



Operation and Maintenance Manual

345 GC Excavator

HYR 1-UP (345 GC)
KEF 1-UP (345 GC)

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:

*** XXX 0789BG 6SL12345 ***

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).

Where:

1. World Manufacturing Code (characters 1-3)

Safety Section

i08071127

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.

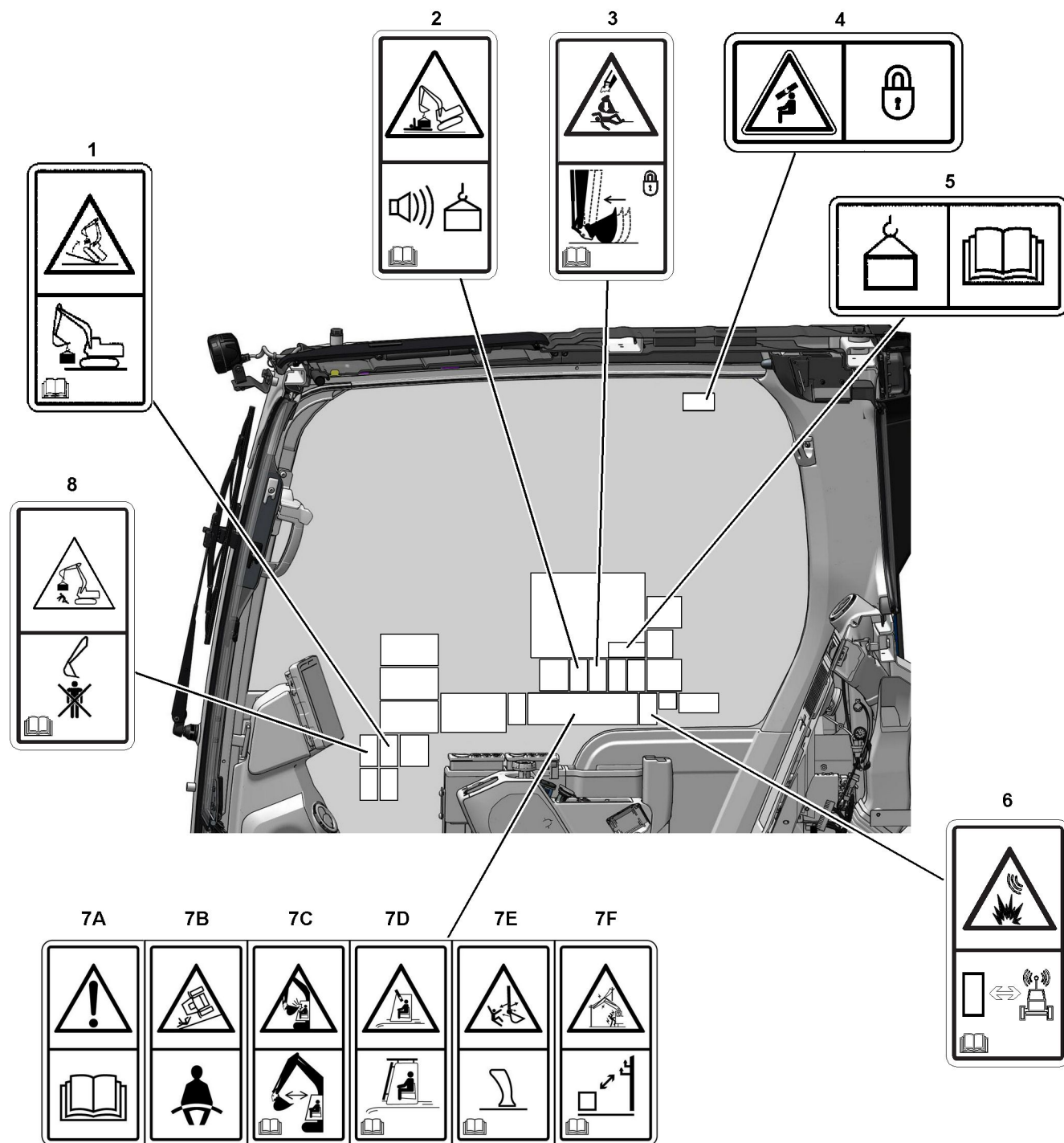


Illustration 2

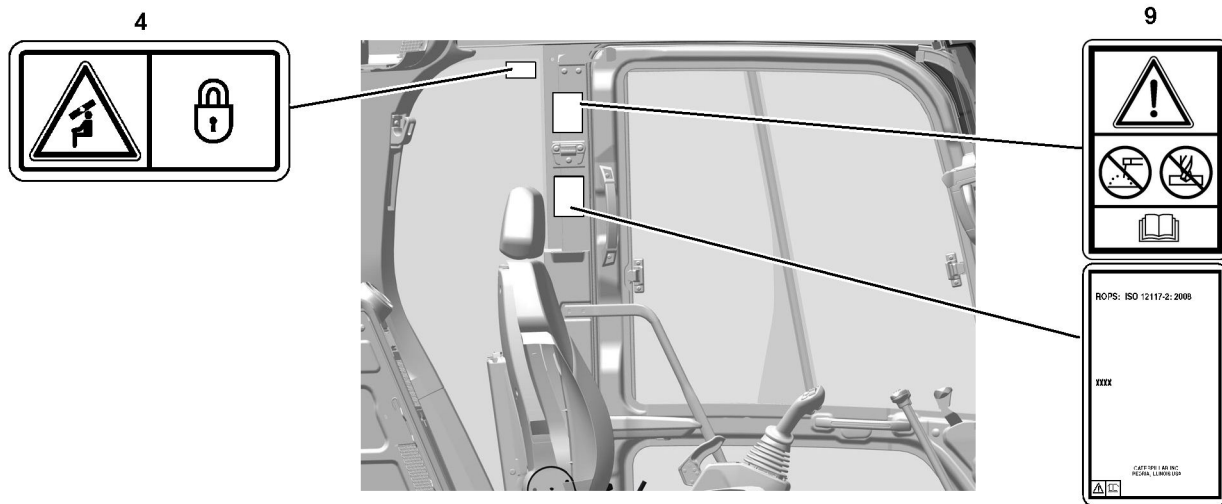


Illustration 3

g06353340

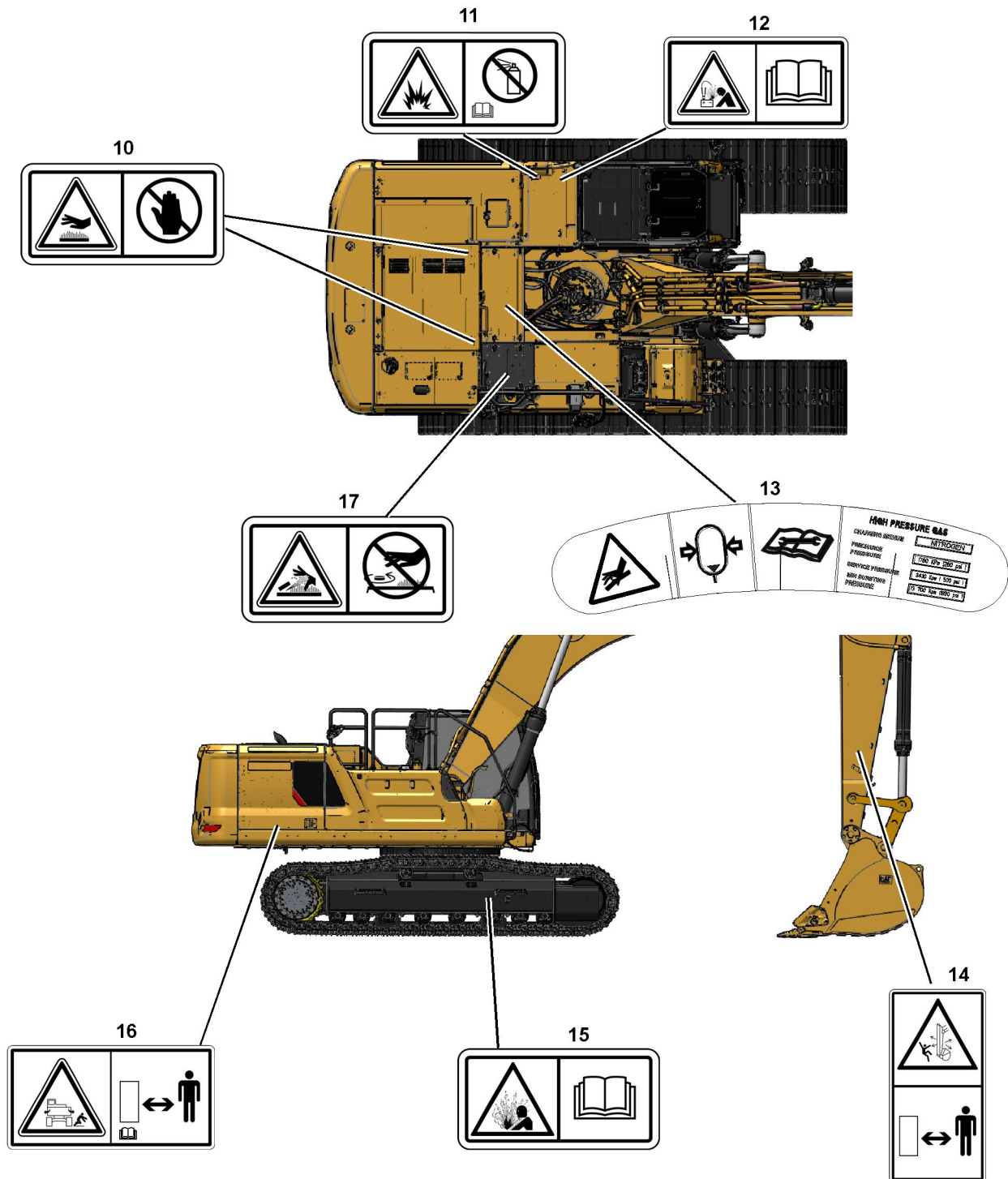


Illustration 4

g06353351

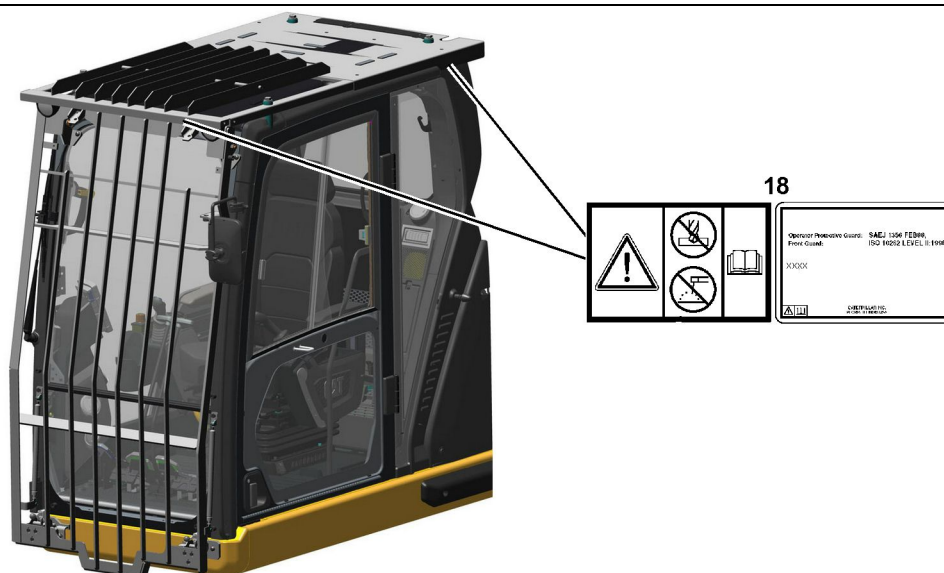


Illustration 5

g06353353

Lifting Level Warning (1)

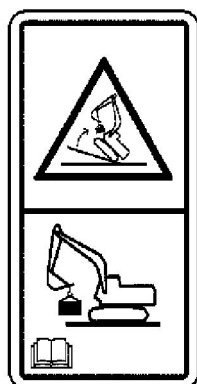


Illustration 6

g06289488

Overload Warning Device (2)

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

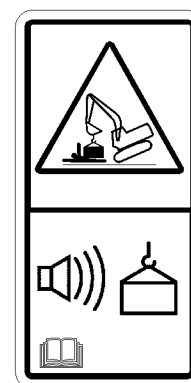


Illustration 7

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.

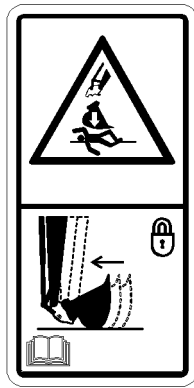


Illustration 8

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.

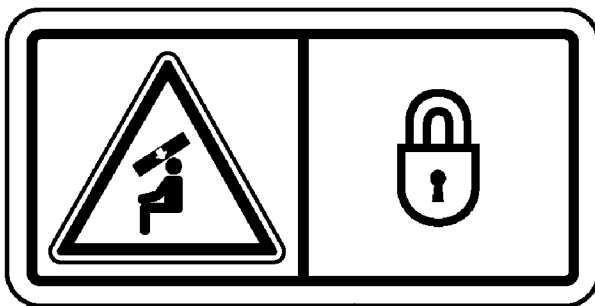


Illustration 9

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.

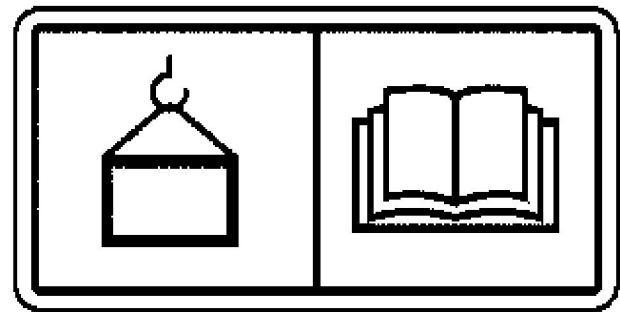


Illustration 10

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.

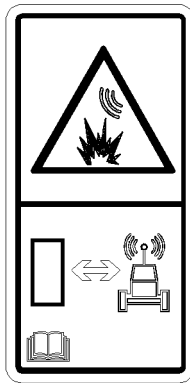


Illustration 11

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.

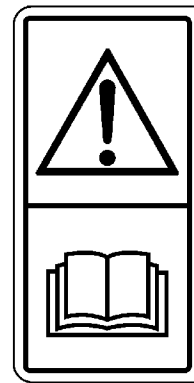


Illustration 12

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.

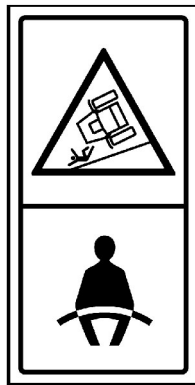


Illustration 13

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.

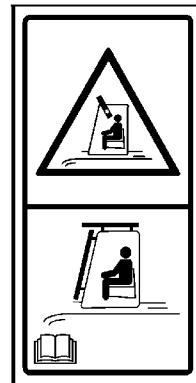


Illustration 15

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.

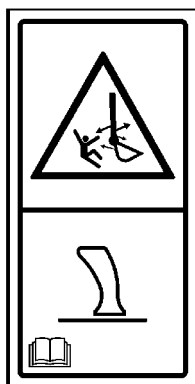


Illustration 16

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.

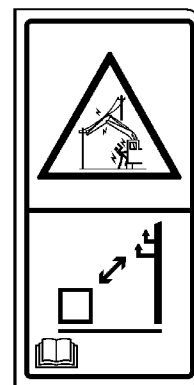


Illustration 17

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.

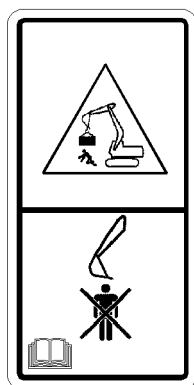


Illustration 18

g06188697

Do not lift

Do Not Weld or Drill on ROPS (9)

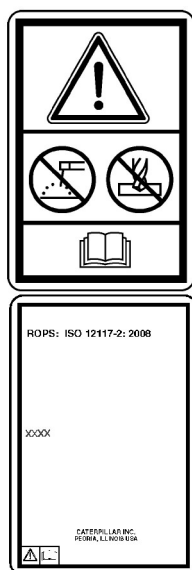


Illustration 19

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 on the 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.

Jump-Start Cables (12)

This safety message is positioned on the circuit breaker panel.

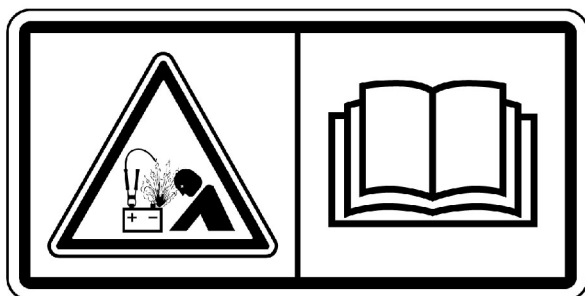


Illustration 22

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 (13)

This safety message is positioned on the accumulator.

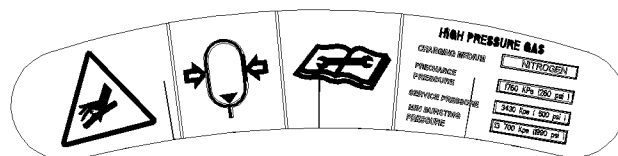


Illustration 23

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 (14)

This safety message is on both sides of the stick.

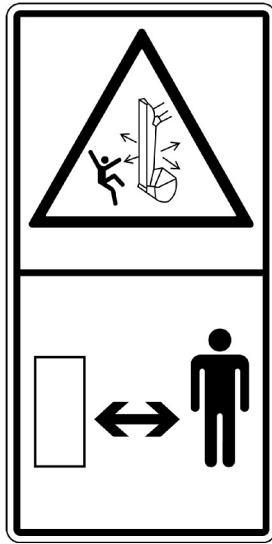


Illustration 24

g01385579

WARNING

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

Vapor Explosion (15)

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

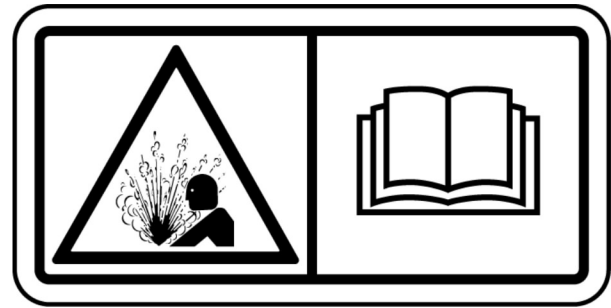


Illustration 25

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 (16)

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

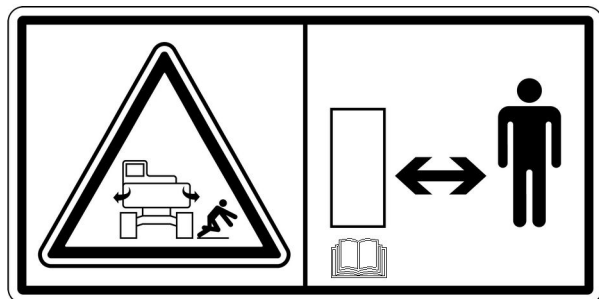


Illustration 26

g06219420

! WARNING

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

Relieve Hydraulic Tank Pressure (17)

This safety message is on top of the hydraulic tank.



Illustration 27

g01371640

! WARNING

Hot Fluid Under Pressure!

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

Falling Object Guard Structure (18)

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.

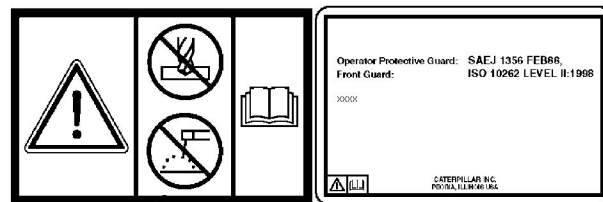


Illustration 28

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.

i08101145

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.

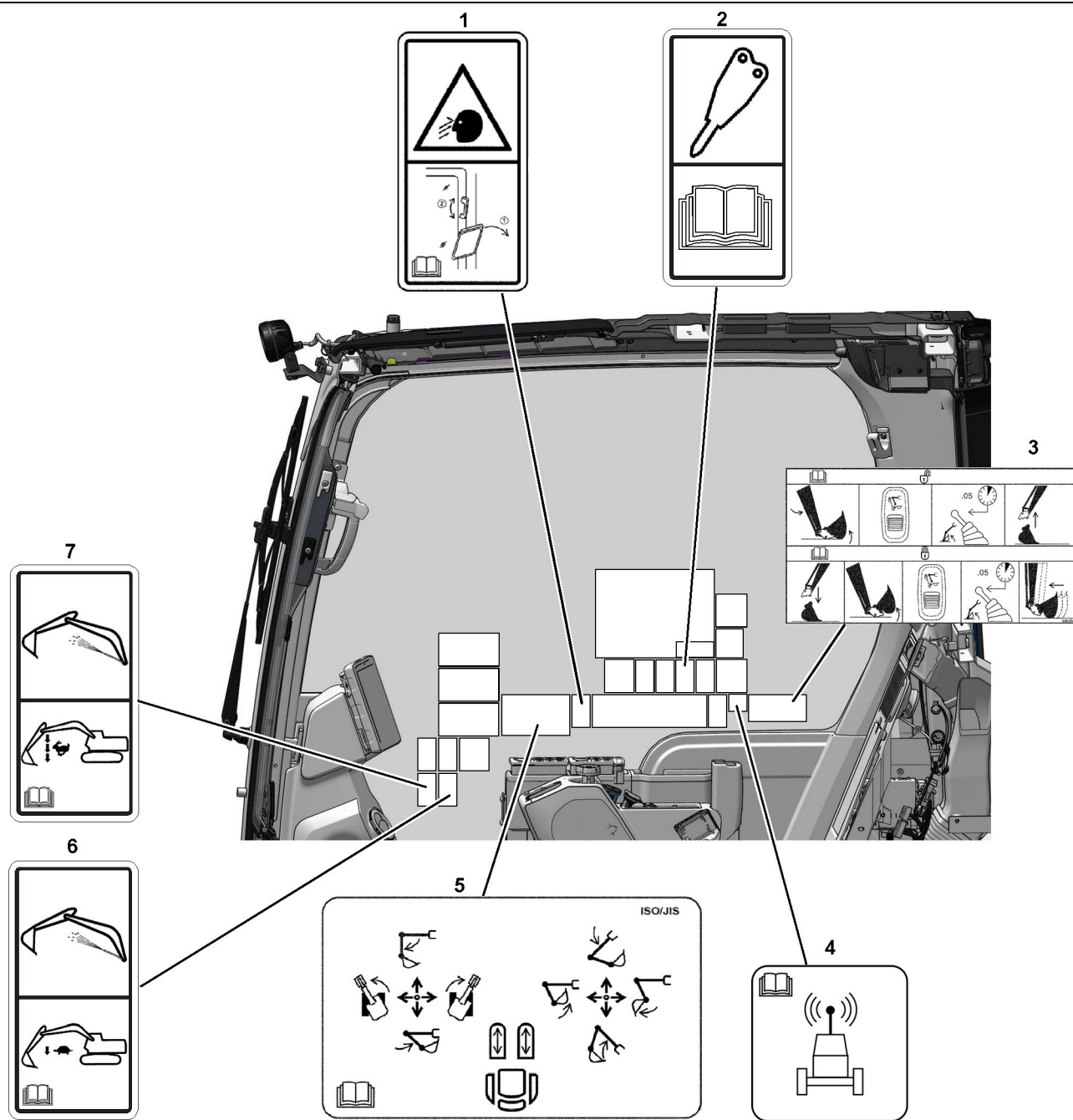


Illustration 29

g06353396

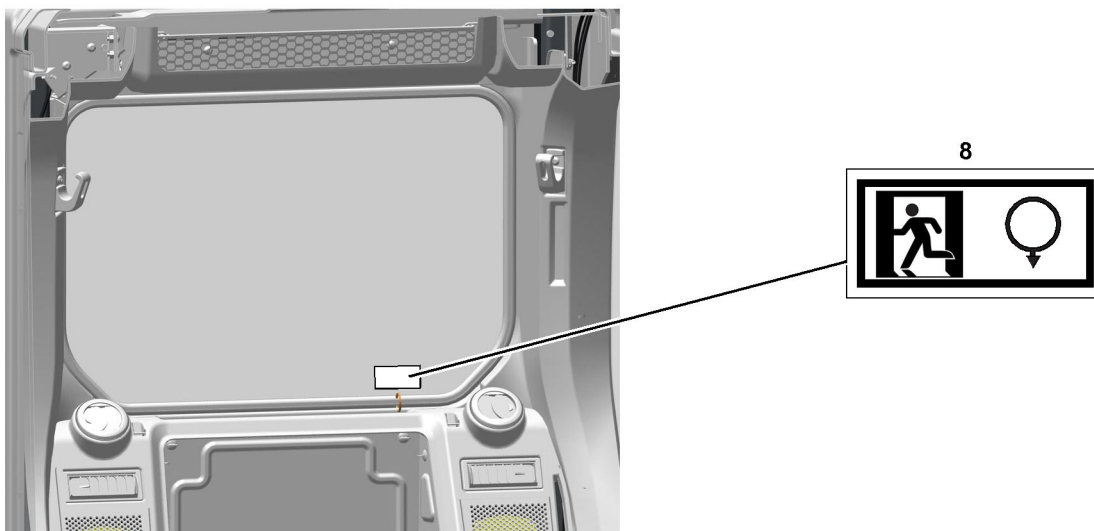


Illustration 30

g06353410

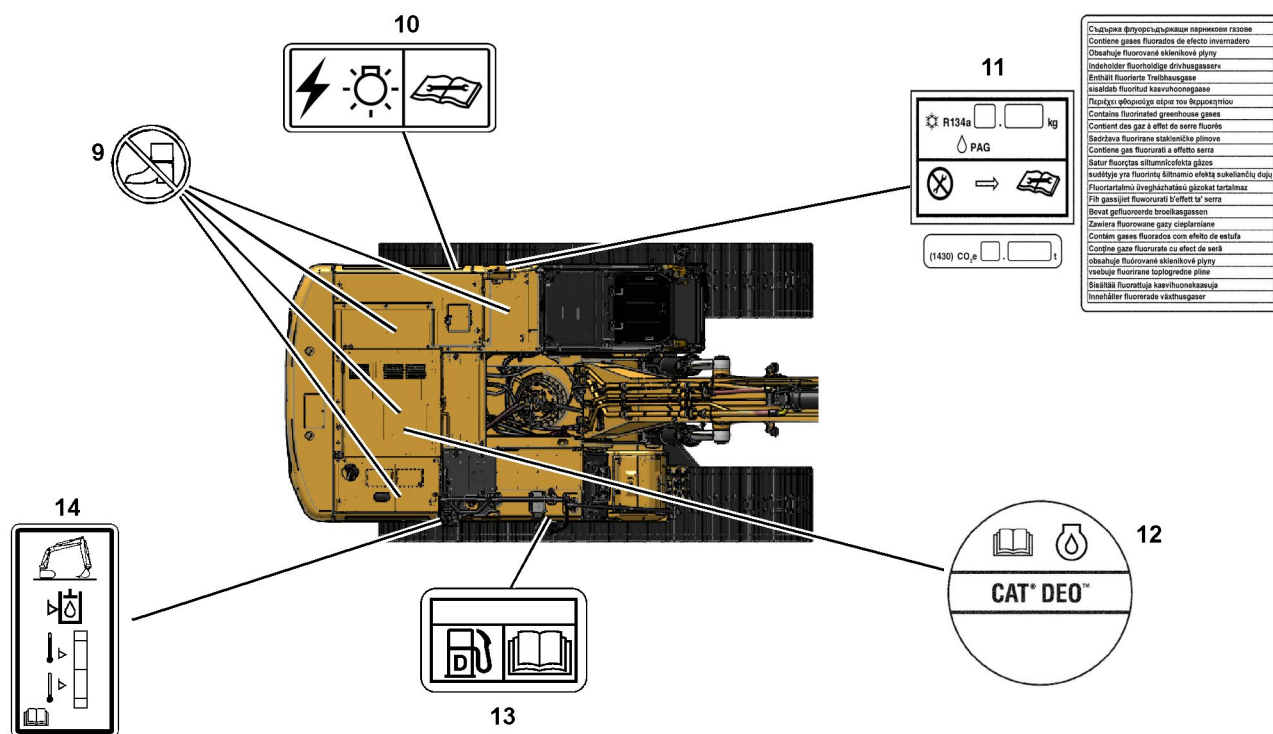


Illustration 31

g06543976

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.

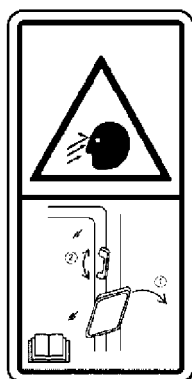


Illustration 32

g06214810

Hammer Operation (2)

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

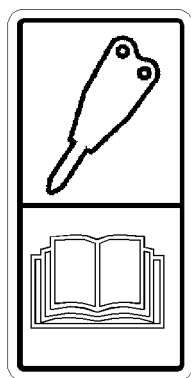


Illustration 33

g06189240

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

Also, see 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.

Quick Coupler Operations (3)

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

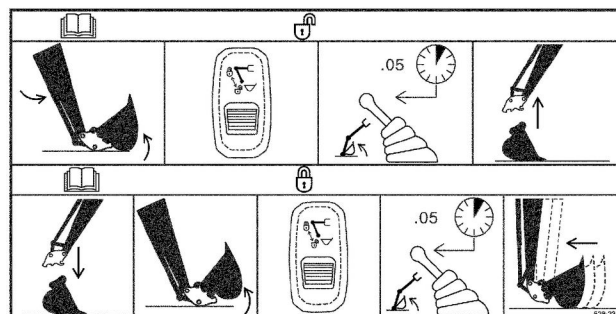


Illustration 34

g06353361

See Operation and Maintenance Manual, “Quick Coupler Operation” for instructions on quick coupler operation.

Data Privacy (4)

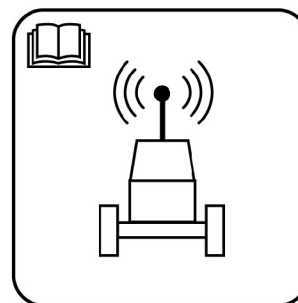


Illustration 35

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

Joystick Controls Alternate Patterns (5)

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

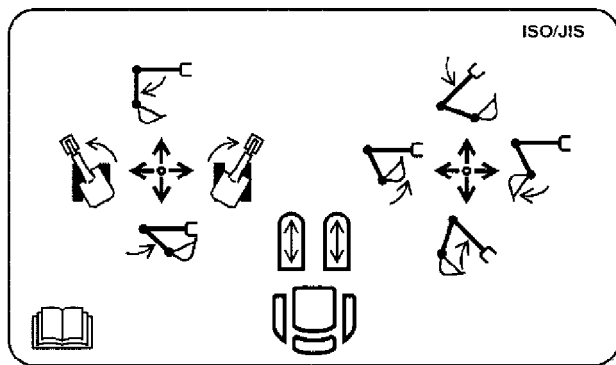


Illustration 36

g06214805

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

Hose Burst Protection (Equipped) (6)

This message is on the window on the right side of the cab if the machine is equipped with Hose Burst Protection Valves.

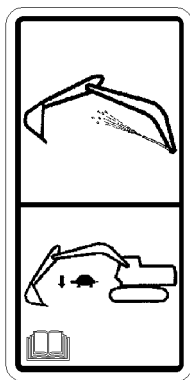


Illustration 37

g06189238

Hose Burst (Not Equipped) (7)

This message is on the window on the right side of the cab if the machine is not equipped with Hose Burst Protection Valves.



Illustration 38

g06189239

Alternate Exit (8)

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

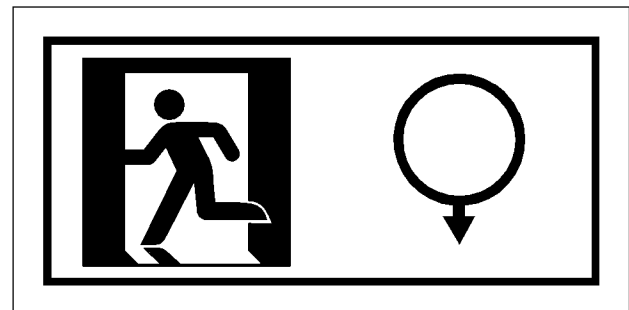


Illustration 39

g06189112

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

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

No Step (9)

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

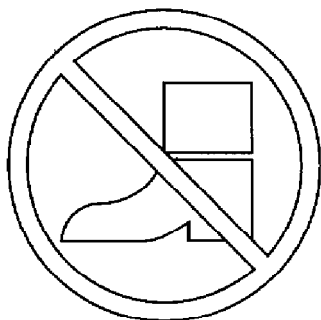


Illustration 40

g00911158

Do not step in this area.

DEF Purge Indicator Lamp (10)

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

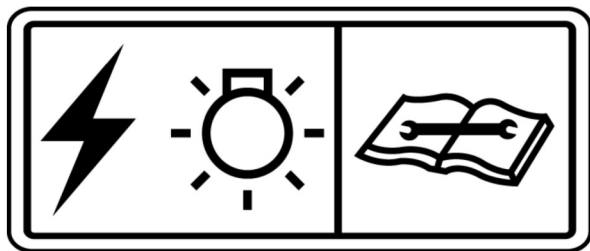


Illustration 41

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 (11)

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

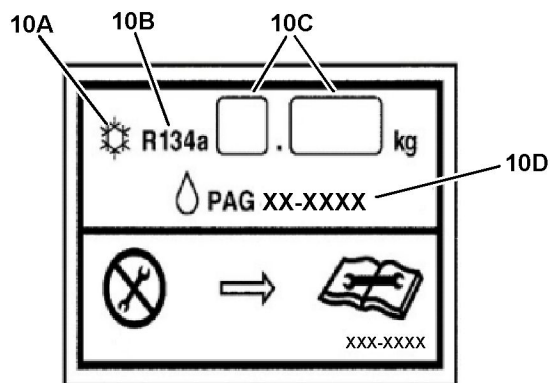


Illustration 42

g06214936

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

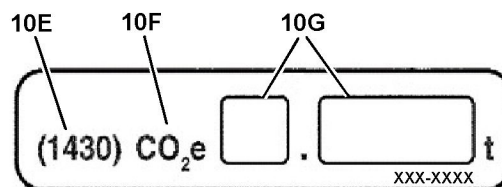


Illustration 43

g06214938

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

- (10E) (1430) - The Global Warming Potential of R134a
- (10F) CO₂ equivalent
- (10G) The system contains 1.430 metric tonne of CO₂ equivalent

10H

Съдържа флуорсъдържащи парникови газове
Contiene gases fluorados de efecto invernadero
Obsahuje fluorované skleníkové plyny
Indeholder fluorholdige drivhusgasser
Enthält fluorierte Treibhausgase
sisaldab fluoritud kasvihuonegaase
Περιέχει φθοριούχα αέρια του θερμοκηπίου
Contains fluorinated greenhouse gases
Contient des gaz à effet de serre fluorés
Sadržiava fluorirane stakleničke plinove
Contiene gas fluorurati a effetto serra
Satur fluorčtas siitumncefekta gāzes
sudėtyje yra fluorintų šiltnamio efektą sukeliančių dujų
Fuortartalmú üvegházhatású gázokat tartalmaz
Fih gassijiet fluorurati b'effett ta' serra
Bevat gefluoreerde broeikasgassen
Zawiera fluorowane gazy cieplarniane
Contém gases fluorados com efeito de estufa
Contine gaze fluorurate cu efect de seră
obsahuje fluórované skleníkové plyny
vsebuje fluorirane toplogredne pline
Sisältää fluorattuja kasvihuonekaasuja
Innehåller fluorerade växthusgaser

Illustration 44

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 (12)

This message is on top of the engine.

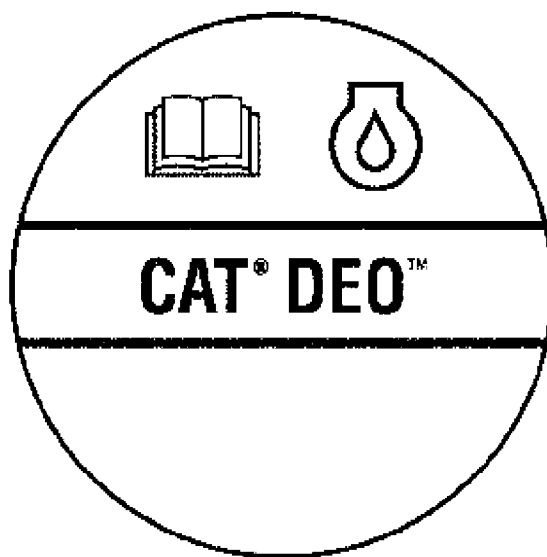


Illustration 45

g06217215

Refer to Operation and Maintenance Manual, "Lubricant Viscosities".

Diesel Fuel Requirements (13)

This message is located by the fuel tank.

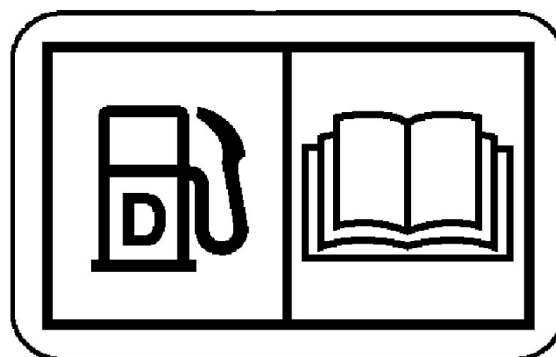


Illustration 46

g03676438

Refer to Operation and Maintenance Manual, "Lubricant Viscosities".

Hydraulic Oil Level Check (14)

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

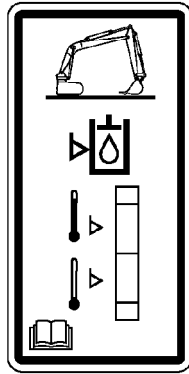


Illustration 47

g01069075

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

i07746355

General Hazard Information

SMCS Code: 7000

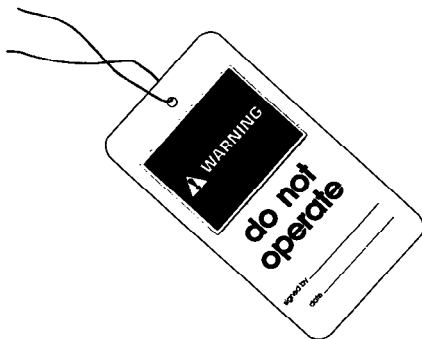


Illustration 48

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.

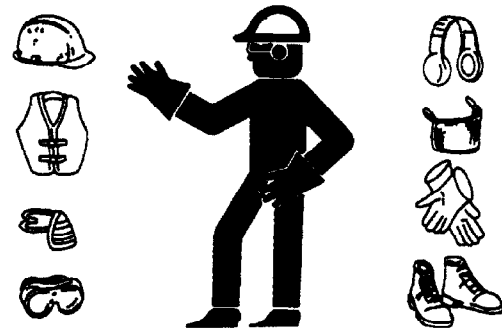


Illustration 49

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.

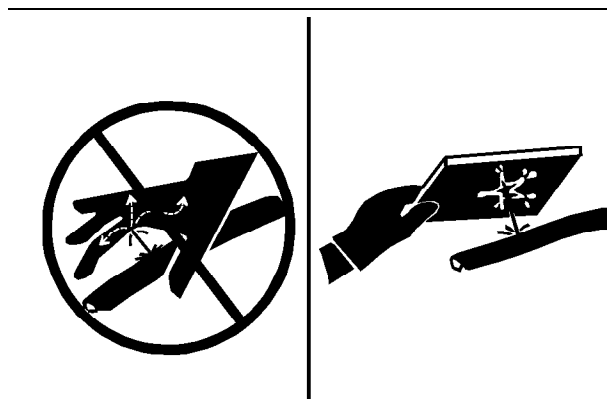


Illustration 50

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

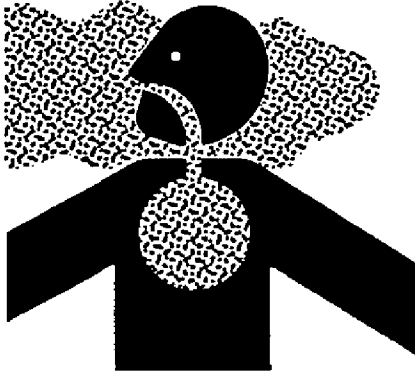


Illustration 51

g02159053

Exhaust

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

Asbestos Information

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

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

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

- Never use compressed air for cleaning.
- Avoid brushing materials that contain asbestos.
- Avoid grinding materials that contain asbestos.
- Use a wet method in order to clean up asbestos materials.
- A vacuum cleaner that is equipped with a high efficiency particulate air filter (HEPA) can also be used.

- Use exhaust ventilation on permanent machining jobs.
- Wear an approved respirator if there is no other way to control the dust.
- Comply with applicable rules and regulations for the work place. In the United States, use Occupational Safety and Health Administration (OSHA) requirements. These OSHA requirements can be found in "29 CFR 1910.1001". In Japan, use the requirements found in the "Ordinance on Prevention of Health Impairment due to Asbestos" in addition to the requirements of the Industrial Safety and Health Act.
- Obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

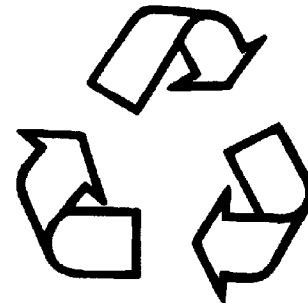


Illustration 52

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.

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.

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.

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 53

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 54

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 55

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

Safety Section

Fire Prevention and Explosion Prevention

- 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.

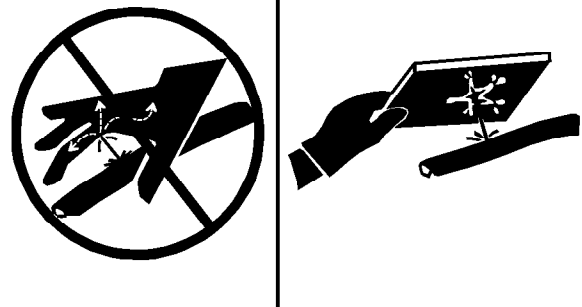


Illustration 56

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.

i07045544

Fire Extinguisher Location

SMCS Code: 7000; 7419

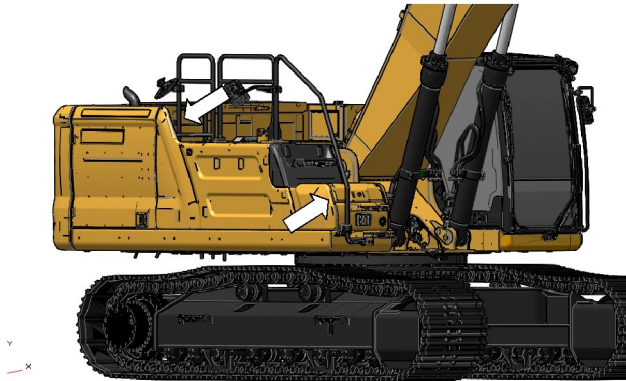


Illustration 57

g06207808

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.

High Pressure Fuel Lines

SMCS Code: 1000; 1274; 7000

i02546320

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.

i08253367

Restricted Visibility

SMCS Code: 7000

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

Illustrations 58 - 60 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 61 shows the position of the work tool in the travel position. The Caterpillar authorized work tool that resulted in the largest visibility restriction was used.

Illustration 58 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.

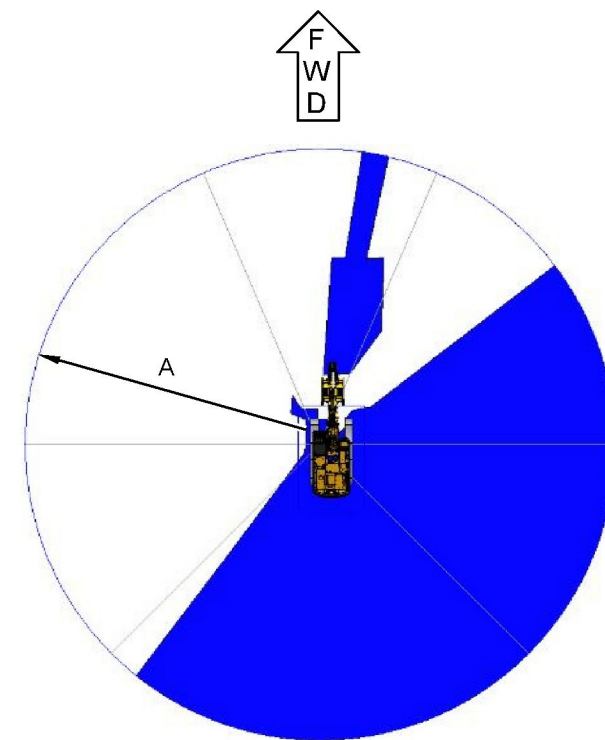


Illustration 58

g06382358

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

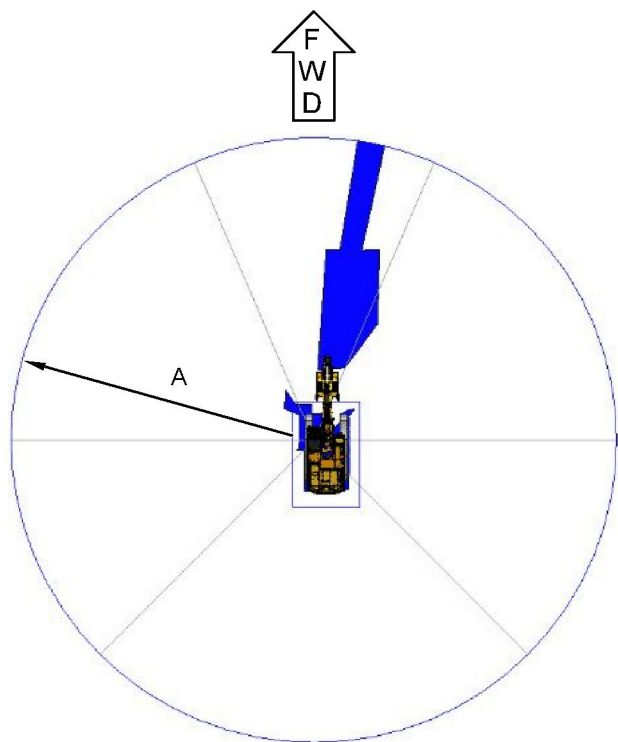


Illustration 59

g06382366

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

(A) 24 m (79 ft)

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

Illustration 60 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.

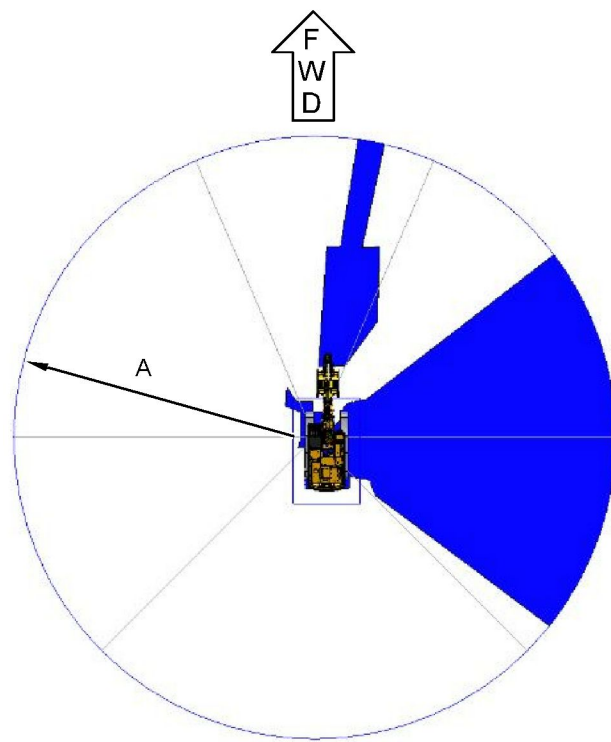


Illustration 60

g06382378

Top view of the machine, ground level visibility with available Rear camera, left side cab mirror, and right hand tank mirror.

(A) 24 m (79 ft)

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

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 61 shows the machine in the travel position.

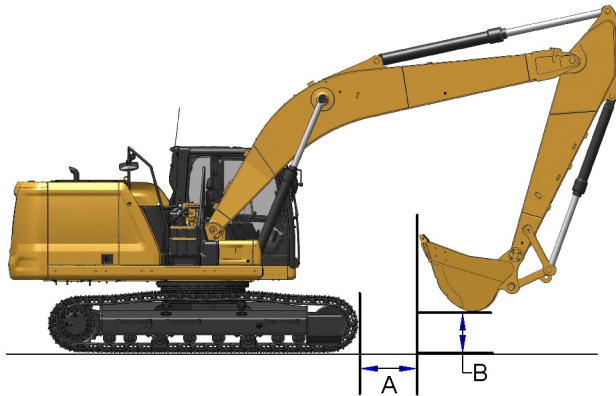


Illustration 61

g06181081

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

i03562260

Engine Starting

SMCS Code: 1000; 7000

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

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

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

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

Briefly sound the horn before you start the engine.

i01340061

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

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

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

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

Fasten the seat belt securely.

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

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

i04159629

Work Tools

SMCS Code: 6700

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

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

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

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

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

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

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

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

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

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

Never use the work tool for a work platform.

i07889511

Operation

SMCS Code: 7000

Machine Operating Temperature Range

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

Limiting Conditions and Criteria

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

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

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

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

Critical Failures

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

Safety Section
Operation

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

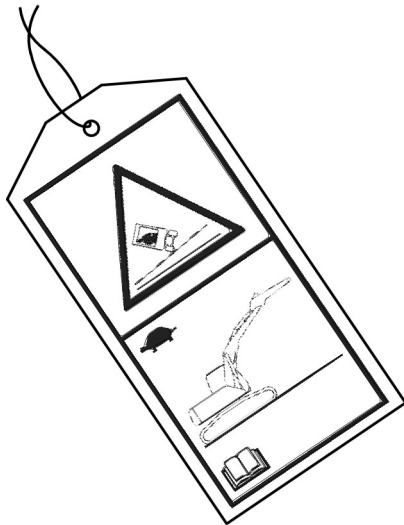


Illustration 62

g02202544

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

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

i06299648

Engine Stopping

SMCS Code: 1000; 7000

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

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

i06589158

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.

i07538717

Parking

SMCS Code: 7000

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

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

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

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

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



Illustration 63

g06289631

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 ring to the OFF position or press button to stop engine.

Turn the battery disconnect switch to the OFF position.

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

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

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

i07746366

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.

i08229294

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.

i08172870

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 107 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 107 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.

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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.

Guards (Operator Protection)

SMCS Code: 7000; 7150

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

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

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

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

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

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

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

Other Guards (If Equipped)

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

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

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

- Demolition applications
- Rock quarries
- Forestry products

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

Product Information Section

General Information

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Specifications

SMCS Code: 7000

Intended Use

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

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 "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.

The operator station is ROPS certified up to a mass of 45835 kg (101049 lb) per ISO 12117-2:2008.

Specification Data

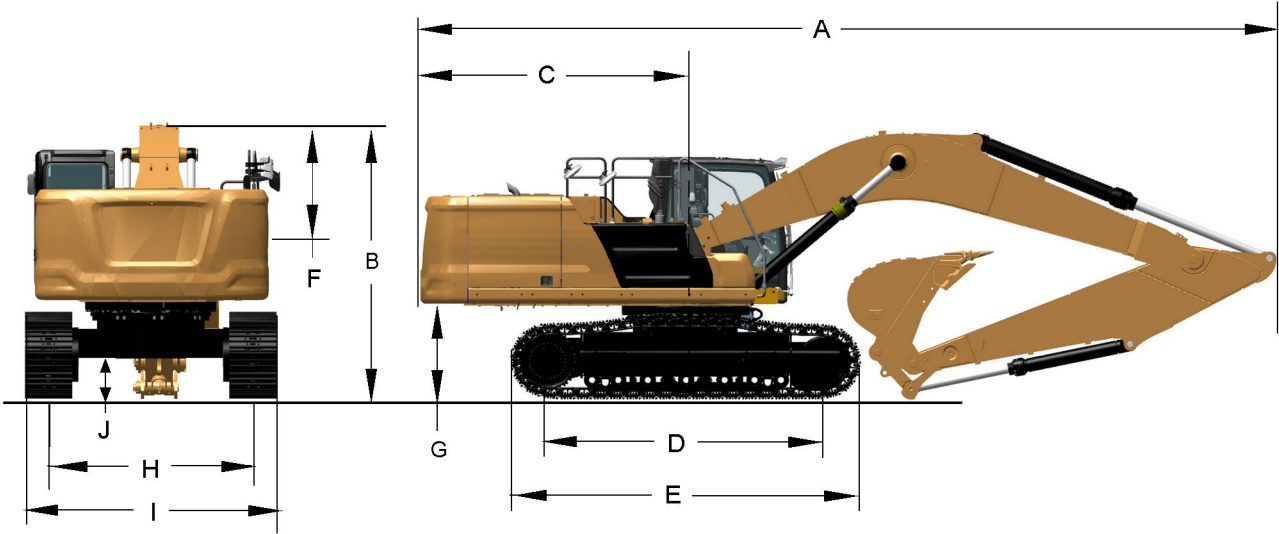


Illustration 64

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Table 3

345 GC Excavators				
Boom	6.9 m (22 ft 8 inch) HD Reach Boom		6.55 m (22 ft 6 inch) Mass Boom	
Stick	3.35 m (11 ft 0 inch)	2.9 m (9 ft 6 inch)	3.0 m (9 ft 10 inch)	2.55 m (8 ft 4 inch)
Bucket	2.41 m ³ (3.15 yd) ³	2.41 m ³ (3.15 yd) ³	2.77 m ³ (3.62 yd) ³	2.77 m ³ (3.62 yd) ³
Operating Weight ⁽¹⁾ with 600 mm (24 inch) TG Track Shoes	41500 kg (91500 lb)	41400 kg (91300 lb)	42600 kg (93900 lb)	42400 kg (93500 lb)
Operating Weight ⁽¹⁾ with 600 mm (24 inch) DG Track Shoes	42200 kg (93000 lb)	42200 kg (93000 lb)	43300 kg (95500 lb)	43200 kg (95200 lb)
Operating Weight ⁽¹⁾ with 600 mm (24 inch) TG HD Track Shoes	42100 kg (92800 lb)	42100 kg (92800 lb)	43200 kg (95200 lb)	43100 kg (95000 lb)
Operating Weight ⁽¹⁾ with 700 mm (28 inch) TG Track Shoes	41800 kg (92200 lb)	41800 kg (92200 lb)	42900 kg (94600 lb)	42800 kg (94400 lb)
Overall Length (A)	11600 mm (38 ft 1 inch)	11620 mm (36 ft 2 inch)	11300 mm (37 ft 1 inch)	11390 mm (37 ft 4 inch)
Overall Height (B)	3560 mm (11 ft 8 inch)	3660 mm (12 ft 0 inch)	4040 mm (13 ft 3 inch)	3990 mm (13 ft 1 inch)

(continued)

(Table 3, contd)

345 GC Excavators				
Boom	6.9 m (22 ft 8 inch) HD Reach Boom		6.55 m (22 ft 6 inch) Mass Boom	
Stick	3.35 m (11 ft 0 inch)	2.9 m (9 ft 6 inch)	3.0 m (9 ft 10 inch)	2.55 m (8 ft 4 inch)
Bucket	2.41 m³ (3.15 yd)³	2.41 m³ (3.15 yd)³	2.77 m³ (3.62 yd)³	2.77 m³ (3.62 yd)³
Swing Radius (C)	3530 mm (11 ft 7 inch)	3530 mm (11 ft 7 inch)	3530 mm (11 ft 7 inch)	3530 mm (11 ft 7 inch)
Length to Center of Rollers (D)	4040 mm (13 ft 3 inch)	4040 mm (13 ft 3 inch)	4040 mm (13 ft 3 inch)	4040 mm (13 ft 3 inch)
Length of Track (E)	5070 mm (16 ft 8 inch)	5070 mm (16 ft 8 inch)	5070 mm (16 ft 8 inch)	5070 mm (16 ft 8 inch)
Handrail Height (F)	3370 mm (11 ft 1 inch)	3370 mm (11 ft 1 inch)	3370 mm (11 ft 1 inch)	3370 mm (11 ft 1 inch)
Counterweight Clearance (G)	1300 mm (4 ft 3 inch)	1300 mm (4 ft 3 inch)	1300 mm (4 ft 3 inch)	1300 mm (4 ft 3 inch)
Track Gauge (H)	2740 mm (9 ft 0 inch)	2740 mm (9 ft 0 inch)	2740 mm (9 ft 0 inch)	2740 mm (9 ft 0 inch)
Overall Width (I) with 600 mm (24 inch) Track Shoe	3340 mm (11 ft 0 inch)	3340 mm (11 ft 0 inch)	3340 mm (11 ft 0 inch)	3340 mm (11 ft 0 inch)
Overall Width (I) with 700 mm (28 inch) Track Shoe	3440 mm (11 ft 3 inch)	3440 mm (11 ft 3 inch)	3440 mm (11 ft 3 inch)	3440 mm (11 ft 3 inch)
Ground Clearance (J)	520 mm (1 ft 8 inch)	520 mm (1 ft 8 inch)	520 mm (1 ft 8 inch)	520 mm (1 ft 8 inch)

(1) 90 percent full fuel tank with 75 kg (165 lb) operator.

Working Ranges

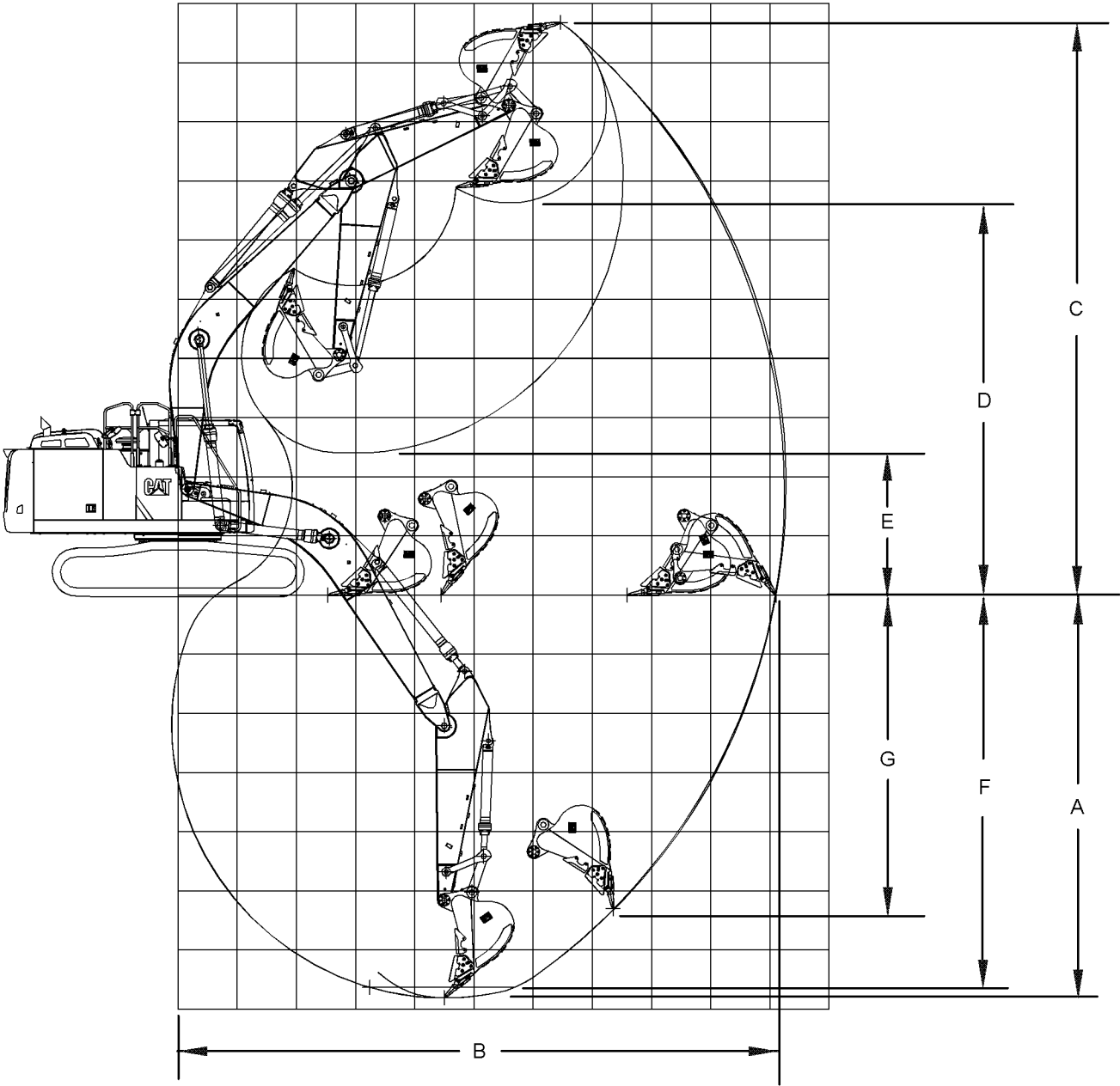


Illustration 65

Table 4

345 GC Excavators				
Boom	6.9 m (22 ft 8 inch) HD Reach Boom		6.55 m (22 ft 6 inch) Mass Boom	
Stick	3.35 m (11 ft 0 inch)	2.9 m (9 ft 6 inch)	3.0 m (9 ft 10 inch)	2.55 m (8 ft 4 inch)
Bucket	2.41 m ³ (3.15 yd) ³	2.41 m ³ (3.15 yd) ³	2.77 m ³ (3.62 yd) ³	2.77 m ³ (3.62 yd) ³
Maximum Digging Depth (A)	7650 mm (25 ft 1 inch)	7200 mm (23 ft 7 inch)	7280 mm (23 ft 11 inch)	6780 mm (22 ft 3 inch)
Maximum Reach at Ground Level (B)	11710 mm (38 ft 5 inch)	11290 mm (37 ft 1 inch)	11220 mm (36 ft 10 inch)	10760 mm (35 ft 4 inch)
Maximum Cutting Height (C)	10720 mm (35 ft 2 inch)	10540 mm (34 ft 7 inch)	10250 mm (33 ft 8 inch)	10060 mm (33 ft 0 inch)
Maximum Loading Height (D)	7390 mm (24 ft 3 inch)	7210 mm (23 ft 8 inch)	6710 mm (22 ft 0 inch)	6510 mm (21 ft 4 inch)
Minimum Loading Height (E)	2680 mm (8 ft 10 inch)	3130 mm (10 ft 3 inch)	2520 mm (8 ft 3 inch)	3020 mm (9 ft 11 inch)
Maximum Depth Cut for 2440mm (8ft) Length (F)	7500 mm (24 ft 7 inch)	7040 mm (23 ft 1 inch)	7130 mm (23 ft 5 inch)	6610 mm (21 ft 8 inch)
Maximum Vertical Wall Digging Depth (G)	5800 mm (19 ft 0 inch)	5390 mm (17 ft 8 inch)	4760 mm (15 ft 7 inch)	4320 mm (14 ft 2 inch)

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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.

Boom/Stick/Bucket Combinations

SMCS Code: 6000; 6700

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

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

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

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

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

Table 5

345 GC Excavators without a quick coupler						
Bucket Type	Linkage	Capacity of Bucket	Weight of Bucket	Fill (%)	6.9 m (22 ft 8 inch) HD Reach Boom ⁽¹⁾	
					3.35 m (11 ft 0 inch) Stick	2.9 m (9 ft 6 inch) Stick
Heavy Duty (HD)	TB	2.41 cubic meter (3.15 cubic yard)	2460 kg (5410 lb)	100	(2)	(2)

(1) Equipped with a 9000 kg (19842 lb) counterweight and 600 mm (24 inch) track shoes

(2) 1500 kg/m³ (2500 lb/yd³) is the maximum density of material.

Table 6

345 GC Excavators without a quick coupler						
Bucket Type	Linkage	Capacity of Bucket	Weight of Bucket	Fill (%)	6.55 m (22 ft 6 inch) Mass Boom ⁽¹⁾	
					3.35 m (11 ft 0 inch) Stick	2.9 m (9 ft 6 inch) Stick
Severe Duty (SD)	UB	2.77 cubic meter (3.62 cubic yard)	2950 kg (6490 lb)	100	(2)	(3)

(1) Equipped with a 9000 kg (19842 lb) counterweight and 600 mm (24 inch) track shoes

(2) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.

(3) 2100 kg/m³ (3500 lb/yd³) is the maximum density of material.

