



Operation and Maintenance Manual

374F Excavator

EBF 1-UP (374F)
DNM 1-UP (374F)
XWL 1-UP (374F)

Important Safety Information

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

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

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

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

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



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

NOTICE

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

Other parts may not meet certain original equipment specifications.

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

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

Table of Contents

Foreword	5

Safety Section

Safety Messages	7
Additional Messages	19
General Hazard Information.....	27
Crushing Prevention and Cutting Prevention..	29
Burn Prevention.....	30
Fire Prevention and Explosion Prevention.....	31
Fire Safety	34
Fire Extinguisher Location.....	35
Track Information	35
High Pressure Fuel Lines	35
Electrical Storm Injury Prevention	36
Before Starting Engine	36
Visibility Information	36
Restricted Visibility	37
Engine Starting.....	39
Before Operation	39
Work Tools.....	39
Operation.....	40
Engine Stopping	43
Lifting Objects.....	43
Parking	43
Slope Operation	44
Equipment Lowering with Engine Stopped	45

Sound Information and Vibration Information .	45

Operator Station	48

Guards (Operator Protection)	48

Product Information Section

General Information	50

Identification Information	89

Operation Section

Before Operation	93

Machine Operation	95

Engine Starting.....	194

Operation.....	198

Operating Techniques	202

Parking	222

Transportation Information	226

Towing Information	247

Engine Starting (Alternate Methods).....	251

Maintenance Section

Maintenance Access	254

Lubricant Viscosities and Refill Capacities ...	256

Maintenance Support	266

Maintenance Interval Schedule.....	273

Warranty Section

Warranty Information	351

Reference Information Section

Reference Materials	352

Index Section

Index.....	353

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 ***

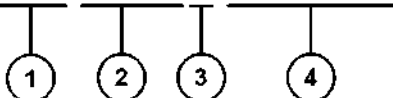


Illustration 1

g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i08022368

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 Caterpillar dealer can provide new safety messages.

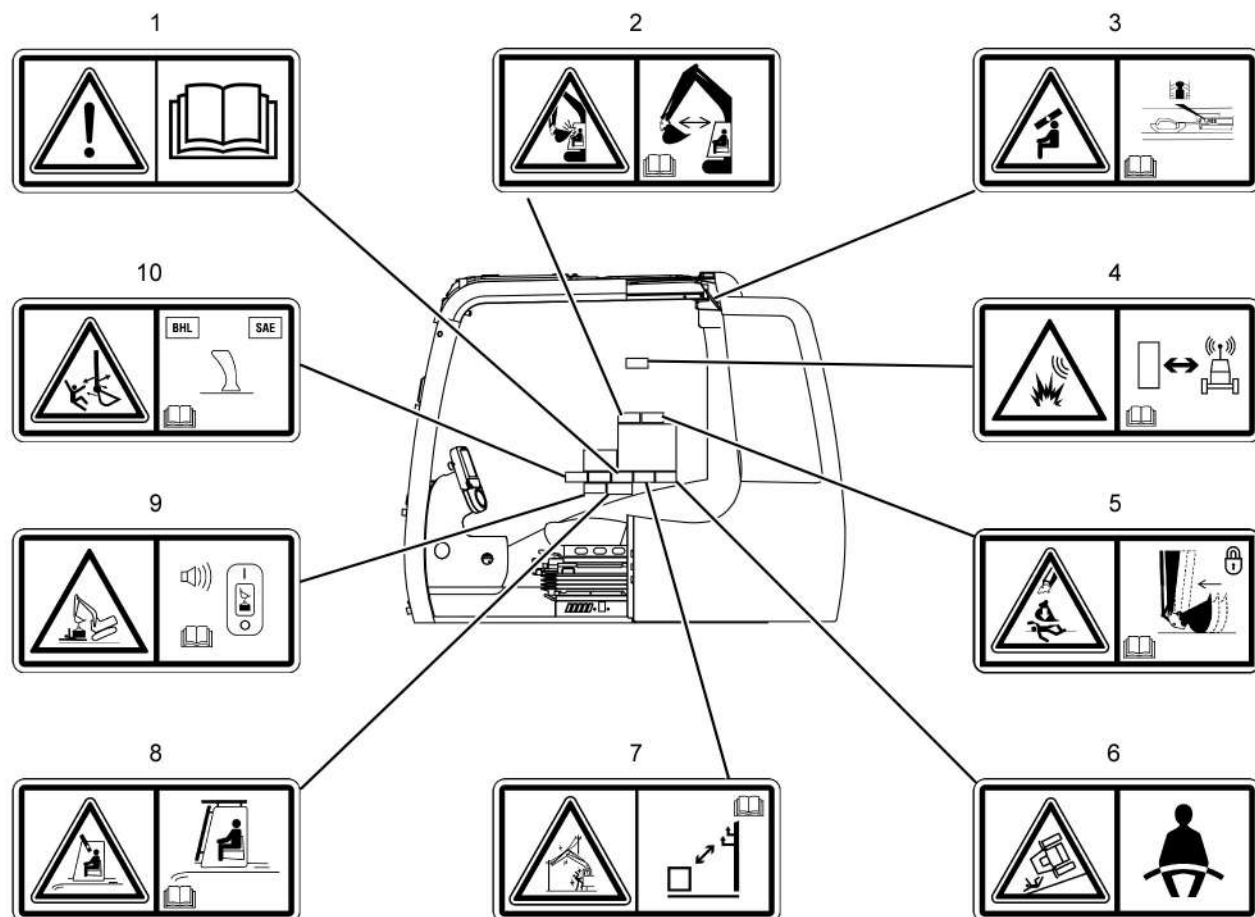


Illustration 2

g01618205

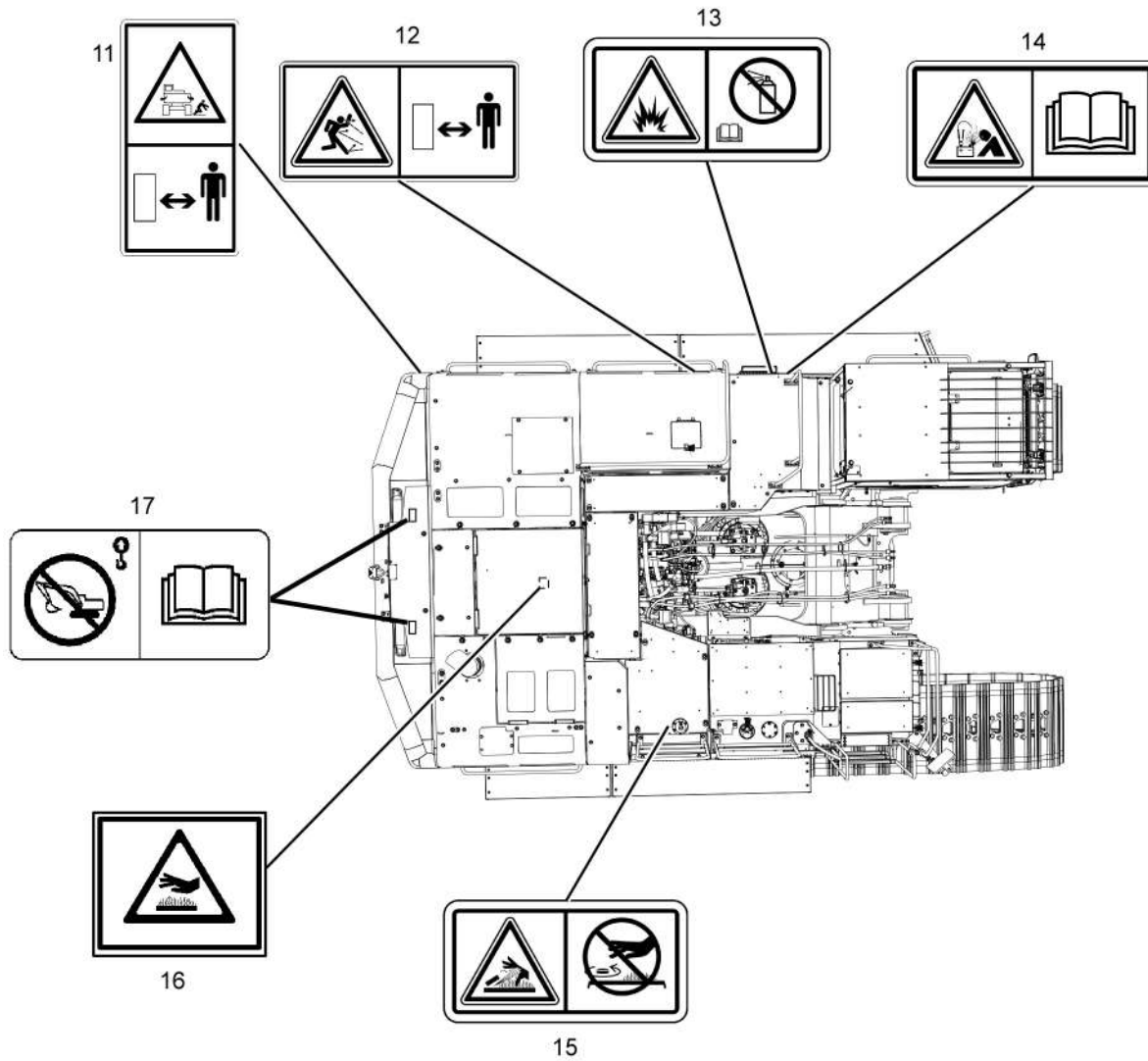


Illustration 3

g03567280

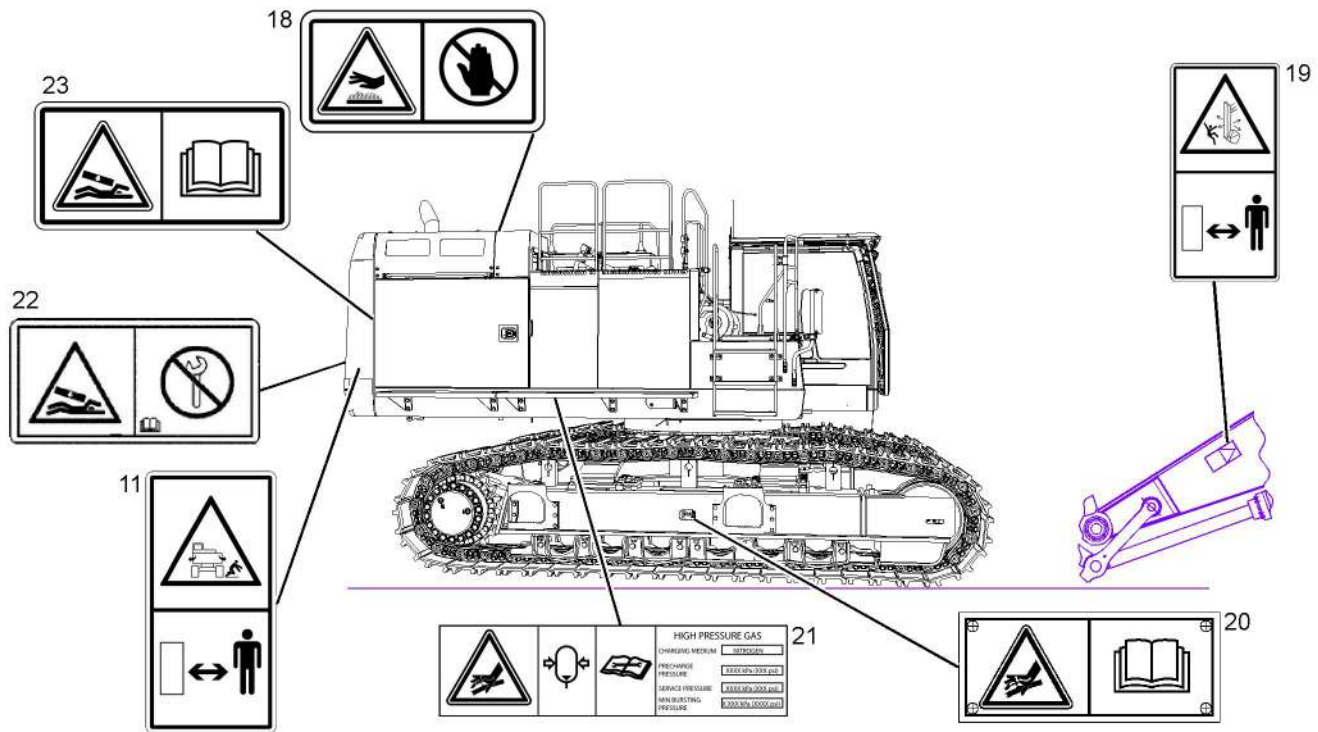


Illustration 4

g06510953

Do Not Operate (1)

This safety message is located in the cab on the right side window, and on the back top side of the counterweight.



Illustration 5

g01370904

WARNING

Do not operate or work on this equipment 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 Cat dealer for replacement manuals. Proper care is your responsibility.

Crushing Hazard (2)

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



Illustration 6

g01373971

WARNING

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

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

Crushing Hazard (3)

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



Illustration 7

g01373978

WARNING

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

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

Product Link (4)

If equipped, this safety message is positioned in the cab.

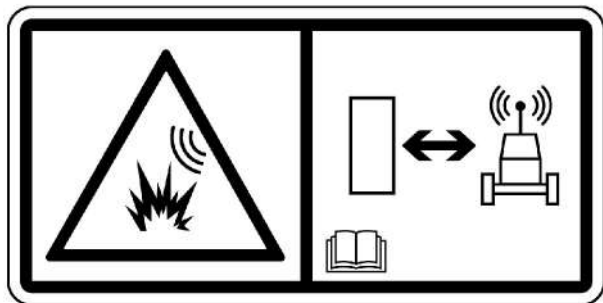


Illustration 8

g01370917

WARNING

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

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

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

Crushing Injury (5)

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



Illustration 9

g01374035

WARNING

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

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

Seat Belt (6)

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



Illustration 10

g01370908

WARNING

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

Electrical Power Lines (7)

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

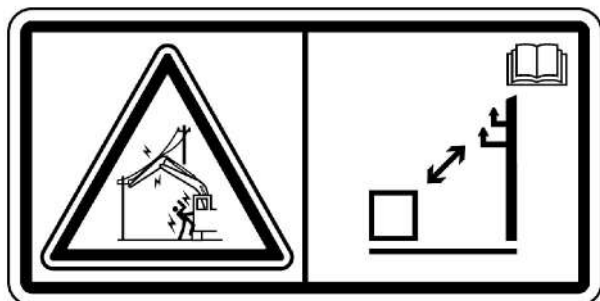


Illustration 11

g01374045

DANGER

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

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

Crushing Hazard (8)

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



Illustration 12

g01374048

WARNING

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

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

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

Overload Warning Device (9) (If Equipped)

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

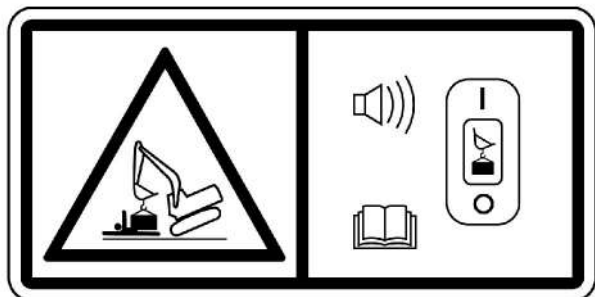


Illustration 13

g01602013

WARNING

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

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

Joystick Controls Alternate Patterns (10)

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



Illustration 14

g01374050

WARNING

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

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

Crushing Hazard (11)

This safety message is also on each side of the counterweight.



Illustration 15

g03610418

WARNING

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

Flying Debris (12)

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

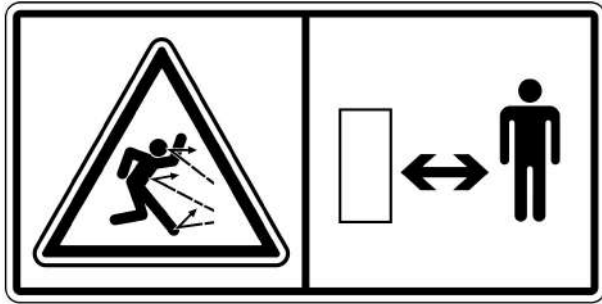


Illustration 16

g01404266

WARNING

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

Aerosol Starting Aid (13)

This safety message is on the bracket that supports the air cleaner housing.



Illustration 17

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 further information.

Jump-Start Cables (14)

This safety message is positioned on the circuit breaker panel.

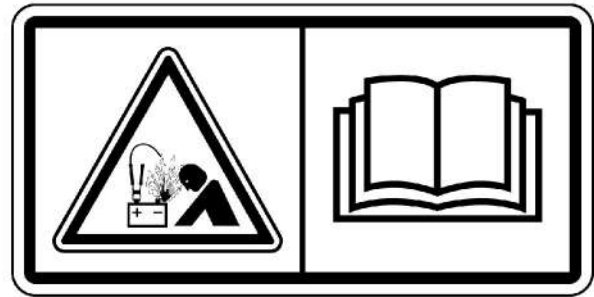


Illustration 18

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.

Relieve Hydraulic Tank Pressure (15)

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



Illustration 19

g01371640

⚠ WARNING

HYDRAULIC TANK

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

Hot Surface (16)

This safety message is located under the engine hood.



Illustration 20

g03610688

⚠ WARNING

Hot parts or hot components can cause burns or personal injury. Do not allow hot parts or components to contact your skin. Use protective clothing or protective equipment to protect your skin.

Lifting Restriction/Counterweight Only (17)

This safety message is on top of the counterweight.

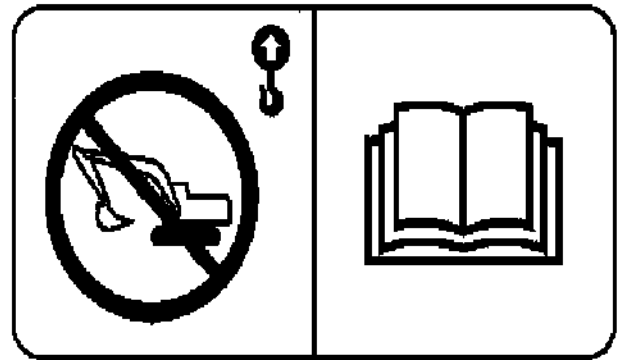


Illustration 21

g03481698

⚠ WARNING

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

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

Hot Surface (18)

This safety message is on the engine hood.



Illustration 22

g01372256

⚠ WARNING

Hot parts or hot components can cause burns or personal injury. Do not allow hot parts or components to contact your skin. Use protective clothing or protective equipment to protect your skin.

Crushing Hazard (19)

This safety message is on both sides of the stick.

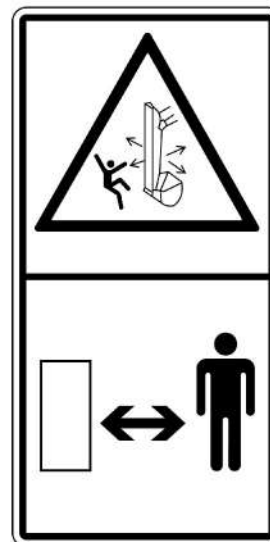


Illustration 23

g01385579

⚠ WARNING

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

High-Pressure Cylinder (20)

This safety message is positioned on the track adjusters.

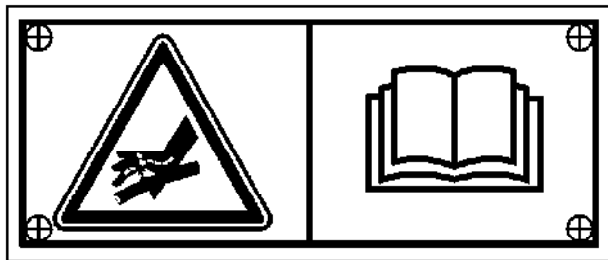


Illustration 24

g01076729

WARNING

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

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

High-Pressure Gas (21)

This safety message is on the accumulator.

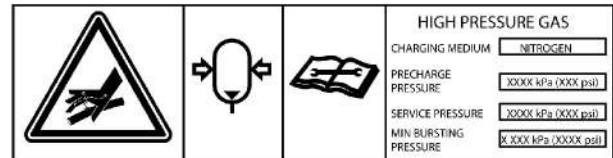


Illustration 25

g01374065

WARNING

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

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

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

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

Crushing Hazard (22)

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

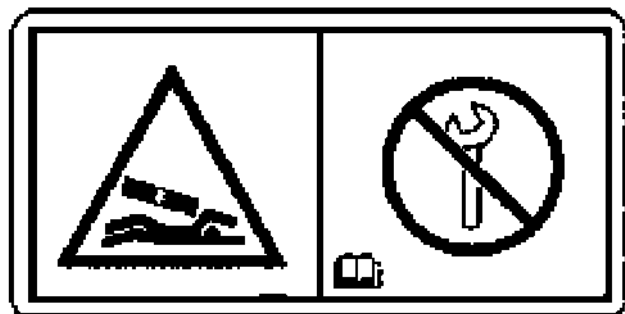


Illustration 26

g06509709

⚠ WARNING

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

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

Crushing Hazard (Counterweight) (23)

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

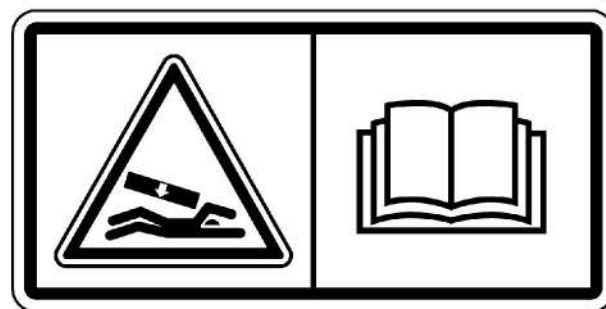


Illustration 27

g01435553

⚠ WARNING

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

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

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

i06893630

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 messages are reviewed in this section. Become familiarized 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 Caterpillar dealer can provide new messages.

