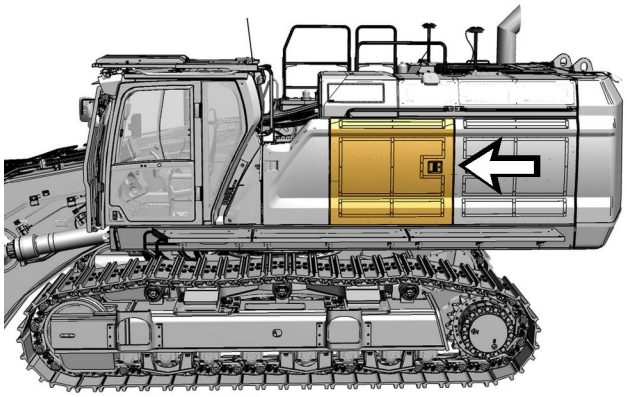


Illustration 477 g06592445

Left Rear Access Door

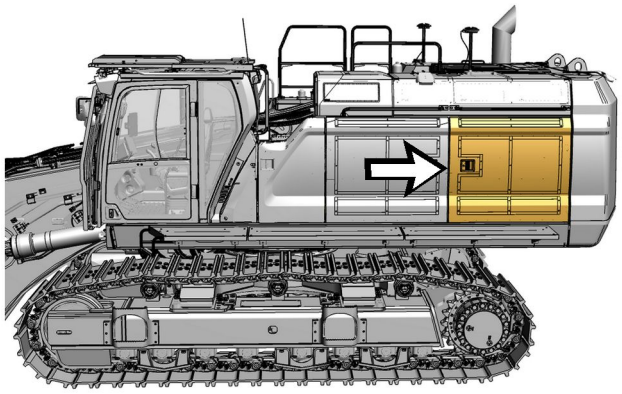


Illustration 478 g06592449

Right Access Door

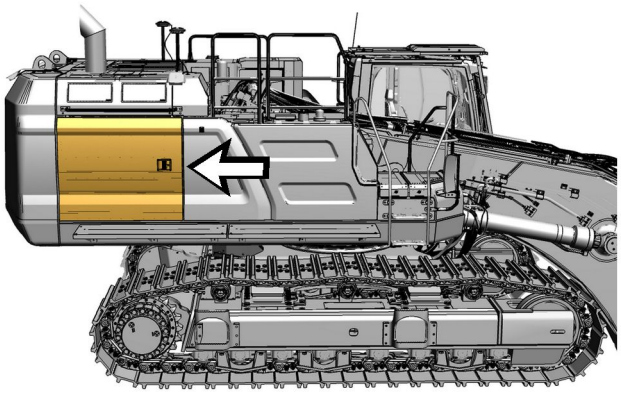


Illustration 479 g06592451

Lubricant Viscosities and Refill Capacities

i07419350

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, API CJ-4, and the newer API CK-4, are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification, API CJ-4, the newer API CK-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, API CJ-4, the newer API CK-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, API CJ-4, or the newer API CK-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) if equipped, will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems may include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)
- Selective Catalytic Reduction (SCR)
- Lean NOx Traps (LNT)

Other systems may apply.

Oils that are per API CI-4 or prior categories are not allowed. These oils have high ash and are not appropriate for use in engines with aftertreatment devices.

Table 42

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Engine Crankcase for all Machines	**Cat DEO-ULS Cold Weather**	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS SYN	SAE 5W-40	−30	50	−22	122
	Cat DEO-ULS	SAE 10W-30	−18	40	0	104
		SAE 15W-40	−10	50	14	122
Pump Coupling (If Equipped)	**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 20 SAE 20W
- Cat HYDO Advanced 30 SAE 30
- Cat BIO HYDO Advanced, Multigrade

Cat HYDO Advanced oils allow 6000 hours or higher oil drain intervals for most applications. S·O·S Services oil analysis is recommended when the oil drain interval is increased to 6000 hours or higher. In comparison, non-Cat commercial hydraulic oils (second choice oils) allow 2000 hours oil drain interval. Itis recommended to followthe maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. Consult your Cat dealer for details. When switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are listed below.

- Cat MTO
- Cat DEO
- Cat DEO-ULS
- Cat TDTO
- Cat TDTO Cold Weather
- Cat TDTO-TMS
- Cat DEO-ULS Cold Weather

Note: Oil drain intervals of the oils listed above are less than those of Cat HYDO Advanced oils. The oil drain interval of these oils is typically 2000 hours and up to a maximum of 4000 hours. An exception is Cat TDTO Cold Weather oil which allows 6000 hours or higher oil drain interval. S·O·S Services oil analysis is required when the oils listed above are used in Cat hydraulic system components and hydrostatic transmissions.

Table 43

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 20 Cat TDTO	SAE 20W	–5	45	23	113
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	10	50	50	122
	Cat BIO HYDO Advanced	“ISO 46” Multi-Grade	−30	50	−22	122
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	−20	40	−4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	−15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−15	50	5	122
	Cat DEO-ULS SYN	SAE 5W-40	−25	40	−13	104
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

For applications requiring the use of fire-resistant hydraulic fluids, Caterpillar recommends the use of EcoSafe FR-46. This product is a fully synthetic, non-aqueous hydraulic fluid. Water based and glycol-based hydraulic products are not recommended for use in Cat machine hydraulic systems. EcoSafe FR-46 is an ISO 46 multi-grade product. For more information refer to the product information provided by the manufacturer of EcoSafe hydraulic oil. Refer to your Cat dealer for availability.

Other Fluid Applications

Table 44

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 Cold Weather**	SAE 0W-20	-40	0	-40	32
	Cat TDTO	SAE 10W	−30	0	-22	32
		SAE 30(1)	−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 Cold Weather**	SAE 0W-20	−40	0	−40	32
	Cat TDTO	SAE 10W	−30	0	−22	32
		SAE 30(1)	−20	25	−4	77

(continued)

(Table 44, contd)

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
		SAE 50	0	50	32	122
	Cat TDTO-TMS	Multi-Grade	−25	25	−13	77
Track Idlers and Track Rollers	Cat DEO-ULS Cat DEO	SAE 15W-40(1)	-10	50	14	122
	Cat DEO Cold Weather	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS SYN	SAE 5W-40	−35	40	−31	104
	Cat FDAO SYN	Multi-Grade	-30	50	-22	122

(1) Factory fill oil for standard configuration machines.

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 45

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

Diesel fuel must meet Caterpillar Specification for Distillate Fuel and the latest revisions of “ASTM D975” and “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.

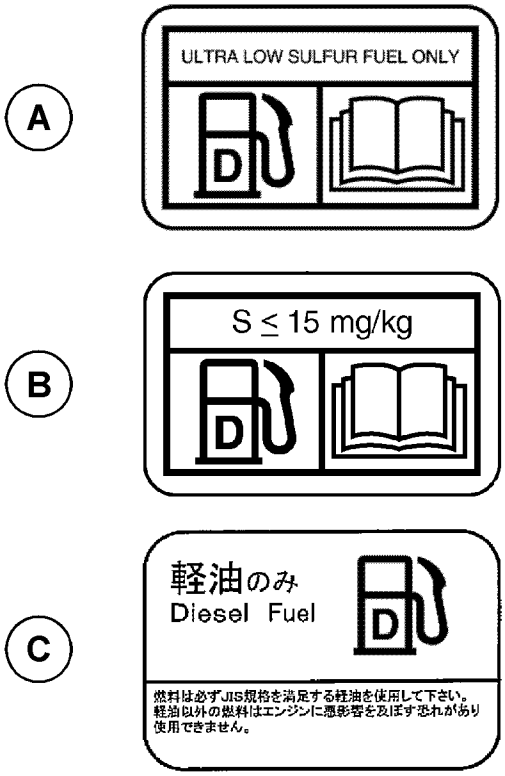


Illustration 480 g03218956

(A) North America film
(B) Europe, Africa, Middle East film
(C) Japan film

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 Stage V type-approved nonroad engines. Additionally, the Cetane number should not be less than 45, and the biodiesel content should not be greater than 20% volume/volume.

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 for 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 nonroad and machine applications that are not Tier 4/ Stage V certified engines and are not equipped with aftertreatment devices. For Tier 4/Stage V certified engines, always follow operating instructions 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/Stage V requirements. This manual may be found on the web at Safety.Cat.com.

Diesel Exhaust Fluid

General Information

Diesel Exhaust Fluid (DEF) is a liquid that is injected into the exhaust system of engines equipped with Selective Catalytic Reduction (SCR) systems. SCR reduces emissions of nitrogen oxides (NOx) in diesel engine exhaust.

Diesel Exhaust Fluid (DEF) is also known under other names including Aqueous Urea Solution (AUS) 32, AdBlue, or generically referred to as urea.

In engines equipped with SCR emissions reduction system, DEF is injected in controlled amounts into the engine exhaust stream. At the elevated exhaust temperature, urea in DEF is converted to ammonia. The ammonia chemically reacts with NOx in diesel exhaust in the presence of the SCR catalyst. The reaction converts NOx into harmless nitrogen (N2) and water (H2O).

DEF Recommendations

For use in Cat engines, DEF must meet all the requirements defined by “ISO 22241-1” Requirements.

Caterpillar recommends the use of DEF available through the Cat parts ordering system for use in Cat engines equipped with SCR systems.

In North America, commercial DEF that is API approved and meets all the requirements defined in “ISO 22241-1” may be used in Cat engines that are equipped with SCR systems.

Outside of North America, commercial DEF that meets all requirements defined in “ISO 22241-1” may be used in Cat engines that are equipped with SCR systems.

The supplier should provide documentation to prove that the DEF is compliant with the requirements of “ISO 22241-1”.

NOTICE
Cat does not warrant the quality or performance of non-Cat fluids.

NOTICE
Do not use agriculture grade urea solutions. Do not use any fluids that do not meet “ISO 22241-1” Requirements in SCR emissions reduction systems. Use of these fluids can result in numerous problems including damage to SCR equipment and a reduction in NOx conversion efficiency.

DEF is a solution of solid urea that is dissolved in demineralized water to produce a final concentration of 32.5% urea. DEF concentration of 32.5% is optimal for use in SCR systems. DEF solution of 32.5% urea has the lowest attainable freeze point of −11.5° C (11.3° F). DEF concentrations that are higher or lower than 32.5% have higher freeze points. DEF dosing systems and “ISO 22241-1” specifications are designed for a solution that is approximately 32.5%.

Caterpillar offers a refractometer, Cat part number 360-0774, that can be used to measure DEF concentration. Follow the instructions provided with the instrument. Appropriate commercial portable refractometers can be used to determine urea concentration. Follow the instructions from the manufacturer.

DEF Guidelines

DEF solution is typically colorless and clear. Changes to color or clarity are indicators of quality issues. Quality of DEF can degrade when stored and handled inappropriately or if DEF is not protected from contamination. Details are provided below.

If quality issues are suspected, testing of DEF should focus on urea percentage, alkalinity as NH3 and biuret content. DEF that does not pass all these tests or that is no longer clear should not be used.

Materials compatibility

DEF is corrosive. Due to the corrosion caused, DEF must be stored in tanks constructed of approved materials. Recommended storage materials:

Stainless Steels:

- 304 (S30400)
- 304L (S30403)
- 316 (S31600)
- 316L (S31603)

Alloys and metals:

- Chromium Nickel (CrNi)
- Chromium Nickel Molybdenum (CrNiMo)
- Titanium

Non-metallic materials:

- Polyethylene
- Polypropylene
- Polyisobutylene
- Teflon (PFA)
- Polyfluoroethylene (PFE)
- Polyvinylidene fluoride (PVDF)
- Polytetrafluoroethylene (PTFE)

Materials NOT compatible with DEF solutions include Aluminum, Magnesium, Zinc, Nickel coatings, Silver and Carbon steel, and Solders containing any of the above. Unexpected reactions may occur if DEF solutions come in contact with any non-compatible material or unknown materials.

Bulk storage

Follow all local regulations covering bulk storage tanks. Follow proper tank construction guidelines. Tank volume typically should be 110% of planned capacity. Appropriately vent indoor tanks. Plan for control of overflow of the tank. Heat tanks that dispense DEF in cold climates.

Bulk tank breathers should be fitted with filtration to keep airborne debris from entering the tank. Desiccant breathers should not be used because water will be absorbed, which potentially can alter DEF concentration.

Handling

Follow all local regulations covering transport and handling. DEF transport temperature is recommended to be −5° C (23° F) to 25° C (77° F). All transfer equipment and intermediate containers should be used exclusively for DEF. Containers should not be reused for any other fluids. Ensure that transfer equipment is made from DEF-compatible materials. Recommended material for hoses and other non-metallic transfer equipment includes:

- Nitrile Rubber (NBR)
- Fluoroelastomer (FKM)
- Ethylene Propylene Diene Monomer (EPDM)

The condition of hoses and other nonmetallics that are used with DEF should be monitored for signs of degradation. DEF leaks are easily recognizable by white urea crystals that accumulate at the site of the leak. Solid urea can be corrosive to galvanized or unalloyed steel, aluminum, copper, and brass. Leaks should be repaired immediately to avoid damage to surrounding hardware.

Cleanliness

Contaminants can degrade the quality and life of DEF. Filtering DEF is recommended when dispensed into the DEF tank. Filters should be compatible with DEF and should be used exclusively with DEF. Check with the filter supplier to confirm compatibility with DEF before using. Mesh-type filters using compatible metals, such as stainless steel, are recommended. Paper (cellulose) media and some synthetic filter media are not recommended because of degradation during use.

Care should be taken when dispensing DEF. Spills should be cleaned immediately. Machine or engine surfaces should be wiped clean and rinsed with water. Caution should be used when dispensing DEF near an engine that has recently been running. Spilling DEF onto hot components will cause harmful vapors.

Stability

NOTICE
Storing Diesel Exhaust Fluid in high heat areas is not recommended. Do not store DEF in high heat generating areas on the machine, such as the pump compartment or the engine compartment. The quality of the DEF can degrade when exposed to high temperatures.

DEF fluid is stable when stored and handled properly. The quality of DEF rapidly degrades when stored at high temperatures. The ideal storage temperature for DEF is between −9° C (15.8° F) and 25° C (77° F). DEF that is stored above 35° C (95° F) for longer than 1 month must be tested before use. Testing should evaluate Urea Percentage, Alkalinity as NH3 and Biuret content.

The length of storage of DEF is listed in the following table:

Table 46

Storage Temperature	Expected DEF Life
Below 25° C (77° F)	18 months
25° C (77° F) to 30° C (86° F)	12 months
30° C (86° F) to 35° C (95° F)	6 months
Above 35° C (95° F)	test quality before use

Refer to “ISO 22241” document series for more information about DEF quality control.

Note: Dispose of all fluids according to applicable regulations and mandates.

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 D7467” includes up to B20 (20 percent) biodiesel. Any diesel fuel in the U.S. may contain up to B20 biodiesel fuel.

European distillate diesel fuel specification “EN16709:2015” includes up to B20 (20 percent) biodiesel. Any diesel fuel in Europe may contain up to B20.

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.

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.

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.

Table 47

Recommendations for Finished Coolants for use in Cat engines				
Coolant Type	**Recommendations**	**Product**	**Service hours (1)(2)**	**Required Maintenance(3)**
Cat ELC, Cat ELI, or commercial coolant that meets Cat EC-1	Preferred	Cat ELC	12000 hours or 6 years	Add Cat ELC Extender at 6000 service hours or one half of service life
		Cat ELI (water based) (4)	12000 hours or 6 years	Add Cat ELC Extender at 6000 service hours or one half of service life
	Min requirements	Cat EC-1 specification and “ASTM D6210” and Organic Additive Technology (OAT) based on a combination of a monocarboxylic acid and a dicarboxylic acid. Free of phosphate, borate, and silicate. Tolyltriazole: minimum typical concentration of 900 ppm Nitrite: minimum typical concentration of 500 ppm in new coolants	6000 hours or 6 years	Add Extender at 3000 service hours or one half of service life
Cat DEAC, Cat SCA, conventional coolants, and commercial extended life coolants that do not meet EC-1	Acceptable	Cat DEAC	3000 hours or 3 years	SCA at maintenance intervals
		Cat SCA (water based) (4)	3000 hours or 2 years	SCA at maintenance intervals

(continued)

(Table 47, contd)

Recommendations for Finished Coolants for use in Cat engines				
	Min requirements for fully formulated Heavy-Duty Commercial coolants	"ASTM D6210" and Nitrite (as NO2) concentration: Minimum of 1200 ppm (70 grains/US gal) and maximum of 2400 ppm (140 grains/US gal) Silicon concentration: minimum of 100 ppm and maximum of 275 ppm	3000 hours or 2 years	SCA at maintenance intervals
	Min requirements for SCA and water (4) (5)	Commercial supplemental coolant additive and water having Nitrite (as NO2) concentration: Minimum of 1200 ppm (70 grains/US gal) and maximum of 2400 ppm (140 grains/US gal) Silicon concentration: minimum of 100 ppm and maximum of 275 ppm	3000 hours or 1 year	Per manufacturer recommendations

(1) New Coolants at 50 volume percent diluted. Coolants that are prediluted at the coolant manufacturer must be diluted with water that meets Reagent 4 "ASTM D1193" requirements.
(2) Maintain the in-service coolant at the given limits.
(3) For appropriate maintenance procedures, refer to the details given in this Chapter. For applications that allow the use of Cat ELI in water, a minimum of 7.5 percent of Cat ELI is recommended. For applications that allow the use of SCA and water, a minimum of 6 percent to a maximum of 8 percent concentration of Cat SCA are recommended.
(4) Water-based coolants are not allowed for use in machines that has NOx reduction aftertreatment devices, in engines that has AATAC and in Marine engines that have SWAC
(5) There are currently no industry standards to define the quality of water-based conventional coolants. To control the quality of SCA and water coolants, the commercial SCA additive package should pass ASTM D6210 when this package is used in a glycol-based coolant. Do not use a commercial SCA additive package that only meets the ASTM D3306 or equivalent specification when used in a glycol-based coolant.

i08308916

Capacities (Refill)

SMCS Code: 1000; 7000

Table 48

Approximate Refill Capacities			
Component or System	**Liters**	**US gal**	**Recommended Type**
Fuel Tank	920	243	Refer to "Lubricant Viscosities".
Cooling System	71	18.8	
Coolant Reservoir	4.5	1.2	
Engine Crankcase with Filter	62	16.4	
Hydraulic System (1)	300	79	
Diesel Exhaust Fluid Tank	80	21.1	
Each Swing Drive	20	5.3	
Each Final Drive	32	8.5	
	kg	**lbs**	

(continued)

(Table 48, contd)

Approximate Refill Capacities			
Refrigerant[2]	1.1	2.4	R-134a
Swing Gear	46	101	Refer to “Lubricant Viscosities“.

(1) The amount of hydraulic fluid that is needed to refill the hydraulic system after performing “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

i07477696

Prepare the Machine for Maintenance

SMCS Code: 1000; 7000

Refer to the following procedure before you perform any maintenance to the machine.

⚠ 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 attachments have been lowered, oil is cool before removing any components or lines. 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, PERJ1017, “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: Permit only one operator on the machine. Keep all other personnel away from the machine or in view of the operator.

1. Park the machine on a dry, level, solid surface that is free of any debris.

Note: The surface must be solid enough to support the weight of the machine and any tooling that is used to support the machine.

2. Engage the parking brake. Place wheel blocks in front and behind the wheels or tracks.
3. Lower all work tools to the ground.
4. Stop the engine.
5. Release the pressure in the hydraulic system. Refer to Operation and Maintenance Manual, “System Pressure Release” for more information.

Perform a visual inspection first. If the visual checks are completed but the problem has not been identified, perform operational checks. If the problem has not been identified, perform instrument tests. This procedure will help to identify system problems.

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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.

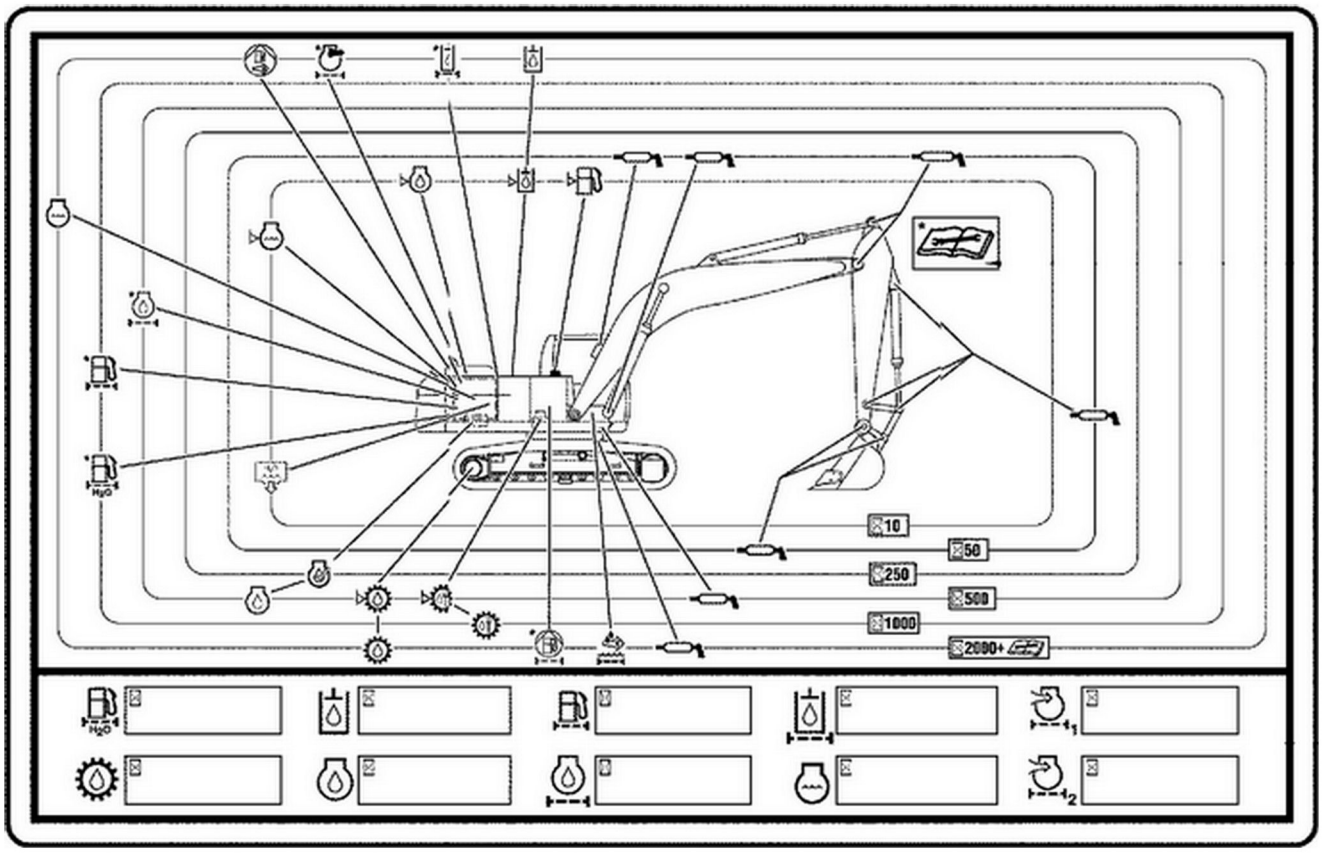


Illustration 481 g06595874

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.



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.

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System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

⚠ WARNING

Personal injury or death can result from sudden machine movement.

Sudden movement of the machine can cause injury to persons on or near the machine.

To prevent injury or death, make sure that the area around the machine is clear of personnel and obstructions before operating the machine.

Coolant System

⚠ WARNING

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

To relieve the pressure from the coolant system, turn off the machine. Allow the cooling system pressure cap to cool. Remove the cooling system pressure cap slowly in order 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 hydraulic lines are disconnected or removed from that hydraulic circuit.

- 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 removing any components or lines. 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, PERJ1017, “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.

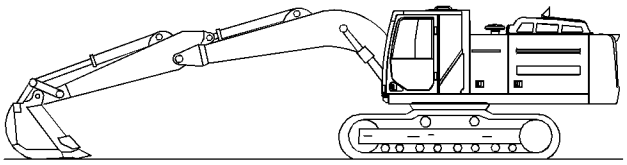


Illustration 482 g02137969

2. Fully retract the stick cylinder rod. Adjust the position of the bucket so that the bucket is parallel to the ground. Lower the boom until the bucket is flat on the ground. Refer to Illustration 482 .

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.

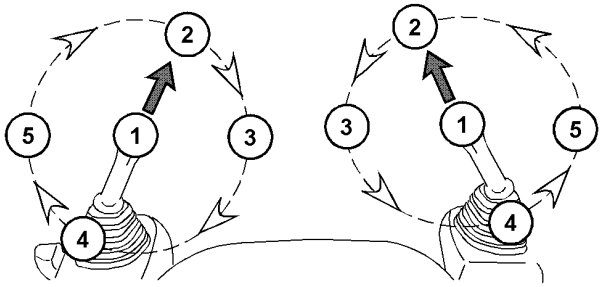


Illustration 483 g03315377

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. Repeat Step 4a through Step 4f 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.

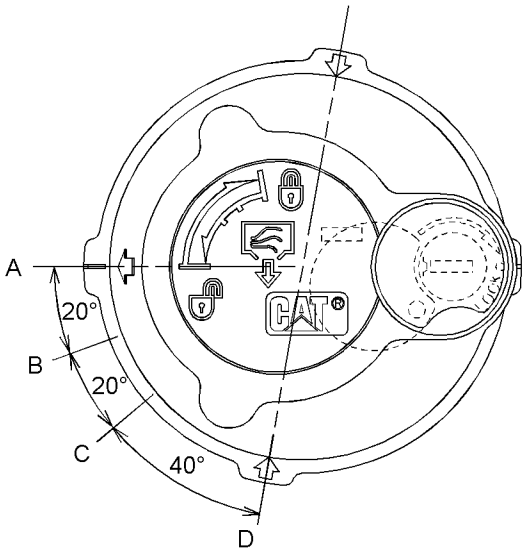


Illustration 484 g02275615

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 484 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).