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Lifting Capacities

(345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes)

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 on 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 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 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 moment that is greater than 40000 N·m (29500 lb ft) is created during object handling applications. If the machine is not equipped with these devices, even if the hydraulic lift capacity is capable, do not exceed a load of 1000 kg (2200 lb). Do not exceed a moment that is greater than 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) **Measurements are provided in**
(inch) **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

R3.35TB Reach Boom

**6.9 m (22 ft 6 inch) Reach Boom
with 3.35 m (10 ft 9 inch) Stick**

600 mm (24 inch) Track Shoes

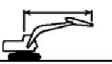
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				(mm) (inch)
 															
9000 360													* 7200 * 16000	* 7200 * 16000	7180 280
7500 300									* 9150 * 20100	* 9150 * 20100			* 6750 * 14900	* 6750 * 14900	8390 330
6000 240									* 9500 * 20750	9400 20200	* 8000 6950		* 6600 * 14550	* 6600 * 14550	9190 360
4500 180					* 15650 * 33650	* 15650 * 33650	* 12100 * 26150	* 12100 * 26150	* 10200 * 22200	9050 19500	* 9100 * 19800	6800 14600	* 6700 * 14700	6000 13250	9690 380
3000 120					* 18950 * 40750	18050 38950	* 13650 * 29500	11950 25750	* 11050 * 23900	8650 18650	* 9450 * 20550	6600 14200	* 6950 * 15300	5650 12450	9950 400
1500 60					* 16950 * 40550	* 16950 36500	* 14800 * 32050	11300 24400	* 11650 * 25300	8300 17900	9400 20200	6400 13800	* 7450 * 16350	5500 12150	9970 400
0 0					* 18350 * 42650	16550 35550	* 15200 * 32900	10950 23550	* 11950 * 25850	8050 17350	9250 19900	6250 13450	* 8250 * 18100	5600 12300	9750 390
-1500 -60			* 12550 * 28400	* 12550 * 28400	* 19300 * 41850	16500 35400	* 14750 * 32000	10750 23200	* 11650 * 25150	7900 17050	9200 19750	6200 13350	* 8800 * 19350	5950 13100	9300 370
-3000 -120			* 20150 * 45550	* 20150 * 45550	* 17200 * 37300	16650 35750	* 13500 * 29150	10800 23250	* 10600 * 22750	7950 17100			* 8650 * 19050	6700 14850	8550 340
-4500 -180			* 17350 * 37400	* 17350 * 37400	* 14050 * 30150	* 14050 * 30150	* 11050 * 23600	11000 23600					* 8200 * 17950	* 8200 * 17950	7430 290

Illustration 66

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345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

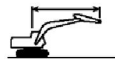
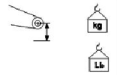
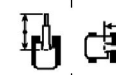
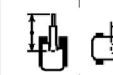
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360								
								(mm) (inch)						
+2														
9000 360							* 7900 * 17500	* 7900 * 17500 7180 280						
7500 300					* 10150 * 22250	9550 20550	* 7400 * 16350	* 7400 * 16350 8390 330						
6000 240					* 10550 * 22950	9400 20200	* 8750 6950 * 7250 * 15950	6700 14850 9190 360						
4500 180			* 17300 * 37100	* 17300 * 37100	* 13400 * 28900	12700 27350	* 11350 * 24600	9050 19500 9800 21100 6800 14600 * 7350 * 16150	6000 13250 9690 380					
3000 120			* 20950 * 45100	18050 38950	* 15150 * 32700	11950 25750	* 12250 * 26500	8650 18650 9600 20650 6600 14200 * 7650 * 16800	5650 12450 9950 400					
1500 60			* 17950 * 42950	16950 36500	* 16450 * 35550	11300 24400	12300 26500	8300 17900 9400 20200 6400 13800 8100 17800	5500 12150 9970 400					
0 0			* 19450 * 45200	16550 35550	16800 36100	10950 23550	12000 25850	8050 17350 9250 19900 6250 13450 8250 18150	5600 12300 9750 390					
-1500 -60		* 13300 * 30100	* 13300 * 30100	* 21400 * 46500	16500 35400	* 16400 * 35550	10750 23200	11900 25550	7900 17050	9200 19750	6200 13350	8800 19400	5950 13100	9300 370
-3000 -120		* 21350 * 48250	* 21350 * 48250	* 19200 * 41550	16650 35750	* 15050 * 32450	10800 23250	* 11800 * 25400	7950 17100			* 9700 * 21300	6700 14850	8550 340
-4500 -180		* 19450 * 41900	* 19450 * 41900	* 15700 * 33750	* 15700 * 33750	* 12400 * 26450	11000 23750					* 9200 * 20150	8300 18450	7430 290

Illustration 67

g06349248

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

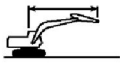
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
9000 360									* 7200 * 7200 7180 * 16000 * 16000 280
7500 300					* 9150 * 9150 * 20100 * 20100				* 6750 * 6750 8390 * 14900 * 14900 330
6000 240					* 9500 9350 * 8000 6900 * 20750 20150				* 6600 * 6600 9190 * 14550 * 14550 360
4500 180			* 15650 * 15650 * 12100 * 12100 * 33650 * 33650 * 26150 * 26150		* 10200 9050 * 9100 6800 * 22200 19450 * 19800 14550				* 6700 6000 9690 * 14700 13250 380
3000 120			* 18950 18000 * 13650 11900 * 40750 38850 * 29500 25700		* 11050 8650 * 9450 6600 * 23900 18600 * 20550 14150				* 6950 5650 9950 * 15300 12400 400
1500 60			* 16950 16900 * 14800 11300 * 40550 36450 * 32050 24350		* 11650 8300 9350 6400 * 25300 17850 20150 13750				* 7450 5500 9970 * 16350 12100 400
0			* 18350 16500 * 15200 10900 * 42650 35500 * 32900 23500		* 11950 8050 9200 6250 * 25800 17300 19850 13450				8200 5600 9750 18100 12300 390
-1500		* 12550 * 12550 * 19300 16450 * 14750 10750		* 11650 7900 9150 6200					8750 5950 9300
-60		* 28400 * 28400 * 41850 35350 * 32000 23150		* 25150 17000 19700 13350					19350 13100 370
-3000		* 20150 * 20150 * 17200 16800 * 13500 10750		* 10600 7900					* 8650 6700 8550
-120		* 45550 * 45550 * 37300 35650 * 29150 23200		* 22750 17050					* 19050 14800 340
-4500		* 17350 * 17350 * 14050 * 14050 * 11050 11000							* 8200 * 8200 7430
-180		* 37400 * 37400 * 30150 * 30150 * 23600 * 23600							* 17950 * 17950 290

Illustration 68

g06349251

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

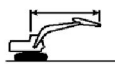
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360								
 +2								(mm) (inch)						
9000 360							* 7900 * 7900 * 17500 * 17500	7180 280						
7500 300					* 10150 * 22250	9550 20500	* 7400 * 7400 * 16350 * 16350	8390 330						
6000 240					* 10550 * 22950	9350 20150	* 8750 * 8750 * 15950 * 15950	9190 360						
4500 180			* 17300 * 37100	* 17300 * 37100	* 13400 * 28900	12650 27300	* 11350 * 24600	9050 19450	9800 21050	6800 14550	* 7350 * 16150	6000 13250	9690 380	
3000 120			* 20950 * 45100	18000 38850	* 15150 * 32700	11900 25700	* 12250 * 26500	8650 18600	9600 20600	6600 14150	* 7650 * 16800	5650 12400	9950 400	
1500 60			* 17950 * 42950	16900 36450	* 16450 * 35550	11300 24350	12250 26400	8300 17850	9350 20150	6400 13750	8050 17750	5500 12100	9970 400	
0 0			* 19450 * 45200	16500 35500	16750 36000	10900 23500	12000 25800	8050 17300	9200 19850	6250 13450	8200 18100	5600 12300	9750 390	
-1500 -60		* 13300 * 30100	* 13300 * 30100	* 21400 * 46500	16450 35350	* 16400 * 35550	10750 23150	11850 25500	7900 17000	9150 19700	6200 13350	8750 19350	5950 13100	9300 370
-3000 -120		* 21350 * 48250	* 21350 * 48250	* 19200 * 41550	16600 35650	* 15050 * 32450	10750 23200	* 11800 * 25400	7900 17050			* 9700 * 21300	6700 14800	8550 340
-4500 -180		* 19450 * 41900	* 19450 * 41900	* 15700 * 33750	* 15700 * 33750	* 12400 * 26450	11000 23700					* 9200 * 20150	8250 18400	7430 290

Illustration 69

g06349254

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

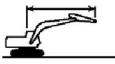
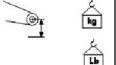
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				(mm) (inch)
															
9000 360													* 7200 * 16000	* 7200 * 16000	7180 280
7500 300									* 9150 * 20100	* 9150 * 20100			* 6750 * 14900	* 6750 * 14900	8390 330
6000 240									* 9500 * 20750	9250 19900	* 8000 6800		* 6600 * 14550	6600 * 14550	9190 360
4500 180					* 15650 * 33650	* 15650 * 33650	* 12100 * 26150	* 12100 * 26150	* 10200 * 22200	8900 19200	* 9100 * 19800	6700 14350	* 6700 * 14700	5900 13050	9690 380
3000 120					* 18950 * 40750	17750 38350	* 13650 * 29500	11750 25350	* 11050 * 23900	8500 18350	9450 20300	6500 13950	* 6950 * 15300	5550 12200	9950 400
1500 60					* 16950 * 40550	16650 35900	* 14800 * 32050	11150 24000	* 11650 * 25300	8150 17600	9250 19850	6300 13550	* 7450 * 16350	5400 11900	9970 400
0					* 18350 * 42650	16250 35000	* 15200 * 32900	10750 23150	11800 25400	7900 17050	9050 19500	6150 13250	8100 17800	5500 12100	9750 390
-1500 -60			* 12550 * 28400	* 12550 * 28400	* 19300 * 41850	16200 34800	* 14750 * 32000	10600 22800	* 11650 25100	7800 16750	9000 19400	6100 13150	8650 19050	5850 12900	9300 370
-3000 -120			* 20150 * 45550	* 20150 * 45550	* 17200 * 37300	16350 35150	* 13500 * 29150	10600 22850	* 10600 * 22750	7800 16800			* 8650 * 19050	6800 14550	8550 340
-4500 -180			* 17350 * 37400	* 17350 * 37400	* 14050 * 30150	* 14050 * 30150	* 11050 * 23800	10850 23350					* 8200 * 17950	8150 * 17950	7430 290

Illustration 70

g06349261

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

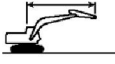
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
+2									
9000 360							* 7900	* 7900	7180
7500 300							* 17500	* 17500	280
6000 240							* 7400	* 7400	8390
4500 180							* 16350	* 16350	330
3000 120							* 7250	6600	9190
1500 60							* 15950	14600	360
0							* 7350	5900	9690
0							* 16150	13050	380
-1500							* 7650	5550	9950
-60							* 16800	12200	400
-3000							7950	5400	9970
-120							17450	11900	400
-4500							8100	5500	9750
-180							17800	12100	390
							8650	5850	9300
							19050	12900	370
							* 9700	6600	8550
							* 21300	14550	340
							* 9200	8150	7430
							* 20150	18150	290

Illustration 71

g06349263

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

700 mm (27 inch) Track Shoes

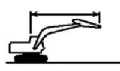
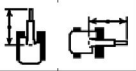
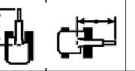
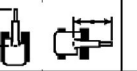
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360		(mm) (inch)						
														
9000 360							* 7200 * 16000	* 7200 * 16000 7180 280						
7500 300					* 9150 * 20100	* 9150 * 20100	* 6750 * 14900	* 6750 * 14900 8390 330						
6000 240					* 9500 * 20750	9300 20000	* 8000 * 14550	6900 * 14550 9190 360						
4500 180			* 15650 * 33650	* 15650 * 33650	* 12100 * 26150	* 12100 * 26150	* 10200 * 22200	9000 19350	* 9100 * 19800 6750 14450	* 6700 * 14700 5950 13150	9690 380			
3000 120			* 18950 * 40750	17900 38650	* 13650 * 29500	11850 25550	* 11050 * 23900	8600 18500	* 9450 * 20450	6550 14050	* 6950 * 15300 5600 12300	9950 400		
1500 60			* 16950 * 40550	16800 36200	* 14800 * 32050	11200 24200	* 11650 * 25300	8250 17700	9300 20000	6350 13650	* 7450 * 16350 5450 12000	9970 400		
0 0			* 18350 * 42650	16400 35250	* 15200 * 32900	10850 23350	11900 25600	7950 17150	9150 19700	6200 13350	8150 17950	5550 12200	9750 390	
-1500 -60		* 12550 * 28400	* 12550 * 28400	* 19300 * 41850	16350 35100	* 14750 * 32000	10650 23000	* 11650 * 25150	7850 16900	9100 19600	6150 13250	8700 19200	5900 13000	9300 370
-3000 -120		* 20150 * 45550	* 20150 * 45550	* 17200 * 37300	16500 35400	* 13500 * 29150	10700 23050	* 10800 * 22750	7850 16950			* 8650 * 19050	6650 14700	8550 340
-4500 -180		* 17350 * 37400	* 17350 * 37400	* 14050 * 30150	* 14050 * 30150	* 11050 * 23600	10900 23550					* 8200 * 17950	* 8200 * 17950	7430 290

Illustration 72

g06349269

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

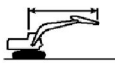
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
+2									
9000 360									* 7900 * 7900 7180 * 17500 * 17500 280
7500 300					* 10150 9500 * 22250 20350				* 7400 * 7400 8390 * 16350 * 16350 330
6000 240					* 10550 9300 * 22950 20000	* 8750 6900			* 7250 6650 9190 * 15950 14700 360
4500 180			* 17300 * 17300 * 37100 * 37100	* 13400 12600 * 28900 27150	* 11350 9000 * 24600 19350	9750 6750 20900 14450			* 7350 5950 9690 * 16150 13150 380
3000 120			* 20950 17900 * 45100 38650	* 15150 11850 * 32700 25550	* 12250 8600 * 26500 18500	9500 6550 20450 14050			* 7650 5600 9950 * 16800 12300 400
1500 60			* 17950 16800 * 42950 36200	* 16450 11200 * 35550 24200	12200 8250 26250 17700	9300 6350 20000 13650			8000 5450 9970 17600 12000 400
0			* 19450 16400 * 45200 35250	16650 10850 35800 23350	11900 7950 25600 17150	9150 6200 19700 13350			8150 5550 9750 17950 12200 390
-1500		* 13300 * 13300	* 21400 16350	* 16400 10650	11750 7850	9100 6150			8700 5900 9300
-60		* 30100 * 30100	* 48500 35100	35350 23000	25300 16900	19600 13250			19200 13000 370
-3000		* 21350 * 21350	* 19200 16500	* 15050 10700	11800 7850				* 9700 6650 8550
-120		* 48250 * 48250	* 41550 35400	* 32450 23050	25400 16950				* 21300 14700 340
-4500		* 19450 * 19450	* 15700 * 15700	* 12400 10900					* 9200 8200 7430
-180		* 41900 * 41900	* 33750 * 33750	* 26450 23550					* 20150 18300 290

Illustration 73

g06349274

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 3.35 m (10 ft 9 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

R2.9TB Reach Boom
**6.9 m (22 ft 6 inch) Reach Boom
with 2.9 m (9 ft 5 inch) Stick**

600 mm (24 inch) Track Shoes

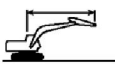
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360		(mm) (inch)					
 	 	 	 	 	 	 	 						
9000 360							* 8600 * 19150	* 8600 * 19150	6600 260				
7500 300					* 9750 * 20850	9400 20150	* 8000 * 17700	* 8000 * 17700	7890 310				
6000 240				* 11300 * 24450	* 11300 * 24450	* 9950 * 21750	9250 19900	* 7850 * 17250	7200 15950	8740 350			
4500 180			* 16800 * 35950	* 16800 * 35950	* 12700 * 27400	12500 26950	* 10600 * 23000	8950 19250	* 9400 * 20050	6750 14450	* 7950 * 17450	6400 14150	9270 370
3000 120			* 18950 * 42700	17600 38000	* 14150 * 30500	11800 25400	* 11350 * 24550	8600 18500	9550 20550	6550 14100	* 8300 * 18200	6000 13200	9530 380
1500 60			* 12600 * 30850	* 12600 * 30850	* 15050 * 32600	11200 24200	* 11850 * 25650	8250 17800	9350 20150	6400 13750	8600 18900	5850 12900	9550 380
0 0			* 17000 * 39700	16550 35550	* 15200 * 32900	10900 23500	* 11950 * 25850	8050 17300	9250 19900	6250 13500	8800 19350	6000 13150	9330 370
-1500 -60		* 12550 * 28600	* 12550 * 28600	* 18550 * 40300	16550 35600	* 14500 * 31450	10800 23250	* 11450 * 24750	7950 17150		* 9150 * 20150	6400 14100	8850 350
-3000 -120		* 19350 * 42300	* 19350 * 42300	* 16250 * 35200	* 16250 * 35200	* 12950 * 27950	10900 23450	* 10100 * 21500	8000 17300		* 8900 * 19600	7350 16200	8060 320
-4500 -180				* 12650 * 27150	* 12650 * 27150	* 10050 * 21250	* 10050 * 21250				* 8200 * 17900	* 8200 * 17900	6860 270

Illustration 74

g06349287

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

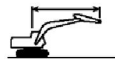
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360							
								(mm) (inch)					
+2													
9000 360							* 9400 * 20900	* 9400 * 20900	6600 260				
7500 300					* 10750 * 22800	9400 20150		* 8750 * 19350	8600 19350	7890 310			
6000 240				* 12450 * 27000	* 12450 * 27000	* 11050 * 24050	9250 19900	* 8550 * 18850	7200 15950	8740 350			
4500 180			* 18500 * 39700	* 18500 * 39700	* 14000 * 30300	12500 26950	* 11750 * 25500	8950 19250	9750 20900	6750 14450	* 8700 * 19100	6400 14150	9270 370
3000 120			* 20050 * 47250	17600 38000	* 15650 * 33800	11800 25400	* 12550 * 27150	8600 18500	9550 20550	6550 14100	8750 19300	6000 13200	9530 380
1500 60			* 13350 * 32650	* 13350 * 32650	* 16700 * 36150	11200 24200	12250 26350	8250 17800	9350 20150	6400 13750	8600 18900	5850 12900	9550 380
0 0			* 18000 * 42100	16550 35550	16750 36050	10900 23500	12000 25850	8050 17300	9250 19900	6250 13500	8800 19350	6000 13150	9330 370
-1500 -60		* 13350 * 30300	* 13350 * 30300	* 20600 * 44800	16550 35600	* 16150 * 34950	10800 23250	11900 25650	7950 17150		9450 20850	6400 14100	8850 350
-3000 -120		* 21650 * 47250	* 21650 * 47250	* 18100 * 39200	16750 36050	* 14450 * 31150	10900 23450	* 11250 * 24050	8000 17300		* 10000 * 21950	7350 16200	8060 320
-4500 -180				* 14200 * 30450	* 14200 * 30450	* 11250 * 23800	11200 * 23800				* 9200 * 20150	* 9200 * 20150	6860 270

Illustration 75

g06349289

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

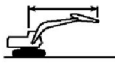
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
9000 360							* 8600 * 19150	* 8600 * 19150	6600 260
7500 300					* 9750 * 20850	9400 20100		* 8000 * 17700	7890 310
6000 240				* 11300 * 24450	* 11300 * 24450	* 9950 19900		* 7850 * 17250	7150 15950
4500 180			* 16800 * 35950	* 16800 * 35950	* 12700 * 27400	12450 26900	* 10600 * 23000	8950 19250	* 9400 * 20050
3000 120			* 18950 * 42700	17650 37950	* 14150 * 30500	11750 25350	* 11350 * 24550	8550 18450	9550 20500
1500 60			* 12600 * 30850	* 12600 * 30850	* 15050 * 32600	11200 24150	* 11850 * 25650	8250 17750	9350 20100
0			* 17000 * 39700	16500 35450	* 15200 * 32900	10850 23450	* 11950 25800	8000 17250	9250 19850
-1500			* 12550	* 12550	* 18550	16550	* 14500	10800	* 11450
-60			* 28600	* 28600	* 40300	35550	* 31450	23200	* 24750
-3000			* 19350	* 19350	* 16250	* 16250	* 12950	10850	* 10100
-120			* 42300	* 42300	* 35200	* 35200	* 27950	23400	* 21500
-4500					* 12650	* 12650	* 10050	* 10050	
-180					* 27150	* 27150	* 21250	* 21250	

Illustration 76

g06349290

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

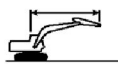
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360							
 +2								(mm) (inch)					
9000 360								* 9400 * 20900	* 9400 * 20900	6600 260			
7500 300					* 10750 * 22800	9400 20100		* 8750 * 19350	8600 19300	7890 310			
6000 240				* 12450 * 27000	* 12450 * 27000	* 11050 * 24050	9250 19900	* 8550 * 18850	7150 15950	8740 350			
4500 180			* 18500 * 39700	* 18500 * 39700	* 14000 * 30300	12450 26900	* 11750 * 25500	8950 19250	9700 20850	6700 14400	* 8700 * 19100	6400 14150	9270 370
3000 120			* 20050 * 47250	17650 37950	* 15650 * 33800	11750 25350	* 12550 27050	8550 18450	9550 20500	6550 14050	8750 19250	6000 13200	9530 380
1500 60			* 13350 * 32650	* 13350 * 32650	* 16700 * 36150	11200 24150	12200 26300	8250 17750	9350 20100	6350 13700	8550 18850	5850 12850	9550 380
0 0			* 18000 * 42100	16500 35450	16700 35950	10850 23450	12000 25800	8000 17250	9250 19850	6250 13450	8800 19300	5950 13100	9330 370
-1500 -60		* 13350 * 30300	* 13350 * 30300	* 20600 * 44800	16550 35550	* 16150 * 34950	10800 23200	11900 25600	7950 17100		9450 20800	6400 14100	8850 350
-3000 -120		* 21650 * 47250	* 21650 * 47250	* 18100 * 39200	16750 35950	* 14450 * 31150	10850 23400	* 11250 * 24050	8000 17250		* 10000 * 21950	7300 16200	8060 320
-4500 -180				* 14200 * 30450	* 14200 * 30450	* 11250 * 23800	11150 * 23800				* 9200 * 20150	* 9200 * 20150	6860 270

Illustration 77

g06349291

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

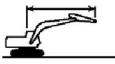
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
															(mm) (inch)
9000 360													* 8600 * 19150	* 8600 * 19150	6600 260
7500 300									* 9750 * 20850	9250 19850			* 8000 * 17700	* 8000 * 17700	7890 310
6000 240							* 11300 * 24450	* 11300 * 24450	* 9950 * 21750	9150 19600			* 7850 * 17250	7050 15700	8740 350
4500 180					* 16800 * 35950	* 16800 * 35950	* 12700 * 27400	12300 26550	* 10600 * 23000	8800 18950	* 9400 * 20050	6600 14200	* 7950 * 17450	6300 13900	9270 370
3000 120					* 18950 * 42700	17300 37400	* 14150 * 30500	11600 25000	* 11350 * 24550	8450 18200	9400 20200	6450 13850	* 8300 * 18200	5900 13000	9530 380
1500 60					* 12600 * 30850	* 12600 * 30850	* 15050 * 32600	11050 23800	* 11850 * 25650	8100 17500	9200 19800	6300 13500	8450 18550	5750 12650	9550 380
0					* 17000 * 39700	16250 34950	* 15200 * 32900	10700 23100	11800 25400	7900 17000	9100 19550	6150 13250	8650 19000	5850 12900	9330 370
-1500				* 12550	* 12550	* 18550	16300	* 14500	10600	* 11450	7800		* 9150	6300	8850
-60				* 28600	* 28600	* 40300	35000	* 31450	22850	* 24750	16850		* 20150	13850	350
-3000				* 19350	* 19350	* 16250	* 16250	* 12950	10700	* 10100	7900		* 8900	7200	8060
-120				* 42300	* 42300	* 35200	* 35200	* 27950	23050	* 21500	17000		* 19600	15950	320
-4500					* 12650	* 12650	* 10050	* 10050					* 8200	* 8200	6860
-180					* 27150	* 27150	* 21250	* 21250					* 17900	* 17900	270

Illustration 78

g06349295

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

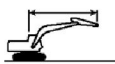
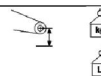
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
															(mm) (inch)
+2															
9000 360													* 9400 * 20900	* 9400 * 20900	6600 260
7500 300									* 10750 * 22800	9250 19850			* 8750 * 19350	8500 19050	7890 310
6000 240							* 12450 * 27000	* 12450 * 27000	* 11050 * 24050	9150 19600			* 8550 * 18850	7050 15700	8740 350
4500 180					* 18500 * 39700	* 18500 * 39700	* 14000 * 30300	12300 26550	* 11750 * 25500	8800 18950	9600 20550	6600 14200	* 8700 * 19100	6300 13900	9270 370
3000 120					* 20050 * 47250	17300 37400	* 15650 * 33800	11600 25000	12400 26650	8450 18200	9400 20200	6450 13850	8600 18950	5900 13000	9530 380
1500 60					* 13350 * 32650	* 13350 * 32650	* 16700 * 36150	11050 23800	12050 25900	8100 17500	9200 19800	6300 13500	8450 18550	5750 12650	9550 380
0 0					* 18000 * 42100	16250 34950	16450 35400	10700 23100	11800 25400	7900 17000	9100 19550	6150 13250	8650 19000	5850 12900	9330 370
-1500 -60				* 13350 * 30300	* 13350 * 30300	* 20600 * 44800	16300 35000	* 16150 * 34950	10600 22850	11700 25200	7800 16850		9300 20500	6300 13850	8850 350
-3000 -120				* 21650 * 47250	* 21650 * 47250	* 18100 * 39200	16500 35450	* 14450 * 31150	10700 23050	* 11250 * 24050	7900 17000		* 10000 * 21950	7200 15950	8060 320
-4500 -180						* 14200 * 30450	* 14200 * 30450	* 11250 * 23800	11000 23700				* 9200 * 20150	9200 * 20150	6860 270

Illustration 79

g06349297

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

700 mm (27 inch) Track Shoes

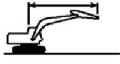
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360				(mm) (inch)
										
9000 360							* 8600 * 19150	* 8600 * 19150	6600 260	
7500 300					* 9750 * 20850	9350 20000			* 8000 * 17700	7890 310
6000 240				* 11300 * 24450	* 11300 * 24450	* 9950 21750	9200 19750		* 7850 * 17250	7150 15850
4500 180			* 16800 * 35950	* 16800 * 35950	* 12700 * 27400	12400 26750	* 10800 * 23000	8900 19100	* 9400 * 20050	8650 14300
3000 120			* 18950 * 42700	17450 37700	* 14150 * 30500	11700 25200	* 11350 * 24550	8500 18350	9450 20350	6500 13950
1500 60			* 12600 * 30850	* 12600 * 30850	* 15050 * 32600	11100 23950	* 11850 * 25650	8200 17650	9300 20000	6350 13600
0			* 17000 * 39700	16400 35250	* 15200 * 32900	10800 23250	11900 25600	7950 17150	9150 19700	6200 13400
-1500 -60		* 12550 * 28600	* 12550 * 28600	* 18550 * 40300	16450 35300	* 14500 * 31450	10700 23050	* 11450 * 24750	7900 16950	
-3000 -120		* 19350 * 42300	* 19350 * 42300	* 16250 * 35200	* 16250 * 35200	* 12950 * 27950	10800 23250	* 10100 * 21500	7950 17150	
-4500 -180			* 12650 * 27150	* 12650 * 27150	* 10050 * 21250	* 10050 * 21250				
									* 8200 * 17900	* 8200 * 17900

Illustration 80

g06349303

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

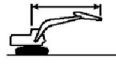
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360						
 +2								(mm) (inch)				
9000 360							* 9400 * 20900	* 9400 * 20900 6600 260				
7500 300					* 10750 * 22800	9350 20000		* 8750 * 19350 8550 19150 7890 310				
6000 240				* 12450 * 27000	* 12450 * 27000	* 11050 * 24050	9200 19750	* 8550 * 18850 7150 15850 8740 350				
4500 180			* 18500 * 39700	* 18500 * 39700	* 14000 * 30300	12400 26750	* 11750 * 25500	8900 19100	9650 20700	6650 14300	* 8700 * 19100 6350 14050 9270 370	
3000 120			* 20050 * 47250	17450 37700	* 15650 * 33800	11700 25200	12500 26900	8500 18350	9450 20350	6500 13950	8650 19100	5950 13100 9530 380
1500 60			* 13350 * 32650	* 13350 * 32650	* 16700 * 36150	11100 23950	12150 26100	8200 17650	9300 20000	6350 13600	8500 18750	5800 12750 9550 380
0 0			* 18000 * 42100	16400 35250	16600 35700	10800 23250	11900 25600	7950 17150	9150 19700	6200 13400	8700 19200	5900 13000 9330 370
-1500 -60		* 13350 * 30300	* 13350 * 30300	* 20600 * 44800	16450 35300	* 16150 * 34950	10700 23050	11800 25400	7900 16950		9350 20650	6350 14000 8850 350
-3000 -120		* 21650 * 47250	* 21650 * 47250	* 18100 * 39200	16650 35750	* 14450 * 31150	10800 23250	* 11250 * 24050	7950 17150		* 10000 * 21950	7250 16050 8060 320
-4500 -180				* 14200 * 30450	* 14200 * 30450	* 11250 * 23800	11100				* 9200 * 20150	* 9200 * 20150 6860 270

Illustration 81

g06349305

345 GC: 6.9 m (22 ft 6 inch) Reach boom, 2.9 m (9 ft 5 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

R3.0 UB Mass Boom
**6.55 m (21 ft 5 inch) Mass Boom
with 3.0 m (9 ft 8 inch) Stick**

600 mm (24 inch) Track Shoes

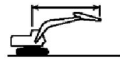
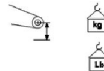
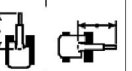
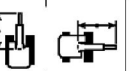
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
														(mm) (inch)	
7500 300								* 8400	* 8400			* 7900 * 17500	* 7900 * 17500	7570 300	
6000 240								* 9500 * 20750	9000 19250			* 7650 * 16900	7300 16200	8450 330	
4500 180				* 15250 * 32750	* 15250 * 32750	* 11850 * 25600	* 11850 * 25600	* 10050 * 21850	8650 18600			* 7750 * 17000	6400 14100	9000 360	
3000 120				* 18400 * 39500	17550 37850	* 13300 * 28700	11500 24800	* 10750 * 23300	8250 17800	9200 19800	6200 13300	* 8050 * 17700	5900 13050	9270 370	
1500 60				* 20000 * 43250	16400 35300	* 14350 * 31050	10850 23400	* 11300 * 24500	7900 17000	9050 19400	6050 12950	8600 18950	5750 12650	9290 370	
0 0				* 19850 * 43050	15950 34350	* 14700 * 31750	10450 22550	* 11500 * 24850	7650 16450	8900	5900	8800 19400	5850 12900	9060 360	
-1500 -60			* 15000 * 34000	* 15000 * 34000	* 18550 * 40300	15950 34200	* 14150 * 30600	10300 22200	* 11050 * 23800	7550 16250		* 9150 * 20100	6300 13900	8570 340	
-3000 -120			* 20700 * 44950	* 20700 * 44950	* 16250 * 35200	16150 34650	* 12600 * 27150	10400 22400	* 9500 * 20200	7650 16500		* 8950 * 19700	7350 16250	7750 310	
-4500 -180					* 12500 * 26700	* 12500 * 26700	* 9450 * 19750	* 9450 * 19750				* 8250 * 18050	* 8250 * 18050	6490 260	

Illustration 82

g06349309

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

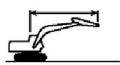
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
+2									
7500 300					* 9200	9100			* 8650 * 8650 7570 * 19150 * 19150 300
6000 240					* 10550	9000			* 8400 7300 8450 * 18550 16200 330
4500 180			* 16850 * 16850 * 13150 12300		* 11200	8650			* 8500 6400 9000 * 18650 14100 360
3000 120			* 20400 17550 * 14750 11500		* 12000	8250	9200	6200	8800 5900 9270 * 43850 37850 * 31900 24800 * 26000 17800 19800 13300 19400 13050 370
1500 60			* 22150 16400 * 16000 10850		* 11900	7900	9050	6050	8600 5750 9290 * 48050 35300 * 34550 23400 25600 17000 19400 12950 18950 12650 370
0			* 22100 15950 16350 10450		* 11600	7650	8900	5900	8800 5850 9060 * 47900 34350 35100 22550 25000 16450
-1500		* 15950 * 15950	* 20700 15950 * 15800 10300		11500	7550			9550 6300 8570 * 36100 * 36100 * 44900 34200 * 34150 22200 24750 16250 21050 13900 340
-3000		* 23150 * 23150	* 18200 16150 * 14100 10400		* 10700	7650			* 10050 7350 7750 * 50350 * 50350 * 39350 34850 * 30400 22400 * 22650 16500 * 22150 16250 310
-4500			* 14050 * 14050 * 10650 * 10650						* 9350 * 9350 6490 * 30050 * 30050 * 22300 * 22300 * 20400 * 20400 260

Illustration 83

g06349312

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

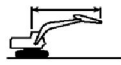
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
										(mm) (inch)					
7500 300								* 8400	* 8400				* 7900	* 7900	7570 300
6000 240								* 9500	8950				* 7650	7250	8450 330
								* 20750	19200				* 16900	16150	
4500 180					* 15250	* 15250	* 11850	* 11850	* 10050	8650			* 7750	6350	9000 360
					* 32750	* 32750	* 25600	* 25600	* 21850	18550			* 17000	14100	
3000 120					* 18400	17500	* 13300	11500	* 10750	8250	9200	6200	* 8050	5900	9270 370
					* 39500	37750	* 28700	24750	* 23300	17750	19750	13300	* 17700	13000	
1500 60					* 20000	16350	* 14350	10850	* 11300	7900	9000	6000	8600	5750	9290 370
					* 43250	35200	* 31050	23350	* 24500	16950	19350	12900	18900	12600	
0 0					* 19850	15950	* 14700	10450	* 11500	7650	8900	5900	8800	5850	9060 360
					* 43050	34250	* 31750	22500	* 24850	16400			19350	12850	
-1500 -60			* 15000	* 15000	* 18550	15900	* 14150	10300	* 11050	7500			* 9150	6300	8570 340
			* 34000	* 34000	* 40300	34150	* 30600	22150	* 23800	16200			* 20100	13900	
-3000 -120			* 20700	* 20700	* 16250	16100	* 12600	10400	* 9500	7600			* 8950	7300	7750 310
			* 44950	* 44950	* 35200	34550	* 27150	22350	* 20200	16450			* 19700	16200	
-4500 -180					* 12500	* 12500	* 9450	* 9450					* 8250	* 8250	6490 260
					* 26700	* 26700	* 19750	* 19750					* 18050	* 18050	

Illustration 84

g06349315

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

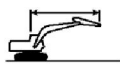
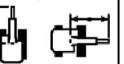
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360		(mm) (inch)		
 +2										
7500 300					* 9200 9050		* 8650 * 8650 * 19150	7570 300		
6000 240					* 10550 * 23100 19200	8950	* 8400 * 18550 16150	8450 330		
4500 180			* 16850 * 36250	* 16850 * 36250 * 28400 26450	* 11200 * 24350 18550	8650	* 8500 * 18650 14100	8350 360		
3000 120			* 20400 * 43850	17500 37750 * 31900 24750	* 14750 * 26000 17750	8250 9200 6200 19750 13300	8750 5900 9270 19350 13000	9270 370		
1500 60			* 22150 * 48050	16350 35200 * 16000 10850 * 11850 7900 9000 6000 8600 5750 9290	23350 25550 16950 19350 12900 18900 12600 370	25550 16950 19350 12900 18900 12600 370	8800 5850 9060 19350 12850 360	9060 360		
0 0			* 22100 * 47900	15950 34250	16300 35000	10450 22500	11600 24950 16400	7650 8900 5900	8800 5850 9060 19350 12850 360	
-1500 -60		* 15950 * 36100	* 15950 * 36100	* 20700 * 44900	15900 34150 * 34150 22150	11500 24700 16200	7500	9500 21000 13900 340	6300 13900 340	8570
-3000 -120		* 23150 * 50350	* 23150 * 50350	* 18200 * 39350	16100 34550 * 30400 22350	* 10700 * 22650 16450	7600	* 10050 * 22150 16200 310	7300 16200 310	7750
-4500 -180				* 14050 * 30050	* 14050 * 30050 * 10650 * 22300	* 10650 * 22300		* 9350 * 20400	* 9350 * 20400	6490 260

Illustration 85

g06349317

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

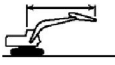
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				(mm) (inch)
															
7500 300									* 8400	* 8400			* 7900	* 7900	7570
6000 240									* 9500	8850			* 7650	* 7150	8450
4500 180					* 15250	* 15250	* 11850	* 11850	* 10050	8500			* 7750	* 6250	9000
3000 120					* 32750	* 32750	* 25600	* 25600	* 21850	18300			* 17000	* 13850	360
1500 60					* 18400	17250	* 13300	11350	* 10750	8100	9050	6100	* 8050	5800	9270
0					* 39500	37250	* 28700	24400	* 23300	17450	19450	13050	* 17700	12800	370
0					* 20000	16100	* 14350	10650	* 11300	7750	8850	5900	* 8450	5650	9290
-1500					* 43250	34700	* 31050	23000	* 24500	16700	19050	12700	18600	12400	370
-60					* 19850	15700	* 14700	10300	11400	7500	8750	5800	8650	5750	9060
-3000					* 43050	33750	* 31750	22150	24550	16150			19050	12650	360
-120			* 15000	* 15000	* 18550	15650	* 14150	10150	* 11050	7400			* 9150	6200	8570
-4500			* 34000	* 34000	* 40300	33600	* 30600	21800	* 23800	15950			* 20100	13650	340
-180			* 20700	* 20700	* 16250	15850	* 12600	10200	* 9500	7500			* 8950	7200	7750
			* 44950	* 44950	* 35200	34050	* 27150	22000	* 20200	16200			* 19700	15950	310
					* 12500	* 12500	* 9450	* 9450					* 8250	* 8250	6490
					* 26700	* 26700	* 19750	* 19750					* 18050	* 18050	260

Illustration 86

g06349320

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

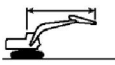
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
															(mm) (inch)
+2															
7500 300									* 9200	8950			* 8650	* 8650	7570
6000 240									* 10550	8850			* 8400	* 7150	8450
4500 180					* 16850	* 16850	* 13150	12100	* 11200	8500			* 8500	* 6250	9000
3000 120					* 36250	* 36250	* 28400	26100	* 24350	18300			* 18650	* 13850	360
1500 60					* 20400	17250	* 14750	11350	* 12000	8100	9050	6100	8650	5800	9270
0					* 43850	37250	* 31900	24400	* 26000	17450	19450	13050	19050	12800	370
0					* 22150	16100	* 16000	10650	11700	7750	8850	5900	8450	5650	9290
0					* 48050	34700	* 34550	23000	25150	16700	19050	12700	18600	12400	370
-1500					* 22100	15700	16050	10300	11400	7500	8750	5800	8650	5750	9060
-60					* 47900	33750	34450	22150	24550	16150			19050	12650	360
-3000					* 15950	* 15950	* 20700	15650	* 15800	10150	11300	7400	9350	6200	8570
-120					* 36100	* 36100	* 44900	33600	34100	21800	24300	15950	20650	13650	340
-4500					* 23150	* 23150	* 18200	15850	* 14100	10200	* 10700	7500	* 10050	7200	7750
-180					* 50350	* 50350	* 39350	34050	* 30400	22000	* 22650	16200	* 22150	15950	310
					* 14050	* 14050	* 10650	10600					* 9350	* 9350	6490
					* 30050	* 30050	* 22300	* 22300					* 20400	* 20400	260

Illustration 87

g06349323

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

700 mm (27 inch) Track Shoes

(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
 	 		 		 		 		 		 		 	(mm) (inch)	
7500 300									* 8400	* 8400			* 7900 * 17500	* 7900 * 17500	7570 300
6000 240									* 9500 * 20750	8900 19100			* 7650 * 16900	7200 16050	8450 330
4500 180					* 15250 * 32750	* 15250 * 32750	* 11850 * 25600	* 11850 * 25600	* 10050 * 21850	8600 18450			* 7750 * 17000	6350 14000	9000 360
3000 120					* 18400 * 39500	17400 37500	* 13300 * 28700	11400 24600	* 10750 * 23300	8200 17600	9150 19600	6150 13200	* 8050 * 17700	5850 12900	9270 370
1500 60					* 20000 * 43250	16250 34950	* 14350 * 31050	10750 23200	* 11300 * 24500	7800 16850	8950 19200	5950 12800	8500 18750	5700 12500	9290 370
0 0					* 19850 * 43050	15800 34000	* 14700 * 31750	10350 22300	* 11500 * 24750	7550 16300	8800	5850	8750 19200	5800 12750	9060 360
-1500 -60			* 15000 * 34000	* 15000 * 34000	* 18550 * 40300	15800 33900	* 14150 * 30600	10200 22000	* 11050 * 23800	7450 16100			* 9150 * 20100	6250 13800	8570 340
-3000 -120			* 20700 * 44950	* 20700 * 44950	* 16250 * 35200	16000 34350	* 12600 * 27150	10300 22200	* 9500 * 20200	7550 16350			* 8950 * 19700	7250 16100	7750 310
-4500 -180					* 12500 * 26700	* 12500 * 26700	* 9450 * 19750	* 9450 * 19750					* 8250 * 18050	* 8250 * 18050	6490 260

Illustration 88

g06349328

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

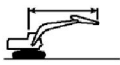
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			
									(mm) (inch)
+2									
7500 300					* 9200	9000			* 8650 * 8650 7570 * 19150 * 19150 300
6000 240					* 10550 8900 * 23100 19100				* 8400 7200 8450 * 18550 16050 330
4500 180			* 16850 * 16850 * 13150 12200 * 36250 * 36250 * 28400 26300		* 11200 8600 * 24350 18450				* 8500 6350 9000 * 18650 14000 360
3000 120			* 20400 17400 * 14750 11400 * 43850 37500 * 31900 24600		* 12000 8200 * 26000 17600	9150 6150	8700 5850 9270 19200 12900 370		
1500 60			* 22150 16250 * 16000 10750 * 48050 34950 * 34550 23200		* 11800 7800 * 25350 16850	8950 5950 19200 12800	8500 5700 9290 18750 12500 370		
0			* 22100 15800 16200 10350 * 47900 34000 34750 22300		* 11500 7550 * 24750 16300	8800 5850	8750 5800 9060 19200 12750 360		
-1500		* 15950 * 15950 * 20700 15800 * 15800 10200 * 36100 * 36100 * 44900 33900 * 34150 22000			11400 7450		9450 6250 8570 20850 13800 340		
-3000		* 23150 * 23150 * 18200 16000 * 14100 10300 * 50350 * 50350 * 39350 34350 * 30400 22200			* 10700 7550 * 22650 16350		* 10050 7250 7750 * 22150 16100 310		
-4500			* 14050 * 14050 * 10650 * 10650 * 30050 * 30050 * 22300 * 22300				* 9350 * 9350 6490 * 20400 * 20400 260		

Illustration 89

g06349329

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 3.0 m (9 ft 8 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

R3.0 UB Mass Boom
**6.55 m (21 ft 5 inch) Mass Boom
with 2.5 m (8 ft 2 inch) Stick**

600 mm (24 inch) Track Shoes

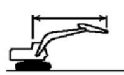
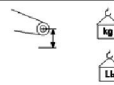
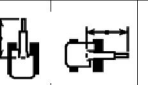
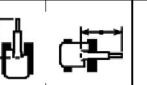
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300		(mm) (inch)					
												
7500 300				* 23450	* 23450	* 10400 * 23000	10100 22800 7000 280					
6000 240				* 11300 * 24550	* 11300 * 24550	* 10150 * 22200	8900 19050 * 9950 * 22000	8050 17900 7950 310				
4500 180			* 16500 * 35450	* 16500 * 35450	* 12550 * 27100	12150 26200	* 10600 * 23000	8600 18500 * 9800 * 21600	6950 15450 8520 340			
3000 120			* 19450 * 41850	17150 37000	* 13850 * 29950	11400 24600	* 11150 * 24200	8250 17750	9550 21050	6450 14200	8810 350	
1500 60			* 36200 35050		* 14700 * 31850	10850 23350	* 11600 * 25100	7950 17050	9350 20550	6250 13800	8830 350	
0 0			* 19450 * 42350	16100 34600	* 14750 * 31950	10550 22700	* 11550 * 25000	7750 16650	9600 21200	6400 14100	8590 340	
-1500 -60		* 15050 * 34350	* 15050 * 34350	* 17800 * 38750	16150 34700	* 13900 * 30100	10450 22550	* 10800 * 23250	7700 16550	* 9650 * 21300	7000 15450	8070 320
-3000 -120		* 18000 * 39300	* 18000 * 39300	* 15200 * 32900	* 15200 * 32900	* 11950 * 25700	10600 22900			* 9300 * 20450	8300 18450	7190 290
-4500 -180			* 10800 * 10800							* 8100 * 18300	* 8100 * 18300	5810 220

Illustration 90

g06349361

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300			(mm) (inch)
 	 	 	 	 	 	 		
+2								
7500 300				* 25950	* 25950			* 11350 10100 7000 * 25150 22800 280
6000 240				* 12500 * 12500 * 27200 * 27200	* 11250 8900 * 24650 19050			* 11000 8050 7950 * 24250 17900 310
4500 180			* 18250 * 18250 * 39200 * 39200	* 13900 12150 * 30050 26200	* 11750 8600 * 25550 18500			10250 6950 8520 22700 15450 340
3000 120			* 21600 17150 * 46400 37000	* 15400 11400 * 33300 24600	12250 8250 26400 17750			9550 6450 8810 21050 14200 350
1500 60			* 38350 35050 * 35400 23350	* 16350 10850 * 35400 23350	11900 7950 25650 17050			9350 6250 8830 20550 13800 350
0 0			* 21650 16100 * 47100 34600	16400 10550 35200 22700	11700 7750 25150 16650			9600 6400 8590 21200 14100 340
-1500 -60		* 15950 * 15950 * 36450 * 36450	* 19900 16150 * 43200 34700	* 15500 10450 * 33600 22550	11650 7700 25100 16550			10550 7000 8070 23250 15450 320
-3000 -120		* 20250 * 20250 * 44100 * 44100	* 17000 16450 * 36800 35300	* 13400 10600 * 28800 22900				* 10450 8300 7190 * 23000 18450 290
-4500 -180			* 12200 * 12200					* 9200 * 9200 5810 * 20750 * 20750 220

Illustration 91

g06349364

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) double grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

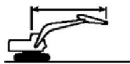
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300		(mm) (inch)
							
7500 300				* 23450	* 23450	* 10400	10100
6000 240				* 11300	* 11300	* 10150	8850
4500 180			* 16500	* 16500	* 12550	12100	* 10600
3000 120			* 19450	17100	* 13850	11400	* 11150
1500 60			* 36200	34950	* 31850	23300	* 25100
0 0			* 19450	16050	* 14750	10500	* 11550
-1500 -60		* 15050	* 15050	* 17800	16150	* 13900	10450
-3000 -120		* 34350	* 34350	* 38750	34650	* 30100	22450
-4500 -180		* 18000	* 18000	* 15200	* 15200	* 11950	10600

Illustration 92

g06349367

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

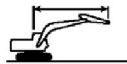
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300		
							(mm) (inch)
+2							
7500 300				* 25950 * 25950		* 11350 10100 * 25150 22750	7000 280
6000 240				* 12500 * 12500 * 11250 8850 * 27200 * 27200 * 24650 19000		* 11000 8000 * 24250 17850	7950 310
4500 180			* 18250 * 18250 * 13900 12100 * 39200 * 39200 * 30050 26100		* 11750 8600 * 25550 18450	10250 6950 22650 15400	8520 340
3000 120			* 21600 17100 * 15400 11400 * 46400 36900 * 33300 24550		12250 8250 26350 17700	9500 6400 21000 14150	8810 350
1500 60			* 38350 34950 * 16350 10800 * 35400 23300		11900 7900 25600 17000	9300 6250 20500 13750	8830 350
0 0			* 21650 16050 16350 10500 * 47100 34500 35150 22600		11650 7700 25100 16600	9600 6400 21150 14100	8590 340
-1500 -60		* 15950 * 15950 * 19900 16150 * 36450 * 36450 * 43200 34650		* 15500 10450 * 33600 22450	11650 7650 25050 16500	10500 7000 23200 15400	8070 320
-3000 -120		* 20250 * 20250 * 17000 16400 * 44100 * 44100 * 36800 35250		* 13400 10600 * 28800 22850		* 10450 8300 * 23000 18400	7190 290
-4500 -180			* 12200 * 12200			* 9200 * 9200 * 20750 * 20750	5810 220

Illustration 93

g06349370

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) heavy-duty triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

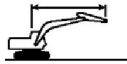
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300				(mm) (inch)
													
7500 300							* 23450	* 23450			* 10400	9950	7000
6000 240							* 11300	* 11300	* 10150	8750	* 9950	7900	7950
4500 180					* 16500	* 16500	* 12550	11950	* 10600	8450	* 9800	6850	8520
3000 120					* 35450	* 35450	* 27100	25800	* 23000	18200	* 21600	15150	340
1500 60					* 19450	16850	* 13850	11200	* 11150	8100	9350	6300	8810
0 0					* 41850	36400	* 29950	24200	* 24200	17450	20650	13950	350
-1500 -60					* 36200	34450	* 14700	10650	* 11600	7800	9150	6150	8830
-3000 -120					* 19450	15800	* 14750	10350	11500	7600	9450	6300	8590
-4500 -180					* 42350	34000	* 31950	22300	24700	16350	20800	13850	340
			* 15050	* 15050	* 17800	15900	* 13900	10300	* 10800	7550	* 9650	6850	8070
			* 34350	* 34350	* 38750	34100	* 30100	22150	* 23250	16250	* 21300	15150	320
			* 18000	* 18000	* 15200	* 15200	* 11950	10450			* 9300	8200	7190
			* 39300	* 39300	* 32900	* 32900	* 25700	22500			* 20450	18150	290
					* 10800	* 10800					* 8100	* 8100	5810
											* 18300	* 18300	220

Illustration 94

g06349372

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

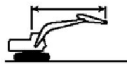
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300			
 												(mm) (inch)
+2												
7500 300							* 25950	* 25950			* 11350 * 25150	9950 22450 7000 280
6000 240							* 12500 * 27200	* 12500 27200	* 11250 * 24650	8750 18750	* 11000 * 24250	7900 17600 7950 310
4500 180					* 18250 * 39200	* 18250 * 39200	* 13900 * 30050	11950 25800	* 11750 * 25550	8450 18200	10100 22300	6850 15150 8520 340
3000 120					* 21600 * 46400	16850 36400	* 15400 * 33300	11200 24200	12050 25950	8100 17450	9350 20650	6300 13950 8810 350
1500 60					* 38350	34450	* 16350 35350	10650 22950	11700 25200	7800 16750	9150 20200	6150 13550 8830 350
0 0					* 21650 * 47100	15800 34000	16100 34600	10350 22300	11500 24700	7600 16350	9450 20800	6300 13850 8590 340
-1500 -60			* 15950 * 36450	* 15950 * 36450	* 19900 * 43200	15900 34100	* 15500 * 33600	10300 22150	11450 24650	7550 16250	10350 22800	6850 15150 8070 320
-3000 -120			* 20250 * 44100	* 20250 * 44100	* 17000 * 36800	16150 34700	* 13400 * 28800	10450 22500			* 10450 * 23000	8200 18150 7190 290
-4500 -180					* 12200	* 12200					* 9200 * 20750	* 9200 * 20750 5810 220

Illustration 95

g06349374

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 600 mm (24 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

700 mm (27 inch) Track Shoes

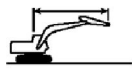
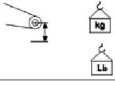
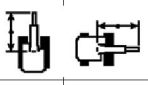
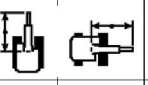
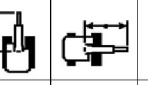
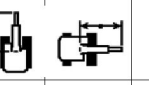
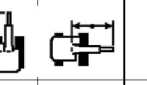
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300		(mm) (inch)
							
7500 300				* 23450	* 23450	* 10400	10000
6000 240				* 11300	* 11300	* 23000	22600
4500 180			* 16500	* 12550	* 10150	* 9950	7950
3000 120			* 35450	* 27100	* 22200	* 22000	17700
1500 60			* 19450	* 13850	* 11150	* 9800	6900
0			* 41850	* 29950	* 24200	* 21600	15300
0			* 36200	* 31850	* 25100	* 20850	14050
-1500 -60		* 15050	* 17800	* 13900	* 10800	* 9650	6950
-3000 -120		* 34350	* 38750	* 30100	* 23250	* 21300	15300
-4500 -180		* 18000	* 15200	* 11950		* 9300	8250
		* 39300	* 32900	* 25700		* 20450	18300
			* 10800			* 8100	8100
						* 18300	18300

Illustration 96

g06349377

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Product Information Section

345 GC with 600 mm (24 inch) and 700 mm (27 inch) Track Shoes

(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300				(mm) (inch)
													
+2													
7500 300							* 25950	* 25950			* 11350	10000	7000
6000 240							* 12500	* 12500	* 11250	8800	* 25150	22600	280
4500 180					* 18250	* 18250	* 13900	12050	* 11750	8550	* 11000	7950	7950
3000 120					* 39200	* 39200	* 30050	25950	* 25550	18350	* 24250	17700	310
1500 60					* 21600	17000	* 15400	11300	12150	8150	9450	6400	8810
0					* 46400	36700	* 33300	24400	26150	17600	20850	14050	350
0					* 38350	34750	* 16350	10750	11800	7850	9250	6200	8830
-1500 -60					* 35400	23150	* 35400	23150	25400	16900	20350	13650	350
-3000 -120					* 21650	15950	16250	10450	11600	7650	9550	6350	8590
-4500 -180					* 47100	34250	34900	22450	24950	16450	21000	14000	340
-1500 -60			* 15950	* 15950	* 19900	16000	* 15500	10350	11550	7600	10450	6950	8070
-3000 -120			* 36450	* 36450	* 43200	34400	* 33600	22300	24850	16400	23000	15300	320
-4500 -180			* 20250	* 20250	* 17000	16300	* 13400	10500			* 10450	8250	7190
-1500 -60			* 44100	* 44100	* 36800	35000	* 28800	22650			* 23000	18300	290
-3000 -120					* 12200	* 12200					* 9200	* 9200	5810
-4500 -180											* 20750	* 20750	220

Illustration 97

g06349381

345 GC: 6.55 m (21 ft 5 inch) Mass boom, 2.5 m (8 ft 2 inch) stick, 700 mm (27 inch) triple grouser track shoe, and 9000 kg (19842 lb) CTWT.

Identification Information

i08172895

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) and CE Plate



Illustration 98

g06276619

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

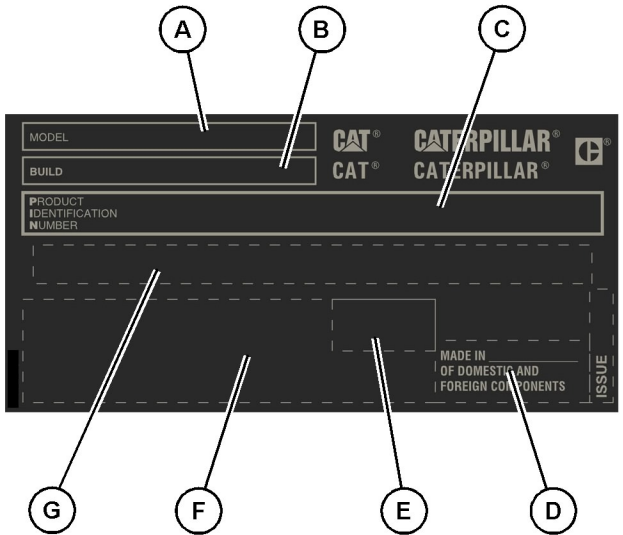


Illustration 99

g06184421

Model number (A)_____

Build (B)_____

Machine PIN (C)_____

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

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

Regional Certification Plate (If Required) (F)

Service Information Plate (G)_____

Local regulation may require documentation of the Month and/or Year of Manufacture in the Operation and Maintenance Manual. Enter on line (E) above if required.

China Pin Plate

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

CAT® CATERPILLAR® CAT® CATERPILLAR® 	
卡特彼勒 徐州 有限公司 Caterpillar Xuzhou Ltd	
产品名称 履带式液压挖掘机	型号
发动机功率 (kw)	制造年份
机器识别号	
江苏省徐州市经济开发区	

Illustration 100 g03153576

European Union

MODEL	CAT® CATERPILLAR®
BUILD	CAT® CATERPILLAR® 
PRODUCT IDENTIFICATION NUMBER	
CATERPILLAR INC. PEORIA, IL 61629 USA	
MADE IN OF DOMESTIC AND FOREIGN COMPONENTS	
ISSUE	

 KW _____ kg _____
KW _____

Illustration 101 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 _____

MODEL	CAT® CATERPILLAR®
BUILD	CAT® CATERPILLAR® 
PRODUCT IDENTIFICATION NUMBER	
CATERPILLAR INC. PEORIA, IL 61629 USA	
MADE IN OF DOMESTIC AND FOREIGN COMPONENTS	
ISSUE	

 KW _____ kg _____
KW _____

Illustration 102 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 mark plate is positioned near the Product Identification Number (PIN) plate (see Product Information Section of the machine Operation and Maintenance Manual). The EAC mark plate is placed on machines certified to the Eurasian Economic Union requirements effective at the time of market entry.



Illustration 103

g06094564

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

Manufacturer Information

Manufacturer:

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

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

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

Engine Serial Number

This label is on the engine.

Engine Serial Number _____

Sound Certification Film

If equipped, this label is on the cab door.

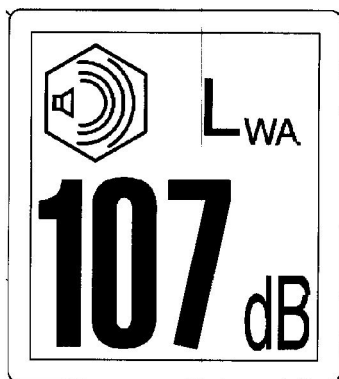


Illustration 104

g06477647

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".

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 7

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 Manage, 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:	345 GC
	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
Harmonised standards taken into consideration: EN 474-1: 2006+A4 :2013+AC:2014;
EN 474-5: 2006+A3: 2013
EN 13309: 2010

Done at:

Signature

Date:

Name/Position

Note: The above information was correct as of **September 2018**, 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 105

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.

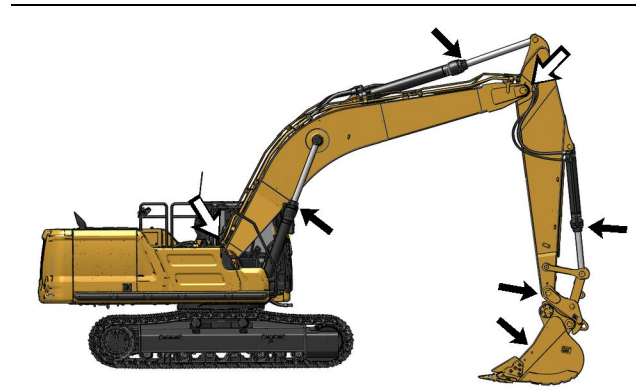


Illustration 106

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.

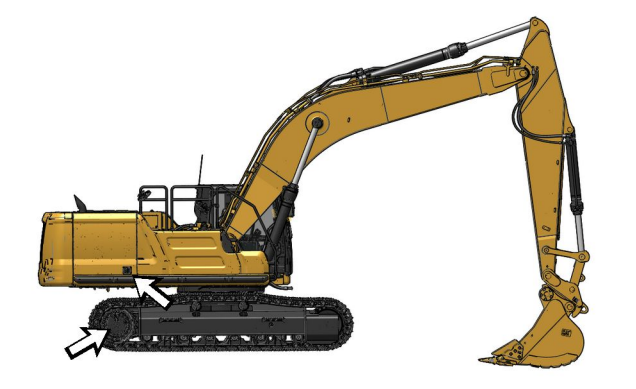


Illustration 107

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.

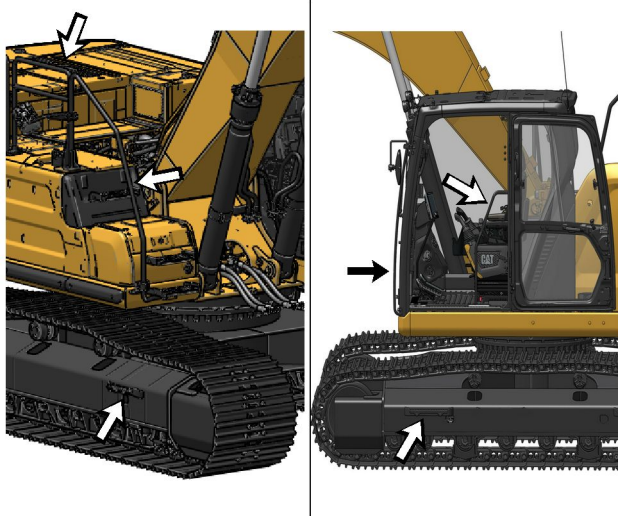


Illustration 108

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)

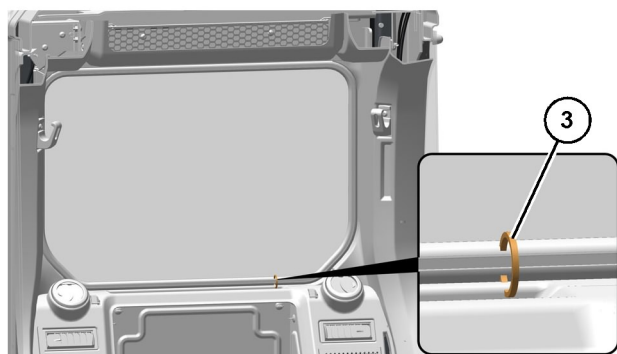


Illustration 109

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)

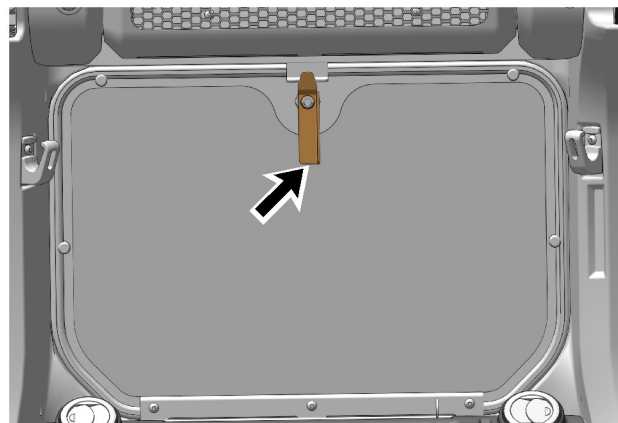


Illustration 110

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.

i07868899



Illustration 111

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.

Seat

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

Comfort Seat



Illustration 112

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.

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

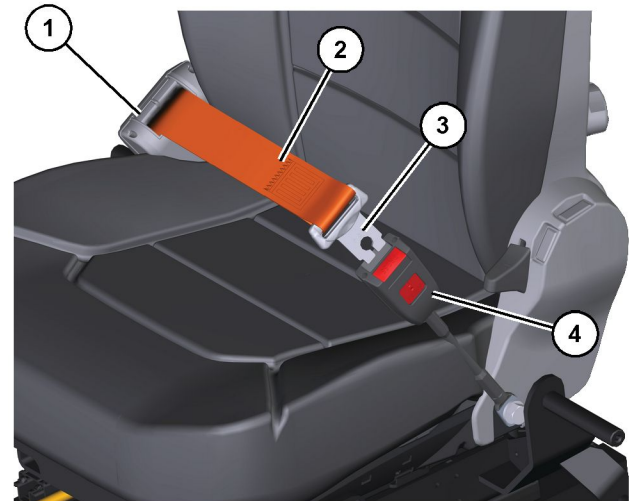


Illustration 113

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 114

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.

i08085055

Operator Controls

SMCS Code: 7300; 7301; 7451

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

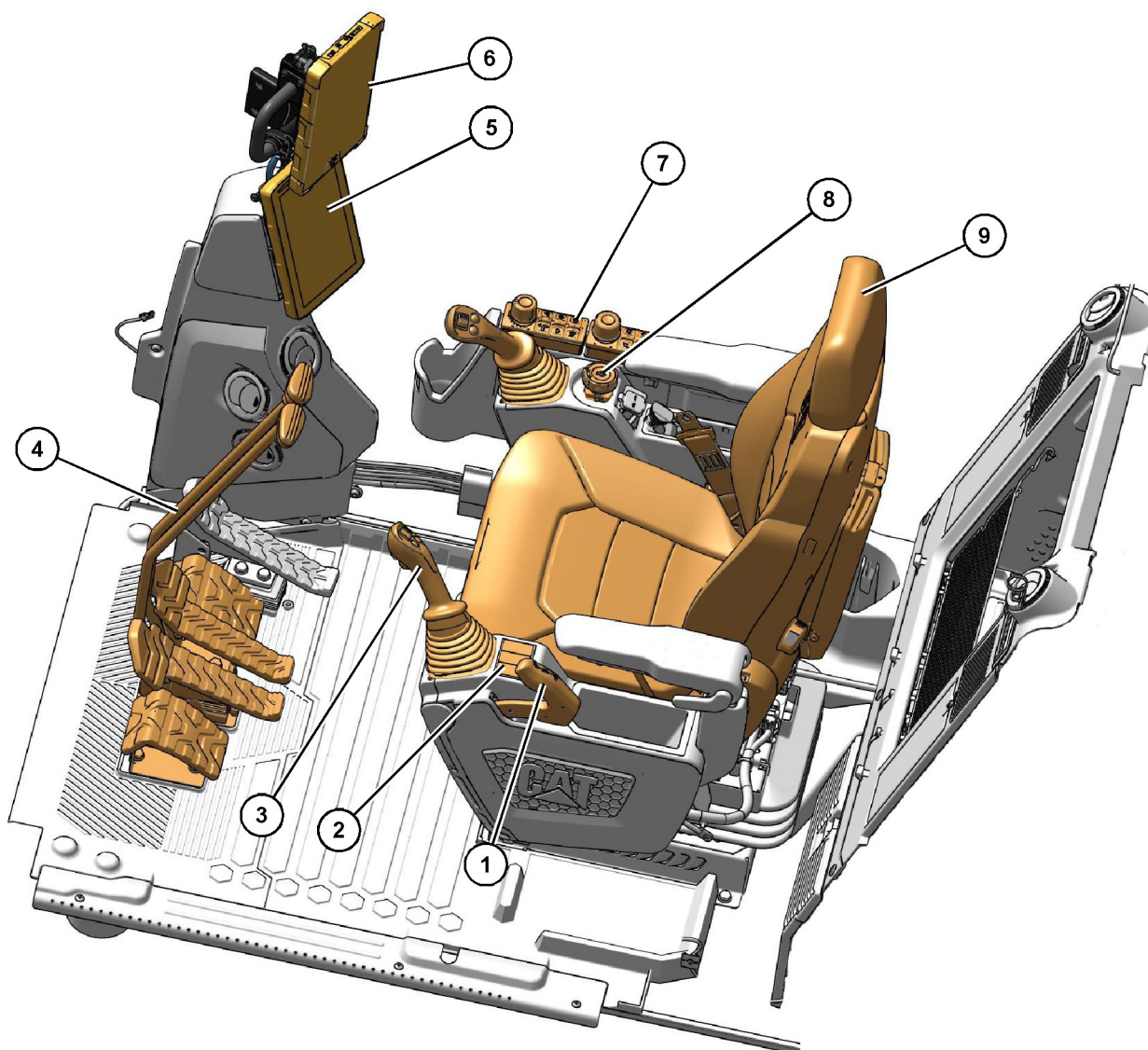


Illustration 115

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.



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

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.



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 116

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 117

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.

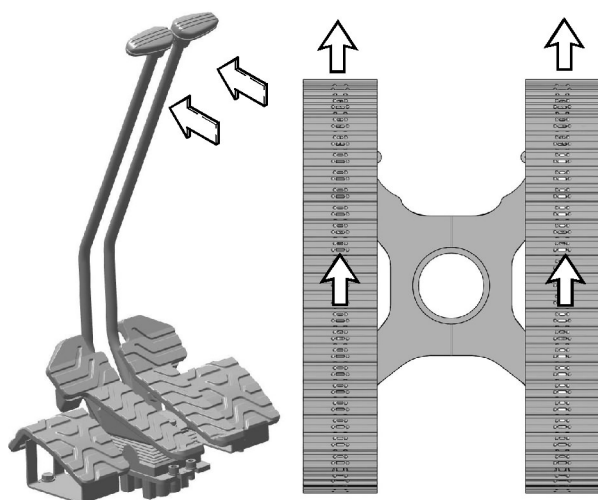


Illustration 118
FORWARD travel

g06178269

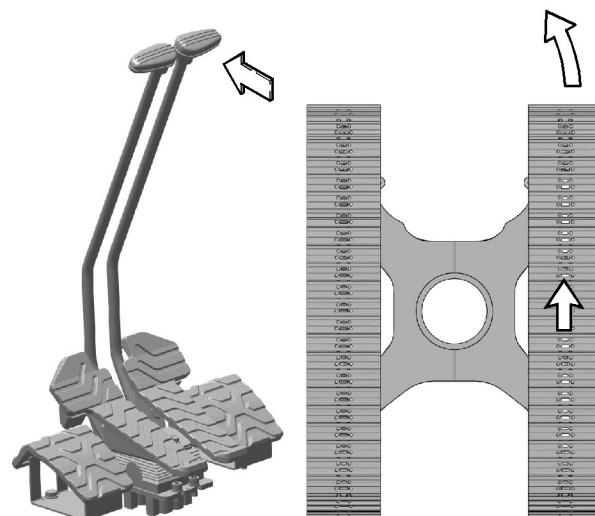


Illustration 120
Pivot left turn (FORWARD)

g06178288

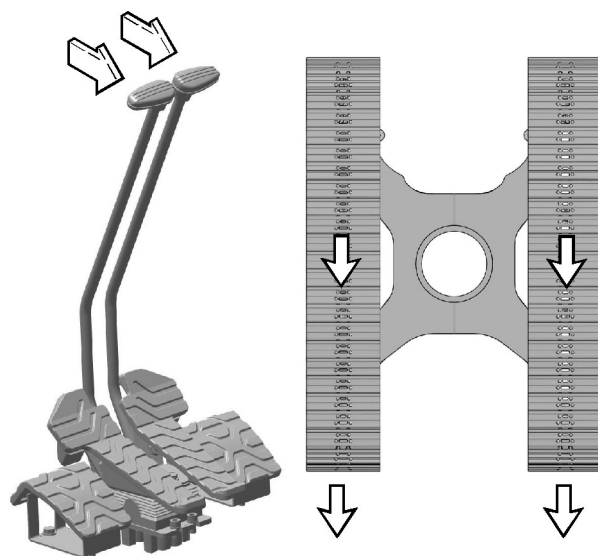


Illustration 119
REVERSE travel

g06178283

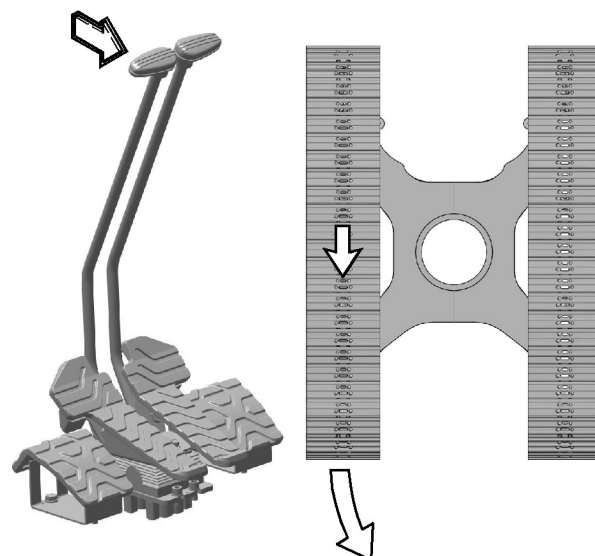


Illustration 121
Pivot Left Turn (REVERSE)

g06178294

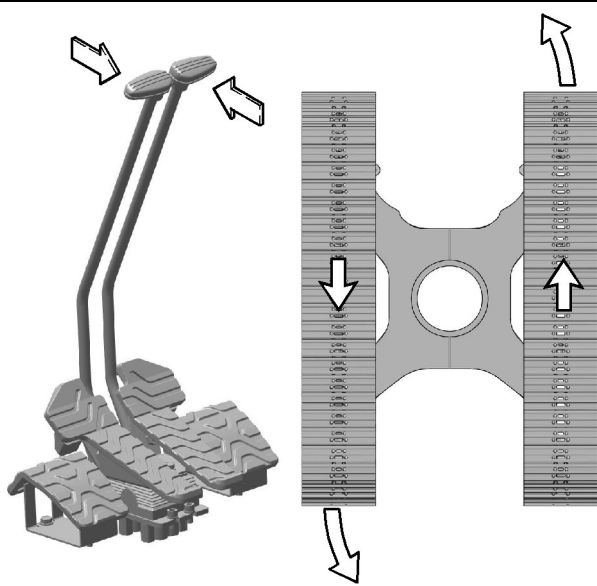


Illustration 122

g06178300

Counterrotate turn (LEFT)

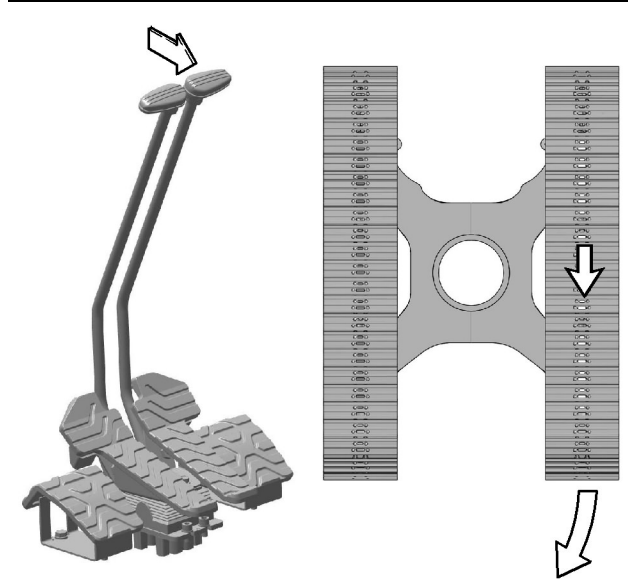


Illustration 124

g06178308

Pivot right turn (REVERSE)

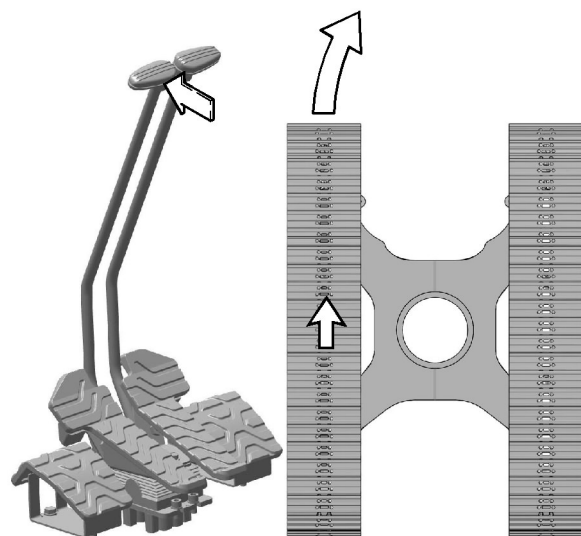


Illustration 123

g06178305

Pivot right turn (FORWARD)

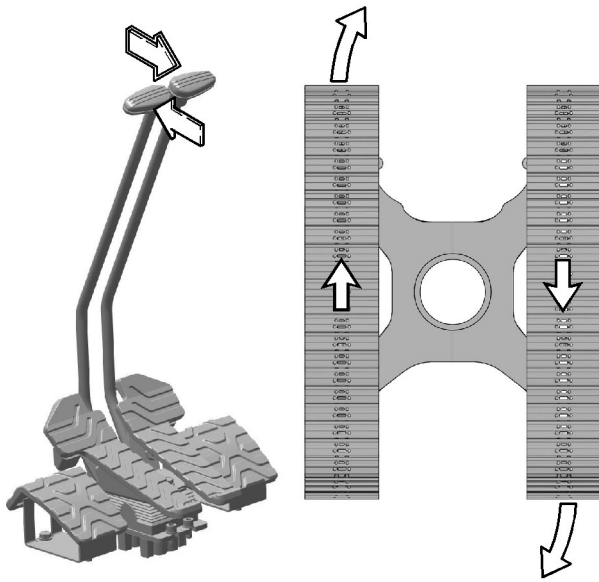


Illustration 125

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.

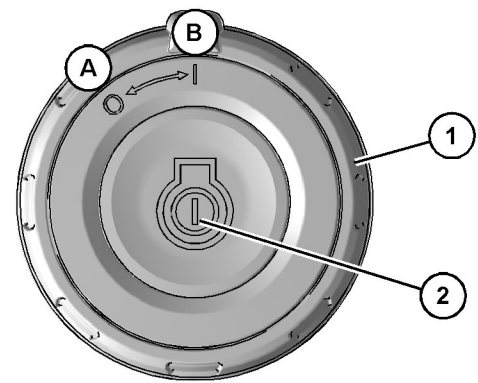


Illustration 126

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 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).



button.

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

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.

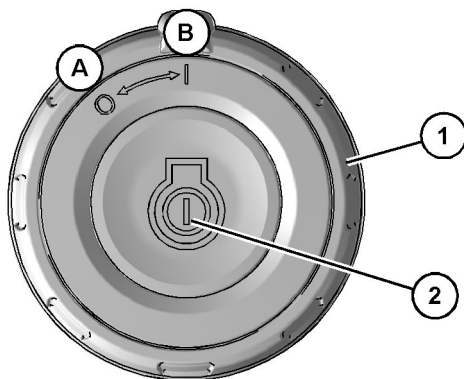


Illustration 127

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).



button.

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

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 a period of 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)

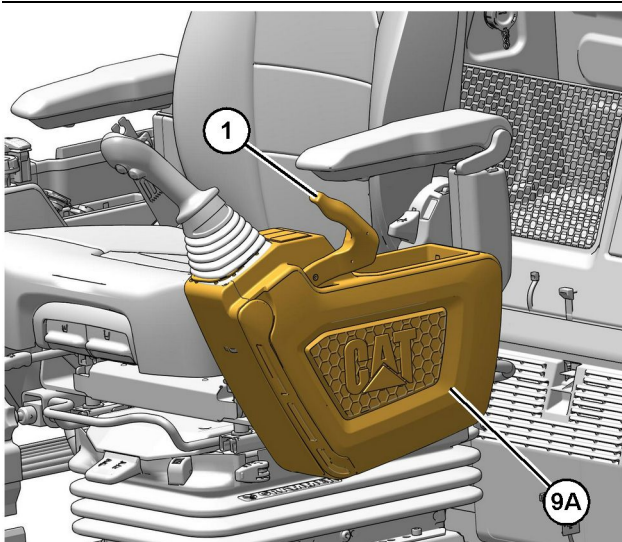


Illustration 128

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)

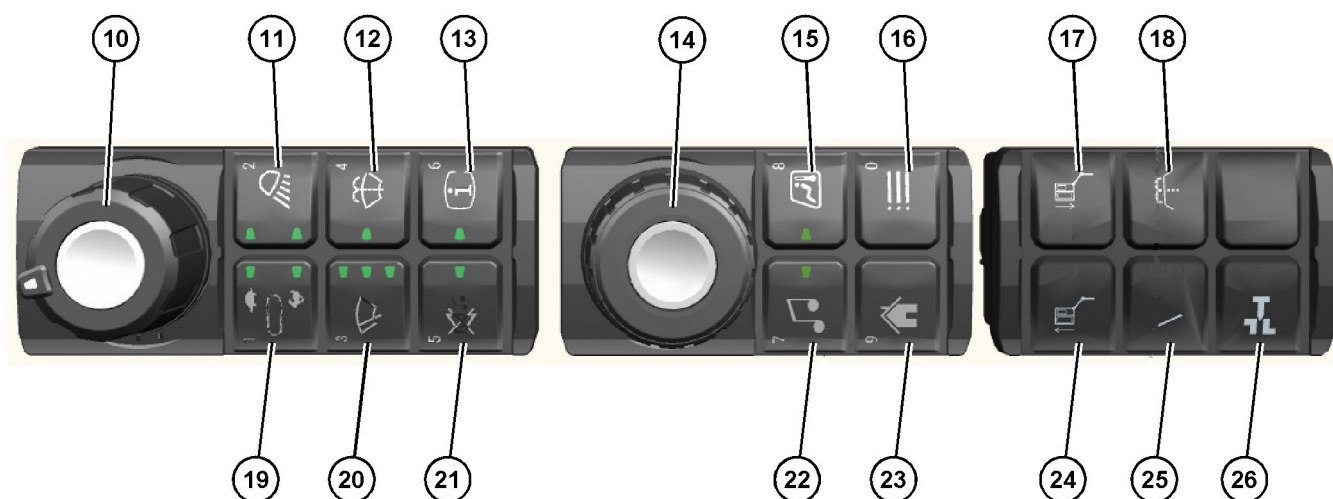


Illustration 129

g06538485

Right side switch panel

(10) Engine speed / power mode control
(11) Light switch
(12) Window washer
(13) Operator Information
(14) Jog dial
(15) Air conditioning and heating

(16) Next menu
(17) Cab tilt - lower
(18) Sky window washer
(19) Travel speed control
(20) Window wiper
(21) Radio mute

(22) Radio control
(23) Home
(24) Cab tilt - raise
(25) Sky window wiper
(26) Boom coupler

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 (10) – 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)

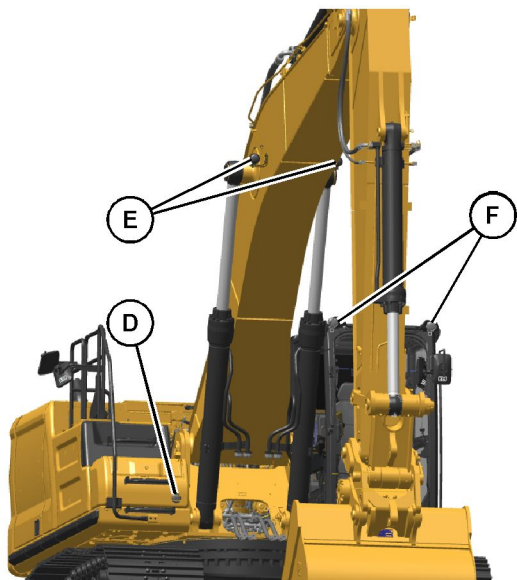


Illustration 130

g06278042



Light Switch(11) – 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.