Safety Section
Additional Messages

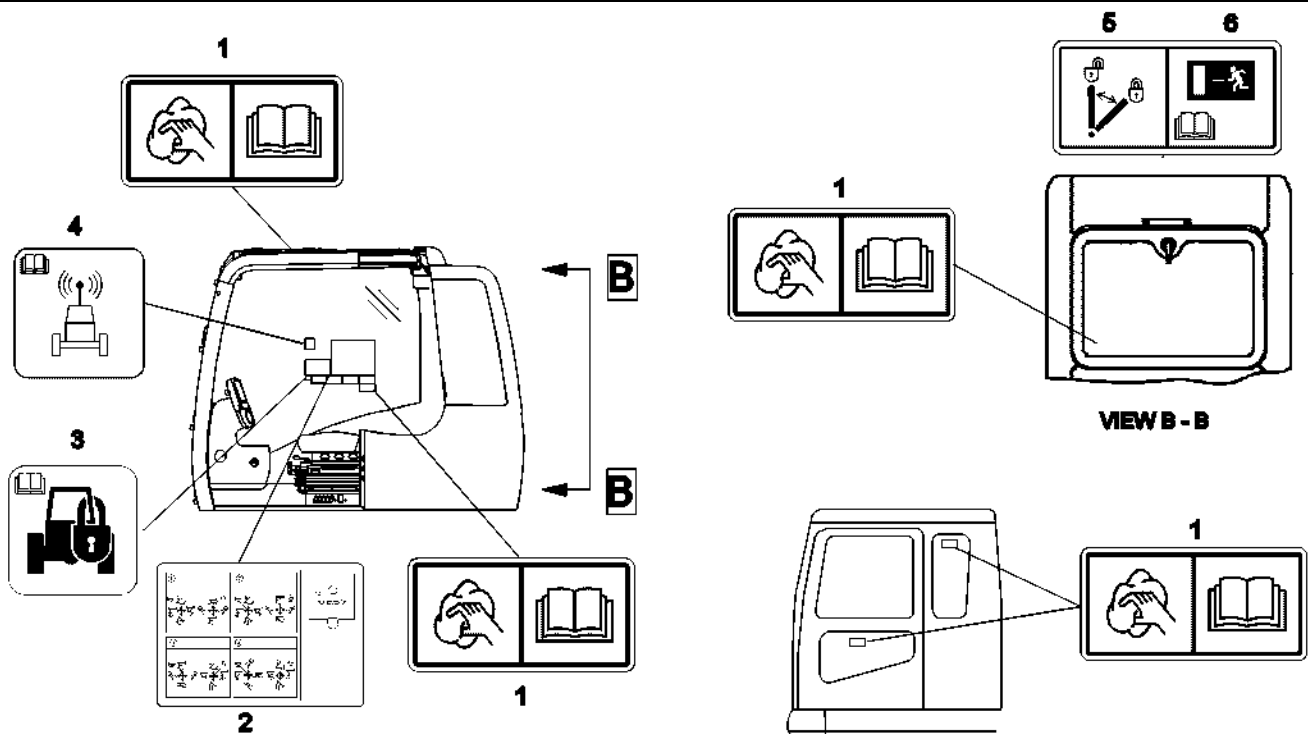


Illustration 28

g03268719

Additional messages inside cab (if equipped)

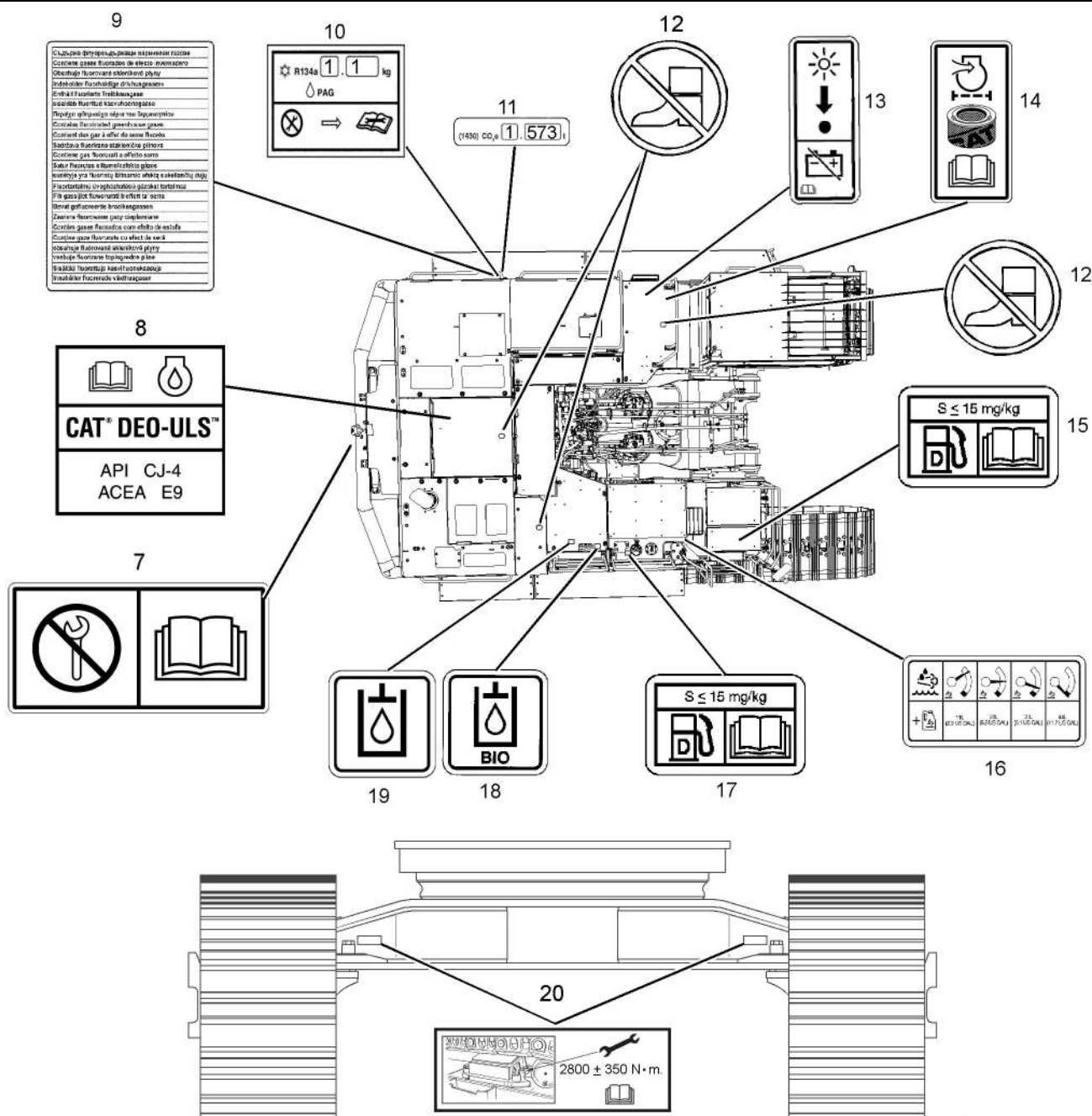


Illustration 29

g06158337

Clean the Windows (1)

This message is located in the cab on the polycarbonate windows.

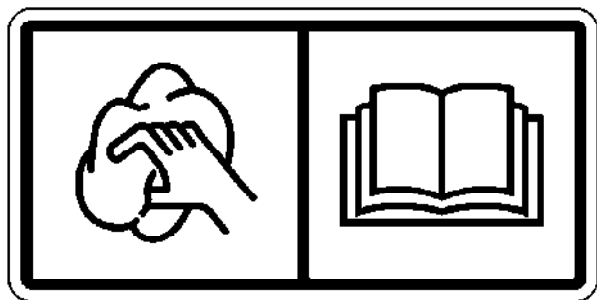


Illustration 30

g01069071

NOTICE

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

See Operation and Maintenance Manual, “Windows - Clean” for instructions on cleaning polycarbonate windows.

Refer to Operation and Maintenance Manual, “Windows - Check” for information on the maintenance of polycarbonate windows.

Joystick Controls Alternate Patterns (2)

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

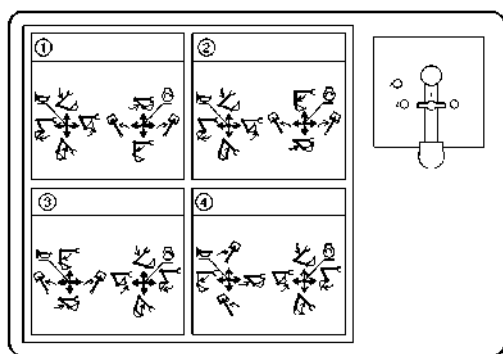


Illustration 31

g03094696

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

Machine Security System (3)

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



Illustration 32

g01396277

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

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

Data Privacy (4)

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



Illustration 33

g01418953

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

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

Alternate Exit Lock/Unlock (5)

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

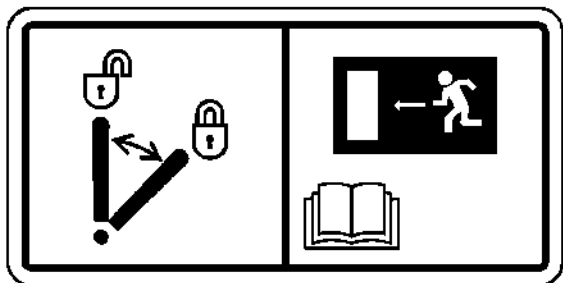


Illustration 34

g01353053

NOTICE

Unlock alternate exit window during machine operations.

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

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

Alternate Exit (6)

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

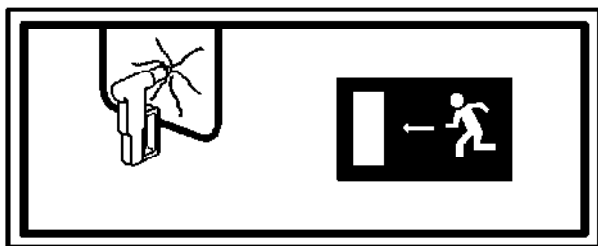


Illustration 35

g01069768

If the primary exits are blocked, use the hammer to break the glass. Exit the machine through the window opening.

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

Counterweight (7)

This message is located underneath the cover on the counterweight.

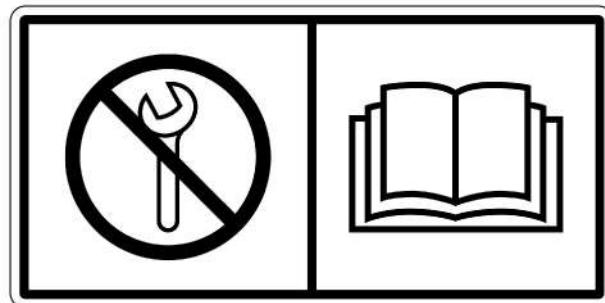


Illustration 36

g01435946

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

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

Engine Oil (8)

This message is on the engine oil fill, at the middle of the machine.

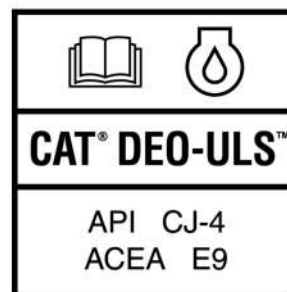


Illustration 37

g02448560

Cat DEO-ULS oils and oils that satisfy the "API CJ-4" and/or "ACEA E9" requirements are required for engines that are equipped with a diesel particulate filter and certified for U.S. EPA Tier 4.

Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for more information.

Air Conditioner (9), (10), (11)

These messages are positioned on the pillar between left rear access panel and left middle access panel.

Safety Section

Additional Messages

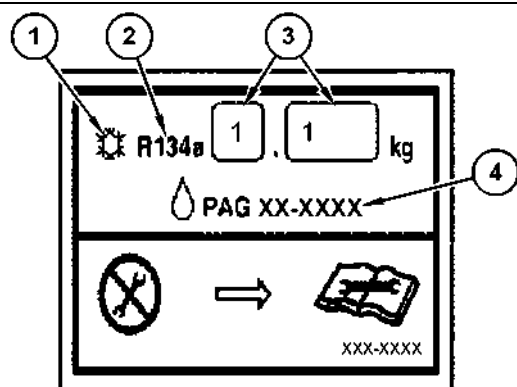


Illustration 38

g06158340

- (1) Air Conditioning Symbol
- (2) R134a (Refrigerant type common name)
- (3) The system contains 1.1 kg of refrigerant.
- (4) The lubricating oil type for this system is PAG (polyalkylene glycol)

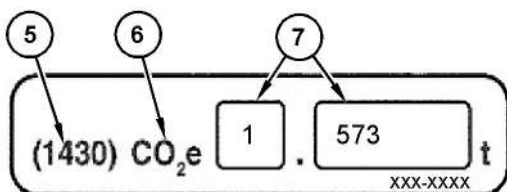


Illustration 39

g06158344

If equipped

- (5) This is the Global warming potential of R134a
- (6) CO2 equivalent
- (7) System contains 1.573 metric tonne of CO2

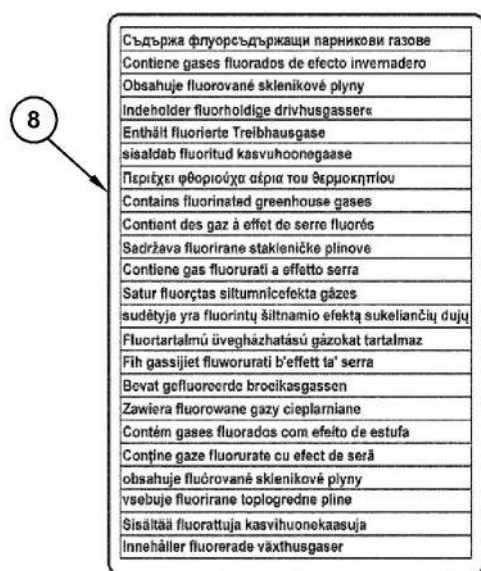


Illustration 40

g06155418

If equipped

- (8) Translations (Contains fluorinated greenhouse gases)

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.

Do not service the air conditioner system before reading the service manual.

No Step (12)

This message is on the engine hood and near the hydraulic tank. This message is also on the left side of the machine behind the cab.

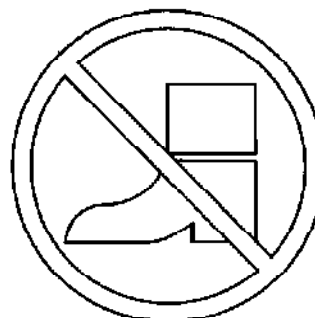


Illustration 41

g00911158

Wait to Disconnect Lamp (13)

This notice is located next to the battery disconnect switch.

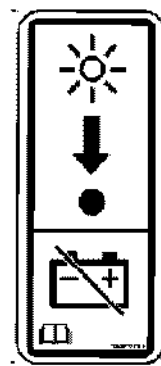


Illustration 42

g03380714

NOTICE

Do not turn the battery power disconnect switch off until indicator lamp has turned off. If the switch is turned off when the light is illuminated then the DEF system will not purge and DEF could freeze and cause damage to the pump and lines.

Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" for more information.

Radial Air Cleaner (14)

This message is on the cover of the air cleaner.

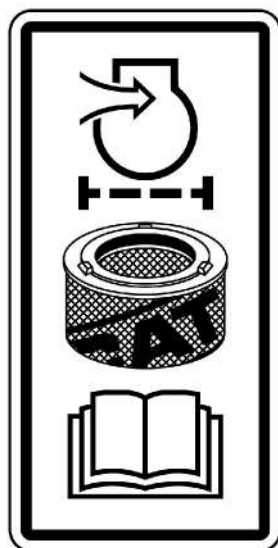


Illustration 43

g01134494

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

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

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

Diesel Engine Fuel (15)

This Message is on the right side of the machine next to the refueling pump (if equipped).

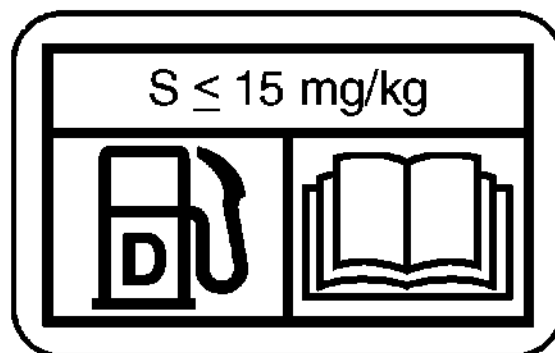


Illustration 44

g02052934

Diesel Exhaust Fluid Fill (16)

This message is on the right side of the machine near the storage box.

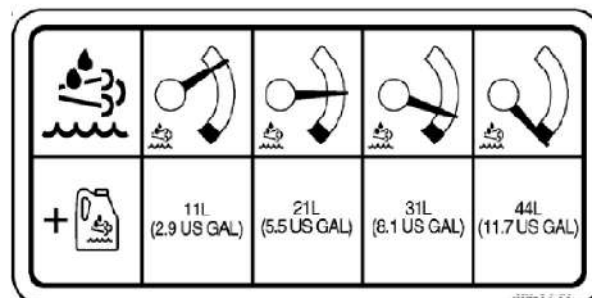


Illustration 45

g03621698

Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Diesel Exhaust Fluid - Fill" for more information.

Diesel Fuel Requirements (17)

This message is located by the fuel tank.

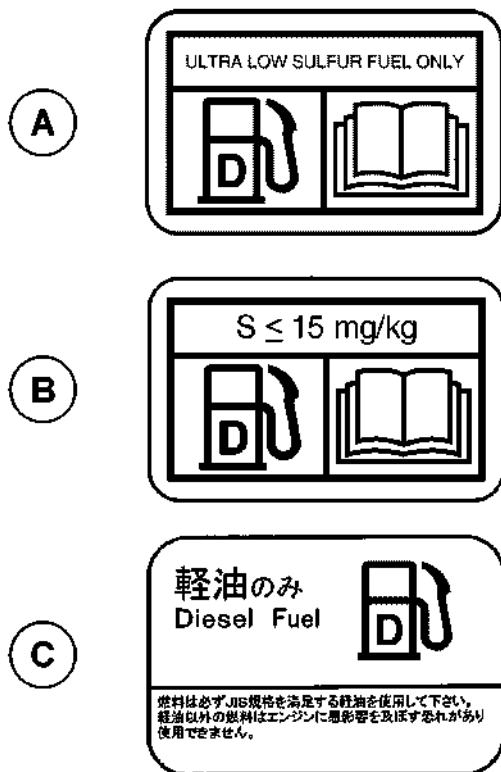


Illustration 46

g03218956

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

Refer to Operation and Maintenance Manual,
"Lubricant Viscosities" for more information.

Oil Biodegradable (18)

This message is on the left side of the machine by the fuel tank.

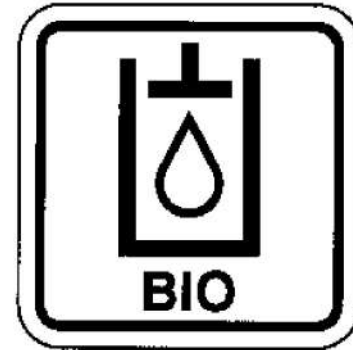


Illustration 47

g03621717

Refer to Operation and Maintenance Manual,
"Lubricant Viscosities" for more information about the oil.

Hydraulic Oil (19)

This message is on the left side of the machine by the fuel tank.



Illustration 48

g03621736

Refer to Operation and Maintenance Manual,
"Lubricant Viscosities" for more information about the oil.

Adjustable Gauge Undercarriage Frame (20)

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

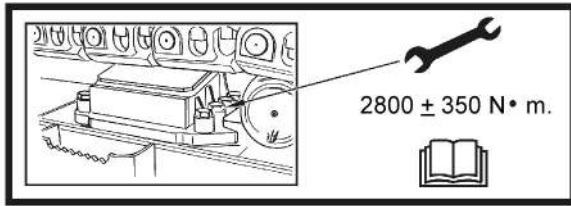


Illustration 49

g03392413

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

i07746355

General Hazard Information

SMCS Code: 7000

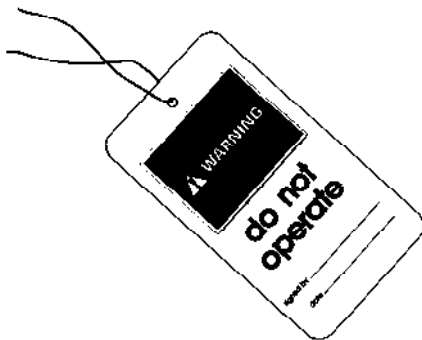


Illustration 50

g00104545

Typical example

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

WARNING

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

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

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

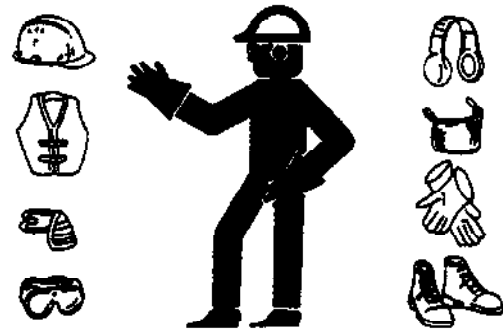


Illustration 51

g00702020

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

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

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

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

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

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

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

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

Obey all local regulations for the disposal of liquids.

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

Do not allow unauthorized personnel on the equipment.

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

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

Pressurized Air and Water

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

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

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

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

Trapped Pressure

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

Fluid Penetration

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

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

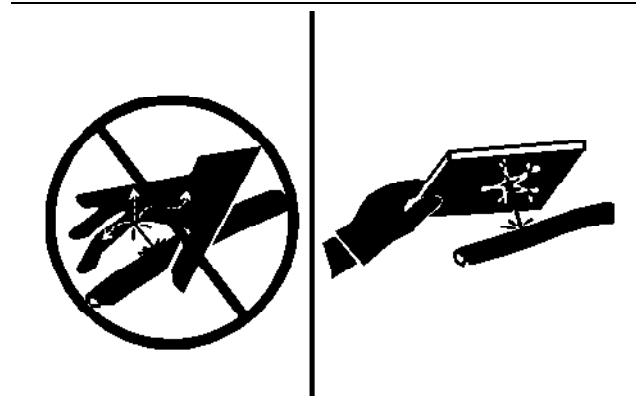


Illustration 52

g00687600

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

Containing Fluid Spillage

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

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

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

Obey all local regulations for the disposal of liquids.