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.

Note: If a hydraulic line for the boom, the stick or the bucket must be disconnected, utilize the purge screws. Refer to Purge Screws (Boom, Stick and/or Bucket Hydraulic Circuits).

Purge Screws (Boom, Stick and/or Bucket Hydraulic Circuits)

If a hydraulic line for the boom, the stick or the bucket must be disconnected, utilize the purge screws.

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the pilot pressure is released. Serious injury can result if this remaining pressure is not released before any service is done on the hydraulic system.

Make sure that the remaining pressure has been released by utilizing the purge screws that are located on the boom, stick and bucket lines. Before any purge screw is turned, the bucket and or all of the attachments must be lowered to the ground or properly supported.

1. Locate a section of hose that will tightly fit over one of the purge screws.

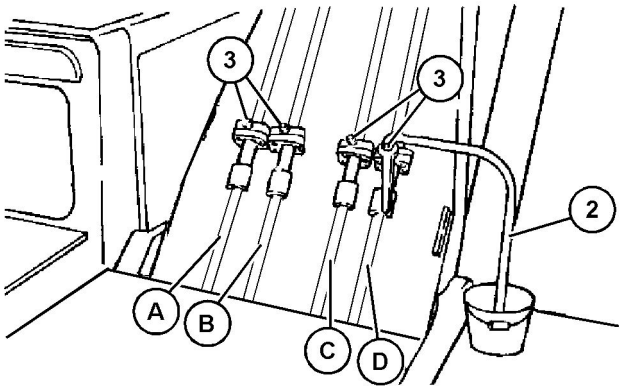


Illustration 485 g06235838

374 Stick and Bucket circuits

(2) Hose
(3) Purge screws (one on each line)
(A) Line for Stick In
(B) Line for Bucket Open
(C) Line for Bucket Close
(D) Line for Stick Out

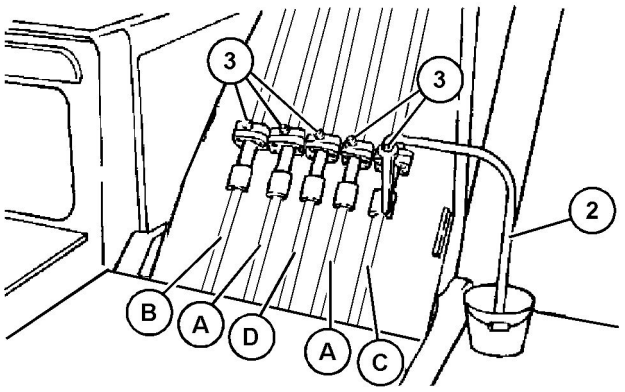


Illustration 486 g06235851

390 Stick and Bucket circuits

(2) Hose
(3) Purge screws (one on each line)
(A) Lines for Stick In
(B) Line for Bucket Open
(C) Line for Bucket Close
(D) Line for Stick Out

2. Connect one end of drain hose (2) to purge screw (3). Insert the other end of drain hose (2) into an empty container.

3. Loosen purge screw (3) 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.

4. Tighten purge screw (3) to a torque of 13 ± 2 N·m (9.6 ± 1.5 lb ft) after all of the hydraulic oil has been drained from the line.

5. Repeat Step 2 through Step 4 for all the stick and bucket circuits.

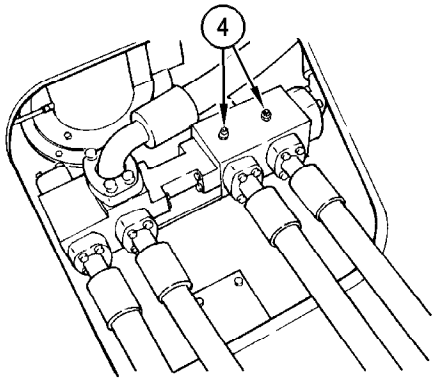


Illustration 487 g00582502

(4) Purge screws for the boom

6. Locate the purge screws for the boom circuit on the boom cylinder lines.

7. Repeat Step 2 through Step 4 for all the boom circuits.

8. Remove the drain hose and install the hydraulic tank fill cap.

9. 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.

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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.

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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”)

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Maintenance Interval Schedule

SMCS Code: 7000

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

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

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

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

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

When Required

“ Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace“ 316
“ Battery Electrolyte Level - Check“ 317
“ Battery or Battery Cable - Inspect/Replace“. . . . 317
“ Bucket Linkage - Inspect/Adjust“ 319
“ Bucket Tips - Inspect/Replace“. 321
“ Cab Air Filter (Fresh Air) - Clean/Replace“ 324
“ Condenser (Refrigerant) - Clean“. 325
“ DEF Filler Screen - Clean“ 331
“ Diesel Exhaust Fluid - Drain“ 333
“ Camera - Clean“ 325
“ Engine Air Filter Primary and/or Secondary Element - Replace“. 336
“ Ether Starting Aid Cylinder - Replace“ 344
“ Film (Product Identification) - Clean“ 345
“ Fuel System - Prime“. 347
“ Fuel Tank Strainer - Clean“. 351
“ Fuses - Replace“ 352
“ Hydraulic System - Purge“ 355
“ Light Emitting Diode Lamp (LED) - Replace“. . . 369
“ Oil Filter - Inspect“ 371
“ Radiator, Aftercooler and Oil Cooler Cores - Clean“. 372
“ Rollover Protective Structure (ROPS) - Inspect“. 373
“ Track Adjustment - Adjust“ 379
“ Undercarriage - Check“. 382
“ Window - Check“ 382
“ Window Washer Reservoir - Fill“ 382
“ Window Wiper - Inspect/Replace“ 382
“ Windows - Clean“. 382

Every 10 Service Hours or Daily for First 50 Hours

“ Boom and Stick Linkage - Lubricate“ 318
“ Bucket Linkage - Lubricate“ 320

Every 10 Service Hours or Daily

“ Air Cleaner Dust Valve - Clean/Inspect“. 316
“ Cooling System Coolant Level - Check“. 329
“ Engine Oil Level - Check“ 339
“ Fuel System Water Separator - Drain“ 350
“ Fuel Tank Water and Sediment - Drain“ 351
“ Hydraulic System Oil Level - Check“ 367
“ Indicators and Gauges - Test“. 369
“ Seat Belt - Inspect“ 373
“ Track Adjustment - Inspect“ 380
“ Travel Alarm - Test“ 381

“ Undercarriage - Check“ 382

Every 50 Service Hours

“ Boom and Stick Linkage - Lubricate“ 318
“ Bucket Linkage - Lubricate“ 320

Every 250 Service Hours

“ Engine Oil Sample - Obtain“ 340

Initial 500 Service Hours

“ Final Drive Oil - Change“ 345
“ Swing Drive Oil - Change“ 375

Every 500 Service Hours

“ Cooling System Coolant Sample - Obtain“ 330
“ Engine Oil and Filter - Change“ 340
“ Final Drive Oil Level - Check“ 346
“ Final Drive Oil Sample - Obtain“ 347
“ Hydraulic System Oil Sample - Obtain“ 368
“ Pump Coupling Oil Level - Check“ 371
“ Swing Bearing - Lubricate“ 374
“ Swing Drive Oil Level - Check“ 377
“ Swing Drive Oil Sample - Obtain“ 377

Every 1000 Service Hours

“ Battery - Clean“ 317
“ Battery Hold-Down - Tighten“ 317
“ Battery or Battery Cable - Inspect/Replace“. . . . 317
“ Belt - Inspect/Adjust/Replace“. 318
“ Fuel System Primary Filter (Water Separator) Element - Replace“ 348
“ Fuel System Secondary Filter - Replace“. 349
“ Hydraulic System Oil Filter - Replace“ 365
“ Hydraulic Tank Breather - Inspect/Replace“ . . . 369
“ Swing Drive Oil - Change“. 375

Every 2000 Service Hours

“ Final Drive Oil - Change“. 345
“ Swing Gear - Lubricate“. 377

Every 2500 Service Hours

“ Engine Valve Lash - Check“ 343

Every 3000 Service Hours

“ Hydraulic System Oil Filter (Return) - Replace“ 360

Every 3 Years

“ Seat Belt - Replace“. 374

Every 5000 Service Hours

“ ARD Spark Plug - Clean“. 315
“ Diesel Exhaust Fluid Filter - Replace“ 335
“ Diesel Exhaust Fluid Injector - Replace“ 336
“ Diesel Particulate Filter - Clean“ 336
“ Receiver Dryer (Refrigerant) - Replace“. 373

Every 6000 Service Hours

“ Cooling System Coolant Extender (ELC) - Add“ 327
“ Hydraulic System Oil - Change“ 356

Every 10 000 Service Hours

“ DEF Manifold Filters - Replace“ 331

Every 12 000 Service Hours

“ Cooling System Coolant (ELC) - Change“ 326

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ARD Spark Plug - Clean
(Emission-Related Component)

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.

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

Allow the exhaust system to cool before performing this procedure.

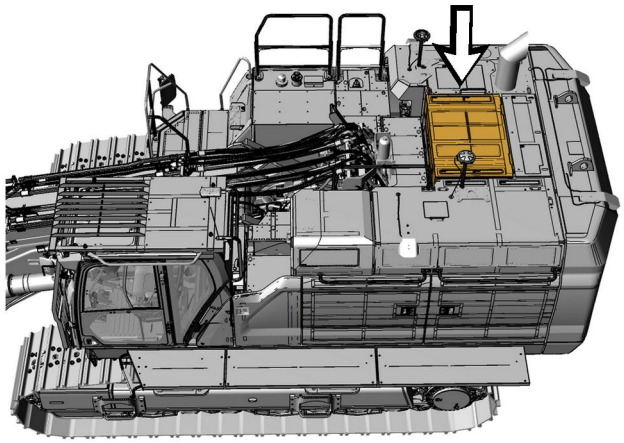


Illustration 488 g06592425

1. Open the engine compartment access door. Refer to “Engine Starting“.

2. Remove any dirt or debris from the area around the spark plug.

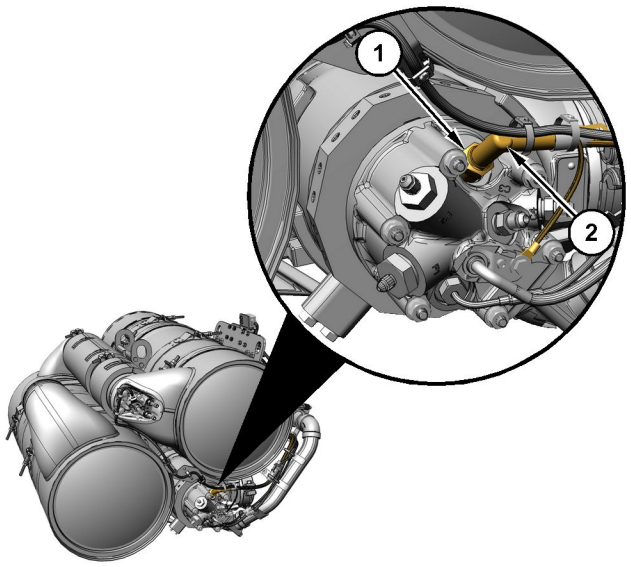


Illustration 489 g06600710

(1) Spark plug
(2) Wiring harness

3. Remove wiring harness (2) from spark plug (1).

4. Use a deep well socket and a breaker bar to loosen the spark plug. If necessary, consult with your Cat ® 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.

5. After removing spark plug (1), clean the ground probe inside the After treatment Regeneration Device (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.

6. 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 (1).

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.

7. Install spark plug (1) by hand until the spark plug contacts the ARD. Tighten the spark plug to a torque of 43.4 N·m (32.0 lb ft) to 51.5 N·m (38.0 lb ft).

8. Connect wiring harness (2).

9. Close the engine compartment access door.

i08251228

Air Cleaner Dust Valve - Clean/ Inspect

SMCS Code: 1051-571-VL

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

1. Open the rear access door on the right side of the machine. Refer to “Access Door and Cover Locations“.

2. The air filter housing is in the engine compartment.

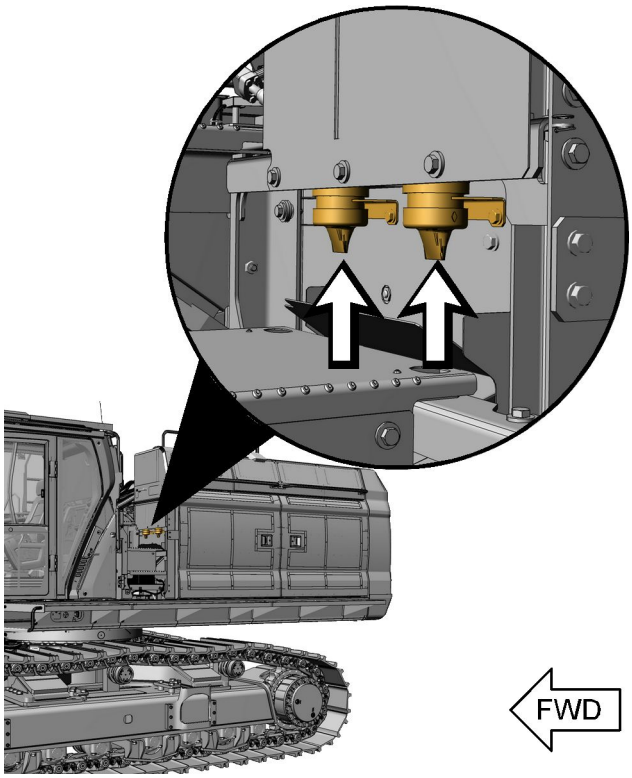


Illustration 490 g06600601

Dust valve

3. Check the dust valve after every 10 service hours or at the end of each day. Actuate the valve by squeezing the lips of the valve to remove any accumulated debris.

4. Close the rear access door.

i06954215

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

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

NOTICE
An air recirculation filter element plugged with dust will result in decreased performance and service life to the air conditioner or cab heater.

To prevent decreased performance, clean the filter element, as required.

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

1. Slide the operator seat forward.

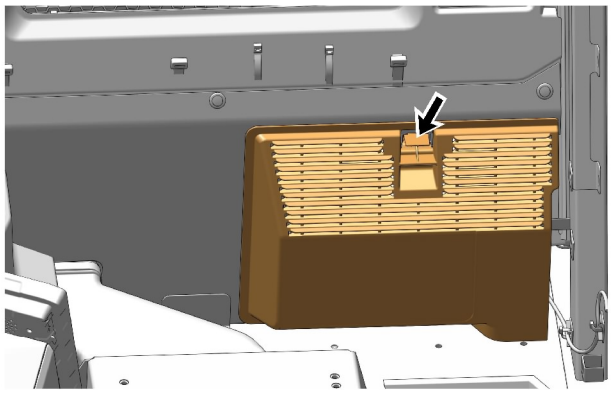


Illustration 491 g06181599

2. Release the cover latch.

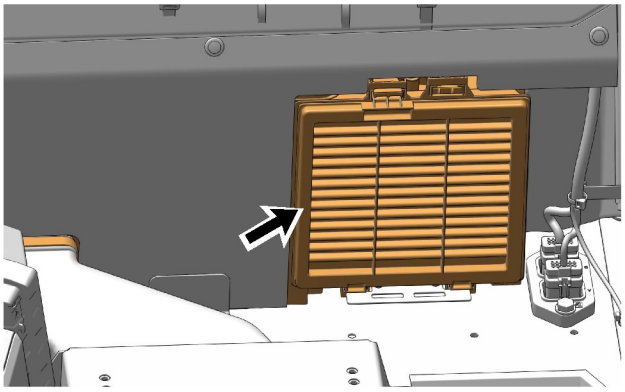


Illustration 492 g06181603

3. Slide the filter element upward.

4. Tap the air filter to remove the dirt. Do not use compressed air to clean the filter.

5. After you clean the filter element, inspect the filter element. If the filter element is damaged or badly contaminated, use a new filter element. Make sure that the filter element is dry.
6. Install the filter element.
7. Install the cover.

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.

i06019968

Battery Electrolyte Level - Check

SMCS Code: 1401; 1401-535-FLV; 1401-535

⚠ 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; 1401-561; 1401-040; 1401-510; 1402-510; 1402-040

⚠ 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.

i04779186

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-040; 1357-025; 1357-510; 1397-025; 1397-040; 1397-510

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.

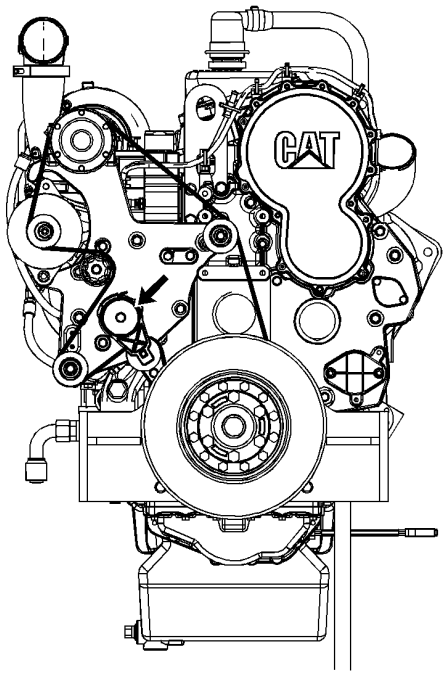


Illustration 493 g01127241

a. Turn the belt tensioner in order to release the tension from the belt.

b. Remove the belt.

c. Install a new belt.

Note: Refer to Disassembly and Assembly, “Belt - Remove and Install” for the procedure to replace the belt.

4. Close the engine hood.

i07531958

Boom and Stick Linkage - Lubricate

SMCS Code: 6501-086; 6502-086

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

Apply lubricant through all fittings after operation under water.

Wipe all fittings before you apply lubricant.

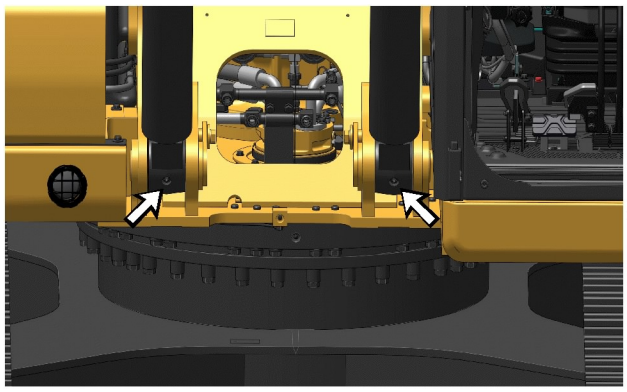


Illustration 494 g06183509

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

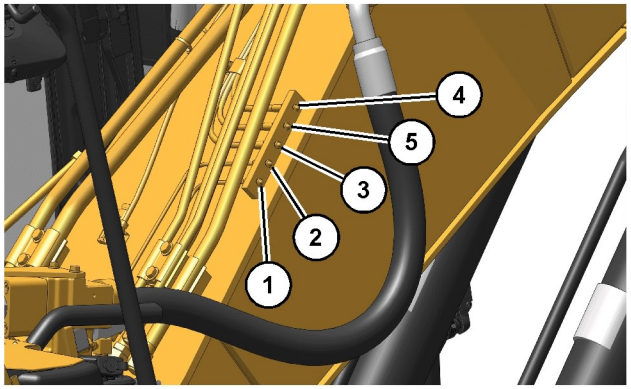


Illustration 495 g06183534

Note: Your machine may have the fittings mounted in a vertical position as shown in the illustration above, or your machine may have the fittings mounted in a horizontal position.

2. The fittings are at the base of the boom. The fittings can be serviced from the platform on the fuel tank. To lubricate the lower boom bearings, apply lubricant through fittings (1) and (2).

3. Apply lubricant through fittings (3) and (4) for the boom cylinder rod.

4. Apply lubricant through fitting (5) for the stick cylinder head.

Note: To ensure proper lubrication of the lower boom bearings and of the boom cylinder rod end bearings, lubricant should be applied through fittings (1), (2), (3), and (4). Apply lubricant first when the boom is raised and any attachment is suspended. Then apply lubricant when the boom is lowered and the attachment is rested on the ground with a slight downward pressure.

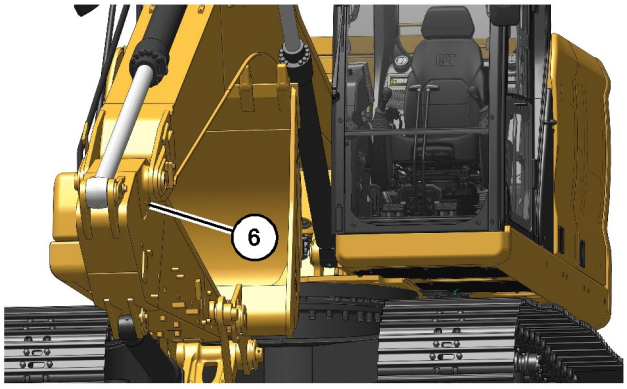


Illustration 496 g06183854

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

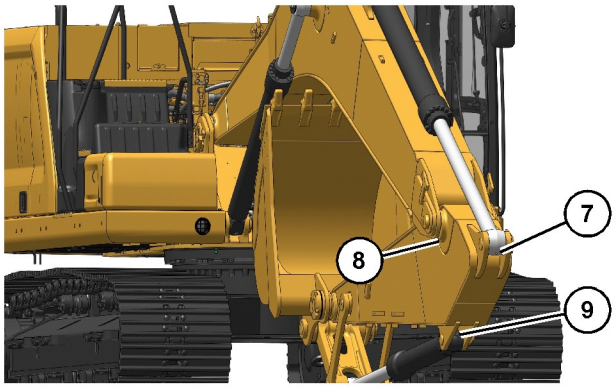


Illustration 497 g06183864

6. Apply lubricant through fitting (7) on the stick cylinder rod. Apply lubricant through fitting (8) at the connection point of the boom and of the stick. Apply lubricant through fitting (9) at the bucket cylinder head end.

i07313700

Bucket Linkage - Inspect/ Adjust

SMCS Code: 6513-025; 6513-040

⚠ 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 498 g06279682

Area for linkage adjustment

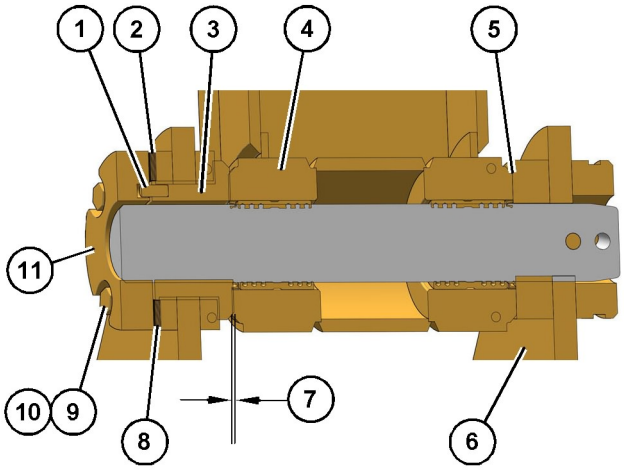


Illustration 499 g06185866

(1) Pin
(2) Shims
(3) Flange
(4) Stick boss
(5) No gap
(6) Bucket boss
(7) Bucket clearance
(8) Location
(9) Bolts
(10) Washers
(11) Plate

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 (7) to 0.5 to 1 mm (0.02 to 0.04 inch).

Two shims of different thickness are used at location (8). The thicknesses of the shims are 0.5 mm (0.02 inch) and 1.0 mm (0.04 inch).

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 (4) and the bucket boss (6) are in full face contact at no gap (5). 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 (7), which is the existing total clearance.
5. Determine the number of shims that need to be removed from shims (2) by using the following calculation:

   Subtract 0.5 mm (0.02 inch) or 1.0 mm (0.04 inch) from bucket clearance (7).
6. Remove the appropriate number of shims at location (8) 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 (9), washers (10), and plate (11).
7. After the correct number of shims has been removed and pin (1) is aligned with the pin hole, install plate (11), bolts (9), and washers (10). Tighten the bolts to 240 ± 40 N·m (175 ± 30 lb ft).
8. After installation, make sure that bucket clearance (7) is still correct.

i07659933

Bucket Linkage - Lubricate

SMCS Code: 6513-086

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

Wipe all fittings before you apply lubricant.

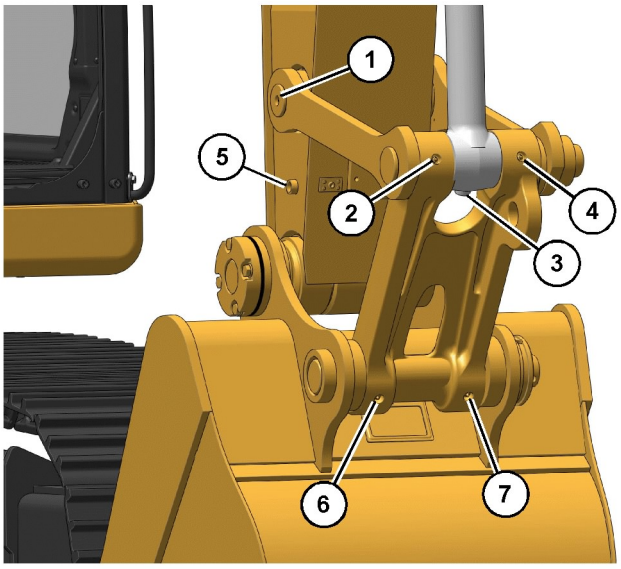


Illustration 500 g06183336

Note: Completely fill all cavities of the bucket control linkage with grease when you initially install a bucket.

1. Apply lubricant through fittings for the linkages (1), (2), (3), and (4).
2. Apply lubricant through fittings for the bucket (5), (6), and (7).

Note: Service the above fittings after you operate the bucket under water.

i07114992

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

⚠ 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.