Cab Tilt - Lower (17)



Cab Tilt - Lower (17) – Press the switch to lower the tilt cab.

Note: Remove Lock Pin for Tilt Cab before tilting Cab. For more information refer to Operation and Maintenance Manual, Cab Tilt Control.

Sky Window Washer (18)



Sky Window Washer (18) – Push down on the switch and keep the switch depressed to activate the sky window washer. While the switch is depressed, the washer fluid will spray from the nozzle.

Travel Speed Control (19)

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 (19) – 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.

Window Wiper (20)



Window Wiper (20) – 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.

Radio Mute (21)



Radio Mute (21) – 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.

Radio Control (22)



Radio Control (22) – 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.

Home (23)



Home Key (23) – Press the home key to return to the default display at any time.

Refer to Monitoring System for more information.

Cab Tilt - Raise (24)



Cab Tilt - Raise (24) – Press the switch to raise the tilt cab.

Note: Remove Lock Pin for Tilt Cab before tilting Cab. For more information refer to Operation and Maintenance Manual, Cab Tilt Control.

Sky Window Wiper (25)



Sky Window Wiper (25) – Push down the switch to turn the sky window wiper on and off.

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.

Boom Coupler (26)



Boom Coupler (26) – Press the boom coupler switch to lock and unlock the boom coupler.

USB/Aux Port (27)

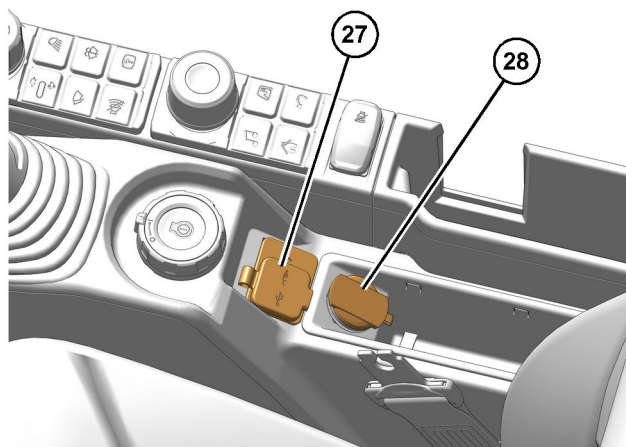


Illustration 131

g06541619

(27) USB/AUX/MIC port
(28) 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 (28) & (29)

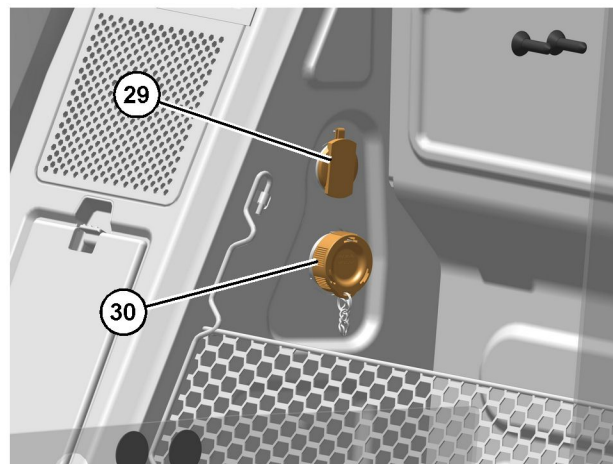


Illustration 132

g06541623

(29) 12 V socket
(30) Service Port

12V **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 (30)

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 (31)

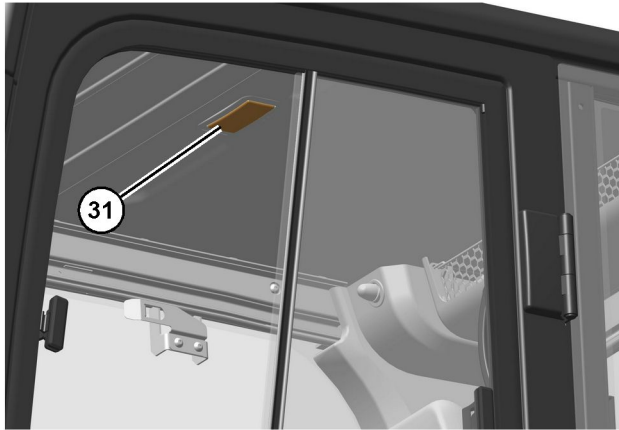


Illustration 133

g06541625

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.

i07357258

Battery Disconnect Switch

SMCS Code: 1411-B11



Illustration 134

g06264946

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

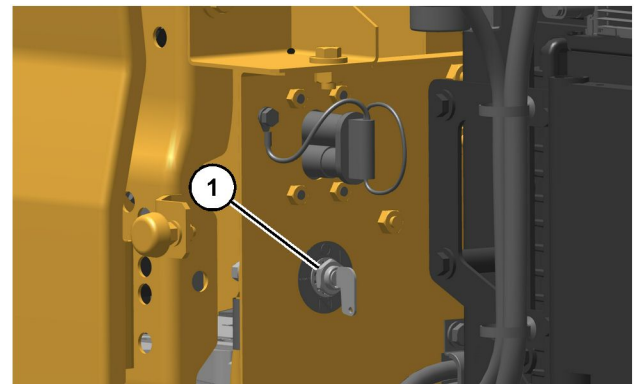


Illustration 135

g06264951

(1) Battery disconnect switch



Battery Disconnect Switch – The battery disconnect switch can be used to disconnect the battery from the machine's 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

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 136

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 machine 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

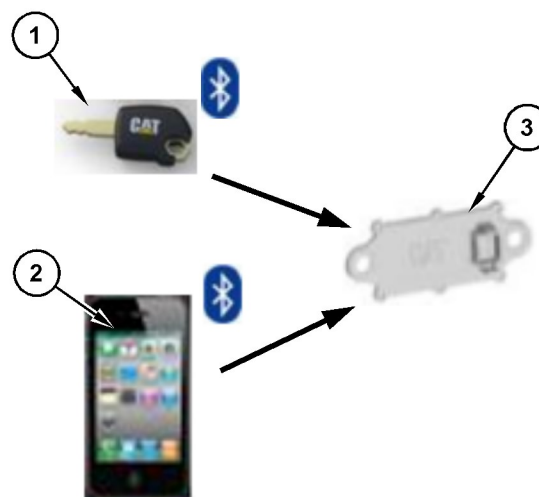


Illustration 137

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:

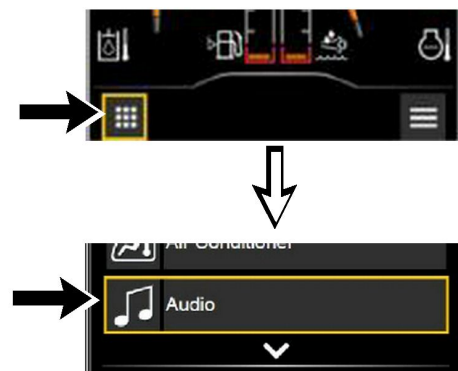


Illustration 138

g06319669

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

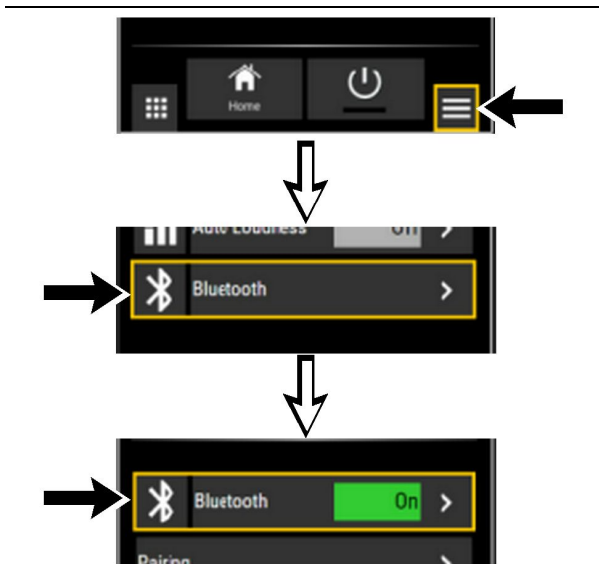


Illustration 139

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 the following procedure to pair your device to the machine:



Illustration 140

g06319669

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

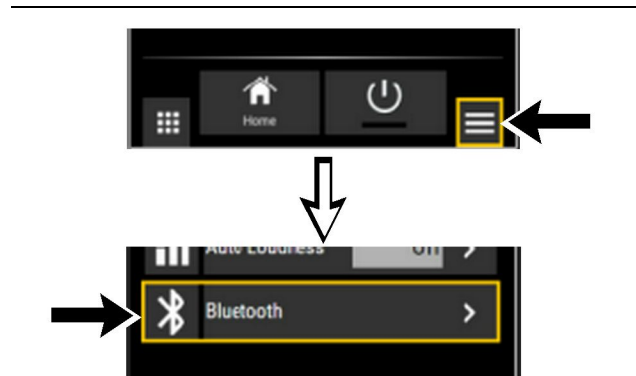


Illustration 141

g06319672

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

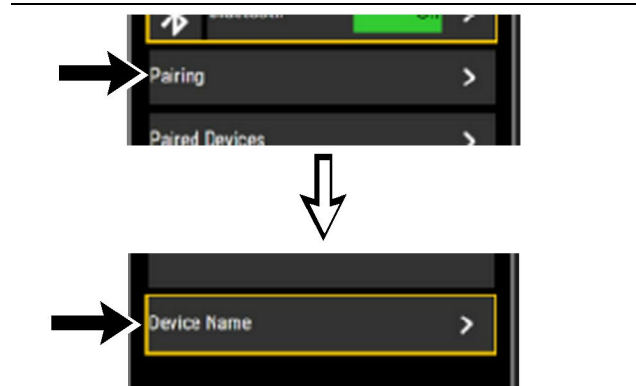


Illustration 142

g06319676

3. Select "Pairing", then "Device Name".

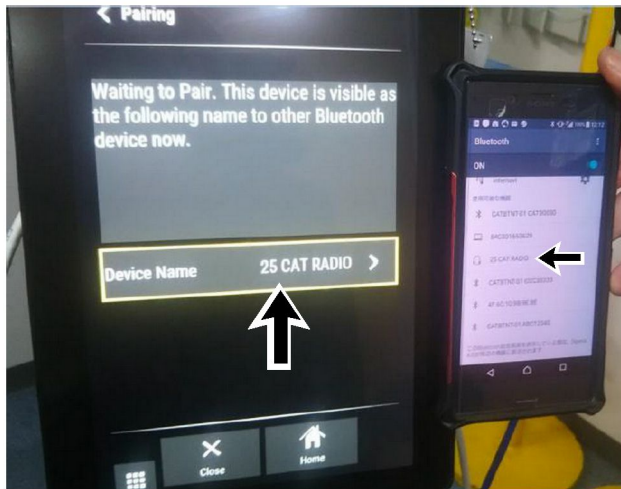


Illustration 143

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

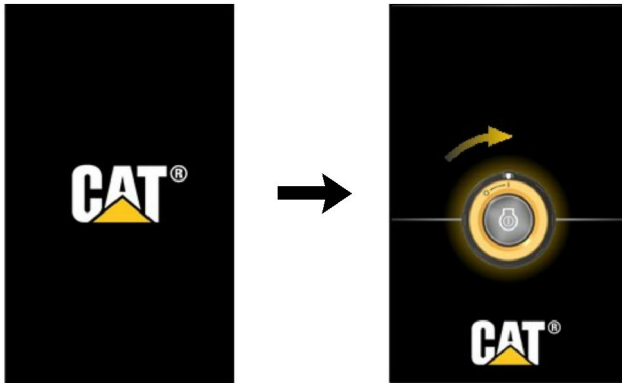


Illustration 144
Startup sequence screens

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 8

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 145
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 146

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 147

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:

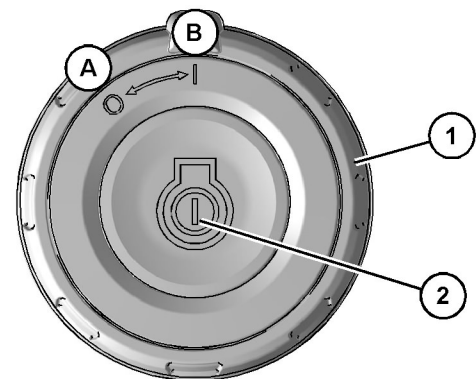


Illustration 148

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).

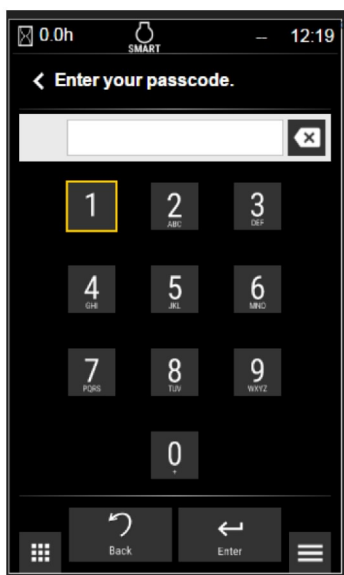


Illustration 149

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 150

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 150 .
4. Select “OK” to continue to the display homescreen.

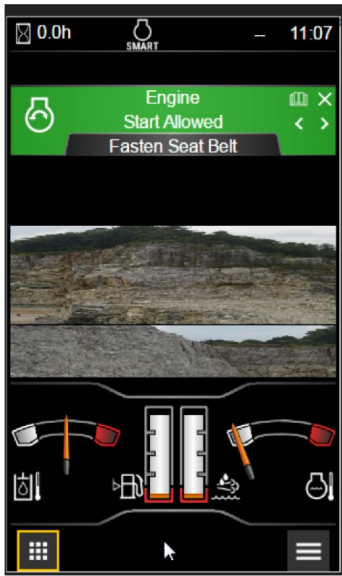


Illustration 151 g06209482

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

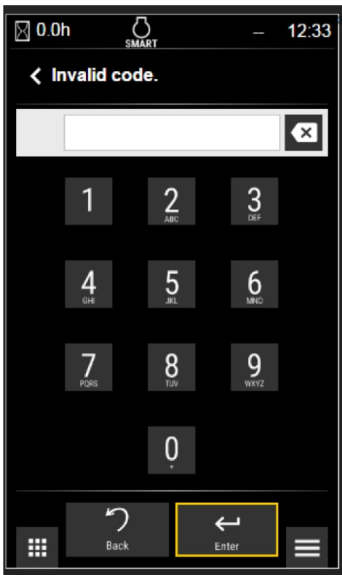


Illustration 152 g06209472

Invalid passcode screen

If a passcode is not recognized, the display will notify the user with an “Invalid code” message. Refer to Illustration 152 .

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:

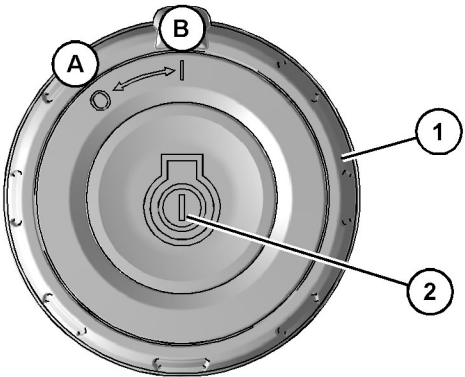


Illustration 153 g06180554

- (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.

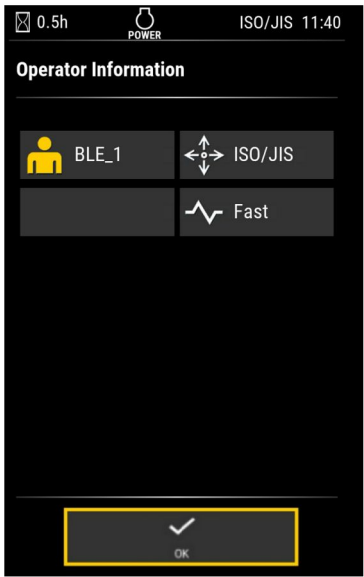


Illustration 154
Bluetooth operator information screen

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

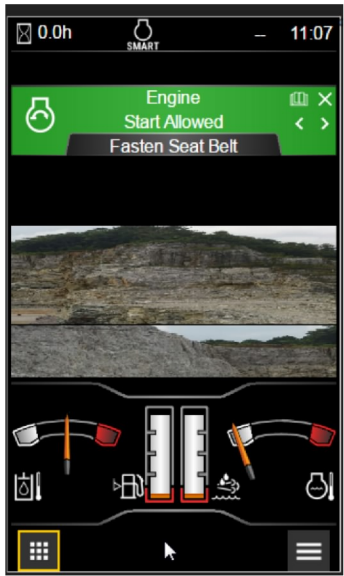


Illustration 155
g06209482

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

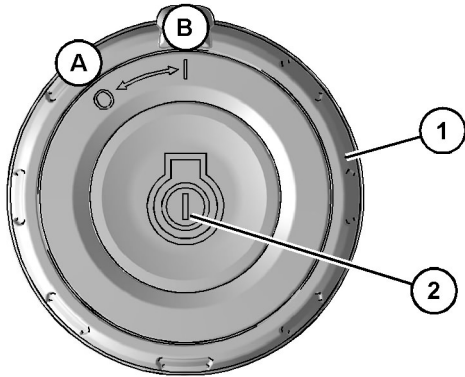
Table 9

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:



- (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 157 g06400799

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

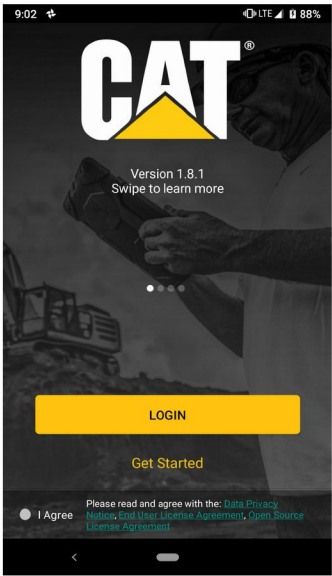


Illustration 158 g06433500

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” .

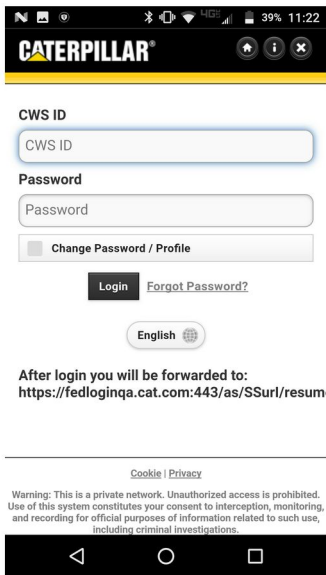


Illustration 159
CWS login screen

5. Enter Cat eCustomer account credentials.

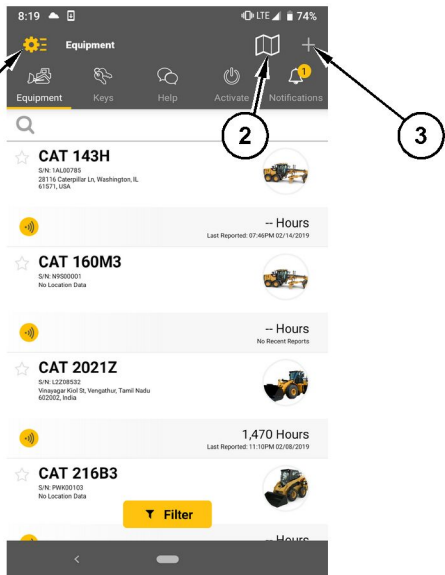


Illustration 161
(1) Menu Icon
(2) Map Icon
(3) Add Equipment Icon

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).

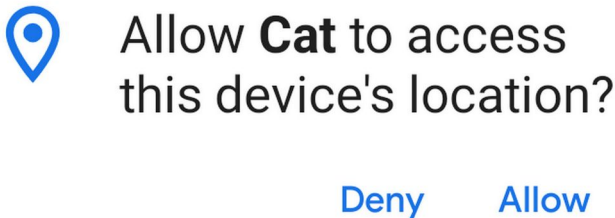


Illustration 160

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.

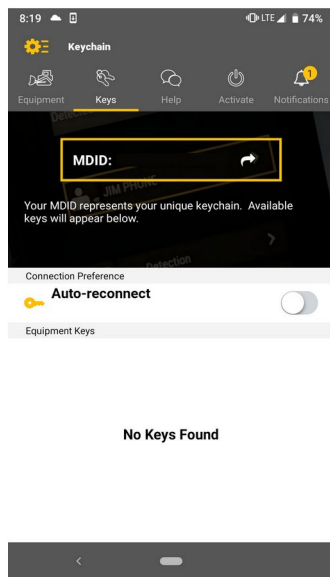


Illustration 162

g06433513

8. Go to the keys tab.

Keys are necessary to connect to vehicles. If no keys are given, the screen in Illustration 162 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.

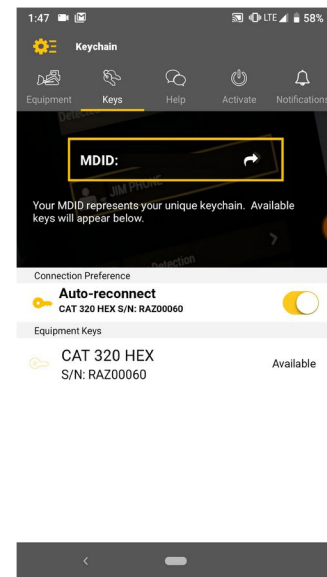


Illustration 163

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.

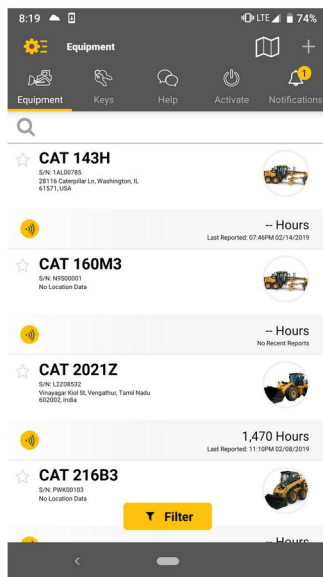


Illustration 164

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.

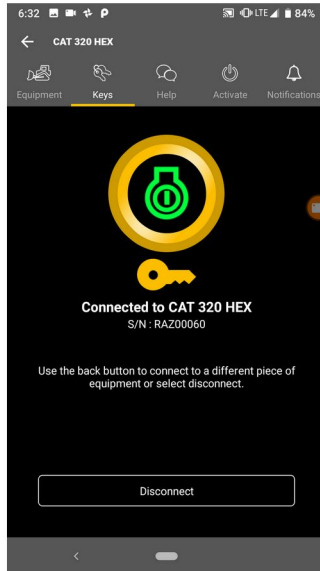


Illustration 165

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.

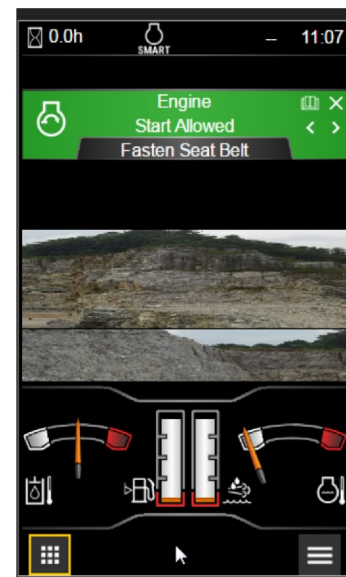


Illustration 166

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:

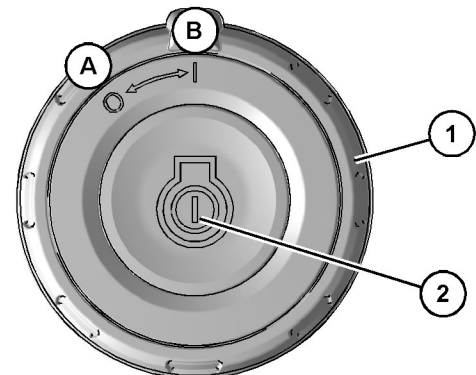


Illustration 167

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 168

g06400799

Cat App: Fleet management mobile application icon

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

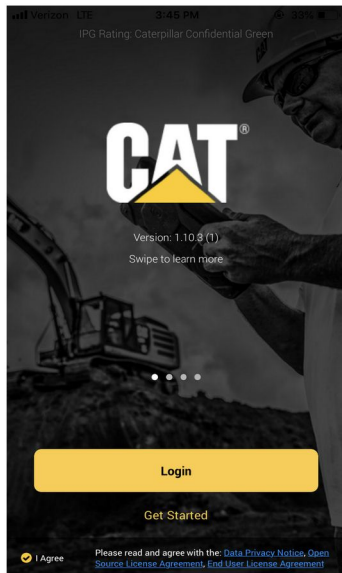


Illustration 169

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" .

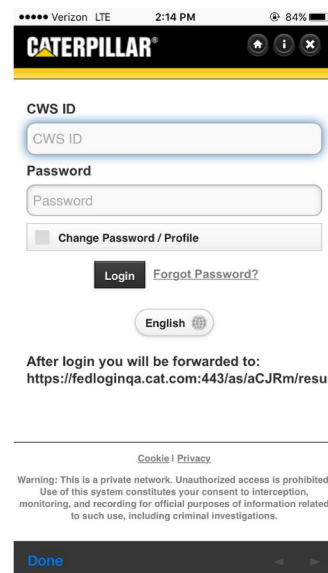


Illustration 170

g06214875

6. Enter eCustomer account credentials to log in.

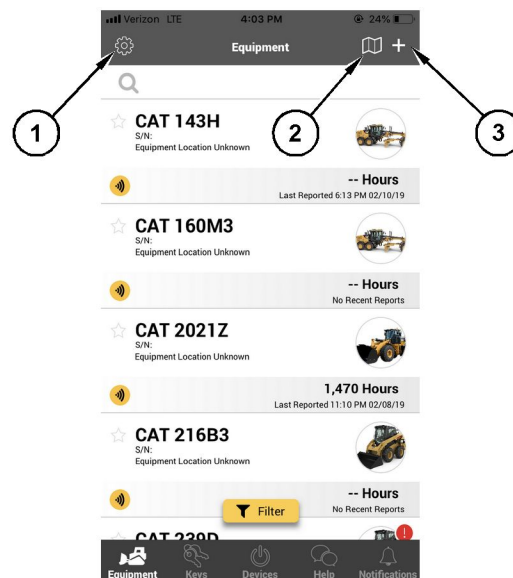


Illustration 171

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).

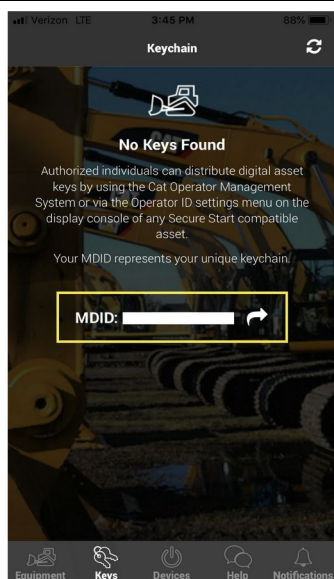


Illustration 172

g06433536

8. Access the “Keys” tab. Keys are necessary to connect to vehicles. If no keys are given, the screen in Illustration 172 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.

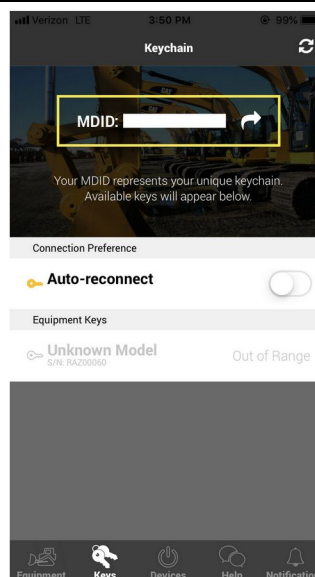


Illustration 173

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”.

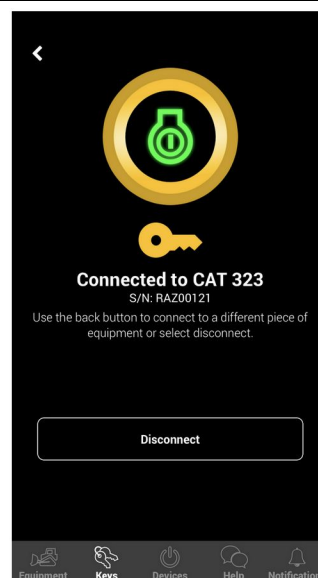


Illustration 174

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.

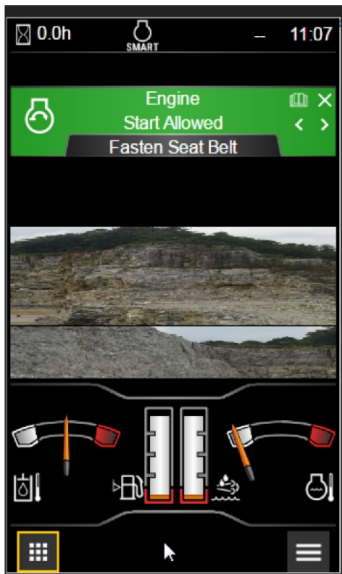


Illustration 175 g06209482

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 10

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

(continued)

(Table 10, contd)

Switch Status	Possible Cause	Resolution
	Operator not authenticated (Cat Fleet management app)	Alternately login with display passcode or contact local Cat dealer
		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

i07692597

Camera

SMCS Code: 7347; 7348

Rear View Camera



Illustration 176

g06279174

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)

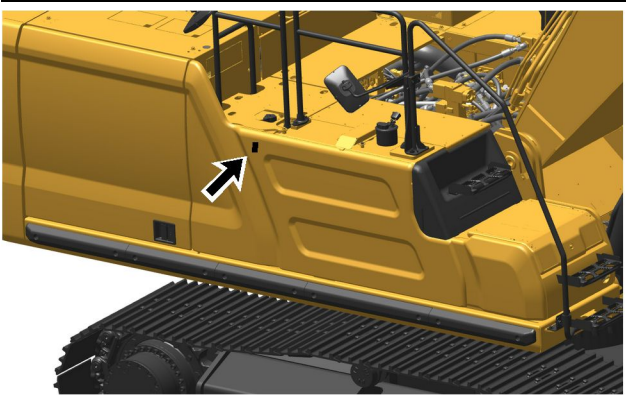


Illustration 177

g06279183

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”.

360 Visibility (If Equipped)

Note: 10 inch monitor is required for 360 Visibility.

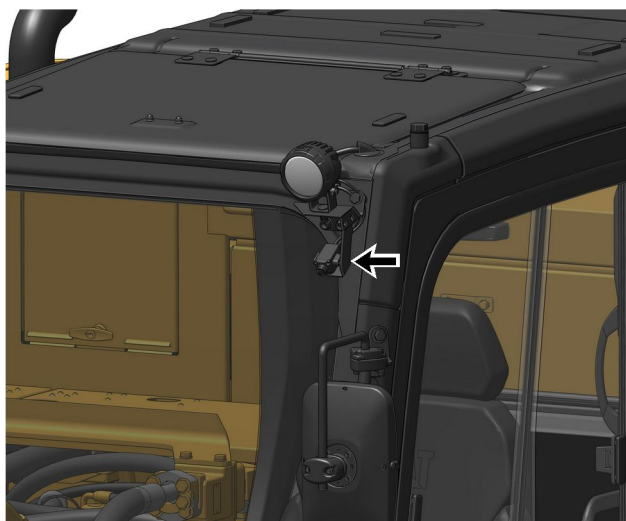


Illustration 178

g06263449

Front camera

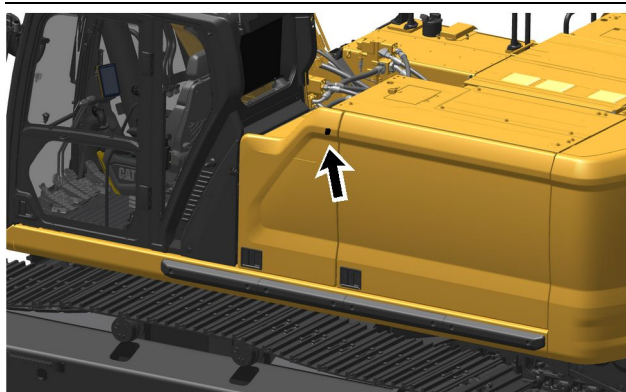


Illustration 179

g06279184

Left side camera

The 360 visibility system consists of a front camera and a left side camera in addition to the right side and rear view cameras.

If equipped with the optional side and front cameras, the 360 visibility feature can be toggled on and off to enable or disable the 360 degree visibility view in the monitor.

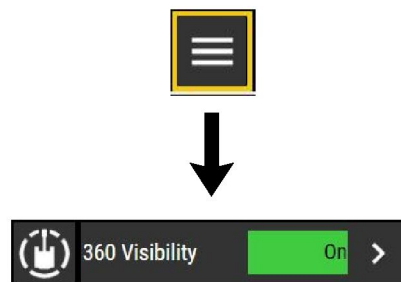


Illustration 180

g06263096

Note: The 360 visibility 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".

i08259360

Monitoring System

SMCS Code: 7451; 7490

NOTICE

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

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

General Information

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

The monitoring system is an input and an output of the Machine Control System. The monitor has a multi-touch 8 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 181

g06469575

- (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)

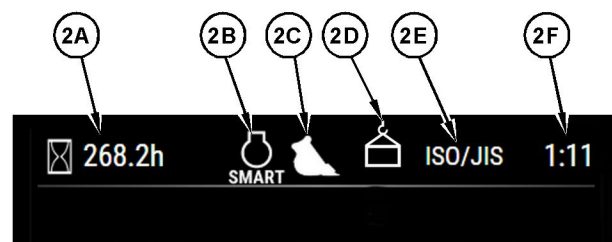


Illustration 182

g06469582

- (2A) Multi Status Information
- (2B) Seatbelt Switch Status (if equipped) / Power Mode
- (2C) Work Tool
- (2D) Overload Warning Device
- (2E) Lever Pattern / Fuel Level
- (2F) Clock

Multi Status Information (2A)



Service Hour Meter (2A) – Shows the total operating hours of the engine. Use the display to determine the service-hour maintenance intervals.



Soot Load (2A) – The amount of soot built up in the Diesel Particulate Filter (DPF) at the time of regeneration.



Time To Regen (2A) – Shows the estimated time left for regeneration.



Fuel Consumption Rate (2A) – Displays fuel consumption per hour. Fuel consumption can be measured in liters or gallons.



Fuel Remain Time (2A) – Shows the estimated time until fuel is empty.

Tool Name(2A) – Shows the tool name selected.

Tool #1

Note: When the cursor is on this area, the information can be changed by touching the area or by rotating the jog dial.

Seatbelt Switch Status (If equipped) / Power Mode (2B)

Not Fastened (2B) – Displays when the seatbelt is not fastened.



Smart Mode (2B) – This indicator shows that the machine is set to operate in the SMART mode.



Power Mode (2B) – This indicator shows that the machine is set to operate in the Power mode.



Disabled (2B)

Work Tool (2C)

Work Tool – Displays the current work tool.



Off (inactive, Not Installed)



Other



Hammer



Grapple



Bucket



Shear



Thumb



Magnet



Compactor



Clamshell



Rotary Cutter



Tilt Bucket



Tilt Rotor



Quick Coupler

Lever Pattern/Fuel Level (2E)

Lever Pattern – The lever pattern will be displayed if the hydraulic lock switch is locked. The lever patterns that can be displayed are: ISO/JIS, KOBE, MHL, SCM, and BHL.

Fuel Level – The fuel level will be displayed when the hydraulic lock switch is unlocked and the fuel gauge is not displayed in Gauge Area (5). The fuel level will indicate the amount of fuel left in the fuel tank. 100% is displayed when the fuel tank is full. The displayed fuel level will decrease by 10% as fuel is consumed. "E" in red will be displayed when the fuel tank is empty.

Note: If the hydraulic lock switch is unlocked and the fuel gauge is displayed in Gauge Area (5), then this area will be blank.

Overload Warning Device (If Equipped) (2D)

On (Active) (2D) – The Overload Warning Device is in active status.



Off (inactive, Not Installed)(2D)

Clock (2F)

Clock (2F) – The clock function displays the current time.

Event Indicator Area (3)

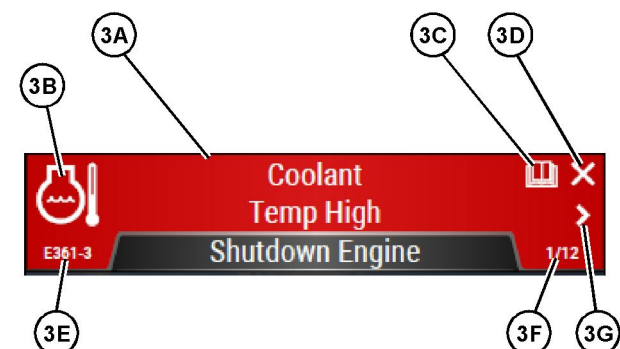


Illustration 183

g06223056

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

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

Close Key (3D) – Select this key 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 Keys (3G) – The arrow keys are shown when there is a next or previous message. Select the arrow key 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 radio 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

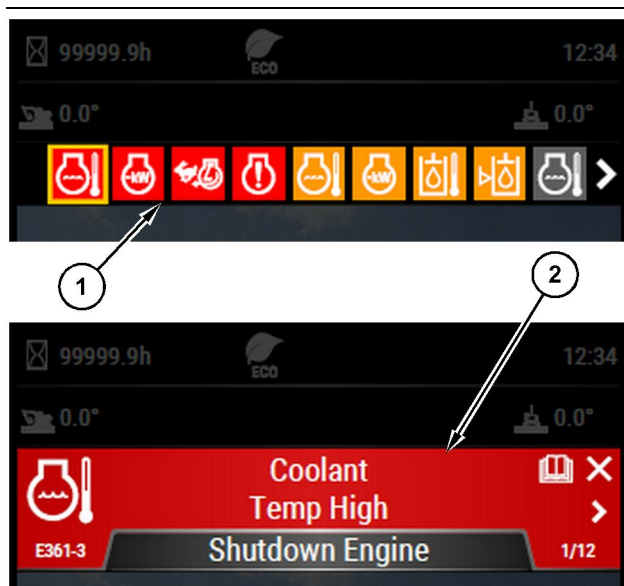


Illustration 184

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.

Event Icon List



Illustration 185

g06223816

The Event Icon List displays all active events. The list orders the higher-level warnings first, with the red furthest left, and gray furthest right. The currently selected icon will be highlighted with a yellow box surrounding the icon. Turn the jog dial left and right to change the highlighted icon and press down on the jog dial to navigate to the highlighted icon pop-up message.

Arrows will appear at either side of the icon list if there are too many icons to display on a single bar. The arrow will navigate to the next set of icons instantly rather than the next icon from the bold one. Refer to "List of Warning Messages" for more information on possible causes and responses to Machine System Event Codes.



E119-2 Fuel Level Low - Refill Fuel



E236-2 Hyd Oil Filter Plugged - Replace Filter



**E237-1 Overload Warning Sensor
Malfunction - Check Sensor**



**E237-2 Overload Warning Overload -
Reduce Load**



E241-2 e-fan Failure - Service Required



E363-1 Fuel Temp High



E363-2 Fuel Temp High / Power Derate



**E534-2 Swing Parking Brake
Malfunction - Service Required**



**E534-3 Hyd Lock Active - Cycle The
Lock Lever**



**E862-2 Att Hyd Oil Filter Plugged -
Replace Filter**



**E875-2 Battery Voltage Low - Service
Required**



**E876-2 Battery Voltage High - Service
Required**



**E878-2 Hyd Oil Temp High - Stop
Operating**



**E1046-2 Tool Control Hyd Oil Temp High
- Stop Operating**



**E1132-1 Machine Software
Configuration Inconsistent - Check
Software Version**



**E1377-1 Security System Disable/Derate
Pending**



**E1377-2 Security System Disable/Derate
Pending**



**E1378-2 Machine Fault - Service
Required**



**E1379-2 Machine Fault - Service
Required**



**E1634-2 Refueling Pump Strainer
Plugged - Check Strainer**



**E1635-2 Refueling Pump Runs Dry -
Stop Refueling**



E2138-1 Payload Memory Full

List of Warning Messages

Note: Not all the warnings that are listed may be applicable to all machine models.

Table 11

Machine System Event Codes		
Event Code	Description	Possible Cause / Recommended Response
E119-2	Fuel Level Low - Refill Fuel	Possible Cause: Low fuel level in the tank, fuel line leakage, or the fuel filter is plugged. Recommended Response: Check the fuel level in the tank.
E236-2	Hyd Oil Filter Plugged - Replace Filter	Possible Cause: This event is active only when the machine is traveling and the oil temperature is greater than 50° C (122° F) for 10 seconds or more. Recommended Response: Replace the filter as soon as possible. If filter replacement is not convenient, stop machine travel until oil temperature is less than 50° C (122° F) for 180 seconds or more. If a code is present after the filter is replaced, inspect the hydraulic lines for signs of severe bending or internal collapse.
E237-1	Overload Warning Sensor Malfunction - Check Sensor	Possible Cause: The Boom Cylinder Head Pressure Sensor has experienced a failure. Recommended Response: Consult with your Cat dealer for service.
E237-2	Overload Warning Overload - Reduce Load	Immediate Safe Shutdown of Machine is required Possible Cause: The machine overload pressure threshold has been exceeded. Recommended Response: Reduce the load on the machine before shutting down machine. Inspect machine stress points.
E241-2	e-fan Failure - Service Required	Possible Cause: This event is active when fan embedded control detects locked rotor, high electric current, or internal error. Recommended Response: Investigate if fan is obstructed. Test the fan with the override e-fan speed command in the monitor.
E363-1	Fuel Temp High	Possible Cause: This event is active only when the fuel temperature reaches the trip level. Recommended Response: Reduce Engine Load.
E363-2	Fuel Temp High / Power Derate	Possible Cause: This event is active only when the fuel temperature reaches the trip level. Recommended Response: Reduce Engine Load.
E534-2	Swing Parking Brake Malfunction - Service Required	Possible Cause: Swing movement detected with no command given. Recommended Response: Consult with your Cat® dealer for service.
E534-3	Hyd Lock Active - Cycle The Lock Lever	Possible Cause: Swing movement detected with no command given. Recommended Response: Consult with your Cat dealer for service.
E862-2	Att Hyd Oil Filter Plugged - Replace Filter	Possible Cause: Occurs when hydraulic oil temperature exceeds 50° C (122° F) for more than 5 seconds. Recommended Response: Replace filter as soon as possible. If code is present after the filter is replaced, inspect the hydraulic lines for damage.

(continued)

(Table 11, contd)

Machine System Event Codes		
Event Code	Description	Possible Cause / Recommended Response
E875-2	Battery Voltage Low - Service Required	Possible Cause: Event is active when the system voltage is less than 18 VDC for more than 60 seconds. Recommended Response: The machine returns to normal operation when the voltage exceeds 18 VDC for more than 2 seconds.
E876-2	Battery Voltage High - Service Required	Possible Cause: Event is active when the system voltage exceeds 32 VDC for more than 5 seconds. Recommended Response: The machine returns to normal operation when the voltage is less than 31.5 VDC for more than 2 seconds.
E878-2	Hyd Oil Temp High - Stop Operating	Possible Cause: The event is active when the temperature of the hydraulic oil exceeds 126° C (259° F) for more than 2 seconds. Recommended Response: Change the operation of the machine to allow the hydraulic oil to cool.
E1046-2	Tool Control Hyd Oil Temp High - Stop Operating	Possible Cause: The event is active when the temperature of the hydraulic oil exceeds 126° C (259° F) for more than 2 seconds. Recommended Response: Change the operation of the machine to allow the hydraulic oil to cool.
E1132-1	Machine Software Configuration Inconsistent - Check Software Version	Possible Cause: An attachment valve has not been configured correctly. Recommended Response: Reconfiguration of one or more of the attachment valves is required.
E1377-1	Security System Disable/Derate Pending	Possible Cause: This code is used to inform the operator that the machine is remotely disabled. Recommended Response: Consult with your Cat dealer for service.
E1377-2	Security System Disable/Derate Pending	Possible Cause: This code is used to inform the operator that the machine is remotely disabled. Recommended Response: Consult with your Cat dealer for service.
E1378-2	Machine Fault - Service Required	Possible Cause: Event is active when the system voltage exceeds 32 VDC for more than 5 seconds. Recommended Response: The machine returns to normal operation when the voltage is less than 31.5 VDC for more than 2 seconds.
E1379-2	Machine Fault - Service Required	Possible Cause: Event is active when the system voltage is less than 18 VDC for more than 60 seconds. Recommended Response: The machine returns to normal operation when the voltage exceeds 18 VDC for more than 2 seconds.
E1634-2	Refueling Pump Strainer Plugged - Check Strainer	Possible Cause: Debris in foot valve screen. Recommended Response: Clean or replace the foot valve screen.

(continued)

(Table 11, contd)

Machine System Event Codes		
Event Code	Description	Possible Cause / Recommended Response
E1635-2	Refueling Pump Runs Dry - Stop Refueling	Possible Cause: Kink in fuel hose or source fuel low. Recommended Response: Check source fuel and check for kink in hose.
E2138-1	Payload Memory Full	Possible Cause: When data transfer between machine ECM and network manager (product link elite) is failed. Recommended Response: Reconfigure the machine and clear the payload memory.

Logging In

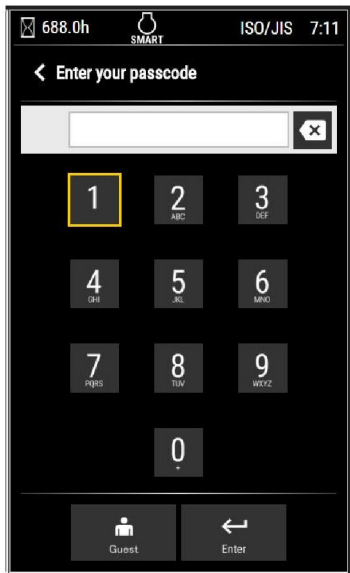


Illustration 186

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

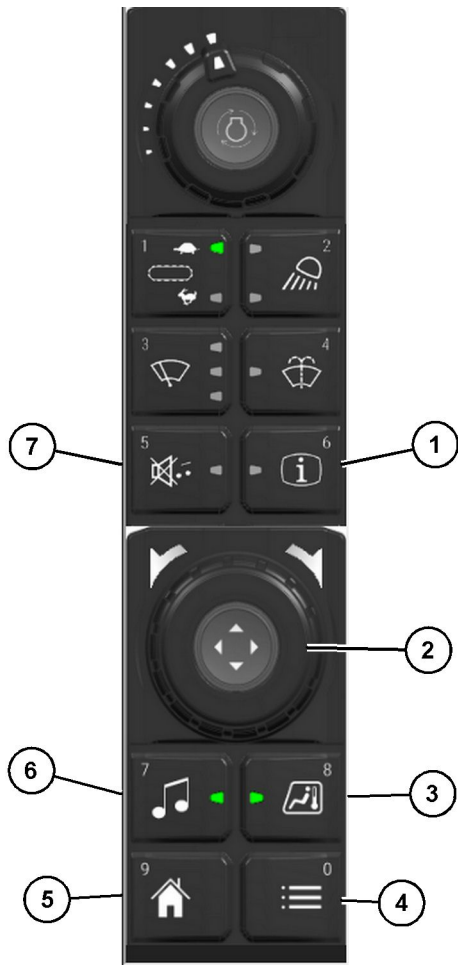


Illustration 187

g06469589

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.

Radio button (6) – Press this button to access the radio controls.

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

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.

Operator Screen



Illustration 188

g06241547

After logging in, the operator information screen will appear. The screen provides the following information for the logged in operator:

- Operator ID
- Joystick pattern
- Active tool
- Spool response speed
- Joystick button assignments



Illustration 189

g06469596

The operator information screen can be accessed at any time by pressing the operator information button on the right side switch panel.

Application Menu



Illustration 190

g06469601

Press the application menu button to access the Application menu.

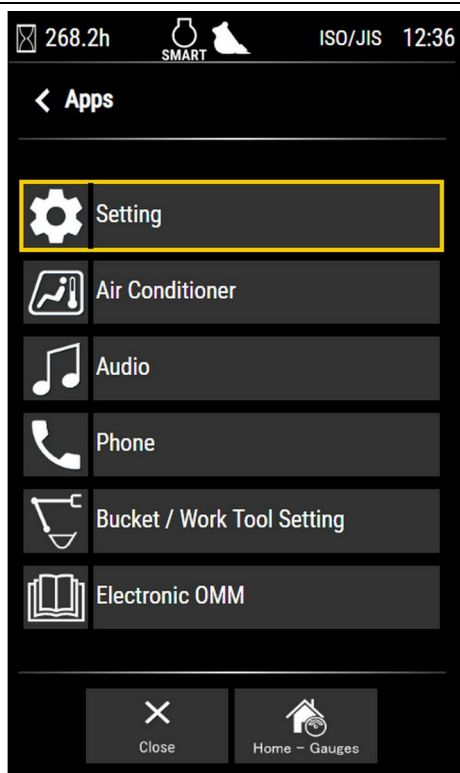


Illustration 191

g06469604

The Application menu or “Apps” menu contains the following menu items:

- Setting
- Air Conditioner
- Audio
- Phone
- Bucket/Work Tool Setting
- Electronic OMM

Setting Menu

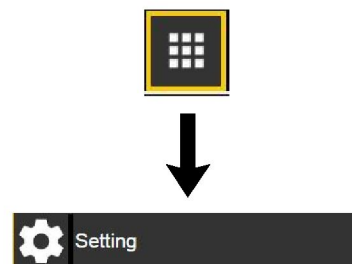


Illustration 192

g06213909

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

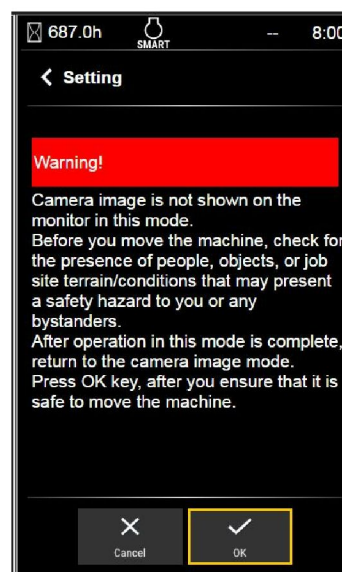


Illustration 193

g06217518

A warning will appear to notify 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.

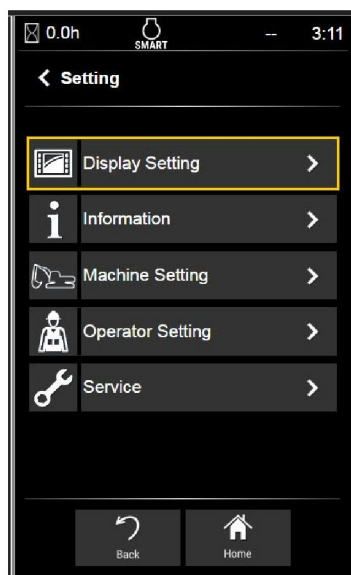


Illustration 194

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.

Display Setting

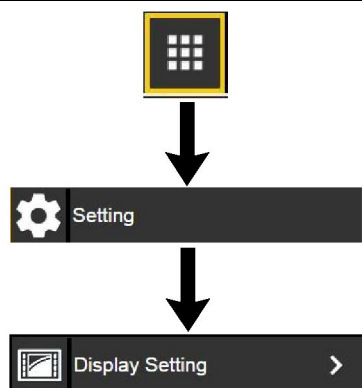


Illustration 195

g06213920

From the main screen, press the application menu button. In the Application menu, select "Setting". Next, select "Display Setting".

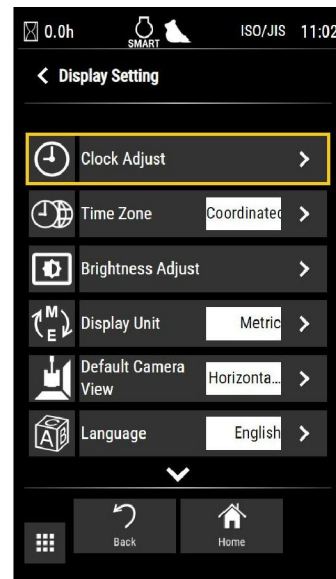


Illustration 196

g06470093

The Display Setting menu contains the following menu items:

- Clock Adjust
- Time Zone
- Brightness Adjust
- Display Unit
- Default Camera View
- Language

Clock Adjust

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

The clock adjust feature allows the operator to set the clock and set the date.

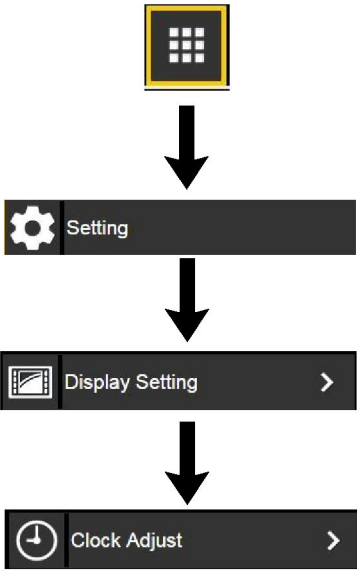


Illustration 197 g06215252

To access the Clock Adjust screen, press the application menu button. Select Setting, Display Setting, then Clock Adjust.

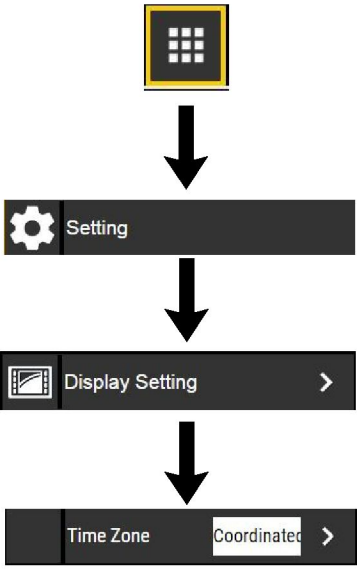


Illustration 199 g06247439

To access the Time Zone screen, press the application menu button. Select Setting, Display Setting, then Time Zone.

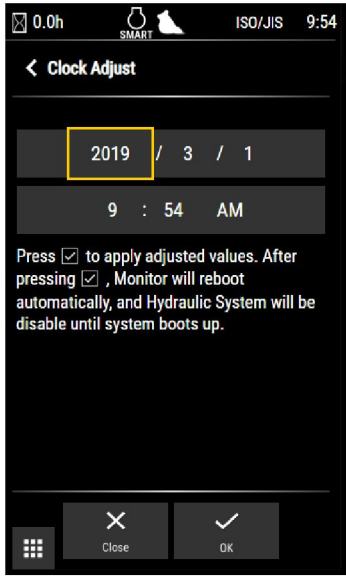


Illustration 198 g06400030

Adjust the date and time as necessary. Select the Home button to return to the main screen.

Time Zone

The time zone feature allows the operator to set the time zone for the region the machine is operating in.

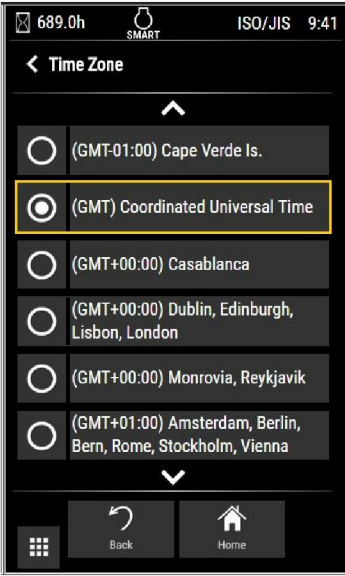


Illustration 200 g06247442

Select the correct time zone setting from the list. Select the Home button to return to the main screen.

Brightness Adjust

The brightness adjust function allows the operator to adjust the brightness of the display for day and night mode.

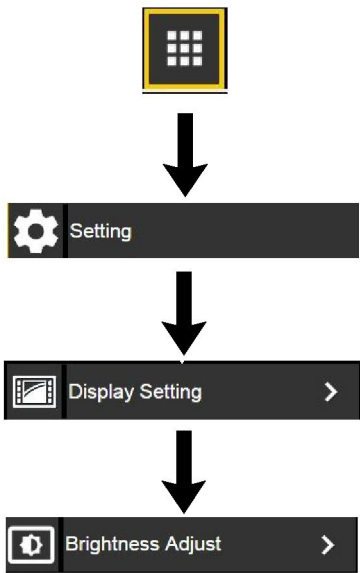


Illustration 201 g06215260

To access the Brightness Adjust screen, press the application menu button. Select Setting, Display Setting, then Brightness Adjust.

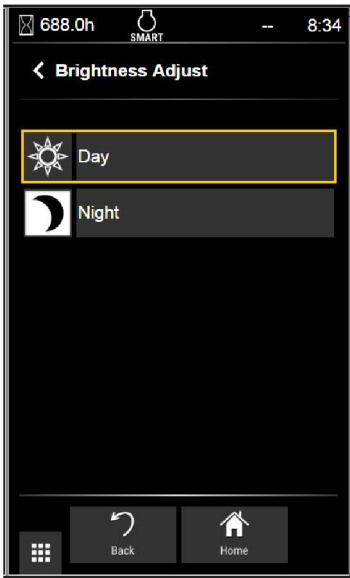


Illustration 202 g06215263

Select Day or Night to adjust the brightness level.

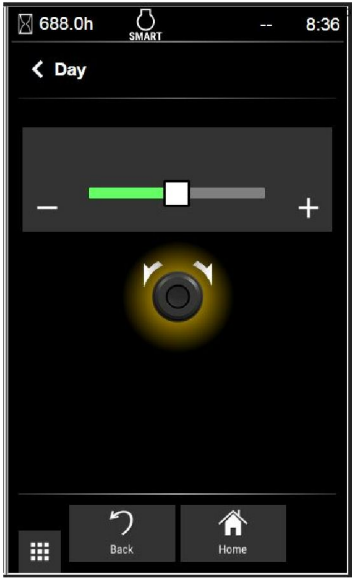


Illustration 203 g06215264

Adjust the brightness level then select “Home” to return to the main screen.

Display Unit

Display unit allows the operator to choose between Metric or English units being displayed.

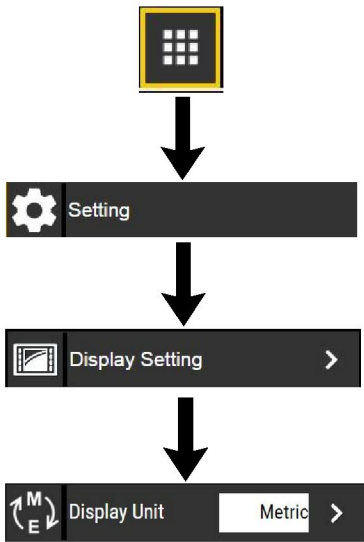


Illustration 204 g06470878

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

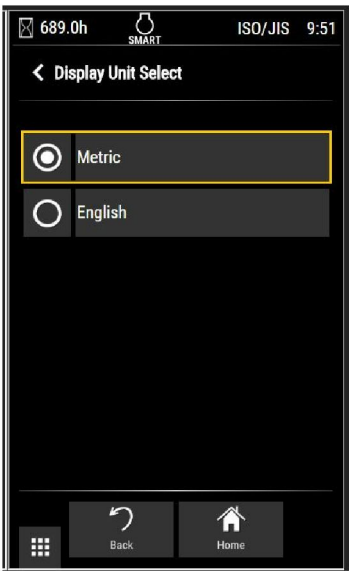


Illustration 205 g06241051

Select either Metric or English then select “Home” to return to the main screen.

Default Camera View

Default camera view allows the operator to choose the default camera view. The two choices are split screen horizontal or split screen vertical.

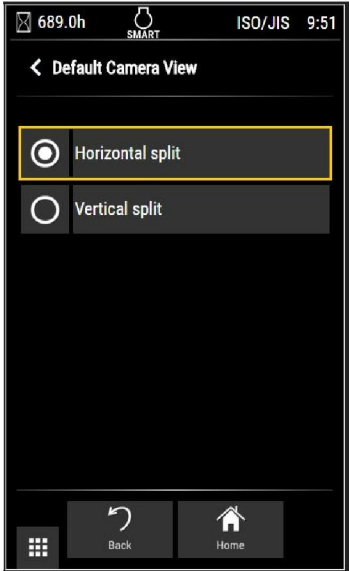


Illustration 207 g06241057

Select between “Vertical Split” or “Horizontal Split” then select “Home” to return to the main screen.

Language

Language allows the operator to choose the language for the monitor.

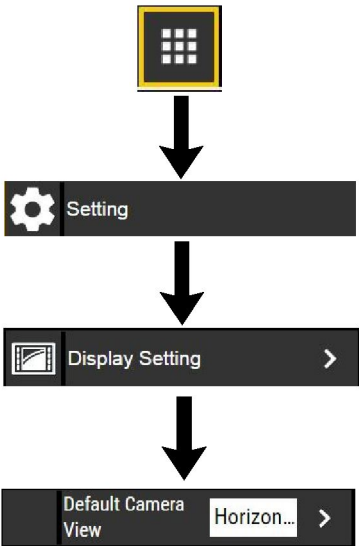


Illustration 206 g06241046

From the main screen, press the application menu button. In the Application menu, select “Setting” . Next, select “Display Setting” and then “Default Camera View” .

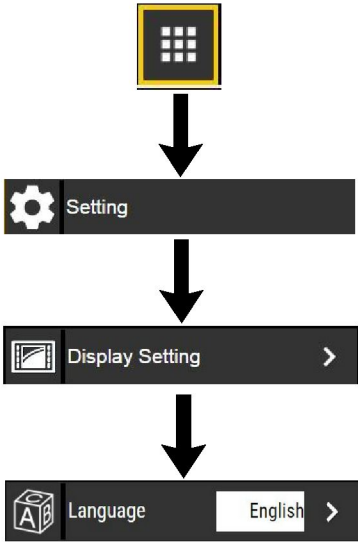


Illustration 208 g06470922

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

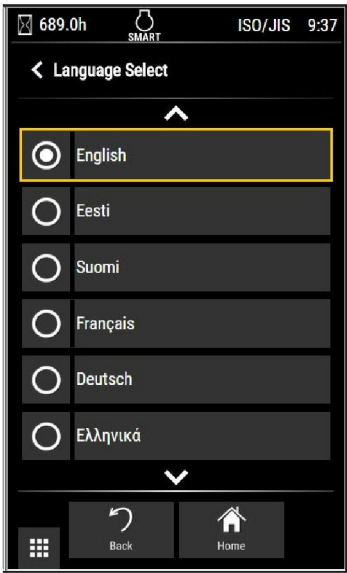


Illustration 209 g06241058

Select the desired language, then select “Home” to return to the main screen.

Shortcut

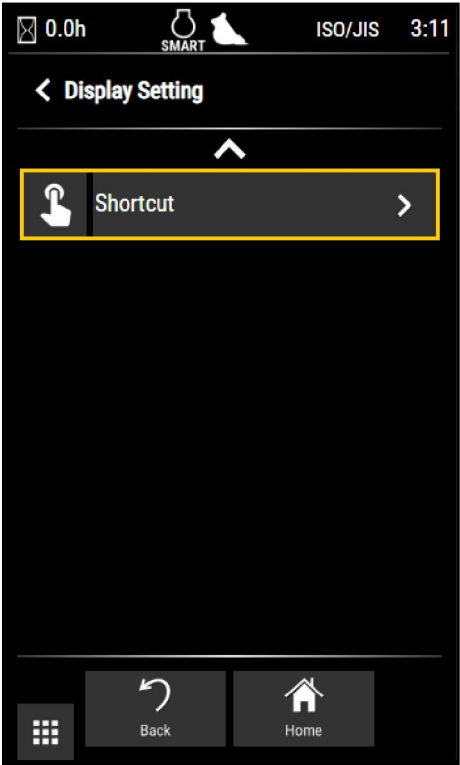


Illustration 210 g06389546

Shortcut allows the operator to choose up to 4 shortcuts to be displayed on home screen of the monitor.

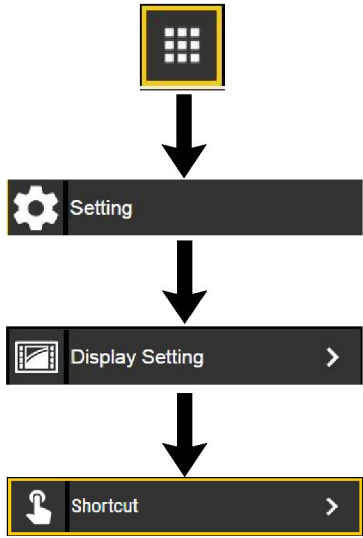


Illustration 211 g06389544

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

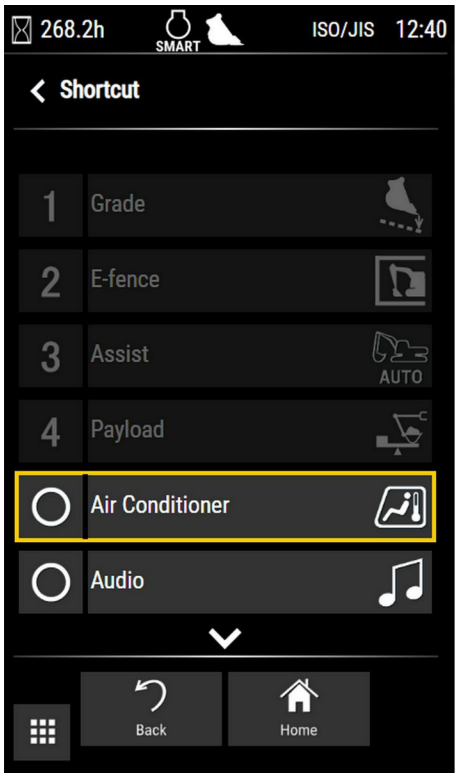


Illustration 212 g06469605

Select the desired shortcuts to be displayed on the home screen.

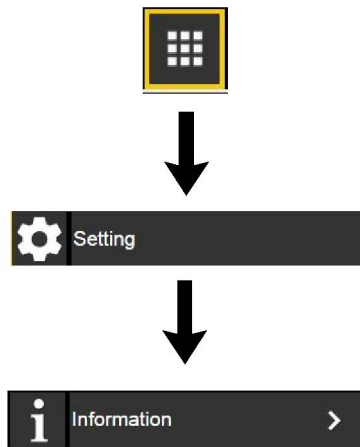
Information

Illustration 213

g06217520

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

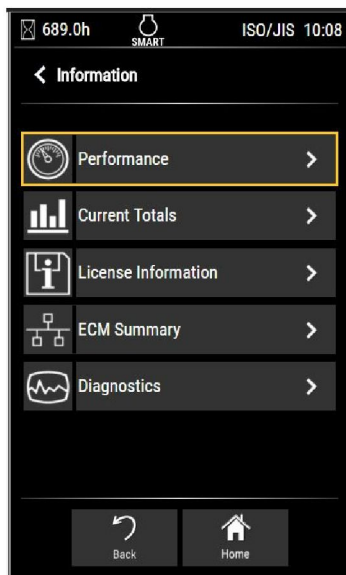


Illustration 214

g06261280

The Information menu contains the following menu items:

- Performance
- Current Totals
- License Information
- ECM Summary

- Diagnostics

Performance

The Performance screen allows the operator to view performance information such as pump outlet pressure and battery voltage.

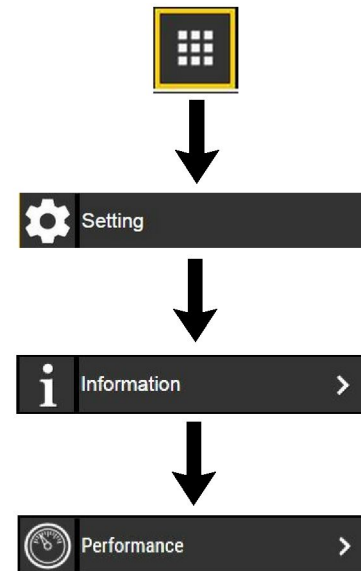


Illustration 215

g06261291

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

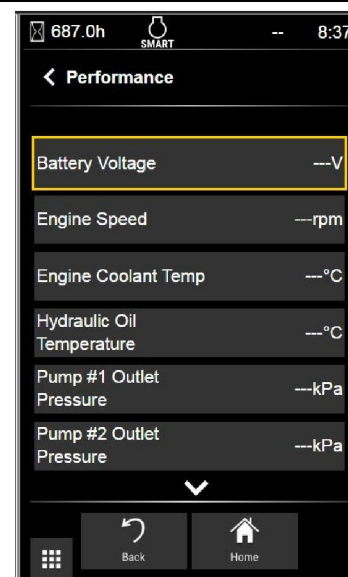


Illustration 216

g06217555

Scroll through the list of values to view machine performance. Press the “Home” button to return to the main screen.

Current Totals

The Current Totals screen allows the operator to view operating hours for machine components such as the hydraulic pump and swing motor.

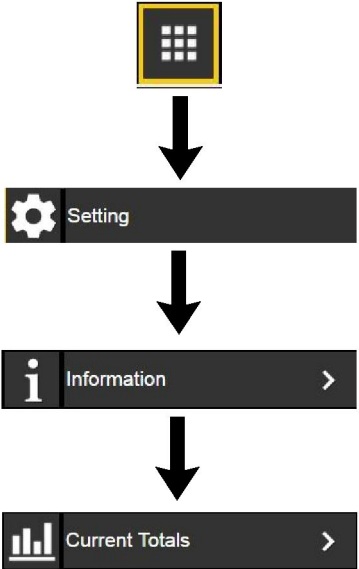


Illustration 217 g06261293

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

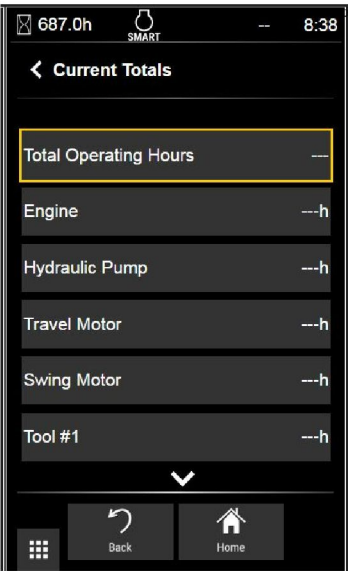


Illustration 218 g06217554

Scroll through the list of values to view component operating hours. Press the “Home” button to return to the main screen.

License Information

The License Information screen allows the operator or maintenance personnel to view the software license agreement.

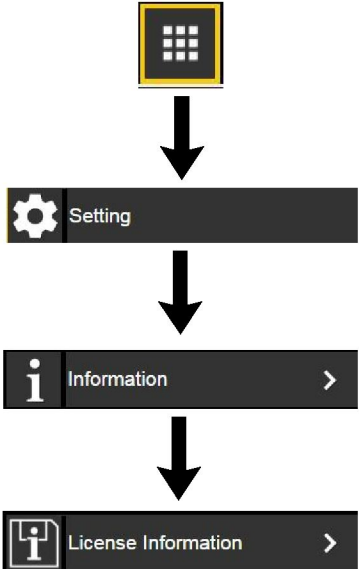


Illustration 219 g06261300

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

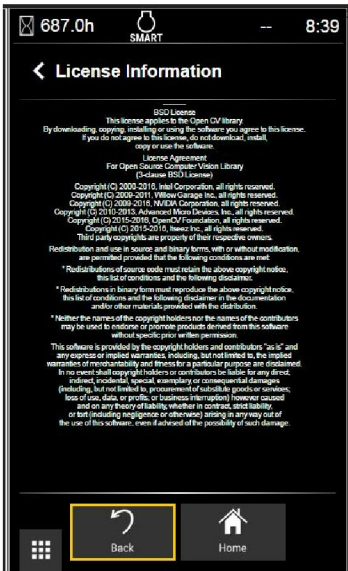


Illustration 220 g06217551

Press the “Home” button to return to the main screen.

ECM Summary

The ECM Summary screen allows the operator to choose any electronic control module (ECM) on the machine and view the following for that ECM:

- Hardware part number
- Hardware serial number
- Software description
- Software part number
- Software release date

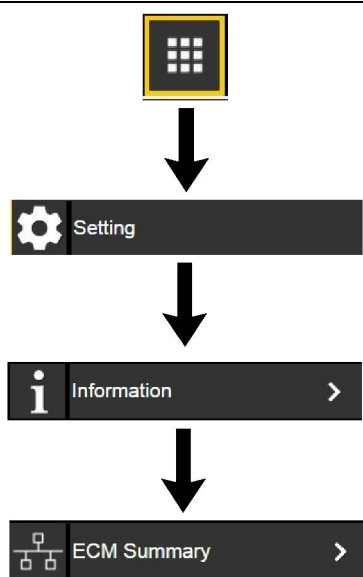


Illustration 221

g06261304

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

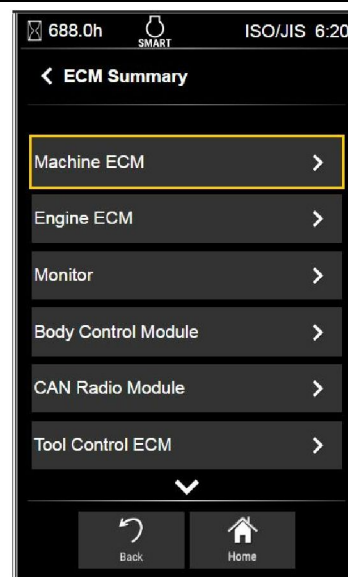


Illustration 222

g06242055

Select one of the components to view hardware and software information. Press the “Home” button to return to the main screen.