Inhalation

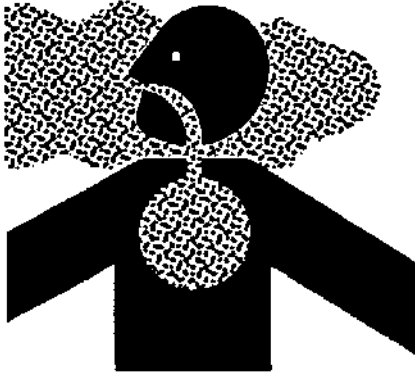


Illustration 53

g02159053

Exhaust

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

Asbestos Information

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

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

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

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

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

Dispose of Waste Properly

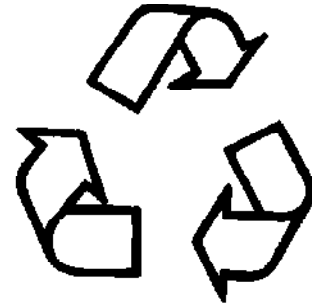


Illustration 54

g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07746334

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000



Illustration 55

g00704000

Regeneration

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

General

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

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

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

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

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



Illustration 56

g03839130

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

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

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

Battery and Battery Cables



Illustration 57

g03839133

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

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

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

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

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

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

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

- Fraying

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

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

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

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

WARNING

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

Wiring

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

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

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

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

Consult your Cat dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

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

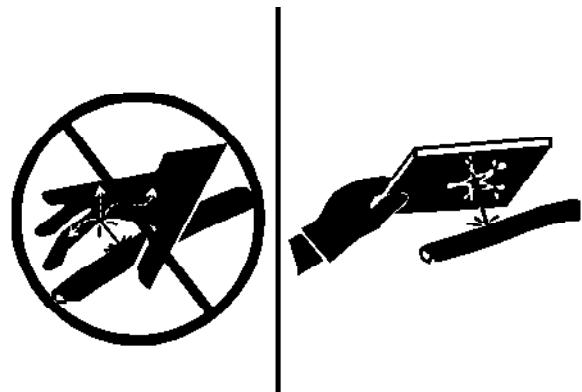


Illustration 58

g00687600

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

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

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

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

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

Ether

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

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

WARNING

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

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.

- Remember that nearly all the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

i02546320

i05474728

Fire Extinguisher Location

SMCS Code: 7000; 7419

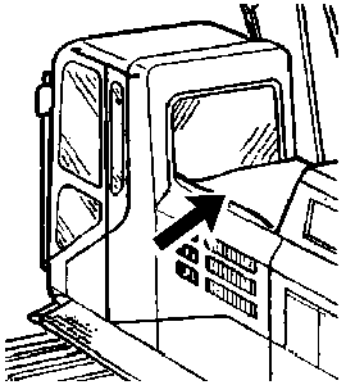


Illustration 59

g03459623

Typical example

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

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

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.

i06590585

Restricted Visibility

SMCS Code: 7000

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

Illustrations 60 - 62 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 63 shows the position of the work tool in the travel position. The Caterpillar authorized work tool that resulted in the largest visibility restriction was used.

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

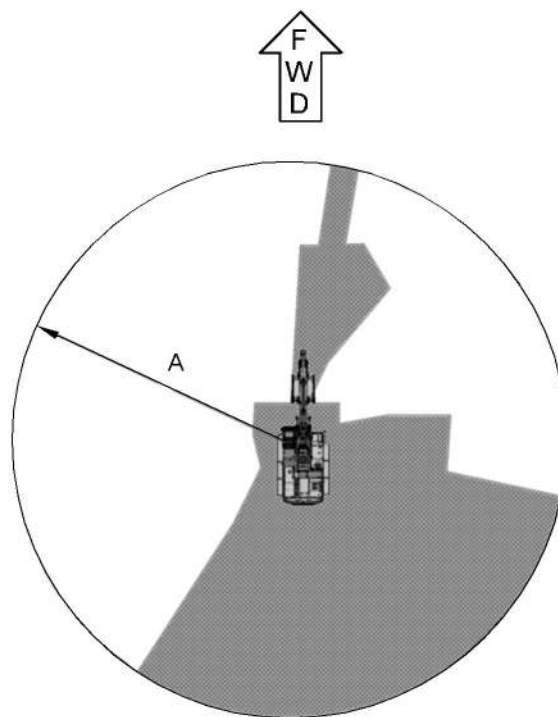


Illustration 60

g06038258

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

(A) 24 m (79 ft)

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

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

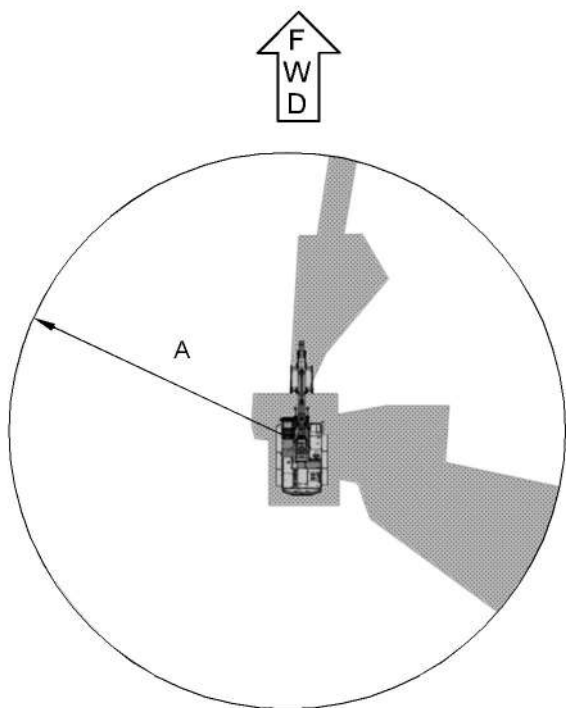


Illustration 61 g06038262
Top view of the machine, ground level visibility with available camera, left side mirror and right side mirror
(A) 24 m (79 ft)

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

Illustration 62 indicates restricted visibility areas at ground level inside the shown radius from the operator with the use of available rear camera, right side camera (if equipped), left side mirrors installed.

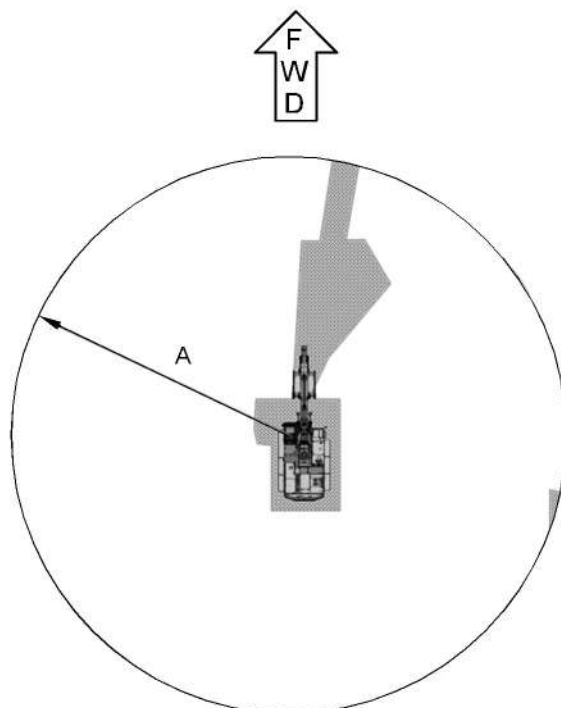


Illustration 62 g06038266
Top view of the machine, ground level visibility with available camera, left side mirror.
(A) 24 m (79 ft)

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

Restricted visibility is measured when the front linkage of the machine is in the travel position. Illustration 63 shows the machine in the travel position.

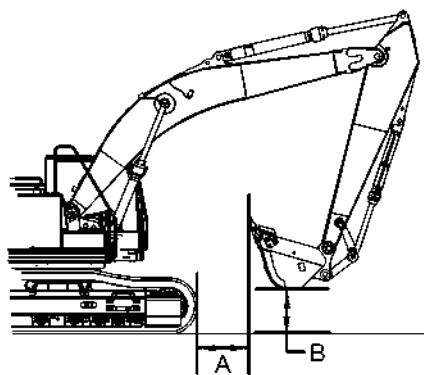


Illustration 63 g02155813
(A) 1 m (3.0 ft) from the front of the machine to the bucket
(B) 0.5 m (1.6 ft) from ground level

i03562260

i04159629

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.

Work Tools

SMCS Code: 6700

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

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

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

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

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

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

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

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

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

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

Never use the work tool for a work platform.

i07889511

Operation

SMCS Code: 7000

Machine Operating Temperature Range

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

Limiting Conditions and Criteria

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

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

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

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

Critical Failures

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

Table 1

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Line, tubes, and hoses	End fittings are damaged or leaking. Outer coverings are chafed or cut. Wires are exposed. Outer coverings are swelling or ballooning. Flexible parts of the hoses are kinked. Outer covers have exposed embedded armoring. End fittings are displaced.	Visible corrosion, loose, or damaged lines, tubes, or hoses. Visible fluid leaks.	Immediately repair any lines, tubes, or hoses that are corroded, loose, or damaged. Immediately repair any leaks as these may provide fuel for fires.
Electrical Wiring	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation	Visible damage to electrical wiring	Immediately replace damaged wiring
Battery cable(s)	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation of the cable, fouling, corroded terminals, damaged terminals, and loose terminals	Visible damage to battery cable(s)	Immediately replace damaged battery cables
Operator Protective Structure	Structures that are bent, cracked, or loose. Loose, missing, or damaged bolts.	Visible damage to structure. Loose, missing, or damaged bolts.	Do not operate machine with damaged structure or loose, missing, or damaged bolts. Contact your Cat dealer for inspection and repair or replacement options.
Seat Belt	Worn or damaged seat belt or mounting hardware	Visible wear or damage	Immediately replace parts that are worn or damaged.
Seat Belt	Age of seat belt	Three years after date of installation	Replace seat belt three years after date of installation
Safety Messages	Appearance of safety message	Damage to safety messages making them illegible	Replace the illustrations if illegible.
Audible Warning Device(s) (if equipped)	Sound level of audible warning	Reduced or no audible warning present	Immediately repair or replace audible warning devices not working properly.
Camera(s) (if equipped)	Dirt or debris on camera lens	Dirt or debris obstructing camera view	Clean camera before operating machine.
Cab Windows (if equipped)	Dirt, debris, or damaged windows	Dirt or debris obstructing operator visibility. Any damaged windows.	Clean windows before operating machine. Repair or replace damaged windows before operating machine.
Mirrors (if equipped)	Dirt, debris, or damaged mirror	Dirt or debris obstructing operator visibility. Any damaged mirrors.	Clean mirrors before operating machine. Repair or replace damaged mirrors before operating machine.
Braking System	Inadequate braking performance	System does not pass Braking System - Test(s) included in Maintenance Section or in the Testing and Adjusting Manual	Contact your Cat dealer to inspect and, if necessary, repair the brake system.
Cooling System	The coolant temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the coolant level and check the radiator for debris. Refer to Operation and Maintenance Manual, Cooling System Coolant Level - Check. Check the fan drive belts for the water pump. Refer to Operation and Maintenance Manual, Belts - Inspect/Adjust/ Replace. Make any necessary repairs.
Engine Oil System	A problem has been detected with the engine oil pressure.	Monitoring System displays Warning Category 3	If the warning stays on during low idle, stop the engine and check the engine oil level. Perform any necessary repairs as soon as possible.
Engine system	An engine fault has been detected by the engine ECM.	Monitoring System displays Warning Category 3	Stop the engine immediately. Contact your Cat dealer for service.
Fuel System	A problem has been detected with the fuel system.	Monitoring System displays Warning Category 3	Stop the engine. Determine the cause of the fault and perform any necessary repairs.
Hydraulic Oil System	The hydraulic oil temperature is too high.	Monitoring System displays Warning Category 3	Stop the engine immediately. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.

(continued)

(Table 1, contd)

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

Machine Operation

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

Check for proper operation of all controls and of all protective devices while you operate the machine slowly in an open area.

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

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

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

Never use the work tool for a work platform.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Know the maximum dimensions of your machine.

Watch the load at all times.

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

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

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

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

Machine Operation when the Machine is not Completely Assembled

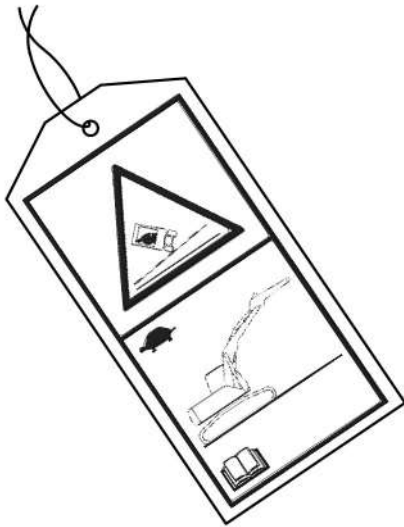


Illustration 64

g02202544

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

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

i06299648

Engine Stopping

SMCS Code: 1000; 7000

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

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

i07262981

Lifting Objects

SMCS Code: 7000

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

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

i07393520

Parking

SMCS Code: 7000

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

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

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

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

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

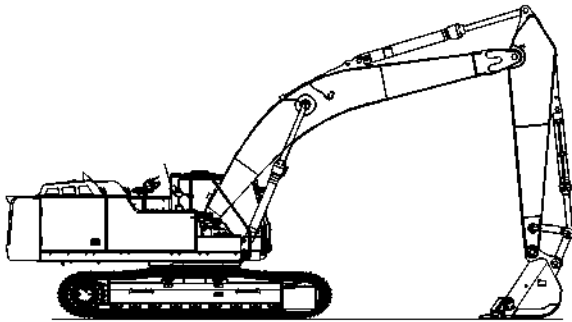


Illustration 65

g02280104

Place the machine in the servicing position.

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

Move the hydraulic lockout control to the LOCKED position.

Stop the engine.

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

Turn the battery disconnect switch to the OFF position.

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

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

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

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

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.

i01329161

Equipment Lowering with Engine Stopped

SMCS Code: 7000-II

Before lowering any equipment with the engine stopped, clear the area around the equipment of all personnel. The procedure to use will vary with the type of equipment to be lowered. Keep in mind most systems use a high pressure fluid or air to raise or lower equipment. The procedure will cause high pressure air, hydraulic, or some other media to be released in order to lower the equipment. Wear appropriate personal protective equipment and follow the established procedure in the Operation and Maintenance Manual, "Equipment Lowering with Engine Stopped" in the Operation Section of the manual.

i07475727

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

The declared dynamic operator sound pressure level is 72dB(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. When the doors and windows are open for extended periods or in a noisy environment.

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

The declared exterior sound power level (L_{wa}) is 108dB(A) when "ISO6395" 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 72dB(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 72 dB(A) when "ISO 6396:2008" is used to measure the value for an enclosed cab. The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed.

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

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

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

Vibration Data for Track Type Excavator

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5 m/s².

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 Excavator	excavating	0.44	0.27	0.30	0.24	0.16	0.17
	hydraulic breaker application	0.53	0.31	0.55	0.30	0.18	0.28
	mining application	0.65	0.42	0.61	0.21	0.15	0.32
	transfer	0.48	0.32	0.79	0.19	0.20	0.23

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

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

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations.
 - a. Tire pressures
 - b. Brake and steering systems
 - c. Controls, hydraulic system, and linkages
3. Keep the terrain in good condition.
 - a. Remove any large rocks or obstacles.
 - b. Fill any ditches and holes.
 - c. Provide machines and schedule time to maintain the conditions of the terrain.
4. Use a seat that meets "ISO 7096". Keep the seat maintained and adjusted.
 - a. Adjust the seat and suspension for the weight and the size of the operator.

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

5. Perform the following operations smoothly.

- a. Steer
- b. Brake
- c. Accelerate.
- d. Shift the gears.

6. Move the attachments smoothly.

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

- a. Drive around obstacles and rough terrain.
- b. Slow down when it is necessary to go over rough terrain.

8. Minimize vibrations for a long work cycle or a long travel distance.

- a. Use machines that are equipped with suspension systems.
- b. Use the ride control system on track type excavators.
- c. If no ride control system is available, reduce speed to prevent bounce.
- d. Haul the machines between workplaces.

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

- a. Adjust the seat and adjust the controls to achieve good posture.
- b. Adjust the mirrors to minimize twisted posture.
- c. Provide breaks to reduce long periods of sitting.
- d. Avoid jumping from the cab.
- e. Minimize repeated handling of loads and lifting of loads.

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

i07746359

Sources

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

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

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

Refer to Operation and Maintenance Manual Supplement, SEBU8257 for more information about vibration.

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

Use the following web site to find your local dealer:

Caterpillar, Inc.
www.cat.com

i07746362

Operator Station

SMCS Code: 7300; 7301; 7325

Any modifications to the inside of the operator station should not project into the operator space or into the space for the companion seat (if equipped). The addition of a radio, fire extinguisher, and other equipment must be installed so that the defined operator space and the space for the companion seat (if equipped) is maintained. Any item that is brought into the cab should not project into the defined operator space or the space for the companion seat (if equipped). A lunch box or other loose items must be secured. Objects must not pose an impact hazard in rough terrain or in the event of a rollover.

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

i07105852

Regulatory Information
(Japan)

SMCS Code: 7000

Qualifications for Machine
Operation

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

Excavation and Loading

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

Demolition

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

Mining Jobs

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

Crane Slinging for the Bucket with a Hook

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

Trailer Transportation

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

- In the event heavy items are to be transported, observe the related laws. These laws include Road Traffic Law, Road Laws, Road Transportation Vehicle Laws, and Vehicle Restriction Laws.

- Conduct prior investigation of the road width, ground clearance of road/railway bridges, weight restrictions etc. of the planned transportation route, to confirm the viability of the transportation execution.

Load

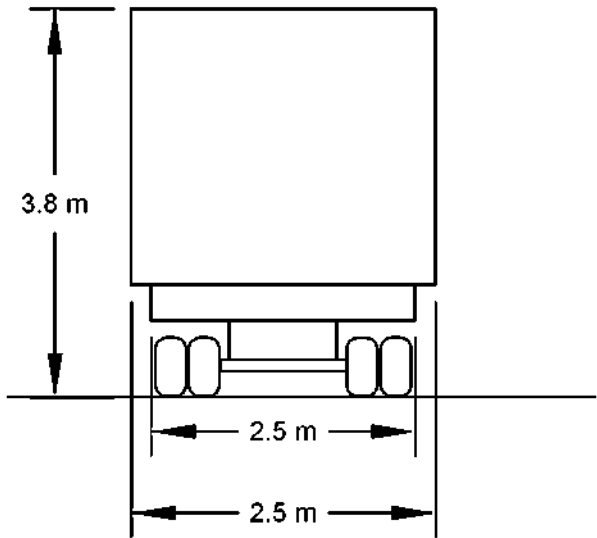


Illustration 66

g02698738

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

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

Table 3

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

(continued)

(Table 3, contd)

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

Operation of Construction Equipment and the Governing Laws and Regulations

NOTICE

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

NOTICE

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

Qualification of Operators

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

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

- One who completed an operating skill course for vehicle-type construction equipment at a registered training institution.
- One who passed the construction equipment and technologies license examination (Type 1-3) defined by the Construction Industry Law.
- One who completed an operating training course for construction equipment defined by the Vocational Training Law.

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

Acquisition of the Qualifications

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

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

Subsidy System

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

Operation of Construction Equipment and the Governing Laws and Regulations

NOTICE

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

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

Request for Periodical Self-Inspection

Rules of Periodical Self-Inspection

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

Ordinance on Industrial Safety and Hygiene

Periodical self-inspections Article 167

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

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

Periodical self-inspections Article 168

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

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

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

Record of Periodical Self-Inspections Article 169

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

Specified Self-Inspection Article 169-2

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

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

Checkup before Commencing the Work Article 170

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

Other Rules

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

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

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

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

Construction Equipment and Environmental Laws

Prohibition of Emissions and Obligations to Recover Fluorocarbons

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

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

1. 1. Do not arbitrarily emit the encapsulated refrigerant installed on the product into the atmosphere.
2. 2. Recover the encapsulated refrigerant when disposing of the product.

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

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

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

Standard Certificate of Transfer

Dear Customers

Japan Construction Equipment Manufacturers Association

Standard Certificate of Transfer

Issued by the Japan Construction Equipment Manufacturers Association

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

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

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

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

1. About the standard certificate of transfer

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

2. Purpose of issuance

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

3. Issuer

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

4. Eligibility

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

5. Issuance

- a. A certificate of transfer will be issued and directly given to a buyer upon the buyer's request when he/she buys eligible equipment from an issuer.
- b. A certificate of transfer may not be issued for the equipment, which was sold as new merchandise more than 10 years ago.
- c. A certificate of transfer is not permitted to substitute a vehicle inspection certificate.

6. Prohibition of reissuance

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

7. In case a certificate description runs out of space
- Discretionary page/s to the certificate will be valid with a tally seal of the issuer at the joint of two pages.

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

Industrial Safety and Health Act

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

Article 164

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

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

- In performing cargo lifting, any one of the following may be applicable.
 - Cannot be avoided due to the nature of the work or necessary in view of performing work in safe.
 - When working with attachments installed for metals of hook or shackle etc or other devices for lifting application applicable to any one of the following as implements for boom or bucket etc
 - Enough strength is retained bearable for loads to be applied.
 - Load lifted up is not feared to be dropped from the applicable instrument used, due to provided locking device is in use or etc.
 - Load not feared of disengaging from the implement.
- In performing work other than cargo lifting, nothing is feared to do harm to the workers.

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

- Designate one person who issues a sign as well as setting up fixed signs related to cargo lifting work, and follow his signs.
- Perform work on a flat ground.
- Keep any worker away from any place where is feared to cause any danger to worker due to contact with a cargo or drop of lifted cargo.

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

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

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

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

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

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

- Ensure that the operating weight does not exceed limits set by manufacturer.

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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 8,000 service hours. The expected life interval corresponds to the service hours to engine overhaul or replacement. Service hours to engine overhaul or replacement may vary based on overall machine duty cycle. At the expected life interval, remove the machine from operation and consult your Cat dealer for inspect, repair, rebuild, install remanufactured, install new components, or disposal options and to establish a new expected life interval. If a decision is made to remove this machine from service, refer to Operation and Maintenance Manual, "Decommissioning and Disposal".

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

- Perform regular preventive maintenance procedures as described in the Operation and Maintenance Manual.
- Perform machine inspections as described in the Operation and Maintenance Manual and correct any problems discovered.
- Perform system testing as described in the Operation and Maintenance Manual and correct any problems discovered.
- Ensure that machine application conditions comply with Caterpillar's recommendations.