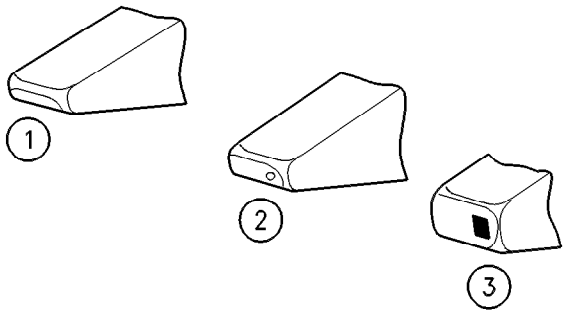


Illustration 501 g00101352

(1) Usable
(2) Replace
(3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

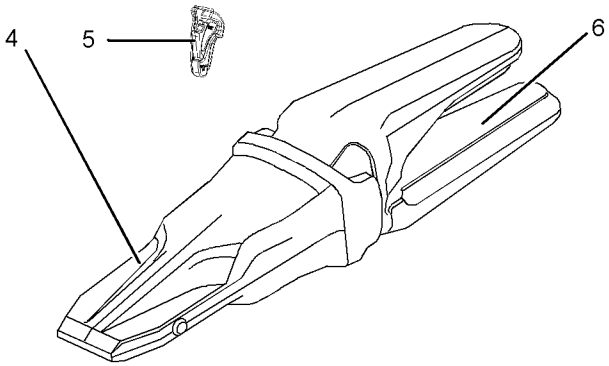


Illustration 502 g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

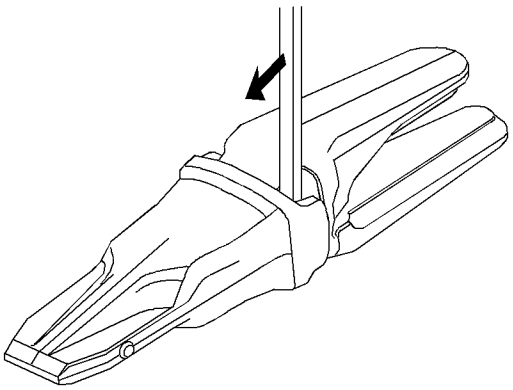


Illustration 503 g01175361

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.

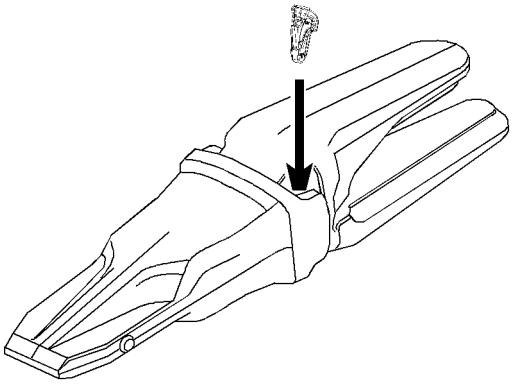


Illustration 504 g01124736

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.

Bucket Tips (Cat® Advansys) - If Equipped

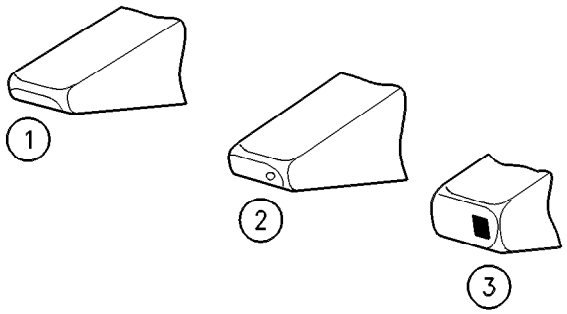


Illustration 505 g00101352

(1) Usable
(2) Removal Procedure
(3) Removal Procedure

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

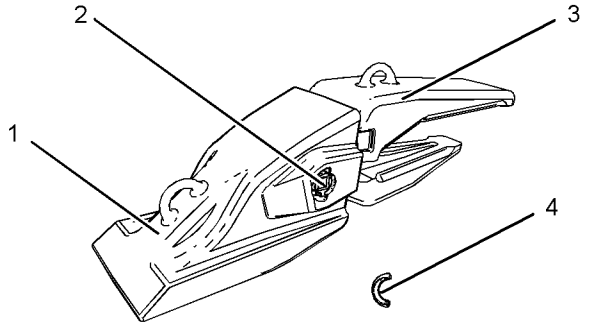


Illustration 506 g03830653

(1) Bucket Tip
(2) Retainer
(3) Adapter
(4) Compression Sleeve

1. Use a 3/4" ratchet and rotate the retainer (2) 180 degrees to the unlocked position.

2. Remove the bucket tip (1) from adapter (3).

3. Clean adapter (3).

Installation

1. Clean the adapter and the area around the latch, if necessary.

2. Install the new bucket tip (1) onto the adapter (3).

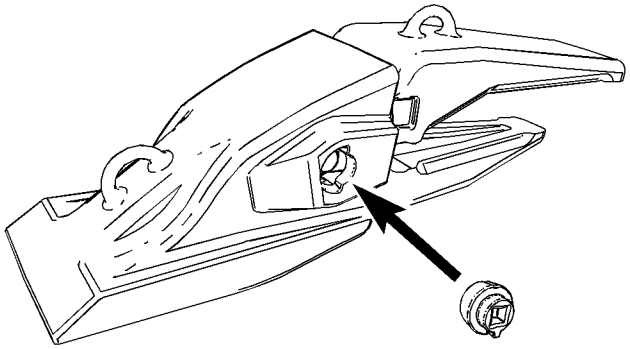


Illustration 507 g03832654

3. Use a 3/4" ratchet to rotate the retainer (2) 180 degrees to the locked position.

Side Cutters (If Equipped)

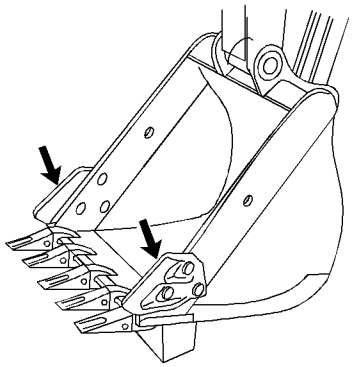


Illustration 508 g01389740

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.

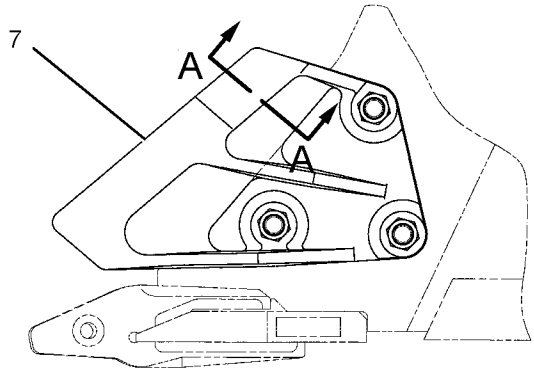


Illustration 509 g01389456

(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.

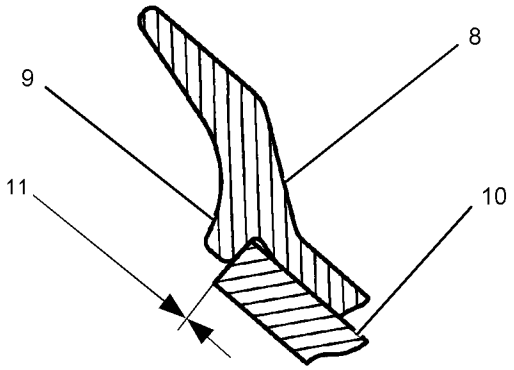


Illustration 510 g01389457

Section A-A From Illustration 509

(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.

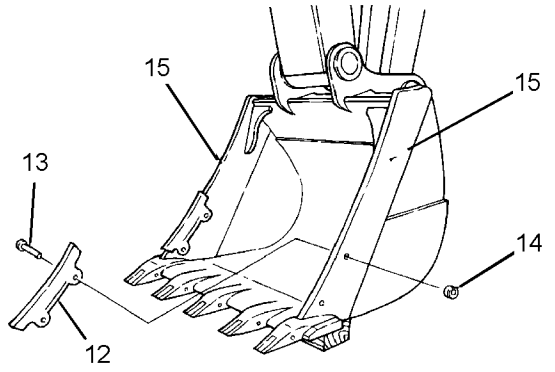


Illustration 511 g01389458

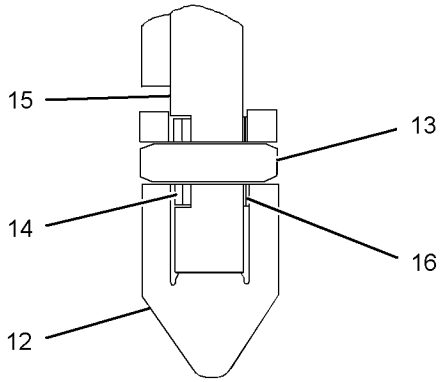


Illustration 512 g01903698

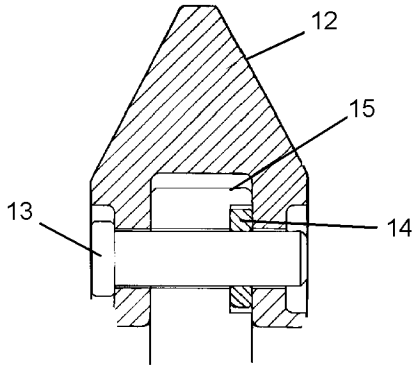


Illustration 513 g01389459

(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.

i07092323

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-070; 7342-510

The cab air filter is on the left side of the cab.

1. Use the ignition key to open the access panel.

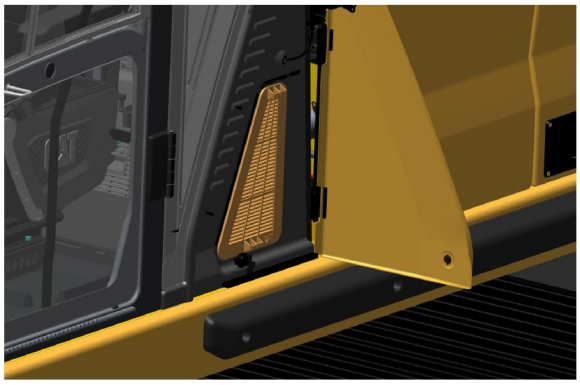


Illustration 514 g06182115

2. Remove air filter (1).

3. Tap the air filter to remove the dirt. Do not use compressed air to clean the filter.

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.

6. Close and lock the access panel.

i08233133

Camera - Clean
(If Equipped)

SMCS Code: 7348-070

⚠ 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.

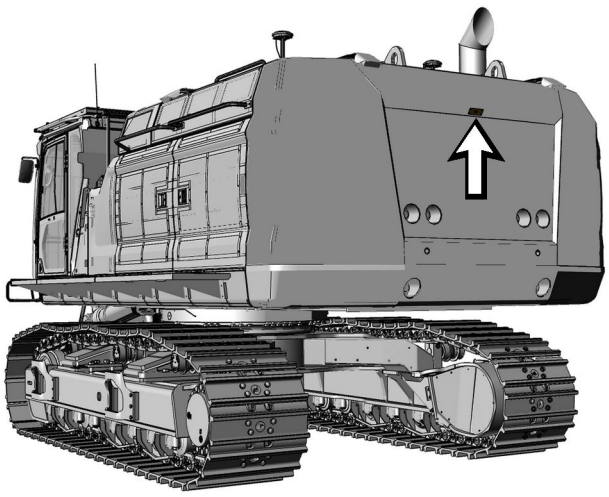


Illustration 515 g06592468

The rear view camera is located on top of the counterweight.

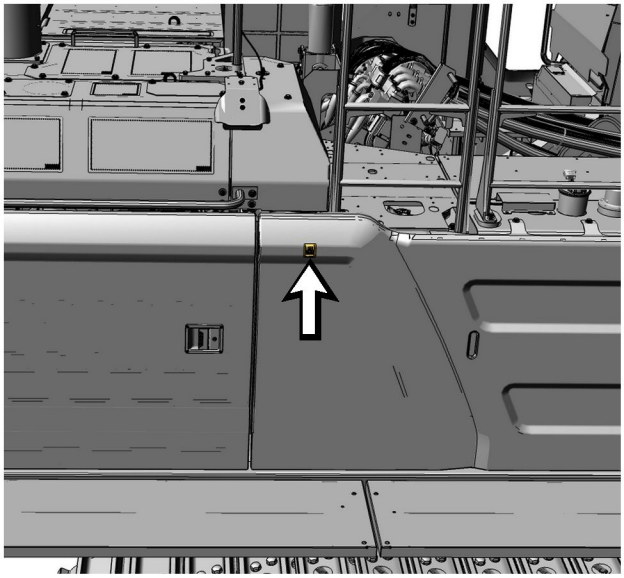


Illustration 516 g06592490

The side view camera is located on the right side to the rear of the Fuel Tank.

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.

i02189743

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 middle access door on the left side of the machine. The condenser is located behind the engine air precleaner.

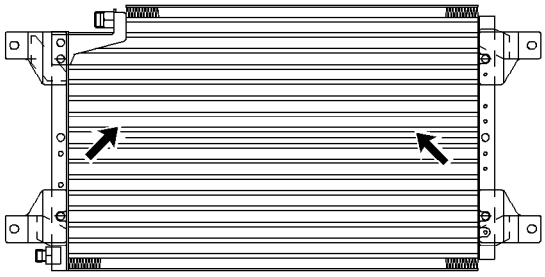


Illustration 517 g00537515

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.

i05331702

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

NOTICE
Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, “Cat Extended Life Coolant (ELC)”.

This machine was factory filled with Extended Life Coolant.

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, PERJ1017, “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.

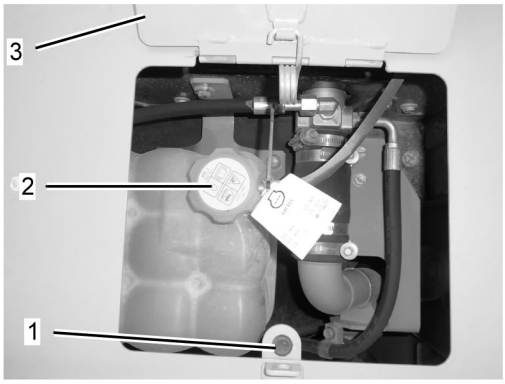


Illustration 518 g03377499

1. Open the access cover by removing the bolt. (1) Lift the access cover to the open position. (3) The cooling system pressure cap is located on top of the machine above the left rear access door. (2).

2. Slowly loosen the cooling system pressure cap (2) in order to release pressure. Remove the cooling system pressure cap.

3. Open the left rear access panel by removing the bolts that secure the panel to the machine.

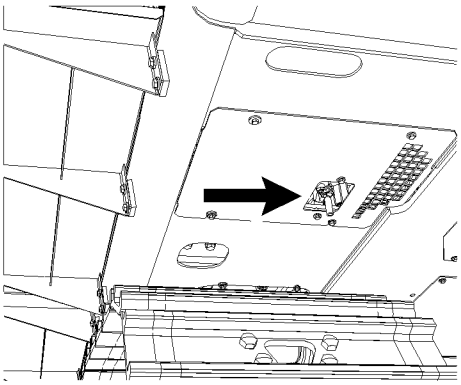


Illustration 519 g03377715

4. Remove the access cover that is under the radiator.

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

5. Open the drain valve that is on the bottom of the radiator. Allow the coolant to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

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

7. Close the drain valve.

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

9. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

10. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

11. Check the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.

12. Install the cooling system pressure cap and close the access cover for the cooling system pressure cap. Install the bolts for the access cover.

13. Stop the engine.

14. Open the left middle access door.

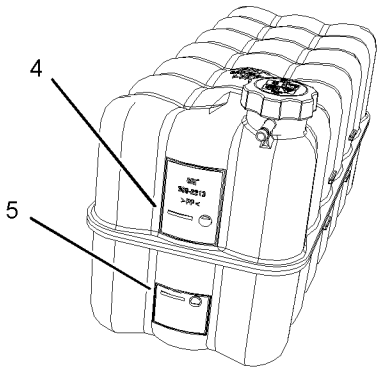


Illustration 520 g03377742

Coolant reservoir

(4) “FULL”
(5) “LOW”

15. Check the coolant reservoir. Maintain the coolant level between the “FULL” mark (A) and the “LOW” mark (B).

16. If additional coolant is necessary, remove the reservoir cap on top of the coolant reservoir and add the appropriate coolant solution.

17. Install the reservoir cap.

18. Close the left middle access door.

19. Close the left rear access panel and install the bolts for the left rear access panel.

20. Install the access cover that is under the radiator.

i05331973

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

NOTICE
Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, “Cat Extended Life Coolant (ELC)”.

This machine was factory filled with Extended Life Coolant.

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, PERJ1017, “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.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system. See Special Publication, SEBU6250, “Cooling Recommendations” for all cooling system requirements.

Use a coolant conditioner test kit in order to check the concentration of the coolant.

NOTICE
Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, “Cat Extended Life Coolant (ELC)”.

This machine was factory filled with Extended Life Coolant.

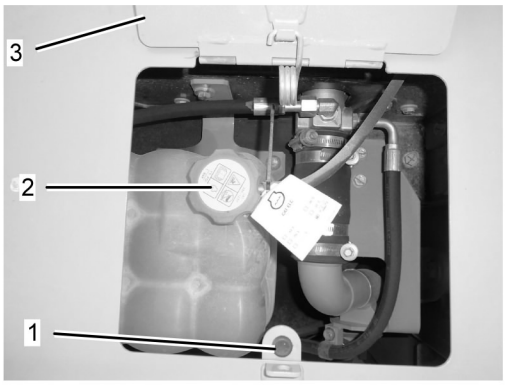


Illustration 521 g03377757

1. Open the access cover (3) for the cooling system pressure cap (2). The access cover for the cooling system pressure cap is located on top of the machine above the left rear access door. Remove bolt (1) . to open the access cover .
2. Slowly loosen the cooling system pressure cap in order to release system pressure. Remove the pressure cap.

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

3. You may have 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.

4. Add Extender to the cooling system. Refer to the following topics for the proper amount of Caterpillar Extender:
   - Special Publication, SEBU6250, “Cat Extended Life Coolant (ELC)”
   - Operation and Maintenance Manual, “Capacities (Refill)”
5. Inspect the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.
6. Install the cooling system pressure cap.
7. Close the access door for the cooling system pressure cap.

i05333384

Cooling System Coolant Level - Check

SMCS Code: 1350-040; 1350-535-FLV; 1395-535-FLV

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

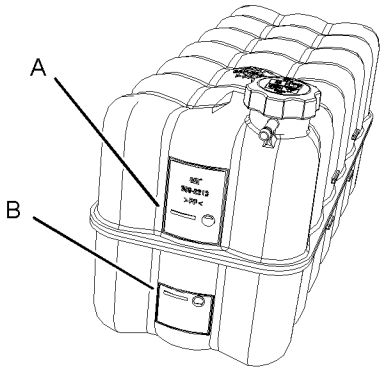


Illustration 522 g03378511

Coolant reservoir

(A) "FULL"
(B) "LOW"

2. Check the coolant level of the coolant reservoir. Maintain the coolant level between the "FULL" mark and the "LOW" mark. If the coolant reservoir is empty, follow Steps 2a through 2i.

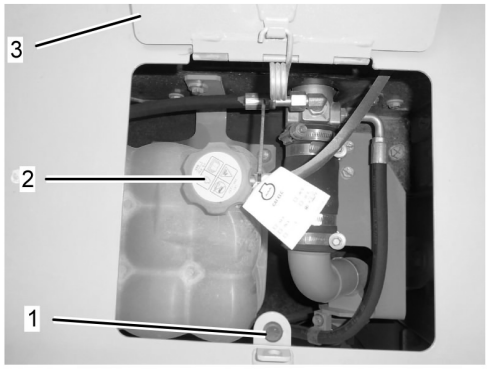


Illustration 523 g03378512

a. Open the access cover (3) for the cooling system pressure cap (2). The access cover for the cooling system pressure cap is located on top of the machine above the left rear access door. Remove bolt (1) and slide the access cover open.

b. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

c. Add the appropriate coolant solution to the cooling system. Refer to the following topics:

- Operation and Maintenance Manual, SEBU6250, "Cooling System Specifications"
- Operation and Maintenance Manual, "Capacities (Refill)"

d. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

e. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

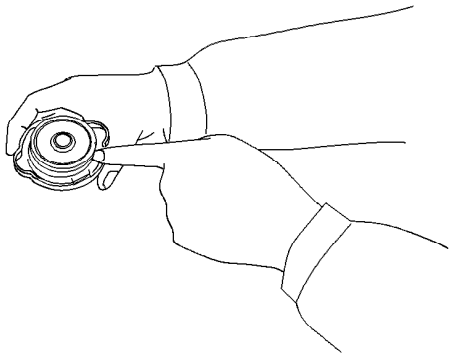


Illustration 524 g00102170

f. Inspect the condition of the gasket on the pressure cap. If the gasket is damaged, replace the pressure cap.

g. Install the cooling system pressure cap.

h. Stop the engine.

i. Close the access cover for the cooling system pressure cap. Install and tighten bolts (1) and (2).

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

3. If additional coolant is necessary, remove the reservoir cap and add the appropriate coolant solution.

4. Install the reservoir cap.

5. Close the left access door.

i08066725

Cooling System Coolant Sample - Obtain

SMCS Code: 1395-008; 1395-554

The cooling system coolant should be sampled and monitored with regular frequency. The samples should be analyzed per the following guidelines:

- **Level 1 analysis: Every 500 hours**
- **Level 2 analysis: Yearly**

Note: Obtain a Coolant Sample (Level 1) every 250 hours if the cooling system is filled with anything other than Cat ELC or Commercial EC-1 coolants. This includes the following type of coolants.

- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty coolant/antifreeze

Note: A level 1 analysis may indicate the need for a Level 2 analysis.

Note: A Level 2 analysis is required after 500 hours of operation for the following reasons:

- The cooling system is new
- The cooling system has been refilled
- The cooling system has been converted to a new coolant

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

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, PERJ1017, “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.

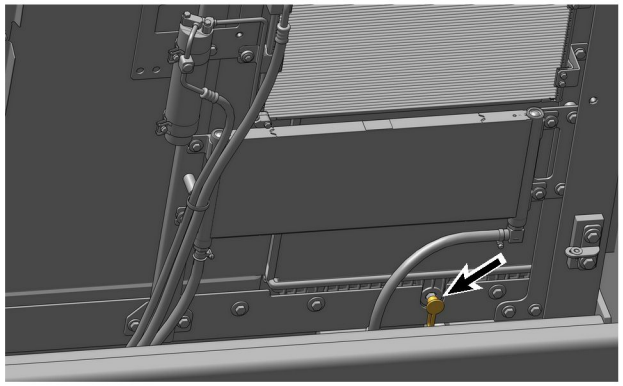


Illustration 525 g06479425

The coolant sample port is on the radiator.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. To receive the full effect of S·O·S analysis, establish a consistent trend of data. 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 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.

i08373285

DEF Filler Screen - Clean (Emission Related Component)

SMCS Code: 108K-070-Z3

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

The filler neck adapter filter screen in the diesel exhaust fluid tank will need to be cleaned or replaced if contaminated.

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

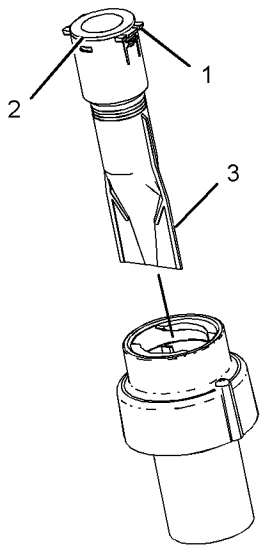


Illustration 526 g03618438

2. Use a screwdriver or pick to press the tabs (1).

3. Pull the screen assembly (2) upward from both sides and remove from the fill neck adapter

4. Use water or compressed air to clean out the filter screen (3). If there is any debris inside, let dry and remove the debris by turning the screen upside down and dumping debris out. If the debris cannot be removed or the filter screen is damaged, replace the filler neck adapter filter screen.

i08364413

DEF Manifold Filters - Replace (Emission Related Component)

SMCS Code: 108K-510-FI

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools 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: Refer to Special Instruction, REHS8231, “Removal Procedures for Diesel Exhaust Fluid (DEF) Connectors” for the correct removal procedure of hose assemblies (1) and (5).