Diagnostics

The Diagnosis screen allows the operator to view the following diagnostic items:

- Active diagnostic codes
- Logged diagnostic codes
- Active event codes
- Logged event codes

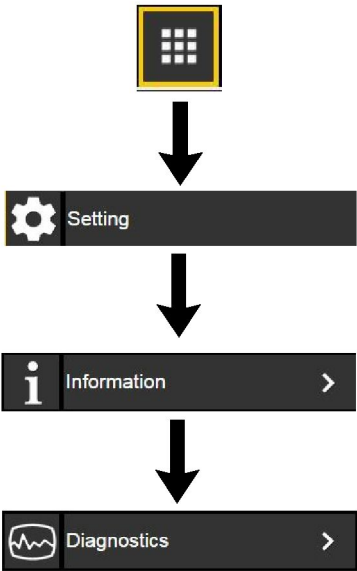


Illustration 223 g06242064

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

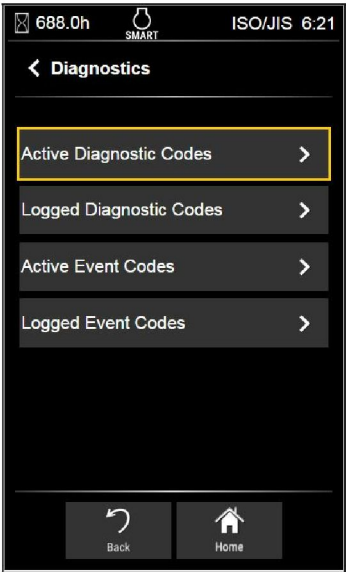


Illustration 224 g06242065

Select from the groups of diagnostic codes to view active and logged codes. Press the “Home” button to return to the main screen.

Machine Setting

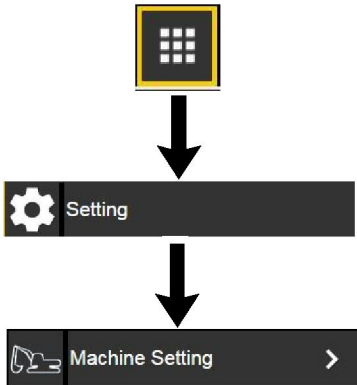


Illustration 225 g06217583

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

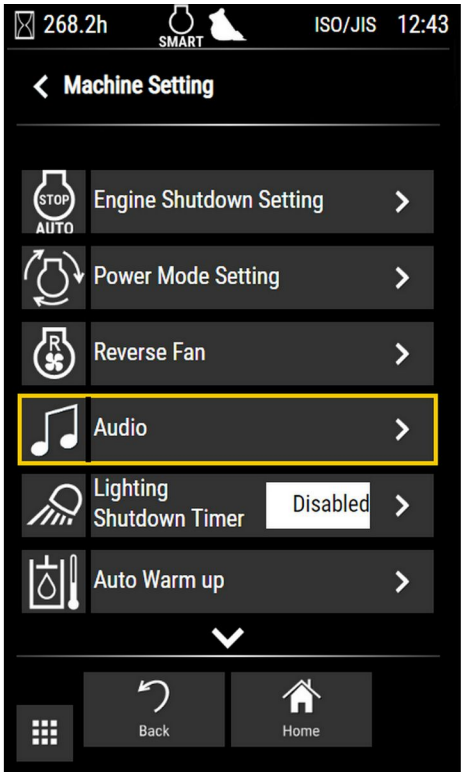


Illustration 226 g06469610

The Machine Settings menu contains the following menu items:

- Engine Shutdown Setting
- Power Mode Setting
- Reverse Fan
- Audio

- Lighting Shutdown Timer
- Auto Warm Up
- Preventive Maintenance
- Sleep Time
- Security

Engine Shutdown Setting

Note: Master level access is required to adjust engine shutdown settings.

The Engine Shutdown Setting screen allows the operator to enable, disable, and adjust the engine shutdown timer. This feature operates the engine at idle speed for a set amount of time to cool the engine before shutting down automatically.

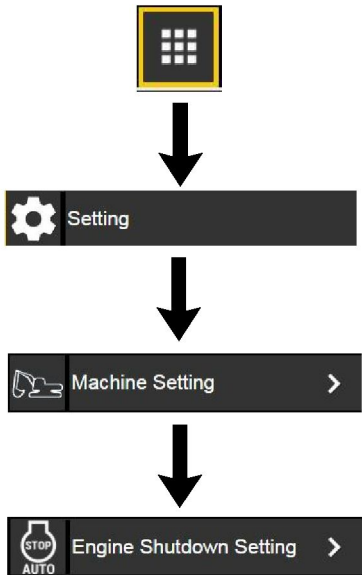


Illustration 227

g06261307

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

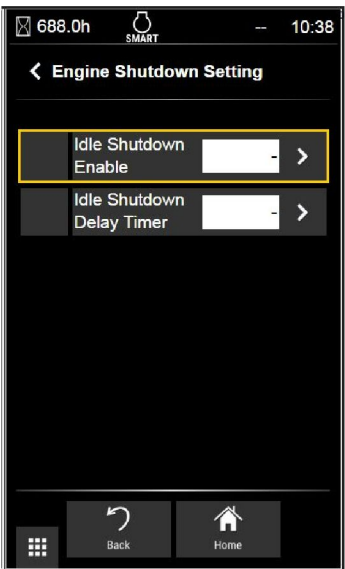


Illustration 228

g06217629

Select “Idle Shutdown Enable” to enable or disable the idle shutdown feature. If enabled, select “Idle Shutdown Delay Timer” to change the delay time.

Power Mode Setting

Note: Master level access is required to adjust power mode settings.

The Power Mode Setting screen allows the operator to choose what power mode to operate the engine.

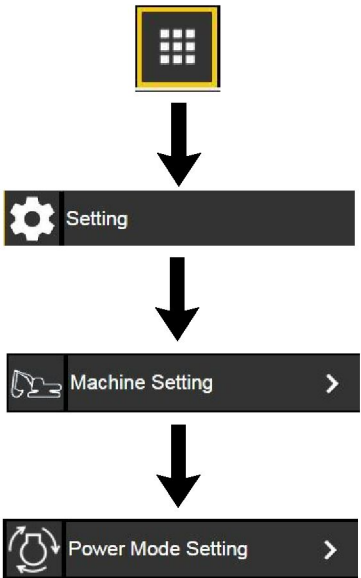


Illustration 229

g06261309

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

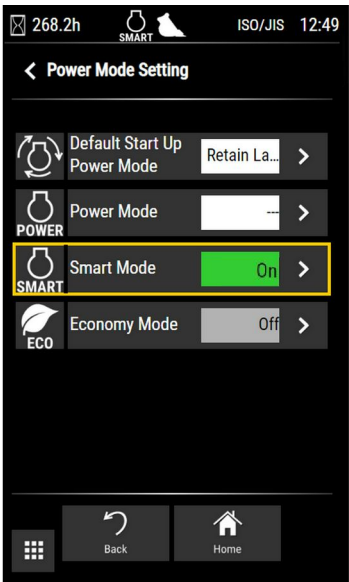


Illustration 230

g06469611

Select the desired power mode to operate in and switch to “ON” . The operator can also select the default power mode when the engine is first started. Once finished, press the “Home” button to return to the main screen.

Note: Economy Mode is not available on GC models.

Reverse Fan (If Equipped)

Note: Master level access is required to adjust reverse fan settings.

The reversing fan feature allows the operator or maintenance personnel to reverse the fan to clean debris from the cooling group. The Reverse Fan screen allows the activation of the reverse fan feature.

Note: The HVAC system in the cab will reduce air flow in the cab and disengage the compressor so it doesn't over pressurize during a reverse fan operation.

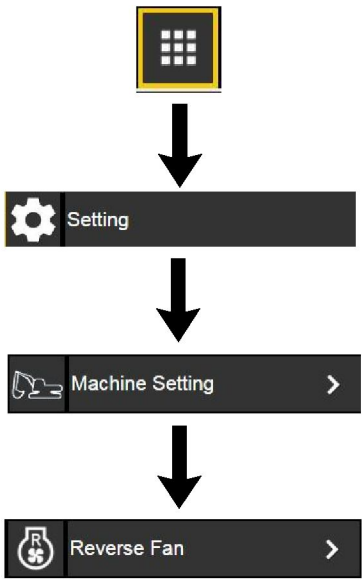


Illustration 231

g06261312

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

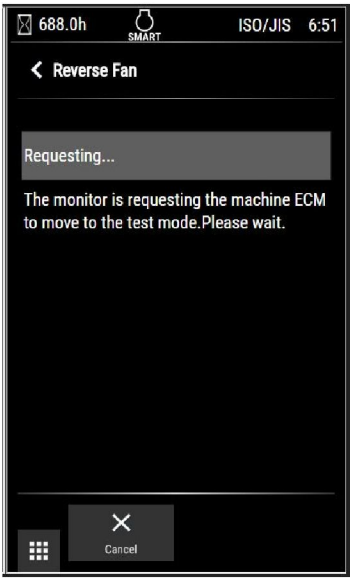


Illustration 232

g06242068

Follow the instructions and prompts on the monitor to reverse the fan.

Reverse Fan - Auto Mode

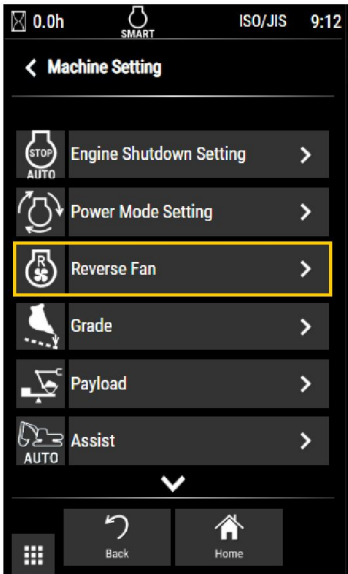


Illustration 233

g06360003

The reversing fan feature allows the operator or maintenance personnel to reverse the fan to clean debris from the cooling group. The Reverse Fan screen allows the activation of the reverse fan feature.

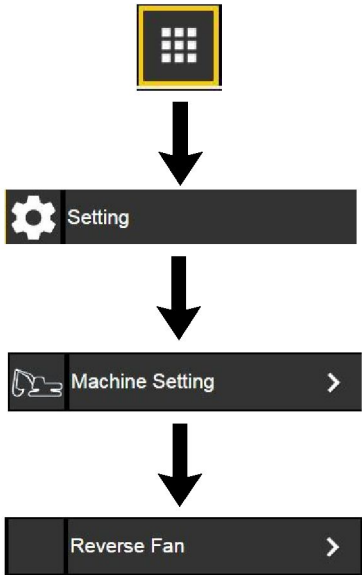


Illustration 234

g06217601

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

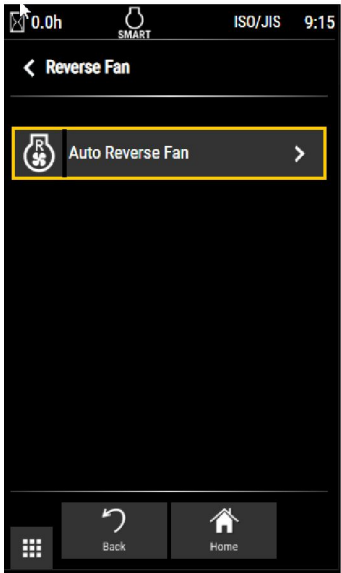


Illustration 235

g06360011

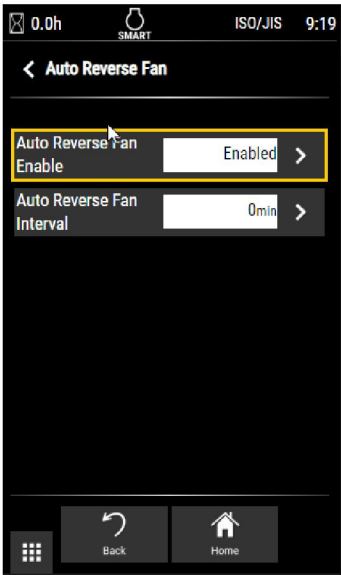


Illustration 236

g06360013

Select “Auto Reversal Fan Enable” to enable or disable the idle Auto Reverse fan feature. If enabled, select “Auto Reverse Fan Interval” to set the interval time for auto reverse fan feature. Once finished, press the “Home” button to return to the main screen.

Audio

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

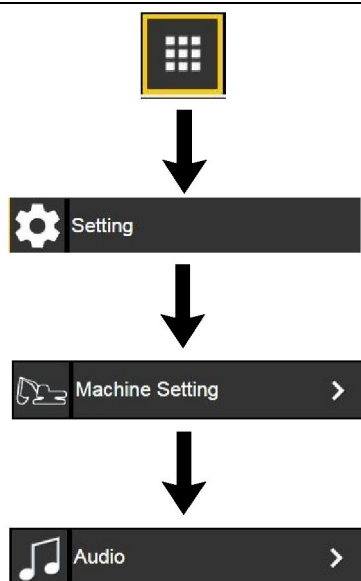


Illustration 237

g06261319

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

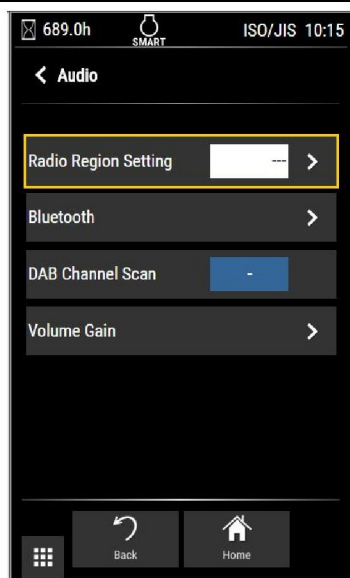


Illustration 238

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.

Lighting Shutdown Timer

Note: Master level access is required to lighting shutdown settings.

The Lighting Shutdown Timer screen allows the user to enter a delay time for the exterior lights to shut off. The Lighting Shutdown Timer provides light for a set amount of time to allow the operator to safely dismount the machine.

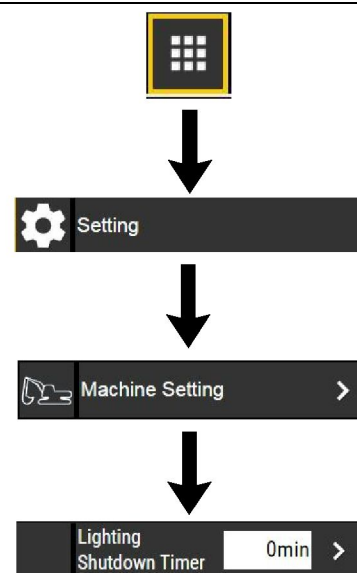


Illustration 239

g06241072

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

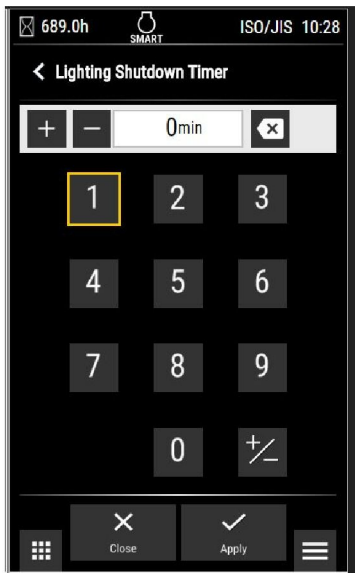


Illustration 240 g06241076

Use the keypad to enter the number of minutes for the light delay. Select “Apply” when done.

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.

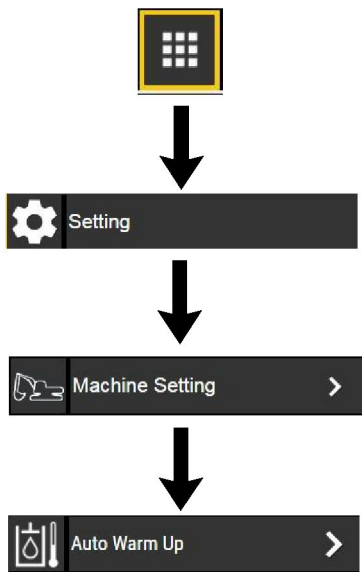


Illustration 241 g06261321

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

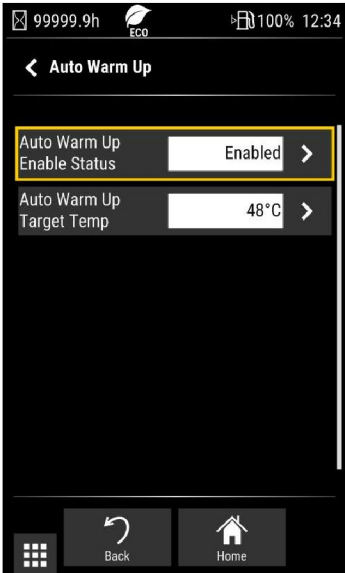


Illustration 242 g06220397

To enable or disable auto warm-up, press the “Auto Warm Up Enable Status” window, then select “Enabled” or “Disabled”.

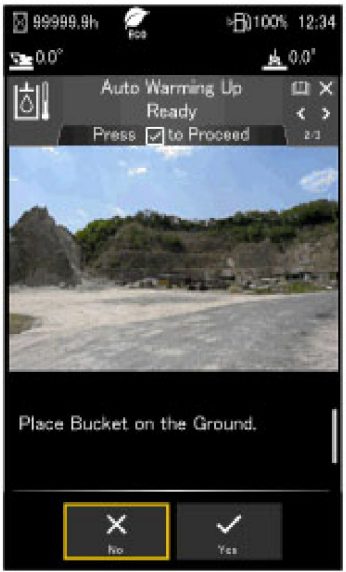


Illustration 243 g06219830

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.

Preventive Maintenance

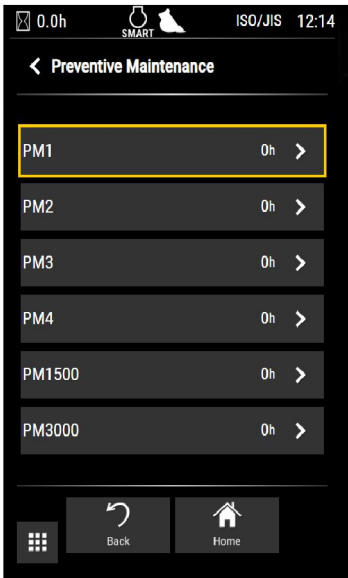


Illustration 244 g06475293

The Preventative Maintenance screen allows the operator to set up a notification when maintenance is soon required or overdue based on the preventive maintenance table.

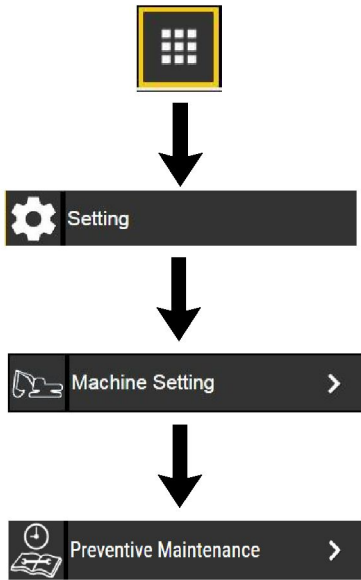


Illustration 245 g06475295

From the main screen, press the application menu button. In the Application menu, select "Setting". Next, select "Machine Setting", and then "Preventive Maintenance".

Prevention Maintenance Alerts

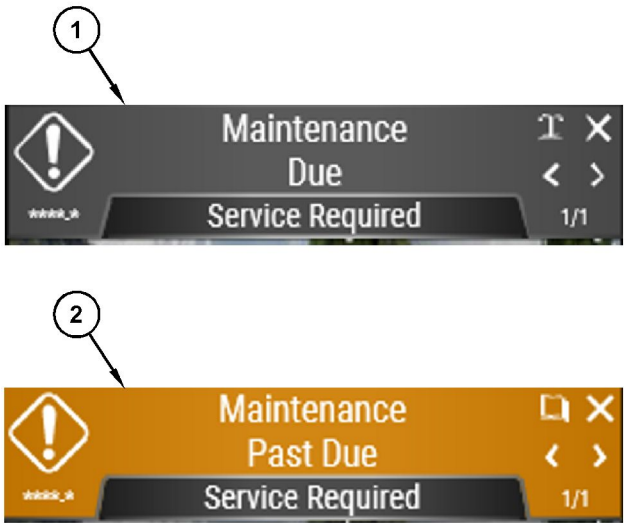


Illustration 246 g06610954

Monitor maintenance alert messages

- (1) Maintenance due (Event Code EID: 456)
- (2) Maintenance past due (Event Code EID: 457)

Prevention Maintenance alert feature notifies the operator when maintenance is soon required or overdue based on the preventive maintenance table. A pop-up alert message and an event code will appear on the monitor when maintenance is due (1) or past due (2).

The Preventative Maintenance Alert feature settings can be adjusted in the Service Menu.

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

Sleep Time

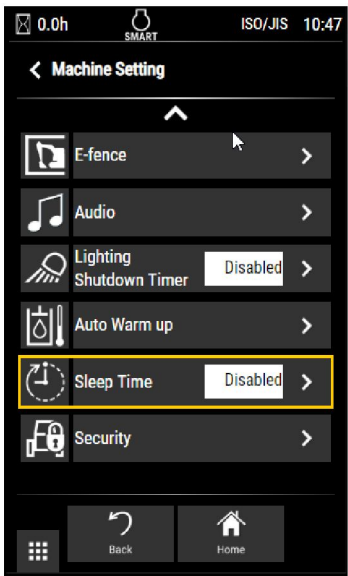


Illustration 247 g06360101

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.

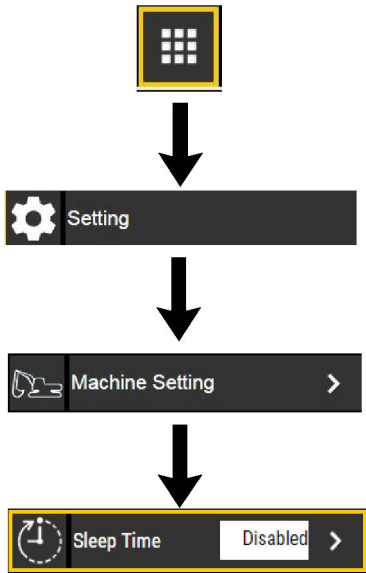


Illustration 248 g06360104

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

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.

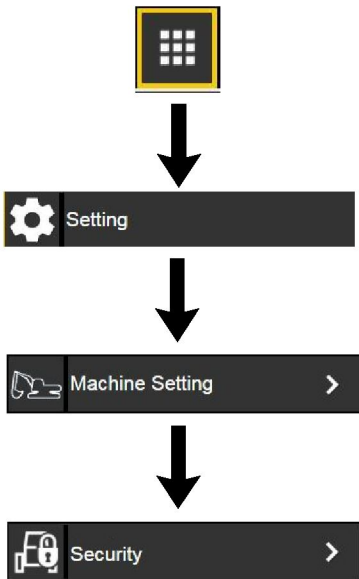


Illustration 249 g06261324

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

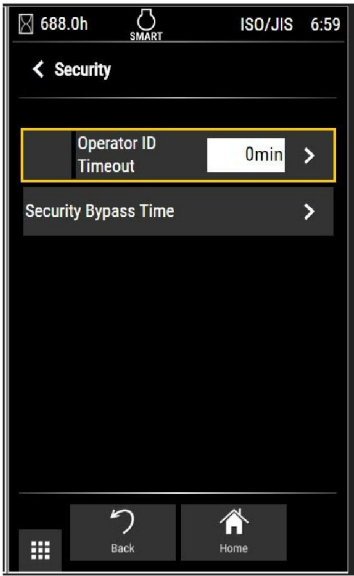


Illustration 250 g06242069

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” .

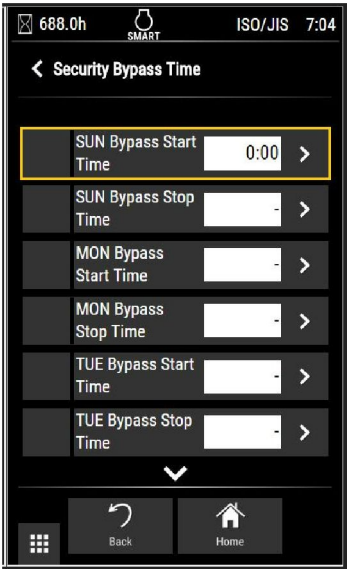


Illustration 251 g06242071

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

Operator Setting

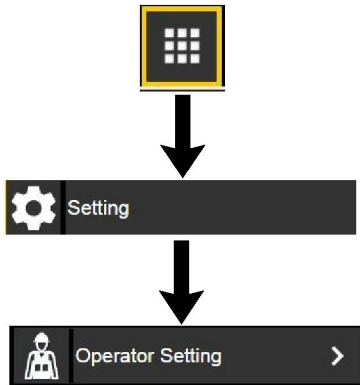


Illustration 252 g06217328

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

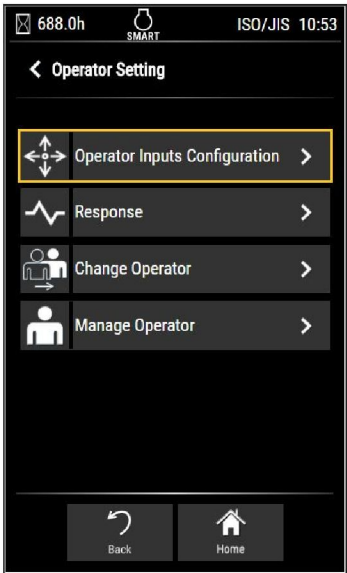


Illustration 253 g06261330

The Operator Setting menu contains the following menu items:

- Operator Inputs Configuration
- Response
- Change Operator
- Manage Operator

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.

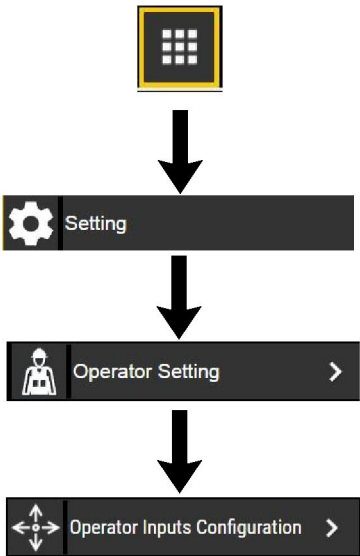


Illustration 254 g06261334

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

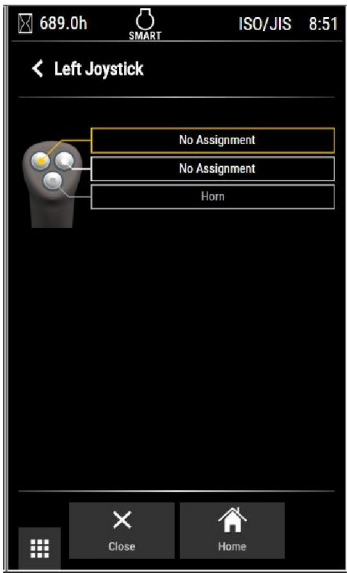


Illustration 256 g06241466

Select the button to configure.

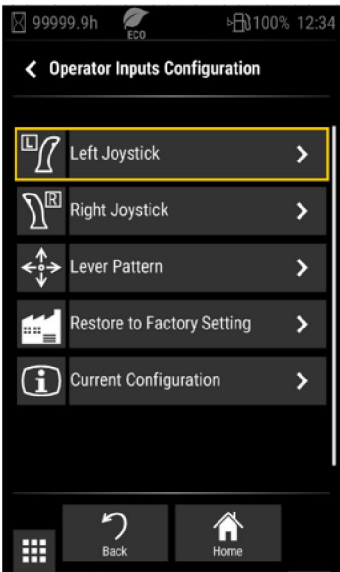


Illustration 255 g06222026

Choose the joystick to configure.

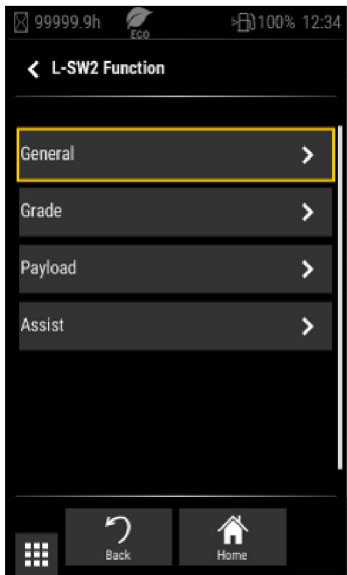


Illustration 257 g06222031

Select the category of button functions to choose from.

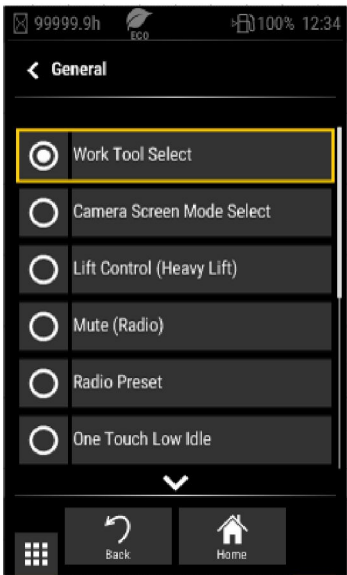


Illustration 258 g06222034

Select the desired function from the list. Repeat for the remaining buttons and press the “Home” button to return to the main screen.

Lever Pattern

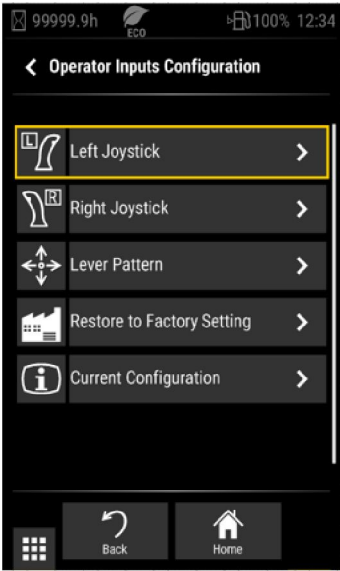


Illustration 259 g06222026

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

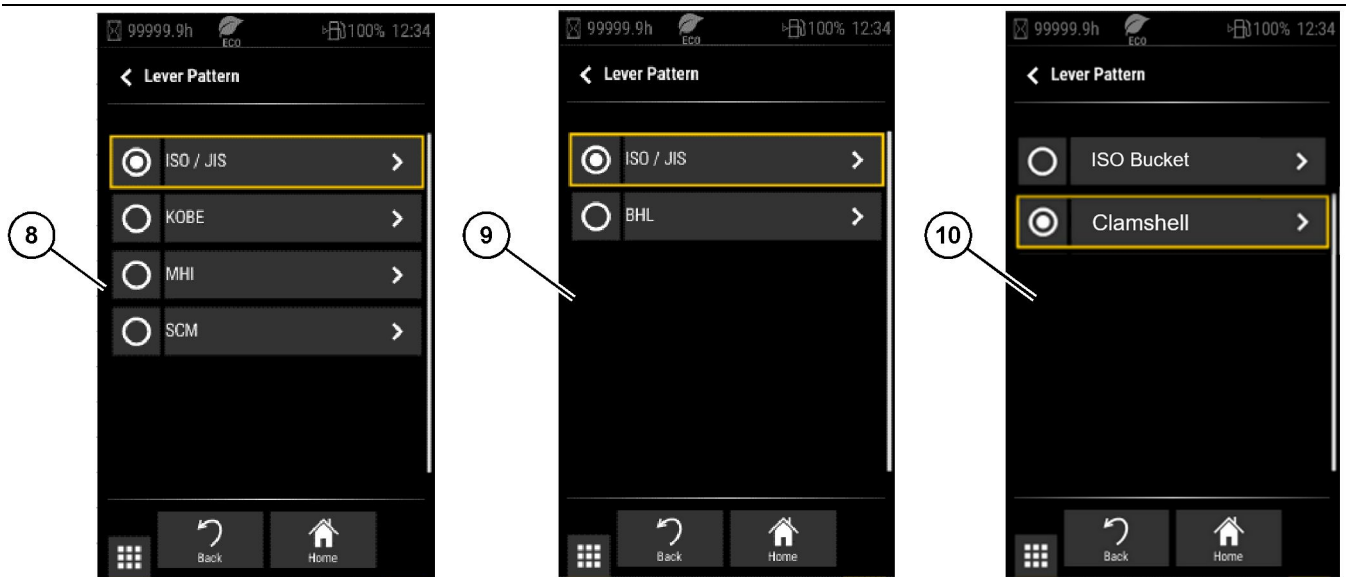


Illustration 260

g06340479

(8) 4-way menu items

(9) 2-way menu items

(10) Clamshell menu items (if equipped)

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

Restore to Factory Setting

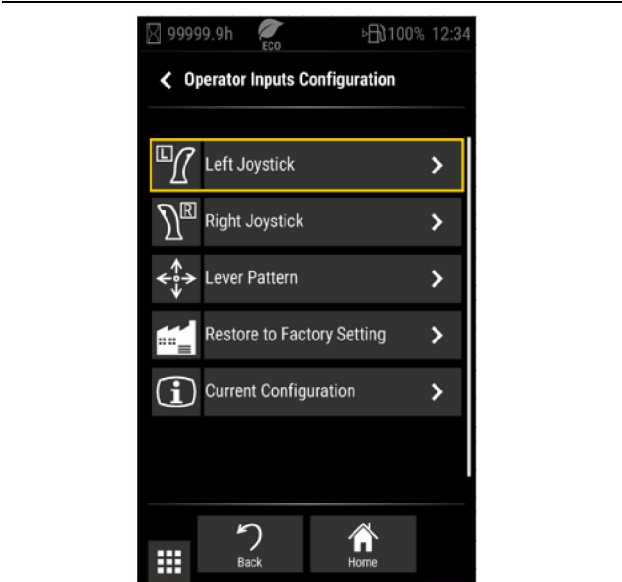


Illustration 261

g06222026

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

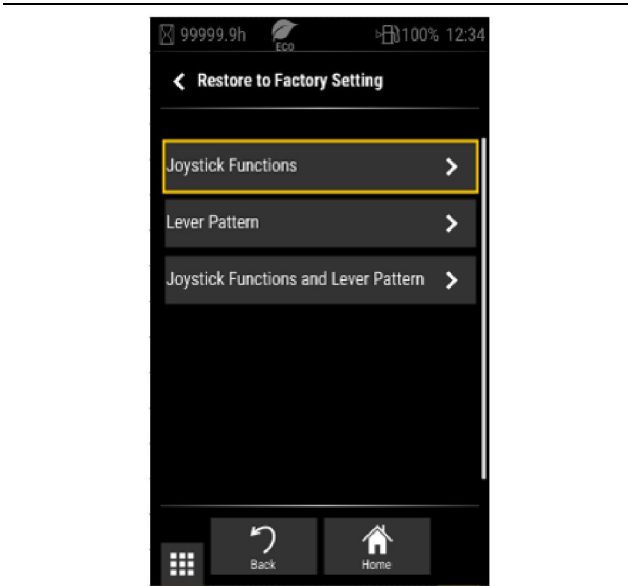


Illustration 262

g06222053

Select the item from the list to be restored.

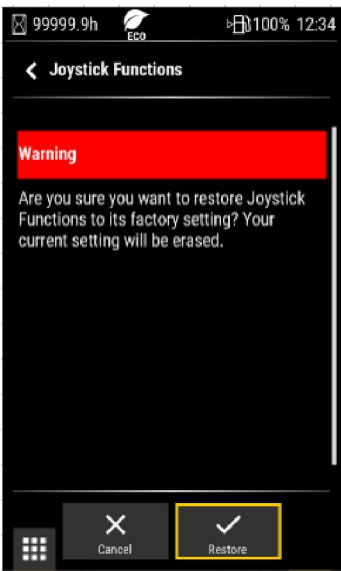


Illustration 263 g06222061

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.

Response

The response screen allows the operator to adjust the spool settings which will affect how quick the machine responds when using the joysticks. The settings can be set to slow, medium, or fast.

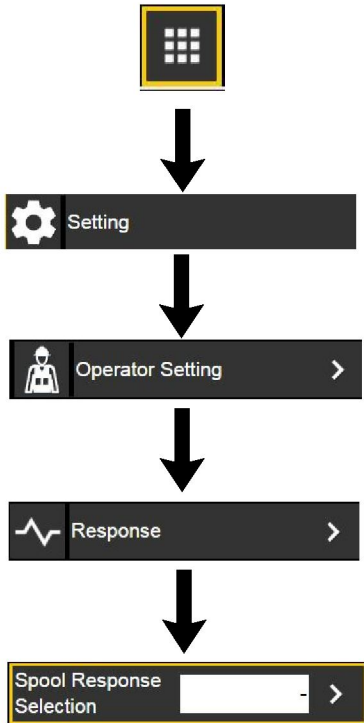


Illustration 264 g06261337

From the main screen, press the application menu button. In the Application menu, select “Setting”. Next, select “Operator Setting”, then “Response”. Once in the Response screen, select “Spool Response Selection”.

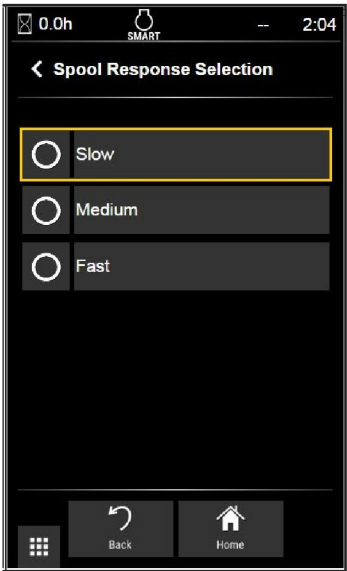


Illustration 265 g06217360

Select the desired response speed, then select the “Home” button to return to the main screen.

Change Operator

The change operator screen allows a new operator to log in. After successfully logging in, the previous operators preferences will be overridden with the new operators preferences.

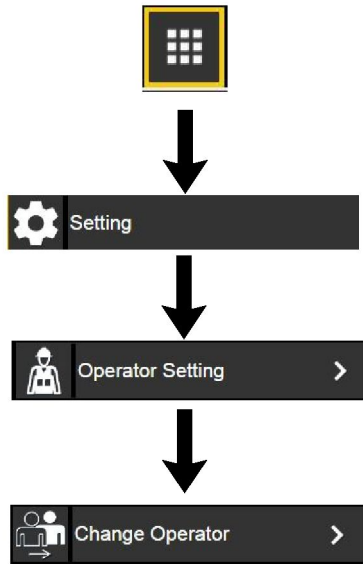


Illustration 266 g06217364

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

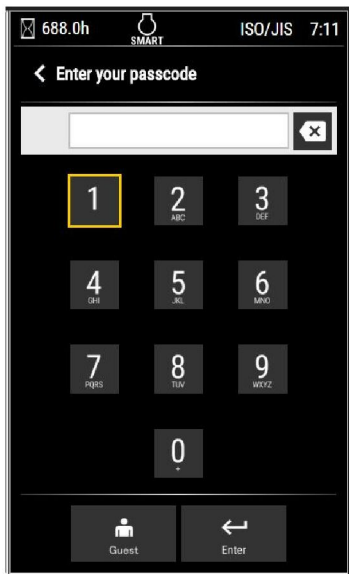


Illustration 267 g06242074

Enter the passcode or press the “Guest” button to log in as a guest.



Illustration 268 g06241547

If the login was successful, the operator screen will appear to show the preferences for the new operator. Press the “OK” button to return to the main screen.

Manage Operator

Note: Master level access is required to manage operator settings.

The Manage Operator screen allows users to add and remove operators to the machine.

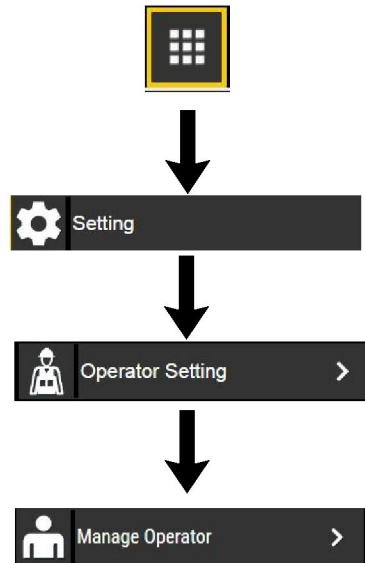


Illustration 269 g06241473

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

Add Operator

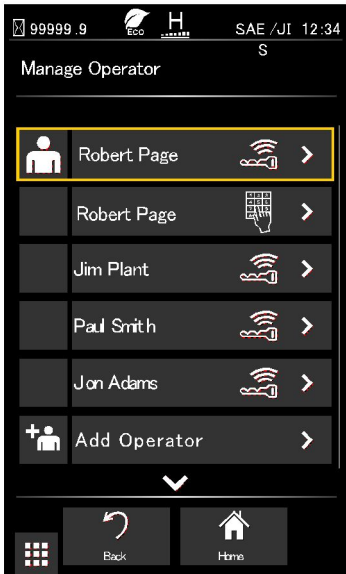


Illustration 270

g06241475

In the Manage Operator screen, select “Add Operator” .

Edit/Delete Operator

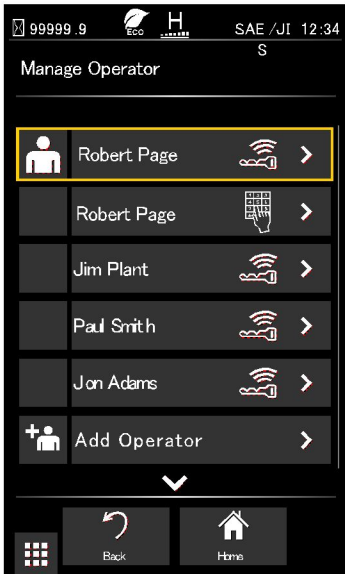


Illustration 272

g06241475

To edit or delete an operator, scroll through the operator list in the Manage Operator screen and find the operator to be changed.

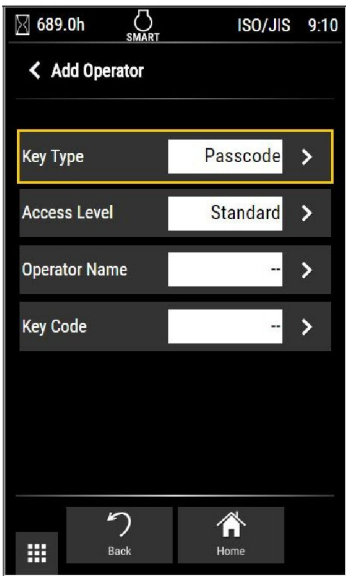


Illustration 271

g06241502

Enter the key type, access level, operator name, and the key code for the new operator. Select the “Home” button to return to the main screen.

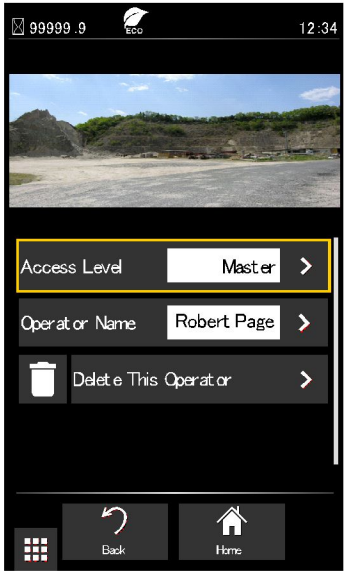


Illustration 273

g06243109

To change the access level, select the window and change to either Master or Standard.

To edit the operator name, select the window and use the keyboard to change the name.

To delete the operator, select “Delete The Operator” .

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

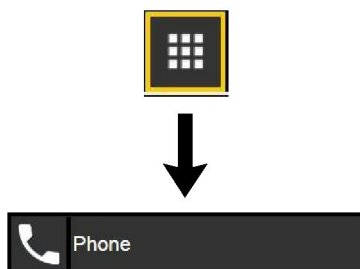


Illustration 274

g06213901

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

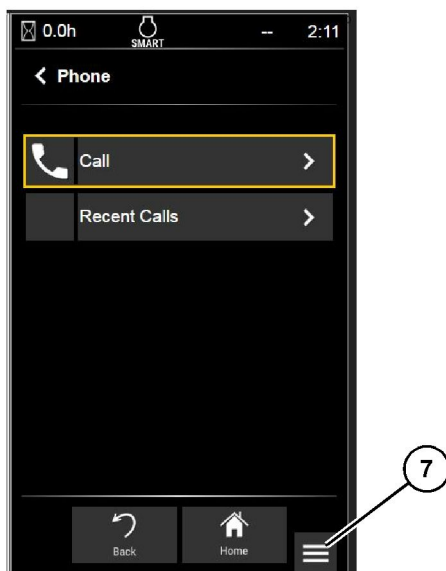


Illustration 275

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.

To check for recent calls, select “Recent Calls” from the menu. The Recent Calls screen will appear to list the most recent calls.

To access the Audio menu, press button (7).

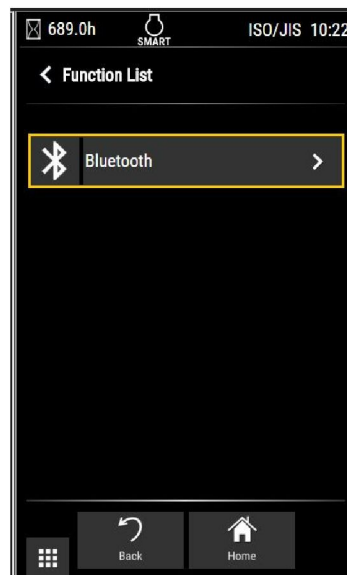


Illustration 276

g06241520

The Audio menu contains the following:

- 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.

Bluetooth

Pairing A Phone

1. While in the phone application, select “Bluetooth Setting” from the Function List menu.

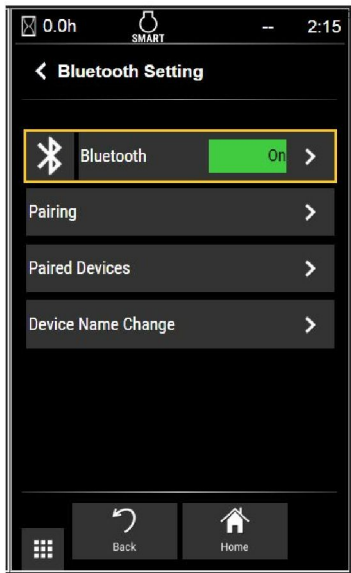


Illustration 277 g06261348

2. Ensure that the Bluetooth power is on in the monitor. If not, select “Power” and switch to On.
3. Ensure that the Bluetooth setting on the phone is on, then select “Pairing” from the monitor menu.

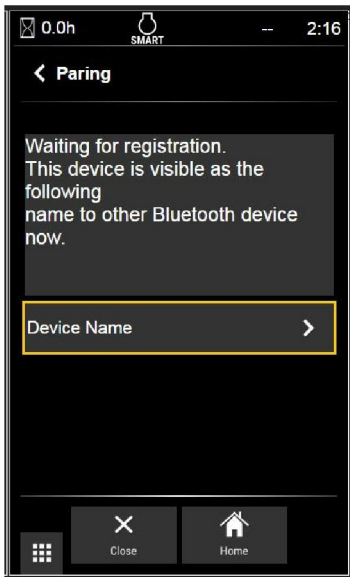


Illustration 278 g06217712

4. If the phone does not automatically search for devices, activate the search feature on the phone and follow any phone prompts.

Once paired, the phone will be added to the “Paired Devices” screen. On the screen the connected phone will have a Bluetooth symbol next to the listing. To change the name assigned to the phone, go to “Device Name Change” screen and edit the name.

Bucket/Work Tool Setting

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

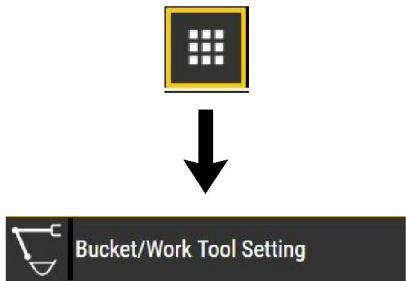


Illustration 279 g06220041

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

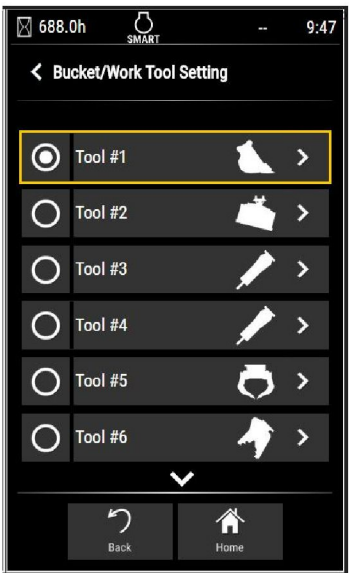


Illustration 280 g06220034

Select the desired tool.

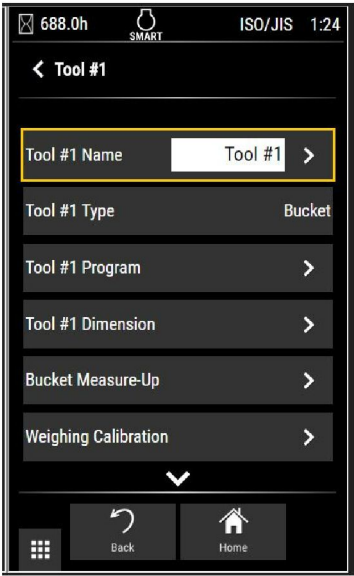


Illustration 281 g06241581

The Tool screen contains the following:

- Tool Name - Enter this screen to edit the name of the tool.
- Tool Type
- Tool Program - This screen requires a dealer password and is used to set parameters for the tool.

Auto Hammer Stop

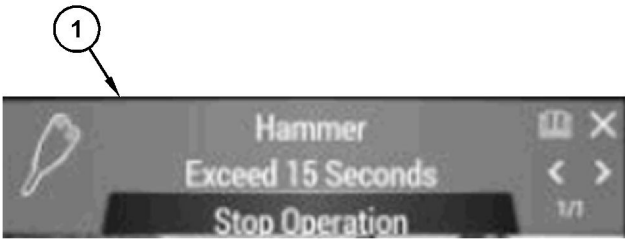


Illustration 282 g06610956

Monitor warning

(1) Monitor warning (Hammer Exceed 15 Seconds)

The hammer auto stop feature will improve the service life of hammer work tools by monitoring the time a hammer is continuously being activated. When this feature is enabled, the monitor will display a warning message after 15 seconds of continuous activation of a hammer. If the operator exceeds 30 seconds of continuous activation, the hammer will automatically stop. The hammer auto stop feature is enabled as a default machine setting and can be disabled in the Service Menu.

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

Note: The time intervals of this feature cannot be configured.

Enable / Disable Auto Hammer Stop

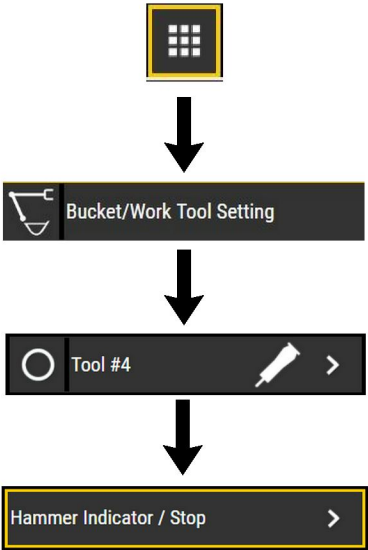


Illustration 283 g06610967

From the main screen, press the application menu button. In the Application menu, select “Bucket/Work Tool Setting” . Select the hammer tool, then select “Hammer Indicator / Stop” .

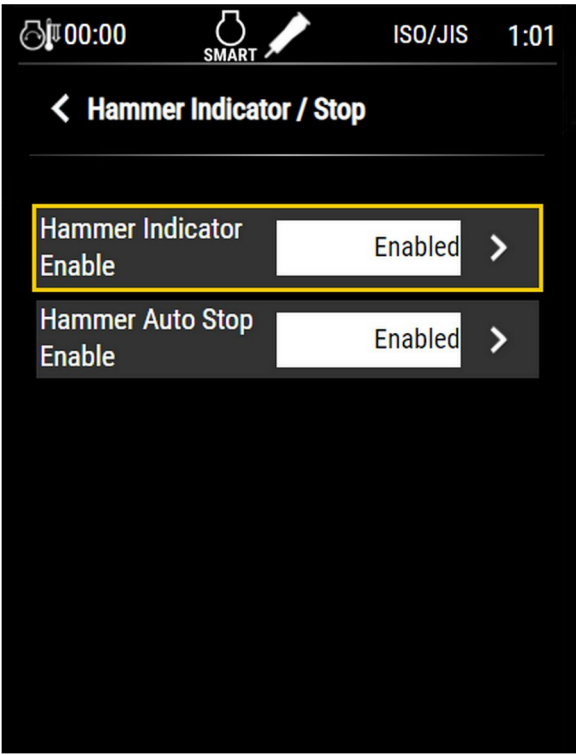


Illustration 284 g06610971

To enable or disable the hammer auto stop option, press the “Hammer Auto Stop Enable” window, then select “Enabled” or “Disabled” .

Hammer Operation Setting (Momentary / Toggled)

Note: Master level access is required to adjust the hammer operation settings.

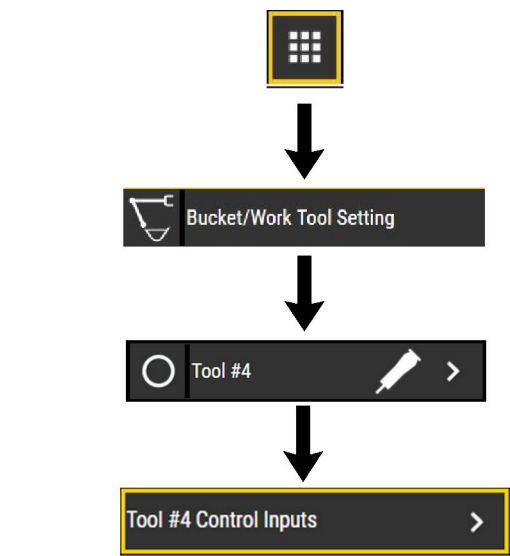


Illustration 285 g06610991

From the main screen, press the application menu button. In the Application menu, select “Bucket/Work Tool Setting” . Select the desired tool, then select “Tool # Control Inputs” .

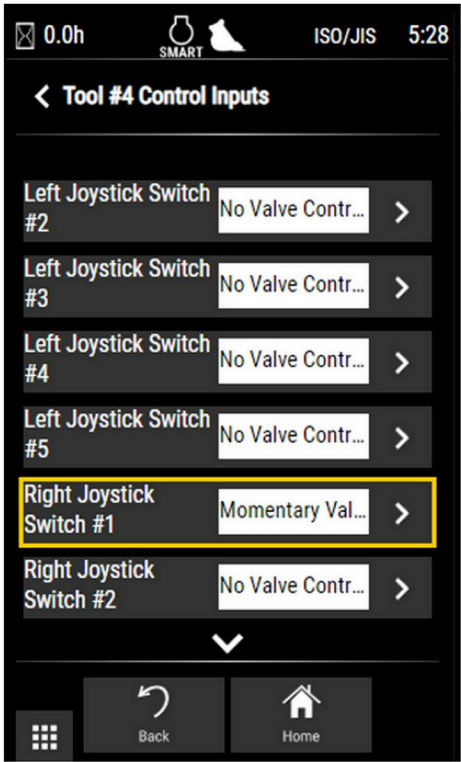


Illustration 286 g06610994

Select right or left joystick switch.

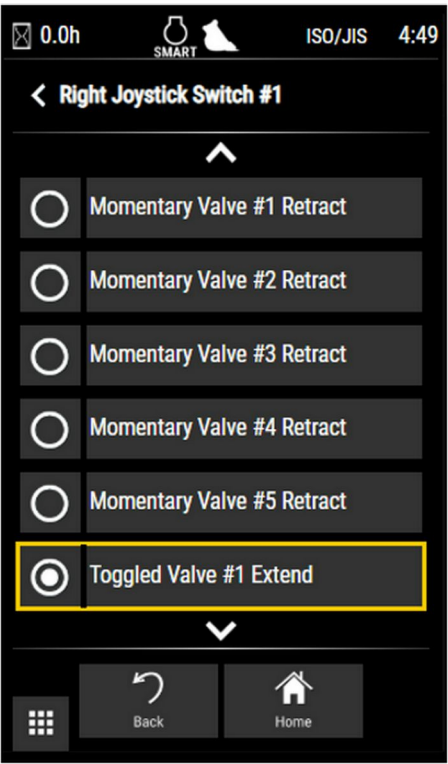


Illustration 287 g06610995

Then select the desired operation by clicking on the toggled or momentary valve options.

- Momentary - When pressing the joystick switch, hammer will remain activate at a constant rate. Release the switch to turn off the hammer.
- Toggled - Press the switch once to activate the hammer. Press the switch again to turn off the hammer.

Electronic OMM

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

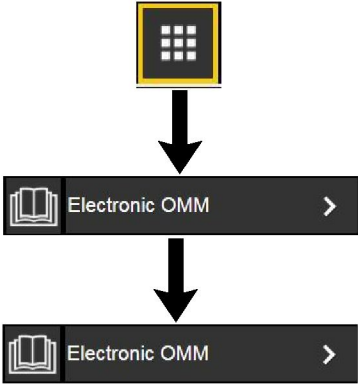


Illustration 288 g06261340

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

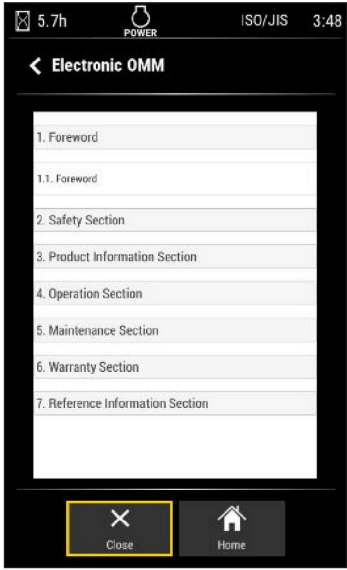


Illustration 289 g06342831

Navigate through the OMM to find the topic of choice. Press the “Home” button to return to the main screen.

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

Function List Screen

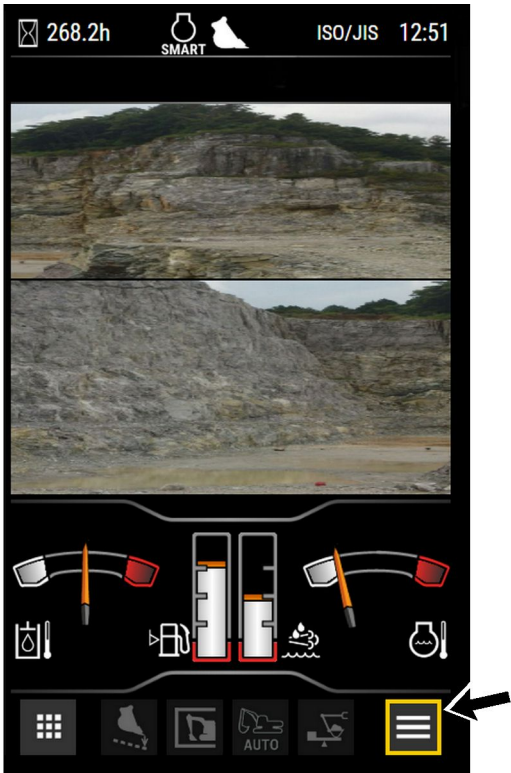


Illustration 290 g06469616

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

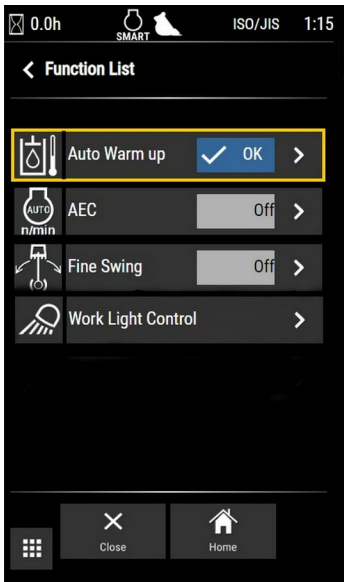


Illustration 291 g06493173

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.

Auto Warm Up

The auto warm-up feature is a convenient way to make sure that the machine component temperatures are optimum for machine operation. More settings are located in Settings, Machine Settings, Auto Warm Up screen.

AEC

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

The engine rpm will recover automatically to the setting of the engine speed dial when any hydraulic function is activated.

Table 12

AEC State	Position of Manual Low Idle Switch	Description of Mode
Enabled	OFF	The electronic controller will automatically reduce the engine rpm after there has been no hydraulic demand for a set amount of time. The default time setting is 5 seconds. Approximate engine rpm: 320 GC - 950 rpm, All models except 320 GC - 1000 rpm.
Enabled or Disabled	ON	The engine speed is reduced. Approximate engine rpm: 320 GC - 950 rpm, All models except 320 GC - 1000 rpm.

Note: The position of the engine speed dial has no relevance on the actions described in Table 12 .

Fine Swing

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

Operate the machine with the fine swing control disabled when the machine is on a slope. Operate the machine with the fine swing control disabled when great swing forces are required. For example, digging on a sidewall requires great swing force. Operate the machine with the fine swing control disabled to control the motion with the swing brake.

Work Light Control

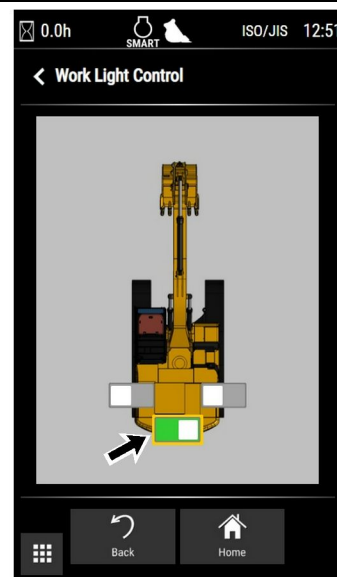


Illustration 292

g06493153

If equipped with premium surrounding lighting package, the lights are selected by this menu. The operator can activate or deactivate the lights and the lights can be selected based upon operator preference.

i07046279

Fuel Transfer Pump (Refueling) (If Equipped)

SMCS Code: 1256

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

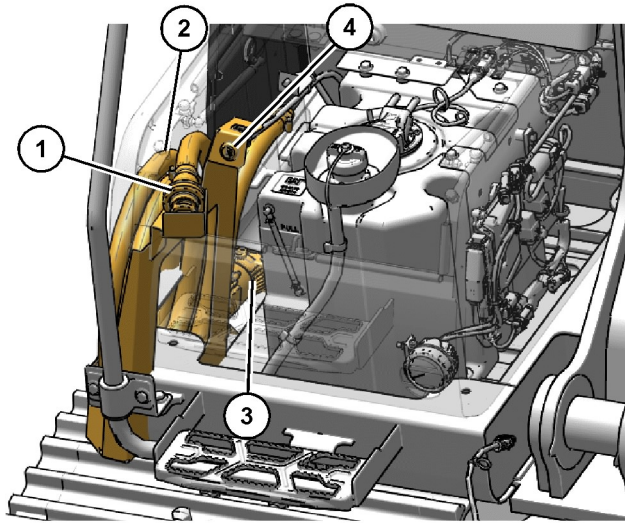


Illustration 293

g06208102

- (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 occur, 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. Park the machine on a level surface. 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.
3. Remove the fuel tank cap from the fuel tank.
4. Open the access that is on the right side of the machine.

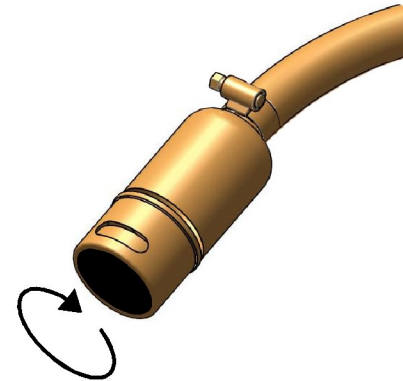


Illustration 294

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.

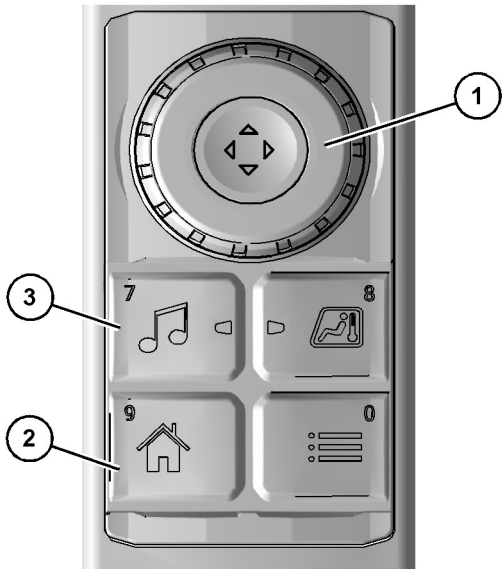


Illustration 295

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.

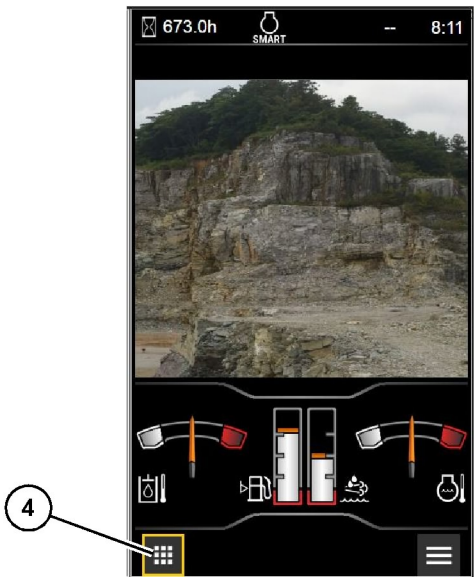


Illustration 296

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).

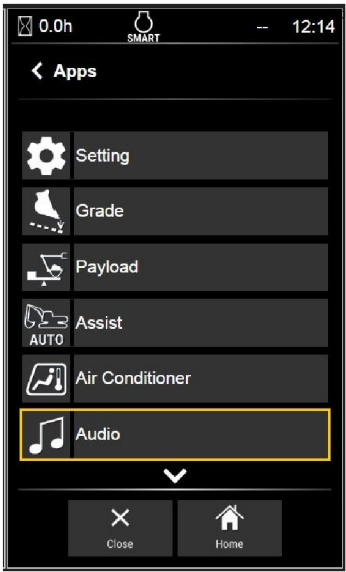


Illustration 297

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.

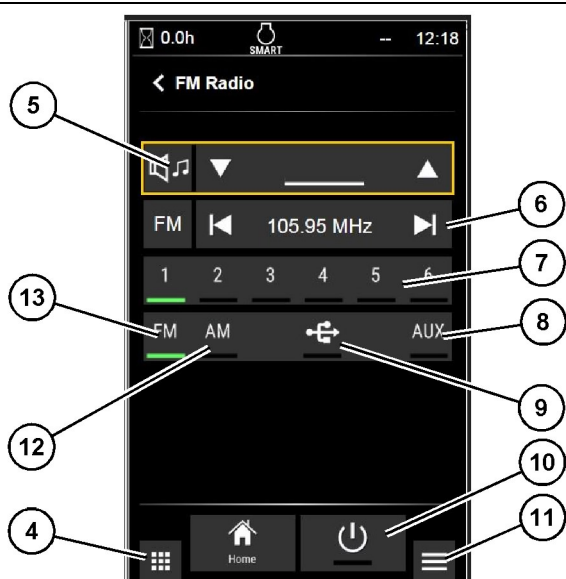


Illustration 298

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.

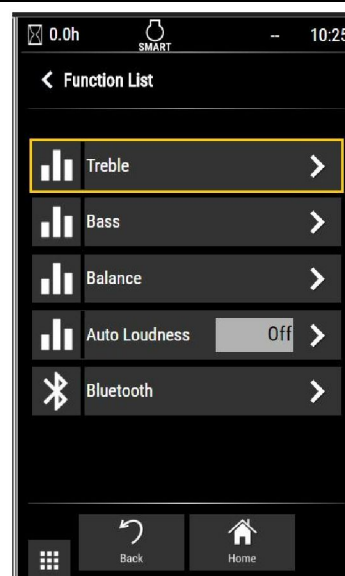


Illustration 299

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 300

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

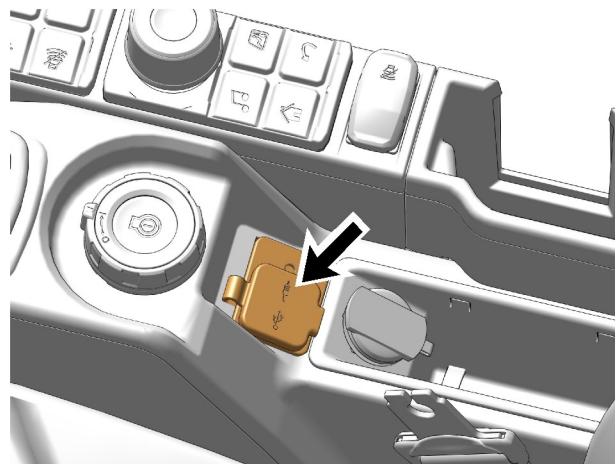


Illustration 301

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.

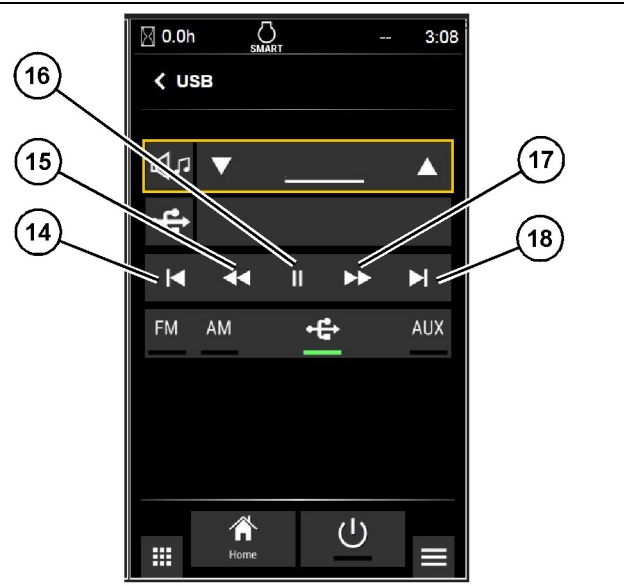


Illustration 302 g06213254

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

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.

i08031142

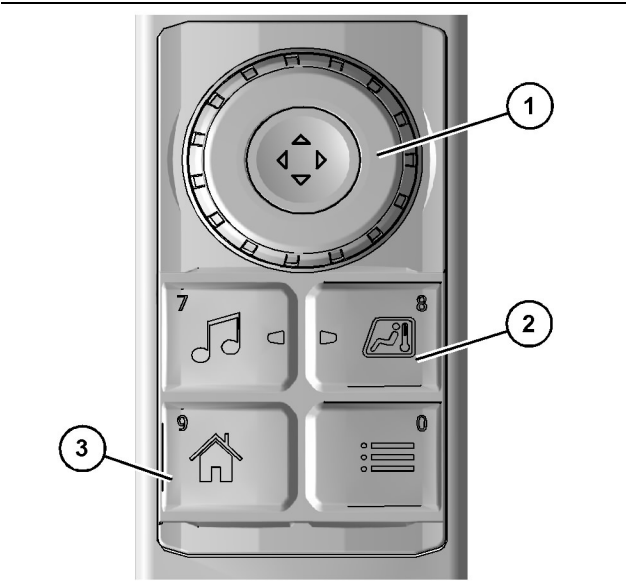


Illustration 303 g06178710

- (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.

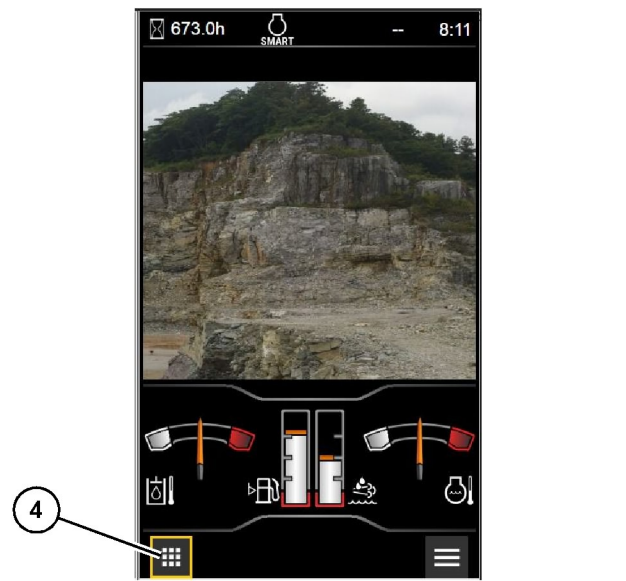


Illustration 304 g06213076

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).

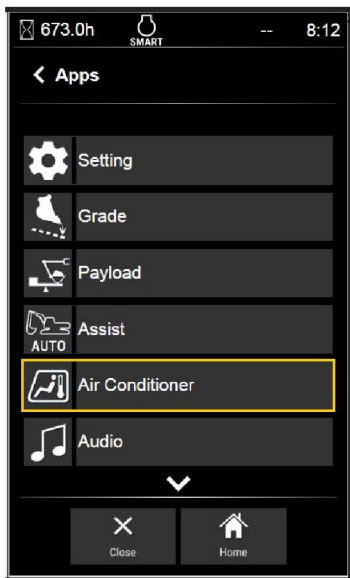


Illustration 305

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.