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

Application/Configuration Restrictions

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

Specification Data

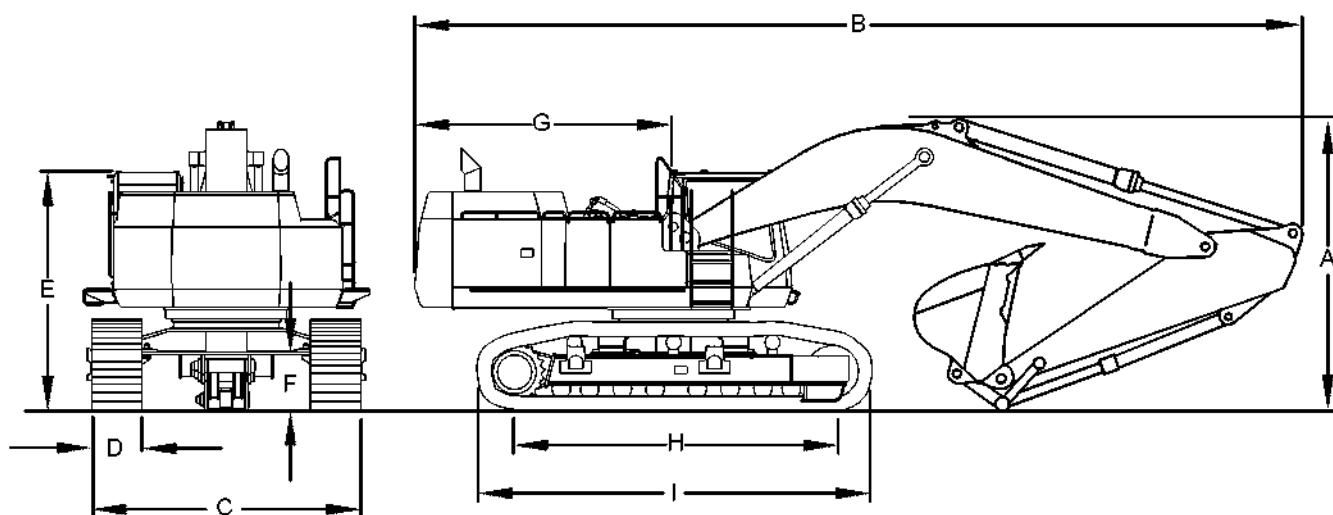


Illustration 67

g02150559

Table 4

374F L Excavator				
	7.80 m (25 ft 7 inch) Reach Boom			
	4.67 m (15 ft 4 inch) Stick	4.15 m (13 ft 7 inch) Stick	3.6 m (11 ft 10 inch) Stick	2.84 m (9 ft 4 inch) Stick
Bucket	3.8 m ³ (5.0 yd ³)			
Approximate Weights	73240 kg (161470 lb) ⁽¹⁾ 72190 kg (159150 lb) ⁽²⁾ 71510 kg (157650 lb) ⁽³⁾	73025 kg (160990 lb) ⁽¹⁾ 71980 kg (158690 lb) ⁽²⁾ 71300 kg (157190 lb) ⁽³⁾	72880 kg (160670 lb) ⁽¹⁾ 71825 kg (158350 lb) ⁽²⁾ 71150 kg (156860 lb) ⁽³⁾	72700 kg (160275 lb) ⁽¹⁾ 71650 kg (157960 lb) ⁽²⁾ 70975 kg (156470 lb) ⁽³⁾
Shipping Height (A)	4980 mm (16 ft 4 inch)	4650 mm (15 ft 3 inch)	4480 mm (14 ft 8 inch)	4380 mm (14 ft 4 inch)
Shipping Length (B)	13220 mm (43 ft 4 inch)	13310 mm (43 ft 8 inch)	13320 mm (43 ft 8 inch)	13470 mm (44 ft 2 inch)
Shipping Width (C)	3020 mm (9 ft 11 inch) ⁽¹⁾	3020 mm (9 ft 11 inch) ⁽¹⁾	3020 mm (9 ft 11 inch) ⁽¹⁾	3020 mm (9 ft 11 inch) ⁽¹⁾
	2750 mm (9 ft) ⁽²⁾	2750 mm (9 ft) ⁽²⁾	2750 mm (9 ft) ⁽²⁾	2750 mm (9 ft) ⁽²⁾
	2650 mm (8 ft 8 inch) ⁽³⁾	2650 mm (8 ft 8 inch) ⁽³⁾	2650 mm (8 ft 8 inch) ⁽³⁾	2650 mm (8 ft 8 inch) ⁽³⁾
Track Shoe Width (D)	900 mm (36 inch) 750 mm (30 inch) 650 mm (26 inch)			

(continued)

(Table 4, contd)

Cab Height (E)	3535 mm (11 ft 7 inch)	3535 mm (11 ft 7 inch)	3535 mm (11 ft 7 inch)	3535 mm (11 ft 7 inch)
Ground Clearance (F)	840 mm (33 inch)	840 mm (33 inch)	840 mm (33 inch)	840 mm (33 inch)
Tail Swing Radius (G)	4020 mm (13 ft 2 inch)	4020 mm (13 ft 2 inch)	4020 mm (13 ft 2 inch)	4020 mm (13 ft 2 inch)
Length to Center of Rollers (H)	4705 mm (15 ft 5 inch)	4705 mm (15 ft 5 inch)	4705 mm (15 ft 5 inch)	4705 mm (15 ft 5 inch)
Track Length (I)	5860 mm (19 ft 3 inch)	5860 mm (19 ft 3 inch)	5860 mm (19 ft 3 inch)	5860 mm (19 ft 3 inch)
Track Gauge (J)	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾

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

Table 5

374F L Excavator		
	7.0 m (23 ft) Mass Boom	
	3.0 m (9 ft 10 inch) Stick	2.57 m (8 ft 5 inch) Stick
Bucket	4.6 m³ (6.0 yd³)	
Approximate Weights	75610 kg (166690 lb)⁽¹⁾ 74560 kg (164375 lb)⁽²⁾ 73880 kg (162880 lb)⁽³⁾	75435 kg (166305 lb)⁽¹⁾ 74390 kg (164000 lb)⁽²⁾ 73710 kg (162500 lb)⁽³⁾
Shipping Height (A)	4740 mm (15 ft 7 inch)	4560 mm (15 ft)
Shipping Length (B)	12630 mm (41 ft 5 inch)	12670 mm (41 ft 7 inch)
Shipping Width (C)	3020 mm (9 ft 11 inch) ⁽¹⁾ 2750 mm (9 ft) ⁽²⁾ 2650 mm (8 ft 8 inch) ⁽³⁾	3020 mm (9 ft 11 inch) ⁽¹⁾ 2750 mm (9 ft) ⁽²⁾ 2650 mm (8 ft 8 inch) ⁽³⁾
Track Shoe Width (D)	900 mm (36 inch) 750 mm (30 inch) 650 mm (26 inch)	
Cab Height (E)	3535 mm (11 ft 7 inch)	3535 mm (11 ft 7 inch)
Ground Clearance (F)	840 mm (33 inch)	840 mm (33 inch)
Tail Swing Radius (G)	4020 mm (13 ft 2 inch)	4020 mm (13 ft 2 inch)
Length to Center of Rollers (H)	4705 mm (15 ft 5 inch)	4705 mm (15 ft 5 inch)
Track Length (I)	5860 mm (19 ft 3 inch)	5860 mm (19 ft 3 inch)
Track Gauge (J)	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾	2750 mm (9 ft) ⁽⁴⁾ 3410 mm (11 ft 2 inch) ⁽⁵⁾

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

Working Ranges

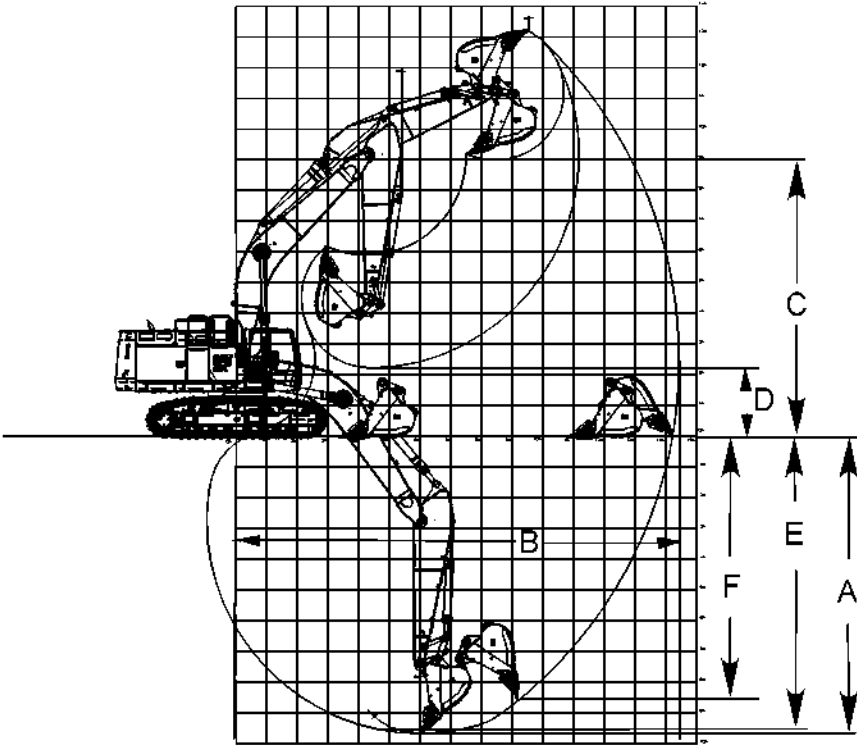


Illustration 68

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Table 6

374F L Excavator				
	7.80 m (25 ft 7 inch) Reach Boom			
	4.67 m (15 ft 4 inch) Stick	4.15 m (13 ft 7 inch) Stick	3.6 m (11 ft 10 inch) Stick	2.84 m (9 ft 4 inch) Stick
Bucket	3.8 m³ (5.0 yd³)			
Maximum Digging Depth (A)	9650 mm (31 ft 8 inch)	9130 mm (29 ft 11 inch)	8580 mm (28 ft 2 inch)	7820 mm (25 ft 8 inch)
Maximum Reach at Ground Level (B)	14450 mm (47 ft 5 inch)	13690 mm (44 ft 11 inch)	13170 mm (43 ft 3 inch)	12780 mm (41 ft 11 inch)
Maximum Loading Height (C)	9000 mm (29 ft 6 inch)	8650 mm (28 ft 5 inch)	8420 mm (27 ft 7 inch)	8250 mm (27 ft 1 inch)
Minimum Loading Height (D)	2240 mm (7 ft 4 inch)	2760 mm (9 ft 1 inch)	3310 mm (10 ft 10 inch)	4070 mm (13 ft 4 inch)

(continued)

(Table 6, contd)

Maximum Cut Depth (E)⁽¹⁾	9540 mm (31 ft 4 inch)	9010 mm (29 ft 7 inch)	8450 mm (27 ft 9 inch)	7670 mm (25 ft 2 inch)
Maximum Digging Depth (Vertical wall) (F)	8430 mm (27 ft 8 inch)	7740 mm (25 ft 5 inch)	7040 mm (23 ft 1 inch)	6570 mm (21 ft 7 inch)

⁽¹⁾ 2440 mm (8 ft) level bottom

Table 7

374F L Excavator		
	7.0 m (23 ft) Mass Boom	
	3.0 m (9 ft 10 inch) Stick	2.57 m (8 ft 5 inch) Stick
Bucket	4.6 m³ (6.0 yd³)	
Maximum Digging Depth (A)	7610 mm (25 ft)	7180 mm (23 ft 7 inch)
Maximum Reach at Ground Level (B)	11810 mm (38 ft 9 inch)	11420 mm (37 ft 6 inch)
Maximum Loading Height (C)	7280 mm (23 ft 11 inch)	7100 mm (23 ft 4 inch)
Minimum Loading Height (D)	3100 mm (10 ft 2 inch)	3520 mm (11 ft 7 inch)
Maximum Cut Depth (E)⁽¹⁾	7460 mm (24 ft 6 inch)	7030 mm (23 ft 1 inch)
Maximum Digging Depth (Vertical wall) (F)	4340 mm (14 ft 3 inch)	3970 mm (13 ft)

⁽¹⁾ 2440 mm (8 ft) level bottom

Basic Machine

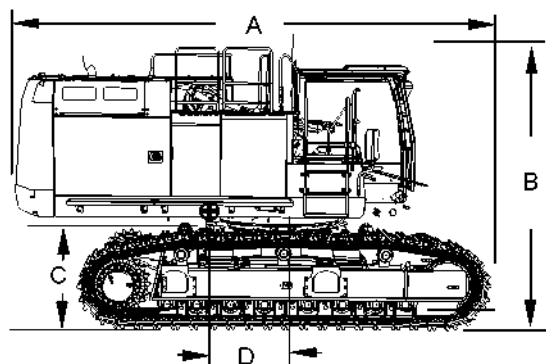


Illustration 69

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Table 8

374F Excavator⁽¹⁾	
Weight	55210 kg (121720 lb)
Width	3470 mm (11 ft 5 inch)
Length (A)	6875 mm (22 ft 7 inch)
Height (B)	3540 mm (11 ft 7 inch)
Center of Gravity (C)	1480 mm (4 ft 10 inch)
Center of Gravity (D)	1127 mm (3 ft 8 inch)

(Table 8, contd)

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

Carbody

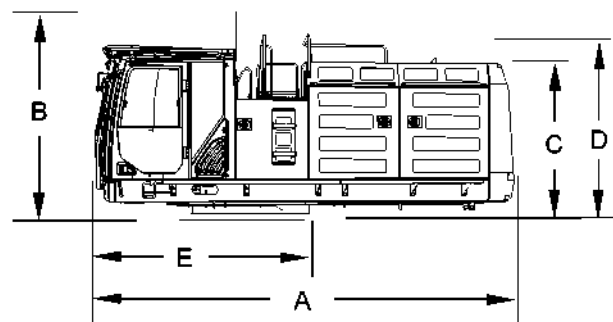


Illustration 70

g03435781

Table 9

374F Excavator	
Weight	21900 kg (48300 lb)
Length (A)	5.30 m (17 ft 5 inch)
Height (B)	2.84 m (9 ft 4 inch)

(continued)

(continued)

(Table 9, contd)

374F Excavator	
Height (C)	2.71 m (8 ft 11 inch)
Height (D)	3.22 m (10 ft 7 inch)
Length (E)	2.45 m (8 ft)

Track Frame

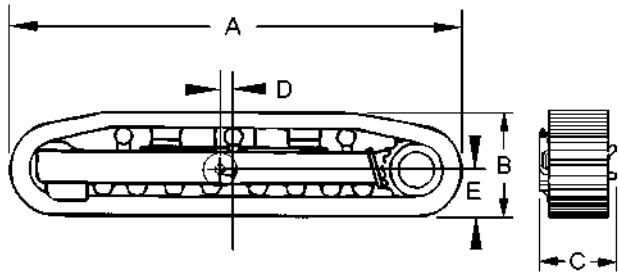


Illustration 71

g02571599

Table 10

374F Excavator ⁽¹⁾ These specifications are for each track.	
Weight (Each Track Frame)	10220 kg (22550 lb)
Length (A)	5.86 m (19 ft 3 inch)
Height (B)	1.34 m (4 ft 5 inch)
Width (C)	980 mm (3 ft 3 inch)
Center of Gravity (D)	64 mm (3 inch)
Center of Gravity (E)	710 mm (2 ft 4 inch)

(continued)

(Table 10, contd)

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

Counterweight

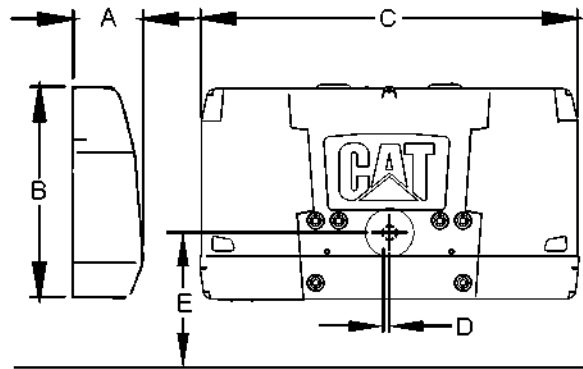


Illustration 72

g03629216

Table 11

Standard Counterweight	
Weight	10050 kg (22200 lb)
Length (A)	630 mm (2 ft 1 inch)
Height (B)	1.86 m (6 ft 1 inch)
Width (C)	3.46 m (11 ft 4 inch)

(continued)

(Table 11, contd)

Standard Counterweight	
Center of Gravity (D)	6 mm (0.23 inch)
Center of Gravity (E)	2330 mm (7 ft 8 inch)

Boom with Stick Cylinder

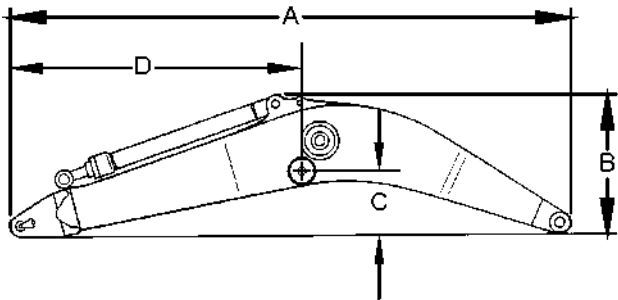


Illustration 73

g02765979

Table 12

	7.80 m (25 ft 7 inch) Reach Boom	6.59 m (21 ft 7 inch) Mass Boom
Weight	6400 kg (14100 lb)	6420 kg (14200 lb)
Width	1.11 m (3 ft 8 inch)	1.11 m (3 ft 8 inch)
Length (A)	8.11 m (26 ft 7 inch)	6.90 m (22 ft 8 inch)
Height (B)	2.00 m (6 ft 7 inch)	2.42 m (7 ft 11 inch)

(continued)

Product Information Section
Specifications

(Table 12, contd)

	7.80 m (25 ft 7 inch) Reach Boom	6.59 m (21 ft 7 inch) Mass Boom
Center of Gravity (C)	658 mm (2 ft 2 inch)	759 mm (2 ft 6 inch)
Center of Gravity (D)	3788 mm (12 ft 5 inch)	3502 mm (11 ft 6 ft)

Stick with Bucket Cylinder

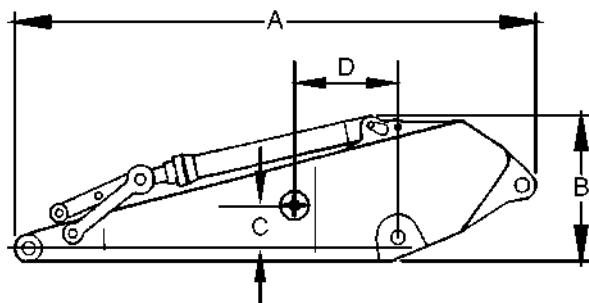


Illustration 74

g02765978

Table 13

	Long Stick (VB) for Reach Boom 4.67 m (15 ft 4 inch)	Medium Stick (VB) for Reach Boom 3.60 m (11 ft 10 inch)	Short Stick (VB) for Reach Boom 2.84 m (9 ft 4 inch)	Long Stick (WB) for Mass Boom 3.00 m (9 ft 10 inch)	Short Stick (WB) for Mass Boom 2.57 m (8 ft 5 inch)
Weight	3980 kg (8800 lb)	3580 kg (7900 lb)	3370 kg (7400 lb)	4230 kg (9300 lb)	4050 kg (8900 lb)
Width	500 mm (1 ft 2 inch)	500 mm (1 ft 2 inch)	500 mm (1 ft 2 inch)	500 mm (1 ft 2 inch)	500 mm (1 ft 2 inch)
Length (A)	6.08 m (19 ft 11 inch)	5.03 m (16 ft 6 inch)	4.23 m (13 ft 11 inch)	4.42 m (14 ft 6 inch)	4.01 m (13 ft 2 inch)
Height (B)	1.32 m (4.3307 ft 4 inch)	1.36 m (4.4619 ft 6 inch)	1.52 m (5 ft)	1.56 m (5 ft 1 inch)	1.57 m (5 ft 2 inch)
Center of Gravity (C)	319 mm (13 inch)	287 mm (11 inch)	345 mm (14 inch)	316 mm (12 inch)	285 mm (11 inch)
Center of Gravity (D)	1505 mm (4 ft 11 inch)	1047 mm (3 ft 5 inch)	628 mm (2 ft 1 inch)	740 mm (2 ft 5 inch)	572 mm (1 ft 10 inch)

Bucket

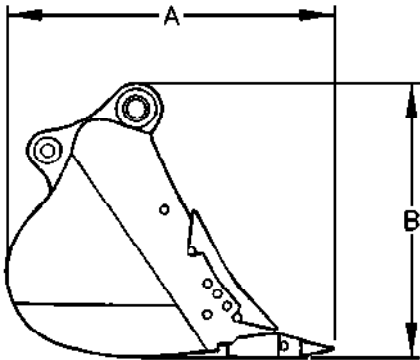


Illustration 75

g00612093

Table 14

Application	Capacity of Bucket	Bucket Family	Length (A)	Height (B)	Width	Weight
Heavy-Duty Rock	4.60 m ³ (6.00 yd ³)	WB	2280 mm (90 inch)	2135 mm (84 inch)	2100 mm (83 inch)	4880 kg (10755 lb)
Heavy-Duty	3.80 m ³ (5.00 yd ³)	VB	2210 mm (87 inch)	1875 mm (74 inch)	1980 mm (78 inch)	3390 kg (7470 lb)

Boom Cylinders

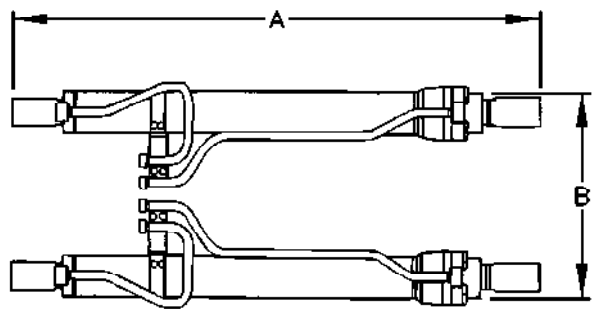


Illustration 76 g00589456

Table 15

Weight (Each Boom Cylinder)	670 kg (1475 lb)
Length (A)	2.80 m (9 ft 2 inch)
Height (B)	1.10 m (3 ft 7 inch)

Walkway

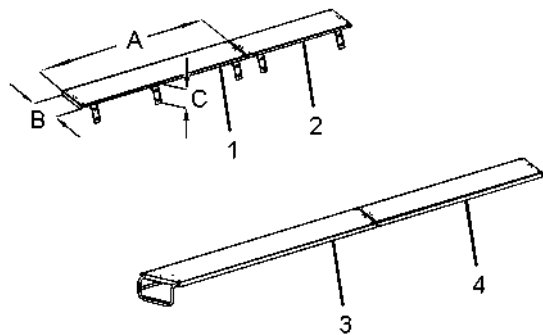


Illustration 77 g01136960

Table 16

	Walkway (1)	Walkway (2)	Walkway (3)	Walkway (4)
Weight	25 kg (55 lb)	15 kg (33 lb)	30 kg (66 lb)	25 kg (55 lb)
Length (A)	1.95 m (6 ft 5 inch)	1.22 m (4 ft)	2.63 m (8 ft 8 inch)	1.95 m (6 ft 5 inch)
Width (B)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)	370 mm (1 ft 3 inch)
Height (C)	210 mm (8 inch)	210 mm (8 inch)	210 mm (8 inch)	210 mm (8 inch)