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

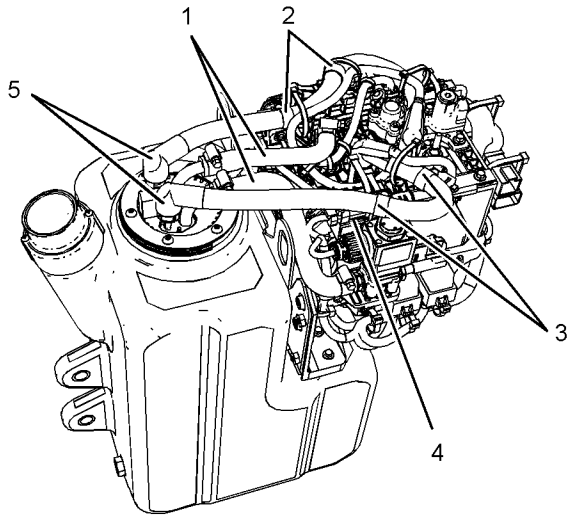


Illustration 527 g03662693
Typical Example

2. Clamp off hoses (1).

3. Remove clips (2) and (3). Disconnect harness assemblies (4). Remove hose assemblies (1) and (5).

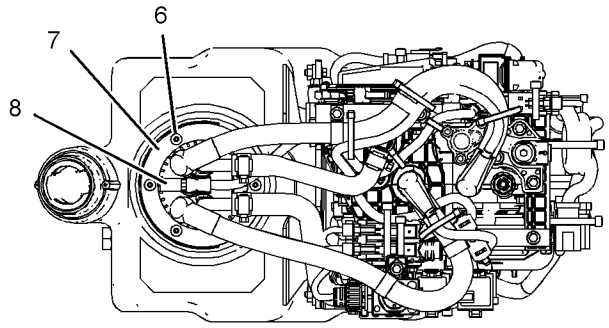


Illustration 528 g03665701
Typical Example

4. Remove bolts (6), plate (7), tank manifold (8), and gasket (not shown).

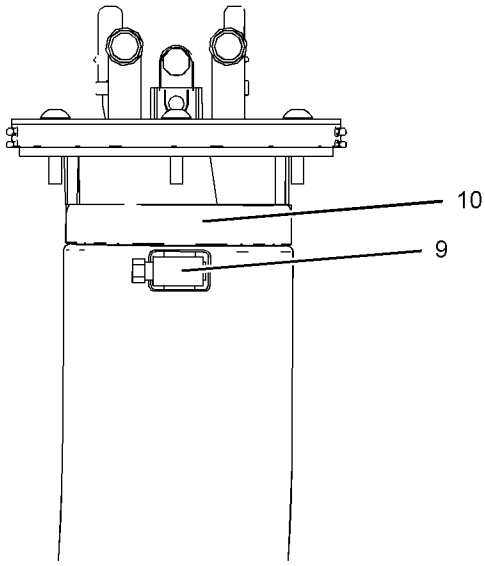


Illustration 529 g03665737

5. Unscrew the band clamp (9) and remove the band clamp from the filter base (10).

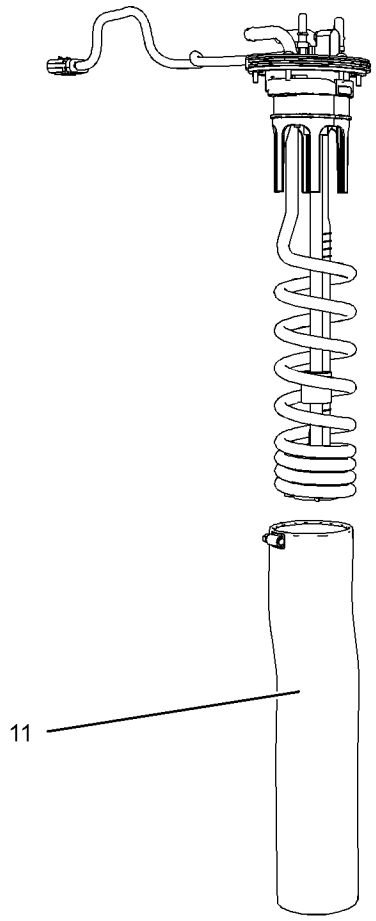


Illustration 530 g03664911

6. Remove the filter (11) from the filter base.

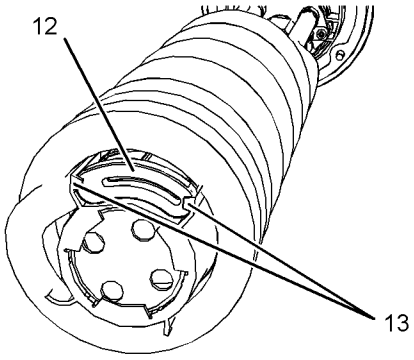


Illustration 531 g03666075

7. Remove the suction filter (12) at the bottom of the header coils by pulling tabs (13). Replace with a new suction filter.

8. Install new filter by pulling filter over the manifold coils up to the bottom of the assembled filter base.

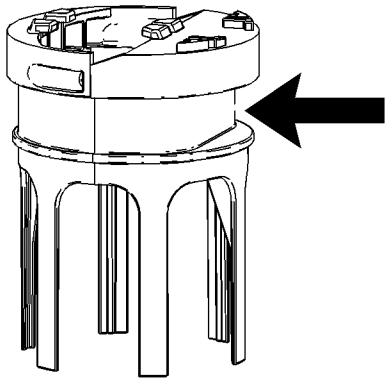


Illustration 532 g03665754

9. Tighten the band clamp 4.5 ± 0.7 N·m (40 ± 6 lb in), ensuring that the band clamp is aligned, as shown in illustration 532 , to the flat spot on the base. Ensure that the filter does not bunch when tightening the band clamp.

10. Install the tank manifold following steps 4 through 6 in reverse order with a new gasket.

11. Tighten bolts (6) in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Tighten bolts (6) a second time in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Apply rubber lubricant to the o-ring seal inside of hose assemblies (1).

i08289027

Diesel Exhaust Fluid - Drain
(Emission Related Component)

SMCS Code: 108K-543

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

Dispose of all fluids according to local regulations and mandates.

1. Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

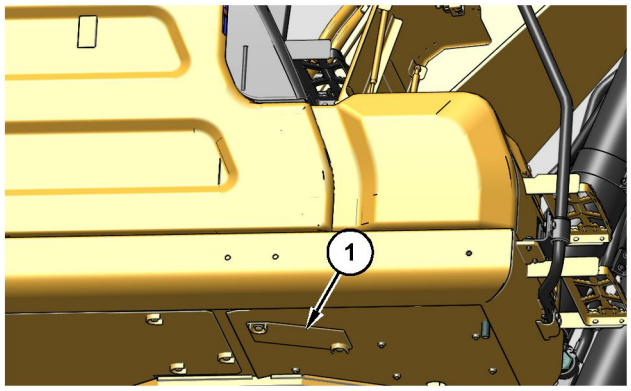


Illustration 533 g06613965

(1) Access cover

2. Remove access cover (1) to reveal drain plug.

3. Remove drain plug and drain the diesel exhaust fluid into a suitable container.

4. Install and tighten the drain plug to a torque of 20 ± 3 N·m (177 ± 26 lb in).

5. Reinstall access cover (1).

i07418840

Diesel Exhaust Fluid - Fill (Emission Related Component)

SMCS Code: 108K-544

NOTICE

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

Dispose of all fluids according to local regulations and mandates.

Reference: See Operation and Maintenance Manual, “Capacities (Refill)” for the capacity of the DEF tank for your machine.

The Diesel Exhaust fluid (DEF) fill is on the right side of machine.



Illustration 534 g06280503

DEF Tank Filler Cap

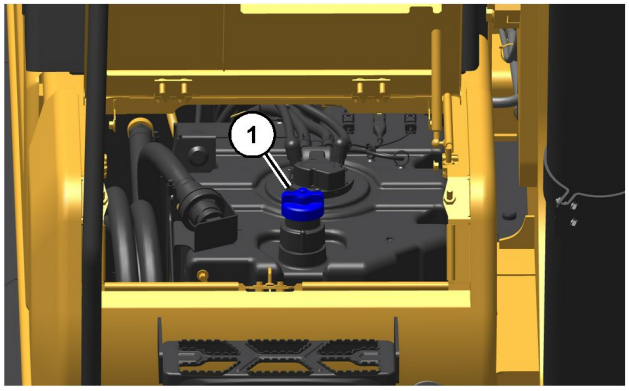


Illustration 535 g06280498

1. Clean blue DEF tank filler cap (1) and the surrounding area.

2. Remove the blue DEF tank filler cap.

3. Fill the tank with diesel exhaust fluid (DEF). DEF level gauge is located on the front side of DEF tank.

Note: Do not fill the DEF tank from a contaminated container or funnel.

Note: Do not over fill the tank. DEF can freeze and needs room for expansion.

4. Install the blue DEF tank filler cap.

Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on diesel exhaust fluid (DEF) guidelines.

i08238441

Diesel Exhaust Fluid Filter - Replace

SMCS Code: 108K-510-FI

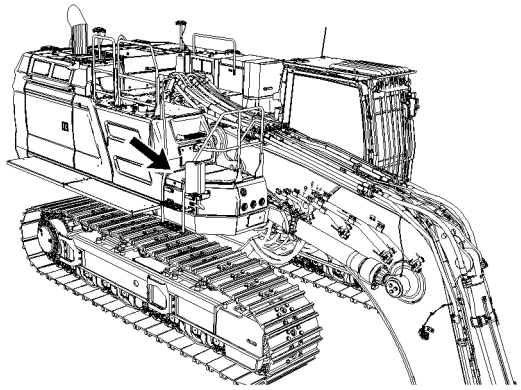


Illustration 536 g06596906

The Diesel Exhaust Fluid (DEF) filter is located on the DEF tank. The DEF tank is located next to the storage box on the right side of the machine.

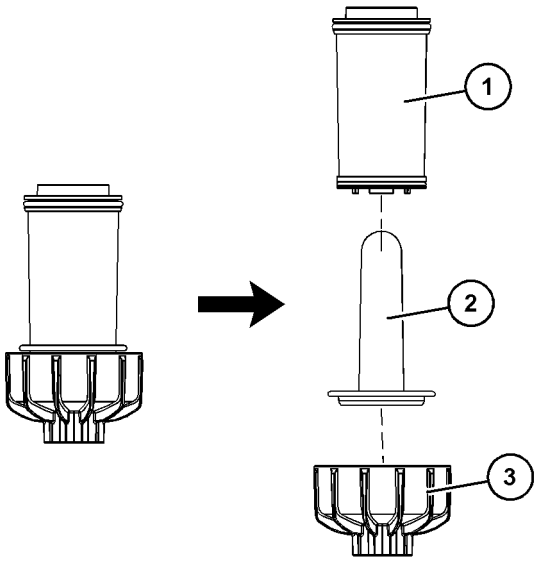


Illustration 537 g06597010

Typical Example

(1) DEF filter
(2) Rubber cone insert
(3) Filter cap

NOTICE
Ensure that the engine is stopped before any servicing or repair is performed.

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, “Cat Dealer Service Tool Catalog” or refer to Special Publication, PECJ0003, “Cat Shop Supplies and Tools Catalog” for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

1. Remove DEF filter cap (3) with a 27.0 mm (1.06 inch) wrench.

2. Remove rubber cone insert (2) from DEF filter (1).

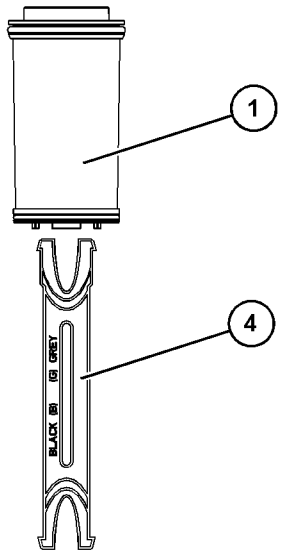


Illustration 538 g06597016

Typical Example

(1) DEF filter
(4) DEF filter removal tool

3. Insert DEF filter removal tool (4) into DEF filter (1) and remove DEF filter (1).

Note: Wear gloves when you handle DEF filter removal tool (4).

4. Clean the area around the filter housing.

5. Apply a thin coat of lubricant to the seals of new DEF filter (1).

6. Install new DEF filter (1) and rubber cone insert (2). Torque the DEF filter to 20 ± 5 N·m (177 ± 44 lb in) with a 27.0 mm (1.06 inch) wrench.

i08364429

Diesel Exhaust Fluid Injector - Replace
(Emission Related Component)

SMCS Code: 108I-510

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

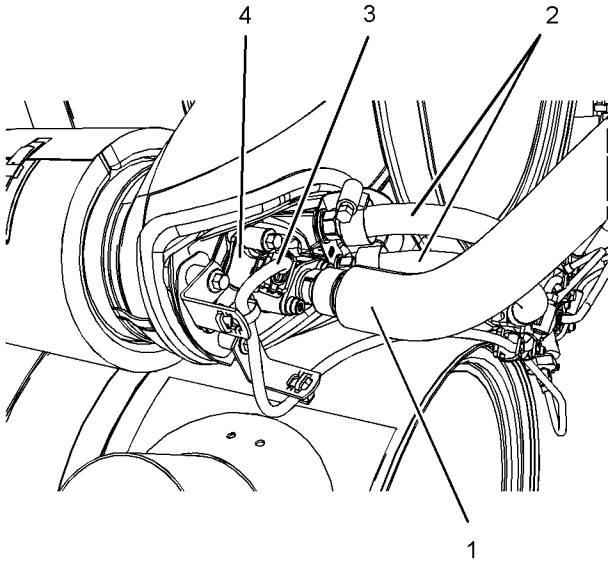


Illustration 539 g03363165

Typical example shown

2. Remove the diesel exhaust fluid (DEF) line (1) from the injector (4).

3. Remove the coolant lines (2) from the injector.

4. Remove the electrical connector (3) from the injector.

5. Remove the bolts from the injector and remove the injector.

6. Replace gasket. The steel side of the gasket should face towards diesel particulate filter (DPF) outlet.

7. Replace the injector.

8. Apply anti-seize to bolt threads.

9. Torque the bolts of the injector to 5 N·m (3.7 lb ft). Retighten all bolts to 5 N·m (3.7 lb ft), then turn 90°.

10. Connect the electrical connector.

11. Connect the coolant lines.

12. Connect the DEF line.

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.

i08309004

Engine Air Filter Primary and/or Secondary Element - Replace

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

Primary Air Filter Element - Replace

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

NOTICE
Service the engine air filter elements only when a message or a warning is displayed on the monitor display. Do not open the filter compartment unless service is indicated. Opening the filter compartment when not necessary to do so increases the chance of dirt contamination in engine air intake system components.

NOTICE
Short air filter life can result if the pre-cleaner system malfunctions. If air filter life is drastically reduced from typical for the operating conditions, consult your Cat dealer.

NOTICE
Do not use the air filter elements longer than 1 year.

The engine air cleaner assembly is located behind the front access door on the left side of the machine.

1. Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

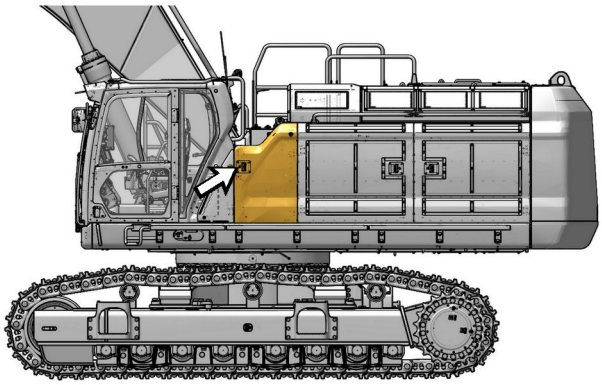


Illustration 540 g06623508

2. Open the front access door on the left side of the machine.

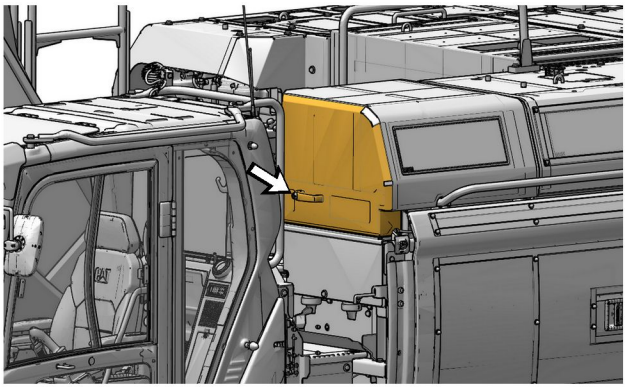


Illustration 541 g06623511

3. Open the filter access door.

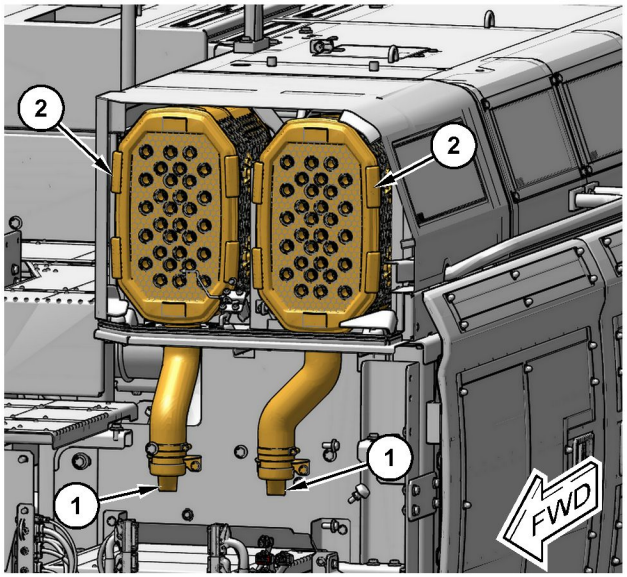


Illustration 542 g06623513

(1) Outlet tube
(2) Latch

4. Squeeze outlet tube (1) to purge the dirt from the outlet tube.

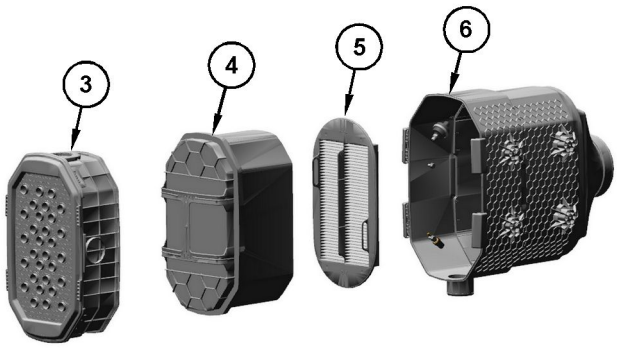


Illustration 543 g06623514

(3) Pre-cleaner
(4) Primary air filter element
(5) Secondary air filter element
(6) Air filter housing

5. Release latches (2) that secure pre-cleaner (3) to engine air filter housing (6).

6. Remove pre-cleaner (3).

7. Clean inside the air filter housing where the pre-cleaner was removed.

NOTICE
Caterpillar does not recommend cleaning the primary air filter element. Caterpillar only recommends to replace the primary air filter element. Caterpillar does not cover costs for damage to engine components caused by cleaning the primary air filter element.

Observe the following guidelines if you attempt to clean the primary 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 clean the air filter element more than three times. The air filter element must be replaced if the filter has been in use for one year, regardless of the number of times the filter has been cleaned.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

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.

8. Remove primary air filter element (4). Replace the filter element as necessary.

Note: Replace the primary filter if the filter has been in use for 1 year.

9. Clean inside the air filter assembly housing.

Note: Do not allow any dirt or debris to contact the secondary air filter element (5).

10. Inspect the seal area ensure that no foreign debris has fallen into the seal area. Clean the air cleaner interior to remove remaining dust or debris

11. Without removing secondary air filter element (5), inspect the filter element for damage. Replace if necessary or dirty. Refer to “Secondary Air Filter Element - Replace”.

12. Install the secondary air filter element.

13. Install the primary filter.

Note: Filters must be fully installed before the pre-cleaner can be attached. If the pre-cleaner cannot be fully latched, verify that the filter elements are properly seated.

14. Install the pre-cleaner and secure the latches that hold the pre-cleaner to the air filter housing.

15. Close the access door.

Secondary Air Filter Element - Replace

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

NOTICE
Do not use the air filter elements longer than 1 year.

NOTICE
Replace the secondary filter element when you service the primary element for the third time. If a clean primary element has been installed and the filter element indicator is still flashing, replace the secondary filter element. Also if the exhaust smoke remains black and a clean primary filter element has been installed, replace the secondary filter element.

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

2. Refer to the section “Primary Air Filter Element - Replace”. Remove the pre-cleaner from the engine air filter housing. Remove the primary air filter element from the air filter housing.

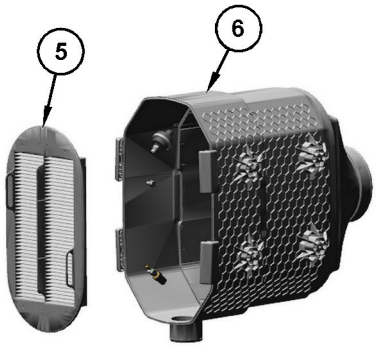


Illustration 544 g06623516

(5) Secondary air filter element
(6) Air filter housing

3. Secondary air filter element (5) is pressed into the rear portion of engine air filter housing (6). Pull forward on the secondary air filter element to remove the element from the engine air filter housing.

4. Cover the air inlet opening. Clean inside the air cleaner housing.

5. Clean all surfaces of the pre-cleaner cover and body.

6. Uncover the air inlet opening.

7. Carefully press the secondary air filter element into the rear portion of the engine air filter housing.

Note: Be certain that the new secondary air filter element is properly seated in the filter housing. Also, check to see that no damage to the filter element has occurred during installation.

8. Install the primary air filter element and the pre-cleaner.

9. Close the access door.

i05353055

Engine Oil Level - Check

SMCS Code: 1000-535

⚠ WARNING

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

NOTICE
Do not overfill the crankcase. Engine damage can result.

Note: This machine is equipped with both an automated function for checking fluid levels and a dipstick. Refer to Operation and Maintenance Manual, “Monitoring System” regarding the automated system. If the machine is on an incline or the engine has been stopped only for a short time, 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. The engine oil level can be checked 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.

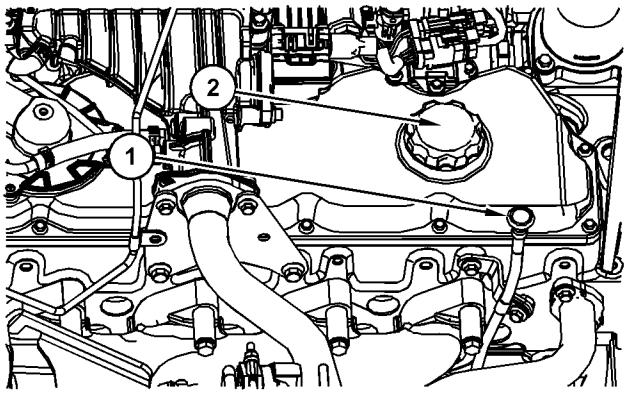


Illustration 545 g02519379

2. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

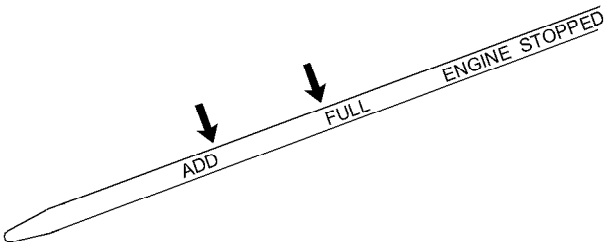


Illustration 546 g03390535

3. Remove the dipstick and check the dipstick. The oil level should be between the “Add” mark and the “Full ” mark.

NOTICE
Operating your engine when the oil level is above the “H” mark could cause the crankshaft to dip into the oil. This could lead to excessively high oil temperatures which can reduce the lubricating characteristics of the oil, lead to bearing damage, and could result in loss of engine power.

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.

i08233138

Engine Oil Sample - Obtain

SMCS Code: 1000; 1000-008; 1348-008; 1348-554-SM; 7542-554-OC; 7542-554-SM; 7542-008

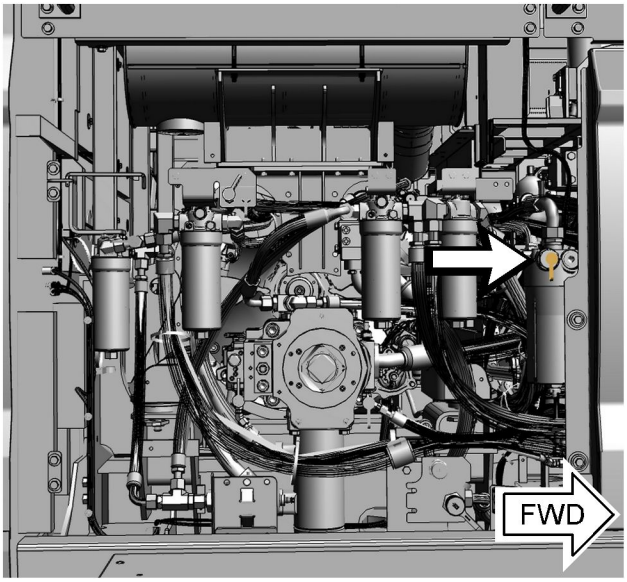


Illustration 547 g06591387

Obtain a sample of the engine oil from the engine oil sampling valve that is located on the engine oil filter housing. In the right rear access compartment. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining a sample of the engine oil.

i08233139

Engine Oil and Filter - Change

SMCS Code: 1318-510

Procedure for Changing Engine Oil and Filter

⚠ WARNING

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

Note: If the sulfur content in the fuel is greater than 1.5 percent by weight, use an oil that has a TBN of 30 and reduce the oil change interval by one-half.

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.

1. Park the machine on a level surface. Stop the engine.

Note: Refer to “General Hazard Information“ for information on Containing Fluid Spillage.

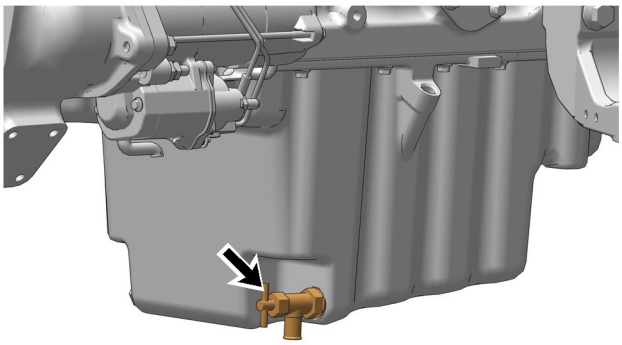


Illustration 548 g06183508

2. Open the crankcase drain valve (1). Allow the oil to drain into a suitable container.

Note: Discard any drained fluids according to local regulations.