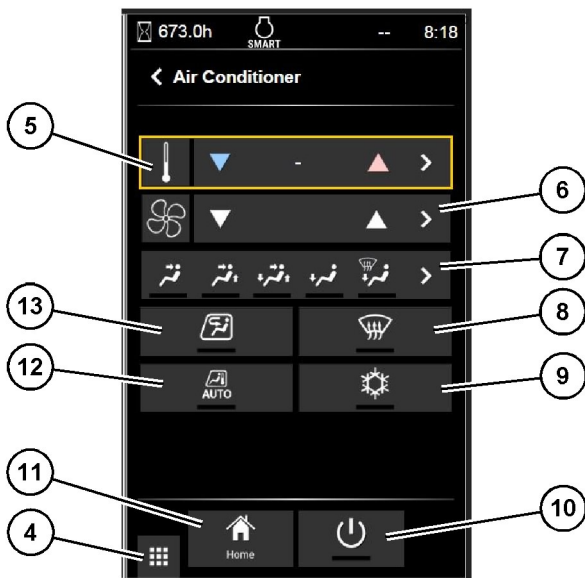


Illustration 306

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

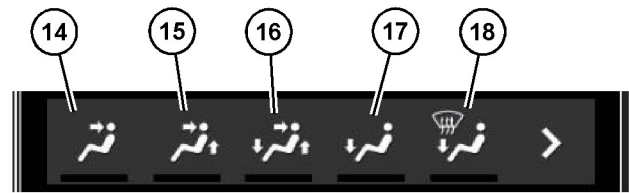


Illustration 307

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.

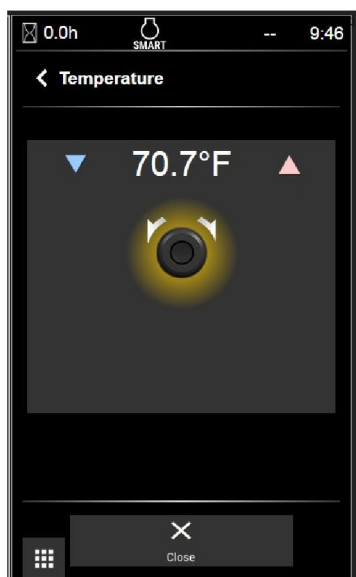


Illustration 308

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.

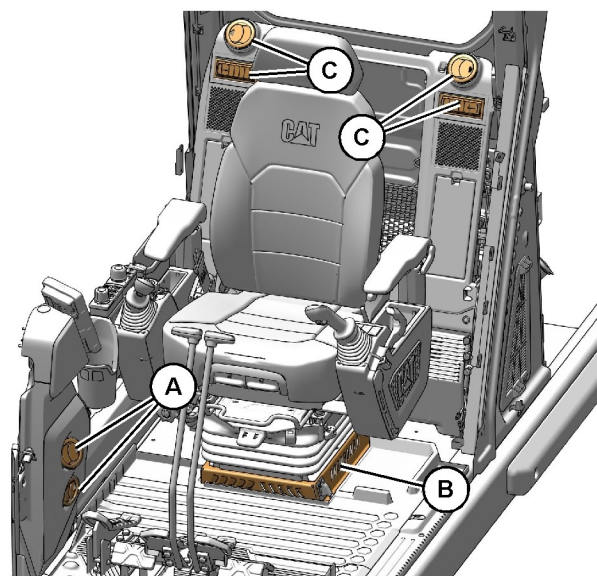


Illustration 309

g06178705

- (A) Defrost vent (front window)
- (B) Foot air vents
- (C) Rear air vents

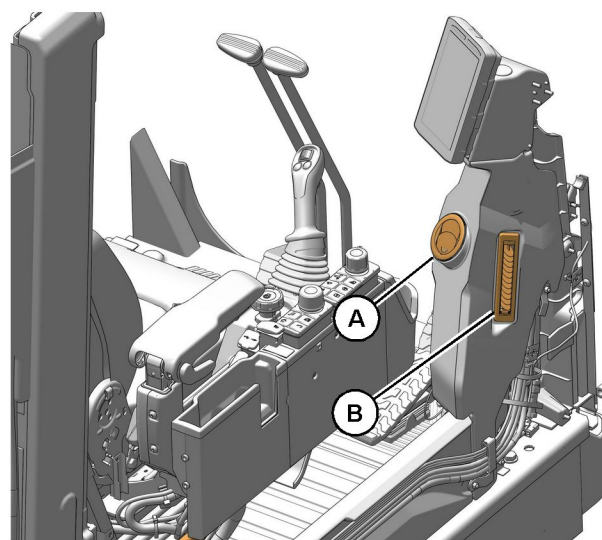


Illustration 310

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.

i07311301

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.

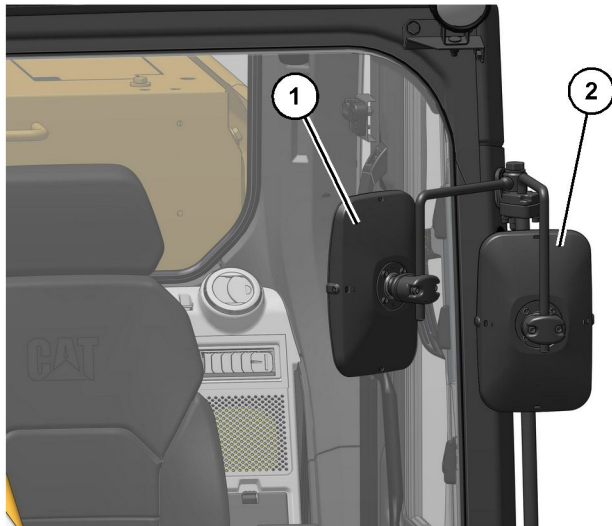


Illustration 311

g06220616

- (1) Right Side View Mirror on the Cab
(2) Left Side View Mirror on the Cab

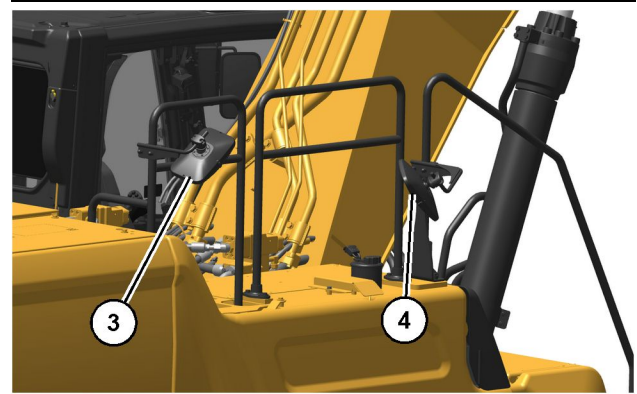


Illustration 312

g06279207

- (3) Rear tank mirror
(4) 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.

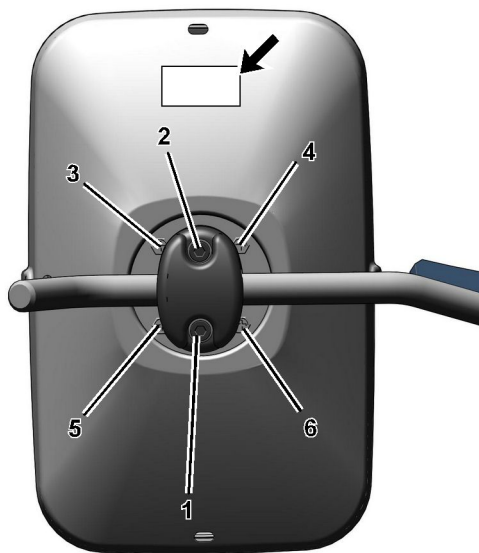


Illustration 313

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 313 . Tighten bolts (1) and (2) to $11 \pm 2 \text{ N}\cdot\text{m}$ ($8.1 \pm 1.5 \text{ lb ft}$).

Tighten the bolts (3) through (6) to $2 \pm 0.4 \text{ N}\cdot\text{m}$ ($1.5 \pm 0.3 \text{ lb ft}$).

Right Side View Mirror on the Cab (1)

Illustration 314

g06223277

If equipped, 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 315

g06223279

If equipped, 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.

Rear Tank Mirror (3)

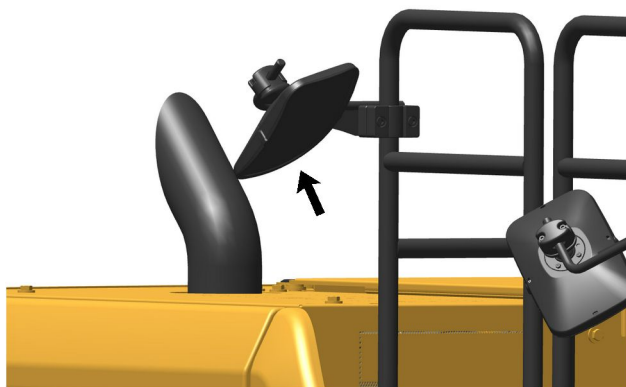


Illustration 316

g06279214

If equipped adjust the rear mirror on the tank so the right side of fuel tank and the hydraulic tank can be seen from the operator seat. A view of at least 1 m (3.3 ft) from the side of the machine should be seen from the operator seat.

Front Tank Mirror (4)

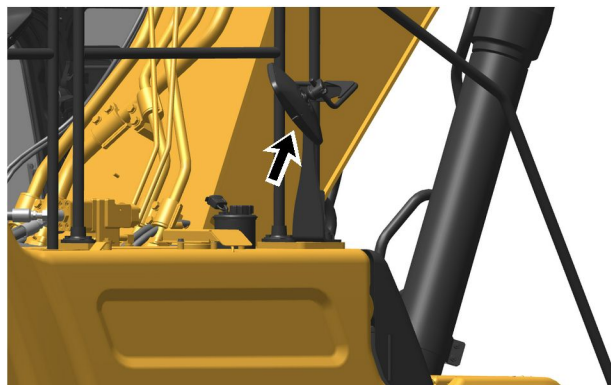


Illustration 317

g06279217

If equipped adjust the front mirror on the tank (2) 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.

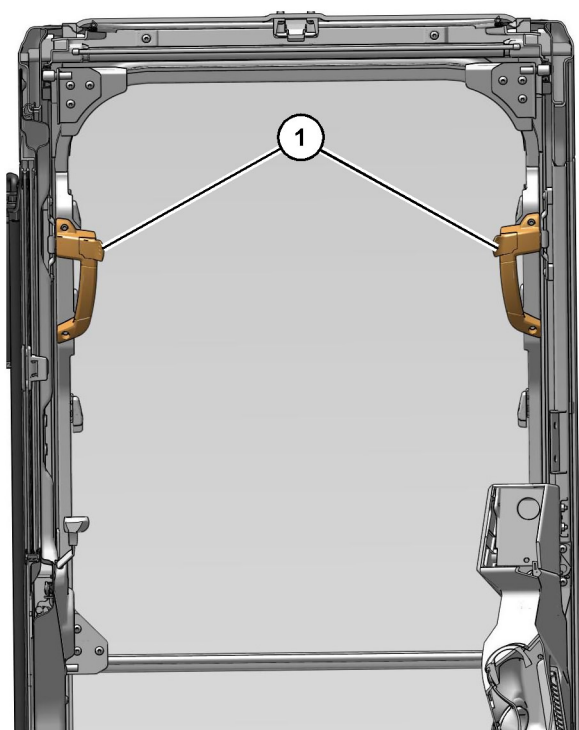


Illustration 318

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.

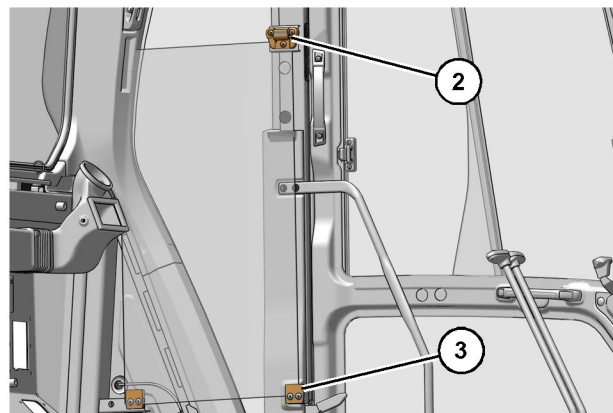


Illustration 319

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.

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.

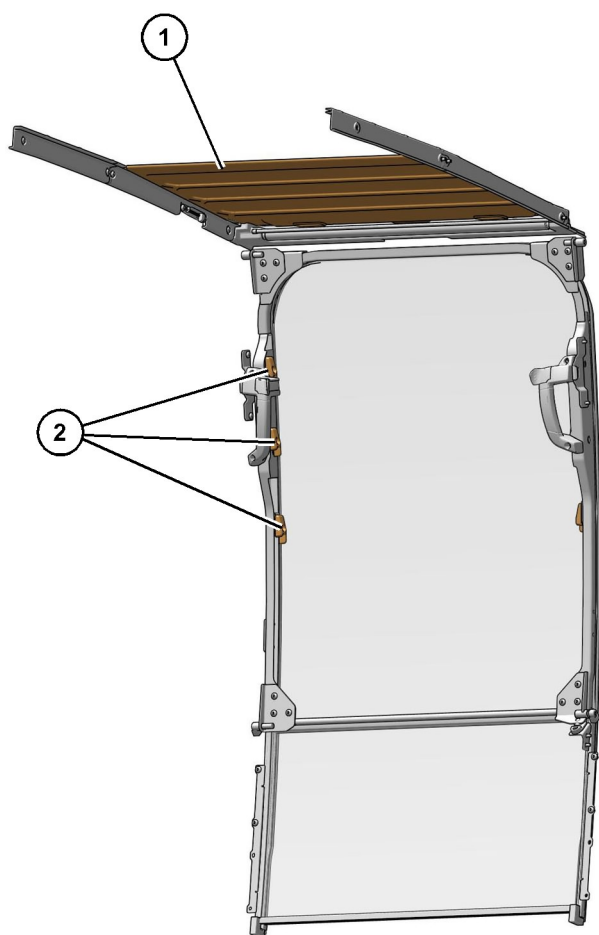


Illustration 320

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.

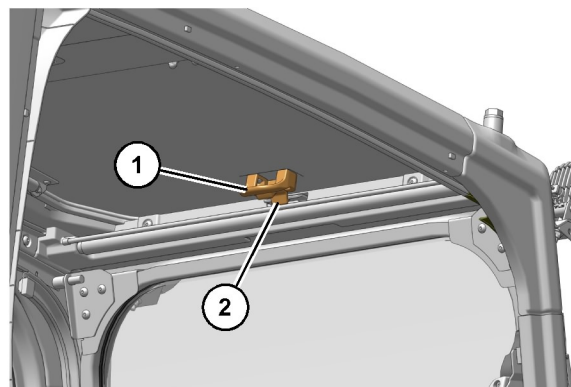


Illustration 321

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 322

g06180275

To open the cab door from the outside of the cab, pull outward on the door handle.

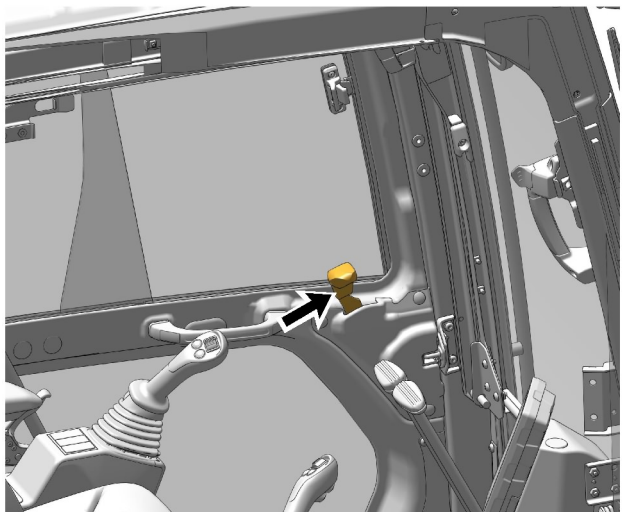


Illustration 323

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.

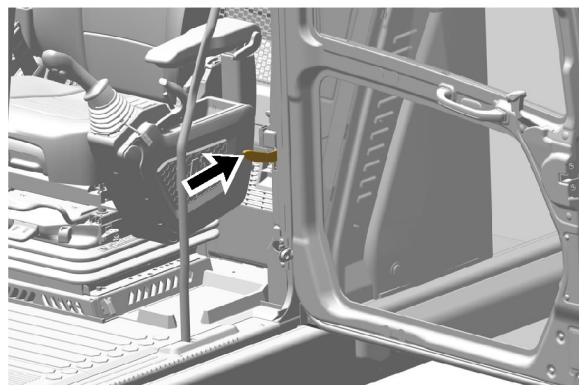


Illustration 324

g06180267

To release the cab door from the catch, pull downward on the cab door release lever.

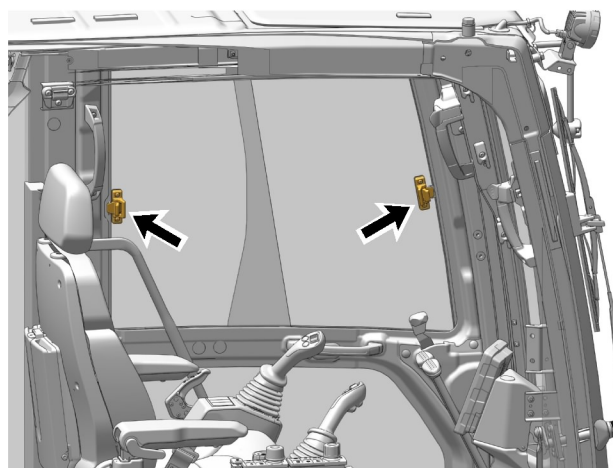


Illustration 325

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 326

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.

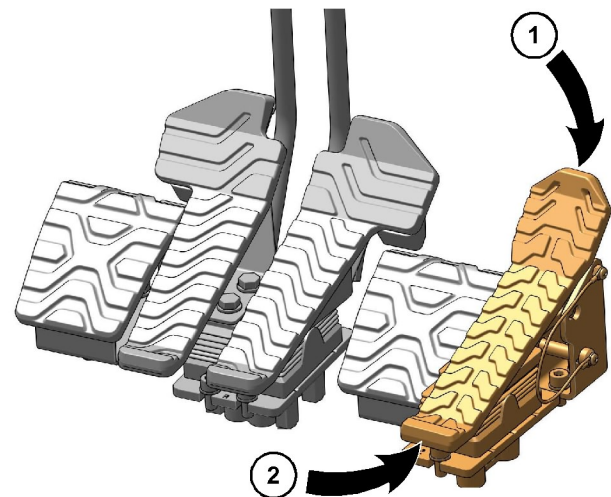


Illustration 327

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.

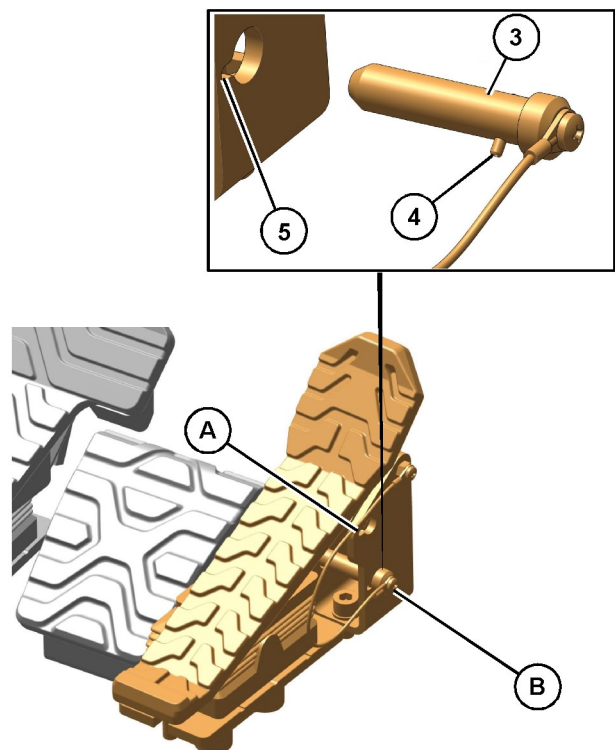


Illustration 328

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.

i08015281

Joystick Controls

SMCS Code: 5705

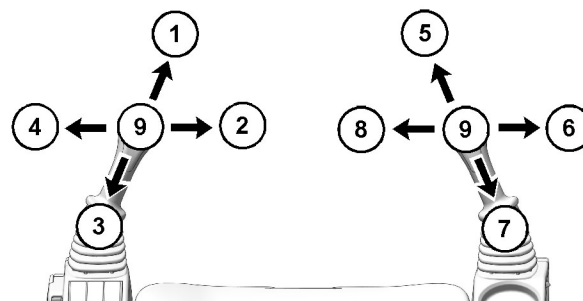


Illustration 329

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.

3 Button Joystick Controls

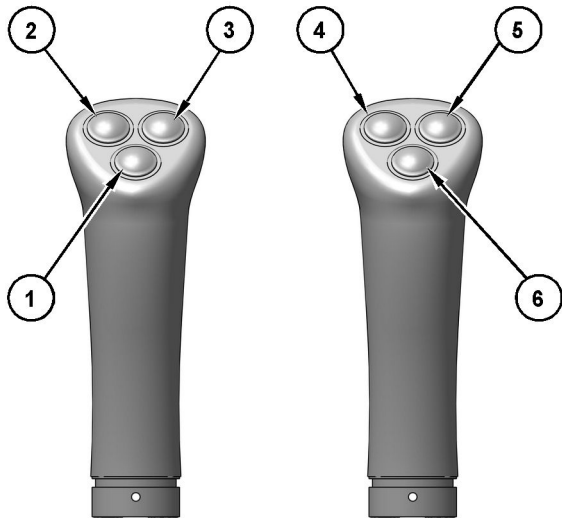


Illustration 330 g06223512

3 Button Joystick Controls

- (1) Left joystick switch 1
- (2) Left joystick switch 2
- (3) Left joystick switch 3
- (4) Right joystick switch 2
- (5) Right joystick switch 3
- (6) Right joystick switch 1

Table 13

Joystick Configurations	
Switch Location	3 Button Joystick
1	Horn
2	Configurable
3	Configurable
4	Configurable
5	Configurable
6	Configurable

Vertical Slider Joystick Controls (If Equipped)

Note: The following functions can be assigned to the configurable buttons: radio mute, one-touch low idle, work tool select, and HVAC.

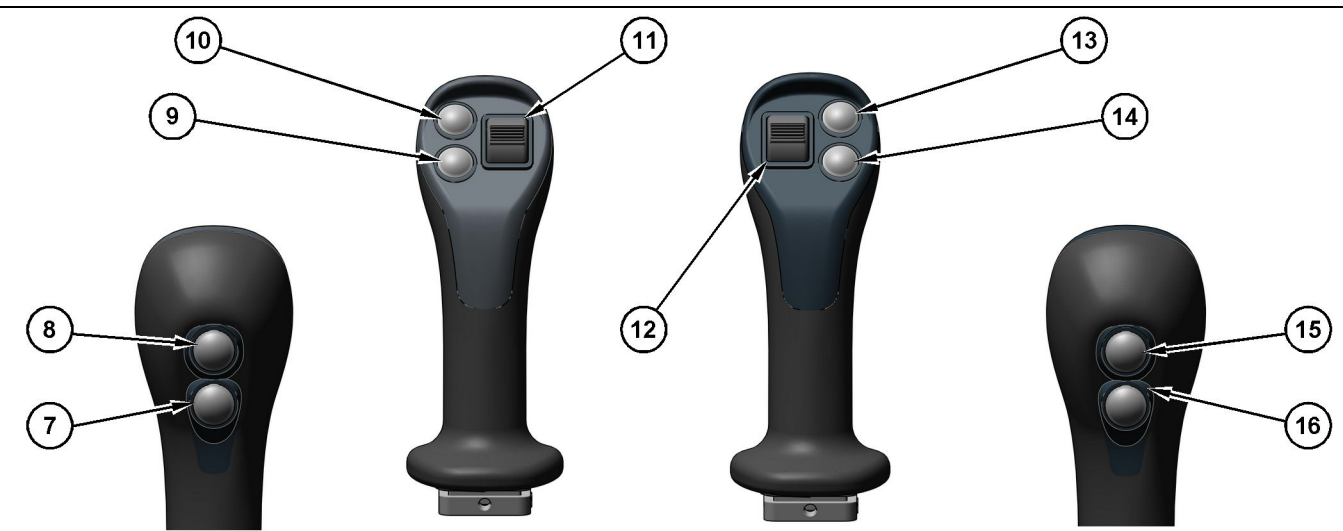


Illustration 331

g06225116

Vertical Slider Joystick Controls

- (7) Left joystick switch 3
(8) Left joystick switch 4
(9) Left joystick switch 1
(10) Left joystick switch 2
- (11) Left joystick thumbwheel
(12) Right joystick thumbwheel
(13) Right joystick switch 2
(14) Right joystick switch 1
- (15) Right joystick switch 4
(16) Right joystick switch 3

Table 14

Joystick Configurations	
Switch Location	Joystick With Tool Control Sliders
7 ⁽¹⁾	Hammer
8	Configurable
9	Horn
10	Configurable
11 ⁽¹⁾	Work Tool Rotation
12 ⁽¹⁾	Work Tool Open / Close
13	Configurable
14	Configurable
15	Configurable
16	Configurable

(Table 14, contd)

(1) Button is configurable on machines without tool control.

Medium Pressure (If Equipped)
Rotating Tool Control

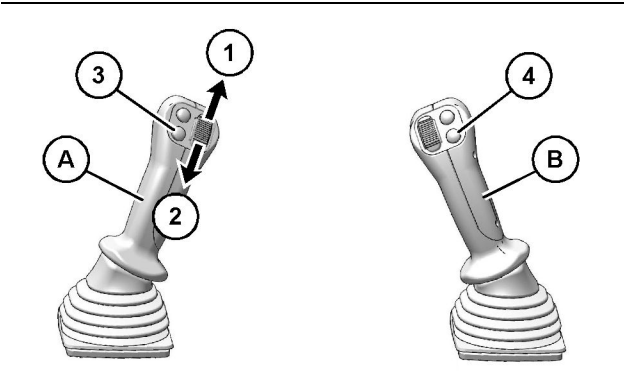


Illustration 332

g06260903

- (A) Left joystick
(B) Right joystick
- (1) Thumb wheel (Clockwise)
(2) Thumb wheel (Counterclockwise)
(3) Horn switch
(4) AEC switch

(continued)



(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 result 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 333

g06210059

From the home screen, press the function list button.

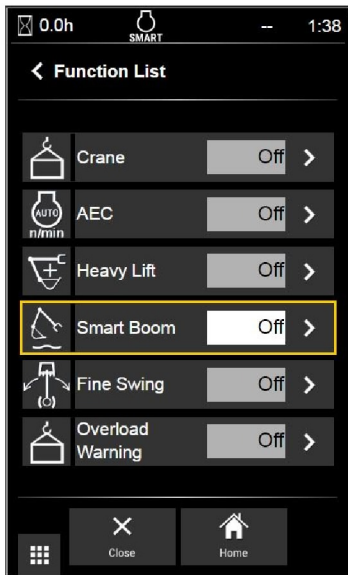


Illustration 334 g06210090

Tap the smart boom option, or if using the jog dial, select the smart boom option and press down on the dial.

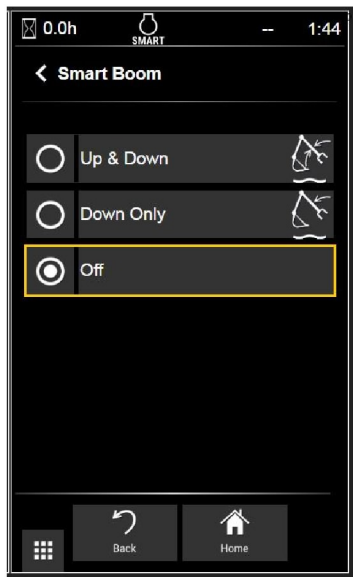


Illustration 335 g06210095

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

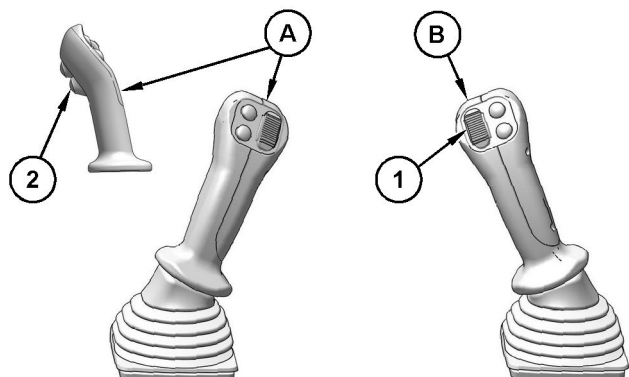


Illustration 336

g06588792

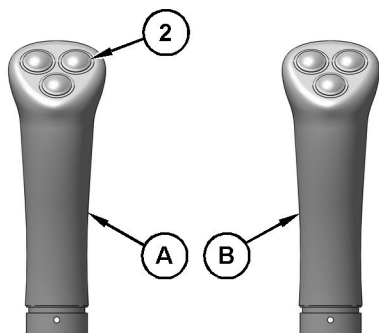


Illustration 337

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.

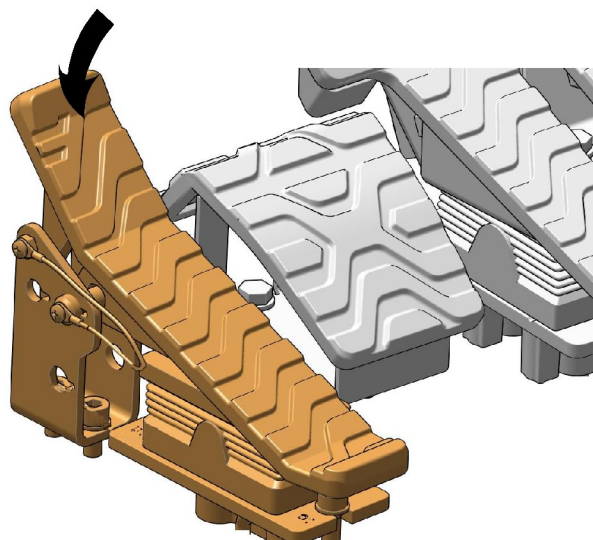


Illustration 338

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.

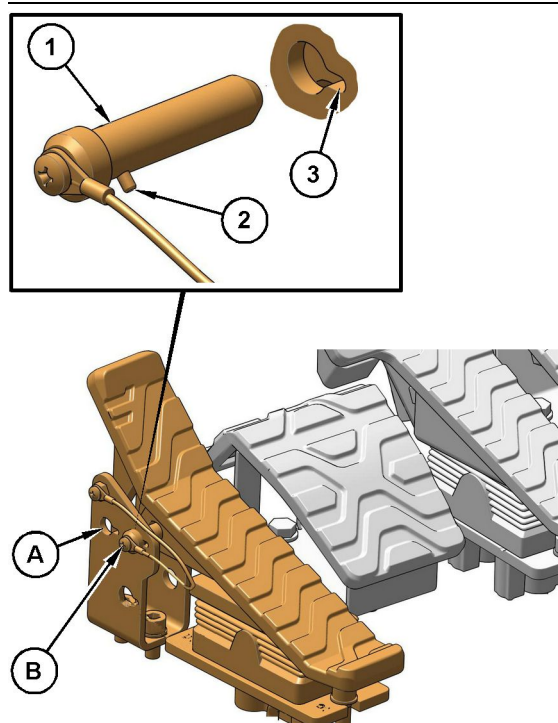


Illustration 339

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

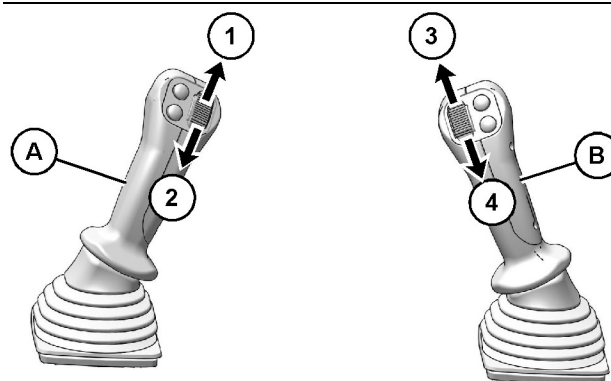


Illustration 340

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.

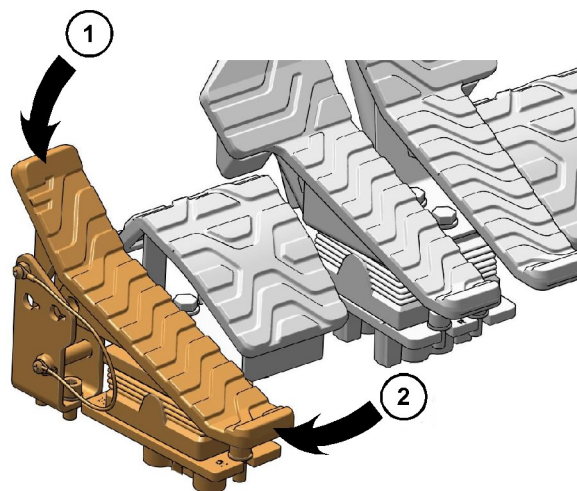


Illustration 341

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.

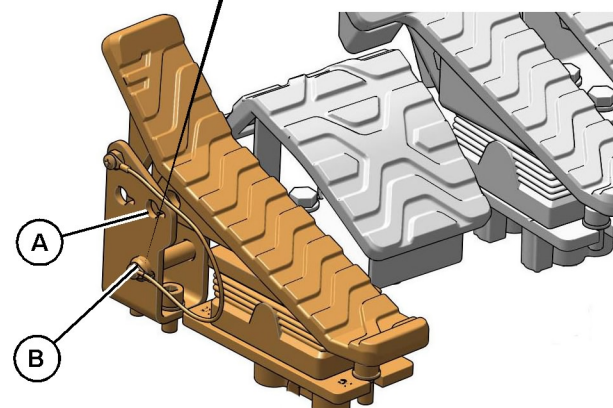
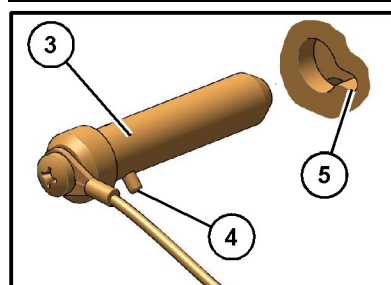


Illustration 342

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.

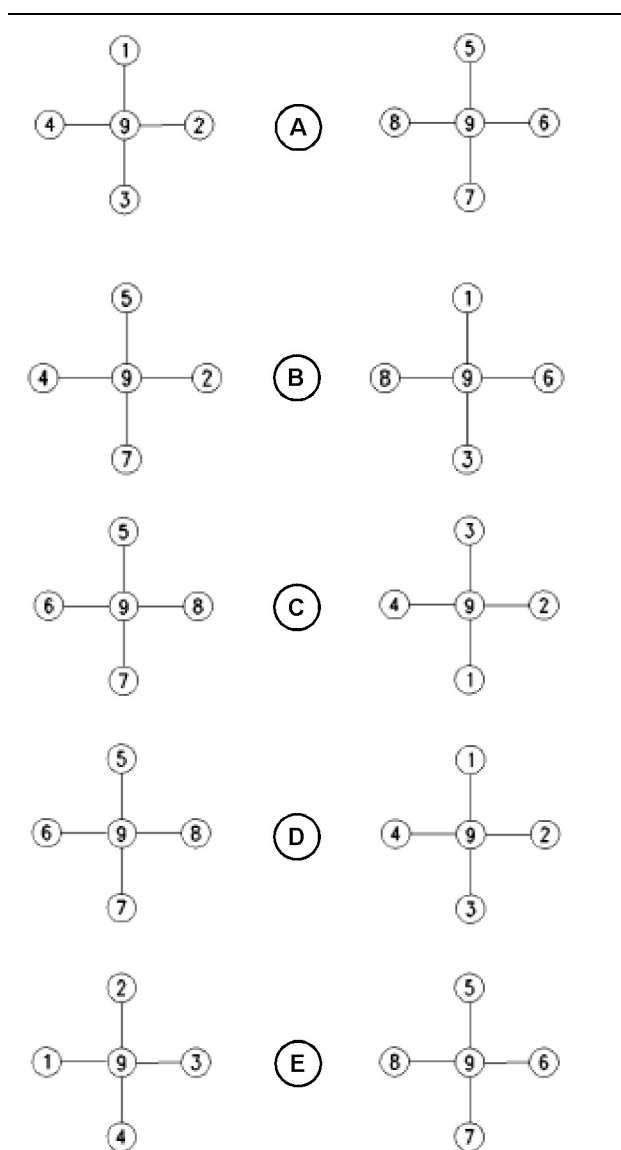


Illustration 343

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.

i07642831

Work Tool Flow Control

SMCS Code: 7007-WTL

Many hydraulic attachment circuits are adaptable on this machine. Various types of work tools can be installed. Select a suitable arrangement of the hydraulic circuit to provide the requirements for flow and the requirements for action for the work tool that is used.

One-way flow is available for work tools such as hydraulic hammers.

Two-way flow is available for work tools such as hydraulic shears.

A manually controlled ball valve is provided in the return line.

Before attachment hydraulic circuits are serviced, place the machine in the servicing position. Stop the engine.

Place the ball valve in the correct position. To determine the correct position, refer to the requirements for the work tool on Illustrations 344 , 345 , and 346 .

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

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

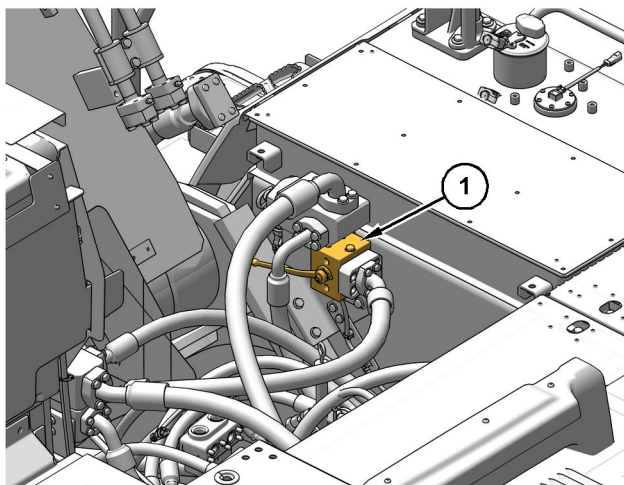


Illustration 344

g06385506

Ball valve location

(1) Ball valve

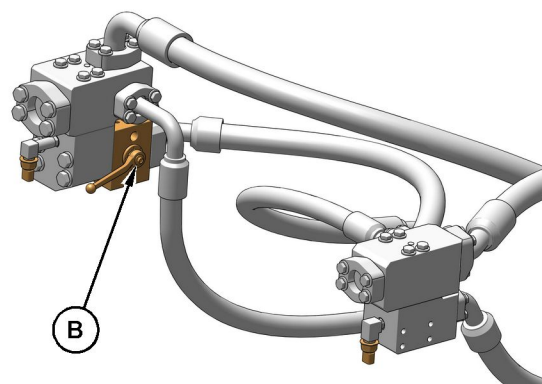


Illustration 346

g06385520

Ball valve (two-way flow position)

(B) Ball valve closed

i07046867

Fuel Tank Shutoff and Drain Control

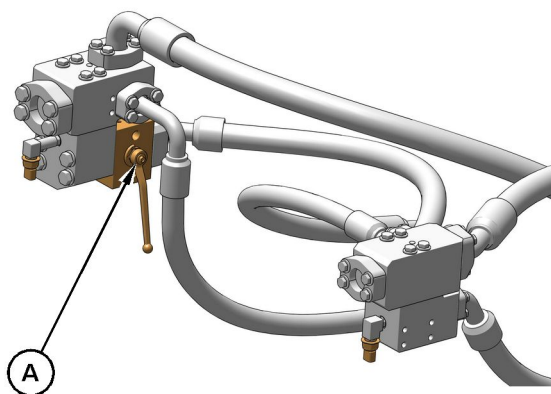
SMCS Code: 1273

Illustration 345

g06385521

Ball valve (one-way flow position)

(A) Ball valve open

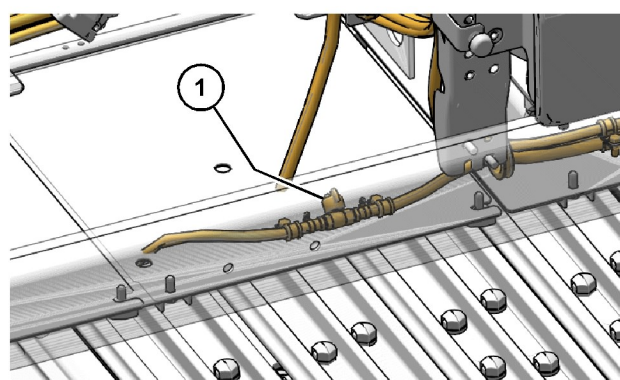


Illustration 347

g06208630

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.

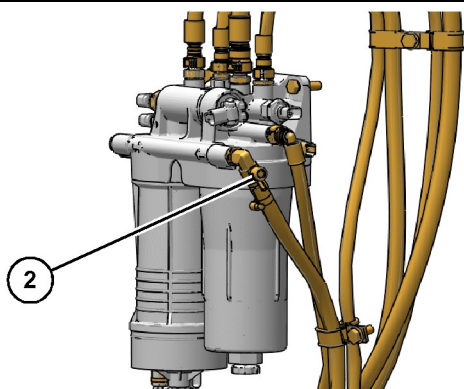


Illustration 348

g06208640

Fuel shutoff valve

Fuel Shutoff Valve (2) – The fuel shutoff valve is on the fuel system water separator. 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

i08265993

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 the joysticks and travel controls are in the HOLD position.

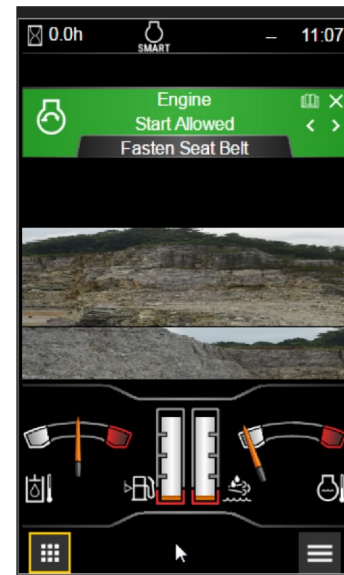


Illustration 349

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.

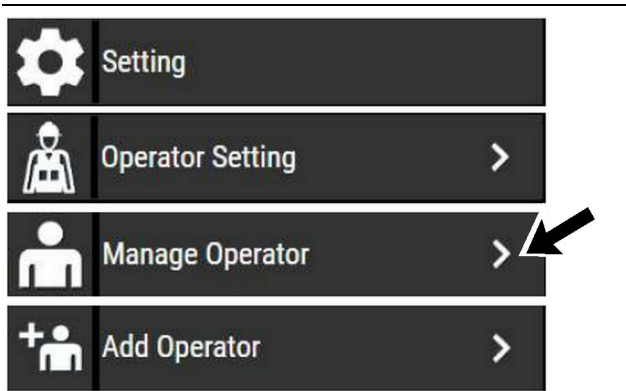


Illustration 350 g06579150

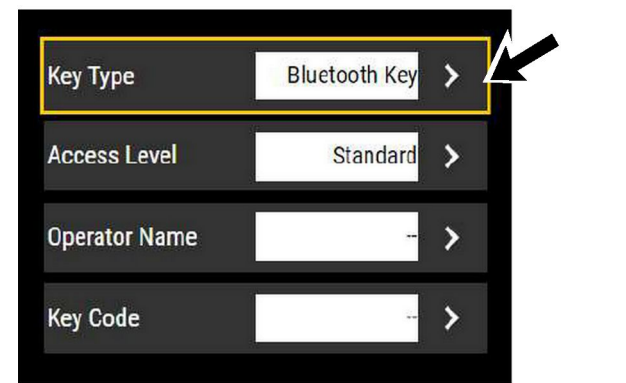


Illustration 351 g06579155

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.

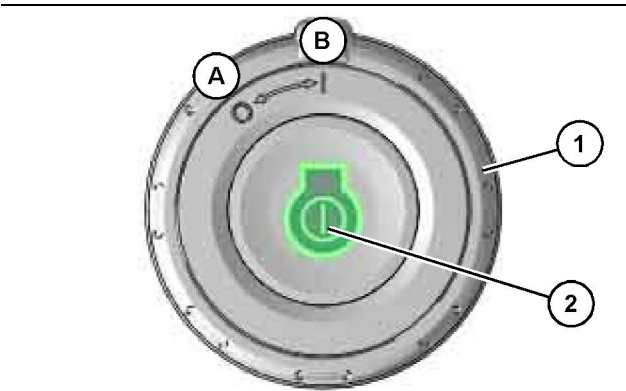


Illustration 352 g06226447

- (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.

i07047055

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 353

g06181368

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 353 . 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 354

g06181515

3. Turn the engine speed dial to the desired operating range.
4. Move the hydraulic lockout control to the UNLOCKED position.

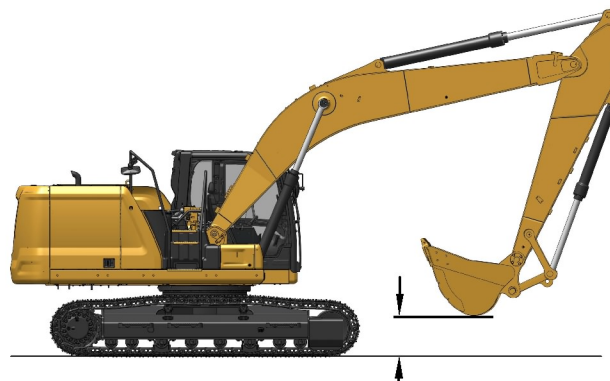


Illustration 355

g06181525

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

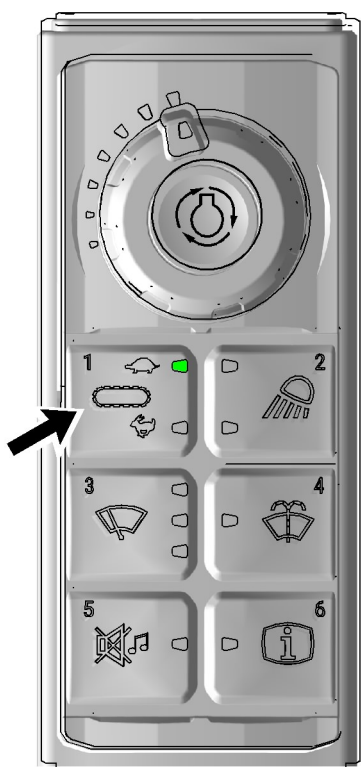


Illustration 356

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.

i07311368

Frozen Ground Conditions

SMCS Code: 7000



Illustration 357

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.

i07311402

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.

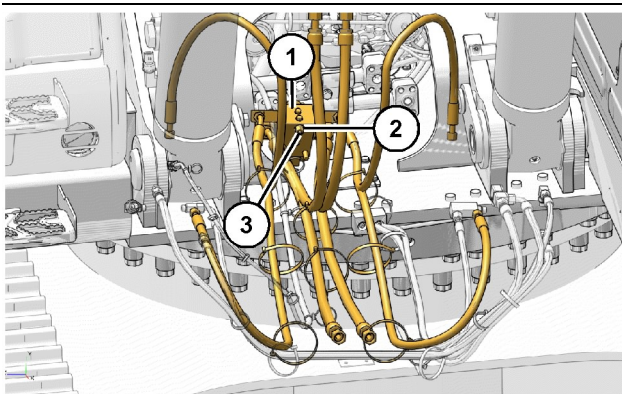


Illustration 358

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 $2.25 \pm 0.25 \text{ N}\cdot\text{m}$ ($20 \pm 3 \text{ lb in.}$).
5. Tighten the locknut (2) to $4 \pm 0.5 \text{ N}\cdot\text{m}$ ($35 \pm 4 \text{ lb in.}$).
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.

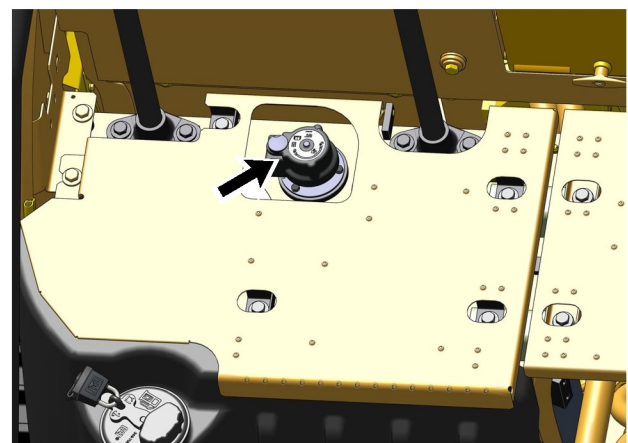


Illustration 359

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.

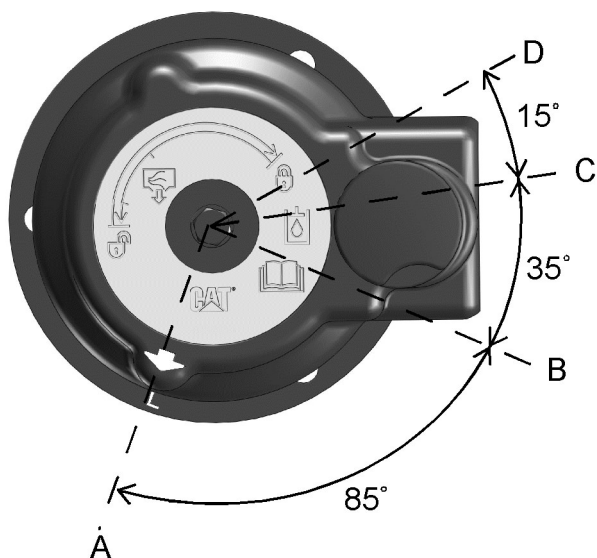


Illustration 360

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 360 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.

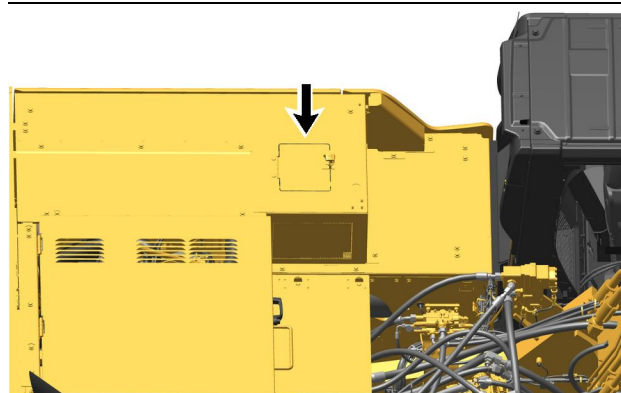


Illustration 361

g06279315

2. Open the access cover.

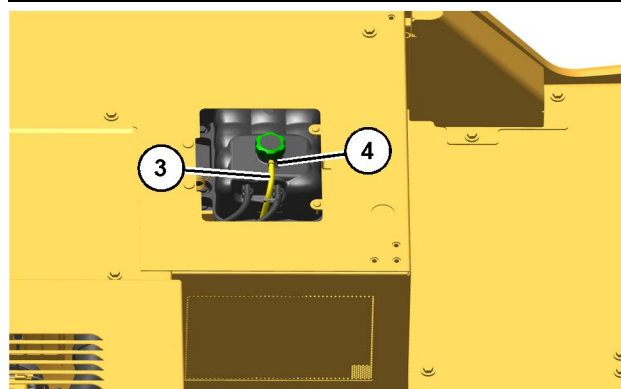


Illustration 362

g06279321

- (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.

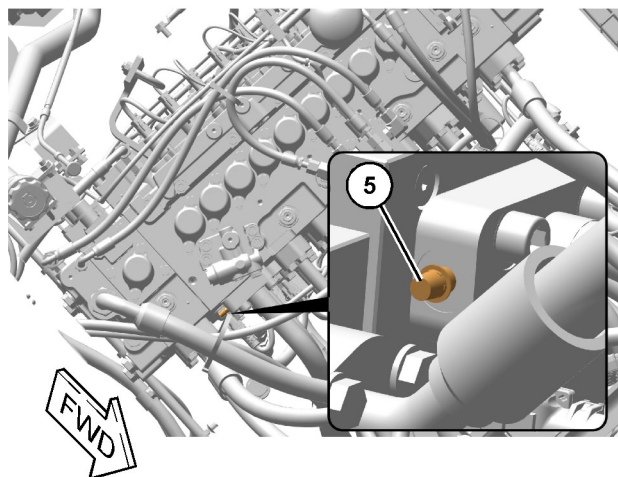


Illustration 363

g06205184

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 $13 \pm 2 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ lb ft}$).
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 access cover.

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 364

g06223763

Digging with a stable machine increases productivity. Create a stable work platform.

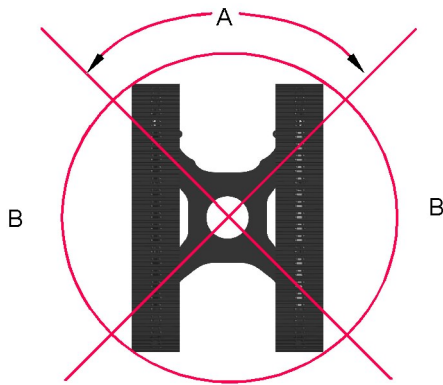


Illustration 365

g06210141

- (A) Most stable dig
(B) Dump

For improved stability: Do not dig over the drives or perpendicular to the tracks.

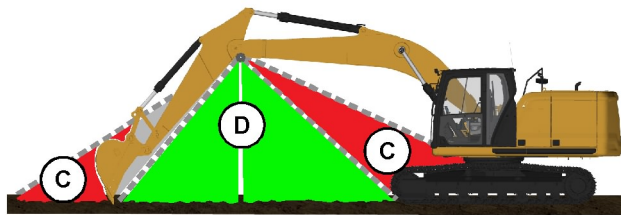


Illustration 366

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.

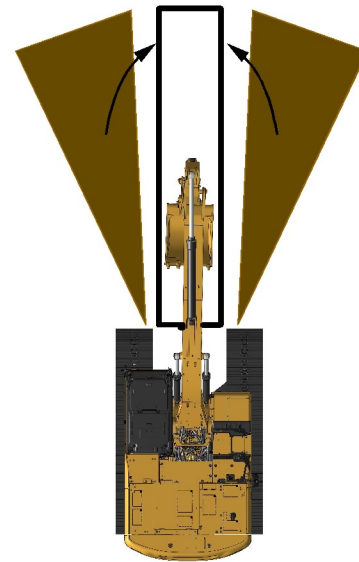


Illustration 367

g06210334

Minimize unneeded movement. During backfilling, start with the material closest to the trench.

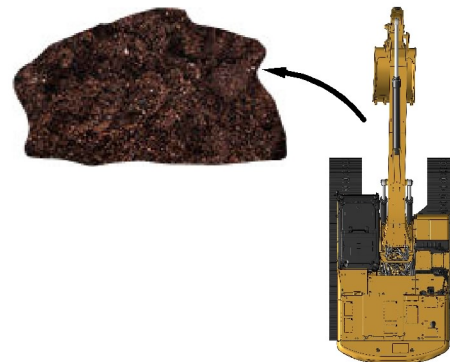


Illustration 368

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.

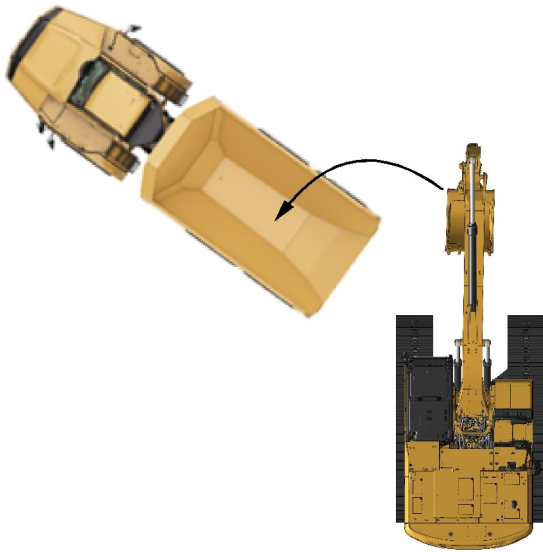


Illustration 369

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 370

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 371

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 372

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.

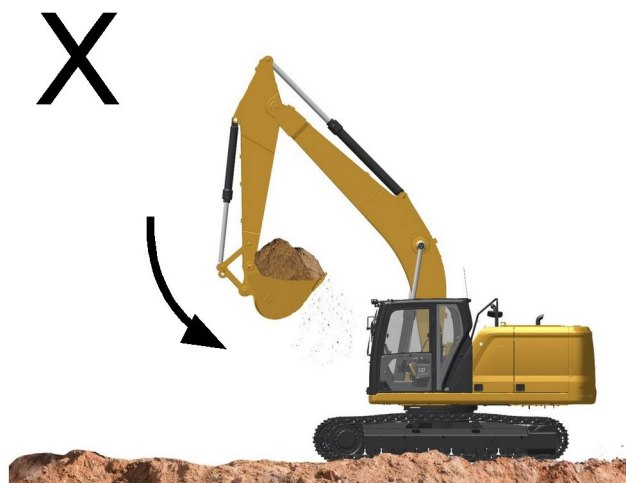


Illustration 373

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 375

g06222505

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

Operating Precaution



Illustration 374

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 376

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 377

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.

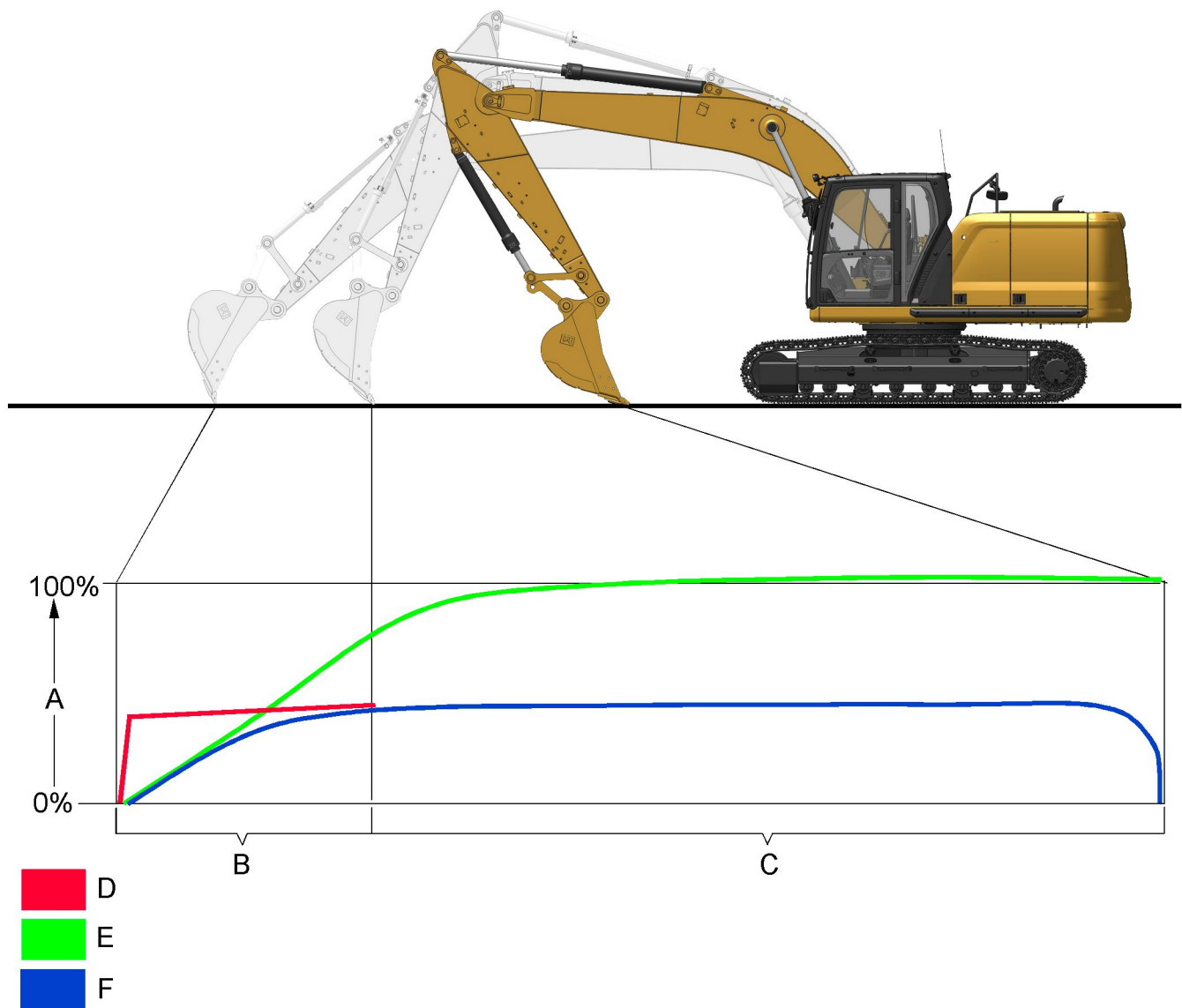


Illustration 378

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 379

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 380

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 381

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 382

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 383

g06212506

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



Illustration 384

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 385

g06222533

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



Illustration 386

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 387

g06222538

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



Illustration 388

g06223077

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



Illustration 389

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.

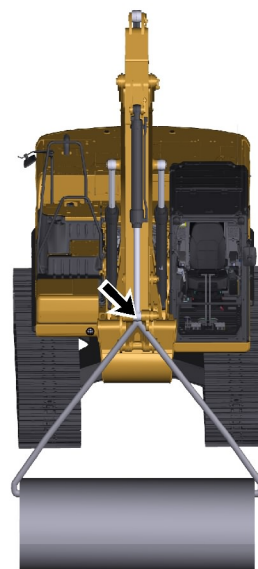


Illustration 390

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 391

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 392

g06212530

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

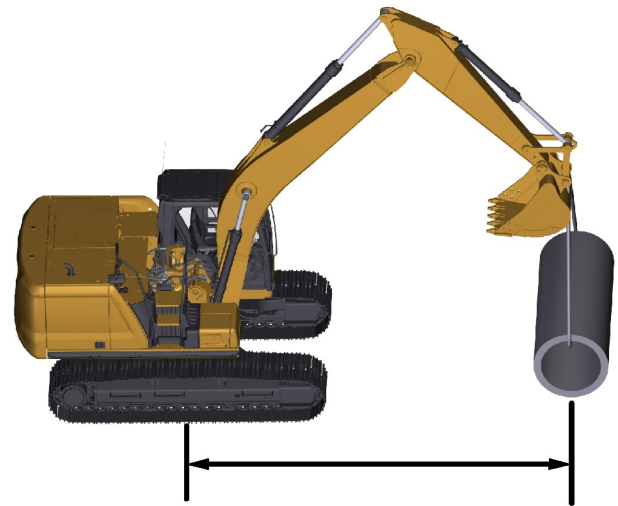


Illustration 394

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

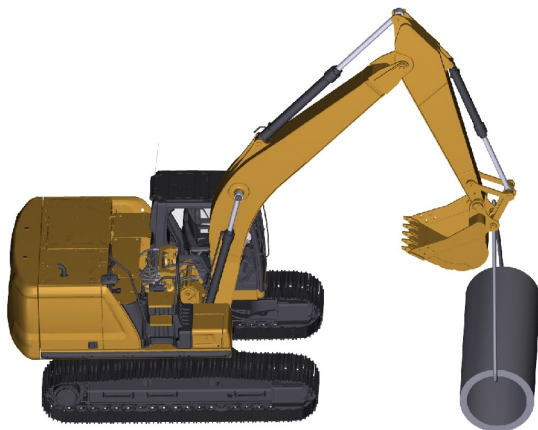


Illustration 393

g06212535

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

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 result 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: 6001-011; 6001; 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.

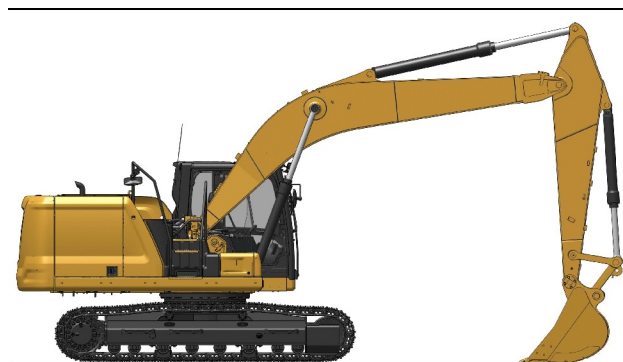


Illustration 395

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.

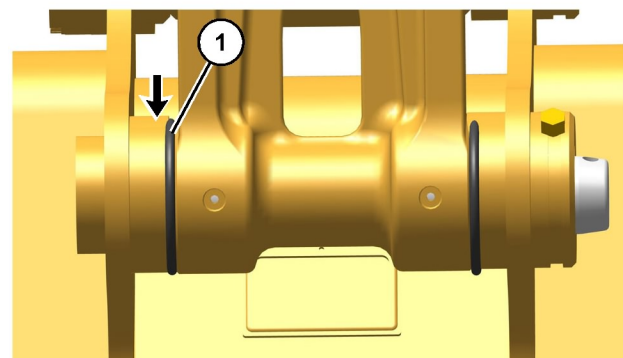


Illustration 396

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.

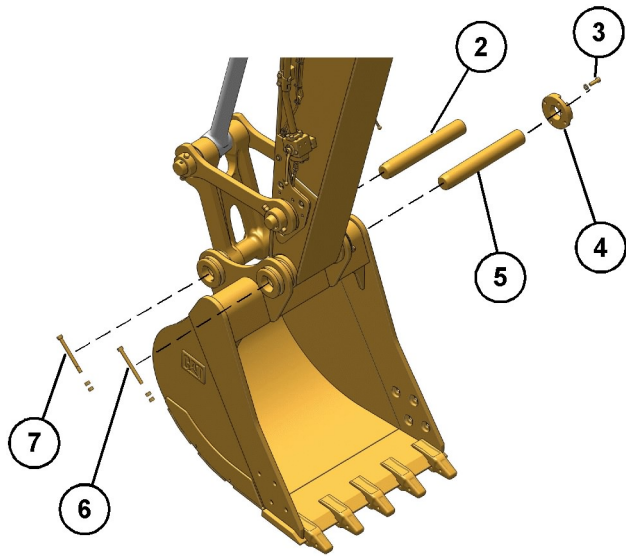


Illustration 397

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.

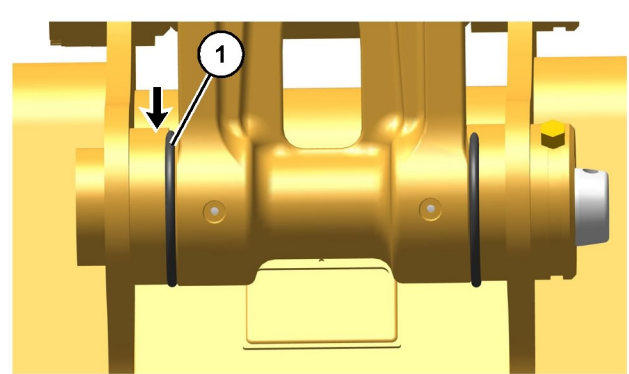


Illustration 398

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.

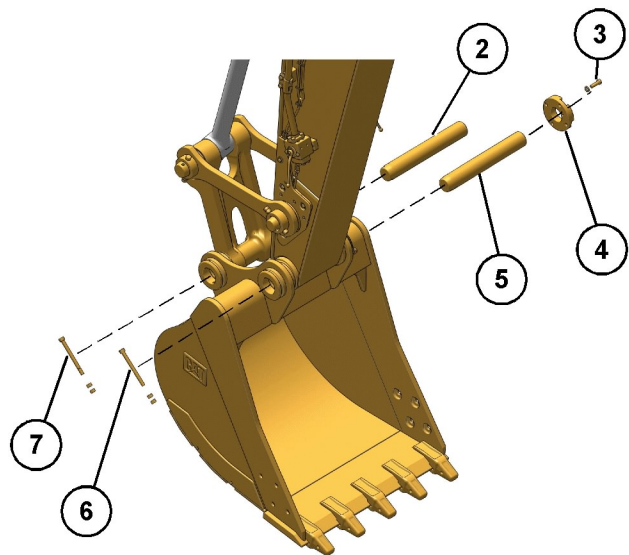


Illustration 399

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.

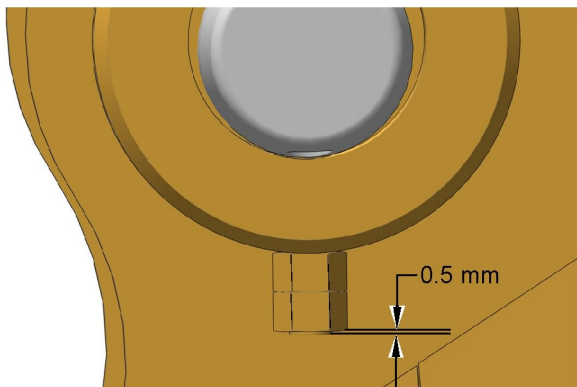


Illustration 400

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

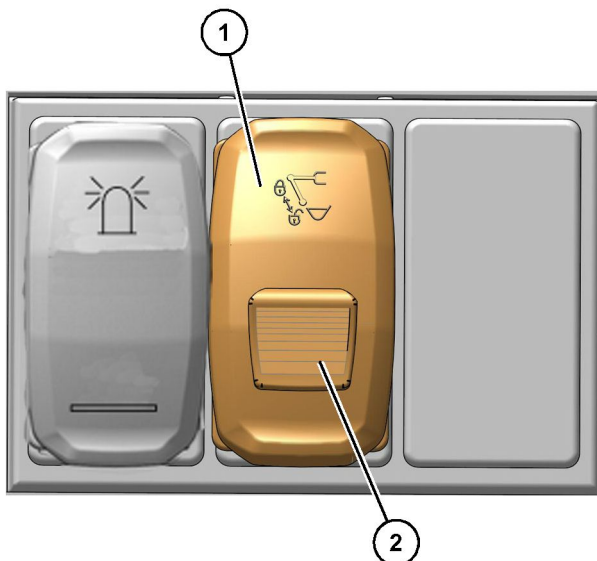


Illustration 401

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.

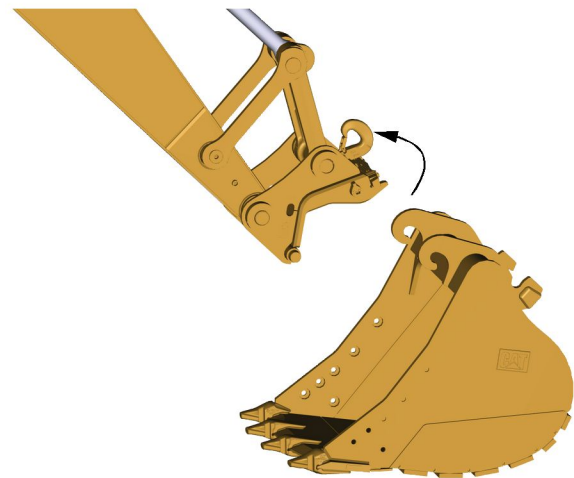


Illustration 402

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.

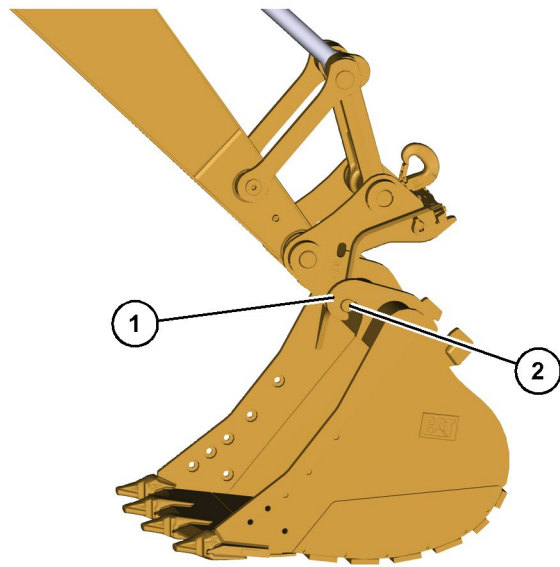


Illustration 403

g06220883

- (1) Hinges
(2) Lower bosses

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.

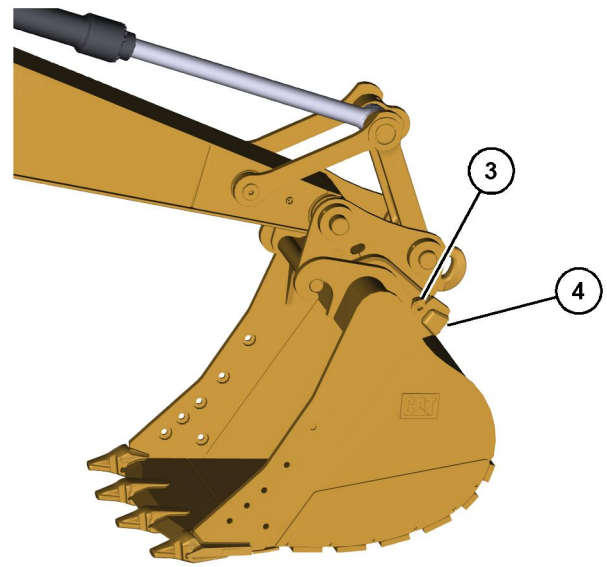


Illustration 404

g06220887

- (3) Center bosses
(4) Locking area

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" .

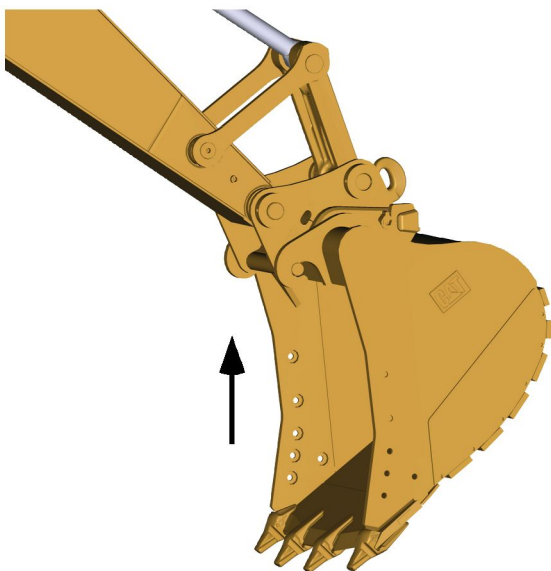


Illustration 405

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.