Step for Track Frame

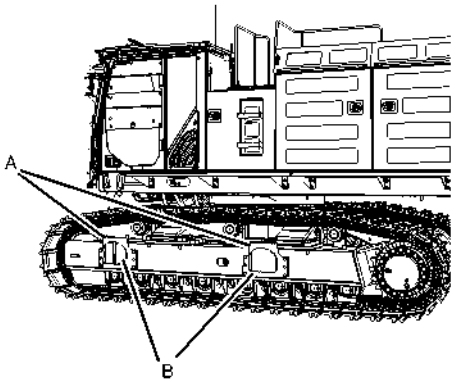


Illustration 78
Left side of the machine

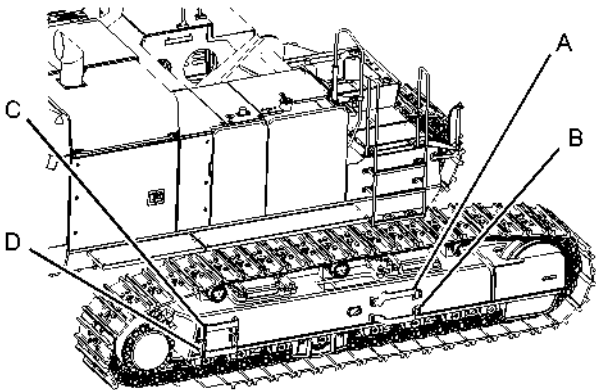


Illustration 79
Right side of the machine

Table 17

	Step (A)	Step (B)	Step (C)	Step (D)
Quantity	3	3	1	1
Weight	9 kg (20 lb)	8 kg (18 lb)	15 kg (33 lb)	14 kg (31 lb)
Length (A)	590 mm (2 ft)	590 mm (2 ft)	480 mm (1 ft 7 inch)	480 mm (1 ft 7 inch)

(continued)

(Table 17, contd)

Length (B)	190 mm (8 inch)	80 mm (3 inch)	190 mm (8 inch)	160 mm (6 inch)
Width	140 mm (6 inch)	140 mm (6 inch)	140 mm (6 inch)	140 mm (6 inch)

Miscellaneous

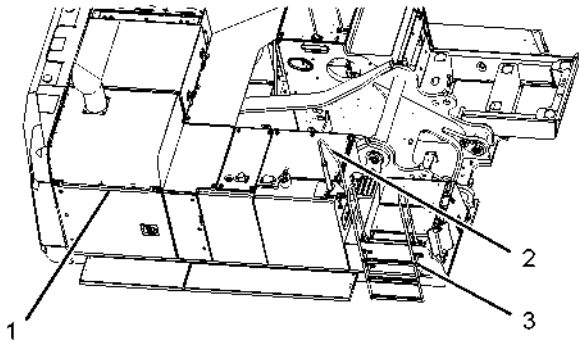


Illustration 80
Right side of the machine

- (1) Hand rail
- (2) Hand rail
- (3) Hand rail

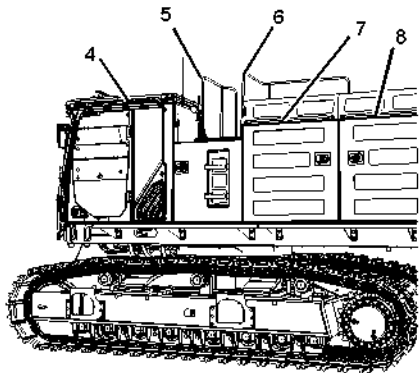


Illustration 81
Left side of the machine

- (4) Hand rail
- (5) Hand rail
- (6) Hand rail
- (7) Hand rail
- (8) Hand rail

Product Information Section
Boom/Stick/Bucket Combinations

Table 18

	Exhaust Pipe	Rear View Mirror on Storage Box	Hand rail (1)	Hand rail (2)	Hand rail (3)	Hand rail (4)	Hand rail (5)	Hand rail (6)
Weight	7 kg (15.4 lb)	8 kg (18.0 lb)	3 kg (6.6 lb)	8 kg (17.6 lb)	23 kg (50.8 lb)	10 kg (22.0 lb)	4 kg (8.8 lb)	3 kg (6.6 lb)
Length	295 mm (11.6 inch)	380 mm (15.0 inch)	1260 mm (49.6 inch)	300 mm (11.8 inch)	720 mm (28.3 inch)	1010 mm (39.8 inch)	390 mm (15.4 inch)	1260 mm (49.6 inch)
Width	255 mm (10.0 inch)	160 mm (6.3 inch)	40 mm (1.6 inch)	270 mm (10.6 inch)	310 mm (12.2 inch)	390 mm (15.4 inch)	50 mm (2.0 inch)	40 mm (1.6 inch)
Height	640 mm (25.2 inch)	670 mm (26.4 inch)	90 mm (3.5 inch)	1390 mm (54.7 inch)	1700 mm (66.9 inch)	850 mm (33.5 inch)	610 mm (24.0 inch)	90 mm (3.5 inch)

i07178161

Boom/Stick/Bucket Combinations

SMCS Code: 6000; 6700

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

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

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

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

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

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

Table 19

374F L Excavator Without Quick Coupler							
Bucket Type	Linkage	Width of Bucket	SAE Capacity of Bucket	Weight of Bucket	Fill (%)	7.8 m (25 ft 7 inch) Boom	7.0 m (23 ft) Boom

(continued)

(Table 19, contd)

						2.84 m (9 ft 4 inch) Stick	3.6 m (11 ft 10 inch) Stick	4.15 m (13 ft 7 inch) Stick	4.67 m (15 ft 4 inch) Stick	2.57 m (8 ft 5 inch) Stick	3.0 m (9 ft 10 inch) Stick
General Duty (GD)	VB2	1525 mm (60 inch)	2.9 m ³ (3.9 yd ³)	3205 kg (7064 lb)	100	(1)	(1)	(1)	(2)		
	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	3622 kg (7982 lb)	100	(1)	(1)	(1)	(3)		
	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	3720 kg (8198 lb)	100	(1)	(1)	(1)	(2)		
	WB2	2000 mm (79 inch)	4.6 m ³ (6.0 yd ³)	4016 kg (8851 lb)	100					(1)	(1)
	WB2	2100 mm (83 inch)	5.0 m ³ (6.5 yd ³)	4167 kg (9184 lb)	100					(1)	(2)
General Duty XL (GDXL)	VB2	2000 mm (79 inch)	4.6 m ³ (6.0 yd ³)	4077 kg (8986 lb)	100	(2)	(3)	(4)	(4)		
Heavy Duty (HD)	VB2	1220 mm (48 inch)	2.2 m ³ (2.9 yd ³)	2892 kg (6373 lb)	100	(1)	(1)	(1)	(1)		
	VB2	1700 mm (66 inch)	3.3 m ³ (4.3 yd ³)	3529 kg (7778 lb)	100	(1)	(1)	(2)	(3)		
	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	3881 kg (8553 lb)	100	(1)	(2)	(3)	(4)		
	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	3782 kg (8336 lb)	100	(1)	(2)	(3)	(4)		
	WB2	2100 mm (83 inch)	5.0 m ³ (6.5 yd ³)	4345 kg (9576 lb)	100					(1)	(2)
	WB2	2250 mm (89 inch)	5.3 m ³ (7.0 yd ³)	4591 kg (10119 lb)	100					(2)	(2)

(1) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.(2) 1500 kg/m³ (2500 lb/yd³) is the maximum density of material.(3) 1200 kg/m³ (2000 lb/yd³) is the maximum density of material.

(4) Not Recommended

Note: The above figures are based on maximum recommended dynamic working weights with front linkage fully extended at ground line with bucket curled. They do not exceed a stability ratio of 1.25. Capacity is based on "ISO 7451". The bucket weights include General Duty tips

Table 20

374F L Excavator Without Quick Coupler											
Bucket Type	Linkage	Width of Bucket	SAE Ca- pacity of Bucket	Weight of Bucket	Fill (%)	7.8 m (25 ft 7 inch) Boom				7.0 m (23 ft) Boom	
						2.84 m (9 ft 4 inch) Stick	3.6 m (11 ft 10 inch) Stick	4.15 m (13 ft 7 inch) Stick	4.67 m (15 ft 4 inch) Stick	2.57 m (8 ft 5 inch) Stick	3.0 m (9 ft 10 inch) Stick

(continued)

Product Information Section
Boom/Stick/Bucket Combinations

(Table 20, contd)

Severe Duty (SD)	VB2	1100 mm (43 inch)	1.9 m ³ (2.5 yd ³)	2840 kg (6259 lb)	90	(1)	(1)	(1)	(1)		
	VB2	1525 mm (60 inch)	2.9 m ³ (3.9 yd ³)	3453 kg (7610 lb)	90	(1)	(1)	(1)	(1)		
	VB2	1700 mm (66 inch)	3.3 m ³ (4.3 yd ³)	3653 kg (8051 lb)	90	(1)	(1)	(1)	(2)		
	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	4016 kg (8851 lb)	90	(1)	(2)	(3)	(3)		
	WB2	1800 mm (71 inch)	3.7 m ³ (4.8 yd ³)	4667 kg (10286 lb)	90					(1)	(1)
	WB2	1900 mm (75 inch)	4.0 m ³ (5.25 yd ³)	4825 kg (10634 lb)	90					(1)	(1)
	WB2	2000 mm (79 inch)	4.4 m ³ (5.75 yd ³)	4982 kg (10980 lb)	90					(1)	(1)
	WB2	2100 mm (83 inch)	4.6 m ³ (6.0 yd ³)	5141 kg (11331 lb)	90					(1)	(1)
	WB2	2200 mm (87 inch)	5.0 m ³ (6.5 yd ³)	5341 kg (11772 lb)	90					(1)	(2)
Extreme Duty (XD)	WB2	2000 mm (79 inch)	4.4 m ³ (5.75 yd ³)	5785 kg (12750 lb)	90					(1)	(1)
	WB2	2100 mm (83 inch)	4.6 m ³ (6.0 yd ³)	5982 kg (13184 lb)	90					(1)	(2)
	WB2	2200 mm (87 inch)	5.0 m ³ (6.5 yd ³)	6212 kg (13691 lb)	90					(2)	(3)

(1) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.

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

(3) 1200 kg/m³ (2000 lb/yd³) is the maximum density of material.

Note: The above figures are based on maximum recommended dynamic working weights with front linkage fully extended at ground line with bucket curled. They do not exceed a stability ratio of 1.25. Capacity is based on "ISO 7451". The bucket weights include General Duty tips

Table 21

374F L Excavator With Quick Coupler											
Bucket Type	Linkage	Width of Bucket	SAE Capacity of Bucket	Weight of Bucket	Fill (%)	7.8 m (25 ft 7 inch) Boom				7.0 m (23 ft) Boom	
						2.84 m (9 ft 4 inch) Stick	3.6 m (11 ft 10 inch) Stick	4.15 m (13 ft 7 inch) Stick	4.67 m (15 ft 4 inch) Stick	2.57 m (8 ft 5 inch) Stick	3.0 m (9 ft 10 inch) Stick
General Duty (GD)	VB2	1900 mm (75 inch)	3.8 m ³ (5.0 yd ³)	3668 kg (8084 lb)	100	(1)	(1)	(1)	(2)		

(continued)

(Table 21, contd)

Severe Duty (SD)	WB2	1900 mm (75 inch)	4.0 m ³ (5.25 yd ³)	4802 kg (10584 lb)	90					(1)	(1)
	WB2	2000 mm (79 inch)	4.4 m ³ (5.75 yd ³)	4959 kg (10930 lb)	90					(1)	(1)
Heavy Duty (HD)	WB2	2000 mm (79 inch)	4.4 m ³ (5.75 yd ³)	5797 kg (12777 lb)	90					(1)	(1)

(1) 1800 kg/m³ (3000 lb/yd³) is the maximum density of material.

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

Note: The above figures are based on maximum recommended dynamic working weights with front linkage fully extended at ground line with bucket curled. They do not exceed a stability ratio of 1.25. Capacity is based on “ISO 7451”. The bucket weights include General Duty tips

i05737002

Lifting Capacities

SMCS Code: 7000



WARNING

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

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

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

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

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

- Lift point: Stick nose without bucket
- Lubricants full
- Fuel tank full
- Steel track

- Complete cab with a 75 kg (165 lb) operator

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

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

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

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

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

Symbols Found in the Lifting Capacity Charts

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

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

(mm) **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

Reach Boom

4670 mm (184 inch) Stick

(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500 420		12000 480				(mm) (inch)	
																		(mm) (inch)		
10500 420												* 11750	* 11750					* 10800 * 24000	* 10800 * 24000	9200 360
9000 360												* 12400 * 27300	* 12400 * 27300					* 10200 * 22500	* 10200 * 22500	10330 410
7500 300												* 12700 * 27800	* 12700 * 27800	* 12200 26500	11800			* 9900 * 21850	* 9900 * 21850	11140 440
6000 240												* 13450 * 29250	* 13450 * 29250	* 12500 27300	11600 24900			* 9850 * 21700	9600 21200	11700 460
4500 180					* 26450	* 26450	* 19950 * 43000	* 19950 * 43000	* 16500 * 35750	* 16500 * 35750	* 14400 * 31250	* 14400 * 31100	* 13000 28350	11300 24300	* 10400	9000		* 10000 * 22000	8950 19750	12050 490
3000 120							* 23000 * 49600	* 23000 * 49600	* 18250 39500	18200 39200	* 15450 33500	13850 29850	* 13600 29550	10950 23550	* 12050 * 22750	8850 18950		* 10350 * 22700	8600 18950	12200 480
1500 60							* 25300 * 54700	23950 51550	* 19700 * 42650	17350 37350	* 16350 * 35400	13300 28700	* 14100 * 30650	10600 22850	12000	8850		* 10900 * 23900	8500 18700	12160 480
0 0					* 17300 * 39900	* 17300 * 39900	* 26400 * 57200	23050 49600	* 20600 * 44600	16700 35950	* 16900 * 36600	12900 27800	* 14350 31000	10350 22300				* 11700 * 25800	8650 19000	11930 470
-1500 -60			* 12500 * 28200	* 12500 * 28200	* 22700 * 52000	* 22700 * 52000	* 26350 * 57100	22600 48600	* 20750 * 44900	16350 35150	* 16950 * 36700	12650 27200	* 14150 * 30650	10200 22000				* 12400 * 27350	9050 19900	11510 460
-3000 -120	* 15350 * 34350	* 15350 * 34350	* 19700 * 44450	* 19700 * 44450	* 30800 * 70400	* 30800 * 70400	* 25200 * 54500	22500 48450	* 20050 * 43350	16200 34900	* 16300 * 35200	12550 27050	* 13200 * 28150	10200 22050				* 12400 * 27350	9800 21650	10850 430
-4500 -180			* 28450 * 64350	* 28450 * 64350	* 28950 * 62550	* 28950 * 62550	* 22800 * 49200	22700 48900	* 18250 * 39300	16300 35150	* 14600 * 31050	12700						* 12200 * 26850	11200 24850	9920 390
-6000 -240			* 29450 * 63000	* 29450 * 63000	* 23400 * 50000	* 23400 * 50000	* 18750 * 50000	* 18750 * 39950	* 14750 * 31100	* 14750 * 31100								* 11500 * 25150	* 11500 * 25150	8640 340

Illustration 82

g03383176

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4670 mm (184 inch) stick and 900 mm (35 inch) DG track shoes

Product Information Section
Lifting Capacities

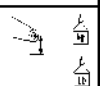
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500 420		12000 480					
																			(mm) (inch)	
10500 420												* 11750	* 11750					* 10800 * 24000	* 10800 * 24000	9200 360
9000 360												* 12400 * 27300	* 12400 * 27300					* 10200 * 22500	* 10200 * 22500	10330 410
7500 300												* 12700 * 27800	* 12700 * 27800	* 12200 24950	11650			* 9900 * 21850	* 9900 * 21850	11140 440
6000 240												* 13450 * 29250	* 13450 * 29250	* 12500 24550	11450			* 9850 * 21700	* 9450 20900	11700 460
4500 180					* 26450	* 26450	* 19950 * 43000	* 19950 * 43000	* 16500 * 35750	* 16500 * 35750		* 14400 * 31250	14250 30650	* 13000 28350	11150 23850	* 10400	8900	* 10000 * 22000	8800 19450	12050 480
3000 120							* 23000 * 49600	* 23000 * 49600	* 18250 * 39500	17950 38650		* 15450 * 33500	13650 29400	* 13600 29550	10800 23200	12000 22750	8700 18650	* 10350 * 22700	8450 18650	12200 480
1500 60							* 25300 * 54700	23600 50850	* 19700 * 42850	17100 36800		* 16350 * 35400	13150 28250	* 14100 * 30550	10450 22500	11800	8550	* 10900 * 23900	8350 18400	12160 480
0 0					* 17300 * 39900	* 17300 * 39900	* 26400 * 57200	22700 48850	* 20600 * 44600	16450 35450		* 16900 * 36600	12700 27350	14200 30550	10200 21950			* 11700 * 25800	8500 18700	11930 470
-1500 -60			* 12500 * 28200	* 12500 * 28200	* 22700 * 52000	* 22700 * 52000	* 26350 * 57100	22250 47900	* 20750 * 44900	16100 34600		* 16850 * 36700	12450 26800	14050 30200	10050 21650			12350 27250	8900 19550	11510 460
-3000 -120	* 15350 * 34350	* 15350 * 34350	* 19700 * 44450	* 19700 * 44450	* 30800 * 70400	* 30800 * 70400	* 25200 * 54500	22200 47700	* 20050 * 43350	15950 34350		* 16300 * 35200	12350 26650	* 13200 * 28150	10050 21700			* 12400 * 27350	9650 21300	10850 430
-4500 -180			* 28450 * 64350	* 28450 * 64350	* 28950 * 62550	* 28950 * 62550	* 22800 * 49200	22400 48150	* 18250 * 39300	16050 34600		* 14600 * 31050	12500 26950					* 12200 * 26850	11050 24500	9920 390
-6000 -240			* 29450 * 63000	* 29450 * 63000	* 23400 * 50000	* 23400 * 50000	* 18750 * 39950	* 18750 * 39950	* 14750 * 31100	* 14750 * 31100								* 11500 * 25150	* 11500 * 25150	8640 340

Illustration 83

g03383183

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4670 mm (184 inch) stick and 750 mm (30 inch) DG track shoes

(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500 420		12000 480				(mm) (inch)	
																			(mm) (inch)	
10500 420												* 11750	* 11750					* 10800 * 24000	* 10800 * 24000	9200 360
9000 360												* 12400 * 27300	* 12400 * 27300					* 10200 * 22500	* 10200 * 22500	10330 410
7500 300												* 12700 * 27800	* 12700 * 27800	* 12200 * 26550	11550 24700			* 9900 * 21850	* 9900 * 21850	11140 440
6000 240												* 13450 * 29250	* 13450 * 29250	* 12500 * 27300	11350 24350			* 9650 * 21700	9350 20700	11700 460
4500 180					* 26450	* 26450	* 19850 * 43000	* 19950 * 43000	* 16500 * 35750	* 16500 * 35750		* 14400 * 31250	14100 30400	* 13000 * 28350	11050 23700	* 10400	8800	* 10000 * 22000	8750 19250	12050 480
3000 120							* 23000 * 49600	* 23000 * 49600	* 18250 * 39500	17800 38300	* 15450 * 33500	13550 29150	* 13600 * 29550	10700 22950	11900 * 22750	8800 18500	* 10350 * 22700	8400 18450	12200 480	
1500 60							* 25300 * 54700	23350 50350	* 19700 * 42650	16900 36450	* 16350 * 35400	13000 28000	* 14100 * 30550	10850 22250	11700	8450	* 10900 * 23900	8250 18200	12160 480	
0 0					* 17300 * 39900	* 17300 * 39900	* 26400 * 57200	22500 48400	* 20600 * 44600	16300 35100	* 16900 * 36600	12600 27100	14050 30250	10100 21700			11650 25700	8400 18500	11930 470	
-1500 -60			* 12500 * 28200	* 12500 * 28200	* 22700 * 52000	* 22700 * 52000	* 26350 * 57100	22050 47400	* 20750 * 44900	15900 34250	* 16950 * 36700	12300 26500	13900 29900	9950 21400			12250 27000	8800 19350	11510 480	
-3000 -120	* 15350 * 34350	* 15350 * 34350	* 19700 * 44450	* 19700 * 44450	* 30800 * 70400	* 30800 * 70400	* 25200 * 54500	21950 47200	* 20050 * 43350	15800 34000	* 16300 * 35200	12250 26350	* 13200 * 28150	9950 21450			* 12400 * 27350	9550 21100	10850 430	
-4500 -180			* 28450 * 64350	* 28450 * 64350	* 28950 * 62550	* 28950 * 62550	* 22800 * 49200	22150 47650	* 18250 * 39300	15900 34250	* 14600 * 31050	12350 26650					* 12200 * 26850	10900 24250	9920 390	
-6000 -240			* 29450 * 63000	* 29450 * 63000	* 23400 * 50000	* 23400 * 50000	* 18750 * 39850	* 18750 * 39850	* 14750 * 31100	* 14750 * 31100							* 11500 * 25150	* 11500 * 25150	8640 340	

Illustration 84

g03383181

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4670 mm (184 inch) stick and 650 mm (26 inch) DG track shoes