3. Close the drain valve.

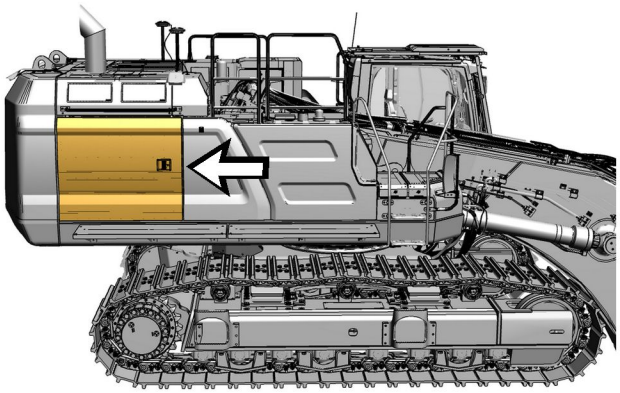


Illustration 549 g06592451

4. Open the access door at the right side of the machine.

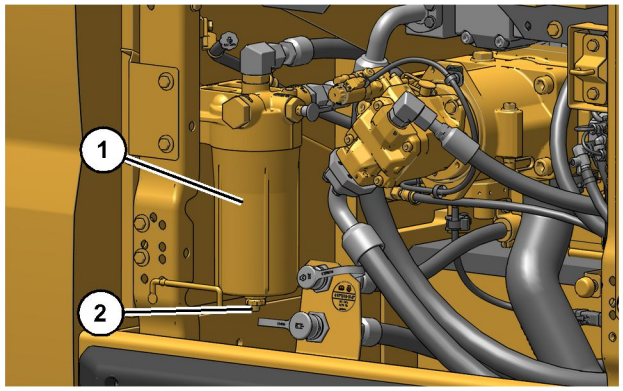


Illustration 550 g06282140

5. Loosen drain valve (2) and allow the oil to drain out of the housing.

Note: If equipped with a fast fill system, the oil can be drained and filled using the fast fill coupler. Refer to “Fast Fill” in this chapter.

6. After all the oil has been removed, tighten the drain.

7. Remove the oil filter housing (1). Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”. Dispose of the used filter according to local regulations.

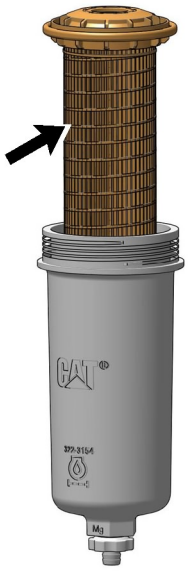


Illustration 551 g06183515

8. Remove the filter from the housing.

9. Clean the filter housing and the base.

10. Install the new filter element into the housing.

11. Apply a thin coat of engine oil to the gasket of the filter.

12. Install the engine oil filter by hand until the filter housing contacts the base.

13. Close the access door.

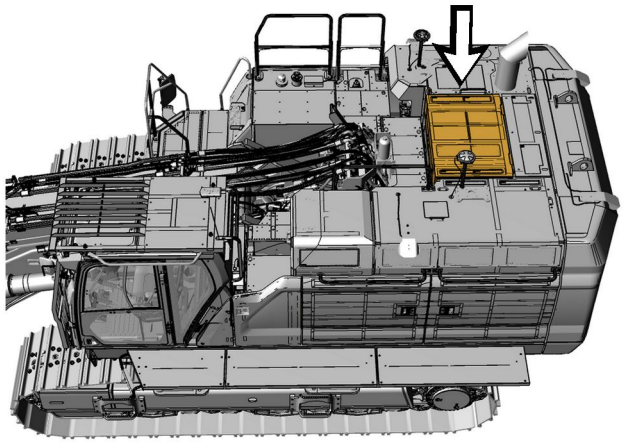


Illustration 552 g06592425

14. Open the access door on top of the machine.

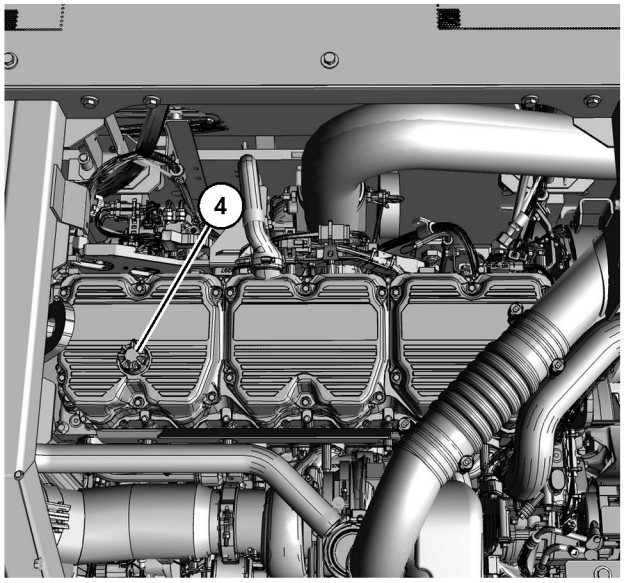


Illustration 553 g06593517

15. Remove oil filler cap (4). Fill the crankcase with new oil. Refer to 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.

16. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.

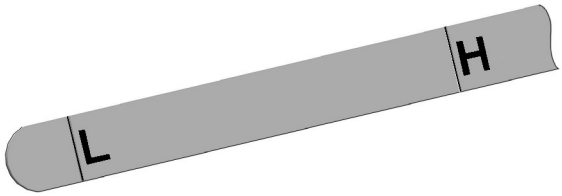


Illustration 554 g06183475

17. Wait for 30 minutes to allow the oil to drain back into the crankcase. Check the oil level with dipstick (3). Maintain the oil between the “L” and “H” marks on the dipstick. If necessary, add oil.

18. Close the access door.

Fast Fill

If your machine is equipped with a deluxe service center, you may drain and add the engine oil through the fast fill port.

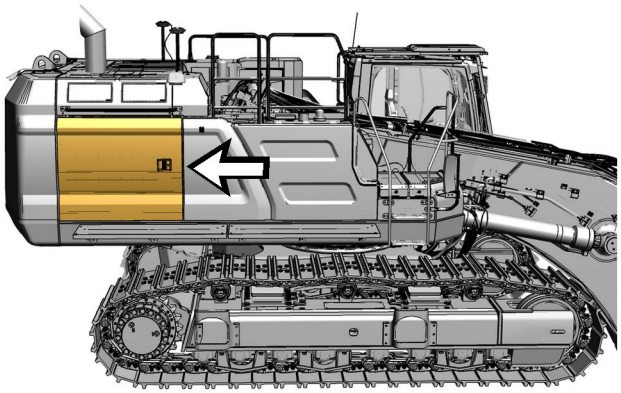


Illustration 555 g06592451

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

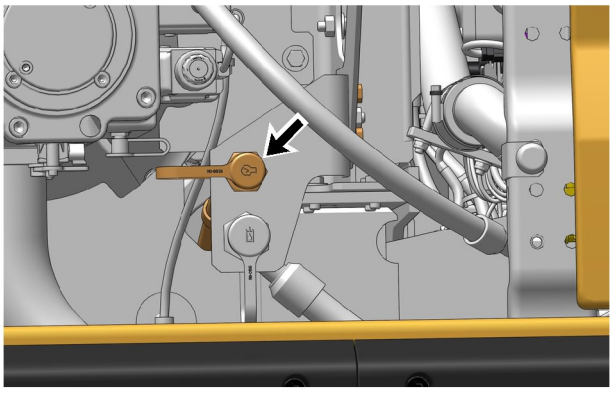


Illustration 556 g06183504

2. Remove the dust cover.
3. Attach a hose that is equipped with a 126-7539 Nozzle.

Note: Make sure that the nozzle and the receiver are free from debris before attaching.

4. Drain the oil or add the oil, as needed.
5. Install the dust cover.

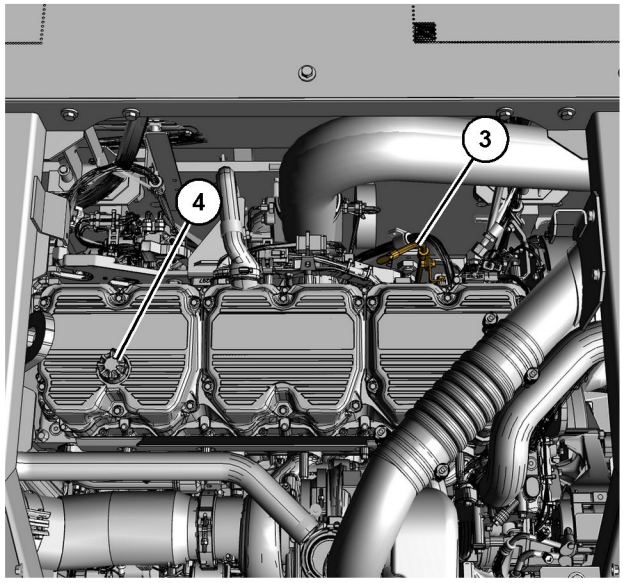


Illustration 557 g06593521

6. Verify that the correct amount of oil was added using the engine dipstick (3).

i07956821

Engine Valve Lash - Check

SMCS Code: 1102-082; 1102-535; 1102; 1105-025; 1105-535; 1121-535; 1209-535; 1209; 1209-082; 7527

Note: Procedures for adjusting the valve lash can be found in Systems Operation/Testing and Adjusting, “Valve Lash Adjustment”. Consult your Cat dealer for assistance.

⚠ WARNING

Ensure that the engine cannot be started while this maintenance is being performed. To help prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting valve lash clearance.

i04688455

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.

To avoid possible injury, be sure the brakes are applied and all controls are in HOLD or NEUTRAL when starting the engine.

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 cylinders.

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

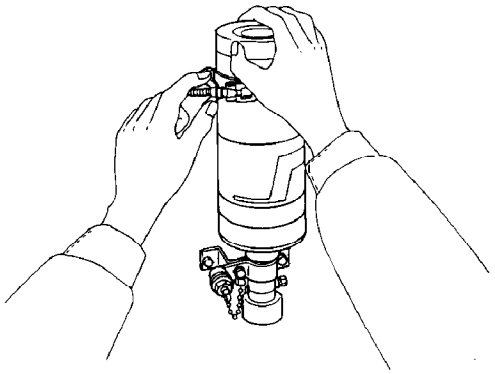


Illustration 558 g00751767

2. Loosen the cylinder retaining clamp.

3. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.

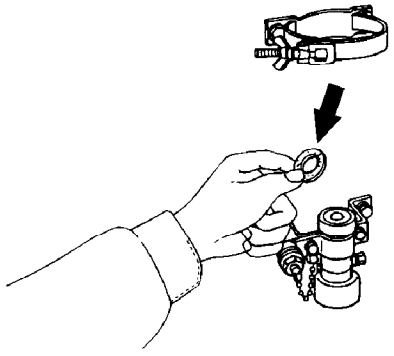


Illustration 559 g00751769

4. Remove the used gasket.

5. Install a new gasket.

Note: A new gasket 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.

i07786001

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070



Illustration 560 g06435629

Cleaning of the Films

Make sure that all the product identification films are legible. Make sure that the recommended procedures are used to clean the product identification films. Ensure that all the product identification films are not damaged or missing. Clean the product identification films or replace the films.

Hand Washing

Use a wet solution with no abrasive material that contains no solvents and no alcohol. Use a wet solution with a “pH” value between 3 and 11. Use a soft brush, a rag, or a sponge to clean the product identification films. Avoid wearing down the surface of the product identification films with unnecessary scrubbing. Ensure that the surface of the product identification films is flushed with clean water and allow the product identification films to air dry.

Power Washing

Power washing or washing with pressure may be used to clean product identification films. However, aggressive washing can damage the product identification films.

Excessive pressure during power washing can damage the product identification films by forcing water underneath the product identification films. Water lessens the adhesion of the product identification film to the product, allowing the product identification film to lift or curl. These problems are magnified by wind. These problems are critical for the perforated film on windows.

To avoid lifting of the edge or other damage to the product identification films, follow these important steps:

- Use a spray nozzle with a wide spray pattern.
- A maximum pressure of 83 bar (1200 psi)
- A maximum water temperature of 50° C (120° F)
- Hold the nozzle perpendicular to the product identification film at a minimum distance of 305 mm (12 inch).
- Do not direct a stream of water at a sharp angle to the edge of the product identification film.

i06882903

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

⚠ WARNING

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

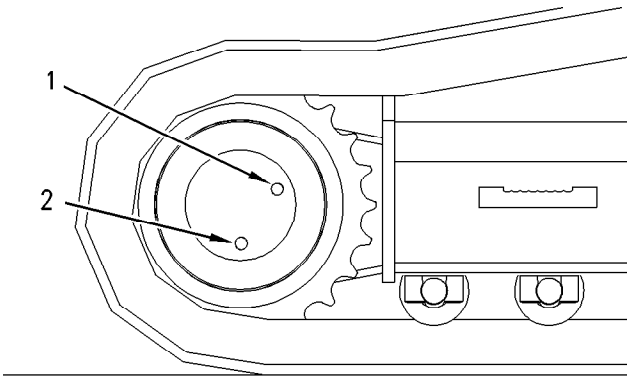


Illustration 561 g00822278

(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.

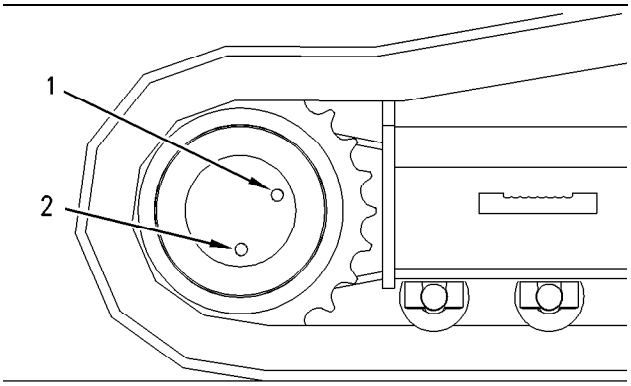


Illustration 562 g00822278

(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.

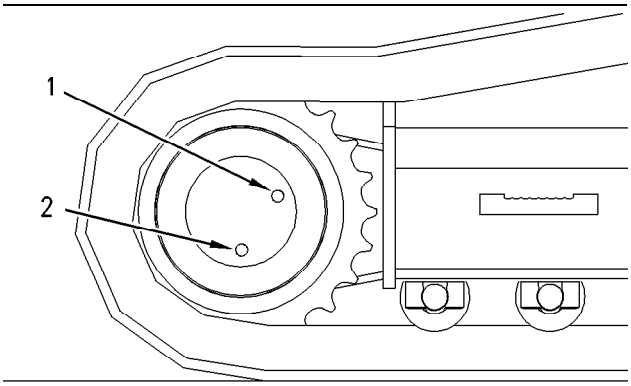


Illustration 563 g00822278

(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”.

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, PERJ1017, “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.

i05785593

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.

1. Remove the cover above the left side access door.

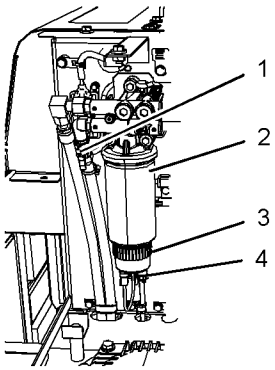


Illustration 564 g03231938

(1) Shutoff valve
(2) Filter
(3) Bowl
(4) Drain valve

2. Turn off the fuel supply to the fuel filter by turning the shutoff valve (1) clockwise.

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

3. Turn drain valve (4) counterclockwise in order to open. The drain valve is located on the bottom of the water separator.

4. Drain the water and sediment into a suitable container.

Note: Dispose of drained fluids and used filters according to local regulations.

5. Close drain valve (4).

6. Remove the filter (2) from the filter base. A filter wrench may be used to loosen the filter.

7. Remove the bowl (3) from the filter (2). Discard the used filter.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

8. Clean the inside surface of the filter head and of bowl (3).

9. Inspect the O-ring on bowl (3). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.

10. Lubricate the O-ring seal for the bowl (3) with clean diesel fuel or lubricate the O-ring seal with motor oil. Place the O-ring seal in the groove in the bowl.

11. Install the bowl (3) onto the new filter element by hand until the bowl is snug. Tighten the bowl to 7.3 N·m (5.0 lb ft) to approximately 1/6 of a turn. Do not use tools to tighten the bowl to the new filter element.

12. Lubricate the O-ring seal on the new filter element with clean diesel fuel or lubricate the O-ring seal with 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.

14. Turn on the fuel supply to the filter by turning the shutoff valve (1) counterclockwise.

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”.

15. Remount the cover over the filters.

i05065833

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
Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

1. Remove the cover.

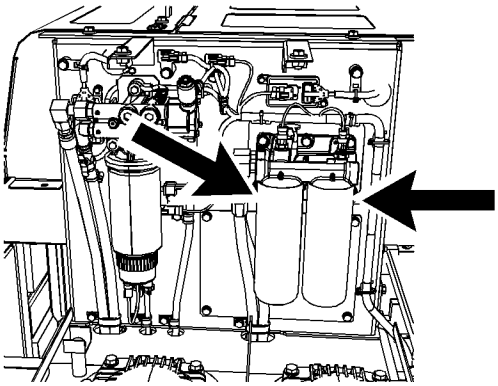


Illustration 565 g03232057

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

2. Remove the fuel filter.

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 filters open.

Note: Dispose of used filters and used fluids according to local regulations.

4. Clean the mounting base of the fuel filter. Make sure that all of the old seal is removed from the mounting base.

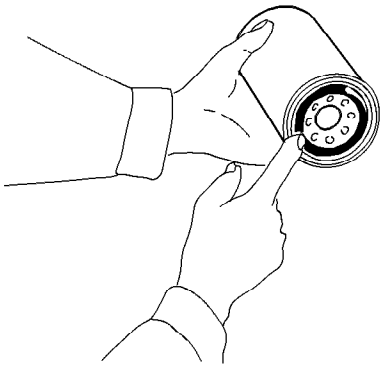


Illustration 566 g00101634

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. Refer to Operation and Maintenance, “Fuel System - Prime”.

8. Reattach the cover.

i05065911

Fuel System Water Separator - Drain

SMCS Code: 1263

1. Remove the cover above the access door on the left 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.

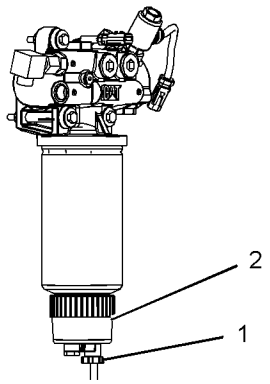


Illustration 567 g02022485

(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. Replace cover over filters.

i08187518

Fuel Tank Cap Filter - Replace

SMCS Code: 1273-510-Z2; 1273-510-FI

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

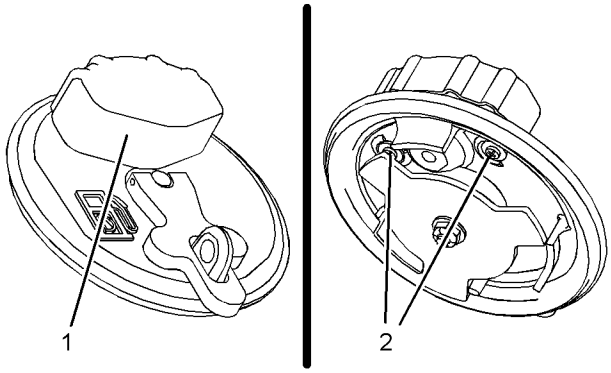


Illustration 568 g02612539

2. Remove the fuel cap.

3. Remove filter element screws (2) from the underside of the fuel cap and remove old filter element (1).

4. Wash the fuel tank cap in a clean, nonflammable solvent.

5. Install a new fuel cap filter element.

6. Install filter element screws (2) to secure filter element (1) to the fuel cap.

7. Install the fuel tank cap

i04462462

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

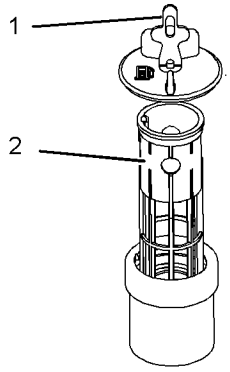


Illustration 569 g02609604

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.

i06061288

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

The fuel tank drain valve is located on the right side of the machine under the fuel tank.

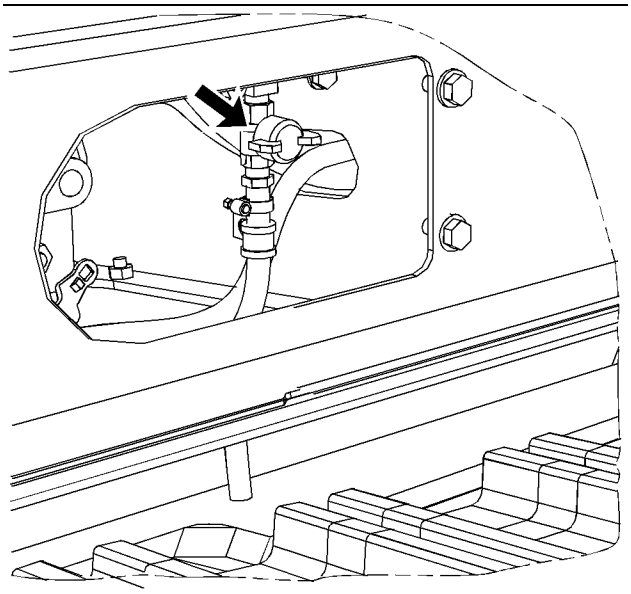


Illustration 570 g03795583

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

1. Open the drain valve by turning the valve counterclockwise. Allow the water and the sediment to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

2. Close the drain valve by turning the valve clockwise.

Fill the Fuel Tank

You can now add fuel to the fuel tank, if necessary. Remove the fuel tank cap and pump fuel through the opening.

Make sure that you lock the fuel tank cap after the refueling is complete.

Note: For machines equipped with fast fill fuel attachment, when the fuel is refilled from the top fuel port, stop refilling as the indicator starts to appear in order to avoid fuel spilling from the breather.

i08330872

Fuses - Replace

SMCS Code: 1417-510

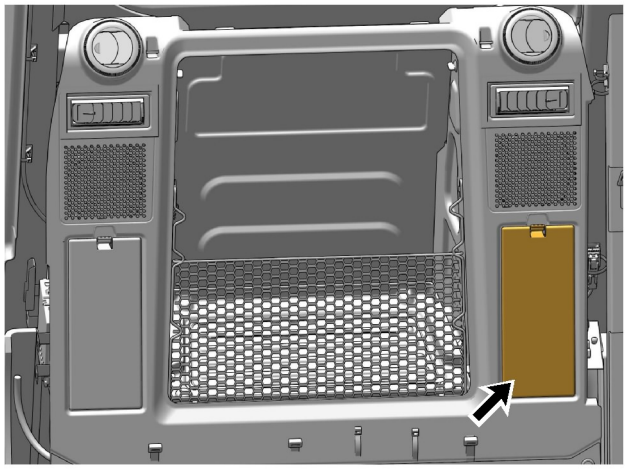


Illustration 571 g06181624

The fuse panel is on the left side of the interior storage box. Remove the cover 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.