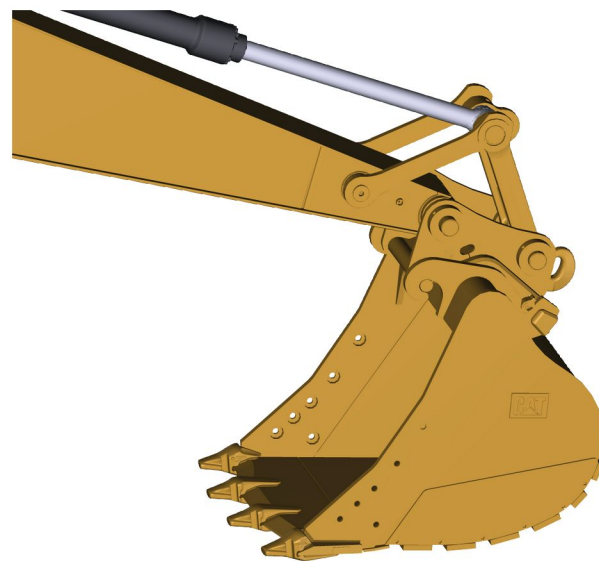


Illustration 406

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.

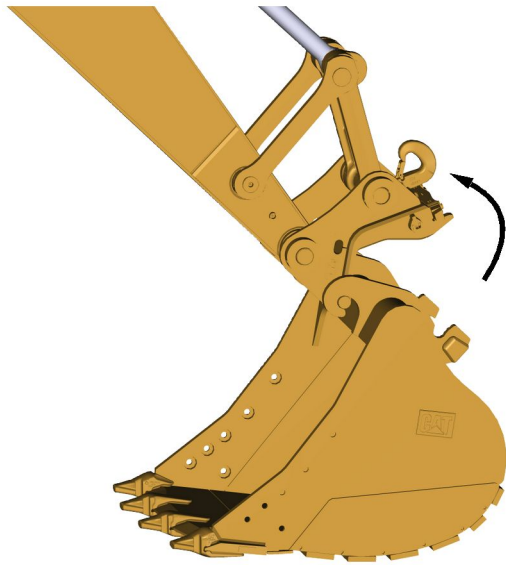


Illustration 407

g06220891

3. Retract the bucket cylinder to move the quick coupler toward the machine.
4. Release the quick coupler switch to retract the wedge.

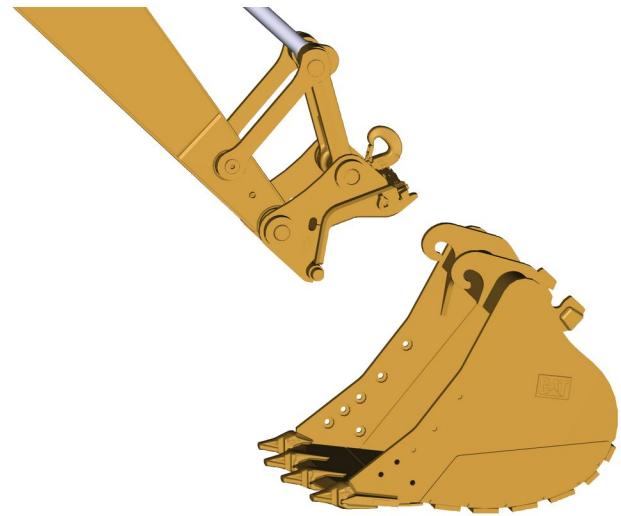


Illustration 408

g06220892

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.

Operation Section

Hydraulic Pin Grabber Quick Coupler (If Equipped)

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.

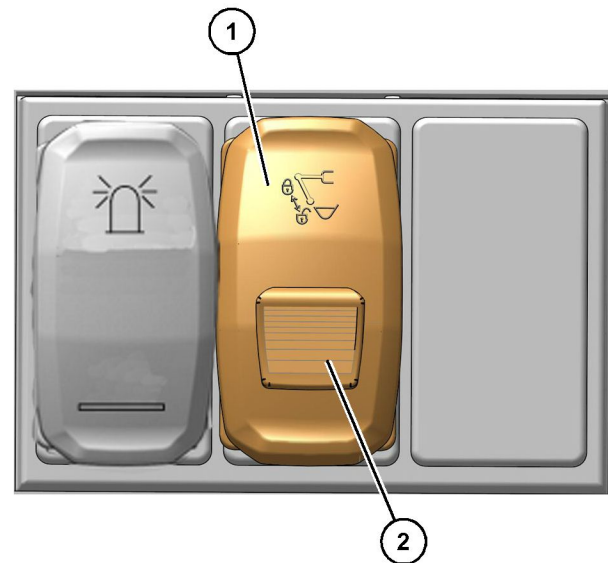
Quick Coupler Operation**Electric Switch Operation**

Illustration 409

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.

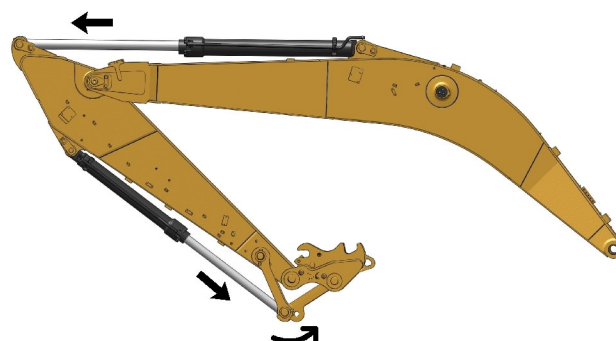


Illustration 410

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 411

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.

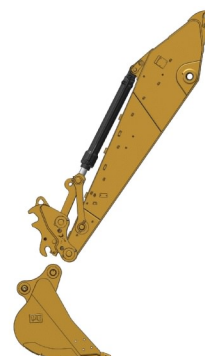


Illustration 412

g06187063

6. Align the quick coupler with the work tool.

Operation Section
Hydraulic Pin Grabber Quick Coupler (If Equipped)

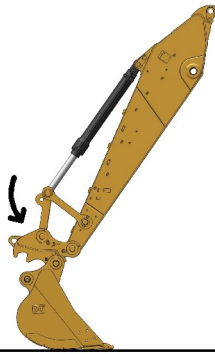


Illustration 413

g06187068

7. Rotate the quick coupler to grab the top pin.



Illustration 414

g06187086

8. Rotate the quick coupler downward to grab the bottom pin.

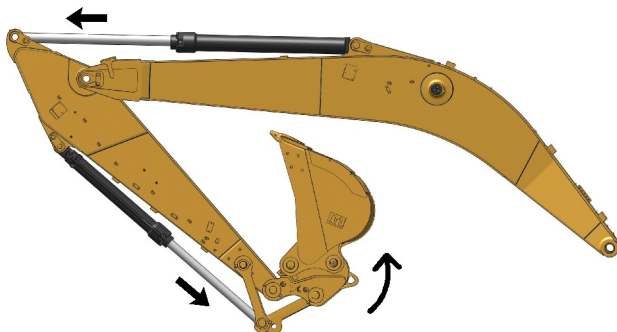


Illustration 415

g06187108

9. Extend the stick cylinder and extend the bucket cylinder until the work tool is curled past a vertical position.



Illustration 416

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.

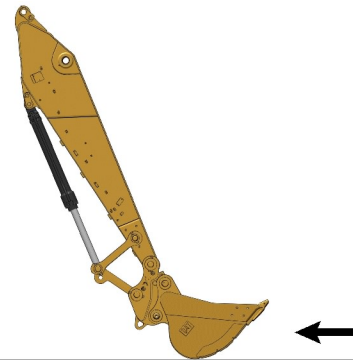


Illustration 417

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.

- Retract the bucket cylinder and place the work tool on the ground.
- 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.

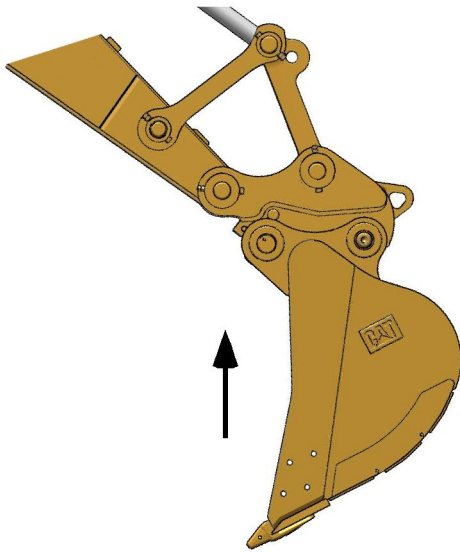


Illustration 418

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.

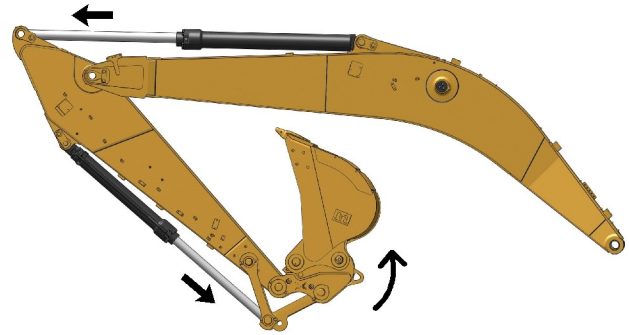


Illustration 419

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.

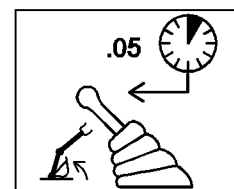


Illustration 420

g01231447

3. Hold the control lever for the bucket cylinder in the EXTEND position for 5 seconds to unlock the hook.

Operation Section
Hydraulic Pin Grabber Quick Coupler (If Equipped)

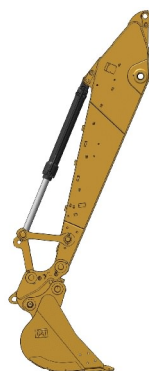


Illustration 421

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.

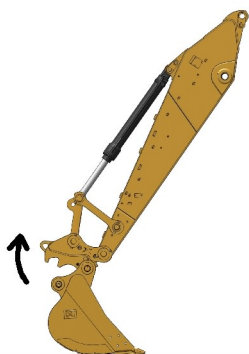


Illustration 422

g06187151

5. Rotate the quick coupler upward to release the bottom pin.

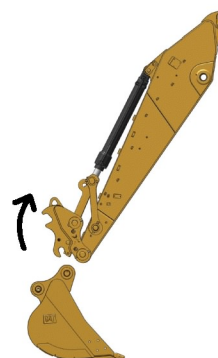


Illustration 423

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

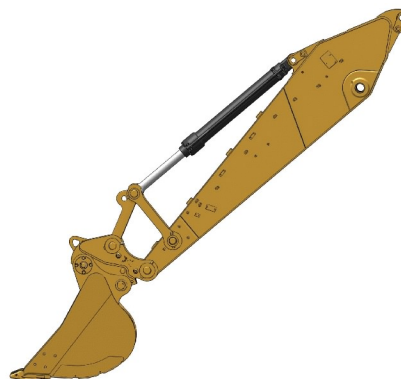


Illustration 424

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 424 for an example of connecting to a bucket that is in a reversed position.

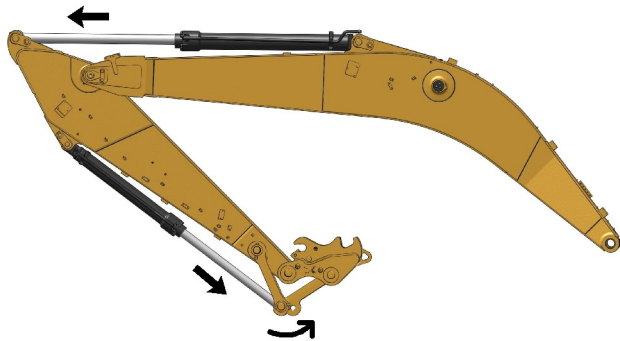


Illustration 425

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.

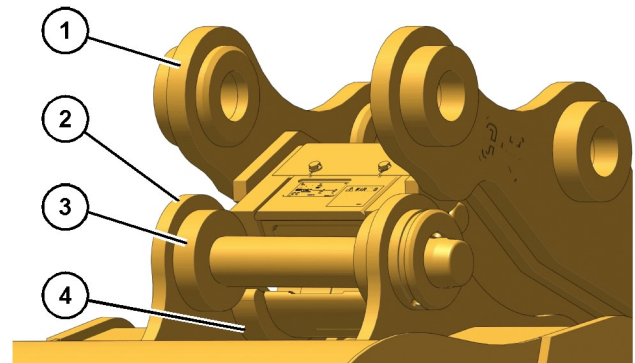


Illustration 426

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.

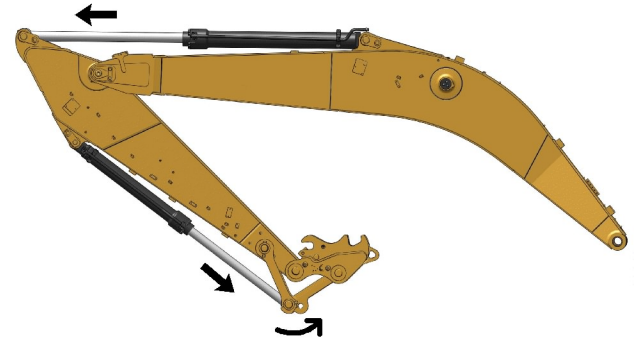


Illustration 427

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.

Operation Section
Hydraulic Pin Grabber Quick Coupler (If Equipped)



Illustration 428

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.

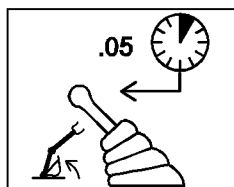


Illustration 429

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 430

g06187164

5. Rotate the quick coupler downward and move the stick to a position that is clear of the work tool.



Illustration 431

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 432

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 433. 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

Operation Section
If Equipped

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.

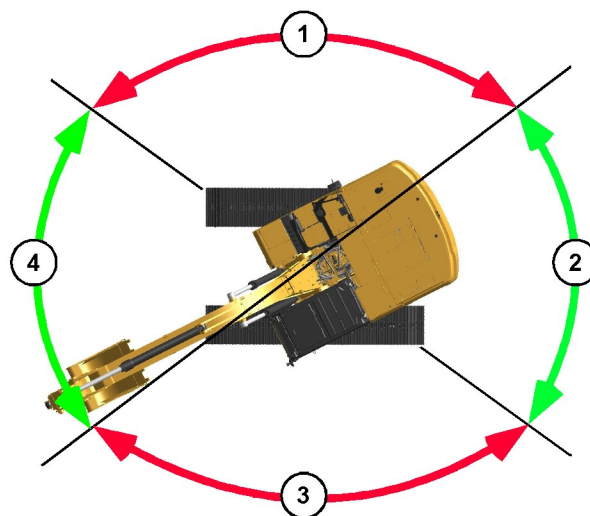


Illustration 433

g06192837

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

Shear Operation (If Equipped)



Illustration 434

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.

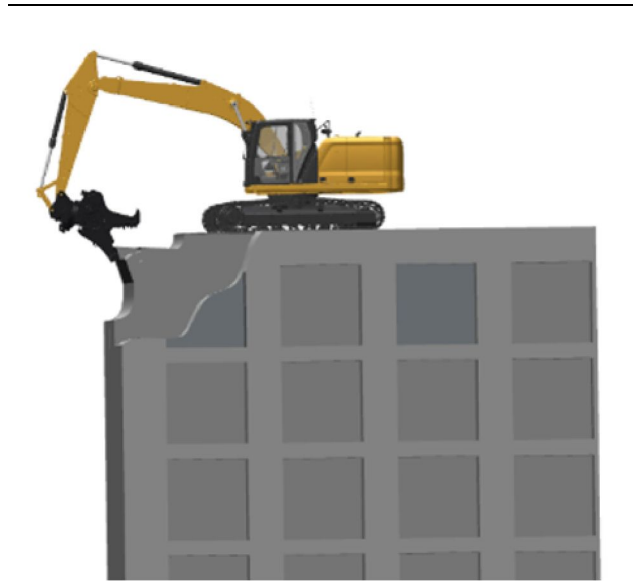


Illustration 435

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.

X



Illustration 436

g06222803

Crushing work above your head must be avoided because objects can fall and damage the machine.

X

Illustration 437

g06222806

Do not perform demolition work at the base of the machine, because the ground could be unstable and cause the machine to fall.

X

Illustration 438

g06222809

Do not suddenly lower or stop the work tool, otherwise the excavator could turn over.

X**X**

Illustration 439

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.

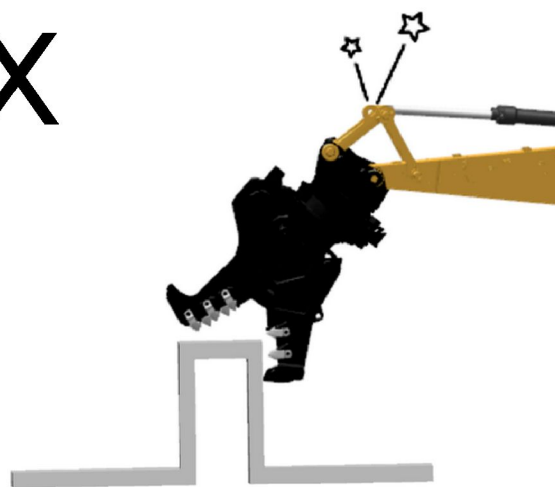
X

Illustration 440

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 441

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 443

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 442

g06222829

When working sideways, the track can lift. Avoid abrupt operation and operate slowly.

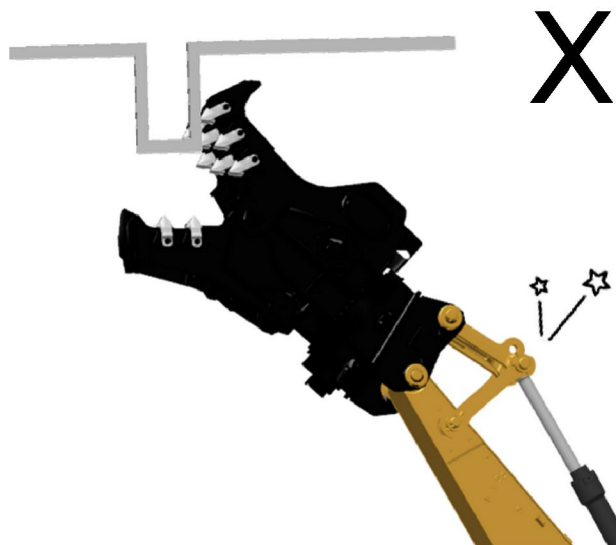


Illustration 444

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 445

g06222836

Never extend the boom cylinder suddenly. Sudden extension of the boom could cause tip backwards.



Illustration 446

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.

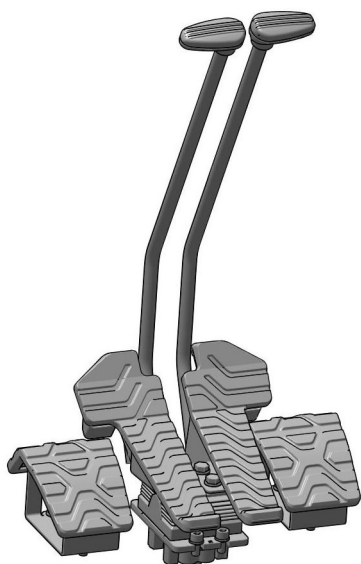


Illustration 447

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 448

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.

i07915139

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.

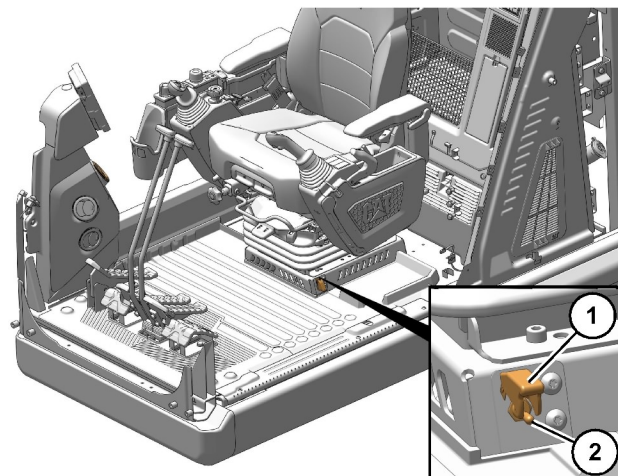


Illustration 449

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.

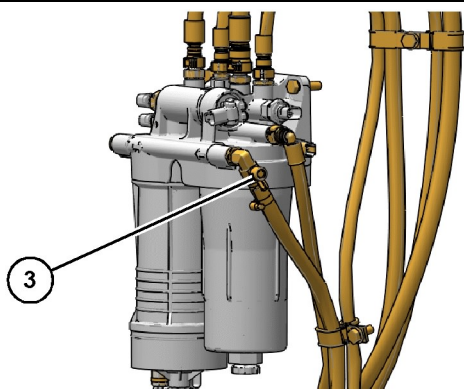


Illustration 450

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 451

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).

i07735116

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.

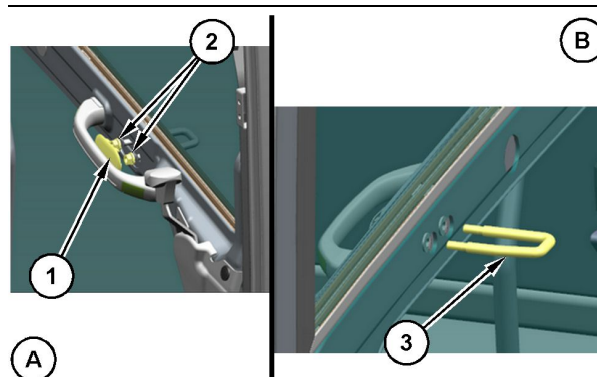


Illustration 452

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).

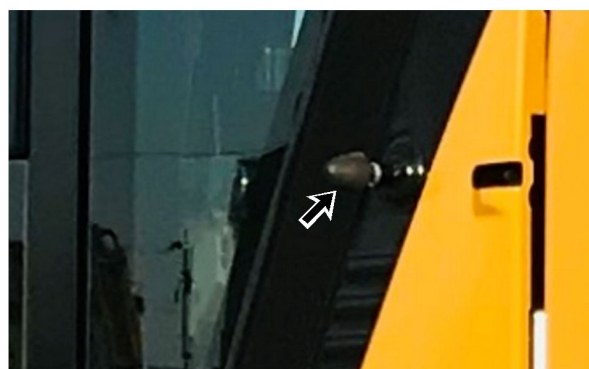


Illustration 453

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.

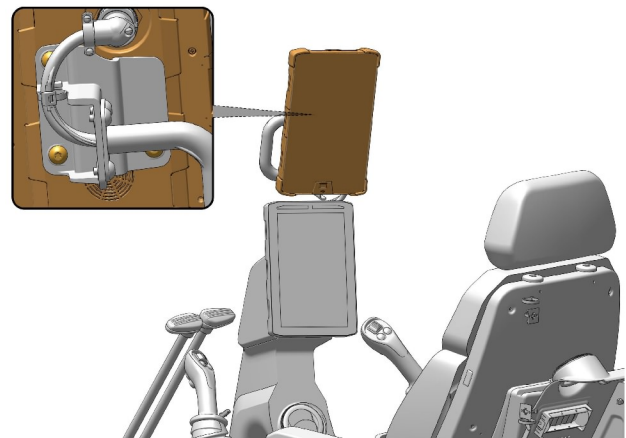


Illustration 454

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.

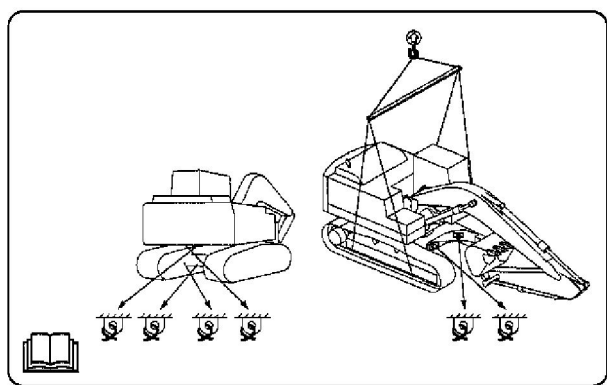


Illustration 455

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.

i07526782

Counterweight Removal and Installation

SMCS Code: 7056

Counterweight Removal

⚠ 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

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

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



Illustration 456

g06284701

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

Operation Section
Counterweight Removal and Installation

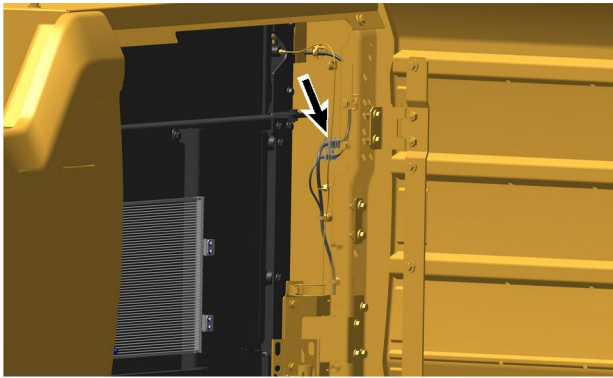


Illustration 457

g06341797

- 3. Before you remove the counterweight, disconnect the wiring for the rear view camera.**



Illustration 459

g06341822

- 5. Fasten a proper rated cable with shackles to the links. Use an appropriate lifting device to tension the cable.**

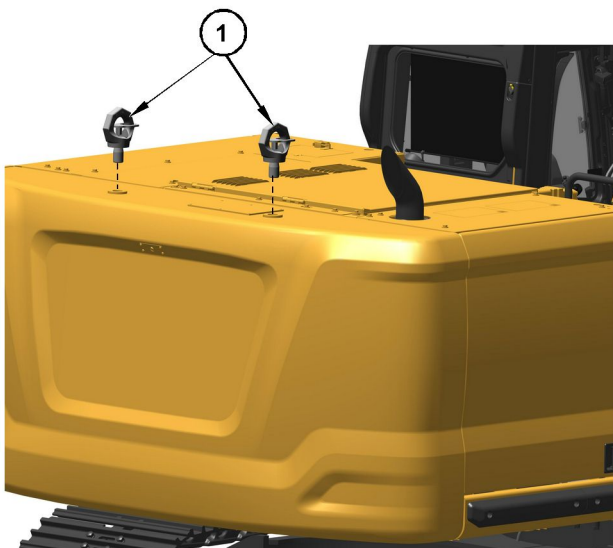


Illustration 458

g06341813

- 4. Insert and tighten eyebolts (1).**

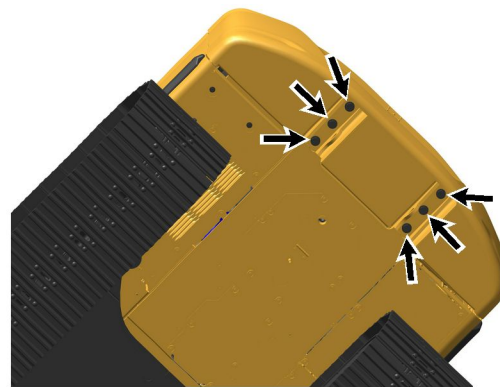


Illustration 460

g06349974

- 6. The counterweight mounting bolts are on the bottom of the counterweight. Remove the six counterweight mounting bolts and six washers.**

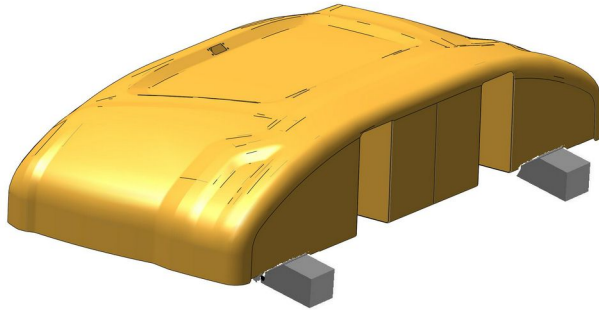


Illustration 461

g06341838

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

Counterweight Installation

Perform the installation procedure in reverse order.

Note: Temporarily tighten the six counterweight mounting bolts. Decrease the tension on the lifting cable. Make sure that the counterweight is correctly positioned on the retaining plates. Tighten the bolts to a torque of $2800 \pm 350 \text{ N}\cdot\text{m}$ ($2065 \pm 260 \text{ lb}\cdot\text{ft}$).

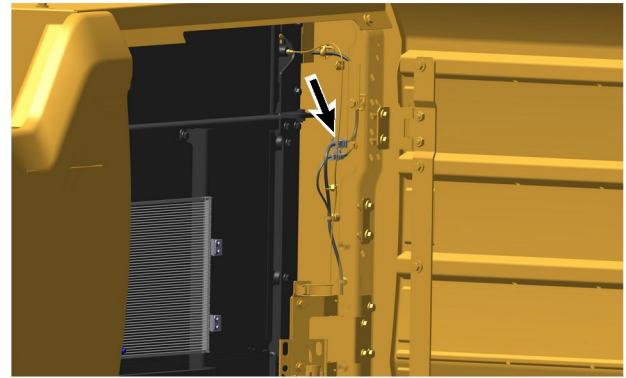


Illustration 462

g06341797

After You install the counterweight, connect the wiring for the rear view camera.

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.

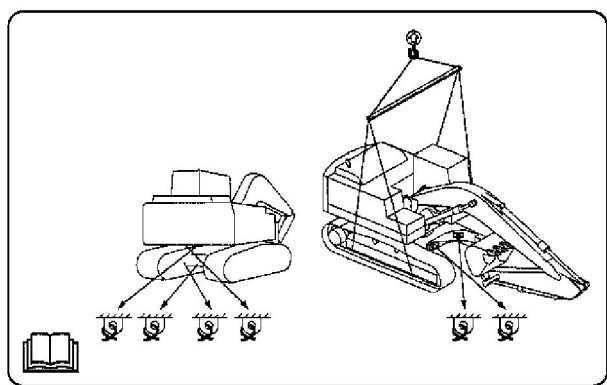


Illustration 463

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.
-

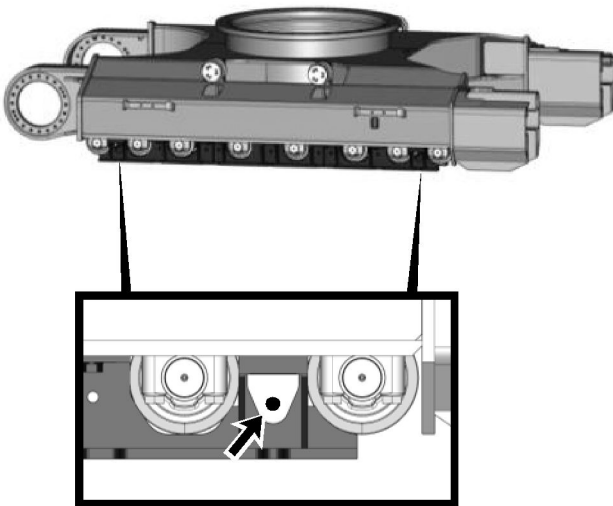


Illustration 465

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

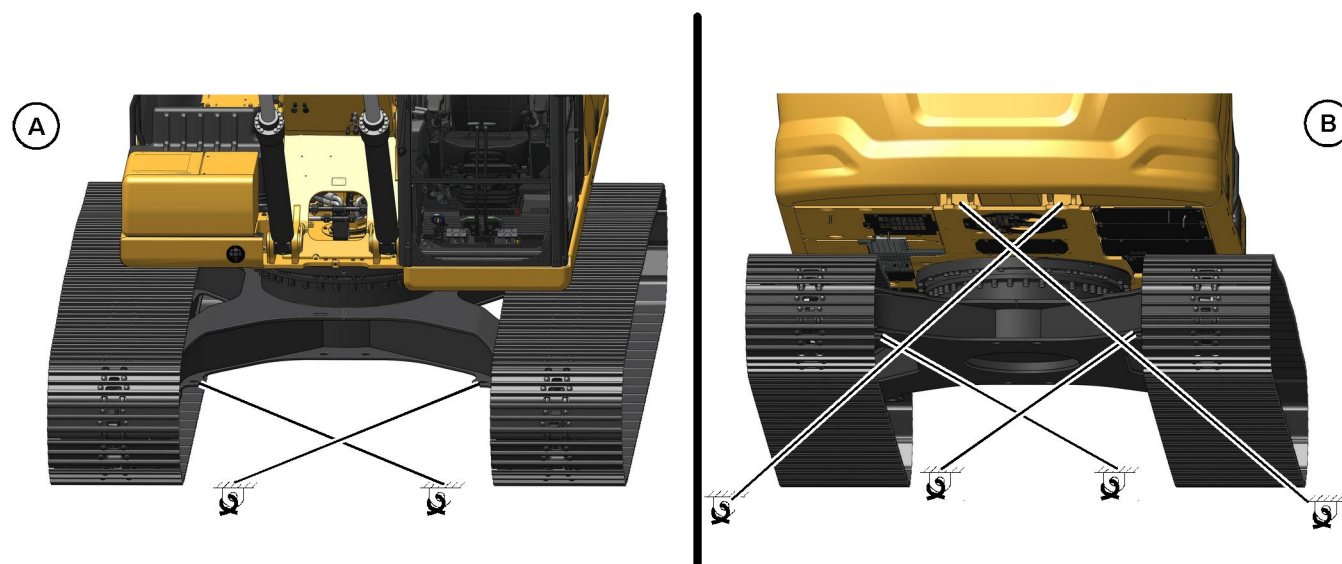


Illustration 466

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

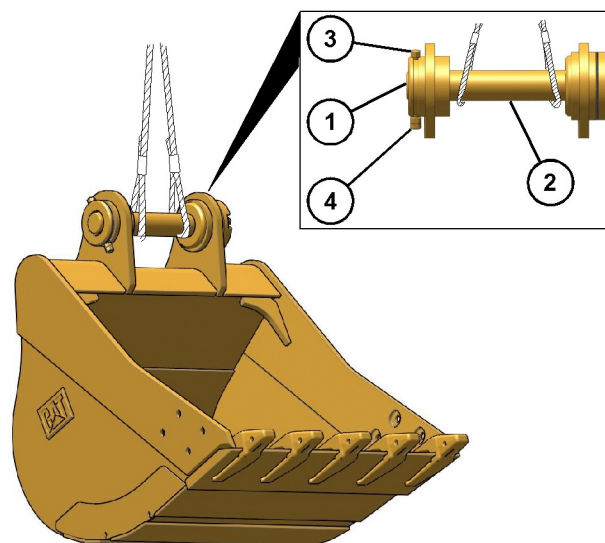


Illustration 467

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

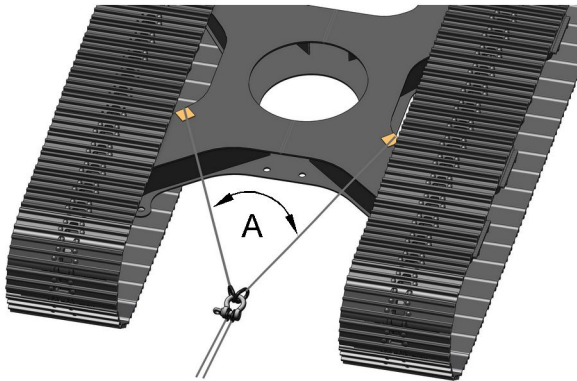


Illustration 468

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

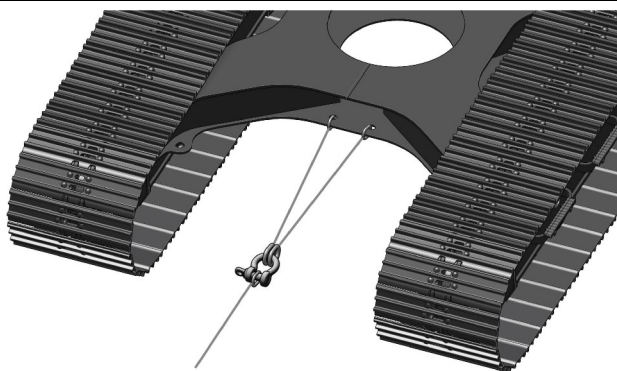


Illustration 469

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

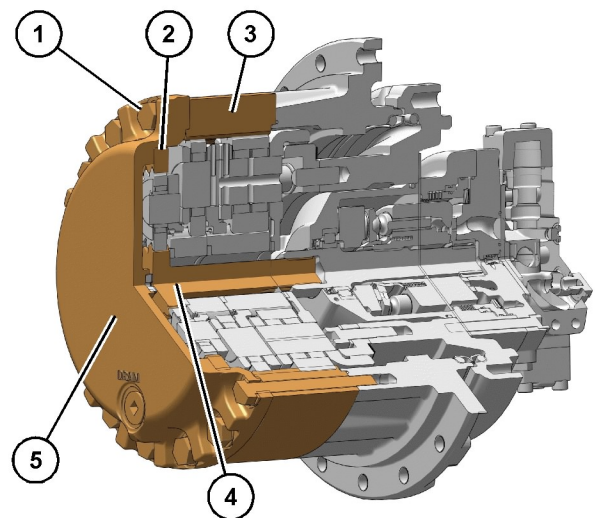


Illustration 470

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.

Operation Section
Final Drive Sun Gear Removal

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)

i06953771

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. Lower the equipment to the ground. Move all controls to the HOLD position. Move the hydraulic lockout control to the LOCKED position.
2. Turn the start switch on the stalled machine to the OFF position. Turn off all accessories.
3. Turn the battery disconnect switch on the stalled machine to the ON position.
4. Move the machine that is being used as an electrical source near the stalled machine so that the jump-start cables reach the stalled machine.
Do not allow the machines to contact each other.
5. Stop the engine of the machine that is being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.



Illustration 471

g06181546

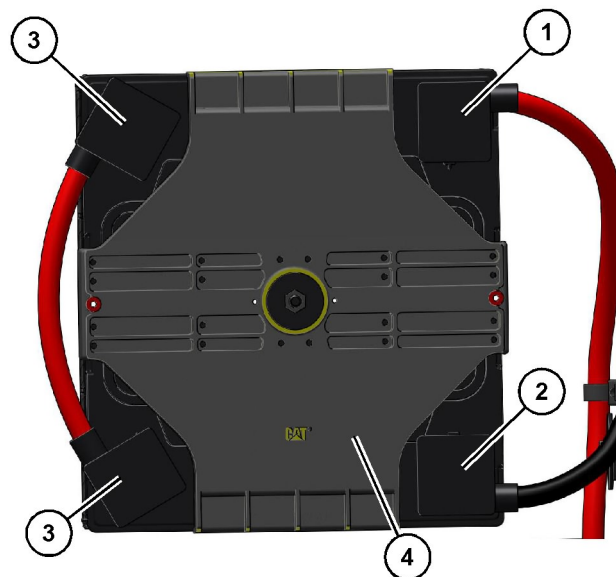


Illustration 472

g06181551

- (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. See Operation and Maintenance Manual, "Engine Starting" for the correct starting procedure.
14. Immediately after you start the stalled engine, disconnect the jump-start cables in reverse order.

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Engine Starting with Auxiliary Start Receptacle (If Equipped)

SMCS Code: 1000; 7000

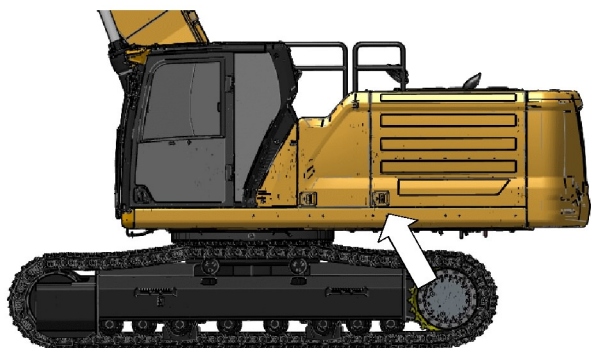


Illustration 473

g06209963

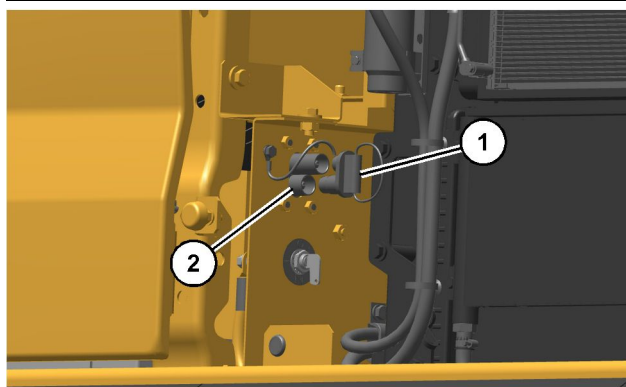


Illustration 474

g06279564

- (1) Cover
(2) 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

i07377167

Access Door and Cover Locations

SMCS Code: 726A-CH

Engine Hood

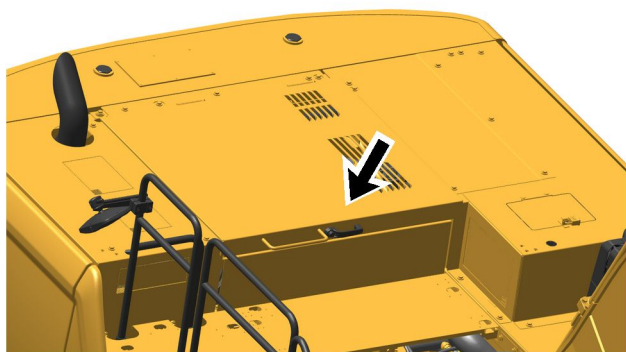


Illustration 475

g06279602

Allows access to engine.

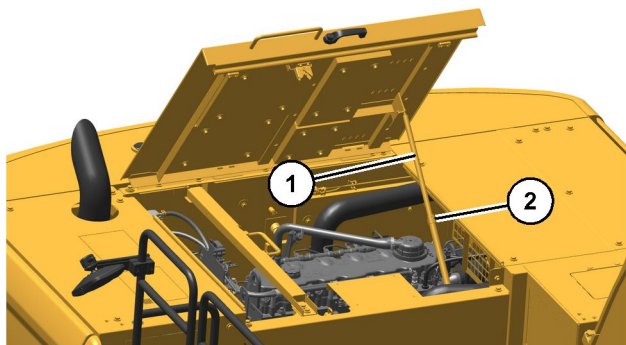


Illustration 476

g06279608

1. Open the engine hood.
2. Gas spring (1) will lock in place to hold the engine hood open.

WARNING

Operation of the Push Button Release for the Engine Hood

When closing the engine hood, only operate the push-button release by hand.

Failure to remove hands from the push-button release before closing the engine hood could result in personal injury.

Be sure to remove hands from the push-button release before completely closing the engine hood.

NOTICE

Do not add pressure to the engine hood when open.

WARNING

When closing the engine hood, Do Not operate the push-button release by foot.

Operation of the push-button release by foot could result in damage to the gas spring of the closing mechanism and/or personal injury.

Only operate the push-button release for closing the engine hood by hand.

3. To close the engine hood, support the engine hood with the door handle. Press the push-button release (2) to unlock the gas spring. Release the push button and slowly close the engine hood.

Engine Service Door

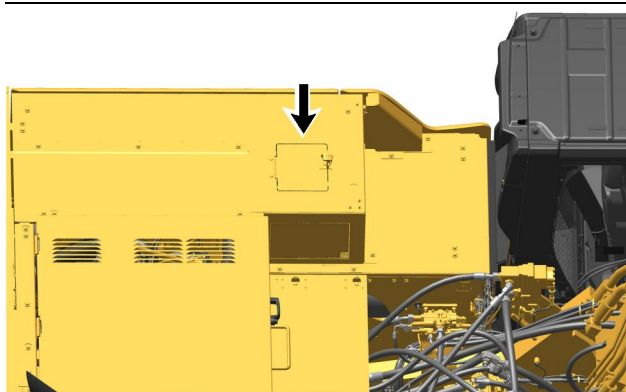


Illustration 477

g06279315

Allows access to the engine coolant reservoir.

Left Rear Access Door



Illustration 478

g06279626

Allows access to the coolant sample port, coolant drain, cooling cores, and battery disconnect switch.

Left Front Access Door



Illustration 479

g06279630

Allows access to engine air filter, batteries, power fuses, and window washer reservoir.

Right Side Access Door



Illustration 480

g06279640

Allows access to the engine oil filter and engine oil sampling port. Additionally, the compartment houses the hydraulic pump, fuel filters, refueling pump, fuel tank drain valve, hydraulic tank sight gauge and tool storage box.

Storage Box



Illustration 481

g06279648

Allows access to the Diesel Exhaust Fluid (DEF) tank for machines equipped with Tier 4 engines. The compartment is empty and free for storage on machines that are equipped with Tier 3 engines.

Lubricant Viscosities and Refill Capacities

i07279902

Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 7581

General Information for Lubricants

When you are operating the machine in temperatures below -20°C (-4°F), refer to Special Publication, SEBU5898, "Cold Weather Recommendations". This publication is available from your Cat dealer.

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

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

Selecting the Viscosity

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

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

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

NOTICE

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

Engine Oil

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

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

Note: SAE 10W-30 is the preferred viscosity grade for the 3116, 3126, C7, C-9, and C9 diesel engines when the ambient temperature is between -18°C (0°F) and 40°C (104°F).

Table 15

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Engine Crankcase	Cat DEO-ULS Cold Weather	SAE 0W-40	-40	40	-40	104
	Cat DEO-ULS SYN Cat DEO SYN	SAE 5W-40	-30	50	-22	122
	Cat DEO-ULS Cat DEO	SAE 10W-30	-18	40	0	104
	Cat DEO-ULS Cat DEO	SAE 15W-40	-9.5	50	15	122
Pump Coupling (If Equipped)	Cat DEO-ULS Cat DEO	SAE 10W-30	-18	40	0	104

Note: API engine oil categories are backwards compatible. Cat DEO-ULS (API CK-4) oil can be used in all engines with some restrictions related to fuel sulfur level. Cat DEO (API CI-4/API CI-4 PLUS) can be used in engines that are Tier 3 emissions certified and prior, and in engines that do not use aftertreatment devices.

Hydraulic Systems

Refer to the “Lubricant Information” section in the latest revision of the Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for detailed information. This manual may be found on the web at Safety.Cat.com.

The following are the preferred oils for use in most Cat machine hydraulic systems:

- Cat HYDO Advanced 10 SAE 10W
- Cat HYDO Advanced 30 SAE 30W
- Cat BIO HYDO Advanced

Cat HYDO Advanced oils allow 6000 hours or higher oil drain intervals for most applications. S·O·S Services oil analysis is recommended when the oil drain interval is increased to 6000 hours or higher. In comparison, non-Cat commercial hydraulic oils (second choice oils) allow 2000 hours oil drain interval. It is recommended to follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. Consult your Cat dealer for details. When switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are listed below.

- Cat MTO
- Cat DEO
- Cat DEO-ULS

- Cat TDTO
- Cat TDTO Cold Weather
- Cat TDTO-TMS
- Cat DEO-ULS SYN
- Cat DEO SYN
- Cat DEO-ULS Cold Weather

Note: Oil drain intervals of the oils listed above are less than those of Cat HYDO Advanced oils. The oil drain 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 16

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 TDO	SAE 10W	-20	40	-4	104
	Cat HYDO Advanced 30 Cat TDO	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 TDO-TMS	Multi-Grade	-15	50	5	122
	Cat DEO-ULS SYN Cat DEO SYN	SAE 5W-40	-30	40	-22	104
	Cat DEO-ULS Cold Weather	SAE0W-40	-40	40	-40	104
	Cat TDO Cold Weather	SAE 0W-20	-40	40	-40	104

Other Fluid Applications

Table 17

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 TDO Cat TDO-TMS Cat TDO SYN Cold Weather commercial TO-4	SAE 0W-20	-40	0	-40	32
		SAE 0W-30	-40	10	-40	50
		SAE 5W-30	-30	10	-22	50
		SAE 10W	-30	0	-22	32
		SAE 30	-25	25	-13	77
		SAE 50	-15	50	5	122
		Cat TDO-TMS	-30	25	-22	77
Track Roller Frame Recoil Spring and Pivot Shaft Bearings	Cat TDO Cat TDO-TMS Cat TDO SYN Cold Weather commercial TO-4	SAE 0W-20	-40	0	-40	32
		SAE 0W-30	-40	10	-40	50
		SAE 5W-30	-35	0	-31	32
		SAE 10W	-30	0	-22	32
		SAE 30	-20	25	-4	77
		SAE 40	-10	40	14	104
		SAE 50	0	50	32	122
		Cat TDO-TMS	-25	25	-13	77

(continued)

(Table 17, contd)

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
Track Idlers and Track Rollers	Cat DEO (single grade) Cat DEO SYN Cat DEO-ULS SYN Cat ECF-1-a Cat ECF-2 Cat ECF-3 API CF	SAE 30	-20	25	-4	77
		SAE 5W-40	-35	40	-31	104

Table 18

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
Variable Pitch Flexxaire Fan (If Equipped)	Cat Full Synthetic Multi-grade DEO commercial Full Synthetic Multigrade Diesel Engine Oil meeting either Cat ECF-1 or API CG-4	SAE 0W40 ⁽¹⁾	-40	50	-40	122
		SAE 5W40 ⁽¹⁾	-40	50	-40	122
	Caterpillar Non-Synthetic TO-4	SAE 30 ⁽²⁾	-15	25	-5	77
		SAE 50 ⁽²⁾	-10	50	14	122

(1) This is the first choice. Full synthetic oils are recommended. Synthetic oils may provide longer service life for the fan. Synthetic oils allow for increased service intervals over non-synthetic oils.

(2) This is the second choice. Caterpillar TDTO is acceptable. Commercial oils that meet the TO-4 specification are also acceptable. TDTO is non-synthetic. Commercial TO-4 oils are typically non-synthetic.

Special Lubricants

Grease

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

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

Table 19

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
External Lubrication Points	Cat Prime Application Grease	NLGI Grade 2	-20	140	-4	284
	Cat Extreme Application Grease	NLGI Grade 1	-20	140	-4	284
		NLGI Grade 2	-15	140	+5	284

(continued)

(Table 19, contd)

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
	Cat Extreme Application Grease-Artic	NLGI Grade 0.5	-50	130	-58	266
	Cat Extreme Application Grease-Desert	NLGI Grade 2	-10	140	+14	284
	Cat Utility Grease	NLGI Grade 2	-20	140	-4	284
	Cat Ball Bearing Grease	NLGI Grade 2	-20	160	-4	320

Grease for the Autolube System (if Equipped)

The grease used with the automatic lubrication system must not contain any graphite or PTFE.

Note: Pumpability is based on “US Steel Mobility and Lincoln Ventmeter Tests”. Performance may vary depending on lubrication equipment and the length of the lines.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for additional information about grease. This manual may be found on the web at Safety.Cat.com.

Table 20

Recommended Grease for the Autolube System						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
Cat Autolube System	Cat Extreme Application Grease	NLGI Grade 1	-35	40	-31	104
		NLGI Grade 2	-30	50	-22	122

Diesel Fuel Recommendations

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

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

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

- Reduce engine efficiency and durability

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

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

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

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

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

Fuel Additives

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

Biodiesel

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

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

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

When biodiesel fuel is used, certain guidelines must be followed. Biodiesel fuel can influence the engine oil, aftertreatment devices, non-metallic, fuel system components, and others. Biodiesel fuel has limited storage life and has limited oxidation stability. Follow the guidelines and requirements for engines that are seasonally operated and for standby power generation engines.

To reduce the risks associated with the use of biodiesel, the final biodiesel blend and the biodiesel fuel used must meet specific blending requirements.

Capacities (Refill)

SMCS Code: 1000; 7000

All the guidelines and requirements are provided in the latest revision of Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations". This manual may be found on the web at Safety.Cat.com.

Coolant Information

The information provided in this "Coolant Recommendation" section should be used with the "Lubricants Information" provided in the latest revision of Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations". This manual may be found on the web at Safety.Cat.com.

The following two types of coolants may be used in Cat diesel engines:

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/Coolant)

NOTICE

Never use water alone as a coolant. Water alone is corrosive at engine operating temperatures. In addition, water alone does not provide adequate protection against boiling or freezing.

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Table 21

345 GC Excavator Approximate Refill Capacities			
Component or System	Liters	US gal	Recommended Type
Cooling System	40	10.5	Refer to Operation and Maintenance Manual, "Lubricant Viscosities".
Fuel Tank	600	158.5	
Engine Crankcase with Filter	32	8.5	
Hydraulic System ⁽¹⁾	186	49.1	
Swing Drive	18	4.8	
Each Final Drive	8	2.1	
Pump Coupling	0.6	0.2	SAE 10W-30 Engine Oil
	kg	lbs	
Refrigerant ⁽²⁾	1	2.2	R-134a
Swing Gear	28.8	63.5	Refer to Operation and Maintenance Manual, "Lubricant Viscosities".
	mL	oz	
Refrigerant Oil Compressor ⁽²⁾	240	8.2	Polyalkylene Glycol (PAG) Oil

⁽¹⁾ The amount of hydraulic fluid that is needed to refill the hydraulic system after performing Operation and Maintenance Manual, "Hydraulic System Oil - Change"

⁽²⁾ Refer to Service Manual, "Air Conditioning and Heating R-134a for All Caterpillar Machines" for additional information

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S·O·S Information

SMCS Code: 1000; 1348; 3080; 4050; 5050; 7000; 7542-008

S·O·S Services is a highly recommended process for Cat customers to use in order to minimize owning and operating cost. Customers provide oil samples, coolant samples, and other machine information. The dealer uses the data in order to provide the customer with recommendations for management of the equipment. In addition, S·O·S Services can help determine the cause of an existing product problem.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluid Recommendations" for detailed information concerning S·O·S Services.

The effectiveness of S·O·S Services is dependent on timely submission of the sample to the laboratory at recommended intervals.

Refer to the Operation and Maintenance Manual, "Maintenance Interval Schedule" for a specific sampling location and a service hour maintenance interval.

Consult your Cat dealer for complete information and assistance in establishing an S·O·S program for your equipment.

Maintenance Support

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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 inside the battery compartment door on the left side of the machine.

Refer to the Operation and Maintenance Manual, "Maintenance Interval Schedule" for the correct maintenance intervals and procedures that are specific to your machine.

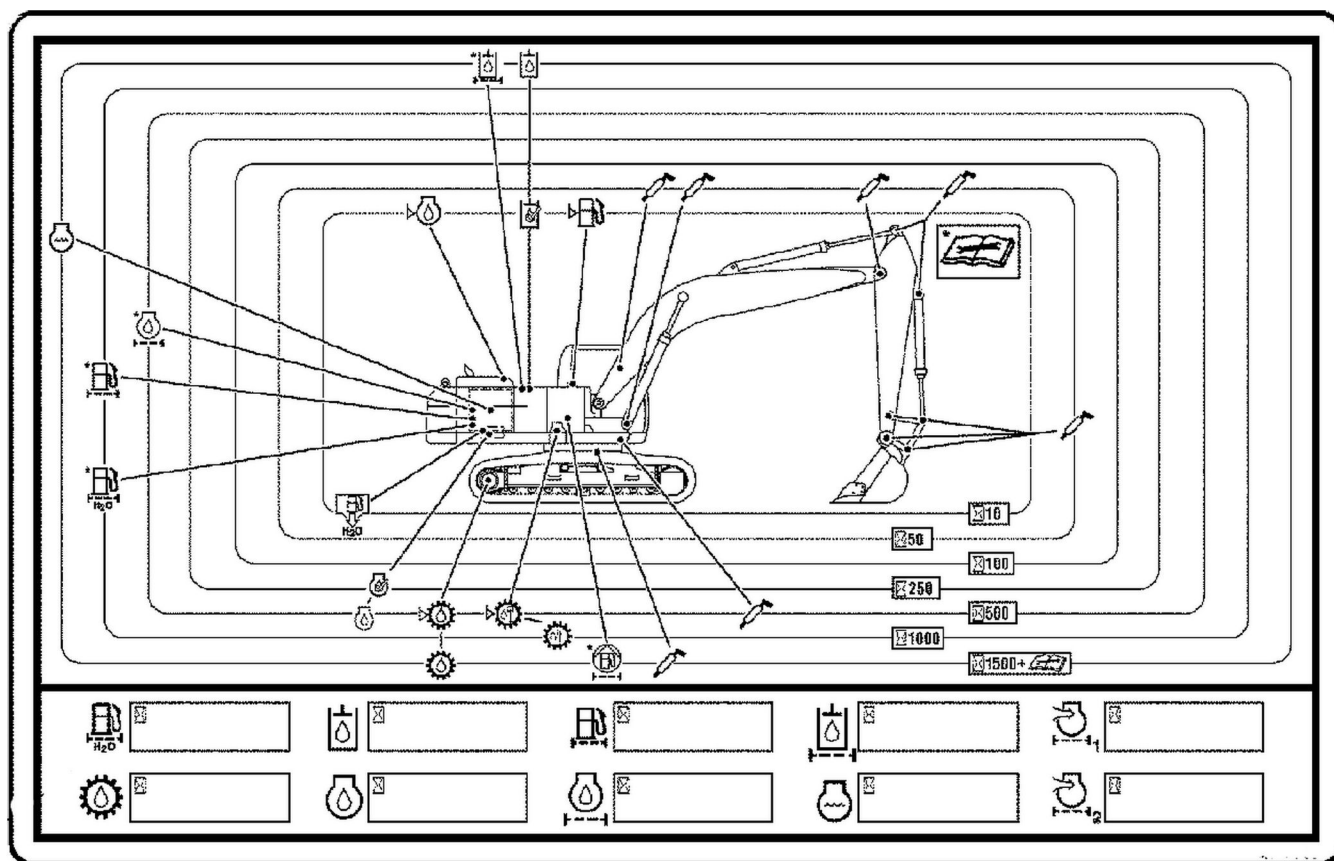


Illustration 482

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Fuel system water separator element – Replace the fuel system water separator element.



Fumes Disposal Filter Element – Replace the fumes disposal filter element.



Grease zerk – Lubricate the designated locations.



Hydraulic oil level – Check the hydraulic oil level.



Hydraulic oil – Change the hydraulic oil.



Hydraulic oil filter – Change the hydraulic oil filter.



Swing drive oil level – Check the swing drive oil level.



Swing drive oil – Change the swing drive oil.

i07398193

System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

WARNING

Personal injury or death can result from sudden machine movement.

Sudden movement of the machine can cause injury to persons on or near the machine.

To prevent injury or death, make sure that the area around the machine is clear of personnel and obstructions before operating the machine.

Coolant System

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

To relieve the pressure from the coolant system, turn off the machine. Allow the cooling system pressure cap to cool. Remove the cooling system pressure cap slowly to relieve pressure.

Hydraulic System

The release of hydraulic pressure in a hydraulic circuit is required before service is performed to that hydraulic circuit. Release the pressure in the following hydraulic circuits before any 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.

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.

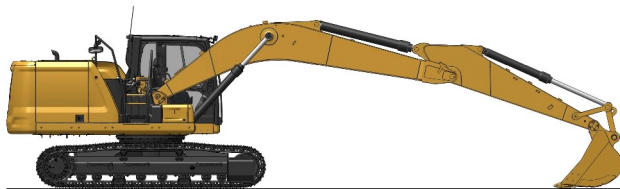


Illustration 483

g06185115

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 work tool is flat on the ground. Refer to Illustration 483 .

3. Release the system pressure from the implement and swing hydraulic circuits.

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.

- a. Shut off the engine.
- b. Turn the engine start ring to the ON position without starting the engine.

c. Place the hydraulic activation control lever in the UNLOCKED position.

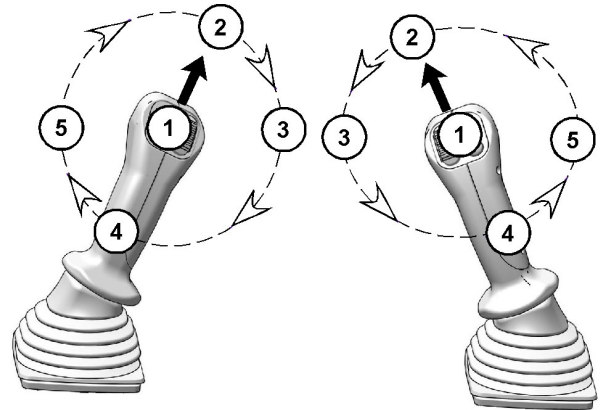


Illustration 484

g06184822

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 the pilot accumulator.

Note: Do not activate any controls when recharging the pilot accumulator.

g. Shut off the engine.

h. Repeat Step 3b through Step 3g until the high-pressure lines have been released.

Note: 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: You can also move only the joysticks or pedals of the hydraulic circuit that requires service to the full stroke positions after moving joysticks in a circular motion multiple times. This action will release the high pressure only in that single hydraulic circuit. This action will also release any pressure that might be present in the pilot hydraulic circuit.

Maintenance Section
System Pressure Release

4. Release hydraulic system pressure in the attachment circuits.

- 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 ring to the ON position without starting the engine.
- d. Place the hydraulic activation control lever in the UNLOCKED position.
- e. Activate the switch or pedal for the attachment circuit.
- f. Place the hydraulic activation control lever in the LOCKED position.
- g. Start the engine to recharge pilot accumulator.

Note: Do not activate any controls when recharging pilot accumulator.

- h. Shut off the engine.
- i. Repeat Step 4c 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 ring to the OFF position.

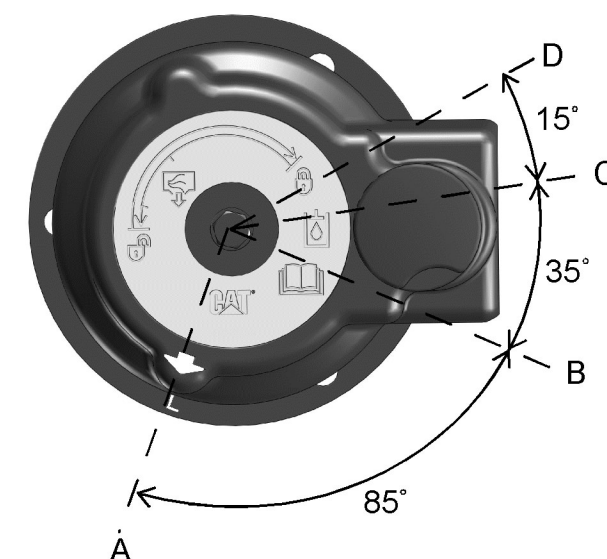


Illustration 485

g06184990

Hydraulic oil tank 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 485 for filler cap positions.

- a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).
- b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
- c. Push down the filler cap and move the arrow from position (C) to position (D).

Note: The travel hydraulic circuit is open to the hydraulic tank. Pressure from the travel circuit is released by releasing pressure from the return circuit.

8. Release the pressure that may be present in the boom circuit to remove the risk of residual pressure in the line. Make sure that the engine start ring is in the OFF position and the pressure in the hydraulic tank has been released.

- a. Remove the hydraulic oil tank filler cap.
- b. Remove any covers to access the main control valve.

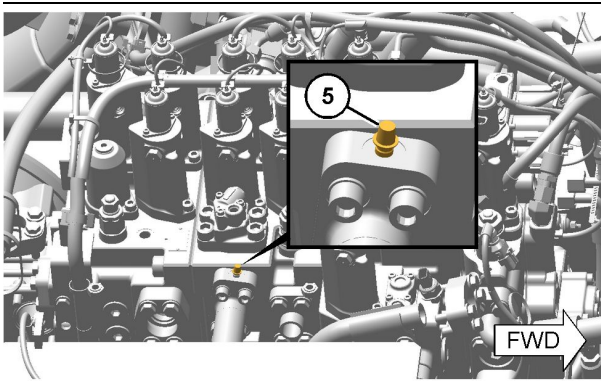


Illustration 486 g06309645

Main control valve

(5) Screw

- c. Use a clean hose of adequate length and size and connect to screw (5). Put the other end of the hose in the filler cap opening.
- d. Slowly loosen screw (5) by a maximum of 1/2 turn. Loosening the screw allows the hydraulic oil in the boom circuit to drain into the hydraulic tank.
- e. Tighten screw (5) to $13 \pm 2 \text{ N}\cdot\text{m}$ ($9 \pm 1 \text{ lb ft}$).

Note: Refer to the Operation and Maintenance Manual, Equipment Lowering with Engine Stopped for information on lowering the work tool with the engine off.

- f. Disconnect the hose from screw (5). Do not allow the oil that is contained in the hose to spill. Drain the oil into a suitable container.

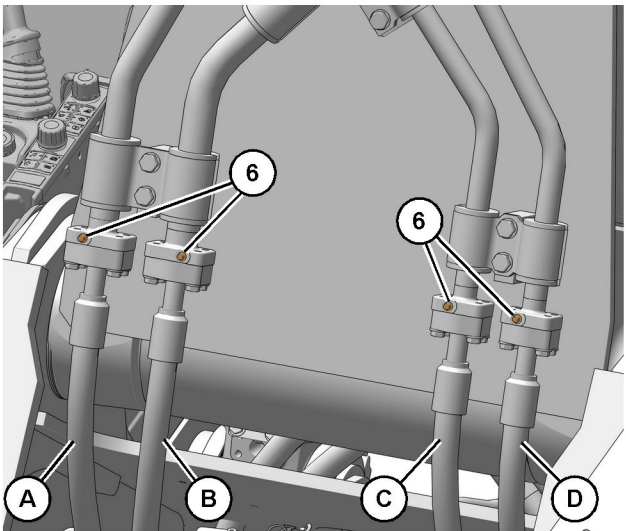


Illustration 487 g06285855

Stick and Bucket circuit locations

(6) Purge Screws (If Equipped)

- (A) Circuit A
- (B) Circuit B
- (C) Circuit C
- (D) Circuit D

- 9. If the purge screws are equipped, perform the following pressure release procedure for each Stick and Bucket circuit. Refer to Illustration 487 and Table 22 for the stick and bucket circuit locations.

Table 22

Stick and Bucket Circuit Locations				
Sales Model	Circuits			
	A	B	C	D
345 GC	Stick In	Stick Out	Bucket Close	Bucket Open

- a. Connect one end of a drain hose to purge screw (6). Insert the other end of the drain hose into an empty container.
- b. Loosen purge screw (6) by 1/2 turn. Hydraulic oil will be drained from the drain hose to the container.

Note: Dispose of drained fluid according to local regulations.

- c. Tighten purge screw (6) to a torque of $13 \pm 2 \text{ Nm}$ ($9 \pm 1 \text{ lb ft}$) after all the hydraulic oil has been drained from the line.
- d. Repeat Steps 9a through 9c for all circuits.

- e. Remove the drain hose and install hydraulic tank fill cap.

10. The pressure in the multiple hydraulic circuits that require service is now released and lines and components can be disconnected or removed from those hydraulic circuits.

i07746333

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

NOTICE

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

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

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

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

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

i04807435

Severe Service Application

SMCS Code: 1000

An engine which operates outside of normal conditions is operating in a severe service application.

An engine that operates in a severe service application may need more frequent maintenance intervals in order to maximize the following conditions:

- Reliability
- Service life

The number of individual applications cause the impossibility of identifying all of the factors which may contribute to severe service operation. Consult your Caterpillar dealer for the unique maintenance that may be necessary for your engine.

An application is a severe service application if any of the following conditions apply:

Severe Environmental Factors

- Frequent operation in dirty air
- Frequent operation at an altitude which is above 1525 m (5000 ft)
- Frequent operation in ambient temperatures which are above 32° C (90° F)
- Frequent operation in ambient temperatures which are below 0° C (32° F)

Severe Operating Conditions

- Frequent operation with inlet air which has a corrosive content
- Operation with inlet air which has a combustible content
- Operation which is outside of the intended application
- Operation with a plugged fuel filter
- Extended operation at low idle (more than 20% of hours)

- Frequent cold starts at temperatures below 0° C (32° F)
- Frequent dry starts (starting after more than 72 hours of shutdown)
- Frequent hot shutdowns (shutting down the engine without the minimum of 2 minutes to 5 minutes of cool down time)
- Operation above the engine rated speed
- Operation below the peak torque speed
- Operating with fuel which does not meet the standards for distillate diesel fuel as stated in Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" "Distillate Diesel Fuel"
- Operating with a blend of distillate fuel which contains more than 20 percent biodiesel

Improper Maintenance Procedures (Maintenance Procedures Which May Contribute to a Severe Service Application)

- Inadequate maintenance of fuel storage tanks from causes such as excessive water, sediment, and microorganism growth.
- Extending maintenance intervals beyond the recommended intervals
- Using fluids which are not recommended in Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
- Extending maintenance intervals for changing the engine oil and engine coolant without S·O·S validation
- Extending maintenance intervals for changing air filters, oil filters, and fuel filters
- Failure to use a water separator
- Using filters which are not recommended by Special Publication, PEWJ0074, "2008 Cat Filter and Fluid Application Guide"
- Storing the engine for more than 3 months but less than 1 yr (For information about engine storage, refer to Special Publication, SEHS9031, "Storage Procedure for Caterpillar Products")

i08265985

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: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

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

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"	278
" Battery or Battery Cable - Inspect/Replace"	279
" Bucket Linkage - Inspect/Adjust"	281
" Bucket Tips - Inspect/Replace"	283
" Cab Air Filter (Fresh Air) - Clean/Replace"	289
" Camera - Clean"	290
" Condenser (Refrigerant) - Clean"	290

" Engine Air Filter Primary and/or Secondary Element - Replace"	296
" Ether Starting Aid Cylinder - Replace"	306
" Film (Product Identification) - Clean"	307
" Fuel System - Prime"	310
" Fuel Tank Strainer - Clean"	313
" Fuses - Replace"	314
" Oil Filter - Inspect"	328
" Radiator, Aftercooler and Oil Cooler Cores - Clean"	331
" Rollover Protective Structure (ROPS) - Inspect"	332
" Track Adjustment - Adjust"	337
" Undercarriage - Check"	340
" Window - Check"	340
" Window Washer Reservoir - Fill"	341
" Window Wiper - Inspect/Replace"	341
" Windows - Clean"	341

Every 10 Service Hours or Daily

" Engine Oil Level - Check"	300
" Fuel System Water Separator - Drain"	313
" Fuel Tank Water and Sediment - Drain"	314
" Hydraulic System Oil Level - Check"	324
" Indicators and Gauges - Test"	326
" Seat Belt - Inspect"	332
" Track Adjustment - Inspect"	339
" Travel Alarm - Test"	339

Every 10 Service Hours or Daily for First 50 Hours

" Boom and Stick Linkage - Lubricate"	280
" Bucket Linkage - Lubricate"	283
" Bucket Linkage - Lubricate"	282

Every 50 Service Hours

" Boom and Stick Linkage - Lubricate"	280
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“ Bucket Linkage - Lubricate” 282

Every 100 Service Hours

“ Oil Filter (Hydraulic Hammer) - Replace” 327

Every 250 Service Hours

“ Cooling System Coolant Sample - Obtain” 295

“ Engine Oil Sample - Obtain” 301

Initial 500 Service Hours

“ Engine Oil and Filter - Change” 301

“ Final Drive Oil - Change” 308

“ Swing Drive Oil - Change” 333

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

“ Cooling System Coolant Sample - Obtain” 295

Every 500 Service Hours

“ Final Drive Oil Level - Check” 308

“ Final Drive Oil Sample - Obtain” 309

“ Hydraulic System Oil Sample - Obtain” 326

“ Pump Coupling Oil Level - Check” 330

“ Swing Bearing - Lubricate” 333

“ Swing Drive Oil Level - Check” 335

“ Swing Drive Oil Sample - Obtain” 335

Every 1000 Service Hours

“ Battery - Clean” 278

“ Battery Hold-Down - Tighten” 279

“ Belt - Inspect/Adjust/Replace” 279

“ Engine Oil and Filter - Change” 301

“ Fuel System Primary Filter (Water Separator)
Element - Replace” 311

“ Fuel System Secondary Filter - Replace” 312

“ Swing Drive Oil - Change” 333

Every 2000 Service Hours

“ Final Drive Oil - Change” 308

“ Fuel Cap Filter - Replace” 310

“ Swing Gear - Lubricate” 336

Every 2500 Service Hours

“ Engine Valve Lash - Check” 306

Every Year

“ Cooling System Coolant Sample - Obtain” 295

Every 3000 Service Hours

“ Hydraulic System Oil Filter (Return) -
Replace” 322

Every 3 Years

“ Seat Belt - Replace” 333

Every 5000 Service Hours

“ Pump Coupling Oil - Change” 329

“ Receiver Dryer (Refrigerant) - Replace” 331

Every 6000 Service Hours or 3 Years

“ Cooling System Coolant Extender (ELC) -
Add” 293

“ Hydraulic System Oil - Change” 317

Every 12 000 Service Hours or 6 Years

“ Cooling System Coolant (ELC) - Change” 291

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.