Reach Boom

Product Information Section
Lifting Capacities

4150 mm (163 inch) Stick

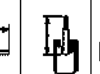
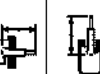
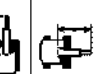
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500 420		
									(mm) (inch)
10500 420									* 12450 * 12450 8470 * 27700 * 27700 330
9000 360						* 13300 * 13300 * 29350 * 29350			* 11750 * 11750 9690 * 25950 * 25950 380
7500 300						* 13500 * 13500 * 29500 * 29500	* 11800 11850		* 11400 * 11400 10550 * 25150 * 25150 420
6000 240					* 15750 * 15750 * 34150 * 34150	* 14150 * 14150 * 30800 * 30800	* 13150 11500		* 11400 10400 11140 * 25100 23000 440
4500 180			* 61900 * 61900	* 21250 * 21250 * 45800 * 45800	* 17400 * 17400 * 37600 * 37600	* 15050 14350 * 32700 30850	* 13550 11250		* 11600 9650 11500 * 25550 21350 460
3000 120				* 24150 * 24150 * 52050 * 52050	* 19000 18050 * 41150 38850	* 16000 13800 * 34700 29700	* 14050 10950		* 12100 9300 11660 * 26550 20450 460
1500 60				* 26100 23750 * 56400 51150	* 20300 17250 * 43900 37200	* 16800 13300 * 36350 28700	* 14450 10650		12650 9150 11620 27850 20200 460
0 0			* 16850 * 16850 * 38950 * 38950	* 26750 23050 * 57950 49600	* 20950 16700 * 45350 36000	* 17200 12950 * 37200 27900	14500 10450		12900 9350 11380 28450 20550 450
-1500 -60		* 13350 * 13350 * 30200 * 30200	* 24050 * 24050 * 55050 * 55050	* 26250 22750 * 56950 48950	* 20800 16450 * 45050 35400	* 17000 12750 * 36800 27500	* 14050 10350		* 13200 9800 10930 * 29100 21650 430
-3000 -120		* 22050 * 22050 * 49800 * 49800	* 31400 * 31400 * 68100 * 68100	* 24650 22750 * 53400 49000	* 19750 16400 * 42700 35300	* 16050 12750 * 34550 27450			* 13200 10750 10240 * 29000 23800 410
-4500 -180		* 32500 * 32500 * 73600 * 73600	* 27150 * 27150 * 58600 * 58600	* 21800 * 21800 * 46950 * 46950	* 17500 16600 * 37550 35800	* 13600 12950 * 28600 28050			* 12850 12550 9250 * 28300 27900 370
-6000 -240			* 20800 * 20800 * 44300 * 44300	* 16950 * 16950 * 35850 * 35850	* 12950 * 12950 * 26650 * 26650				* 11800 * 11800 7860 * 25750 * 25750 310

Illustration 85

g03383688

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4150 mm (163 inch) stick and 900 mm (35 inch) DG track shoes

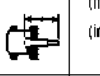
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500 420			(mm) (inch)
										
10500 420										* 12450 * 12450 8470 * 27700 * 27700 330
9000 360						* 13300 * 13300 * 29350 * 29350				* 11750 * 11750 9690 * 25950 * 25950 380
7500 300						* 13500 * 13500 * 29500 * 29500	* 11800 11500			* 11400 11400 10550 * 25150 * 25150 420
6000 240					* 15750 * 15750 * 34150 * 34150	* 14150 * 14150 * 30800 * 30800	* 13150 11350			* 11400 10250 11140 * 25100 22650 440
4500 180			* 61900 * 61900	* 21250 * 21250 * 45800 * 45800	* 17400 * 17400 * 37600 * 37600	* 15050 14150 * 32700 30450	* 13550 11100			* 11600 9550 11500 * 25550 21050 460
3000 120				* 24150 * 24150 * 52050 * 52050	* 19000 17800 * 41150 38350	* 16000 13600 * 34700 29300	* 14050 10800			* 12100 9150 11660 * 26550 20150 460
1500 60				* 26100 23400 * 56400 50450	* 20300 17000 * 43900 36650	* 18800 13100 * 36350 28250	* 14450 10500			* 12450 9050 11620 * 27450 19850 460
0 0			* 16850 * 16850 * 38950 * 38950	* 26750 22700 * 57950 48850	* 20950 18450 * 45350 35500	* 17200 12750 * 37200 27500	* 14250 10300			* 12700 9200 11380 * 28000 20200 450
-1500 -60		* 13350 * 13350 * 30200 * 30200	* 24050 * 24050 * 55050 * 55050	* 26250 22400 * 56950 48200	* 20800 18200 * 45050 34850	* 17000 12550 * 36800 27050	* 14050 10200			* 13200 9650 10930 * 29100 21300 430
-3000 -120		* 22050 * 22050 * 49800 * 49800	* 31400 * 31400 * 68100 * 68100	* 24650 22450 * 53400 48250	* 19750 18150 * 42700 34800	* 16050 12550 * 34550 27050				* 13200 10600 10240 * 29000 23450 410
-4500 -180		* 32500 * 32500 * 73600 * 73600	* 27150 * 27150 * 58600 * 58600	* 21800 * 21800 * 46950 * 46950	* 17500 16350 * 37550 35250	* 13600 12800 * 28600 27650				* 12850 12350 9250 * 28300 27450 370
-6000 -240			* 20800 * 20800 * 44300 * 44300	* 16950 * 16950 * 35850 * 35850	* 12950 * 12950 * 26650 * 26650					* 11800 * 11800 7860 * 25750 * 25750 310

Illustration 86

g03383692

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4150 mm (163 inch) stick and 750 mm (30 inch) DG track shoes

Product Information Section
Lifting Capacities

(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500 420		
									(mm) (inch)
10500 420									* 12450 * 12450 8470 * 27700 * 27700 330
9000 360						* 13300 * 13300 * 29350 * 29350			* 11750 * 11750 9690 * 25950 * 25950 380
7500 300						* 13500 * 13500 * 29500 * 29500	* 11800 11400		* 11400 11300 10550 * 25150 25100 420
6000 240					* 15750 * 15750 * 34150 * 34150	* 14150 * 14150 * 30800 * 30800	* 13150 11250 * 28700 24150		* 11400 10150 11140 * 25100 22450 440
4500 180				* 21250 * 21250 * 45800 * 45800	* 17400 * 17400 * 37600 * 37600	* 15050 14000 * 32700 30150	* 13550 11000 * 29500 23800		* 11600 9450 11500 * 25550 20800 460
3000 120				* 24150 * 24150 * 52050 * 52050	* 19000 17600 * 41150 38000	* 16000 13450 * 34700 29000	* 14050 10850 * 30500 22950		* 12100 9050 11680 * 26550 19950 460
1500 60				* 26100 23200 * 56400 49950	* 20300 16850 * 43900 36300	* 16800 13000 * 36350 28000	* 14350 10400 * 30900 22350		* 12350 8950 11620 * 27150 19650 460
0 0			* 16850 * 16850 * 38950 * 38950	* 26750 22500 * 57950 48400	* 20950 16300 * 45350 35150	* 17200 12650 * 37200 27200	* 14100 10150 * 30400 21900		* 12600 9100 11380 * 27750 20000 450
-1500 -60		* 13350 * 13350 * 30200 * 30200	* 24050 * 24050 * 55050 * 55050	* 26250 22200 * 56950 47750	* 20800 16050 * 45050 34500	* 17000 12450 * 36800 26800	* 14000 10100 * 30200 21700		* 13200 9550 10930 * 29100 21100 430
-3000 -120		* 22050 * 22050 * 49800 * 49800	* 31400 * 31400 * 68100 * 68100	* 24650 22200 * 53400 47750	* 19750 16000 * 42700 34400	* 16050 12400 * 34550 26750			* 13200 10500 10240 * 29000 23200 410
-4500 -180		* 32500 * 32500 * 73600 * 73600	* 27150 * 27150 * 58600 * 58600	* 21800 * 21800 * 46950 * 46950	* 17500 16200 * 37550 34900	* 13600 12650 * 28600 27350			* 12850 12250 9250 * 28300 27200 370
-6000 -240			* 20800 * 20800 * 44300 * 44300	* 16950 * 16950 * 35850 * 35850	* 12950 * 12950 * 26650 * 26650				* 11800 * 11800 7860 * 25750 * 25750 310

Illustration 87

g03383694

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 4150 mm (163 inch) stick and 650 mm (26 inch) DG track shoes

Reach Boom

3600 mm (142 inch) Stick

(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500 420						
																	(mm) (inch)		
10500 420																* 14850 * 33100	* 14850 * 33100	7760 300	
9000 360											* 14300	* 14300				* 13850 * 30700	* 13850 * 30700	9070 360	
7500 300									* 15400 * 33500	* 15400 * 33500	* 14250 * 31200	* 14250 * 31200				* 13450 * 29700	12550 27900	9980 390	
6000 240							* 19550 * 42200	* 19550 * 42200	* 16600 * 36000	* 16600 * 36000	* 14800 * 32250	14650 31500	* 13750	11350		* 13450 * 29600	11150 24700	10610 420	
4500 180							* 22450 * 48400	* 22450 * 48400	* 18150 * 39300	* 18150 * 39300	* 15650 * 33950	14200 30500	* 14050 * 30550	11150 23950		* 13650 * 30100	10350 22850	10990 440	
3000 120							* 25100 * 54150	24550 52950	* 19650 * 42500	17800 38400	* 16450 * 35700	13700 29450	* 14400 * 31300	10850 23400		13600 30000	9900 21850	11150 440	
1500 60							* 26600 * 57550	23500 50600	* 20700 * 44800	17100 36900	* 17100 * 37050	13250 28550	* 14650 * 31600	10650 22900		13500 29800	9800 21550	11110 440	
0 0								* 26800 * 58050	22950 49400	* 21100 * 45650	16650 35900	* 17300 * 37450	12950 27900	* 14500 * 31250	10450 22550		* 13850 * 30500	10000 22050	10860 430
-1500 -60								* 24600 * 56500	* 24600 * 56500	* 25850 * 56000	22800 49050	* 20850 * 44700	16450 35500	* 16850 * 36400			* 13850 * 30550	10600 23400	10390 410
-3000 -120																	* 13700 * 30200	11800 26050	9660 380
-4500 -180																	* 13150 * 28850	* 13150 * 28850	8600 340
-6000 -240																	* 11400 * 24600	* 11400 * 24600	7070 280

Illustration 88

g03383763

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 3600 mm (142 inch) stick and 900 mm (35 inch) DG track shoes

Product Information Section
Lifting Capacities

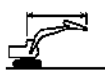
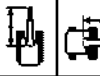
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500 420		(mm) (inch)
									
10500 420								* 14850 * 33100	7760 300
9000 360						* 14300	* 14300	* 13850 * 30700	9070 360
7500 300					* 15400 * 33500	* 14250 * 31200		* 13450 * 29700	12350 27550
6000 240				* 19550 * 42200	* 16600 * 36000	* 14800 * 32250	* 14450 * 31100	* 13750 * 29600	11200 24350
4500 180				* 22450 * 48400	* 18150 * 39300	* 15850 * 33950	* 14050 * 30550	* 11000 * 23600	10200 22500
3000 120				* 25100 * 54150	* 19650 * 42500	* 16450 * 35700	* 13500 * 29050	* 10700 * 23050	9750 21500
1500 60				* 26800 * 57550	* 20700 * 44800	* 17100 * 37050	* 13050 * 28100	* 10450 * 22550	9650 21250
0 0			* 34650	* 26800 * 58050	* 22600 * 48700	* 17300 * 37450	* 12750 * 27450	* 10300 * 22200	9850 21700
-1500 -60			* 24600 * 56500	* 25850 * 56000	* 22450 * 48350	* 16850 * 36400	* 12600 * 27200	* 10380 * 23050	10380 23000
-3000 -120		* 24200 * 54750	* 29450 * 64000	* 23750 * 51500	* 19200 * 41450	* 15450 * 33050	* 12700 * 27350	* 10370 * 23020	9660 25650
-4500 -180		* 29100 * 62950	* 24700 * 53350	* 20300 * 43700	* 16300 * 34800			* 13150 * 28850	8600 28850
-6000 -240				* 14400 * 30050				* 11400 * 24600	7070 280

Illustration 89

g03383770

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 3600 mm (142 inch) stick and 750 mm (30 inch) DG track shoes

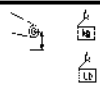
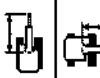
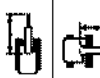
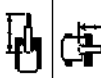
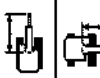
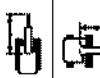
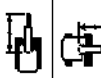
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500 420				(mm) (inch)			
																				
10500 420																	* 14850 * 33100	* 14850 * 33100	7760 300	
9000 360												* 14300	* 14300				* 13850 * 30700	* 13850 * 30700	9070 360	
7500 300									* 15400 * 33500	* 15400 * 33500	* 14250 * 31200	* 14250 * 31200					* 13450 * 29700	12250 27300	9980 390	
6000 240							* 19550 * 42200	* 19550 * 42200	* 16800 * 36000	* 16800 * 36000	* 14800 * 32250	14350 30800	* 13750	11100			* 13450 * 29600	10900 24150	10610 420	
4500 180							* 22450 * 48400	* 22450 * 48400	* 18150 * 39300	* 18150 * 39300	* 15650 * 33950	13850 29800	* 14050	10850			* 13650 * 30100	10100 22250	10990 440	
3000 120							* 25100 * 54150	24000 51750	* 19650 * 42500	17400 37500	* 16450 * 35700	13350 28750	* 14400	10600			13300 29300	9650 21300	11150 440	
1500 60							* 26600 * 57550	22900 49400	* 20700 * 44800	16700 38000	* 17100 * 37050	12900 27850	14300 30800	10350 22300			13200 29050	9550 21000	11110 440	
0 0							* 26800 * 34650	22400 34650	* 21100 * 58050	16250 48200	* 17300 * 45650	12600 35000	14150 37450	10200 27200			13500 30500	9750 22000	10860 29750	
-1500 -60							* 24600 * 56500	* 24600 * 56500	* 25850 * 56000	22250 47850	* 20650 * 44700	16050 34800	* 16850 * 36400	12500 26900			* 13850 * 30550	10350 22800	10390 410	
-3000 -120							* 24200 * 54750	* 24200 * 54750	* 29450 * 64000	* 29450 * 64000	* 23750 * 51500	22400 48150	* 19200 * 41450	16100 34700	* 15450 * 33050	12550 27100		* 13700 * 30200	11500 25400	9660 380
-4500 -180							* 29100 * 62950	* 29100 * 62950	* 24700 * 53350	* 24700 * 53350	* 20300 * 43700	* 20300 * 43700	* 16300 * 34800	* 16300 * 34800			* 13150 * 28850	* 13150 * 28850	8600 340	
-6000 -240							* 14400 * 30050	* 14400 * 30050									* 11400 * 24600	* 11400 * 24600	7070 280	

Illustration 90

g03383774

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 3600 mm (142 inch) stick and 650 mm (26 inch) DG track shoes

Reach Boom

Product Information Section
Lifting Capacities

2840 mm (112 inch) Stick

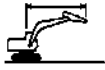
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360		10500				(mm) (inch)
																	
10500															* 17500	* 17500	6820
9000 360									* 16300	* 16300					* 16050	* 16050	8280
7500 300									* 35800	* 35800					* 35550	* 35550	330
6000 240									* 16700	* 16700	* 15450	14750			* 15350	13950	9280
4500 180									* 36300	* 36300	* 33950	31550			* 33950	31150	370
3000 120					* 28350	* 28350	* 21250	* 21250	* 17750	* 17750	* 15750	14450			* 15050	12250	9950
1500 60					* 60500	* 60500	* 45850	* 45850	* 38550	* 38550	* 34350	31100			* 33150	27200	390
0 0							* 24050	* 24050	* 19150	18350	* 16400	14050			* 14900	11300	10350
-1500 -60							* 51800	* 51800	* 41450	39600	* 35650	30200			* 32800	24950	410
-3000 -120							* 26250	24000	* 20400	17550	* 17050	13600	* 14850	10850	* 14850	10800	10530
-4500 -180							* 56700	51800	* 44200	37900	* 37000	29250			* 32850	23850	420
							* 27000	23200	* 21150	17000	* 17450	13200			14800	10700	10490
							* 58500	50050	* 45800	36600	* 37800	28500			32550	23600	420
							* 26450	22950	* 21100	16650	* 17350	13000			* 14800	11000	10220
							* 57400	49400	* 45750	35900	* 37500	28050			* 32550	24250	410
					* 23400	* 23400	* 24850	23000	* 20200	16600	* 16450	12950			* 14600	11800	9710
					* 54300	* 54300	* 54000	49450	* 43750	35750	* 35400	28000			* 32200	25000	390
					* 26150	* 26150	* 22200	* 22200	* 18150	16750					* 14150	13350	8930
					* 57000	* 57000	* 48100	* 48100	* 39050	36150					* 31100	29600	350
					* 20850	* 20850	* 17850	* 17850	* 13850	* 13850					* 12850	* 12850	7770
					* 44950	* 44950	* 38200	* 38200	* 28800	* 28800					* 28150	* 28150	310

Illustration 91

g03383793

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 2840 mm (112 inch) stick and 900 mm (35 inch) DG track shoes

(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500		
									(mm) (inch)
10500									* 17500 * 17500 6820
9000 360					* 16300 * 16300 * 35800 * 35800				* 16050 * 16050 8280 * 35550 * 35550 330
7500 300					* 16700 * 16700 * 36300 * 36300	* 15450 14550 * 33950 31150			* 15350 13800 9280 * 33950 30750 370
6000 240			* 28350 * 28350 * 60500 * 60500	* 21250 * 21250 * 45850 * 45850	* 17750 * 17750 * 38550 * 38550	* 15750 14250 * 34350 30650			* 15050 12100 9950 * 33150 26850 390
4500 180				* 24050 * 24050 * 51800 * 51800	* 19150 18100 * 41450 39050	* 16400 13850 * 35650 29800			* 14900 11150 10350 * 32800 24600 410
3000 120				* 26250 23650 * 56700 51050	* 20400 17300 * 44200 37350	* 17050 13400 * 37000 28850	14700 10700	14650 10650	10530 420
1500 60				* 27000 22900 * 58500 49300	* 21150 16750 * 45800 36100	* 17450 13000 * 37800 28050		14550 10550	10490 420
0 0				* 26450 22600 * 57400 48650	* 21100 16400 * 45750 35400	* 17350 12800 * 37500 27600		* 14800 10850	10220 410
-1500 -60			* 23400 * 23400 * 54300 * 54300	* 24850 22650 * 54000 48700	* 20200 16350 * 43750 35250	* 16450 12800 * 35400 27550		* 14600 11600	9710 390
-3000 -120			* 26150 * 26150 * 57000 * 57000	* 22200 * 22200 * 48100 * 48100	* 18150 16500 * 39050 35600			* 14150 13200	8930 350
-4500 -180			* 20850 * 20850 * 44950 * 44950	* 17850 * 17850 * 38200 * 38200	* 13850 * 13850 * 28800 * 28800			* 12850 * 12850 * 28150 * 28150	7770 310

Illustration 92

g03383795

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 2840 mm (112 inch) stick and 750 mm (30 inch) DG track shoes

Product Information Section
Lifting Capacities

(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360	10500		
									(mm) (inch)
10500									* 17500 * 17500 6820
9000 360					* 16300 * 16300 * 35800 * 35800				* 16050 * 16050 8280 * 35550 * 35550 330
7500 300					* 16700 * 16700 * 36300 * 36300	* 15450 14400 * 33950 30850			* 15350 13650 9280 * 33950 30450 370
6000 240			* 28350 * 28350 * 60500 * 60500	* 21250 * 21250 * 45850 * 45850	* 17750 * 17750 * 38550 * 38550	* 15750 14150 * 34350 30400			* 15050 12000 9950 * 33150 28550 390
4500 180				* 24050 * 24050 * 51800 * 51800	* 19150 17950 * 41450 38700	* 16400 13700 * 35650 29500			* 14900 11050 10350 * 32800 24350 410
3000 120				* 26250 23450 * 56700 50550	* 20400 17150 * 44200 37000	* 17050 13250 * 37000 28550	14550 10600	14500 10550 31950 23250	10530 420
1500 60				* 27000 22850 * 58500 48850	* 21150 16550 * 45800 35750	* 17450 12900 * 37800 27800		14400 10450 31750 23000	10490 420
0 0				* 26450 22400 * 57400 48200	* 21100 16250 * 45750 35050	* 17350 12700 * 37500 27350		* 14800 10750 * 32550 23650	10220 410
-1500 -60			* 23400 * 23400 * 54300 * 54300	* 24850 22400 * 54000 48200	* 20200 16200 * 43750 34900	* 16450 12650 * 35400 27300		* 14600 11500 * 32200 25350	9710 390
-3000 -120			* 26150 * 26150 * 57000 * 57000	* 22200 * 22200 * 48100 * 48100	* 18150 16350 * 39050 35250			* 14150 13050 * 31100 28900	8930 350
-4500 -180			* 20850 * 20850 * 44950 * 44950	* 17850 * 17850 * 38200 * 38200	* 13850 * 13850 * 28800 * 28800			* 12850 * 12850 * 28150 * 28150	7770 310

Illustration 93

g03383798

Lift Chart Above: 374F LC, 7800 mm (307 inch) reach boom, 2840 mm (112 inch) stick and 650 mm (26 inch) DG track shoes

Mass Boom

2995 mm (118 inch) Stick

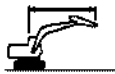
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
															(mm) (inch)
9000 360													* 13950 * 30950	* 13950 * 30950	7350 290
7500 300									* 16350 * 35800	* 16350 * 35800			* 13200 * 29100	* 13200 * 29100	8460 330
6000 240							* 19650 * 42550	* 19650 * 42550	* 17150 * 37300	* 17150 * 37300	* 15800 * 28700	14350 * 28700	* 13000 * 28600	* 13000 * 28600	9190 360
4500 180					* 30500 * 65300	* 30500 * 65300	* 22350 * 48250	* 22350 * 48250	* 18450 * 40000	* 18450 * 40000	* 16250 * 35400	14000 30100	* 13200 * 29050	12550 27700	9630 380
3000 120							* 24950 * 53900	24800 53400	* 19850 * 42950	17800 38400	* 16850 * 36650	13600 29250	* 13800 * 30350	11900 26200	9820 390
1500 60							* 26600 * 57500	23700 51050	* 20850 * 45100	17150 37000	* 17300 * 37500	13200 28450	* 14850 * 32700	11750 25900	9770 390
0 0					* 29100 * 67500	* 29100 * 67500	* 26800 * 58100	23150 49850	* 21100 * 45700	16750 36100	* 17200 * 37150	13000 28000	* 16050 * 35400	12100 26700	9480 380
-1500 -60			* 23950 * 54150	* 23950 * 54150	* 33050 * 71850	* 33050 * 71850	* 25700 * 55700	23050 49550	* 20350 * 43950	16650 35850			* 16150 * 35600	13150 29000	8930 360
-3000 -120			* 35600 * 77550	* 35600 * 77550	* 29050 * 62950	* 29050 * 62950	* 23000 * 49700	* 23000 * 49700	* 17950 * 38400	16850 36300			* 15900 * 35050	15300 33950	8070 320
-4500 -180					* 22500 * 48150	* 22500 * 48150	* 17650 * 37350	* 17650 * 37350					* 14750 * 32200	* 14750 * 32200	6760 270