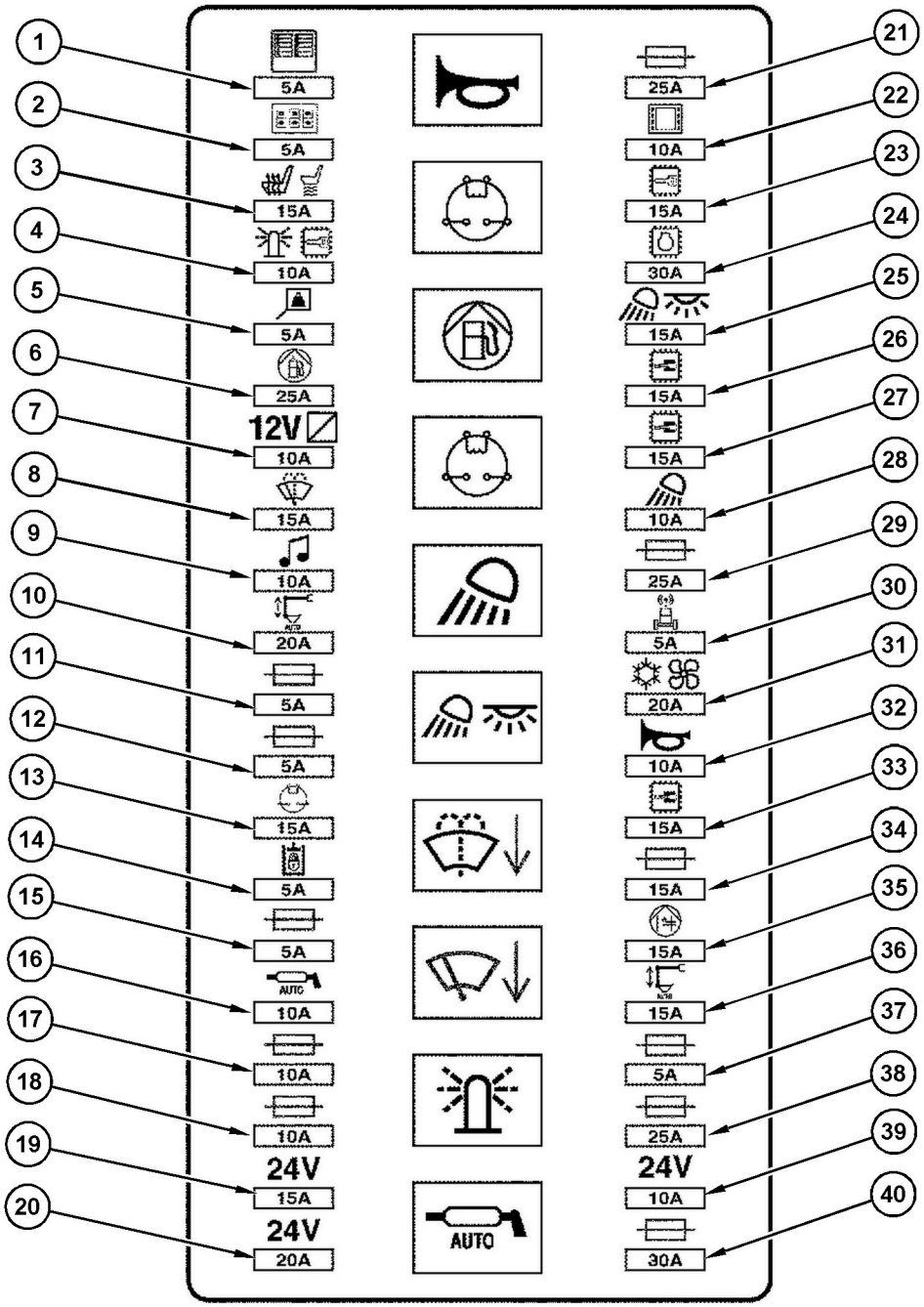


Illustration 572 g06601886

(1) Key ON – 5 Amp

(2) Electronic Switch Control Panel – 5 Amp

(3) Seat Heater, and Air Suspension Seat – 15 Amp

(4) Beacon – 10 Amp

(5) Counterweight Removal – 5 Amp

(6) Electric Refueling Pump – 25 Amp

(7) DC-DC Converter – 10 Amp

(8) Window Wiper and Window Washer – 15 Amp

(9) Radio – 10 Amp

(10) Cat Inertial Measurement Unit, Grade Control – 20 Amp

(11) Spare – 5 Amp

(12) Spare – 5 Amp

(13) Spare – 15 Amp

(14) Hydraulic Lock – 5 Amp

(15) Spare – 5 Amp

(16) Auto Lube – 10 Amp

(17) Spare – 10 Amp

(18) Spare – 10 Amp

(19) AUX (w/ bullet connector) – 15 Amp

(20) AUX (w/ bullet connector) – 20 Amp

(21) Spare – 25 Amp

(22) Display and ET Connector – 10 Amp

(23) BCM,PTS,MSS – 15 Amp

(24) Engine Electronic Control Module/Purge Lamp – 30 Amp

(25) Chas/Cab/Dome Light – 15 Amp

(26) Primary Electronic Control Module – 15 Amp

(27) Secondary Electronic Control Module – 15 Amp

(28) Boom Lamp – 10 Amp

(29) Spare – 25 Amp

(30) Product Link Module – 5 Amp

(31) Air Conditioner and Heater Blower – 20 Amp

(32) Horn – 10 Amp

(33) Machine ECM – 15 Amp

(34) Spare – 15 Amp

(35) Priming Pump – 15 Amp

(36) Cat Grade Control (R2 Sensor) – 15 Amp

(37) Spare – 5 Amp

(38) Spare – 25 Amp

(39) AUX (w/ bullet connector) – 10 Amp

(40) Spare – 30 Amp

Relays

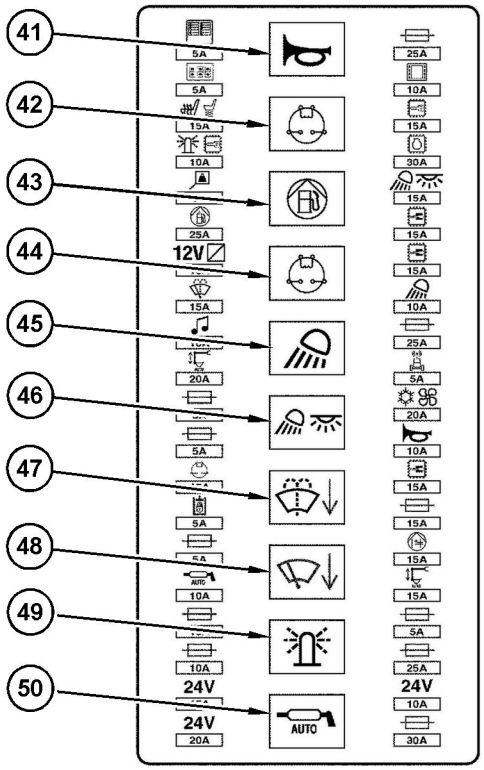


Illustration 573 g06601888

(41) Horn – Relay

(42) Spare – Relay

(43) Refueling Pump – Relay

(44) Spare – Relay

(45) Boom Light – Relay

(46) Chassis Light and Cab Light – Relay

(47)Lower Washer – Relay

(48) Lower Wiper – Relay

(49)Beacon – Relay

(50)Auto Lube – Relay

Power Fuse Module

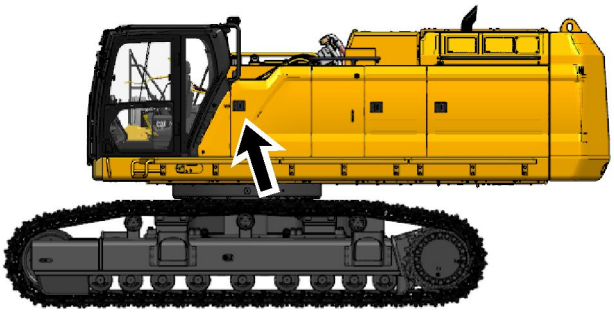


Illustration 574 g06416379

The power fuse module is located behind the rear access door on the left side of the machine. Remove the cover to access the fuses.

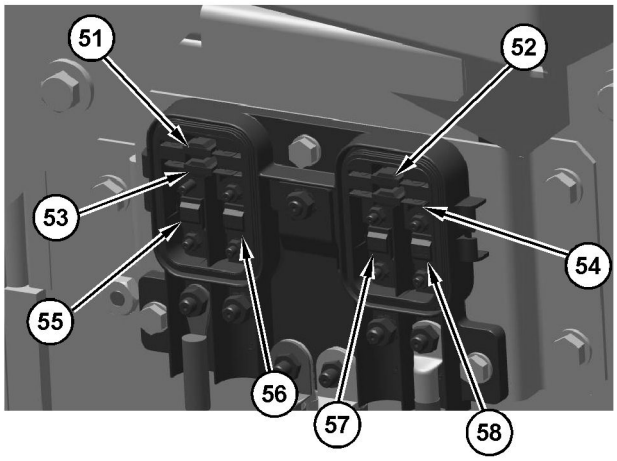


Illustration 575 g06418183

Spare (51 - 54) – The fuse module also includes spare fuses (5) which can be used if one of the installed fuses opens. One spare fuse is provided for each fuse in use.

Main Circuit 100 Amp (55) – This fuse is designed to protect the wires between the batteries and the fuses. If the wires are shorted to the machine body, this fuse would minimize the damage to the wires.

Glow Plug Circuit 40 Amp (56) – This fuse is designed to protect the glow plugs.

Diesel Exhaust Fluid (DEF IF Equipped) Pump Circuit 40 Amp (57) – This fuse is designed to protect the DEF pump circuit (If Equipped).

Alternator Circuit 150 Amp (58) – This fuse is designed to protect the alternator. If the batteries are installed with reversed polarity, the fuse would prevent the alternator from damaging the rectifier.

i08424662

Hydraulic System - Purge
(Air - Purge)

SMCS Code: 5050-542

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

Purging air from the hydraulic system is required in any of the following instances:

- If hydraulic oil level is too low, under level 0, while the machine is parked.
- After hydraulic components are repaired, disassembled, or assembled.
- If the inlet hose is removed from any of the hydraulic pumps.

Note: Make sure that a qualified mechanic performs the hydraulic system air purge. Special tools and training are required.

Refer to the following procedures in the Service Manual for detailed instructions on purging air from the hydraulic system:

- Testing and Adjusting, M0109906, “374 Excavator”, “Main Hydraulic Pump Air - Purge"
- Testing and Adjusting, M0109906, “374 Excavator”, “Hydraulic System Air - Purge - Fan Pump and Charge Pump"
- Testing and Adjusting, M0109906, “374 Excavator”, “Hydraulic System Air - Purge - Swing Pump"

i08424664

Hydraulic System Oil - Change

SMCS Code: 5056-044

WARNING

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

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.

Hydraulic Hammer Use

The use of hydraulic hammers shortens the life of hydraulic oil. If a hydraulic hammer is used, the maintenance interval is shortened, refer to Table 49 for the intervals.

Table 49

Percentage of Hammer Use	Hydraulic System Oil - Change
50%	Every 1000 service hours
100%	Every 600 service hours

Cat HYDO Advanced 10 Oil Change Interval

The standard Cat HYDO Advanced 10 oil change interval is every 3000 service hours or 18 months.

A maintenance interval of 6000 service hours or 3 years for changing the hydraulic oil is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines with hammers are not included in the maintenance interval of 6000 service hours or 3 years . 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 maintenance interval of 6000 service hours or 3 years. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Drain the Oil

1. Park the machine in the servicing position on level ground.
2. Clean the top of the hydraulic tank thoroughly in order to keep dirt out of the hydraulic tank.

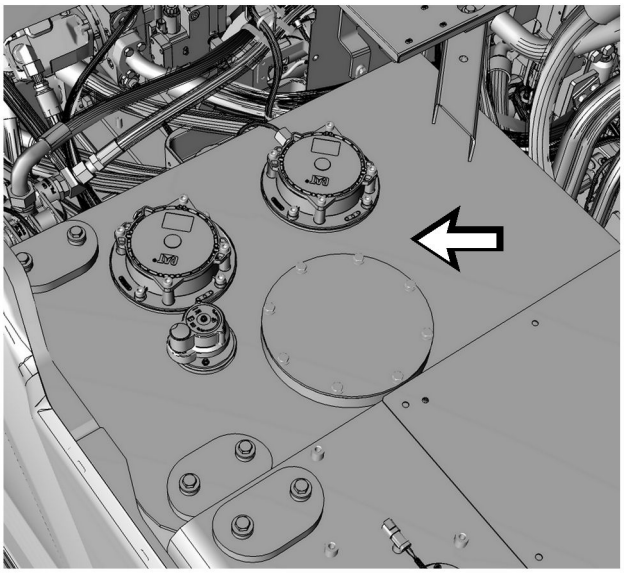


Illustration 576 g06591594

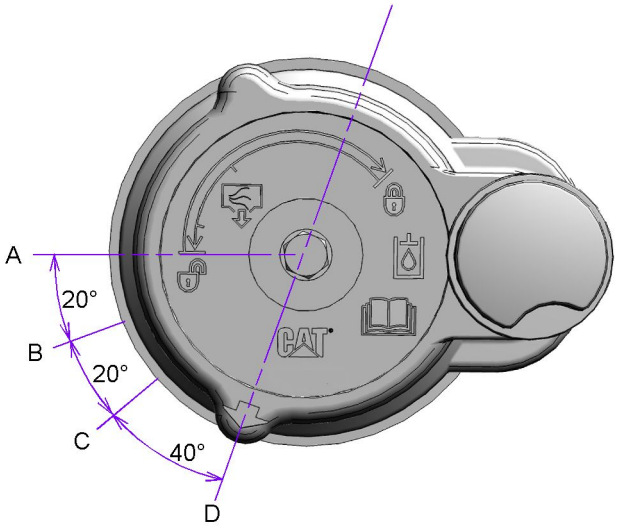


Illustration 577 g06591637

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 577 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. After the pressure is relieved, tighten the filler cap.

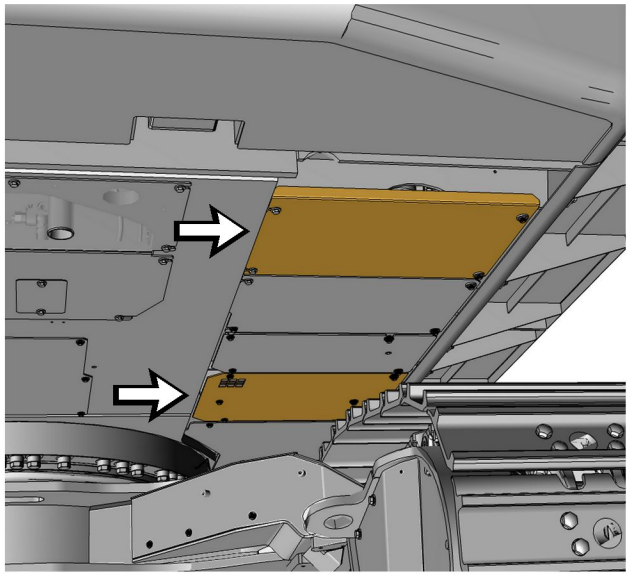


Illustration 578 g06591859

5. Remove the two access covers that are located under the hydraulic tank. This will allow access to the drain valve and the pipe.

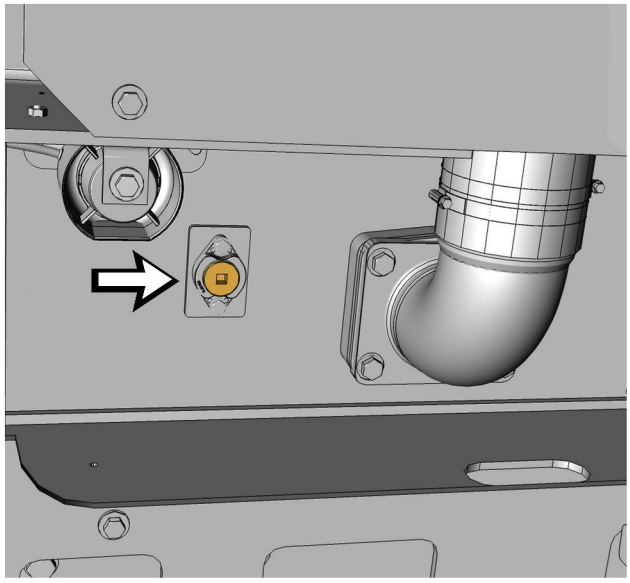


Illustration 579 g06591863

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

6. Remove plug (1).

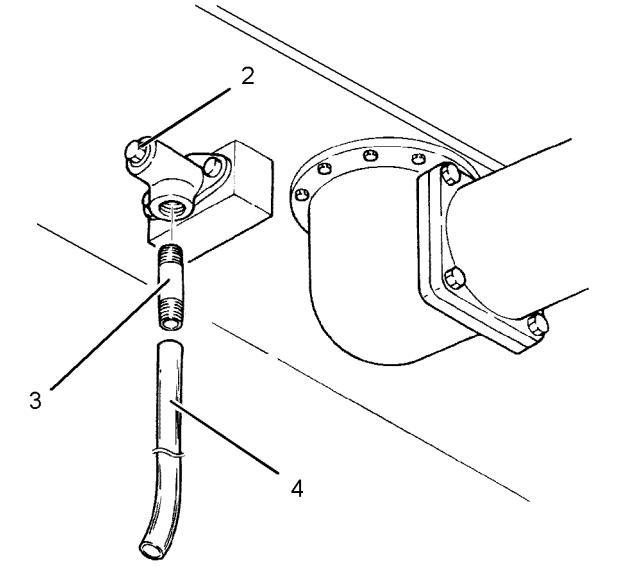


Illustration 580 g01137580

(2) Drain plug
(3) Pipe Nipple
(4) Tube

7. Install a pipe nipple (3) with a clear plastic tube (4) into the hole on the bottom of the hydraulic tank.

8. Loosen drain plug (2) in order to drain the oil.

9. Drain the oil into a suitable container.

10. After the oil has been drained, tighten drain plug (7) to a torque of 110 ± 15 N·m (81 ± 11 lb ft).

11. Remove the pipe nipple.

12. Clean plug (1) and install the plug. Tighten the plug to a torque of 75 ± 5 N·m (55 ± 48 lb ft).

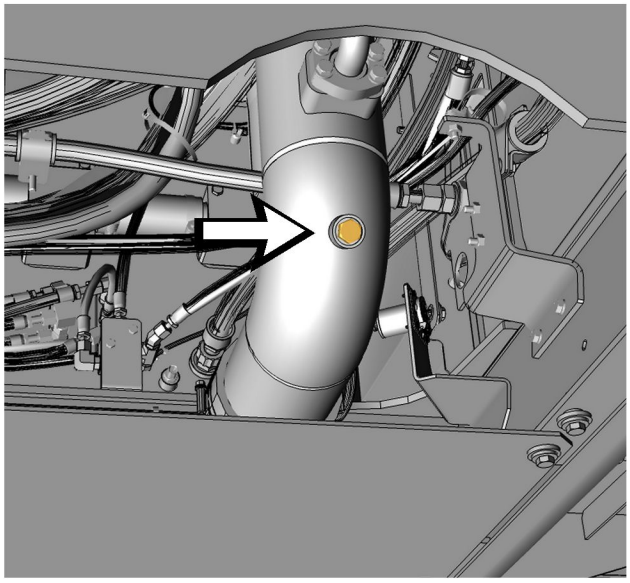


Illustration 581 g06591865

13. Remove the plug from the tube. Allow the oil to drain into a container.

14. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

15. Clean the plug. Install the plug and the O-ring into the drain port.

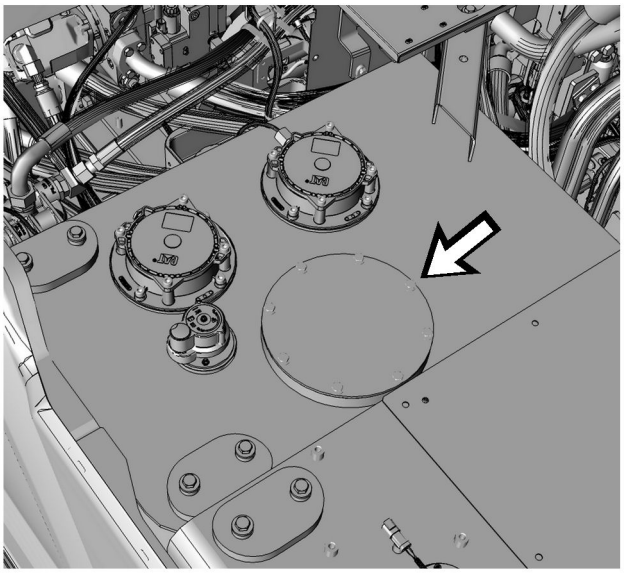


Illustration 582 g06591855

16. Remove the cover to the hydraulic tank screen.

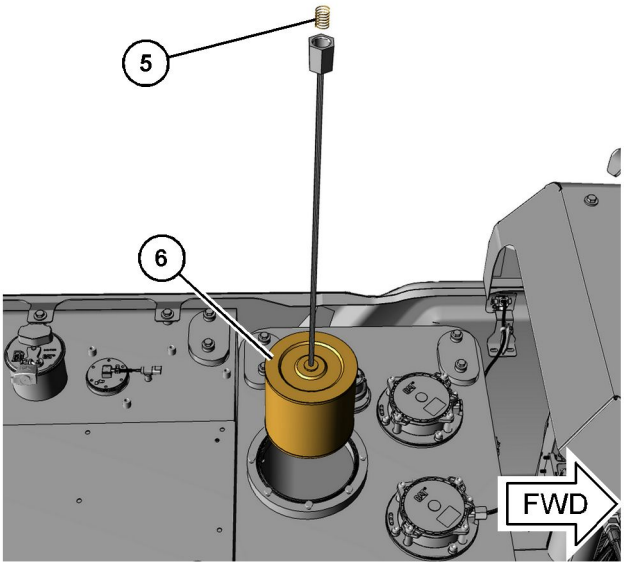


Illustration 583 g06591887

(5) Spring
(6) Screen

Note: Do not allow spring (5) to fall back into the tank.

17. Remove spring (5) and screen (6).

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

18. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

19. There is an O-ring seal on the bottom of the screen. There is also an O-ring seal on the hydraulic tank around the opening for the screen. Inspect the O-ring seals. Replace the O-ring seals if wear or damage is evident.

20. Install the screen and the spring. Then install the cover.

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

Service the Hydraulic System Filters

Note: The hydraulic oil system must be empty when the filters are being serviced. Service the filters before refilling the machine with hydraulic oil.

Note: Dispose of used filters and used fluids according to local regulations.

Refer to the following topics in order to service the hydraulic system filters:

- Operation and Maintenance Manual, “Hydraulic System Filter Element (Fine Filtration) - Replace (If Equipped)”
- Operation and Maintenance Manual, “Hydraulic System Oil Filter (Return) - Replace”
- Operation and Maintenance Manual, “Hydraulic System Oil Filter (Case Drain) - Replace”
- Operation and Maintenance Manual, “Hydraulic System Oil Filter (Pilot) - Replace”

Fill the Hydraulic Tank

1. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

2. Inspect the O-ring seal on the filler plug for damage. Replace the O-ring, if necessary. Clean the filler plug. Install the filler plug.

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.

When the hydraulic oil has been replaced, the air must be removed from the hydraulic oil system. To remove the air from the hydraulic oil system, follow Step 2a through Step 2d.

a. Start the engine.

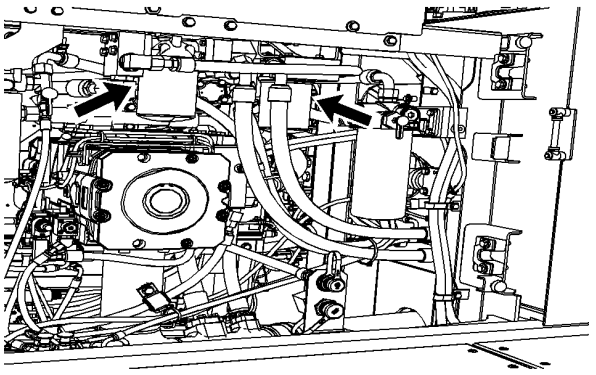


Illustration 584 g03573781

b. Slowly loosen the vent plug on top of the case drain filter until hydraulic oil flows out of the vent plug.

c. After oil flows out of the vent plug without any air bubbles, tighten the vent plug. This indicates that the air has been purged from the drain lines for the main pump and the drain line for the swing pump. Tighten the vent plug to a torque of 11 ± 1 N·m (97 ± 9 lb in).

d. Stop the engine.

3. Start the engine. Operate the engine at idling speed for five minutes.

4. Operate the joysticks in order to circulate the hydraulic oil. Return the machine to the servicing position. Stop the engine.

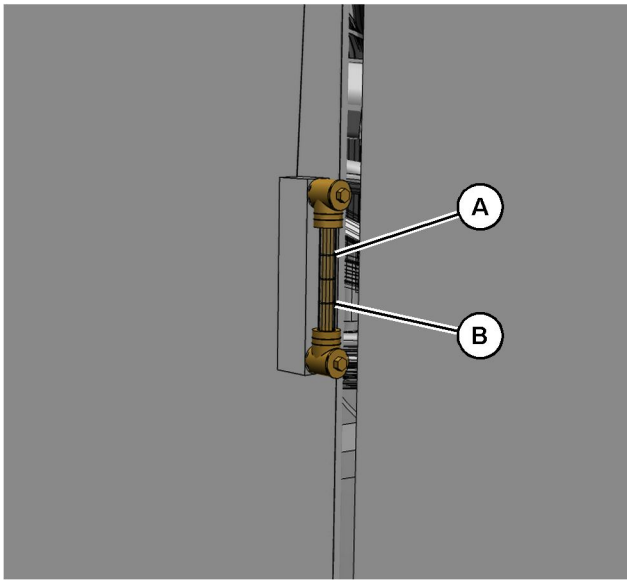


Illustration 585 g06591937

(A) High temperature range
(B) Low temperature range

5. Maintain the oil level between the marks on the sight gauge in the appropriate temperature range.

Note: Purging air from the hydraulic system is recommended following a hydraulic system oil change. Refer to “Hydraulic System - Purge“ for information on purging air from the hydraulic system.

i08217662

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

The return filter is a cartridge type filter. By using a cartridge type filter, the amount of foreign material that enters the hydraulic system is reduced when the filter element is replaced.

Note: If the display shows that the hydraulic return filter is plugged, push the reset switch. Run the machine on level ground for approximately 10 seconds. If the error is still present, inspect the filter and replace the filter, if necessary.

Hydraulic Hammer Use

The use of hydraulic hammers shortens the life of hydraulic oil. If a hydraulic hammer is used, the maintenance interval is shortened, refer to Table50 for the intervals.

Table 50

Percentage of Hammer Use	Hydraulic System Oil Filter (Return) - Replace
50%	Every 500 service hours
100%	Every 250 service hours

Return Filter Replacement Procedure

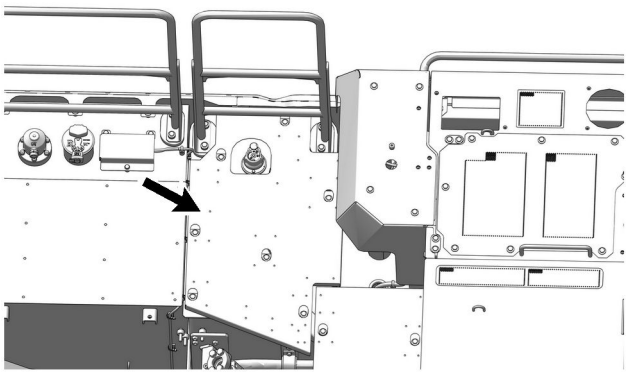


Illustration 586 g06590685

1. Remove the cover to access the return filters.

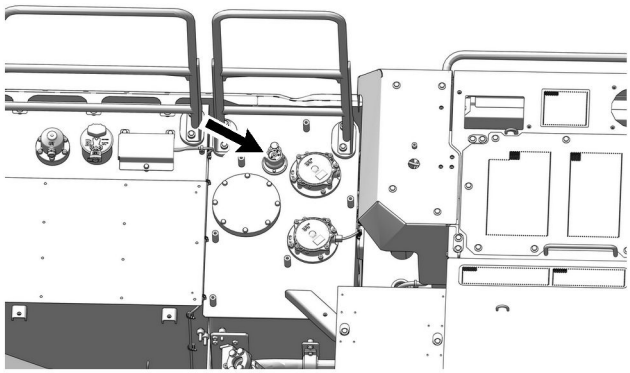


Illustration 587 g06590712

2. Hydraulic Cap is on top of hydraulic tank.

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.

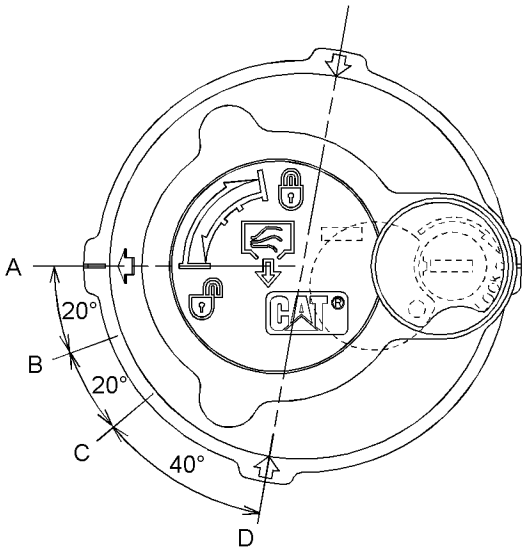


Illustration 588 g02275615

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 588 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. After the pressure is relieved, tighten the filler cap.