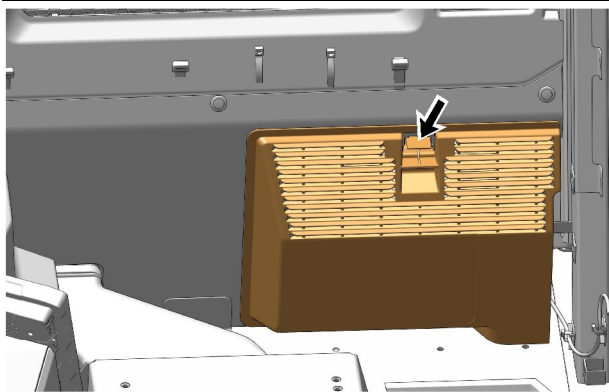


Illustration 488

g06181599

2. Release the cover latch.

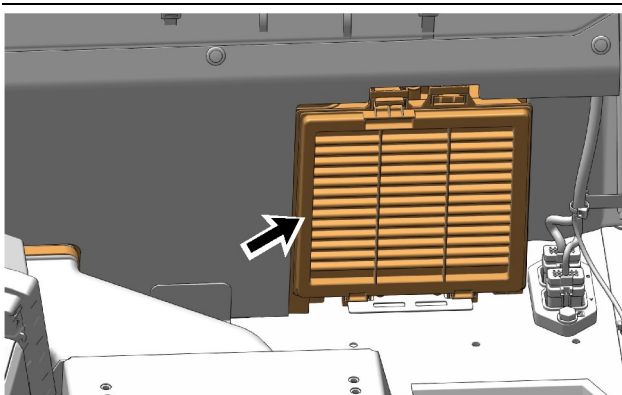


Illustration 489

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: 1401-535-FLV; 1401; 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

i07246860

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.

i07539957

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401; 1401-561; 1401-040; 1401-510; 1402-040; 1402-510

WARNING

Personal injury can result from battery fumes or explosion.

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

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

Always wear protective glasses when working with batteries.

1. Turn all the switches to the OFF position. Turn the engine start ring 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.

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-040; 1357-510; 1357-025; 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.

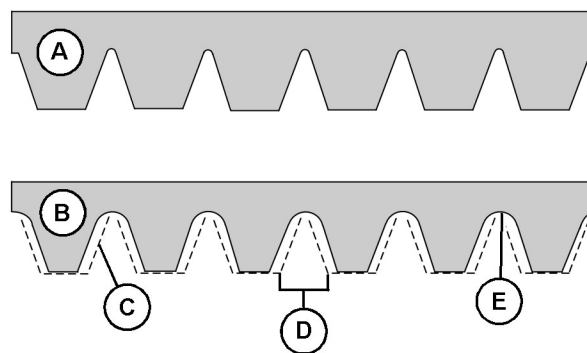


Illustration 490

g06206193

(A) New belt
(B) Worn belt

2. Inspect the condition of the serpentine belt. Over time the belt ribs will lose material (C). The space between the ribs will increase (D). The loss of material will cause the pulley sheave to contact the belt valley. This will lead to belt slippage and accelerated wear (E). Replace the belt if the belt is worn or frayed.
3. If the belt requires replacement, perform Step 3a through Step 3f.
 - a. Remove the upper fan guard.

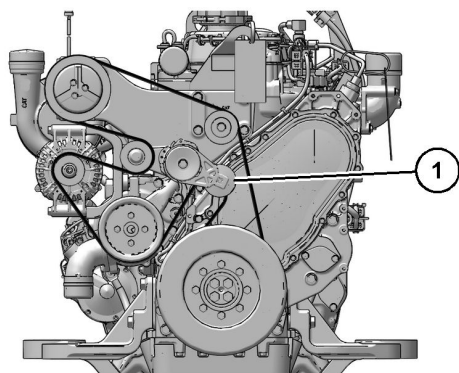


Illustration 491

g06265252

(1) Belt tensioner

- b. Rotate the belt tensioner (1) clockwise to remove the belt.
- c. Remove the belt.
- d. Install a new belt.
- e. Rotate the belt tensioner clockwise to install the belt.
- f. Install the upper fan guard.
- g. Lower the engine hood and latch 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.

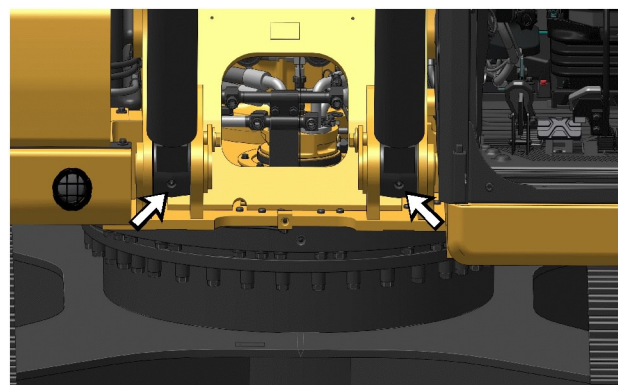


Illustration 492

g06183509

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

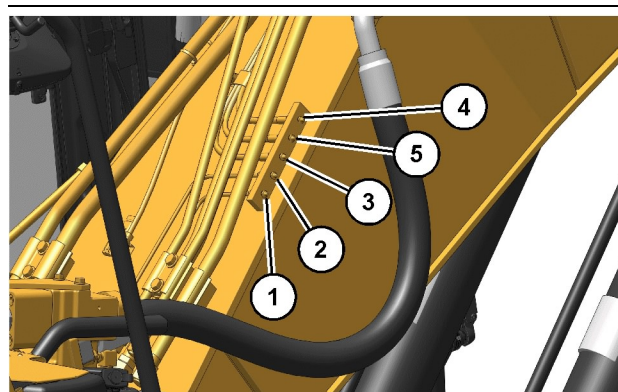


Illustration 493

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.

i07313700

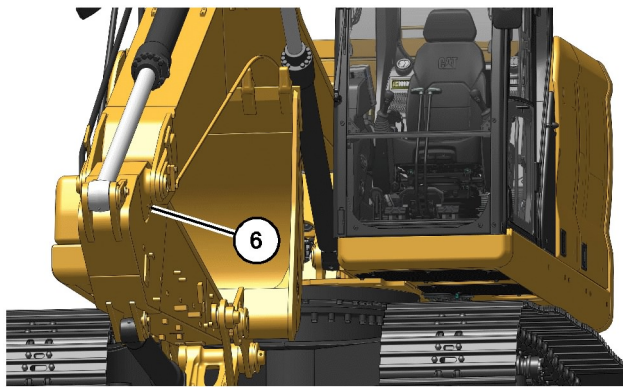


Illustration 494

g06183854

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

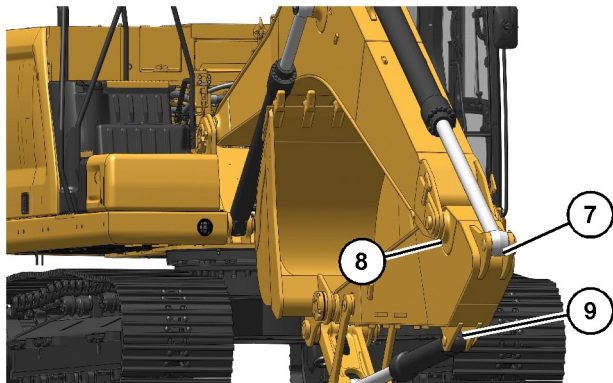


Illustration 495

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.

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 496

g06279682

Area for linkage adjustment

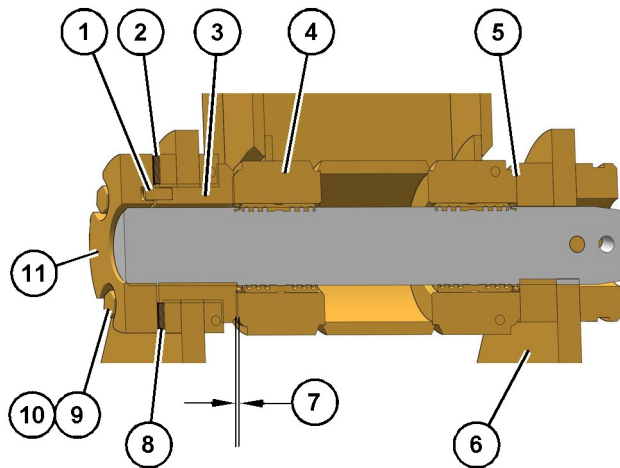


Illustration 497

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 $240 \pm 40 \text{ N}\cdot\text{m}$ ($175 \pm 30 \text{ lb}\cdot\text{ft}$).
8. After installation, make sure that bucket clearance (7) is still correct.

i07377602

Bucket Linkage - Lubricate (TB Bucket Family)

SMCS Code: 6513-086

Note: Use this procedure for the TB bucket family. Lubricate the bucket linkage at the maintenance interval of every 50 service hours.

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.

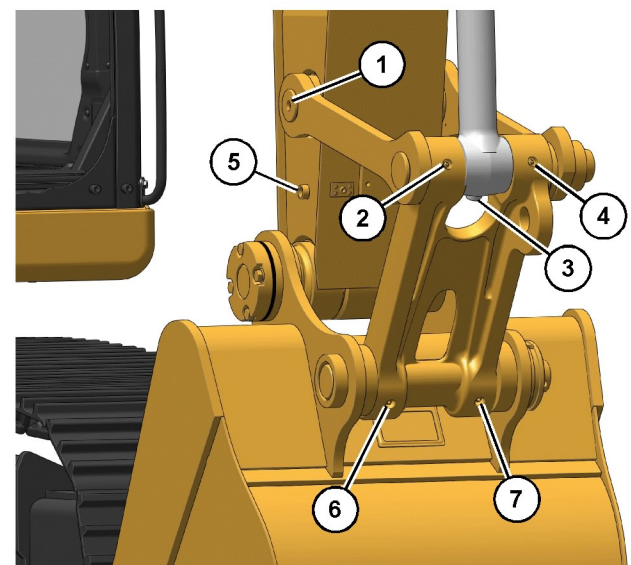


Illustration 498

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.

i07378295

Bucket Linkage - Lubricate (DB Bucket Family)

SMCS Code: 6513-086

Note: Use this procedure for the DB bucket family. Lubricate the bucket linkage at the maintenance interval of every 100 service hours.

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.

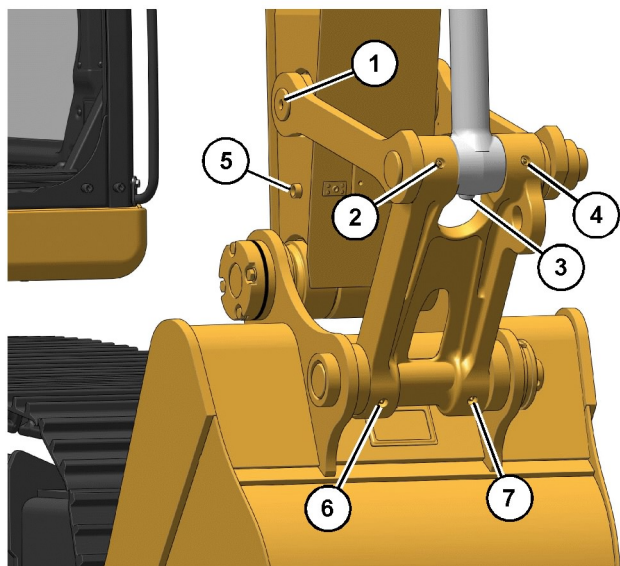


Illustration 499

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.

i08059817

Bucket Tips - Inspect/Replace

SMCS Code: 6805-510; 6805-040

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket tips or side cutters.

K Series GET Drive-through System Bucket Tips

Note: To maximize the life of the bucket tip and the penetration of the bucket tip, the bucket tip can be rotated.



Illustration 500

g01055179

Acceptable wear



Illustration 501

g01055196

Replace this bucket tip.

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal Procedure

WARNING

Retainer pin, when struck with force, can fly out and cause injury to nearby people.

Make sure the area is clear of people when driving retainer pins.

To avoid injury to your eyes, wear protective glasses when striking a retainer pin.

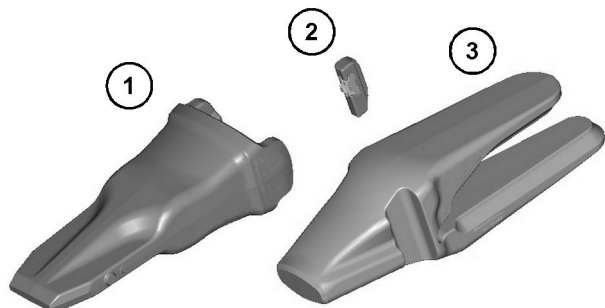


Illustration 502

g06528662

- (1) Bucket tip
- (2) Retainer
- (3) Adapter

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

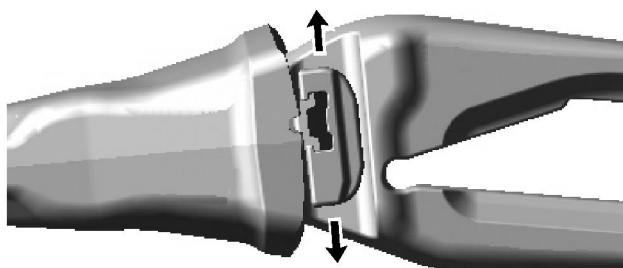


Illustration 503

g01054386

Internal view

1. Use a hammer and a punch to drive out the retainer. The retainer can be removed from the top of the bucket tip or from the bottom of the bucket tip.

2. Remove the bucket tip from the adapter with a slight counterclockwise rotation.

Installation Procedure

1. Clean the adapter, if necessary.
2. Install the new bucket tip or the rotated bucket tip onto the adapter with a slight clockwise rotation.

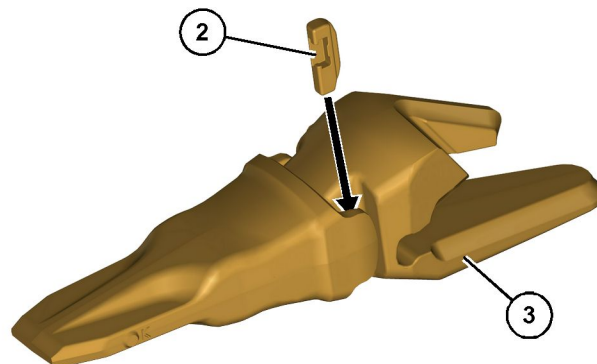


Illustration 504

g06528668

Proper location for installing the retainer

3. The retainer can be installed from the top of the bucket tip or from the bottom of the bucket tip. Use a hammer and a 1 inch X 1 inch X 8 inch steel bar stock to drive retainer (2) into adapter (3).

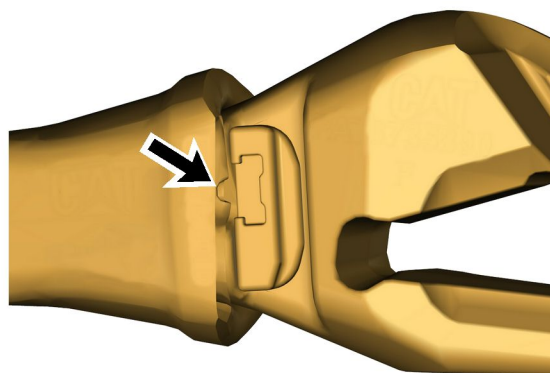


Illustration 505

g06528672

Internal View

The latch of the retainer is properly seated in the recess of the bucket tip.

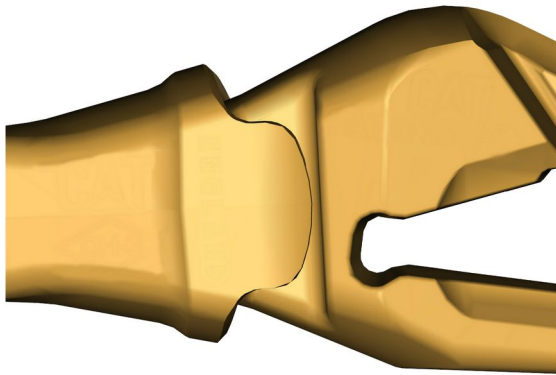


Illustration 506

g06528674

A properly installed retainer does not extend beyond the ear of the bucket tip.

4. The retainer is properly seated if the retainer can be moved slightly by the technicians hand. If the retainer cannot be moved, adjust the retainer, as needed. The ends of the retainer should not extend beyond the ear of the bucket tip.

J Series GET Bucket Tips

WARNING

Block the bucket before changing the bucket teeth.

To prevent possible injury to the eyes, wear a protective face shield when striking the pin.

The pin, when struck, can fly out and cause injury to nearby personnel.

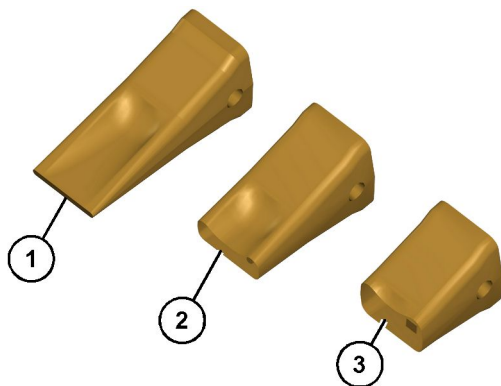


Illustration 507

g06528680

- (1) Usable tip
- (2) Replaceable bucket tip
- (3) Overworn tip

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.

- Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
- Use a Pin-Master. Follow Step 1a through Step 1c for the procedure.

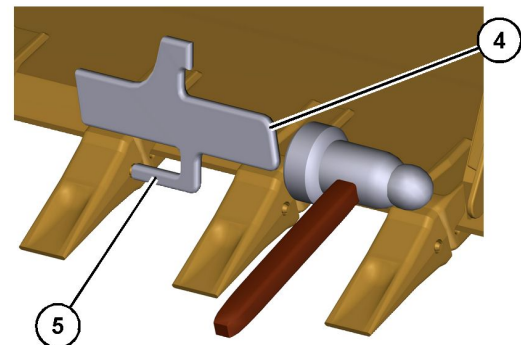


Illustration 508

g06214793

- (4) Back of Pin-Master
- (5) Extractor

- a. Place the Pin-Master on the bucket tip.
- b. Align extractor (5) with the pin.
- c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

Note: Discard the old pin and the retainer assembly. When you change tips, use a new pin and a new retainer assembly. Refer to the appropriate parts manual for your machine.

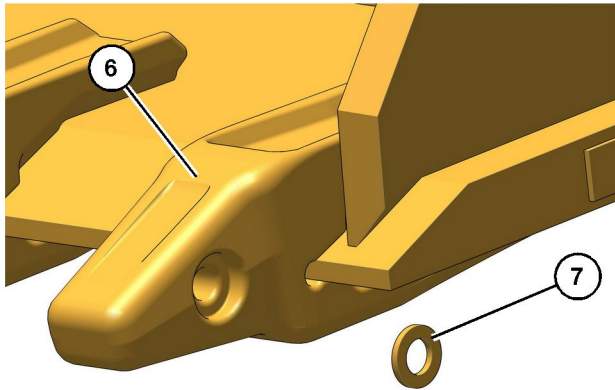


Illustration 509

g06214921

(6) Retainer assembly
(7) Adapter

2. Clean the adapter and the pin.

3. Fit retainer assembly (6) into the counterbore that is in the side of adapter (7). Make sure that the face of the retainer assembly with the marking "OUTSIDE" is visible.

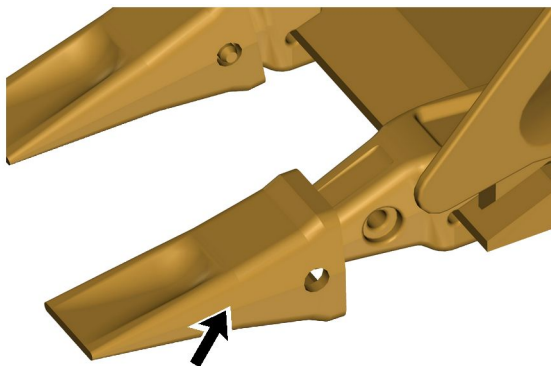


Illustration 510

g06214795

4. Install the new bucket tip onto the adapter.

Note: The bucket tips can be rotated by 180 degrees to allow the tip to wear evenly. You may also move the tips from the outside teeth to the inside teeth. Check the tips often. If wear is present on the tips, rotate the tips. The outside teeth generate the most wear.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the same side of the retainer, drive the pin through the bucket tip, the retainer assembly, and the adapter.
- Use a Pin-Master. Follow Step 5a through Step 5e for the procedure.

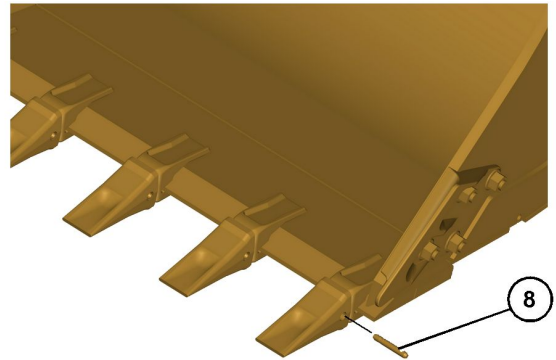


Illustration 511

g06214803

(8) Pin

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

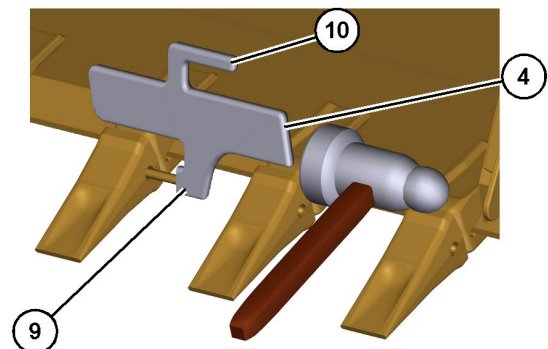


Illustration 512

g06214807

- Place the Pin-Master over the bucket tips so that the pin will fit into the counterbore of the pin holder (9).
- Strike the Pin-Master with a hammer at the back of the tool (4) to insert the pin.
- Slide pin holder (9) away from the pin and rotate the tool slightly to align pin setter (10) with the pin.

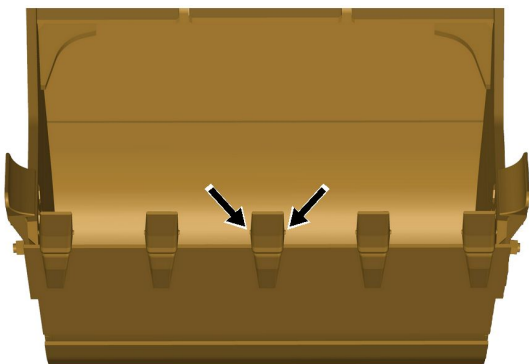


Illustration 513

g06214812

Final assembly of pin into bucket tip

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

Bucket Tips (Cat® Advansys) - If Equipped

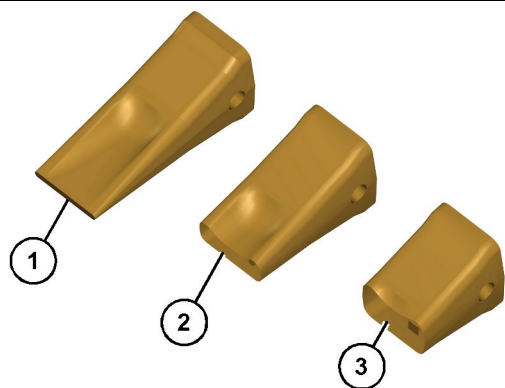


Illustration 514

g06528680

- (1) Usable tip
(2) Replaceable bucket tip
(3) Overworn tip

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

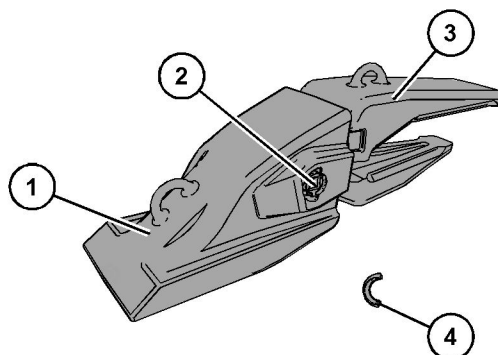


Illustration 515

g06528701

- (1) Bucket Tip
(2) Retainer
(3) Adapter
(4) Compression Sleeve

1. Use a 1/2" 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).

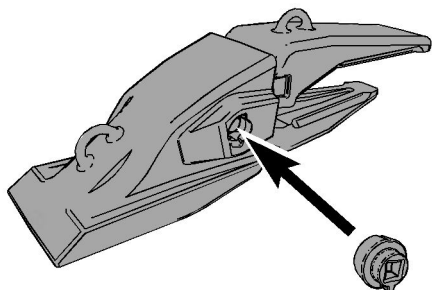


Illustration 516

g06528728

3. Use a 1/2" ratchet to rotate the retainer (2) 180 degrees to the locked position.

Side Cutters

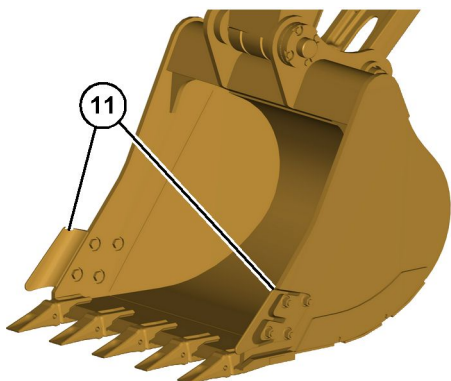


Illustration 517

g06214814

Bucket With Side Cutters

1. Remove the mounting bolts and the side cutters (11).
2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

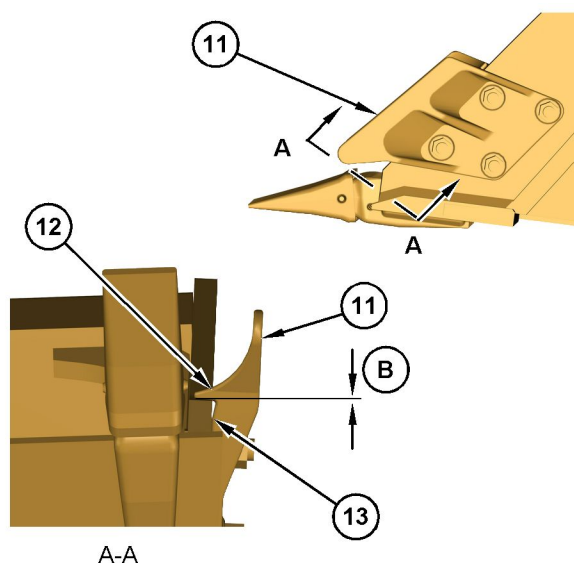


Illustration 518

g06214887

- (12) Shear ledge on a side cutter
(13) Side plate on a bucket
(B) 0.0 mm (0.0 inch)

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.
5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.
6. Torque the mounting bolts to the correct specification.

Side Protectors (If Equipped)

Inspect the wear of the side protector. When too much wear is present, replace the protector.

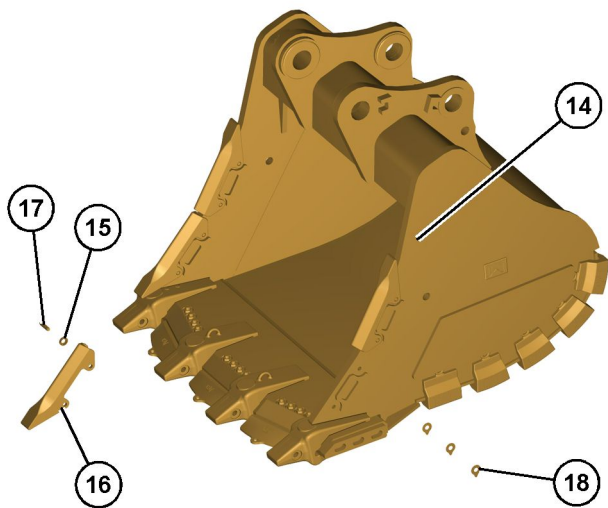


Illustration 519

g06219766

1. Hit pin (17) from the side of the bucket without the retainer to remove side protector (16) from side plate (14).
2. Clean side protector (16), pin (17), retainer(15), and side plate (14) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims (18) may be required to decrease the lateral clearance which will decrease movement. Install the shims between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (15) in side plate (14).
4. Align two pin holes of the new protector and the side plate. Hit the pin from the retainer side of the bucket.

Note: If the pin and/or the retainer are worn, replace the pin and/or the retainer.

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.

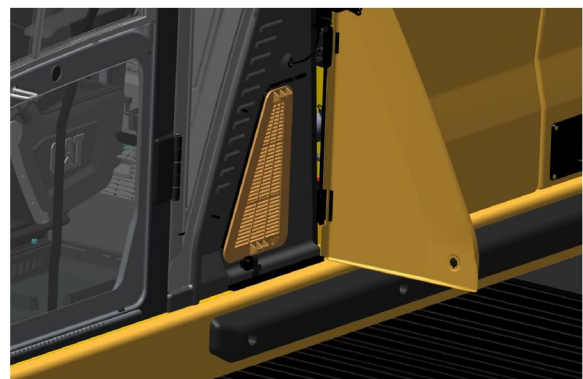


Illustration 521

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.

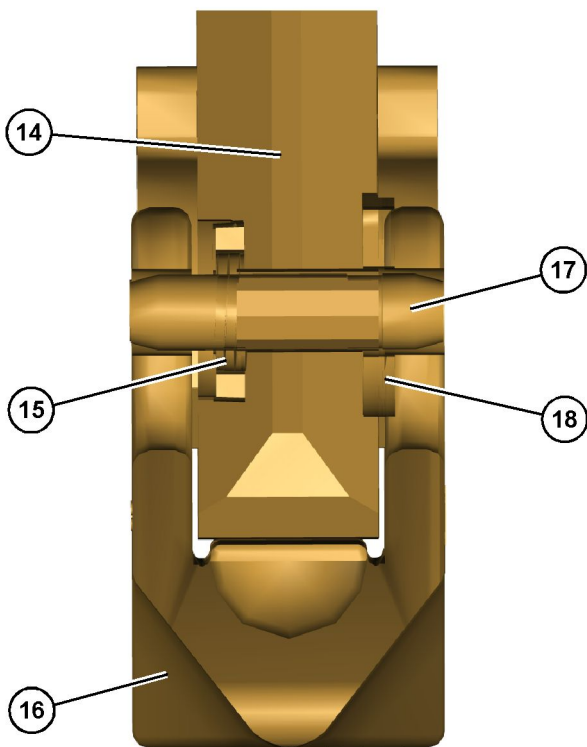


Illustration 520

g06219767

- (14) Side plate
- (15) Retainer
- (16) Side protector
- (17) Pin
- (18) Shim

i07103676

Camera - Clean

SMCS Code: 7348-070

WARNING

Failure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera could result in slipping and falling which could result in personal injury or death. Be sure to use an appropriate external ladder or an appropriate platform for direct access to the rear view camera.

The machine's counterweight and the engine hood are not approved as a maintenance platforms.

WARNING

Unexpected machine movement can cause injury or death.

In order to avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, "Do Not Operate" or similar warning tag to the hydraulic lockout control.

Note: When you access the camera for cleaning, be sure to observe safe procedures for access. Maintain a three-point contact and/or use a body harness.

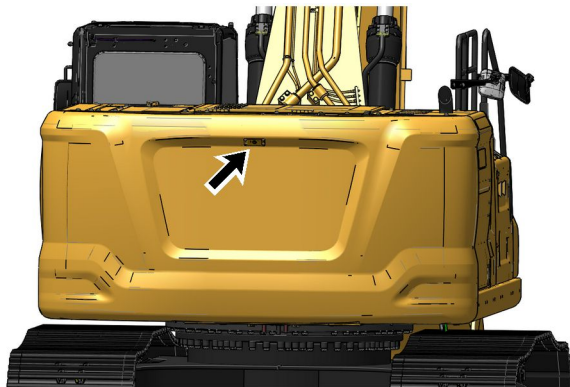


Illustration 522

g06224689

The rear view camera is on top of the counterweight.

If necessary, use a damp cloth 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.

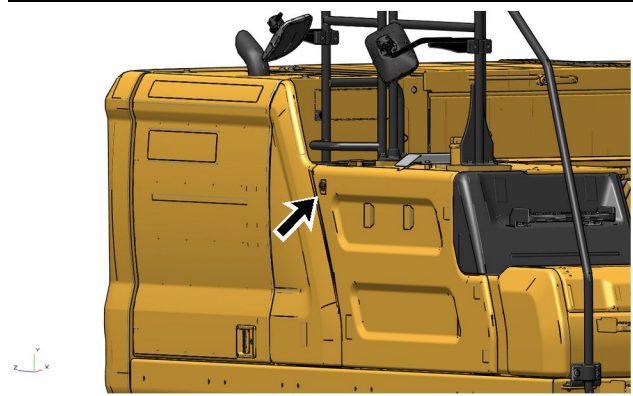


Illustration 523

g06224690

If equipped, clean the side view camera as well.

i06969907

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

NOTICE

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

Repair the fins if found defective.



Illustration 524

g06179792

1. Open the access door on the left side of the machine. The condenser is located in front of the radiator.

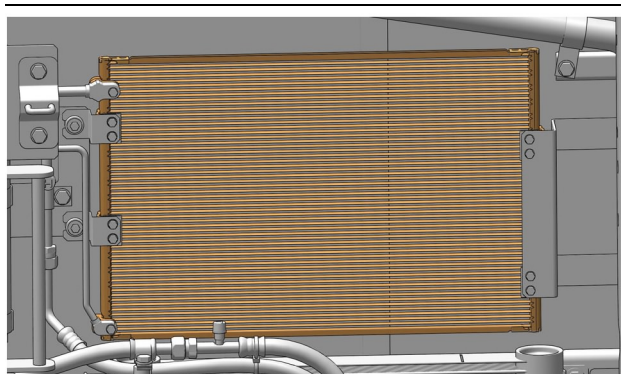


Illustration 525

g06183025

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.

i07313722

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

WARNING

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

WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

NOTICE

Do not change the coolant until you read and understand the cooling system information in Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

Failure to do so could result in damage to the cooling system components.

NOTICE

Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

If the coolant in the machine is changed to Extended Life Coolant from another type of coolant, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

1. Unlatch and raise the engine service door.

Maintenance Section
Cooling System Coolant (ELC) - Change

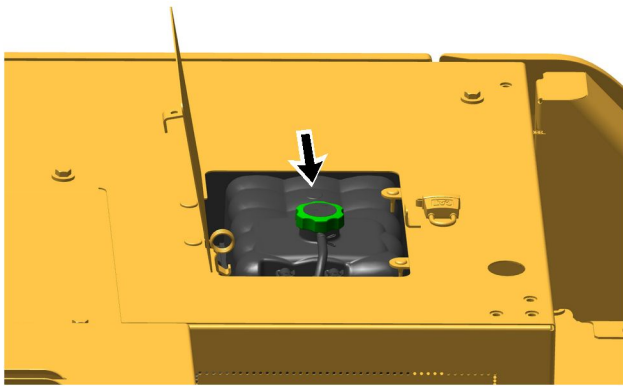


Illustration 526

g06279740

2. Slowly loosen the pressure cap that is on the coolant reservoir to release pressure from the cooling system.
3. Remove the pressure cap.
4. Inspect the o-ring of the cooling system pressure cap. If the o-ring is damaged, replace the pressure cap.

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

5. Open the rear access door on the left side of the machine.

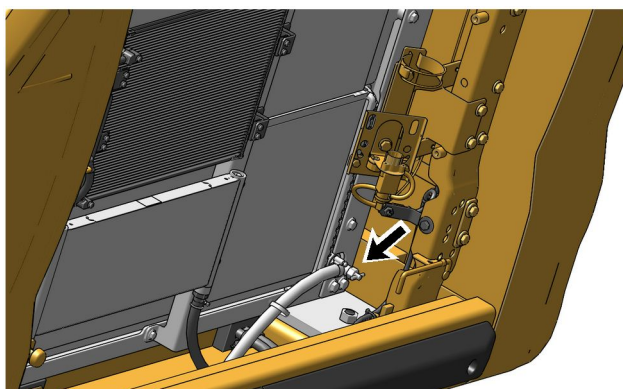


Illustration 527

g06279744

6. Open the drain valve and allow the coolant to drain into a suitable container. The drain valve is on the bottom of the radiator.
7. Flush the cooling system. Follow Step 7a through Step 7h to flush the cooling system.
 - a. Close the drain valve.
 - b. Fill the cooling system with clean water.

- c. Install the pressure cap.

NOTICE

Do not run the engine with plain water in the cooling system for more than 5 min. The water may vaporize and trapped air may damage the NRS cooler.

- d. Start the engine and run the engine until the engine reaches operating temperature.
 - e. Stop the engine and allow the engine to cool.
 - f. Loosen the pressure cap slowly to relieve any pressure in the cooling system.
 - g. Open the drain valve that is on the bottom of the radiator and allow the coolant to drain into a suitable container.
 - h. Flush the radiator with clean water until the draining water is transparent.
8. Close the drain valve.
 9. Add the Extended Life Coolant. Refer to the following topics:
 - Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
 - Operation and Maintenance Manual, "Capacities (Refill)"
 10. After the cooling system has been filled, perform the following procedures during initial start-up:
 - a. Start the engine without the filler cap.
 - b. Run the engine at low idle for 10 minutes.
 - c. Then, increase the engine speed to a high idle until the water temperature regulator is open and the coolant level is stabilized.
 - d. Maintain the coolant at the proper level as the water temperature regulator opens, and the air is purged from the cooling system and NRS cooler. Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check".
 11. Install the cooling system pressure cap.
 12. Stop the engine.

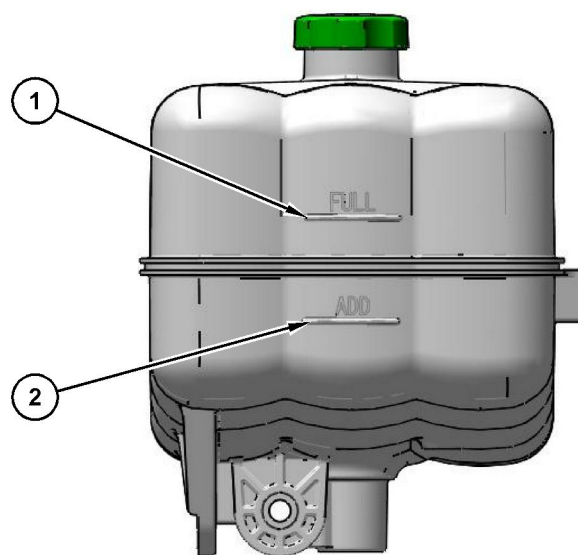


Illustration 528

g06266322

- (1) "FULL"
(2) "LOW"

13. Check the coolant reservoir. Maintain the coolant level between "FULL" mark (1) and "LOW" mark (2).
14. If more coolant is necessary, remove the pressure cap and add the appropriate coolant solution.
15. Install the pressure cap.
16. Close the engine hood and latch the engine hood. Close the left access door.
17. Close and latch engine service door.

i07313797

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

WARNING

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

WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

Use Caterpillar Extended Life Coolant (ELC) when you add coolant to the cooling system. See Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for all cooling system requirements.

Use a Coolant Conditioner Test Kit to check the concentration of the coolant.

NOTICE

Mixing ELC with other products will reduce the effectiveness of the coolant.

This could result in damage to cooling system components.

If Caterpillar products are not available and commercial products must be used, make sure they have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants and Caterpillar Extender.

Note: This machine was filled at the factory with Caterpillar Extended Life Coolant.

1. Park the machine on level ground.
2. Stop the engine.
3. Unlatch and raise the engine service door.

i07321362

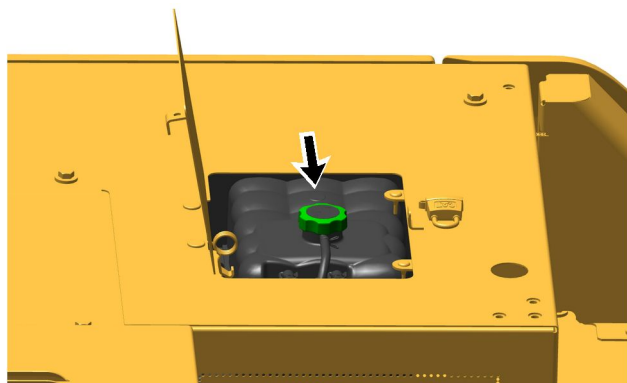


Illustration 529

g06279740

4. Make sure that the cooling system has cooled down. Loosen the cooling system pressure cap slowly to relieve system pressure. Remove the pressure cap.

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

5. It may be necessary to drain some coolant from the radiator so that Caterpillar Extender can be added to the cooling system.

Note: Always discard drained fluids according to local regulations.

6. Add Caterpillar Extended Life Coolant (ELC) to the cooling system. Refer to the following topics for the proper amount of Caterpillar Extender:

- Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”
- Operation and Maintenance Manual, “Capacities (Refill)”

7. Inspect the o-ring of the cooling system pressure cap. If the o-ring is damaged, replace the pressure cap.
8. Install the cooling system pressure cap.
9. Close and latch engine service door.

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV; 1350-040; 1395-535-FLV

WARNING

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

WARNING

Personal injury can result from hot coolant, steam and alkali.

At operating temperature, engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot coolant or steam. Any contact can cause severe burns.

Remove cooling system pressure cap slowly to relieve pressure only when engine is stopped and cooling system pressure cap is cool enough to touch with your bare hand.

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

Cooling System Coolant Additive contains alkali. Avoid contact with skin and eyes.

Note: Your machine may be equipped with an automated function for checking fluid levels. Refer to Operation and Maintenance Manual, “Monitoring System” regarding the automated system.

1. Unlatch the engine hood and raise the engine hood.

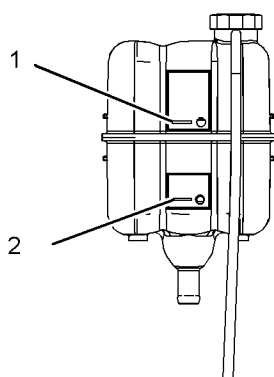


Illustration 530

g02019838

- (1) "FULL" level
(2) "LOW" level

2. Check the coolant level of the coolant reservoir when the engine is cold. Maintain the coolant level between the "FULL" mark and the "LOW" mark. If the coolant reservoir is empty, follow Steps 2a through 2g.

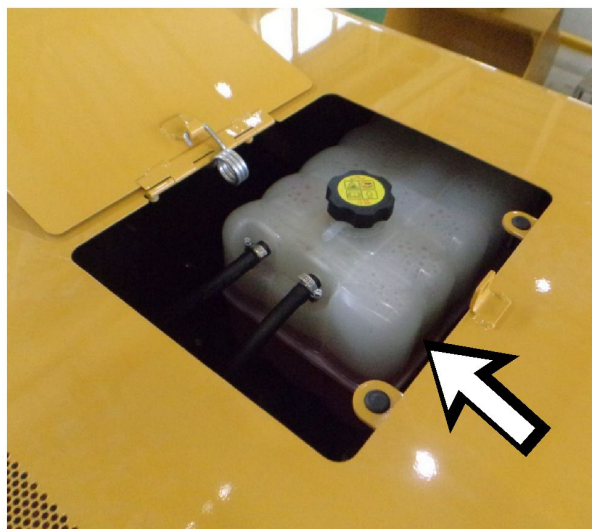


Illustration 531

g06283019

- a. Slowly loosen the cooling system pressure cap to relieve system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

- b. Add the appropriate coolant solution to the cooling system. Refer to the following topics:

- Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
- Operation and Maintenance Manual, "Capacities (Refill)"

- c. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.
- d. Inspect the condition of the o-ring on the pressure cap. If the o-ring is damaged, replace the pressure cap.
- e. Install the cooling system pressure cap.
- f. Stop the engine.
- g. Close the engine hood and latch the engine hood.

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.

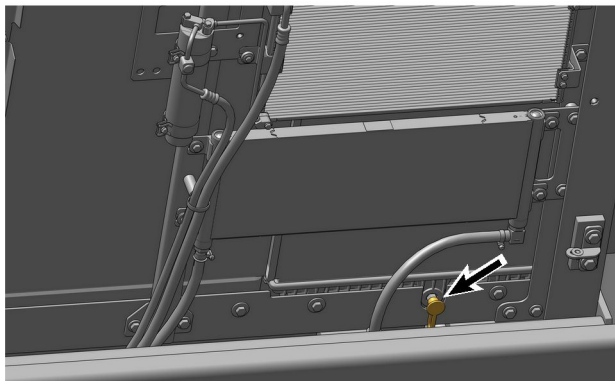


Illustration 532

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.

i07348841

Engine Air Filter Primary and/or Secondary Element - Replace

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

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. Park the machine on a level surface. Stop the engine.



Illustration 533

g06181546

2. Open the front access door on the left side of the machine.

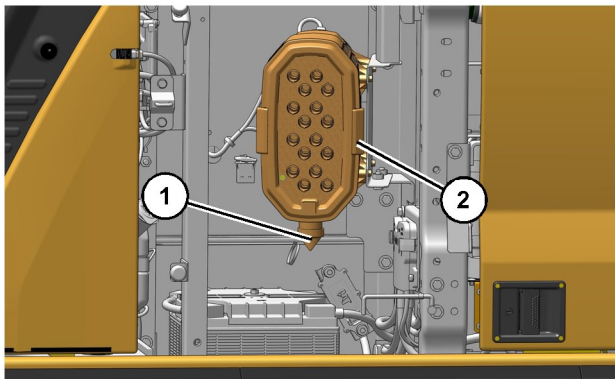


Illustration 534

g06183302

3. Squeeze outlet tube (1) to purge the dirt from the outlet tube.

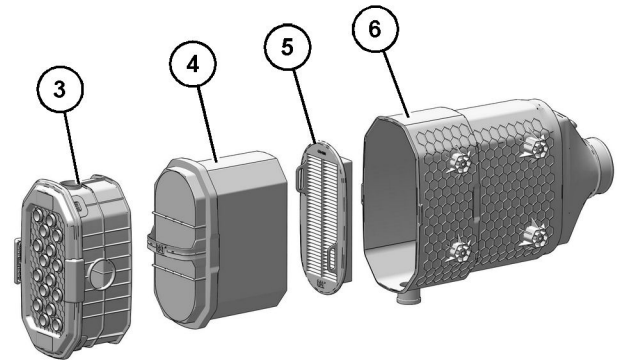


Illustration 535

g06222467

4. Release latches (2) that secure pre-cleaner (3) to engine air filter housing (6).
5. Remove pre-cleaner (3).
6. 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 500 kPa (73 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.

7. 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.

8. Clean inside the air filter assembly housing.

Note: Do not allow any dirt or debris to contact the secondary air filter element (5).

9. 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

10. 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.

11. Install the secondary air filter element.

12. 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.

13. Install the pre-cleaner and secure the latches that hold the pre-cleaner to the air filter housing.

14. 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.

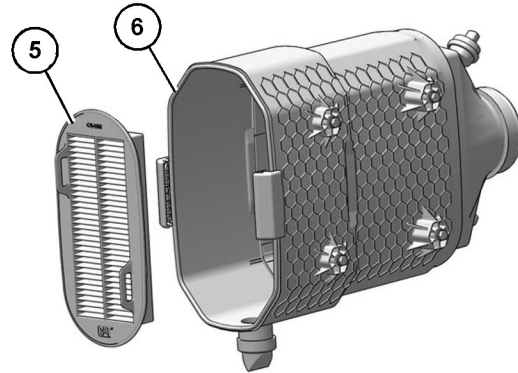


Illustration 536

g06183315

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.

Engine Air Pre-Cleaner - Clean

Note: Do not attempt to clean the pre-cleaner by hitting the filter against another object. Damage to the filter is likely to occur.



Illustration 537

g06183310

After removing the pre-cleaner from the air filter housing, inspect the interior of the pre-cleaner through the ejection ports around the perimeter.

In general, dust and debris will clear automatically through normal pre-cleaner operation and no further service will be required.

If the ejection ports are blocked, or dust is packed between the pre-cleaner tubes, first try to clear any accumulation by vigorously shaking the pre-cleaner.

If the pre-cleaner is still blocked with dirt, the pre-cleaner may be separated by releasing the snap features holding the front cover to the pre-cleaner body.



Illustration 538

g06069263

1. Place the pre-cleaner assembly on a suitable work surface. The interior of the pre-cleaner may have accumulated debris. Protect your work surface to collect excess debris and to avoid scattering debris.

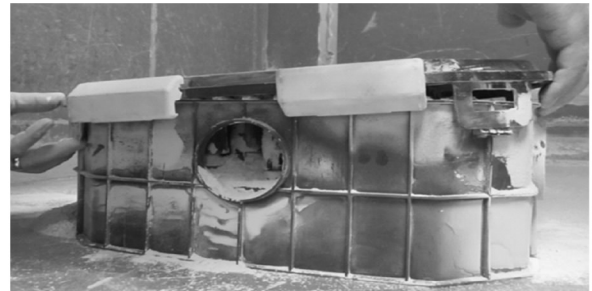


Illustration 539

g06069266

2. Lift the locking tabs on one end of the cover away from the retainers. Move the locking tabs only far enough to clear the retention posts.

Note: Do not bend the locking tabs farther than necessary to release the tabs. Damage to the air cleaner can result. Do not use tools to force the snap features off the retainers.

3. Pull one end of the top cover away from the bottom half.
4. Hold one end of the cover sections apart and separate one of the locking tabs on the other end of the pre-cleaner.



Illustration 540

g06069264

5. Pull the top cover up and away from the bottom.
6. Clear any blockage by shaking the pre-cleaner components and/or brushing away accumulated debris.

Note: Do not use picks or other stiff implements to clear debris, you may damage the pre-cleaner components

Note: Do not attempt to remove the pre-cleaner tubes from the top cover or you will damage the air cleaner.

7. If the blockage is still not cleared, you may attempt to clear the debris by use of an air nozzle limited to 500 kPa (73 psi).

Alternately, each part of the pre-cleaner may be submerged in water to loosen mud or other debris that may have dried on the interior surface of the air cleaner.

Note: Never attempt to use a pressure washer or other high-pressure water sources to clean the pre-cleaner. Use of high-pressure water may damage the pre-cleaner tubes and reduce the pre-cleaner effectiveness.

8. After cleaning, reassemble the pre-cleaner by lining up the tubes on the pre-cleaner top with the tubes in the pre-cleaner bottom.
9. Allow the pre-cleaner top to rest on the pre-cleaner bottom and ensure that the four snap features are aligned.



Illustration 541

g06069247

10. If all the tabs are aligned, gently push the pre-cleaner top down into place. Ensure that all the snap features have engaged.

11. Before installing the pre-cleaner to the air filter housing, inspect the pre-cleaner gasket for damage. Replace if damaged.

i07245363

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: In addition to an engine oil dipstick, your machine may be equipped with an automated function for checking fluid levels. Refer to Operation and Maintenance Manual, "Monitoring System" regarding the automated system.

Note: If the machine is on an incline or the engine has been stopped only for a short time, then the engine oil does not return to the crankcase and the fluid level cannot be properly checked by either method. Park the machine on level ground and check that the oil level after the engine has been stopped for at least 30 minutes.

Check the oil level while the engine is stopped. Do not check the oil level while the engine is running.

1. Open the engine hood.

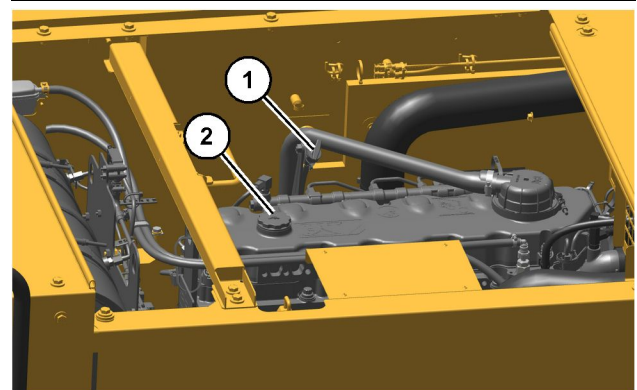


Illustration 542

g06264436

2. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

i07105519

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 1000; 1348-554-SM; 1348-008; 7542-008; 7542-554-OC; 7542-554-SM

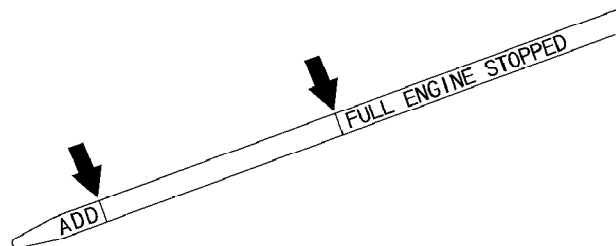


Illustration 543

g00832222

3. Remove the dipstick and check the dipstick. The oil level should be between the "FULL" mark and the "ADD" mark.

NOTICE

Do not fill above the "FULL" mark on the dipstick.

If the oil level is above the "FULL" Mark, the crankshaft might dip into the oil during engine operation. This will lead to excessively high oil temperatures. High oil temperatures can reduce the lubricating characteristics of oil.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

4. Remove oil filler plug (2) 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.

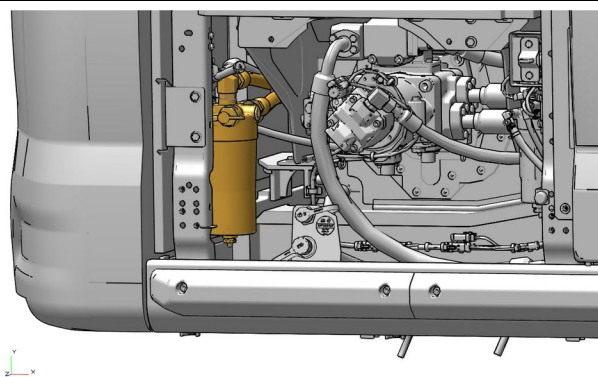


Illustration 544

g06226123

Obtain a sample of the engine oil from the engine oil sampling valve that is on the engine oil filter housing. Refer to Special Publication, SEBU6250, "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample" for more information about obtaining a sample of the engine oil.

i08265994

Engine Oil and Filter - Change

SMCS Code: 1318-510

Prepare the machine for maintenance. Refer to "Prepare the Machine for Maintenance".

Selection of the Oil Change Interval

NOTICE

The engine oil and filter change interval for standard service application is every 1000 hours when the following requirements are met:

- Utilize Cat Recommended Fluids
- Utilize Cat Filters
- Utilize S·O·S Services at recommended interval

When these requirements are not met, the oil and filter change interval should be every 500 hours, or use S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

Maintenance Section
Engine Oil and Filter - Change

NOTICE

When operating in any of the conditions or environments outlined in this Operation and Maintenance Manual, Severe Service Application, use S·O·S Services oil analysis to determine the best oil and filter change interval.

When S·O·S Services are not used in severe service applications, the oil and filter change interval should be every 250 hours..

If you select an interval for oil and filter change that is too long, you may damage the engine.

Reference: Operation and Maintenance Manual, "Lubricant Viscosities"

Reference: Operation and Maintenance Manual, "Maintenance Interval Schedule"

Reference: Operation and Maintenance Manual, "Severe Service Application"

Reference: Operation and Maintenance Manual, "S·O·S Information"

Use the table below to determine the appropriate oil and filter change interval.

Table 23

Selection of Oil and Filter Change Interval				
	Conditions			Interval
	Cat Recommended Fluids	Cat Filters	S·O·S Services	
Standard Service Application	YES	YES	YES	1000 hours
	YES	YES	NO	500 hours
	YES	NO	YES	500 hours
	NO	YES	YES	500 hours
	NO	NO	NO	250 hours
Severe Service Application	NO	NO	NO	250 hours
	YES	YES	NO	250 hours
	YES	YES	YES	Use S·O·S ⁽¹⁾
	YES	NO	YES	Use S·O·S ⁽¹⁾
	NO	YES	YES	Use S·O·S ⁽¹⁾

⁽¹⁾ If operating in any of the conditions or environments outlined in the Severe Service Application, use S·O·S Services oil analysis to determine the best oil change interval.

Note: Initial oil and filter change is required at initial 500 hours.

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 Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

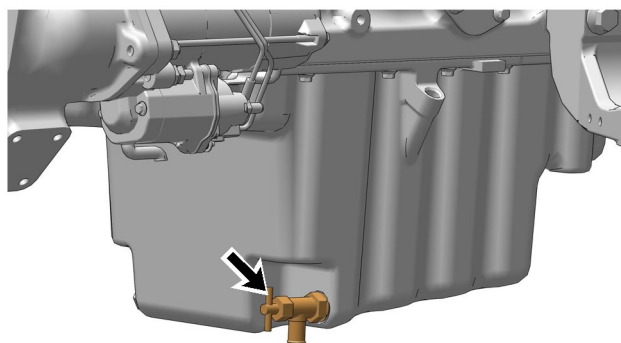


Illustration 545

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 546

g06279640

4. Open the access door at the right side of the machine.

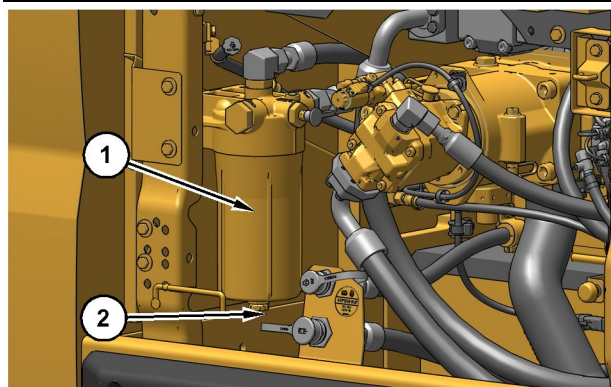


Illustration 547

g06615291

- (1) Oil filter housing
(2) Drain valve

5. Loosen drain valve (2) and allow the oil to drain out of the housing. The drain valve is on the bottom of the engine oil filter 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.

Engine oil filter located in right side pump compartment.

6. Remove oil filter housing (1). Refer Operation and Maintenance Manual, "Oil Filter - Inspect". Dispose of the used filter according to local regulations.

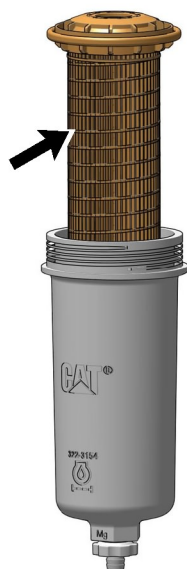


Illustration 548

g06183515

7. Remove the filter from the housing.
8. Clean the filter housing and the base thread.
9. Install the new filter element into the housing.
10. After installing the new element, hand tighten the drain valve (2) at the bottom of the housing.

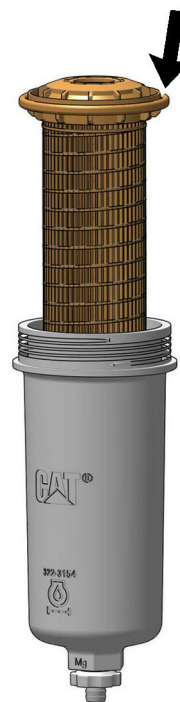


Illustration 549

g06604084

11. Apply a thin coat of engine oil to the gasket of the filter. Refer to Illustration 549 for lubrication points on the gasket.
12. Install the filter housing with element to the filter base utilizing a socket wrench.
- Note:** Apply a tightening torque of 100 N·m (73 lb ft) and tighten until metal to metal contact is achieved.
13. Re-tighten the drain valve to a torque of 2.5 N·m (22.1 lb in).
14. Close the access door.

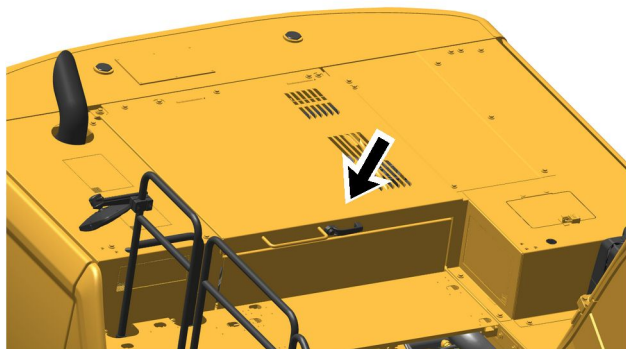


Illustration 550

g06279602

15. Open the access door on top of the machine.

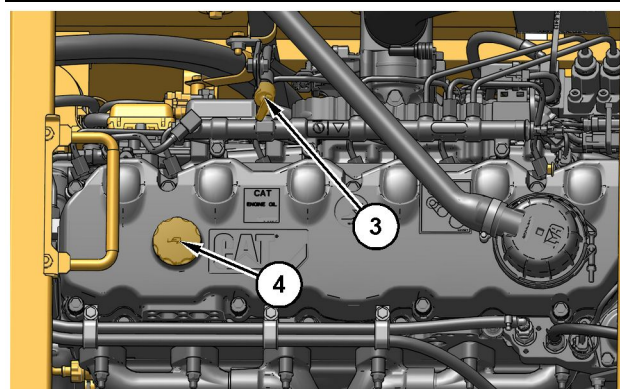


Illustration 551

g06615296

- (3) Oil level gauge
(4) Oil filler cap

16. Remove oil filler cap (4). Fill the crankcase with new oil. Refer 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.

17. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.

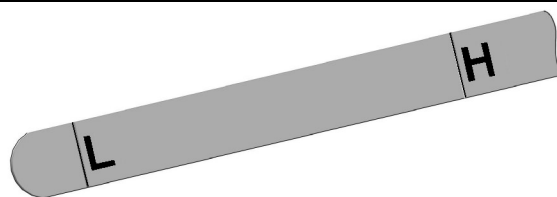


Illustration 552

g06183475

18. Wait for 30 minutes to allow the oil to drain back into the crankcase. Check the oil level with oil level gauge (3). Maintain the oil between the "L" and "H" marks on the oil level gauge. If necessary, add oil.

19. 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 553

g06279640

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

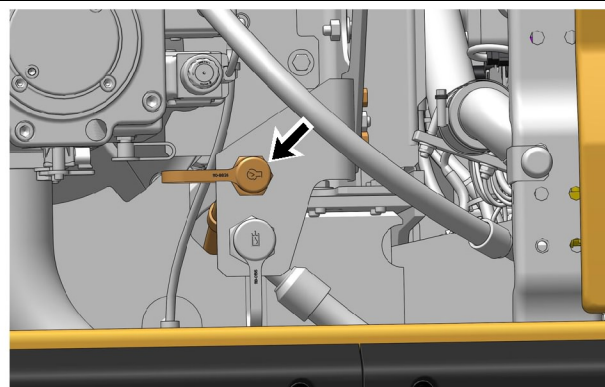


Illustration 554

g06183504

2. Remove the dust cover.

Maintenance Section

Engine Valve Lash - Check

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.

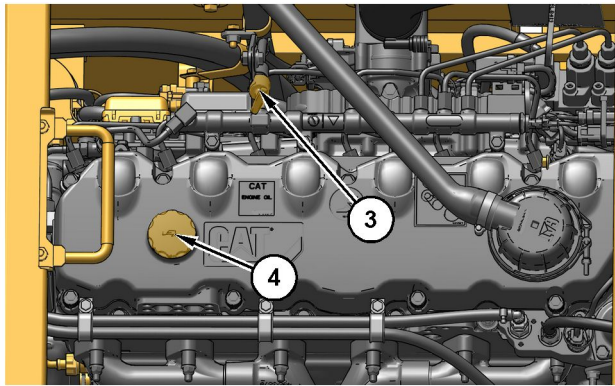


Illustration 555

g06615296

- (3) Oil level gauge
(4) Oil filler cap

6. Verify that the correct amount of oil was added using the engine oil level gauge. (3).

i01747875

Engine Valve Lash - Check

SMCS Code: 1102; 1102-082; 1102-535; 1105-535; 1105-025; 1121-535; 1209; 1209-535; 1209-082; 7527

Refer to Engine Systems Operation/Testing and Adjusting in order to perform the complete procedure for the valve lash adjustment.

i07051358

Ether Starting Aid Cylinder - Replace (If Equipped)

SMCS Code: 1456-510-CD

WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

The ether cylinder is located inside the rear access door on the left side of the machine.

Refer to Operation and Maintenance, "Fire Prevention and Explosion Prevention" before you replace the ether cylinder.

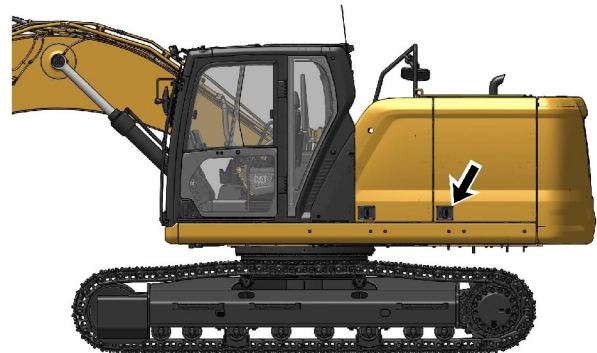


Illustration 556

g06179792

1. Open the rear access door at the left side of the machine.

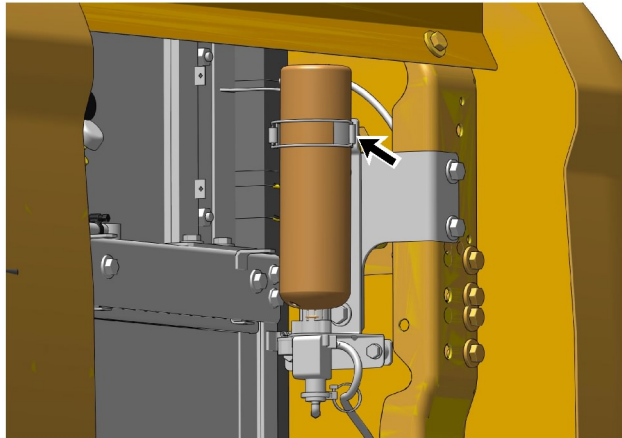


Illustration 557

g06211094

2. Loosen the cylinder retaining clamp.
3. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.

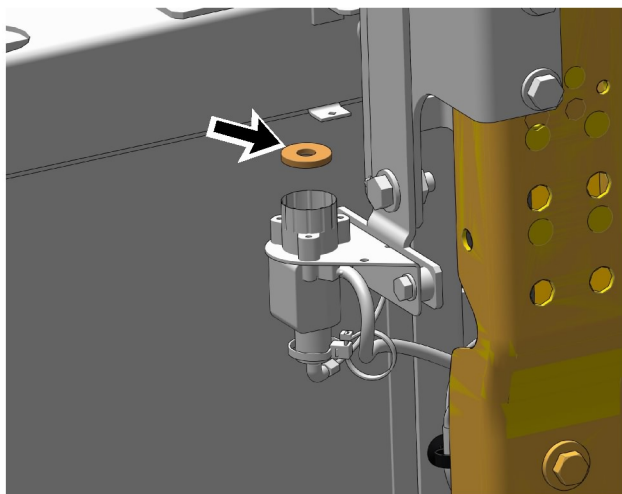


Illustration 558

g06211096

4. Remove the used gasket.
 5. Install a new gasket.
- Note:** A new gasket and O-ring is provided with each new ether starting aid cylinder.
6. Install the new ether starting aid cylinder.
 7. Tighten the ether starting aid cylinder hand tight.

8. Tighten the cylinder retaining clamp securely.
9. Close the access door.

i07786001

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070



Illustration 559

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.

i06969803

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.

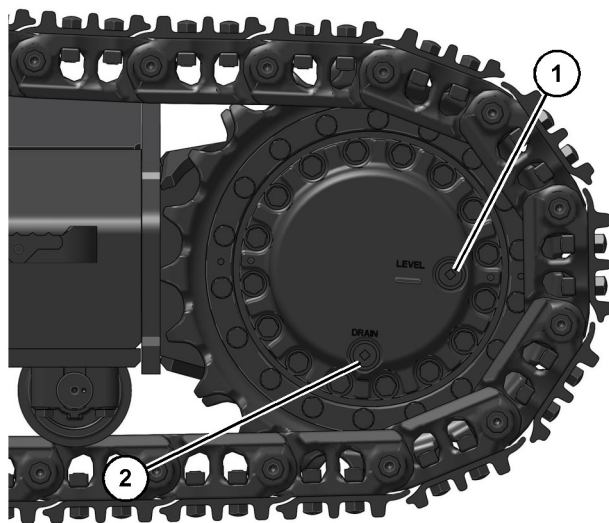


Illustration 560

g06182944

- (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.

i06969810

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.

i06969816

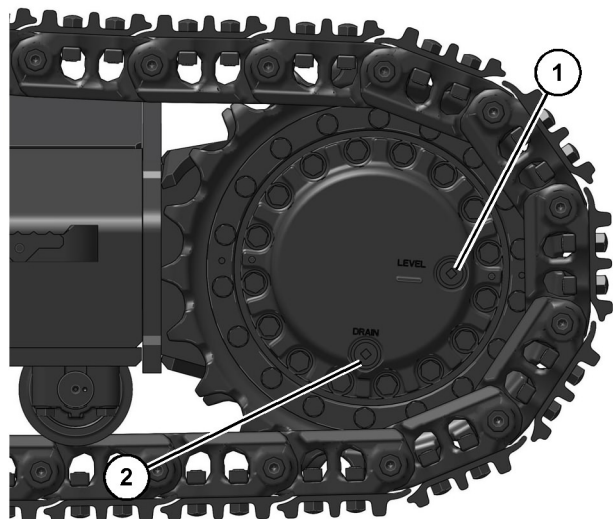


Illustration 561

g06182944

- (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 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.

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.

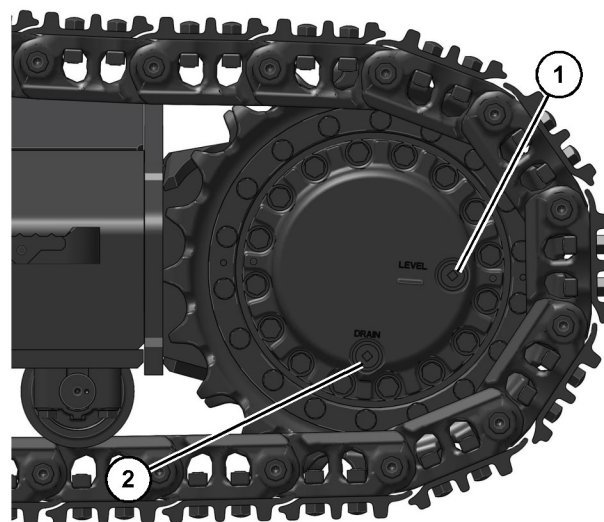


Illustration 562

g06182944

- (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".

i07088575

Fuel Cap Filter - Replace

SMCS Code: 1261-510

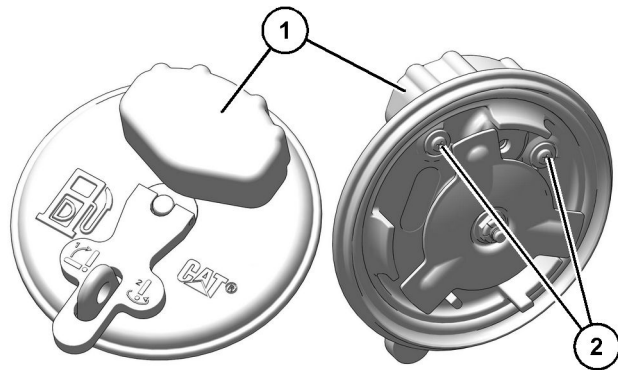


Illustration 563

g06220524

1. Remove the fuel cap.
2. Remove filter element screws (2) from the underside of the fuel cap and remove filter element (1).
3. Install a clean fuel cap filter element.
4. Install the screws to secure the filter element to the fuel cap.
5. Install the fuel tank cap.

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.

i07318410

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

WARNING

Personal injury or death may result from failure to adhere to the following procedures.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE

Do not fill the fuel filters with fuel before installing the fuel filters. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

The primary filter/water separator is located behind the access door on the right side of the machine.



Illustration 564

g06279640

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

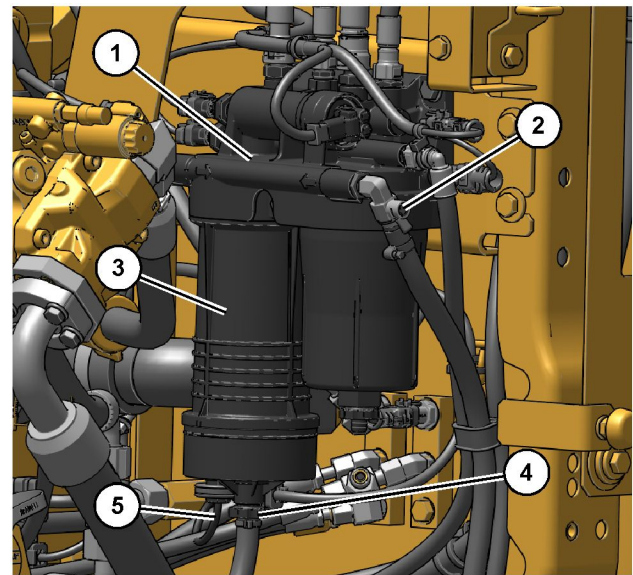


Illustration 565

g06281993

- (1) Filter base
- (2) Fuel shutoff valve
- (3) Filter housing
- (4) Drain valve
- (5) Sensor

2. Turn fuel shutoff valve (2) to the closed position.

Note: Refer to Operation and Maintenance Manual, "Fuel Tank Shutoff and Drain Control" for information on the fuel shutoff valve.

3. Turn drain valve (4) counterclockwise to open. The drain valve is on the bottom of the water separator.

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

Note: Dispose of used fluids according to local regulations.

4. Close the drain valve (4).

5. Disconnect the water sensor (5) from the harness.

Note: Do not attempt to remove the sediment bowl from the housing. The sediment bowl is permanently attached to the housing. Attempting to remove the sediment bowl may damage the bowl.

Note: Do not use a chain type strap wrench to remove the fuel filter. Only use a filter wrench on the reinforced area (area with both horizontal and vertical reinforcing ribs) of the filter housing.