Illustration 94

g03383916

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2995 mm (118 inch)stick and 900 mm (35 inch) track shoes

Product Information Section
Lifting Capacities

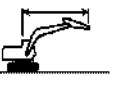
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360		
								(mm) (inch)
9000 360								* 13950 * 13950 * 30950 * 30950
7500 300					* 16350 * 35800	* 16350 * 35800		* 13200 * 13200 * 29100 * 29100
6000 240				* 19650 * 42550	* 19650 * 42550	* 17150 * 37300	* 15800 * 28700	* 13000 * 13000 * 28600 * 28600
4500 180			* 30500 * 65300	* 30500 * 65300	* 22350 * 48250	* 22350 * 48250	* 18450 * 40000	* 16250 * 35400
3000 120					* 24950 * 53900	* 24450 * 52700	* 19850 * 42950	* 17600 * 37900
1500 60					* 26600 * 57500	* 23350 * 50350	* 20850 * 45100	* 16900 * 36450
0 0				* 29100 * 67500	* 29100 * 67500	* 26800 * 58100	* 22800 * 49100	* 21100 * 45700
-1500 -60		* 23950 * 54150	* 23950 * 54150	* 33050 * 71850	* 33050 * 71850	* 25700 * 55700	* 22700 * 48800	* 20350 * 43950
-3000 -120		* 35600 * 77550	* 35600 * 77550	* 29050 * 62950	* 29050 * 62950	* 23000 * 49700	* 22900 * 49300	* 17950 * 38400
-4500 -180				* 22500 * 48150	* 22500 * 48150	* 17650 * 37350	* 17650 * 37350	

Illustration 95

g03383918

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2995 mm (118 inch) stick and 750 mm (30 inch) track shoes

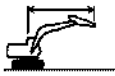
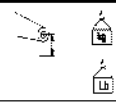
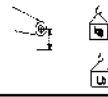
(mm) (inch)	1500 60		3000 120		4500 180		6000 240		7500 300		9000 360				
															(mm) (inch)
9000 360															
7500 300									* 16350 * 35800	* 16350 * 35800			* 13950 * 30950	* 13950 * 30950	7350 290
6000 240							* 19650 * 42550	* 19650 * 42550	* 17150 * 37300	* 17150 * 37300	* 15800 * 28700	14000 * 28700	* 13000 * 28600	* 13000 * 28600	9190 360
4500 180					* 30500 * 65300	* 30500 * 65300	* 22350 * 48250	* 22350 * 48250	* 18450 * 40000	18200 39250	* 16250 * 35400	13650 29400	* 13200 * 29050	12250 27050	9630 380
3000 120							* 24950 * 53900	24200 52200	* 19850 * 42950	17400 37500	* 16850 * 36650	13250 28550	* 13800 * 30350	11600 25600	9820 390
1500 60							* 26600 * 57500	23150 49850	* 20850 * 45100	16750 36100	* 17300 * 37500	12900 27750	* 14850 * 32700	11450 25250	9770 390
0 0					* 29100 * 67500	* 29100 * 67500	* 26800 * 58100	22600 48600	* 21100 * 45700	16350 35200	* 17200 * 37150	12650 27300	* 16050 * 35400	11800 26000	9480 380
-1500 -60			* 23950 * 54150	* 23950 * 54150	* 33050 * 71850	* 33050 * 71850	* 25700 * 55700	22450 48350	* 20350 * 43950	16200 34950			* 16150 * 35600	12800 28250	8930 360
-3000 -120			* 35600 * 77550	* 35600 * 77550	* 29050 * 62950	* 29050 * 62950	* 23000 * 49700	22700 48850	* 17950 * 38400	16400 35450			* 15900 * 35050	14950 33100	8070 320
-4500 -180					* 22500 * 48150	* 22500 * 48150	* 17650 * 37350	* 17650 * 37350					* 14750 * 32200	* 14750 * 32200	6760 270

Illustration 96

g03383919

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2995 mm (118 inch)stick and 650 mm (26 inch) track shoes

Mass Boom

(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360			(mm) (inch)
									
9000 360									* 16700 * 16700 * 37100 * 37100
7500 300						* 17300 * 17300 * 38000 * 38000			* 15700 * 15700 * 34700 * 34700
6000 240				* 20750 * 20750 * 44900 * 44900	* 17950 * 17950 * 39050 * 39050				* 15500 14850 * 34100 33050
4500 180				* 23400 * 23400 * 50450 * 50450	* 19150 18550 * 41550 39950	* 16850 14000			* 15800 13400 * 34700 29650
3000 120				* 25800 24650 * 55700 53100	* 20400 17800 * 44200 38400	* 17350 13600			* 16550 12700 * 36400 28000
1500 60				* 27050 23700 * 58550 51050	* 21200 17250 * 45950 37100	* 17600 13300			* 16800 12550 * 37000 27650
0 0			* 26950 * 26950 * 63150 * 63150	* 26850 23300 * 58250 50150	* 21250 16900 * 46000 36400	* 17150 13150			* 16950 13000 * 37300 28650
-1500 -60		* 55100 * 55100	* 31800 * 31800 * 69250 * 69250	* 25350 23300 * 54900 50100	* 20100 16850 * 43400 36300				* 16900 14250 * 37250 31450
-3000 -120		* 31350 * 31350 * 68550 * 68550	* 27350 * 27350 * 59350 * 59350	* 22100 * 22100 * 47650 * 47650	* 16850 * 16850				* 16450 * 16450 * 36150 * 36150
-4500 -180			* 19950 * 19950 * 42550 * 42550	* 15350 * 15350					* 14550 * 14550 * 31600 * 31600

q03383921

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2574 mm (101 inch)stick and 900 mm (35 inch) track shoes

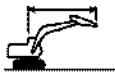
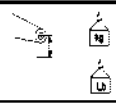
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360									(mm) (inch)
															
9000 360															
7500 300															
6000 240															
4500 180															
3000 120															
1500 60															
0 0															
-1500 -60															
-3000 -120															
-4500 -180															

Illustration 98

g03383923

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2574 mm (101 inch) stick and 750 mm (30 inch) track shoes

Product Information Section
Lifting Capacities

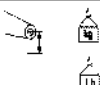
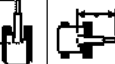
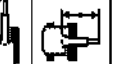
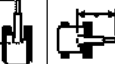
(mm) (inch)	1500 60	3000 120	4500 180	6000 240	7500 300	9000 360							(mm) (inch)
													
9000 360									* 16700 * 37100	* 16700 * 37100			6820 270
7500 300					* 17300 * 38000	* 17300 * 38000			* 15700 * 34700	* 15700 * 34700			8010 320
6000 240				* 20750 * 44900	* 20750 * 44900	* 17950 * 39050			* 15500 * 34100	14550 32300			8770 350
4500 180				* 23400 * 50450	* 23400 * 50450	* 19150 * 41550	18150 39050	* 16850 * 36800	13650 29350	* 15800 * 34700	13100 28950		9230 370
3000 120				* 25800 * 55700	24050 51900	* 20400 * 44200	17400 37500	* 17350 * 37650	13300 28600	* 16550 * 36400	12400 27300		9430 380
1500 60				* 27050 * 58550	23150 49850	* 21200 * 45950	16800 36250	* 17600 * 38100	13000 28000	* 16800 * 37000	12250 27000		9380 370
0 0				* 26950 * 63150	* 26950 * 63150	* 26850 * 58250	22750 48950	* 21250 * 46000	16500 35500	* 17150 * 37300	12850 27950		9080 360
-1500 -60				* 31800 * 69250	* 31800 * 69250	* 25350 * 54900	22700 48900	* 20100 * 43400	16450 35450	* 16900 * 37250	13900 30700		8510 340
-3000 -120				* 31350 * 68550	* 31350 * 68550	* 27350 * 59350	22100 47650	* 22100 * 47650	16800	* 16450 * 36150	* 16450 * 36150		7590 300
-4500 -180				* 19950 * 42550	* 19950 * 42550	* 15350 * 15350				* 14550 * 31600	* 14550 * 31600		6180 240

Illustration 99

g03383930

Lift Chart Above: 374F LC, 7000 mm (276 inch) mass boom, 2574 mm (101 inch) stick and 650 mm (26 inch) track shoes

Identification Information

i08134290

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

Product Identification Number (PIN) and Regional Certification Plate

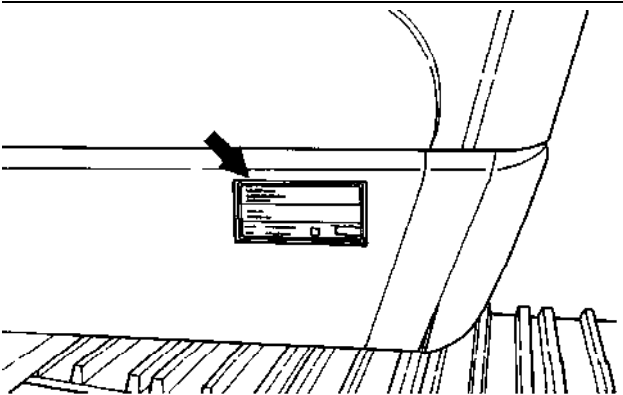


Illustration 100

g00675011

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

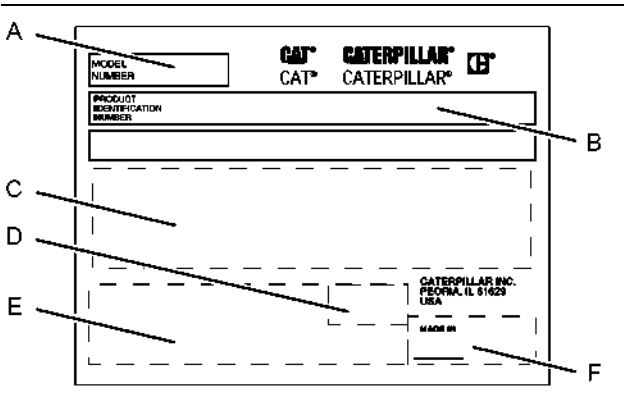


Illustration 101

g02436556

Model number (A) _____

Machine PIN (B) _____

Service Information Plate (C) _____

Year of Manufacture (If Required) (D) _____

Regional Certification Plate (If Required) (E)

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

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

Regional Certification Plate

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

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

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

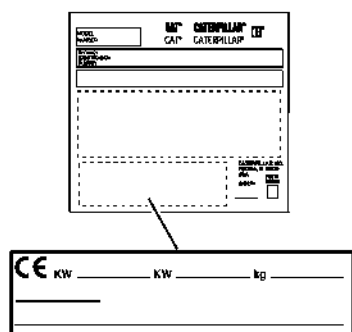


Illustration 102

q01883459

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

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

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

Machine Specification Film

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

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

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



Illustration 103

q06182210

Electromagnetic Emissions

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



Illustration 104

q06063443

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

Engine Serial Number

This label is located on the engine.

Engine Serial Number _____

Sound Certification Film

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

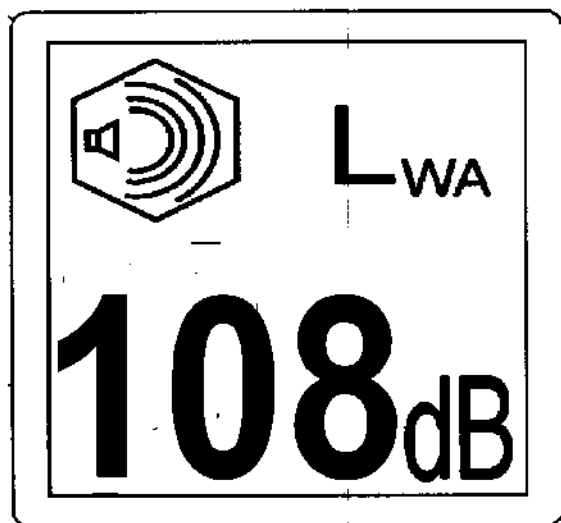


Illustration 105

g03380730

If equipped, the certification label is used to verify the environmental sound certification of the machine to the requirements of the European Union. The value 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".

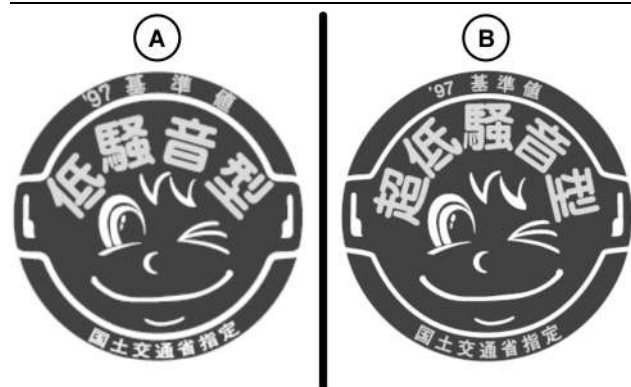


Illustration 106

g03105800

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

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

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

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

i05757951

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Note: This information is pertinent in Japan.



Illustration 107

g03654940

2014 certification label example

A certification label is located on the cab door.

The certification label verifies that the machine conforms to the 2014 Japan Nonroad Special Motor Vehicle Exhaust Regulation.

i08085827

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Consult your Cat dealer for an Emission Control Warranty Statement.

The emission certification film is on the engine.

Declaration of Conformity

SMCS Code: 1000; 7000

Table 22

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

Original EC or EU DECLARATION OF CONFORMITY

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

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

Standards & Regulations Manager, Caterpillar France SAS
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:	374F
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at:

Signature

Date:

Name/Position

Note: The above information was correct as of March 2016, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Operation Section

Before Operation

i04021647

Mounting and Dismounting

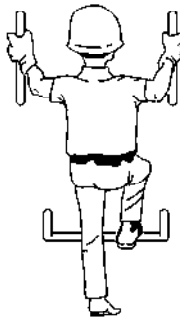
SMCS Code: 6700; 7000

Illustration 108

g00037860

Typical example

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

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

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

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

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

Machine Access System Specifications

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

Alternate Exit

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

i03900822

Daily Inspection

SMCS Code: 1000; 6319; 6700; 7000

NOTICE

Accumulated grease and oil on a machine is a fire hazard.

Remove debris with steam cleaning or high pressure water, at the specified interval in the Maintenance Interval Schedule or each time any significant quantity of oil is spilled on the 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.

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

Reference: For more information, refer to Operation and Maintenance Manual, "Maintenance Interval Schedule".

Remove any trash buildup and debris. Make all necessary repairs before you operate the machine.

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.

Operation Section
Daily Inspection

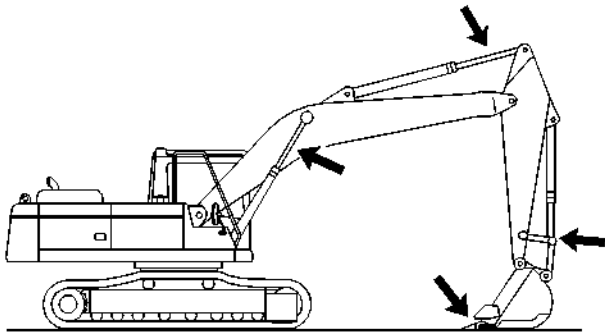


Illustration 109

g02143767

Inspect the hydraulic cylinders for damage or for excessive wear. Inspect the linkage and the bucket for damage or for excessive wear. Make any necessary repairs.

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

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

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

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

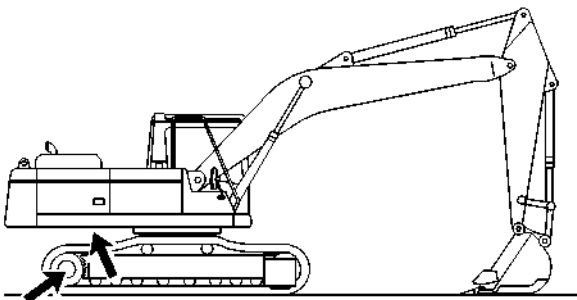


Illustration 110

g02143769

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

Inspect the final drives for leaks. Make any necessary repairs. Check the oil level if leakage is noticed.

Inspect the swing drive for leaks. Make any necessary repairs.

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

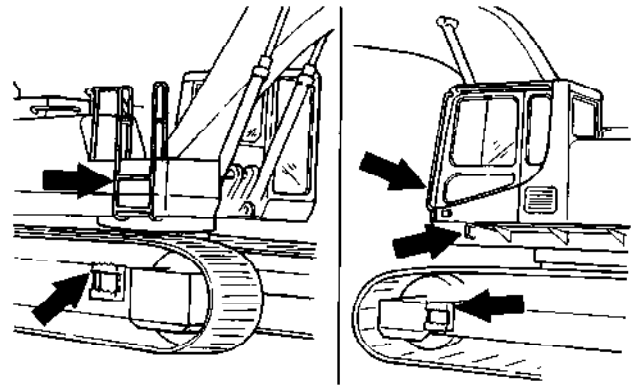


Illustration 111

g00588149

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

Inspect the Falling Object Protective Structure for damage. If repair is necessary, consult your Caterpillar dealer. Tighten any loose bolts.

Inspect the operator compartment for a buildup of trash. Check for a buildup of trash under the floorplate. Keep these areas clean.

Adjust the mirrors for the correct rear view of the machine.

Machine Operation

i05711950

Alternate Exit

SMCS Code: 7310

Front Window (If Equipped)

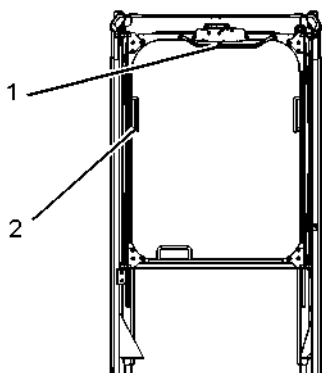


Illustration 112

g02050493

- (1) Lever
(2) Handle

The front window serves as an alternate exit.

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

Roof Hatch (If Equipped)

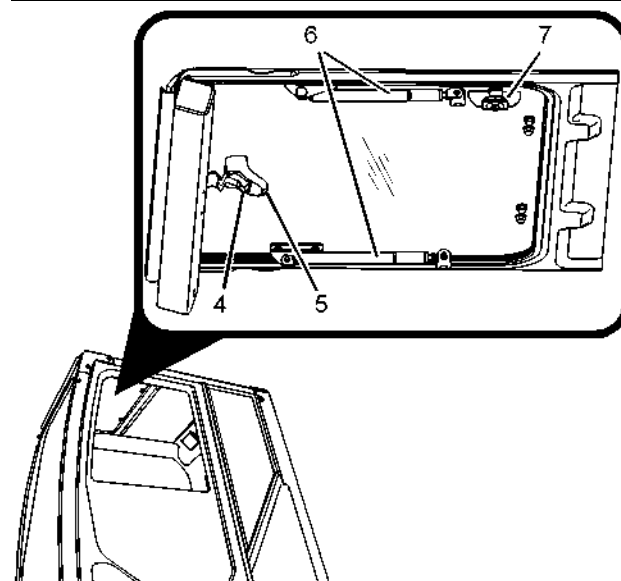


Illustration 113

g02851621

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

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



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

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

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

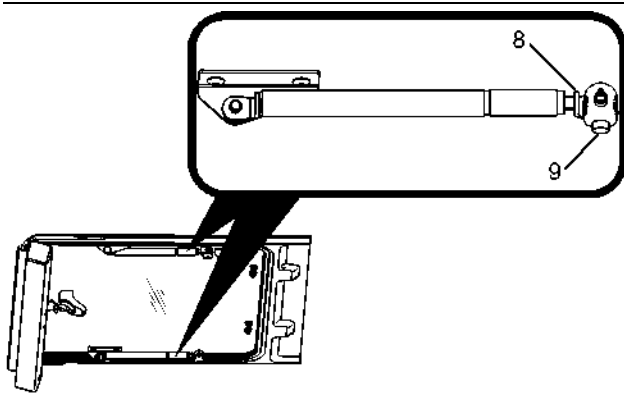


Illustration 114

g02901996

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

Exit through the roof hatch.

Removing the Roof Hatch from the Outside

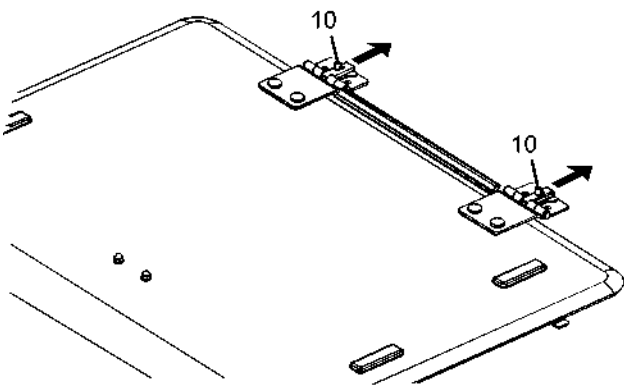


Illustration 115

g02851583

(10) Hinge pin release

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

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

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

Roof Hatch (If Equipped)

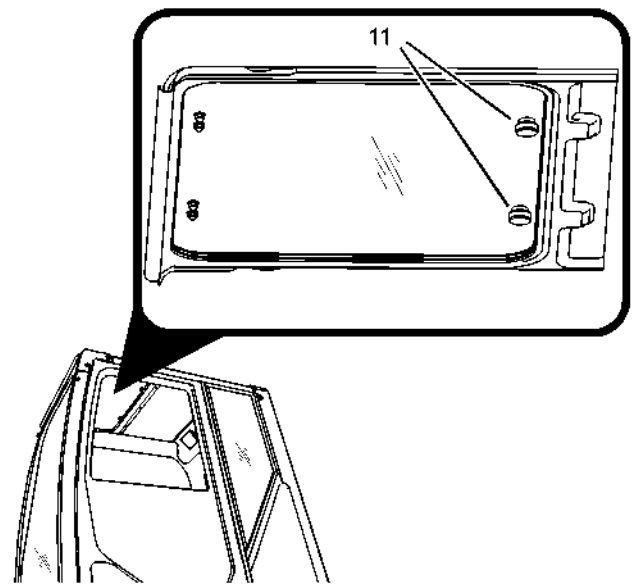


Illustration 116

g02851579



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

Slide the visor cover back.