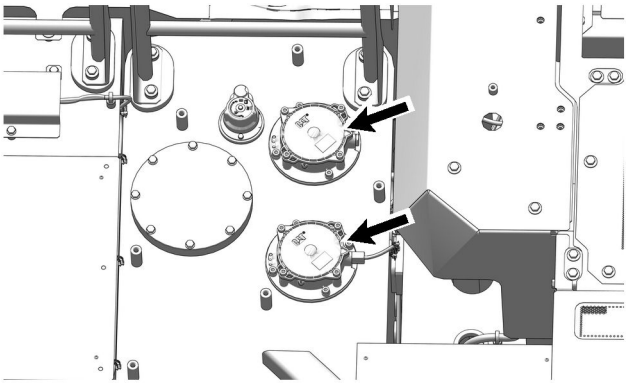


Illustration 589 g06590726

5. Remove the filter cartridge. Perform Step 5a through Step 5e to remove the filter cartridge.

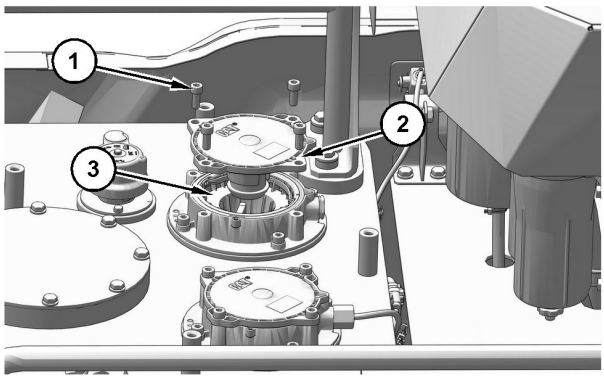


Illustration 590 g06590787

(1) Bolts
(2) Cover
(3) Filter cartridge

a. Remove 4 bolts (1), and cover (2).

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

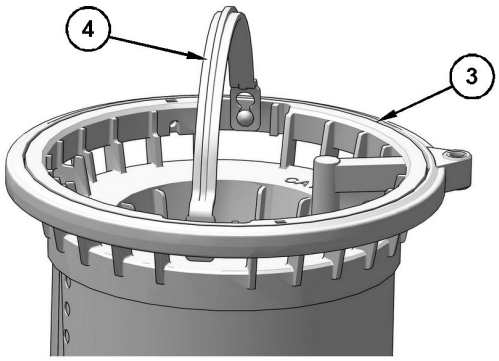


Illustration 591 g06590859

(3) Filter cartridge
(4) Handle

b. Pull up the handle (4) at the top of filter cartridge (3).

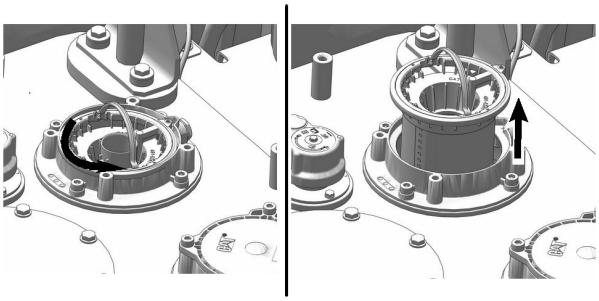


Illustration 592 g06590914

c. Turn the filter cartridge counterclockwise by 180 degrees to align the projection of the filter cartridge with the notch of the filter case. Pull out the filter cartridge.

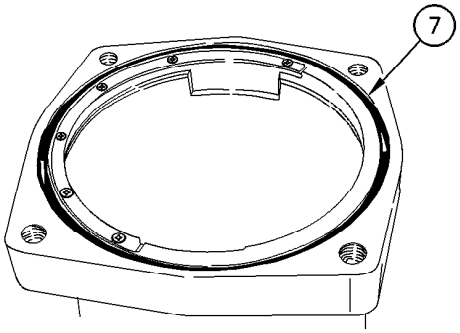


Illustration 593 g00102219

(7) O-ring

d. Inspect the cover and O-ring (7). If either part is damaged, replace the part.

e. Inspect the filter cartridge for debris and for damage. If necessary, replace the filter cartridge.

f. Repeat Step 5a through Step 5e for the other filter groups.

6. Remove the filter element. Perform Step 6a through Step 6f to remove the filter element.

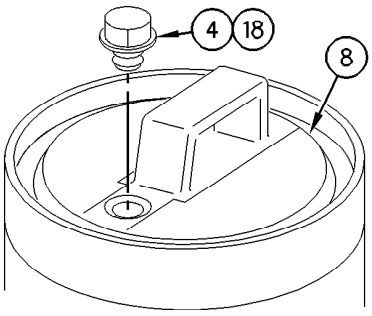


Illustration 594 g00104507

(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).

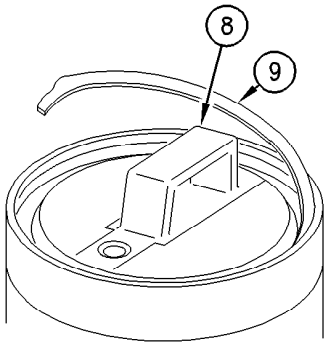


Illustration 595 g00918893

(8) Plate
(9) Spiral retaining ring

b. Remove spiral retaining ring (9).

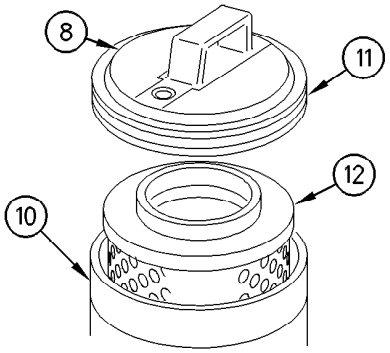


Illustration 596 g00104510

(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) 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 to clean the shell of the filter cartridge.

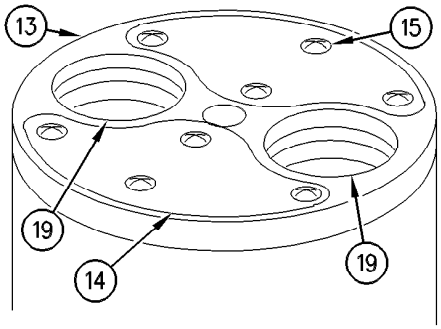


Illustration 597 g00104511

(13) Slide plate
(14) Pads
(15) Screws
(19) Port

a. Turn shell (10) upside-down.

b. Remove screws (15).

c. Remove Pads (14) from slide plate (13).

d. Wash the following parts in a clean nonflammable solvent: plug (4), plate (8), spiral retaining ring (9), shell (10), and Pads (14). Dry the parts.

e. Repeat Step 7a through Step 7d for the other filter groups.

8. Install the filter elements. Perform Step 8a through Step 8k 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 shell (10) to prevent rust.

b. Apply grease to a new O-ring (11).

c. Plate (8) will contact the inside 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).

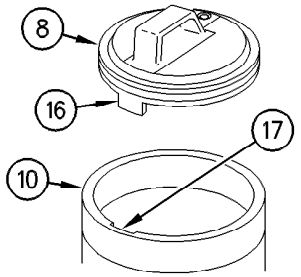


Illustration 598 g00104512

(8) Plate
(10) Shell
(16) Boss
(17) Notch

g. Turn over shell (10). Apply grease to the two O-rings on new element (12). Install element (12) into shell (10).

h. Move boss (16) in alignment with notch (17). Install plate (8) into shell (10).

i. Install spiral retaining ring (9) into the groove in shell (10).

j. Apply grease to new O-ring (18). Install O-ring (18) on plug (4).

k. Install plug (4) into plate (8).

l. Repeat Step 8a through Step 8k for the other filter groups.

9. Install the filter cartridge. Perform Step 9a through Step 9e to install the filter cartridge.

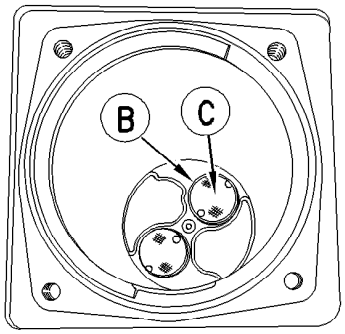


Illustration 599 g00102220

(B) Port
(C) Slide plate

a. Check that ports (B) at the bottom of the filter case are closed.

Note: If the ports are open, rotate slide plate (C) counterclockwise to the stopper tofully close the ports. When the ports are fully closed, any remaining oil in the filter case should be completely removed.

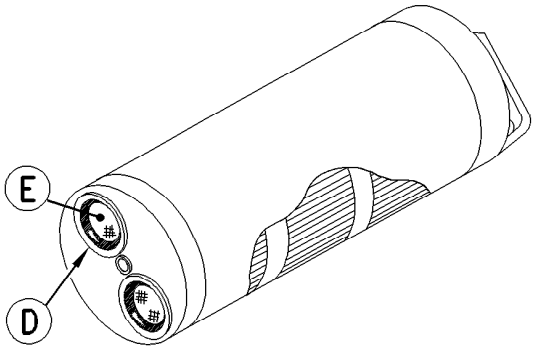


Illustration 600 g00102221

(E) Slide plate
(D) Port

b. Check that ports (D) of the filter cartridge are fully closed.

Note: The filter cartridge cannot be installed unless the ports are fully closed. If the ports are open, rotate slide plate (E) counterclockwise to the stopper tofully close the ports.

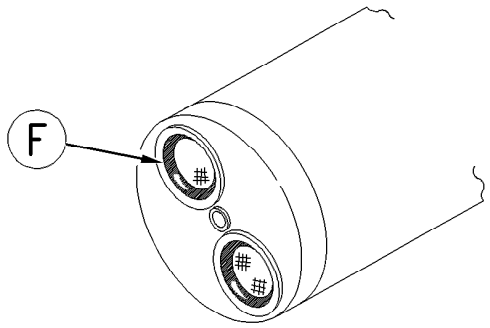


Illustration 601 g00102222

(F) O-rings

c. Check that O-rings (F) have been installed and that oil has been applied to O-rings (F).

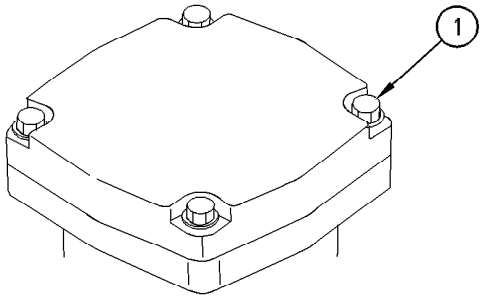


Illustration 602 g00102225

(1) Bolts

d. Install the filter cartridge into the filter case. Turn the filter cartridge clockwise by 180 degrees and push down the filter cartridge when the filter cartridge contacts guide (A).

e. Install plug (4), cover (3), washers (2), and bolts (1). Tighten bolts (1) to a torque of 29 ± 5 N·m (22 ± 4 lb ft).

f. Repeat Step 9a through Step 9e for the other filter groups.

i08251845

Hydraulic System Oil Filter - 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. Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“. Lower the bucket to the ground so that the stick is vertical.
2. Move the hydraulic lockout control to the UNLOCKED position. Refer to “Operator Controls“.
3. Turn the engine start switch to the ON position. Refer to “Engine Starting“.
4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the pilot lines. Refer to “Joystick Controls“.
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. Relieve pressure by slowly turning the cap until the cap reaches the secondary stop.

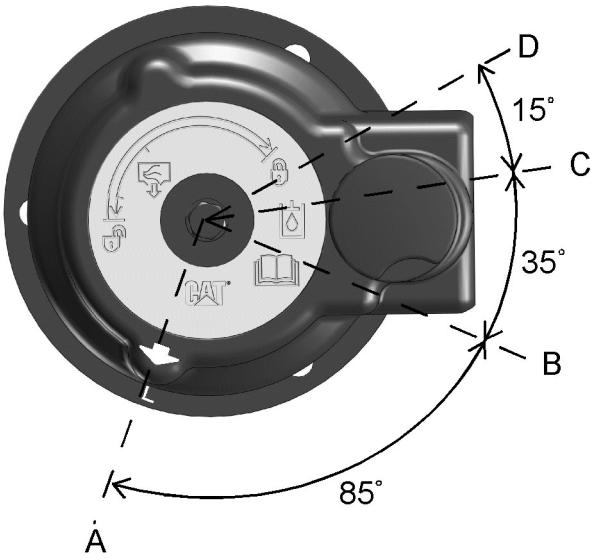


Illustration 603 g06184990

Filler cap is located on top of the machine

(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 603 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. Move the arrow from position (C) to position (D).

d. After the tank pressure is relieved, tighten the filler cap.

7. After the pressure is relieved, tighten the filler cap.

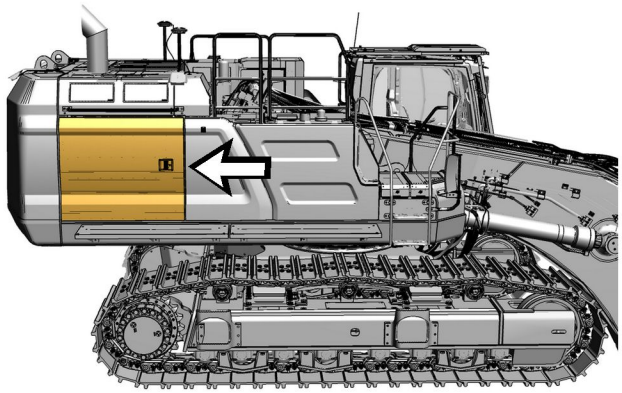


Illustration 604 g06592451

8. Open the access door on the right side of the machine.

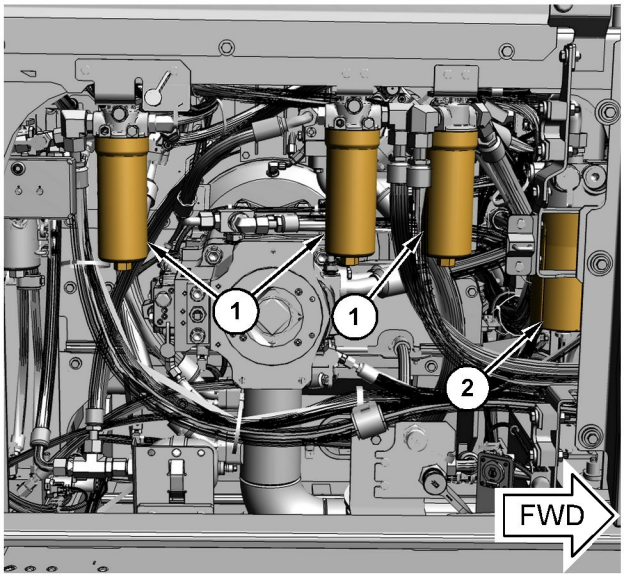


Illustration 605 g06600581

(1) Case drain filter
(2) Charge filter

9. Clean the area in order to keep dirt out of the filter base.

10. Remove the used case drain filters (1) and charge filter (2) from the filter base. Refer to “General Hazard Information“

Note: Dispose of used filters according to local regulations.

11. Clean the filter base.

12. Coat the seal of a new case drain filters and charge filter with clean hydraulic oil.

13. Install the new case drain filters and charge 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. Refer to “Engine Starting“. Move each cylinder evenly through several cycles.

15. Return the machine to the maintenance position. Check the machine for oil leaks.

16. Stop the engine.

17. Check the hydraulic oil level. Refer to Operation and Maintenance Manual, “Capacities (Refill)”.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

18. Close the access door.

i08217412

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

NOTICE
Never remove the fill/vent plug from the hydraulic tank if the oil is hot.

Air can enter the system and cause pump damage.

1. Park the machine in the servicing position on level ground.

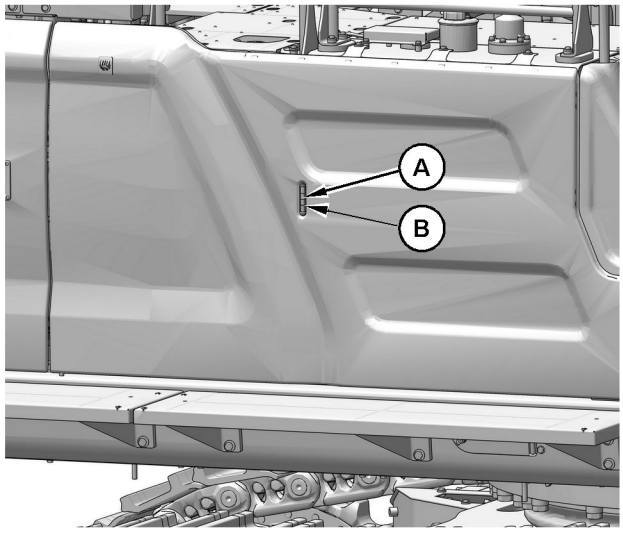


Illustration 606 g06590226

(A) High temperature range
(B) Low temperature range

2. For a machine that is at normal operating temperature, maintain the hydraulic oil level in the high temperature range. For a cold machine, maintain the hydraulic oil level in the low temperature range.

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

3. The Hydraulic fill cap is on top of the Hydraulic tank.

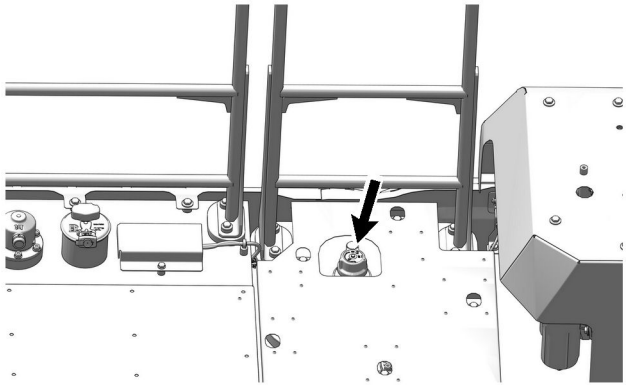


Illustration 607 g06590238

⚠ 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.

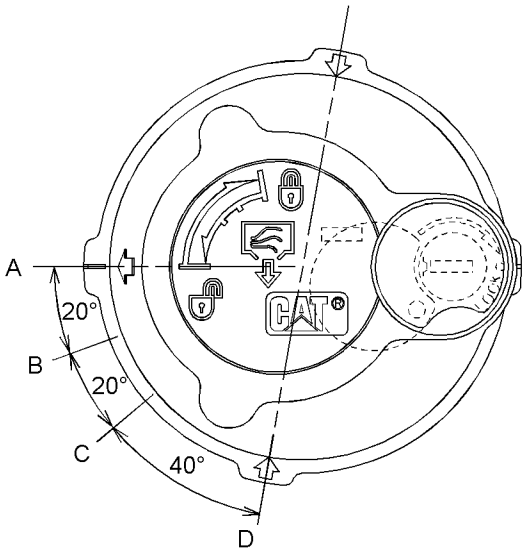


Illustration 608 g02275615

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 608 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).

5. After the pressure is relieved, tighten the filler cap.

i08217376

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-SM; 5095-008; 7542; 7542-008

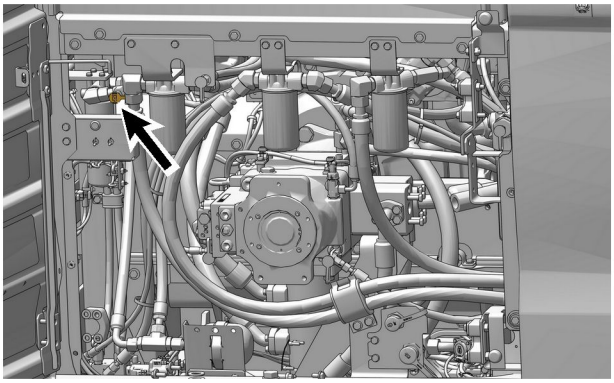


Illustration 609 g06590186

The hydraulic oil sampling valve is near the swing pump in the right rear access compartment. Obtain a sample of the hydraulic oil from the hydraulic oil sampling valve. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEGJ0047, “How To Take A Good Oil Sample” for more information about obtaining a sample of the hydraulic oil.

i08251869

Hydraulic Tank Breather - Inspect/Replace

SMCS Code: 5050-510-BRE; 5050-040-BRE; 5056-040-BRE; 5056-510-BRE; 5118-040; 5118-510

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

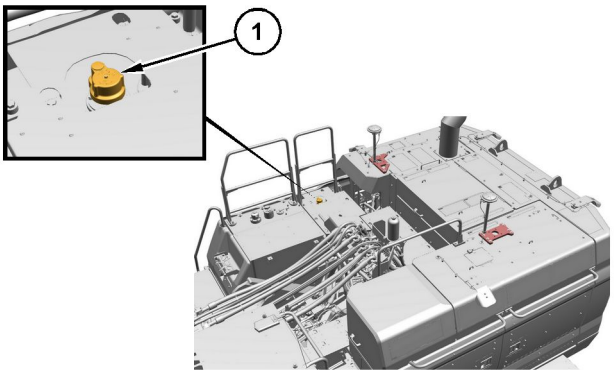


Illustration 610 g06600850

Breather is on the top of the hydraulic tank

(1) Breather

Inspect breather (1). If an oil film appears around the breather, replace the breather.

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.

i08066994

Light Emitting Diode Lamp (LED) - Replace

SMCS Code: 1434-510

1. Remove the electrical power from the light emitting diode (LED) lamp.
2. Disassemble the housing for the LED lamp to have access to the bulb.

Note: On some LED 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 LED lamps.

3. Remove the bulb from the LED lamp.
4. Install the replacement bulb in the LED lamp.

   If the bulb is a part of the lens assembly, install the replacement lens assembly in the LED lamp.
5. Reassemble the housing for the LED lamp. Ensure that any printing on the lens is oriented correctly for the LED lamp mounting position on the machine.
6. Reattach the electrical power to the LED lamp.
7. Check the LED lamp for proper operation.

Note: Consult your Cat dealer for additional information on LED lamps.

i08159724

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.

The use of hydraulic hammers shortens the life of hydraulic oil. If a hydraulic hammer is used, the maintenance interval is shortened, refer to Table 51 for the intervals.

Table 51

Percentage of Hammer Use	Oil Filter (Hydraulic Hammer) - Replace
50%	Every 250 service hours
100%	Every 100 service hours

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

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.

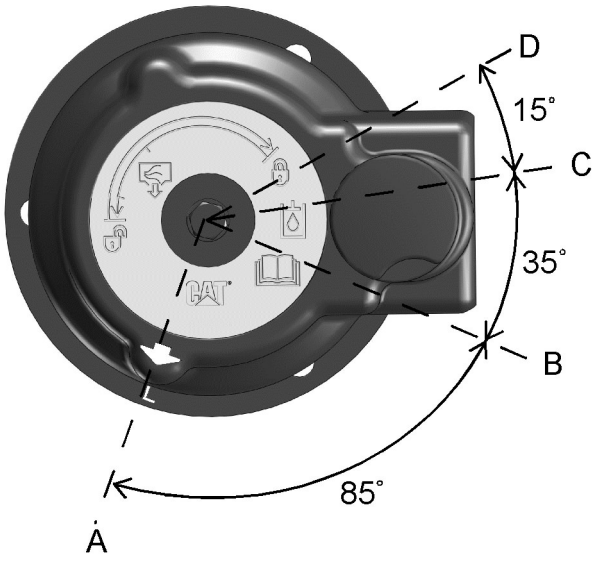


Illustration 611 g06184990

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 611 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.

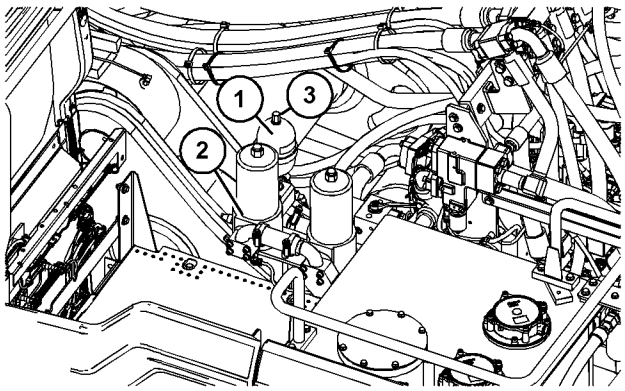


Illustration 612 g06589973

(1) Filter case
(2) Filter base
(3) Plug

8. Position a suitable container in order to contain the oil.

Note: Refer to“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.

11. Remove the used filter element from filter base (2).

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.

14. Assemble filter case (1). Tighten the nut on the filter case to a torque of 100 ± 10 N·m (74 ± 7 lb ft).

15. Remove plug (3) and inspect O-ring for damage. Replace the O-ring if necessary. Tighten plug (3) to a torque of 13 ± 2 N·m (115 ± 18 lb in)

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 “Hydraulic System Oil Level - Check“.

i07349186

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris



Illustration 613 g06224663

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 from steel parts and on cast iron parts.

Nonferrous metals can indicate wear from 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 debris could be caused by friction and by normal wear. Consult your Cat dealer 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.

i05038510

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.

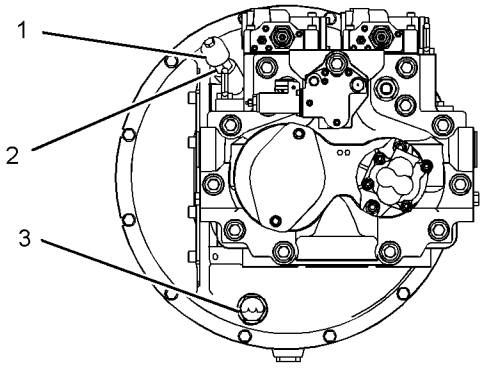


Illustration 614 g02651936

(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 once the engine has been stopped for at least 15 minutes.