6. Unscrew filter housing (3). Rotate and remove a primary filter from drain valve (4). A filter wrench may be used on the filter housing to loosen the filter housing. Do not apply wrench to clear sediment bowl. Properly discard the used filter.
7. Clean the mounting base (1).
8. Lubricate the seal of the new filter with clean diesel fuel.
9. Install the new filter into the housing.
10. Tighten the filter housing (3) on the filter base (1) and tighten until the housing flange touches the filter base. Tighten the drain valve (4). Do not use tools to tighten the filter housing to the filter base.
11. Ensure that sensor (5) is in the correct position and connect to the wiring harness. If the sensor was removed from the bowl, install the sensor and tighten to $2.0 \pm 0.2 \text{ N}\cdot\text{m}$ ($18 \pm 2 \text{ lb in}$).
12. Open the fuel shutoff valve (2).
13. Close the access door.
14. Prime the fuel system. Refer to Operation and Maintenance Manual, "Fuel System - Prime".

i07318618

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

NOTICE

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.



Illustration 566

g06279640

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

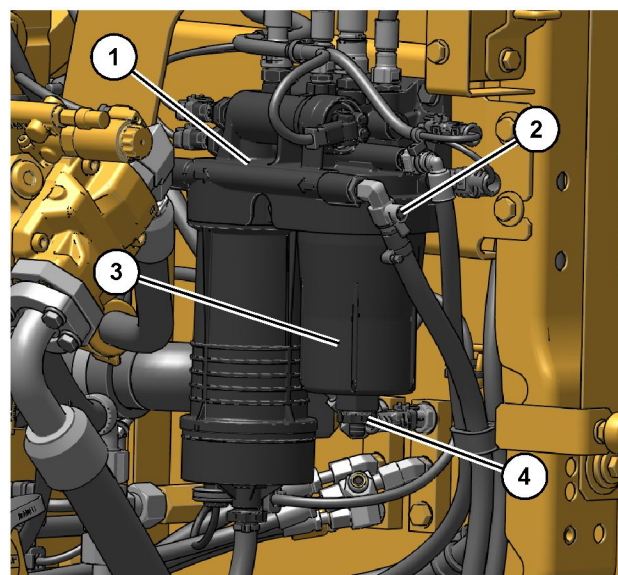


Illustration 567

g06282038

- (1) Filter base
- (2) Fuel shutoff valve
- (3) Secondary filter housing
- (4) Drain valve

2. Turn fuel shutoff valve (2) to the closed position.

Note: Refer to Operation and Maintenance Manual, "Fuel Tank Shutoff and Drain Control" for information on the fuel shutoff valve.

3. Turn drain valve (4) counterclockwise to open and drain.

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

Note: Dispose of used fluids according to local regulations.

4. Loosen filter housing (3) to drain the rest of fuel inside the filter housing. A wrench may be used to loosen the filter housing.
5. Close the drain valve (2).
6. Unscrew filter housing (3) and rotate and remove a secondary filter from the drain valve (4). A wrench may be used to loosen the filter housing. Properly discard the used filter.
7. Clean the mounting base (1).
8. Lubricate the seal of the new filter with clean diesel fuel.
9. Install the new filter into the housing.
10. Install the filter housing (3) on the filter base (1) and tighten to 50 N·m (37 lb ft). Tighten the drain valve(4).
11. Open the fuel shutoff valve (2).
12. Prime the fuel system. See Operation and Maintenance Manual, "Fuel System - Prime" for instructions.
13. Close the access door.

i07318648

Fuel System Water Separator - Drain

SMCS Code: 1263

1. Open the access door on the right side of the machine.
2. Provide a suitable container for used fluid.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

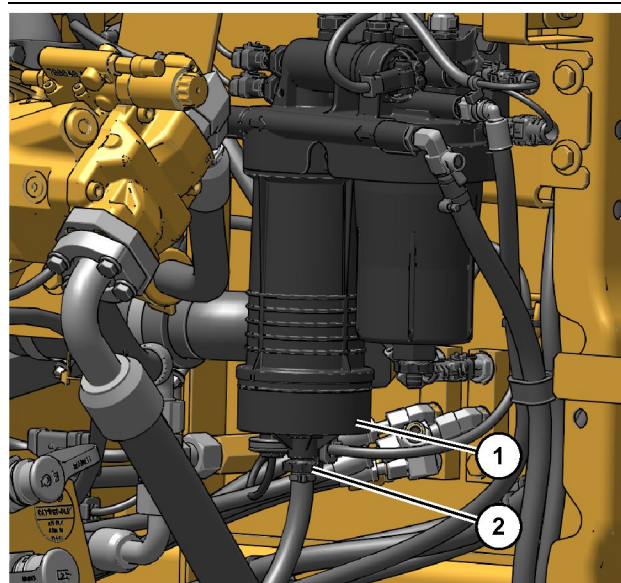


Illustration 568

g06282052

- (1) Bowl
(2) Drain valve

3. Check bowl (1) in the bottom of the water separator. Open drain valve (2). Drain the water and sediment in the bowl.

Note: Dispose of used fluids according to local regulations.

4. Close drain valve (2).
5. Close the access door.

i07321530

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

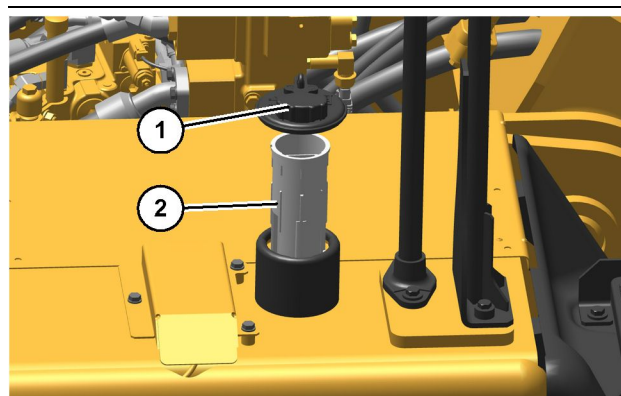


Illustration 569

g06283169

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.

i07348843

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

Refer to this Operation and Maintenance Manual, "Fuel Tank Shutoff and Drain Control" for the exact location of the fuel tank drain valve

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

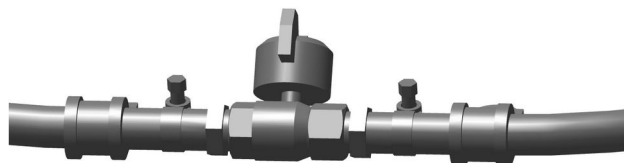


Illustration 570

g06289703

Typical example

1. Open the drain valve by turning the valve counterclockwise. Allow the water and the sediment to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

2. Close the drain valve by turning the valve clockwise.

i08251883

Fuses - Replace

SMCS Code: 1417-510

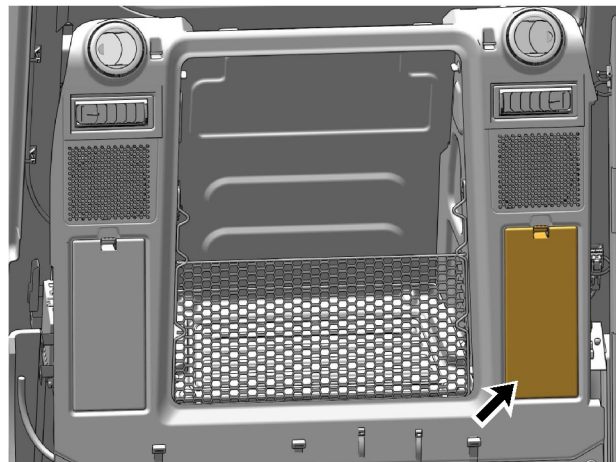


Illustration 571

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.

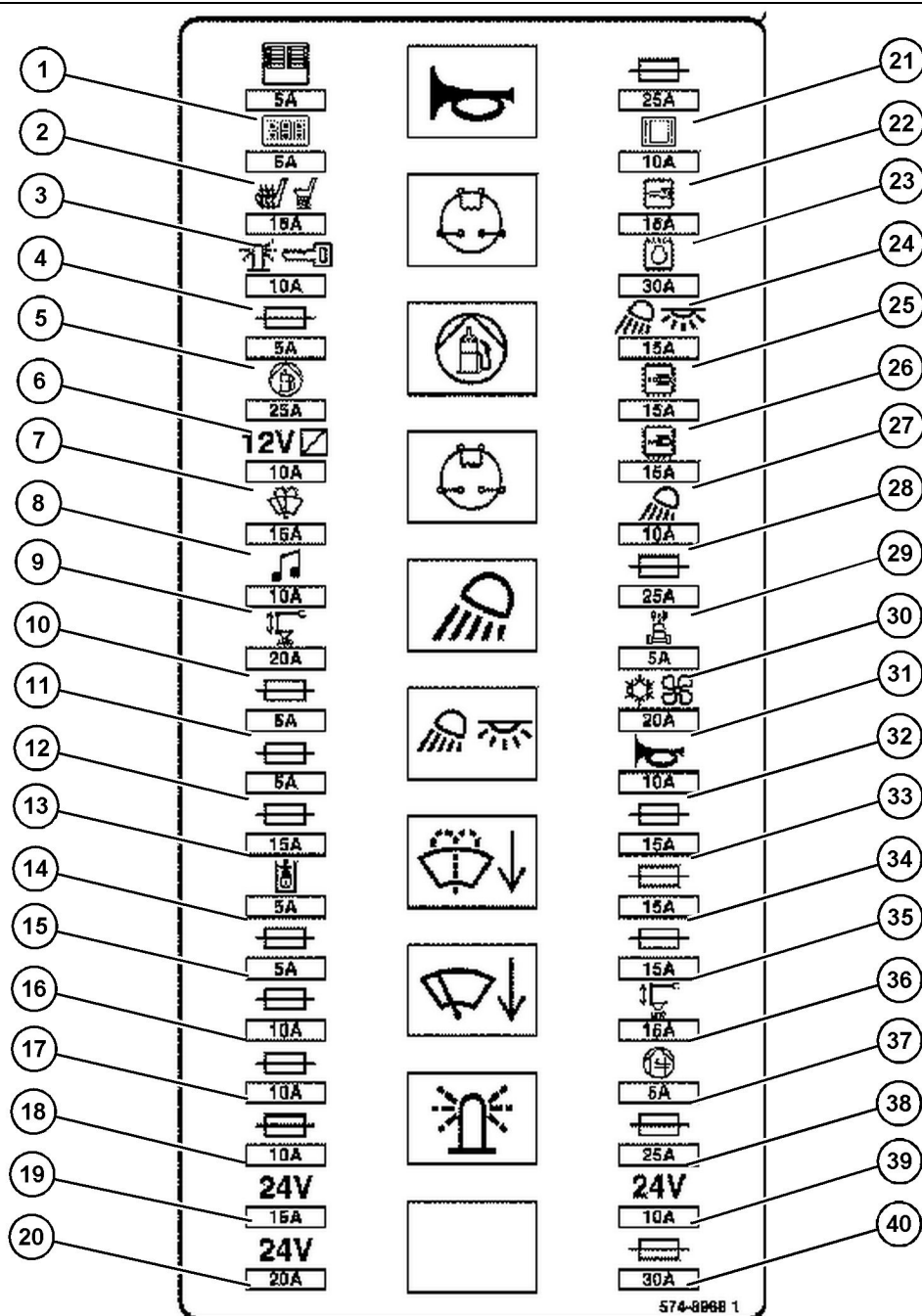


Illustration 572

g06612790

(1) Heater and Air Conditioner Control and Monitor – 5 Amp

(2) Electronic Switch Control Panel – 5 Amp

(3) Grip, Seat Heater, and Air Suspension Seat – 15 Amp

(4) Beacon – 10 Amp

(5) Spare – 5 Amp

(6) Electric Refueling Pump – 25 Amp

(7) Auxiliary Circuit – 10 Amp

(8) Window Wiper and Window Washer – 15 Amp

(9) Radio – 10 Amp

(10) Spare – 15 Amp

(11) Spare – 5 Amp

(12) Spare – 5 Amp

- (13) **Spare** – 15 Amp
- (14) **Hydraulic Lock** – 5 Amp
- (15) **Spare** – 5 Amp
- (16) **Spare** – 10 Amp
- (17) **Auxiliary Circuit** – 10 Amp
- (18) **Auxiliary Circuit** – 30 Amp
- (19) **Spare** – 25 Amp
- (20) **Spare** – 20 Amp
- (21) **Spare** – 25 Amp
- (22) **Display and ET Connector** – 10 Amp
- (23) **Body Control Module** – 15 Amp
- (24) **Engine Electronic Control Module** – 30 Amp
- (25) **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** – 10 Amp
- (30) **Product Link Module** – 5 Amp
- (31) **Air Conditioner and Heater Blower** – 20 Amp
- (32) **Horn** – 10 Amp
- (33) **Spare** – 15 Amp
- (34) **Spare** – 15 Amp
- (35) **Spare** – 15 Amp
- (36) **Spare** – 15 Amp
- (37) **Fuel Lifting Pump** – 5 Amp
- (38) **Spare** – 10 Amp
- (39) **Auxiliary Circuit** – 10 Amp
- (40) **Spare** – 15 Amp

Relays

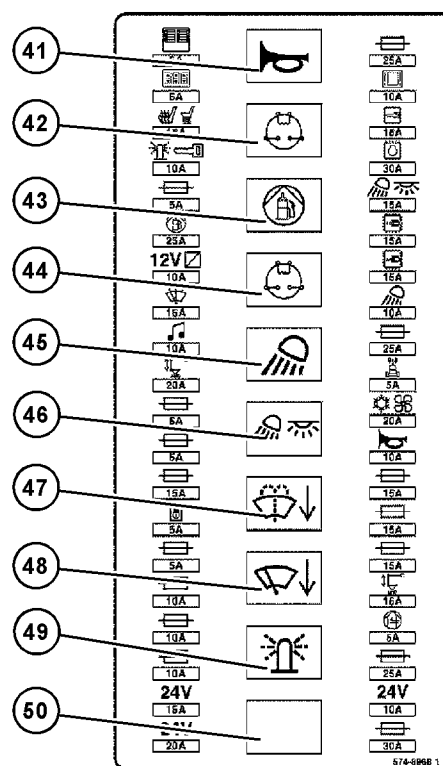


Illustration 573

g06612793

- (41) **Horn** – Relay
- (42) **Main Power** – Relay
- (43) **Priming Pump** – Relay
- (44) **Auxiliary Power** – Relay
- (45) **Boom Light** – Relay
- (46) **Chassis Light and Cab Light** – Relay
- (47) **Lower Washer** – Relay
- (48) **Lower Wiper** – Relay
- (49) **Beacon** – Relay
- (50) **Unused** – Relay

Power Fuse Module



Illustration 574 g06266781

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.

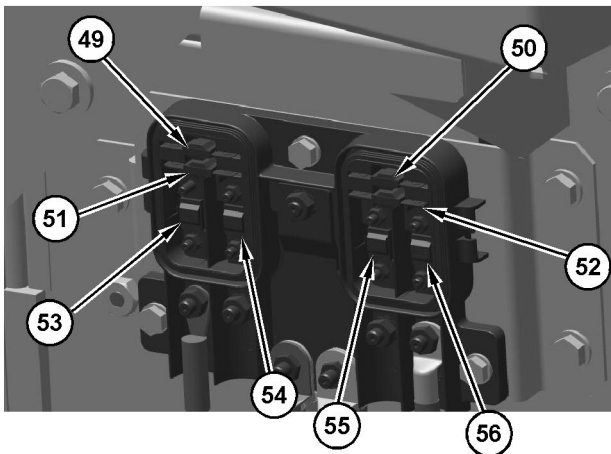


Illustration 575 g06266787

 **Spare (49- 52) – 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 (53) – 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.**

Spare 70 Amp (54)
Spare 40 Amp (55)

 **Alternator Circuit 125 Amp (56) – 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.**

i07915095

Hydraulic System Oil - Change

SMCS Code: 5056-044

Cat HYDO Advanced 10 Oil Change Interval

The standard Cat HYDO Advanced 10 oil change interval is every 6000 service hours or 3 years. But a 6000 service hour or 3-year maintenance interval for hydraulic oil (change) is strongly recommended with S·O·S monitoring of the hydraulic oil after 3000 service hours. The interval for S·O·S monitoring is every 500 hours. The Oil change is strongly recommended when the oil deterioration or contamination is detected. The maintenance interval for the hydraulic oil filter is not changed.

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 24 for the intervals.

Table 24

Percentage of Hammer Use	Hydraulic System Oil - Change
50%	Every 1000 service hours
100%	Every 600 service hours

Procedure to Change the Hydraulic Oil

 WARNING

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

NOTICE

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

Refer to Special Publication, 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.

1. Park the machine on level ground. Lower the bucket to the ground so that the stick is vertical.

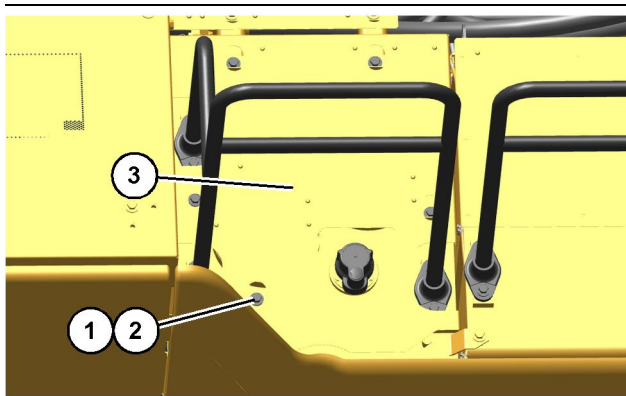


Illustration 576

g06283567

2. Remove five bolts (1) and washers (2). Remove cover (3) from the top of the hydraulic tank.

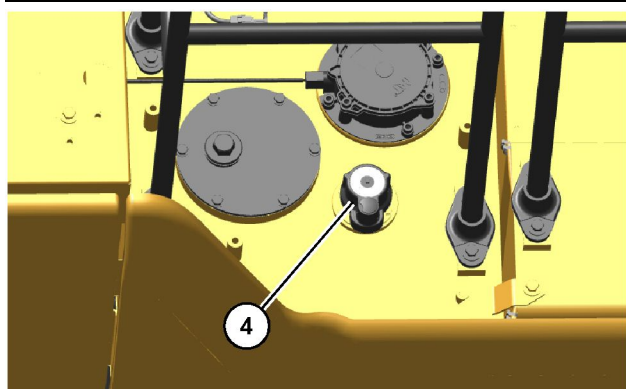


Illustration 577

g06283580

3. Clean the area thoroughly to keep dirt out of the screen cover and filler cap (4).

⚠ 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.

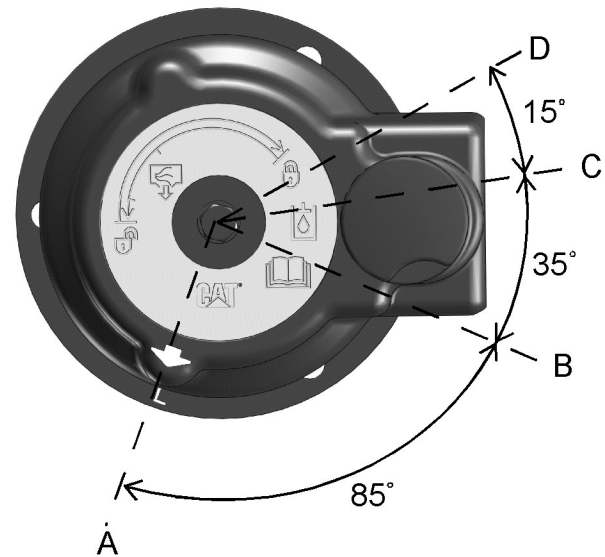


Illustration 578

g06184990

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 578 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.

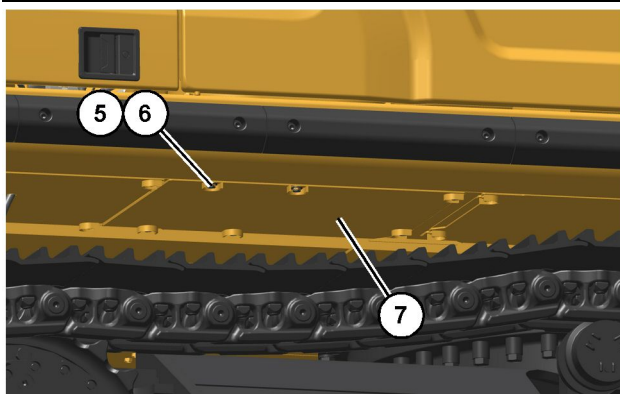


Illustration 579

g06283591

5. Remove six bolts (5) and washers (6). Remove the hydraulic tank access cover (7) that is located under the upper structure. Removing the cover will allow access to the drain valve.

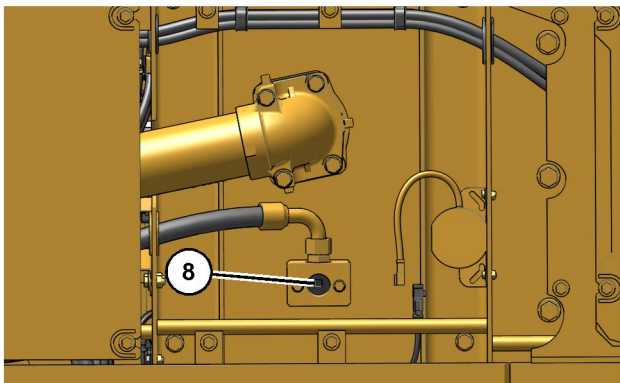


Illustration 580

g06283598

(8) Plug

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

6. Remove plug (8).
7. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

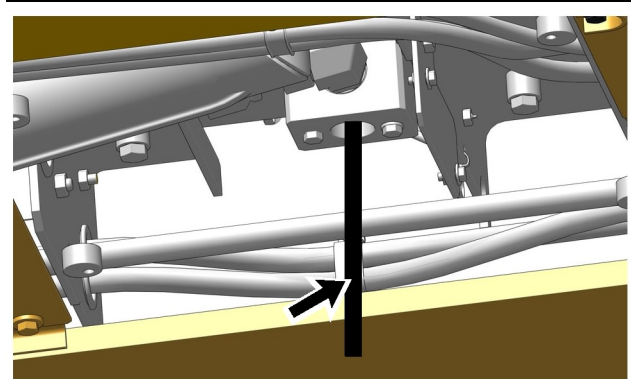


Illustration 581

g06182192

8. Use a bar to push the plunger up to allow the oil to drain.

9. Drain the oil into a suitable container.

Note: Dispose of used fluids according to local regulations.

10. After the oil has been drained, clean drain plug (5) and install. Tighten the plug to $68 \pm 7 \text{ N} \cdot \text{m}$ ($50 \pm 5 \text{ lb ft}$).
11. Open the access door on the right side of the machine.
12. Clean the pump, the hydraulic lines, and the hydraulic tank.

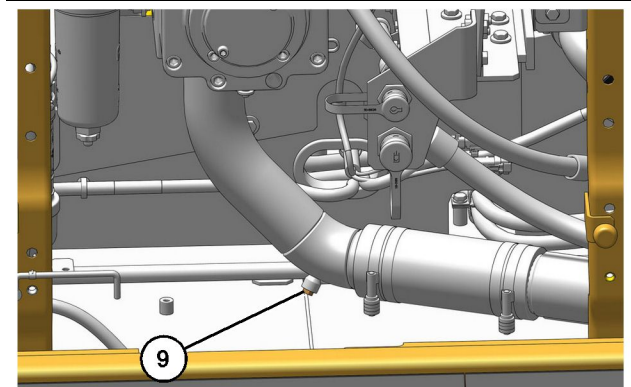


Illustration 582

g06283634

13. Remove plug (9) 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.

Hydraulic Tank Screen - Clean

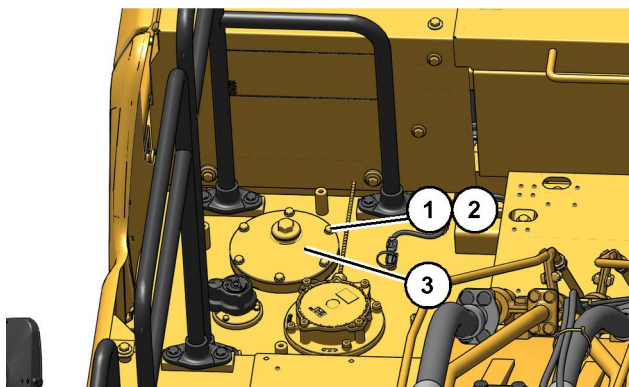


Illustration 583

g06283653

- (1) Bolts
- (2) Washers
- (3) Cover

1. Remove bolts (1), washers (2), and cover (3).

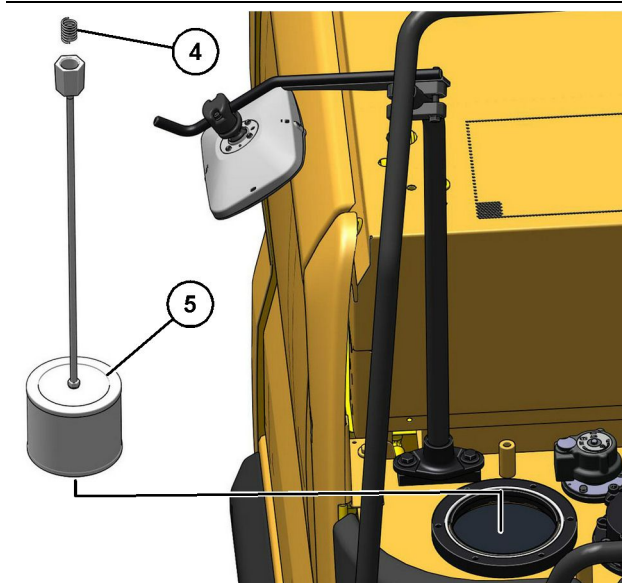


Illustration 584

g06283658

- (4) Spring
- (5) Screen

2. Remove spring (4) and screen (5).

Note: Do not allow spring (4) to fall back into the tank.

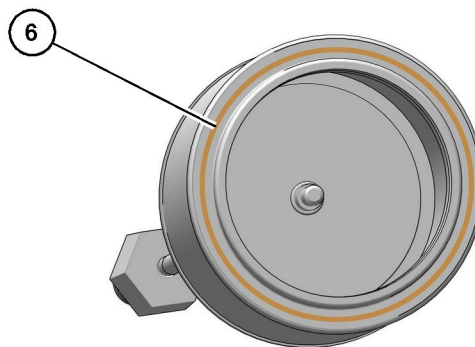


Illustration 585

g06283660

- (6) O-ring seal

3. Remove O-ring seal (6) from the screen.

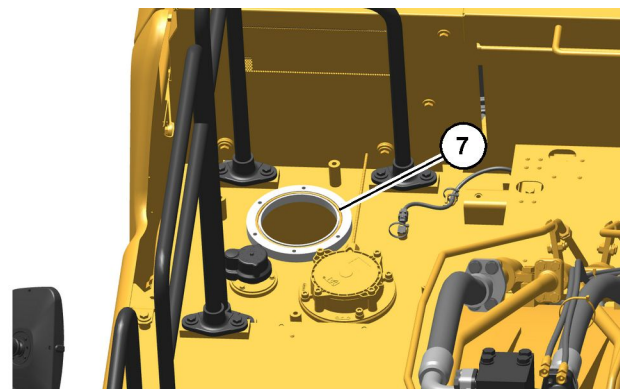


Illustration 586

g06283663

- (7) O-ring seal

4. Remove O-ring seal (7) from the tank.

5. Inspect O-ring seals (6) and (7). Replace the O-ring seals if wear or damage is evident.

6. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.

7. Install O-ring seal (6) on screen (5).

8. Install screen (5) and spring (4). Then install cover (3), washers (2), and bolts (1).

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

Case Drain Filter - Clean

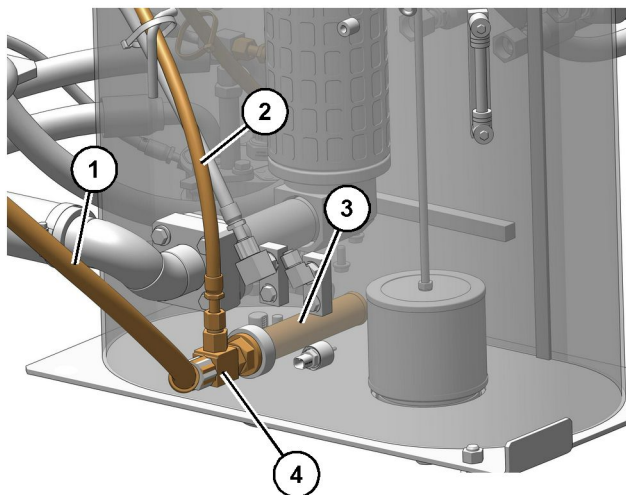


Illustration 587

g06220559

- (1) Hose
- (2) Hose
- (3) Case drain filter
- (4) Tee

1. Remove hose (1) and hose (2) from tee (4). Remove tee (4).
2. Remove case drain filter (3) from the hydraulic tank.
3. Wash the screen of the case drain filter in a clean nonflammable solvent. Allow the filter to dry. Inspect the filter. Replace the filter if the filter is damaged.
4. Inspect the O-ring seal on the filter. Replace the O-ring seal if wear or damage is evident.
5. Install the filter in the hydraulic tank. Tighten the filter to $175 \pm 26 \text{ N}\cdot\text{m}$ ($129 \pm 19 \text{ lb ft}$).
6. Install the tee onto the filter. Tighten the tee to $65 \pm 10 \text{ N}\cdot\text{m}$ ($48 \pm 7 \text{ lb ft}$).
7. Install the two hoses onto the tee.

Hydraulic System Oil - Fill

1. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Capacities (Refill)".
2. Inspect the O-ring seal on the filler cap for damage. Replace the O-ring, if necessary. Clean the filler cap. Install the filler cap.

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.

Main Pump and Hydraulic System Air Purge

1. Access the hydraulic pump. The hydraulic pump is located behind the right access door.

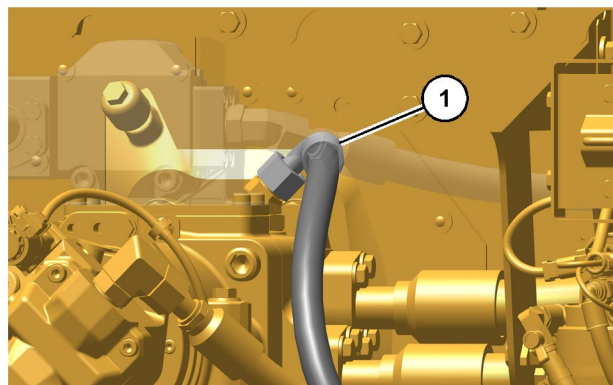


Illustration 588

g06284191

- (1) Hose

2. While the engine is stopped, remove hose (1) from the top of the pump. Add hydraulic oil through the opening.
3. After the pump has been filled with oil, install drain hose (1).
4. Start the engine. When the engine is at low idle, raise the boom. Hold the boom in this position.
5. Stop the engine. Slowly lower the boom until the work tool is on the ground. The hydraulic tank will pressurize.
6. Slowly loosen hose (1) until hydraulic oil flows from the connection. Oil flowing from the connection indicates that the air has been released from the pump.
7. Tighten hose (1).
8. Start the engine. Operate the engine at idling speed for 5 minutes.



Illustration 589

g06284230

9. Operate the joysticks to circulate the hydraulic oil. Lower the bucket to the ground so that the stick is vertical to the ground. Stop the engine.

10. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

11. Close the access door.

12. Close the engine hood and latch the engine hood.

Fast Fill

If your machine is equipped with a deluxe service center, you may drain the hydraulic oil through the fast fill port. You may also add the hydraulic oil through a fast fill port.



Illustration 590

g06279640

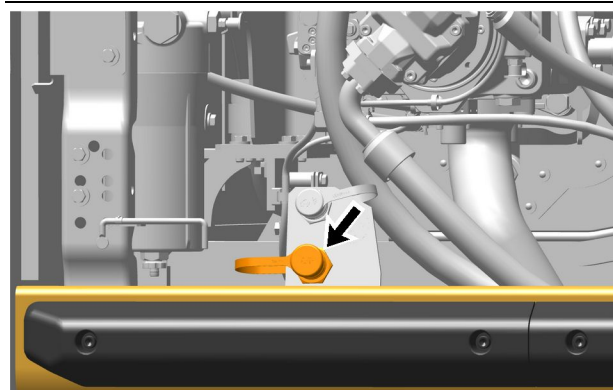


Illustration 591

g06284237

1. Remove the dust cover.
2. Attach the hose to the male coupling.
3. Drain the oil or add the oil, as needed.

i07915108

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

WARNING

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

The return filter is a cartridge type filter. The amount of foreign material that enters the hydraulic system is reduced when the filter element is replaced.

Two different filters are available for the return filter. One filter is used for standard applications such as digging and normal use of a hammer. The second filter is used for an application such as demolishing a ceiling in a tunnel with a hammer.

Note: If the message display shows that the hydraulic return filter is plugged, turn off the machine. After you make sure that the warning has disappeared, start the machine and run the machine on level ground for approximately 10 minutes. If the warning still appears in the message display, inspect the filter and replace the filter, if necessary.

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 25 for the intervals.

Table 25

Percentage of Hammer Use	Hydraulic System Oil Filter (Return) - Replace
50%	Every 500 service hours
100%	Every 250 service hours

Return Filter Replacement Procedure

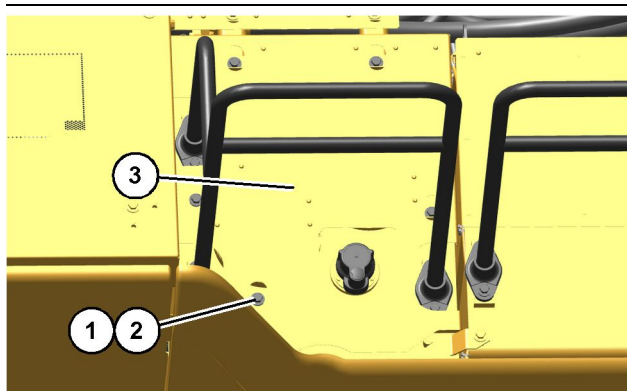


Illustration 592

g06283567

1. Remove seven bolts (1) and washers (2). Remove cover (3) from the top of the hydraulic tank.
2. Clean the area thoroughly to keep dirt out of the return filter and filler cap.

WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off. Relieve pressure by slowly turning the cap until the cap reaches the secondary stop.

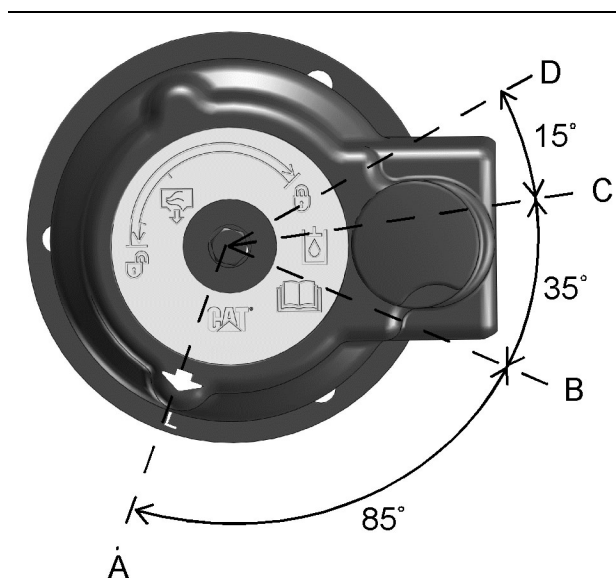


Illustration 593

g06184990

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 593 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 on the hydraulic tank to position (A).
4. Check the hydraulic system oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

Maintenance Section
Hydraulic System Oil Level - Check

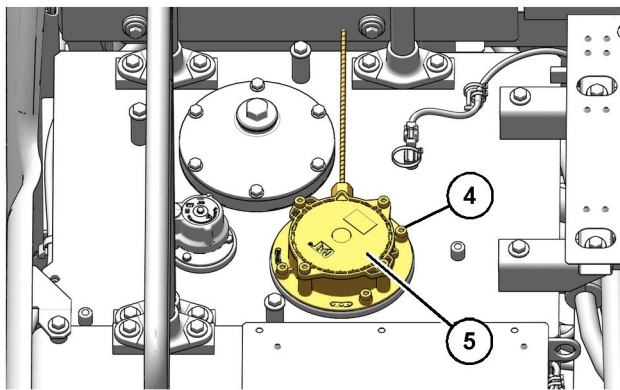


Illustration 594

g06284250

5. Remove four bolts (4), disconnect the harness connector from the filter bypass switch, and remove filter assembly (5) from the tank.

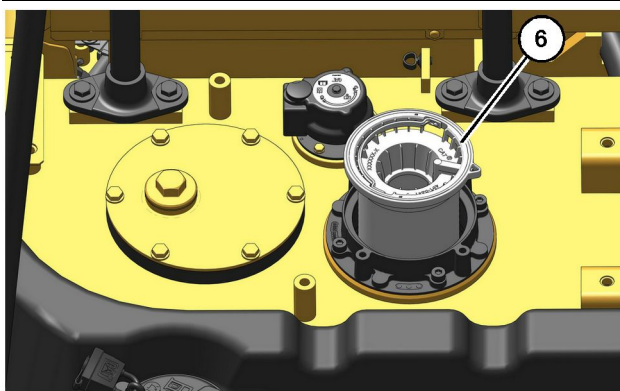


Illustration 595

g06254829

6. Remove filter element (6) and discard. Install a new element into the filter case.

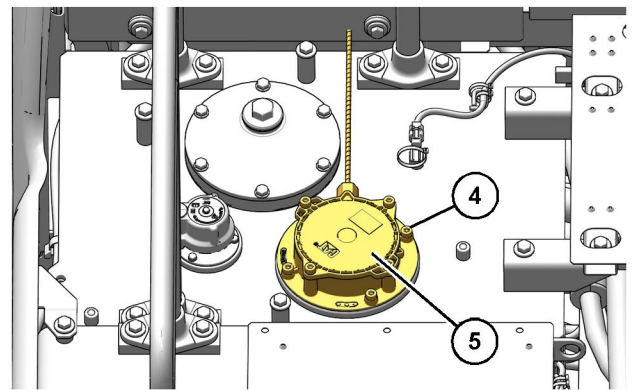


Illustration 596

g06284250

7. Place filter assembly (5) into position in the tank. Install four bolts (4) and tighten to $30 \pm 7 \text{ N}\cdot\text{m}$ ($22 \pm 5 \text{ lb}\cdot\text{ft}$). Install the harness connector on the filter bypass switch.

i07323743

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

WARNING

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

NOTICE

Never remove the fill/vent plug from the hydraulic tank if the oil is hot.

Air can enter the system and cause pump damage.

Note: In addition to an oil level gauge, your machine may be equipped with an automated function for checking fluid levels. Refer to Operation and Maintenance Manual, "Monitoring System" regarding the automated system.



Illustration 597

g06284260

The hydraulic oil tank is on the right side of the machine.

1. Park the machine on level ground. Lower the bucket to the ground with the stick in a vertical position, as shown.
2. Open the access door on the right side of the machine.

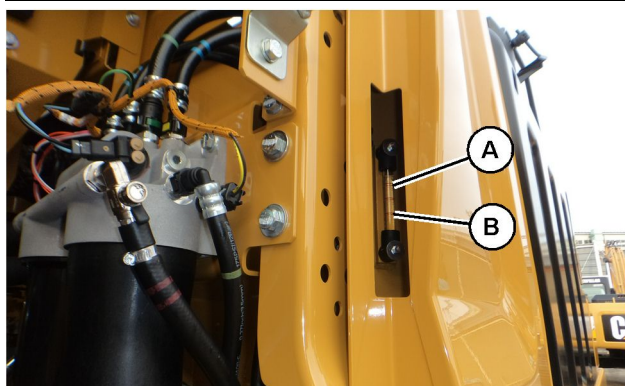


Illustration 598

g06216919

- (A) High temperature range
(B) Low temperature range

3. For a cold machine, maintain the hydraulic oil level in the low temperature range (B). For a machine that is at normal operating temperature, maintain the hydraulic oil level in the high temperature range (A).
4. Close the access door.

Note: Perform Step 5 through Step 8 if the oil level is low.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to Containing Fluid Spillage.

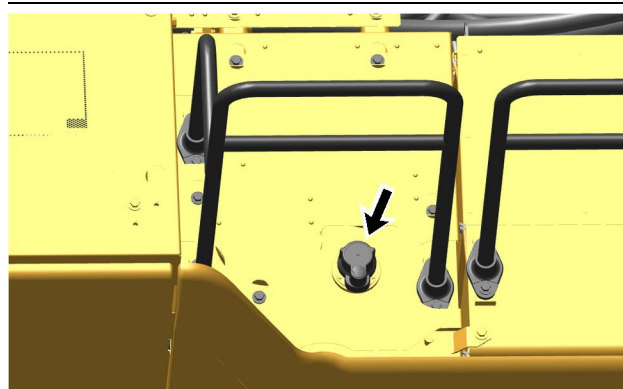


Illustration 599

g06284277

⚠ 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.

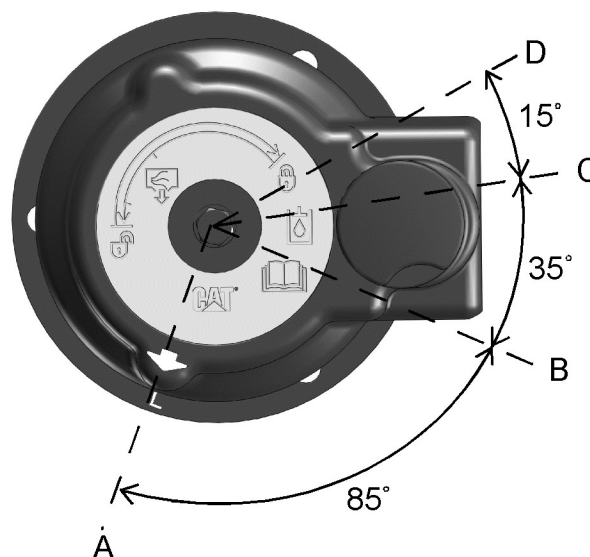


Illustration 600

g06184990

Filler cap

- (A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

5. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 600 for filler cap positions.

Maintenance Section

Hydraulic System Oil Sample - Obtain

- Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).
 - Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
 - Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).
 - The hydraulic tank pressure is relieved. Remove the filler cap.
- Add oil if necessary. See Operation and Maintenance, "Lubricant Viscosities"
 - Check the O-ring seal of the filler cap. Replace the O-ring seal if the O-ring seal is damaged.
 - Clean the filler cap. Tighten the filler cap on the hydraulic tank to position (A).

i07323802

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-008; 5095-SM; 7542-008; 7542

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 6000 hours. S·O·S services after 3,000 hour is recommended. Consult your Cat dealer for details.

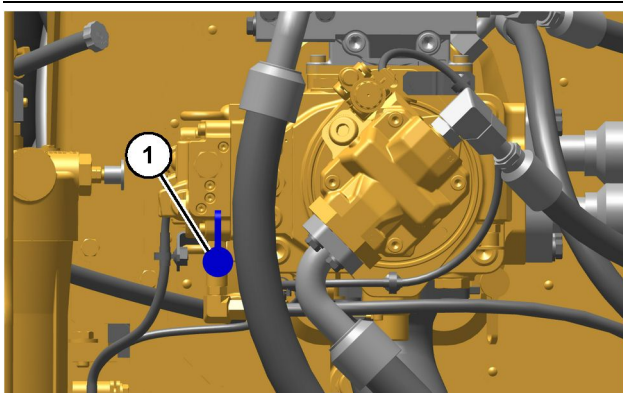


Illustration 601

g06284299

The hydraulic oil sampling valve (1) is on main hydraulic pump housing. 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.

i03753191

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

- Look for broken lenses on the gauges, broken indicator lights, broken switches, and other broken components in the cab.
- Start the engine.
- Look for inoperative gauges.
- Turn on all machine lights. Check for proper operation.
- Move the machine forward. Release the travel levers and the travel pedals. The machine should stop.
- Stop the engine.
- Make any repairs that are required before operating the machine.

i08066994

Light Emitting Diode Lamp (LED) - Replace

SMCS Code: 1434-510

- Remove the electrical power from the light emitting diode (LED) lamp.
- 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.

- Remove the bulb from the LED lamp.
- 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.
- 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.

- Reattach the electrical power to the LED lamp.
- Check the LED lamp for proper operation.

Note: Consult your Cat dealer for additional information on LED lamps.

i07833447

Oil Filter (Hydraulic Hammer) - Replace (If Equipped)

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 26 for the intervals.

Table 26

Percentage of Hammer Use	Oil Filter (Hydraulic Hammer) - Replace
50%	Every 250 service hours
100%	Every 100 service hours



Illustration 602

g06181120

1. Park the machine on level ground in the service position as shown.
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 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. Relieve pressure by slowly turning the cap until the cap reaches the secondary stop.

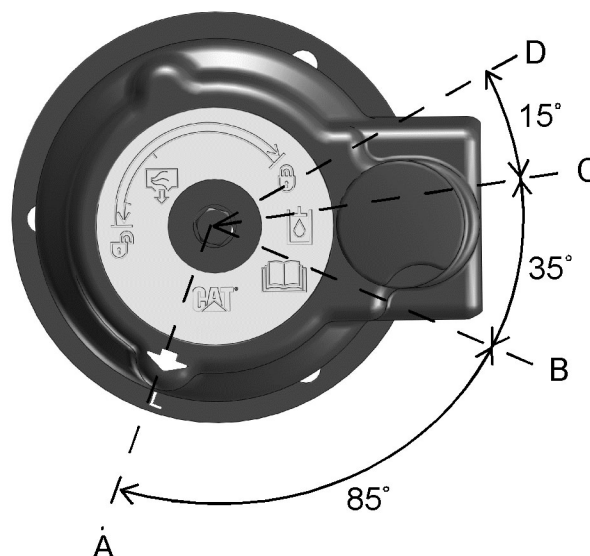


Illustration 603

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 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, remove the filler cap.
7. The oil filter for the hammer is located near the base of the boom.

Note: Some configurations may invert the hammer filter installation.

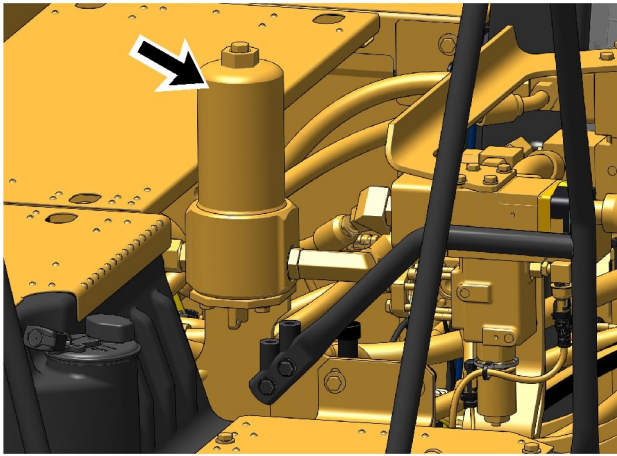


Illustration 604

g06211151

8. Position a suitable container to contain the oil.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

9. Loosen the filter housing and remove. Inspect the plug on the top of the housing. If there are signs of leakage, replace the O-ring on the plug. Tighten the plug to $59 \pm 5 \text{ N}\cdot\text{m}$ ($44 \pm 4 \text{ lb ft}$).

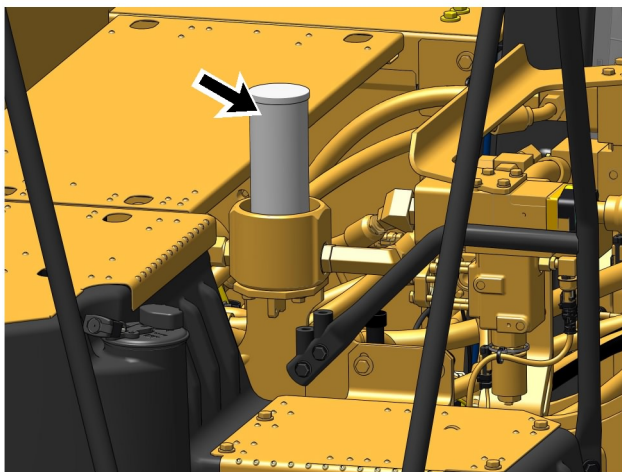


Illustration 605

g06211156

10. Remove the filter element and discard. The element cannot be reused.

Note: Used filter elements should always be disposed of according to local regulations.

11. Install the new filter element.
12. Clean the filter housing and install on the filter base. Tighten the nut on the filter case to $98 \pm 10 \text{ N}\cdot\text{m}$ ($72 \pm 7 \text{ lb ft}$).
13. Start the engine and operate the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles and operate the hammer.
14. Return the machine to the service position. Check the machine for oil leaks.
15. Stop the engine.
16. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

i07349186

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris



Illustration 606

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.

i07326813

Pump Coupling Oil - Change

SMCS Code: 5062-044

WARNING

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

Note: If the machine is parked on an incline or the engine has been stopped for a short time, the oil in the pump coupling will not return to the housing. Park the machine on level ground and drain the oil after the engine has been stopped for at least 15 minutes.

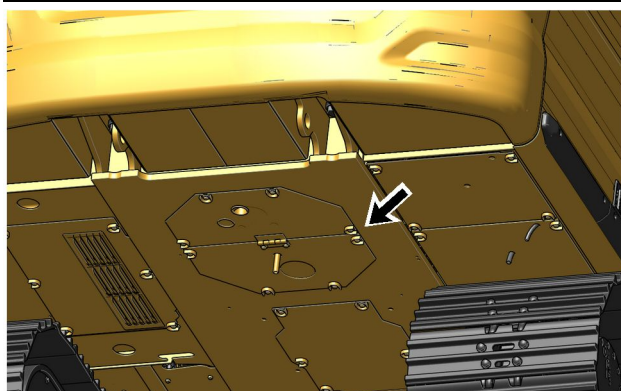


Illustration 607

g06284414

1. Remove the cover plates to gain access to the drain plug.

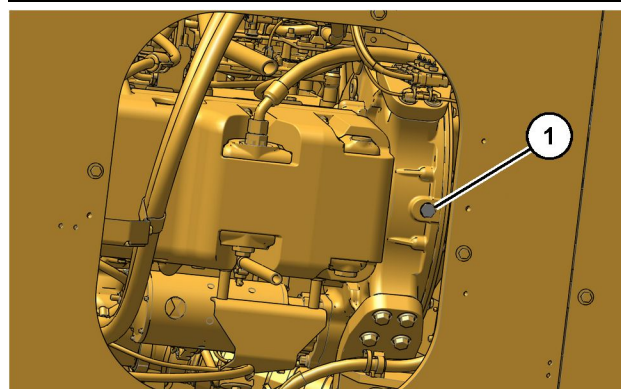


Illustration 608

g06284420

(1) Oil drain plug

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

2. Remove drain plug (1). Allow the oil to drain into a suitable container.
3. Clean the drain plug and inspect the O-ring seal. If wear or damage is evident, replace the drain plug and/or the O-ring seal.
4. Install drain plug (1).
5. Open the access door on the right side of the machine.

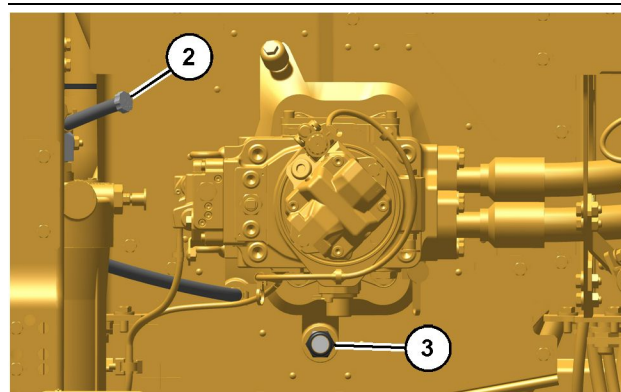


Illustration 609

g06284424

(2) Oil fill cap
(3) Sight gauge

NOTICE

Do not overfill the housing for the pump coupling. Overfilling will cause the engine oil to overheat and engine damage can result.

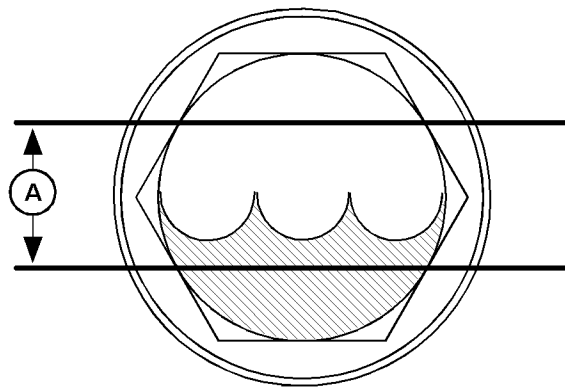


Illustration 610

g03208836

Sight Gauge

6. Remove fill cap (2). Fill the housing with new oil to area (A) of sight gauge (3). See Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".
7. Clean and install the fill cap.
8. Check for leaks.
9. Close the access door on the right side of the machine.
10. Install the cover plate.

i07327147

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.

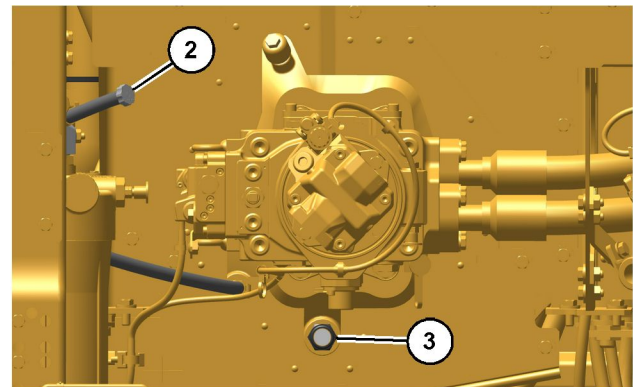


Illustration 611

g06284424

- (2) Oil fill cap
 (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.

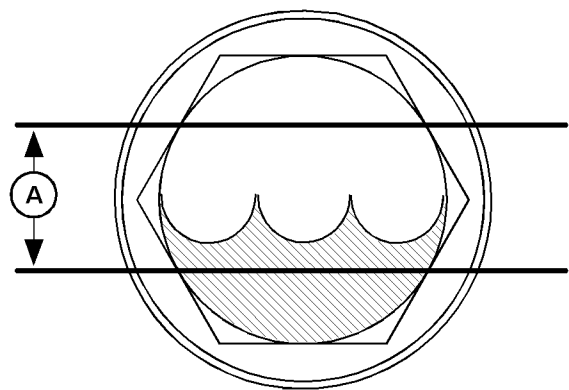


Illustration 612

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 cause the engine oil to overheat and engine damage can result.

3. Remove oil fill cap (2) and fill to the recommended oil level.

4. Clean and install the oil fill cap (2).
5. Close the right side access door.

i07348844

Radiator, Aftercooler and Oil Cooler Cores - Clean

SMCS Code: 1063-070-KO; 1353-070-KO; 1374-070-KO

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

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

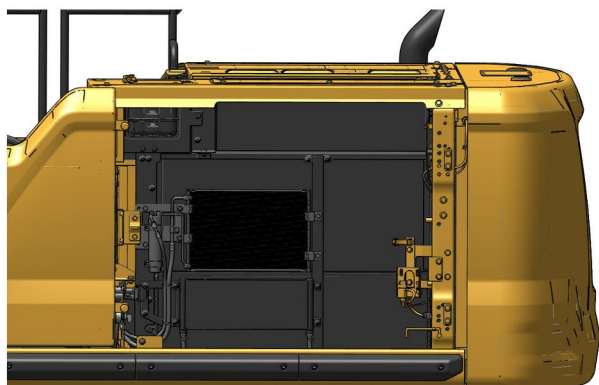


Illustration 613

g06289706

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 access doors.

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.

i07349192

i07103309

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040



Illustration 614

g06184357

Consult your Cat dealer for repair of any cracks in the ROPS.

Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only. Tighten the M24 bolt (1) to $425 \pm 50 \text{ N}\cdot\text{m}$ ($315 \pm 40 \text{ lb ft}$).

Note: Apply oil to all ROPS bolt threads before you install the bolts. Failure to apply oil to the bolt threads can result in improper bolt torque.

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"

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.

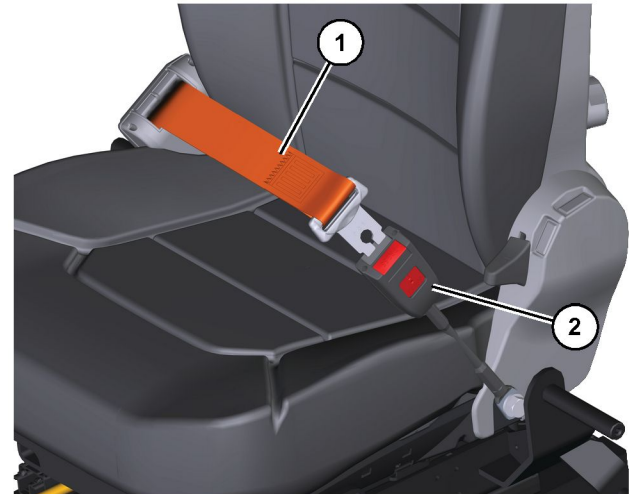


Illustration 615

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).

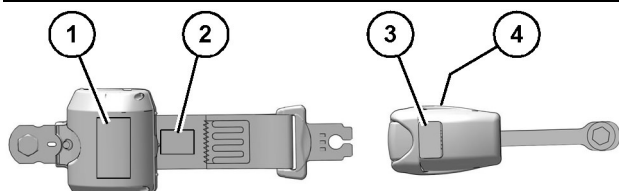


Illustration 616

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.

i07327814

Swing Bearing - Lubricate

SMCS Code: 7063-086

Note: Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on 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 bearing.



Illustration 617

g06285449

The swing bearing grease zerks are at the front of the swing drive housing near the boom cylinders.

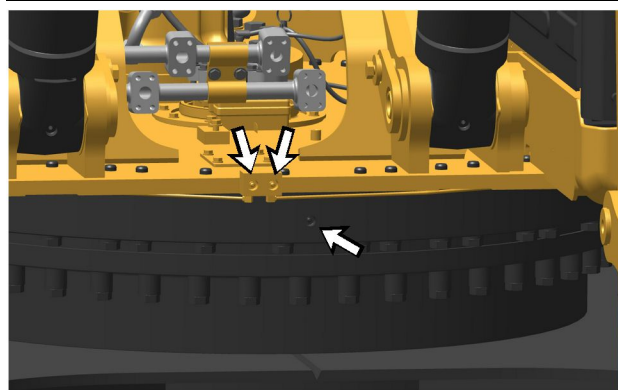


Illustration 618

g06285452

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

i07349047

Swing Drive Oil - Change

SMCS Code: 5459-044



WARNING

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

Maintenance Section
Swing Drive Oil - Change



Illustration 619

g06289887

1. Remove the access cover that is located below the swing drives.

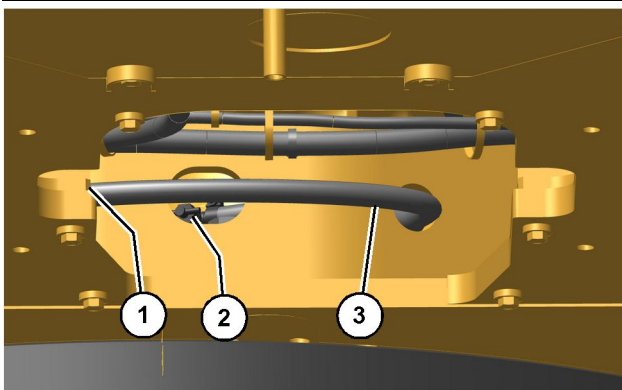


Illustration 620

g06289893

Note: Refer to Operation and Maintenance Manual, “General Hazard Information” for information that pertains to Containing Fluid Spillage.

2. Remove drain hose (3) from holder (1) on the upper frame. Face the end of the hose toward the container.
3. Loosen drain valve (2). Drain the oil into a suitable container.

Note: Drained fluids should be disposed of according to local regulations.

4. Tighten the drain valve. Return the drain hose to holder (1). Make sure that the end of the hose is facing upward.

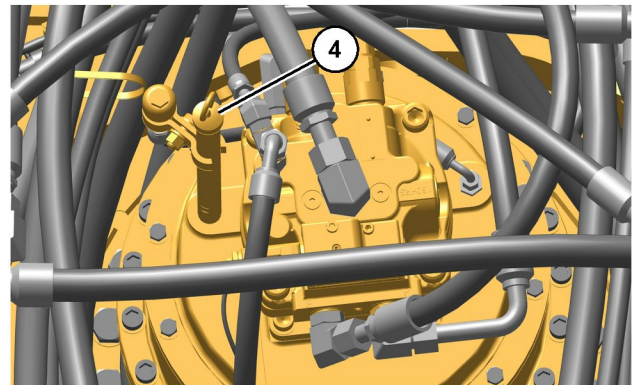


Illustration 621

g06289903

5. Remove dipstick (4).
6. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, “Capacities (Refill)”.

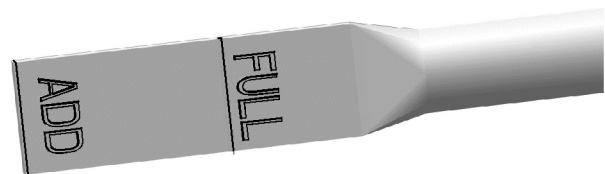


Illustration 622

g06188660

7. Maintain the oil level between the “ADD” and “FULL” marks on the dipstick.
8. 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.
9. Drained materials should be disposed of according to local regulations.

i07349063

Swing Drive Oil Level - Check

SMCS Code: 5459-535-FLV

WARNING

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



Illustration 623

g06289912

The dipstick for the swing drive oil is on the swing drive at the rear base of the boom.

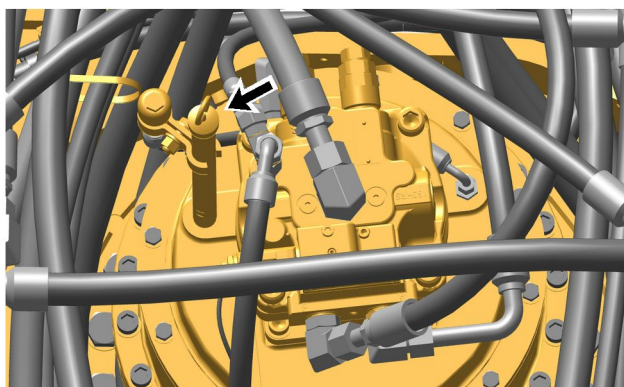


Illustration 624

g06289915

1. Remove the dipstick.

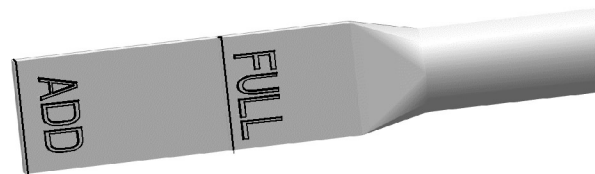


Illustration 625

g06188660

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 "ADD" and "FULL" marks on the dipstick. Add oil through the dipstick tube, if necessary. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" when you select an oil. If the oil level is above the "FULL" line, then remove oil from the system. Restore the oil to the correct level position.
3. Insert the dipstick.

i07349071

Swing Drive Oil Sample - Obtain

SMCS Code: 5459-554-OC; 5459-008; 5459-008-OC; 5459-OC; 7542-008

WARNING

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

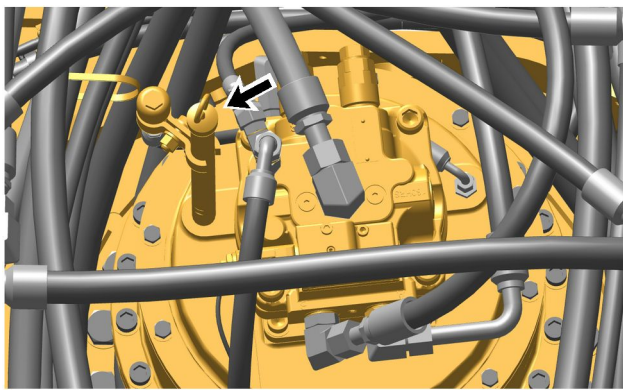


Illustration 626

g06289915

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.

i06988169

Swing Gear - Lubricate

SMCS Code: 7063-086

Note: Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on grease.

NOTICE

Improper lubrication can cause damage to machine components.

To avoid damage, make sure that the proper amount of grease is applied to the swing drive.

When the amount of grease in the compartment becomes too large, the agitation loss becomes large, thereby accelerating grease deterioration.

Grease deterioration can cause damage to the pinion gear of the swing drive and swing internal gear.

Not enough grease will result in poor gear lubrication.

Remove the inspection cover that is located near the boom base. Inspect the grease.

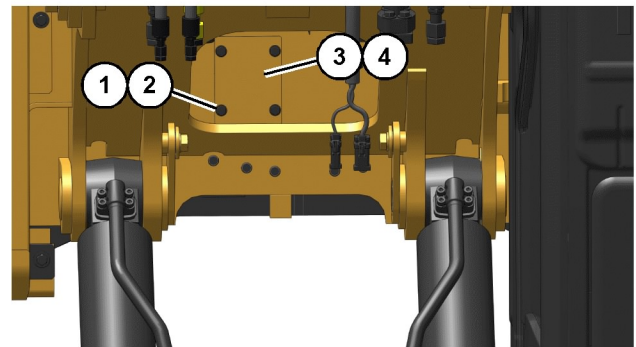


Illustration 627

g06188728

- (1) Bolts
- (2) Washers
- (3) Cover
- (4) Gasket

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).
2. Inspect gasket (4). Replace the gasket if damage is evident.

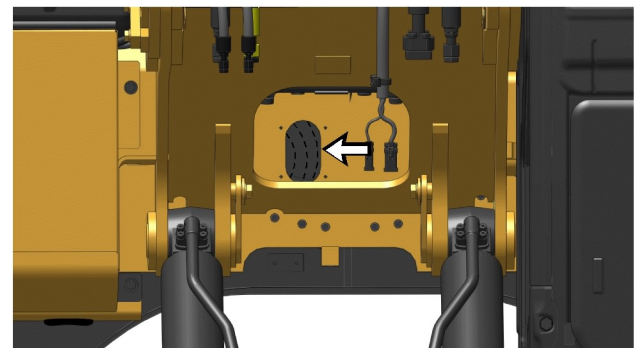


Illustration 628

g06188736

3. Check the level of grease. The level of grease is correct when:
 - Waves of grease are present from the rotating swing drive pinion.
 - The grease is evenly distributed on the floor of the pan.

Note: Smeared or waveless areas are evidence for a lack of grease.

Note: Add grease, as needed. Remove grease, as needed. Too much grease will result in the deterioration of the grease because of excessive movement of the grease. Too little grease will result in poor lubrication of the swing gear.

Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the size of the pan.

i06988628

4. Check for contamination and for discolored grease.

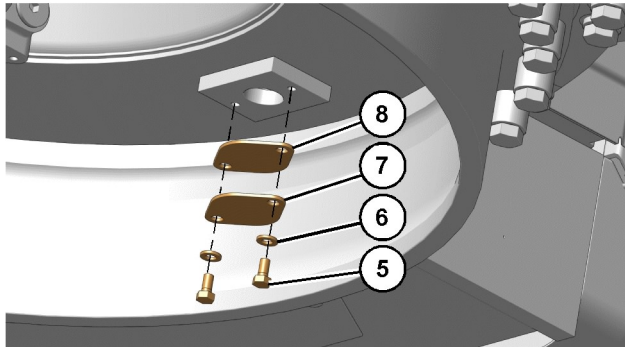


Illustration 629

g06188788

- (5) Bolts
- (6) Washers
- (7) Cover
- (8) Gasket

5. If the grease is contaminated or discolored with water, change the grease. Remove the covers from below the swing drive underneath the undercarriage frame.
6. Remove bolts (5), washers (6), cover (7), and gasket (8) to allow the water to drain. When you reinstall cover (7), inspect gasket (8). Replace the gasket if damage is evident.

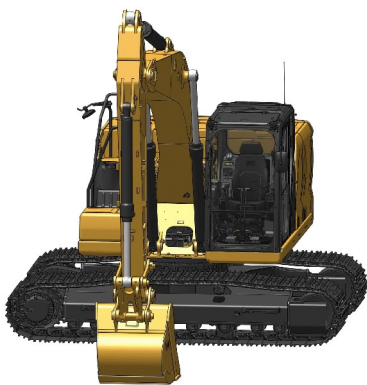


Illustration 630

g06188791

7. Raise the boom and turn the upper structure by 1/4 turn. Lower the bucket to the ground.
8. Repeat Step 7 at every 1/4 turn in four places. Add grease, as needed.
9. Install gasket (4), cover (3), washers (2), and bolts (1).

Track Adjustment - Adjust

SMCS Code: 4170-025

WARNING

Personal injury or death can result from grease under pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve one turn only.

If track does not loosen, close the relief valve and contact your Caterpillar dealer.

NOTICE

Keeping the track properly adjusted will increase the service life of the track and drive components.

Note: The track tension must be adjusted according to the current operating conditions. Keep the track as slack as possible if the soil is heavy.

Measuring Track Tension

1. Operate the machine in the direction of the idlers.

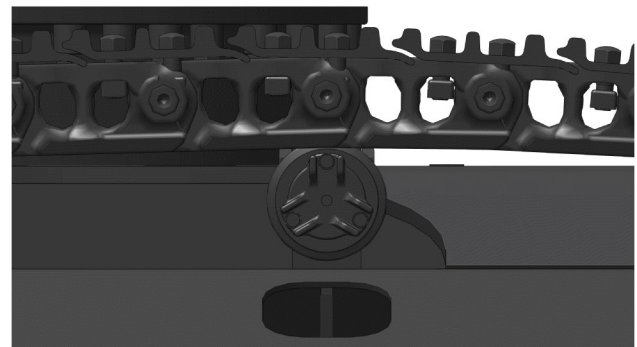


Illustration 631

g06188816

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.



Illustration 632

g06208711

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 633

g06188820

Typical example

The track adjuster is located on the track frame.

Tightening the Track

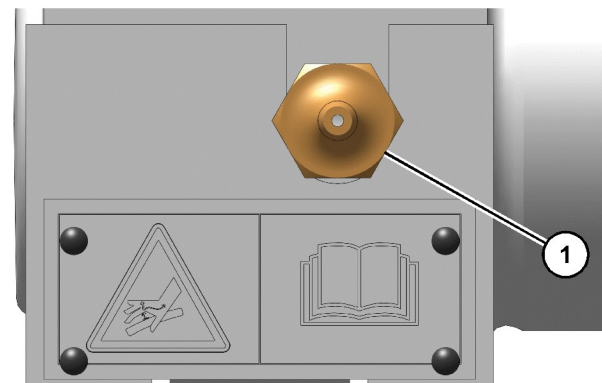


Illustration 634

g06188830

(1) Grease valve

Wipe the fitting before you add grease.

1. Add grease through grease valve (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

i06954313



Illustration 635

g06188830

(1) Grease valve

1. Loosen grease valve (1) carefully until the track begins to loosen. One turn should be the maximum.
2. Tighten grease valve (1) to $34 \pm 5 \text{ N}\cdot\text{m}$ ($25 \pm 4 \text{ lb ft}$) 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.

i06969791

Track Adjustment - Inspect

SMCS Code: 4170-040

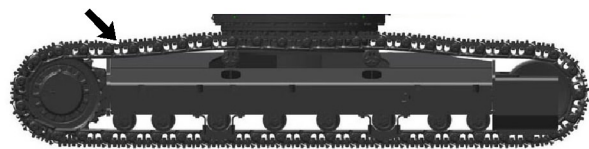


Illustration 636

g06182929

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

If the track appears to be too tight or too loose, refer to Operation and Maintenance Manual, "Track Adjustment - Adjust".

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.

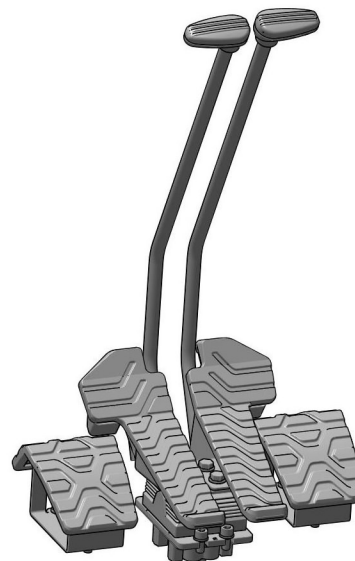


Illustration 637

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.

i08233399



Illustration 638

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.

Undercarriage - Check

SMCS Code: 4150-535

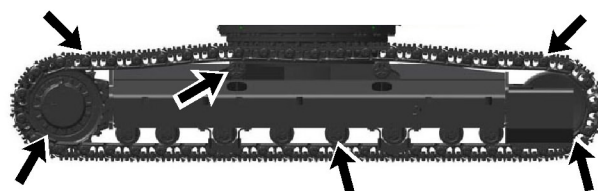


Illustration 639

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.

i06954326

i01258249

Window Washer Reservoir - Fill

SMCS Code: 7306-544-KE

NOTICE

When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.



Illustration 640

g06181546

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

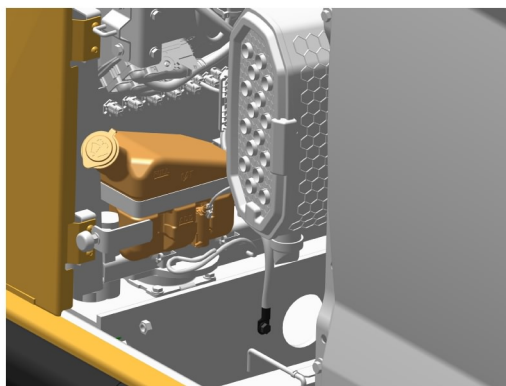


Illustration 641

g06181644

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.

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 642

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

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.
- b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).
- b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.
- b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

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: _____

	<u>Dealer Contact</u>	<u>Phone Number</u>	<u>Hours</u>
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____