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

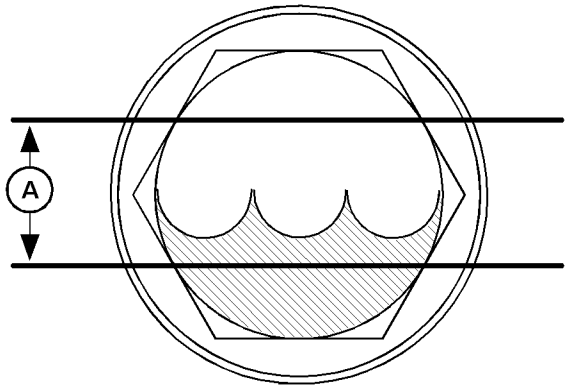


Illustration 615 g03208836

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.

i07660361

Radiator, Aftercooler and Oil Cooler Cores - Clean

SMCS Code: 1063-070-KO; 1353-070-KO; 1374-070-KO

1. Open the rear access door's on the left side of the machine.

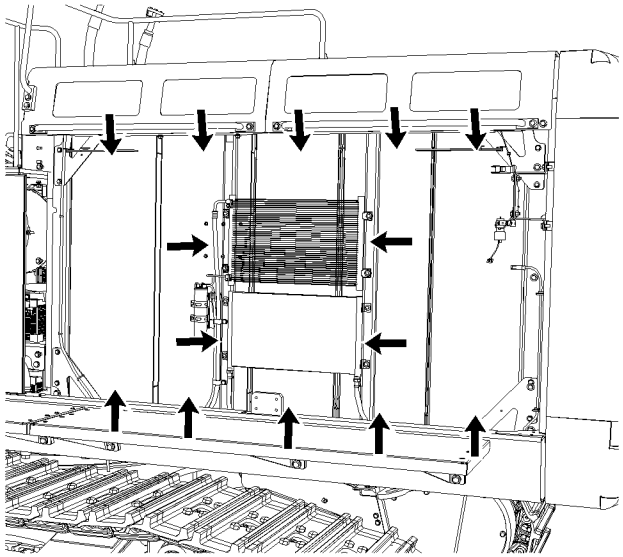


Illustration 616 g03390696

2. Check all the core fins for debris.

3. Remove dust and debris from all 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 rear access door's on the left side of the machine.

i08192239

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.

Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, “Prepare the Machine for Maintenance”.

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

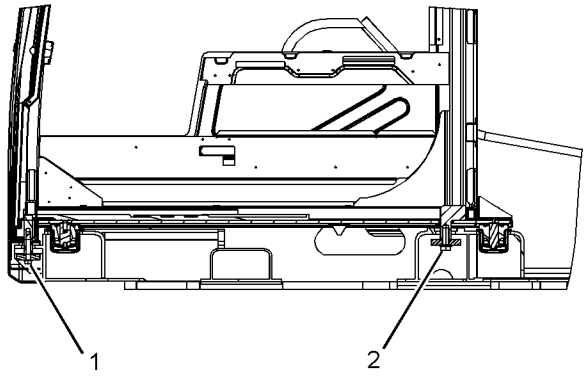


Illustration 617 g02008734

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”

i07103309

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.

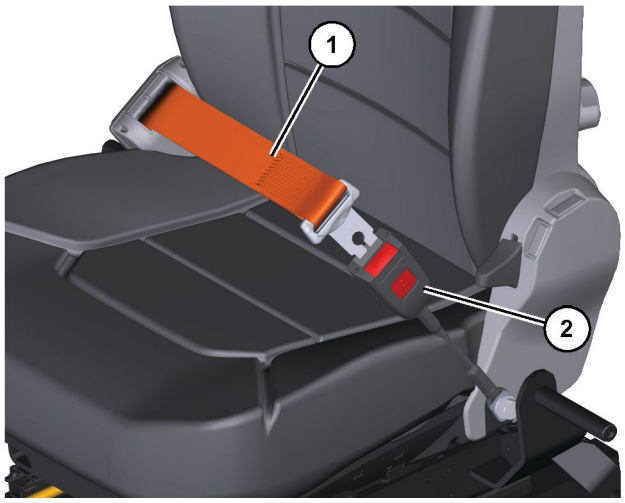


Illustration 618 g06224278

Typical example

Inspect buckle (2) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (1) 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).

i06970675

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 the belt within 3 years from the year of manufacture as indicated on the belt webbing label, buckle housing, or installation tags (non-retractable belts).

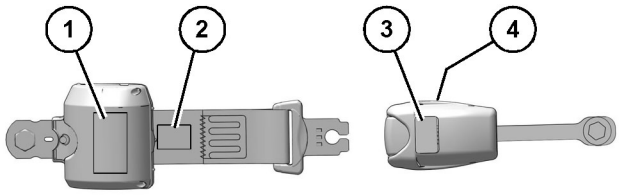


Illustration 619 g06183390

(1) Date of installation (retractor)
(2) Year of manufacture (tag) (fully extended web)
(3) Date of installation (buckle)
(4) Year of manufacture (underside) (buckle)

Consult your Cat dealer for the replacement of the seat belt and the mounting hardware.

Determine the age of a new seat belt before installing on seat. A manufacture label is on the belt webbing and imprinted on the belt buckle. Do not exceed the install by date on the label.

A 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.

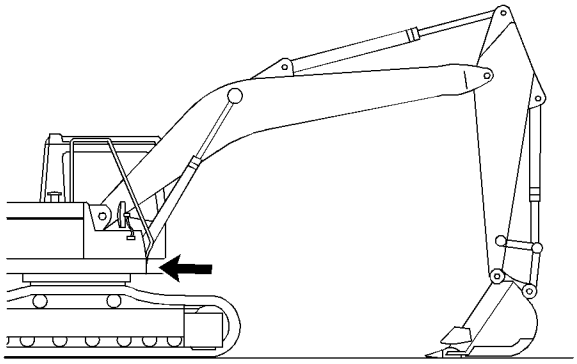


Illustration 620 g02110713

The swing bearings are under the base of the boom.

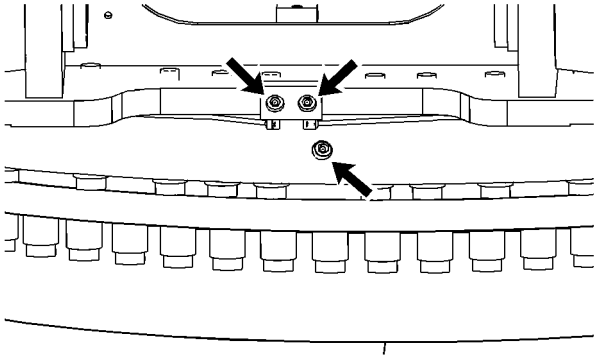


Illustration 621 g01106319

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

i08205744

Swing Drive Oil - Change

SMCS Code: 5459-044

Drain the Swing Drives

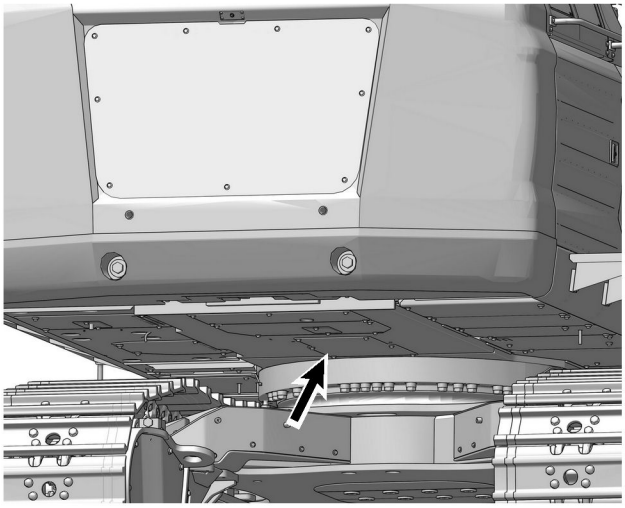


Illustration 622 g06589169

1. Remove the access cover that is located under the machine, near the swing gear.

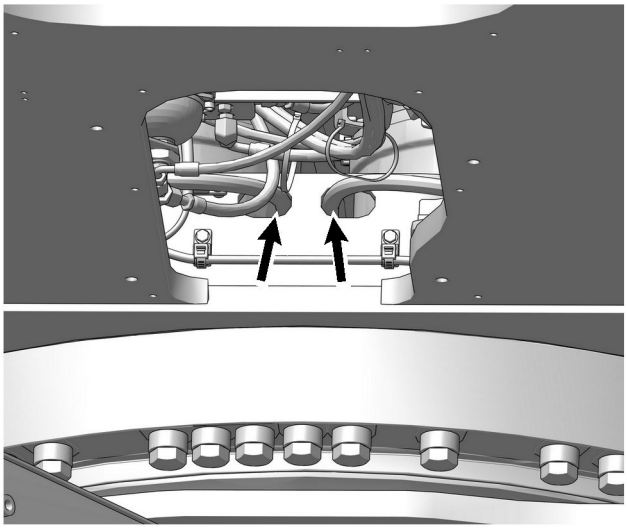


Illustration 623 g06589181

2. Pull out the ends of the drain hoses from the upper frame. Face the ends of the hoses toward the container.

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

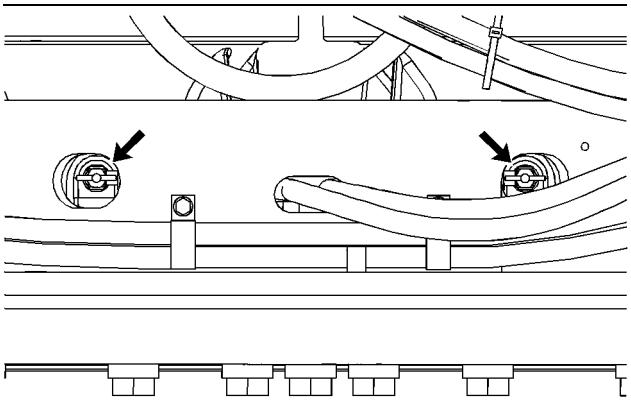


Illustration 624 g01131534

3. Reach through the access holes and open the drain valves. Drain the oil into a suitable container.

Note: Dispose of drained fluids according to local regulations.

4. Tighten the drain valves.

5. Return the ends of the drain hoses to the upper frame. Make sure that the ends of the hoses are facing upward.

6. Install the access cover.

Refill the Swing Drives

Note: Perform this procedure for each swing drive.

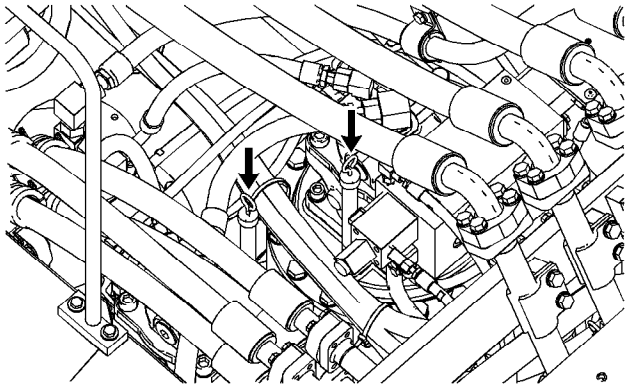


Illustration 625 g01100385

1. Remove the dipstick.

2. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, “Capacities (Refill)”.

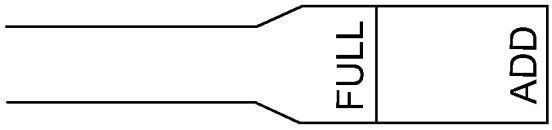


Illustration 626 g01106973

3. Make sure that the oil level is maintained between the marks on the dipstick.

4. 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.

i08205473

Swing Drive Oil Level - Check

SMCS Code: 5459-535-FLV

The dipstick for the swing drive oil is on the swing drive near the right rear corner of the cab.

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.

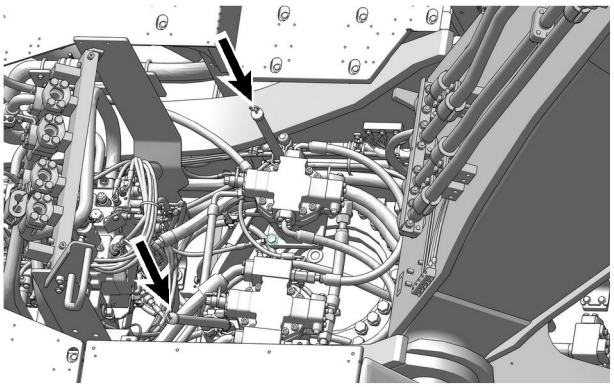


Illustration 627 g06588579

1. Remove the dipstick.

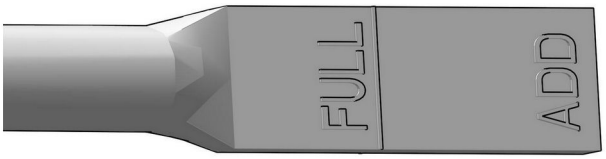


Illustration 628 g06588627

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 marks on the dipstick. Add oil through the dipstick tube, if necessary.

3. Insert the dipstick.

4. Check the dipstick again.

5. Reinsert the dipstick.

i08205445

Swing Drive Oil Sample - Obtain

SMCS Code: 5459-554-OC; 5459-008-OC; 5459-OC; 5459-008; 7542-008

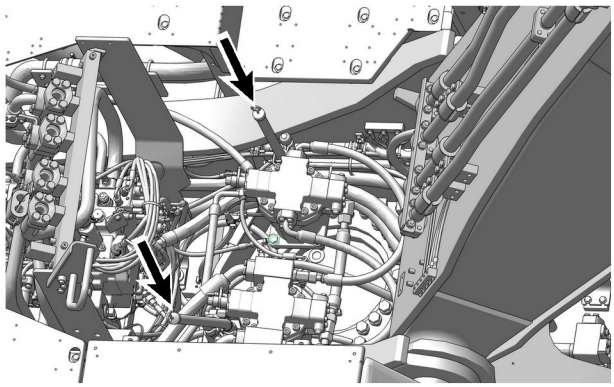


Illustration 629 g06588579

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.

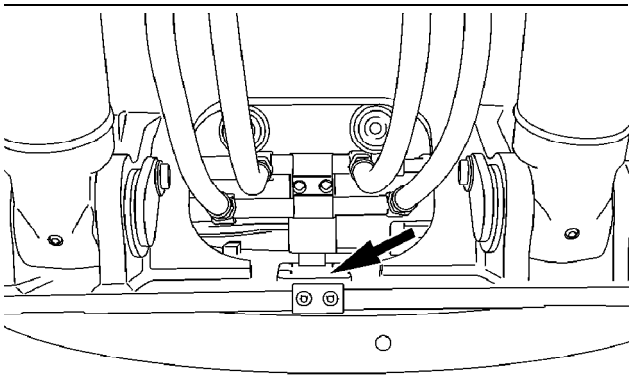


Illustration 630 g00834990

Remove the inspection cover that is located near the boom base. Inspect the grease.

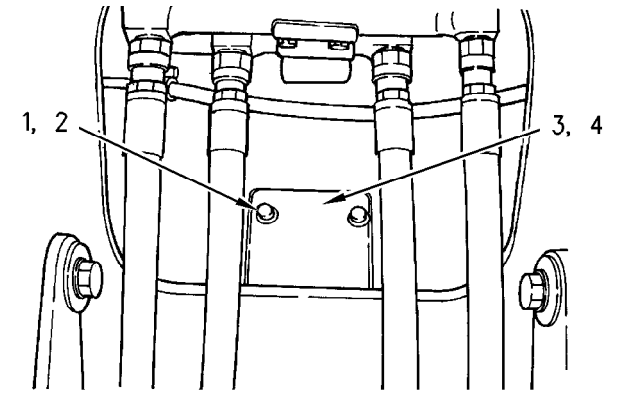


Illustration 631 g00688056

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).

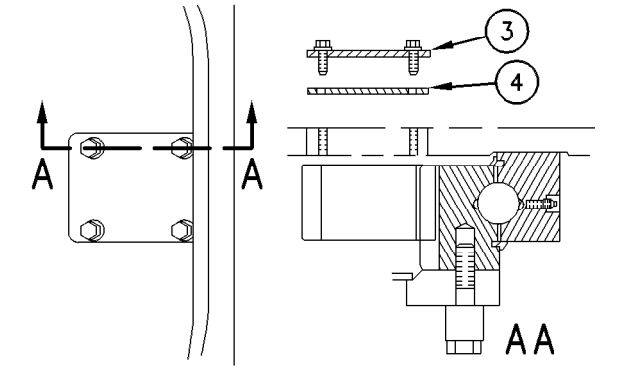


Illustration 632 g00115464

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.

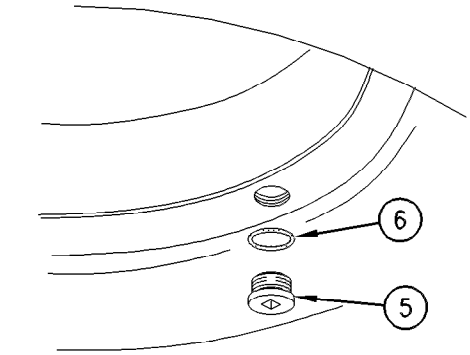


Illustration 633 g00101653

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.

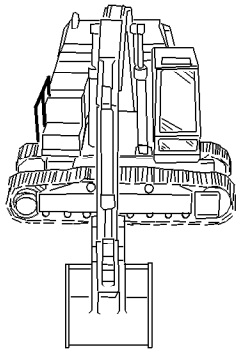


Illustration 634 g00101644

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.

i08159705

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.

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

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.

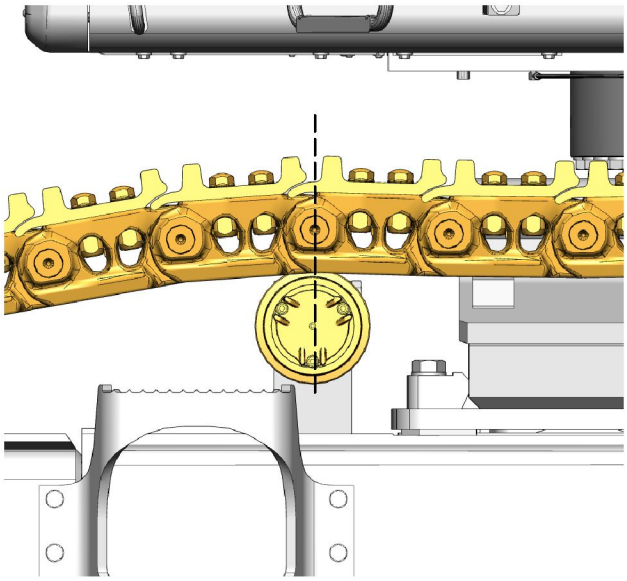


Illustration 635 g06545100

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.

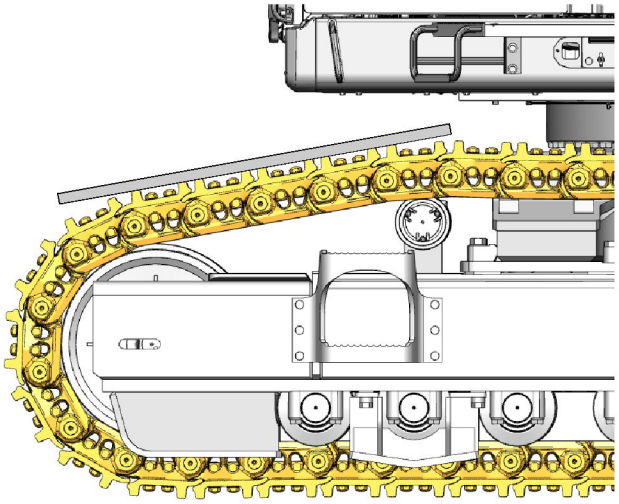


Illustration 636 g06545118

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

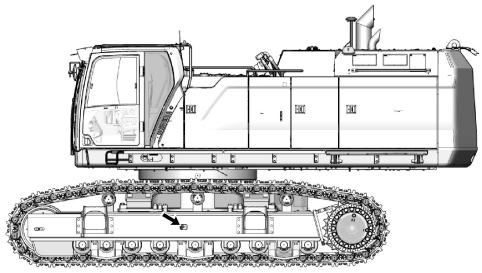


Illustration 637 g06545107

Typical example

The track adjuster is located on the track frame.

Tightening the Track

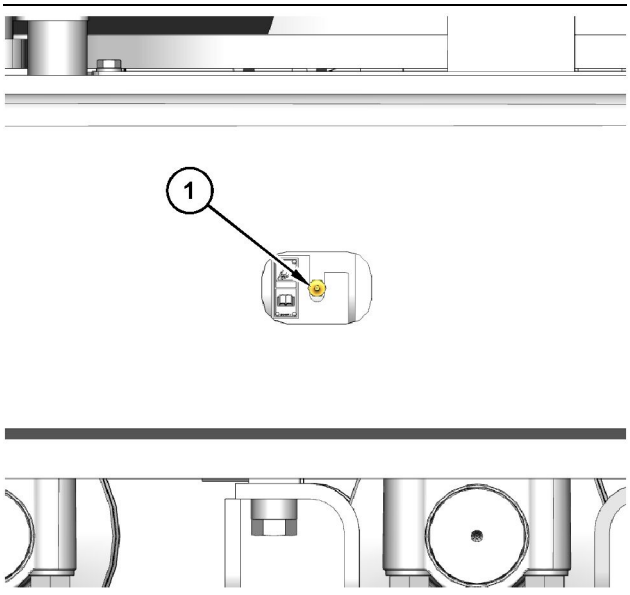


Illustration 638 g06545114

(1) Grease fitting

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

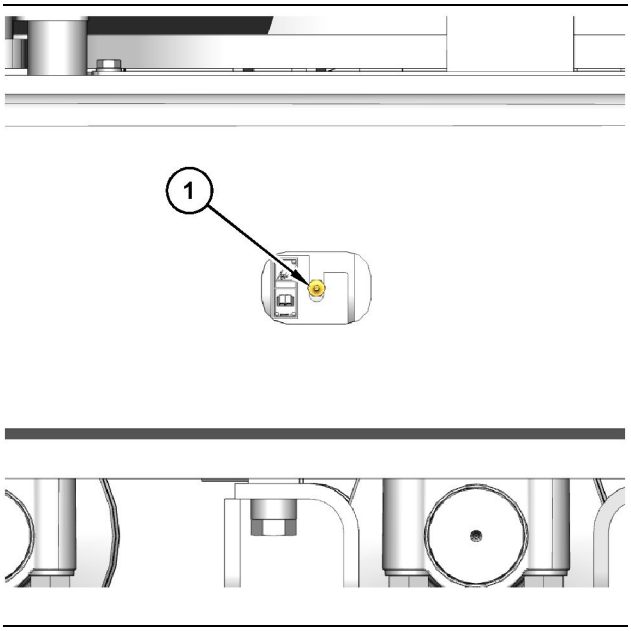


Illustration 639 g06545114

(1) Grease fitting

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.

i08159704

Track Adjustment - Inspect

SMCS Code: 4170-040

Prepare the machine for maintenance. Refer to “Prepare the Machine for Maintenance“.

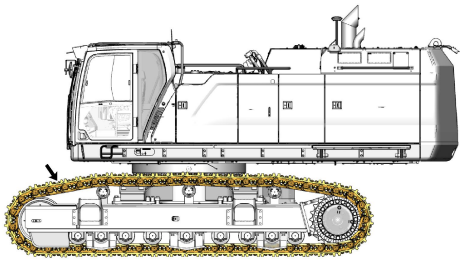


Illustration 640 g06545088

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 “Track Adjustment - Adjust“.

i06954313

Travel Alarm - Test
(If Equipped)

SMCS Code: 7429-081

Move the machine to test the travel alarm.

1. Start the engine. Move the hydraulic lockout control to the UNLOCKED position.

2. Raise the work tool to avoid any obstacles. Make sure that there is adequate overhead clearance.

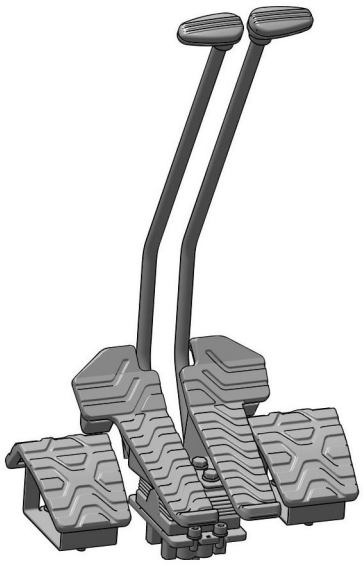


Illustration 641 g06181402

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 to stop the machine.

5. Use the travel levers and the travel pedals to move the machine backward. The travel alarm should sound.



Illustration 642 g06181631

6. Press the alarm mute button. 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.

i08233399

Undercarriage - Check

SMCS Code: 4150-535

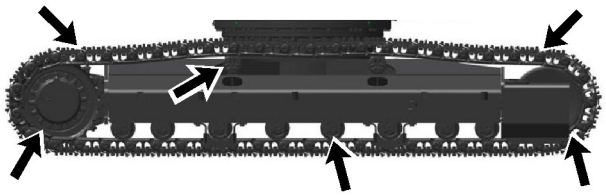


Illustration 643 g06182923

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 required, clean the undercarriage to keep excess material from building up and solidifying.

5. If abnormal wear exists or abnormal noises or leaks are found, consult your Cat ® 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.

i03754181

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 rear access door on the left side of the machine.

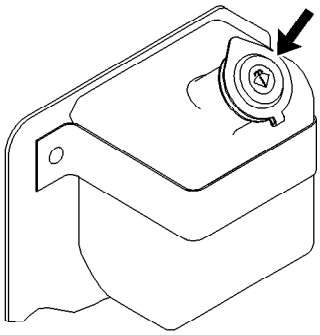


Illustration 644 g00688996

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: 7305-040; 7305-510

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i07103291

Windows - Clean

SMCS Code: 7310-070; 7340-070

Clean the outside of the windows from the ground, unless handholds are available.



Illustration 645 g06224268
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 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 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

i08375716

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 and operating environment 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

i08292374

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

i08292382

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

Improperly disposing of waste can threaten the environment. Obey all local regulations for the decommissioning and disposal of materials.

Utilize appropriate personal protective equipment when decommissioning and disposing product.

Consult the nearest Cat dealer for additional information. Including information for component remanufacturing and recycling options.

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____



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