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

FOGS (If Equipped)

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

Top FOGS

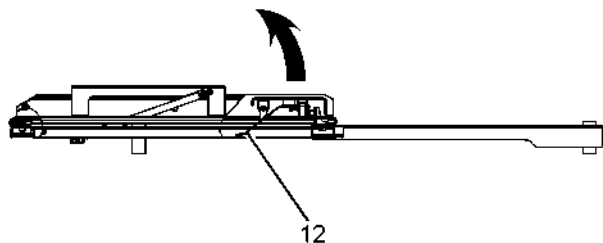


Illustration 117

g02902217

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

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

Front FOGS

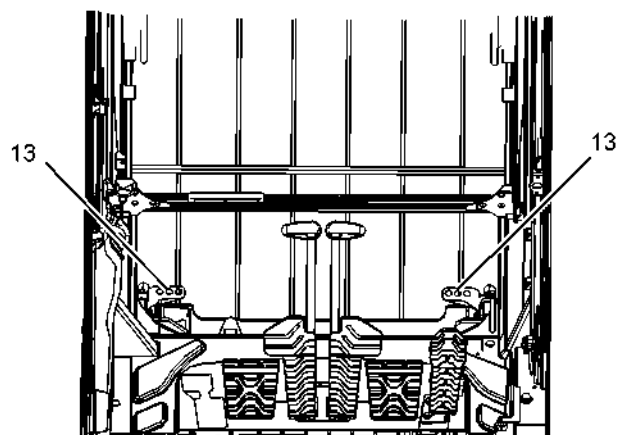


Illustration 118

g02902219

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

i07194752

Seat

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

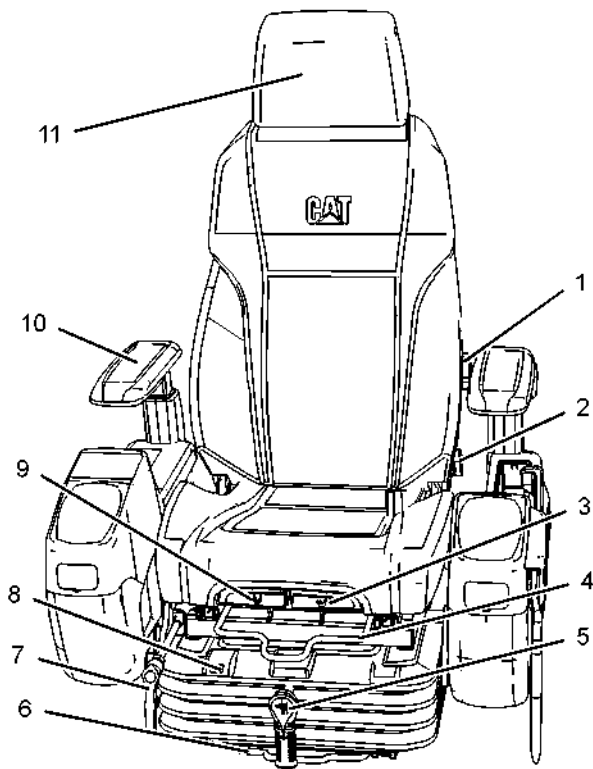


Illustration 119

g01636841

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

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

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

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

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

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

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

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

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

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

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

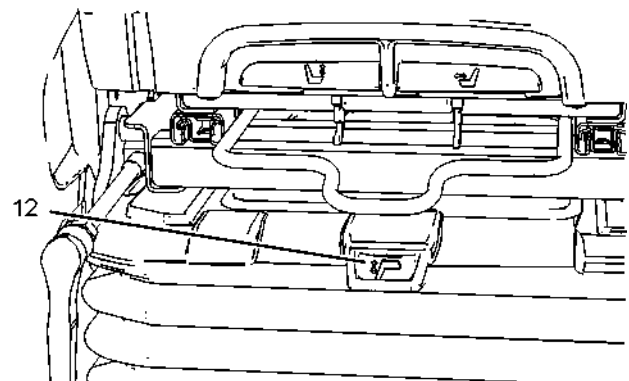


Illustration 120

g01637296

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

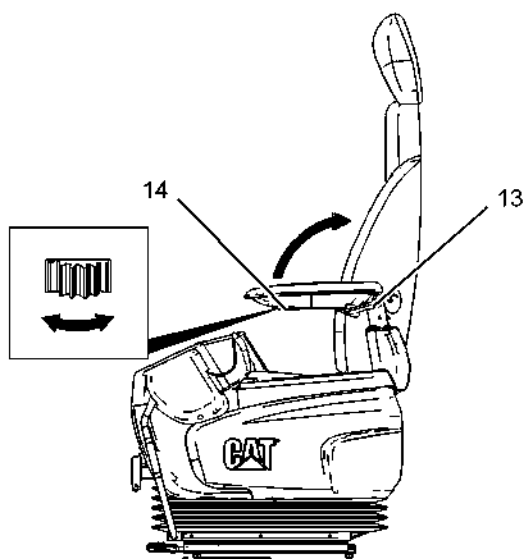


Illustration 121

g01636977

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

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

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

Heated Seat and Ventilated Seat (If Equipped)

WARNING

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

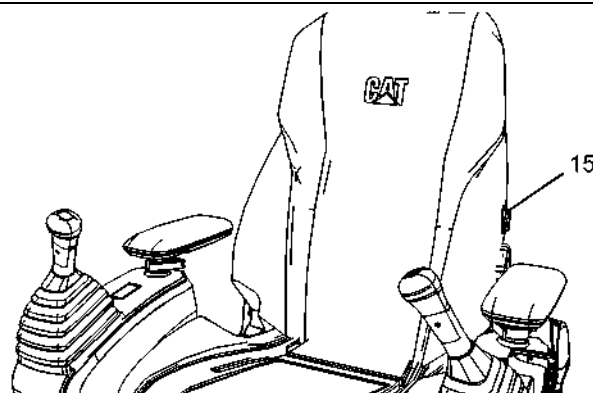


Illustration 122

g06249034

Heated Seat Switch – If equipped with a heated seat, press the top of rocker switch (15) to turn the seat heater to the ON position. Press the bottom of rocker switch (15) to turn the seat heater to the OFF position.

Heated and Ventilated Seat Switch – If equipped with a heated and ventilated seat, press the top of rocker switch (15) for heat. Press the bottom of rocker switch (15) for ventilation. The center switch position is OFF.

i04200349

Seat Belt

SMCS Code: 7327

Note: This machine was equipped with a seat belt when the machine was shipped from Caterpillar. At the time of installation, the seat belt and the instructions for installation of the seat belt meet the SAE J386 and ISO 6683 standards. Consult your Cat dealer for all replacement parts.

Always check the condition of the seat belt and the condition of the mounting hardware before you operate the machine.

Seat Belt Adjustment for Non-Retractable Seat Belts

Adjust both ends of the seat belt. The seat belt should be snug but comfortable.

Lengthening the Seat Belt

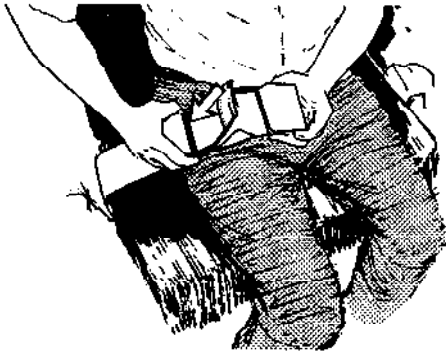


Illustration 123

g00100709

1. Unfasten the seat belt.

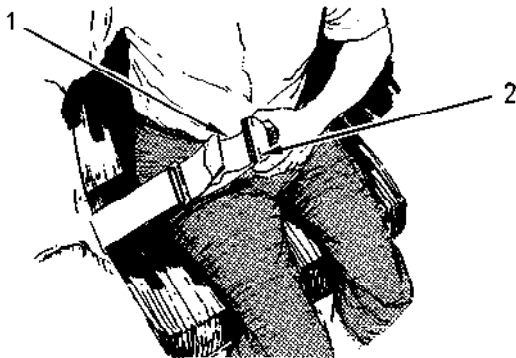


Illustration 124

g00932817

2. To remove the slack in outer loop (1), rotate buckle (2). This will free the lock bar. This permits the seat belt to move through the buckle.
3. Remove the slack from the outer belt loop by pulling on the buckle.
4. Loosen the other half of the seat belt in the same manner. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Shortening the Seat Belt

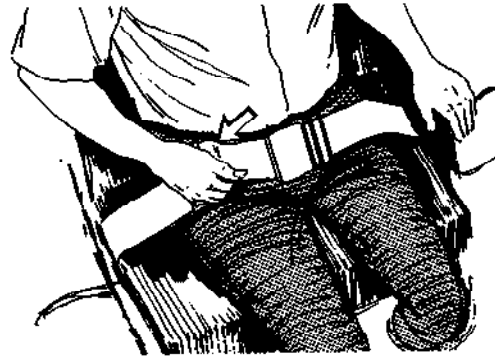


Illustration 125

g00100713

1. Fasten the seat belt. Pull out on the outer belt loop in order to tighten the seat belt.
2. Adjust the other half of the seat belt in the same manner.
3. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Fastening The Seat Belt

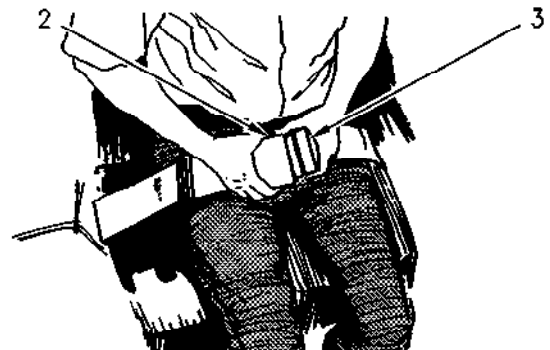


Illustration 126

g00932818

Fasten the seat belt catch (3) into the buckle (2). Make sure that the seat belt is placed low across the lap of the operator.

Releasing The Seat Belt



Illustration 127

g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

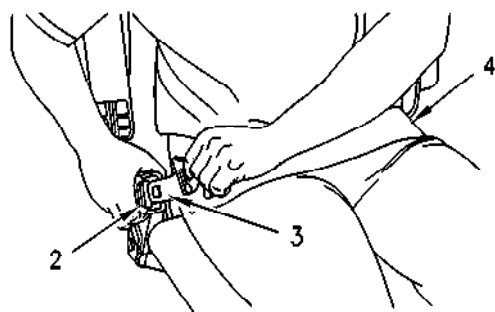


Illustration 128

g00867598

Pull seat belt (4) out of the retractor in a continuous motion.

Fasten seat belt catch (3) into buckle (2). Make sure that the seat belt is placed low across the lap of the operator.

The retractor will adjust the belt length and the retractor will lock in place. The comfort ride sleeve will allow the operator to have limited movement.

Releasing The Seat Belt

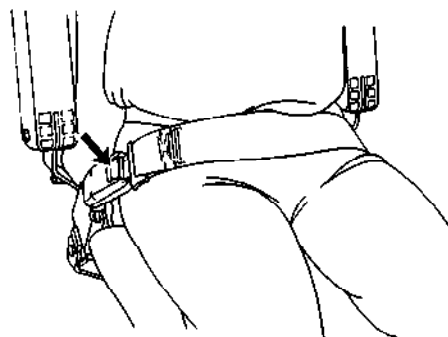


Illustration 129

g00039113

Push the release button on the buckle in order to release the seat belt. The seat belt will automatically retract into the retractor.

Extension of the Seat Belt

⚠ WARNING

When using retractable seat belts, do not use seat belt extensions, or personal injury or death can result.

The retractor system may or may not lock up depending on the length of the extension and the size of the person. If the retractor does not lock up, the seat belt will not retain the person.

Longer, non-retractable seat belts and extensions for the non-retractable seat belts are available.

Caterpillar requires only non-retractable seat belts to be used with a seat belt extension.

Consult your Cat dealer for longer seat belts and for information on extending the seat belts.

i05352913

Diesel Particulate Filter Regeneration

SMCS Code: 108F

Regeneration

Regeneration is to increase the exhaust temperature for a given time. The Caterpillar Regeneration System (CRS) is used to remove soot from the DPF, warm up the SCR catalyst and remove urea deposits when necessary. The DPF traps both soot and ash. The ash is removed through a cleaning process. Refer to Operation and Maintenance Manual, "Diesel Particulate Filter - Clean" for more information on the service of the DPF.

Regeneration Indicators



Regeneration Active – This indicator will illuminate in order to show that the CRS is active. This indicator shows that elevated emission temperatures are possible. This indicator will turn off when regeneration is complete.



DPF – This indicator will illuminate in order to show that a regeneration is needed. This indicator will illuminate when the soot level reaches 90%.



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

Regeneration Switch



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



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

Note: The MIDDLE position of the regeneration switch is the default position for automatic regeneration.

Note: You may return to normal operation at any point during a regeneration.

Note: To re-enable automatic regeneration, cycle the engine start switch key or press and hold down the force regeneration switch for 2 seconds. If the soot level is above 15%, regeneration will begin if the machine is at low idle and is parked.

Note: If, the engine start switch key is cycled while the regeneration system is disabled through the disable regeneration switch, press, and hold the disable regeneration switch for 2 seconds to reinitiate the disable regeneration.

Modes of Regeneration

Automatic: The engine ECM uses multiple inputs from the engine and the machine to determine the best time to perform an automatic regeneration. Automatic regenerations can take place throughout the operating cycle of the engine. The regeneration active indicator will be illuminated when a regeneration is being performed. Interruptions of the regeneration are acceptable. If a regeneration is in progress and needs to be stopped for any reason, it is permissible to press the disable regeneration switch or turn off the engine.

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

Note: If an automatic regeneration is started while the engine is at low idle and the machine is taken back to work, this may stop the regeneration. The engine ECM will continue to monitor inputs to determine the best time to restart the regeneration.

Manual: A manual regeneration is initiated by pressing the force regeneration switch. A manual regeneration is allowed when the soot level is equal to or greater than 15%. The machine must be stationary, the parking brake must be applied, and the engine must be at low idle. In order to perform a manual regeneration.

Disabled: When the regeneration system is in disabled mode, automatic regenerations will not be performed.

Regeneration Triggers

A regeneration may be required for the following reasons:

Soot: The DPF will collect soot produced by the engine. The percentage of soot in the DPF can be viewed on a performance screen under "DPF Level" on the display panel. An automatic regeneration to reduce soot could become active between 80% and 116% soot level.

Start: A start regeneration could be initiated by the ECM at the start of a cold engine. This is to reach a desired SCR catalyst temperature to allow DEF dosing to start.

SCR Maintenance: The ECM uses multiple inputs and determines when urea deposits may be present in the exhaust system. The CRS will heat the exhaust to remove the deposits anywhere in the exhaust system.

ARD Maintenance: Some applications may have a significant time between when a regeneration has occurred. A regeneration will occur if this time is greater than 25 hours to flush fuel through the CRS system.

Regeneration System Warning Indicators



Illustration 130

g02117258

Indicator will illuminate when a regeneration is required. Soot level is greater than 90%

Regeneration should be performed as soon as possible. A manual regeneration should be performed as soon as possible.

Indicator will turn off once DPF regeneration has started.

Note: In some situations, the DPF indicator may stay illuminated when the soot load is below 90%. The illuminated DPF indicator indicates that a complete regeneration has **not** been performed. A complete regeneration is when the soot level is reduced to 0%. If the DPF indicator stays illuminated, perform a regeneration without interruption until the soot level is reduced to 0%. A complete regeneration will reset the DPF indicator.

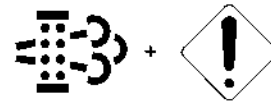


Illustration 131

g02117259

If the soot level has reached 100% or the “Time to Regen” is 0 hours, then a regeneration is required, the DPF indicator and an action indicator will be illuminated. Stop the machine and apply the parking brake. With the engine at low idle, initiate a manual regeneration. Engine power will be slightly derated if the machine continues to operate. The engine will also be derated to 50% power. Engine power will gradually be lost until 100% soot or 25 hours without a regeneration.



Illustration 132

g02117261

Once the soot level has reached 116% soot, the DPF indicator and an action indicator will be illuminated and an audible alarm will sound.

10 minutes after the soot level has reached 116%, the engine will shut down. Cycle the engine start switch key to return the engine to the previous derate before engine shutdown.

If the soot level reaches 120% or 5 hours of run time since the action indicator was illuminated without a successful regeneration, the engine will have a 100% derate.

Once the engine has reached 140% soot, the regeneration will be locked out. At this time, a regeneration can only be done through Cat Electronic Technician (ET), by an authorized Cat dealer. The engine may be restarted but will only run for 30 seconds before shutting down again.

Delayed Engine Shutdown

The Delayed Engine Shutdown allows the engine to run for a time after the engine start switch is turned to the OFF position to cool the engine and the machine system components. The engine start switch key may be removed.

Note: There may be regulations that define the requirements for the operator and/or support personnel to be present when the engine is running.

WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the travel controls, lower the work tools to the ground and deactivate all work tools, and place the lever for the hydraulic lockout control in the LOCKED position.

Refer to Operation and Maintenance Manual, "Parking" for more information.

Note: Leaving the machine unattended when the engine is running may result in property damage in the event of a malfunction.

Turn the engine start switch to the OFF position.



Delayed Engine Shutdown – The delayed engine shutdown indicator will illuminate or the following text will be displayed, ENGINE COOLDOWN ACTIVE.

Delayed engine shutdown will run for a minimum of 30 seconds and will continue to run until the engine and machine system components are cooled. The maximum run time is 10 minutes.

Note: To override delayed engine shutdown and stop the engine, turn the engine start switch to the STOP position. Overriding delayed engine shutdown may reduce engine and machine system component life. A warning message and/or audible alarm will be initiated and a fault code will be logged for improper engine shutdown.

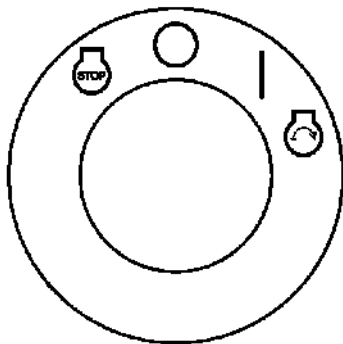


Illustration 133

g02362719

Note: At any time during a delayed engine shutdown, the engine start switch may be turned to the ON position. The machine may be placed back into service.

Note: With the operator key in the OFF position, the purge system will activate after a delayed engine shutdown.



DEF Purge – DEF Purge allows to extract the residual DEF from the DEF injectors, lines, and pump. The DEF purge will activate during a Delayed Engine Shutdown is running or after the key to the Engine is turned OFF in the shutdown position. The start key may be removed.

Note: There may be regulations that define the requirements for the operator and/or support personnel to be present when the engine is running.

WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the travel controls, lower the work tools to the ground and deactivate all work tools, and place the lever for the hydraulic lockout control in the LOCKED position.

Refer to Operation and Maintenance Manual, "Parking" for more information.

Note: Leaving the machine unattended when the engine is running may result in property damage in the event of a malfunction.

i06301373

Selective Catalytic Reduction Warning System

SMCS Code: 1091-WXX; 7400

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

NOTICE

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

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

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

Definitions

Observe the following definitions.

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

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

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

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

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

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

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

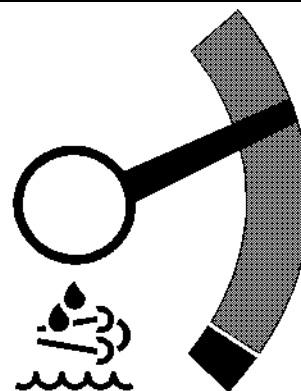


Illustration 134

g03684888

DEF Level Normal

Inducement Strategy for DEF Level

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

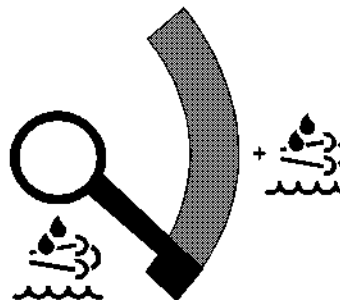


Illustration 135

g03681105

DEF Level Low

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

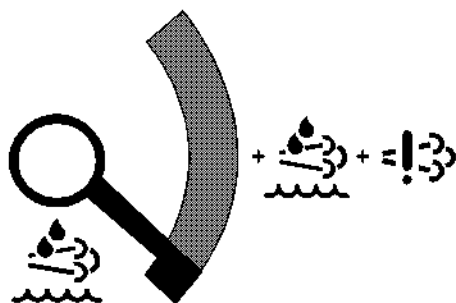


Illustration 136

g03681073

DEF Level Low and Emission Fault

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

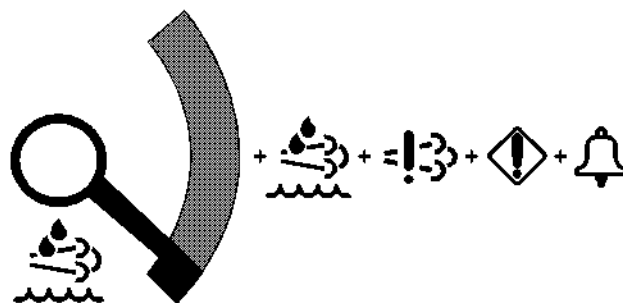


Illustration 138

g03681078

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

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

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

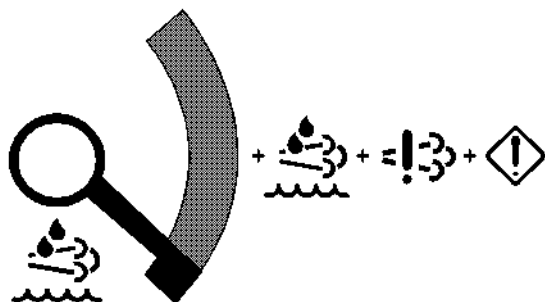


Illustration 137

g03681077

DEF Level Low, Emission Fault, and Flashing Action Lamp

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

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

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



Illustration 139

g03623190

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

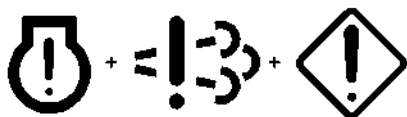


Illustration 140

g03623191

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

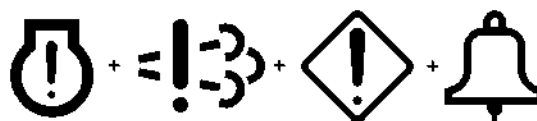


Illustration 141

g03623193

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

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

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

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

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

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

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

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

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

NOTICE

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

Override Activation Method

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

Setting the Override through Cat Electronic Technician (ET)

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

Setting the Override through Electronic Display Menu

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

Resetting the Override

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

Override Usage Report

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

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

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

Email :

Emissions_Compliance@cat.com

Regular Mail :

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

i07568615

Operator Controls

SMCS Code: 7300; 7301; 7451

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

Cat Grade Control (If Equipped)

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

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

Operator Controls

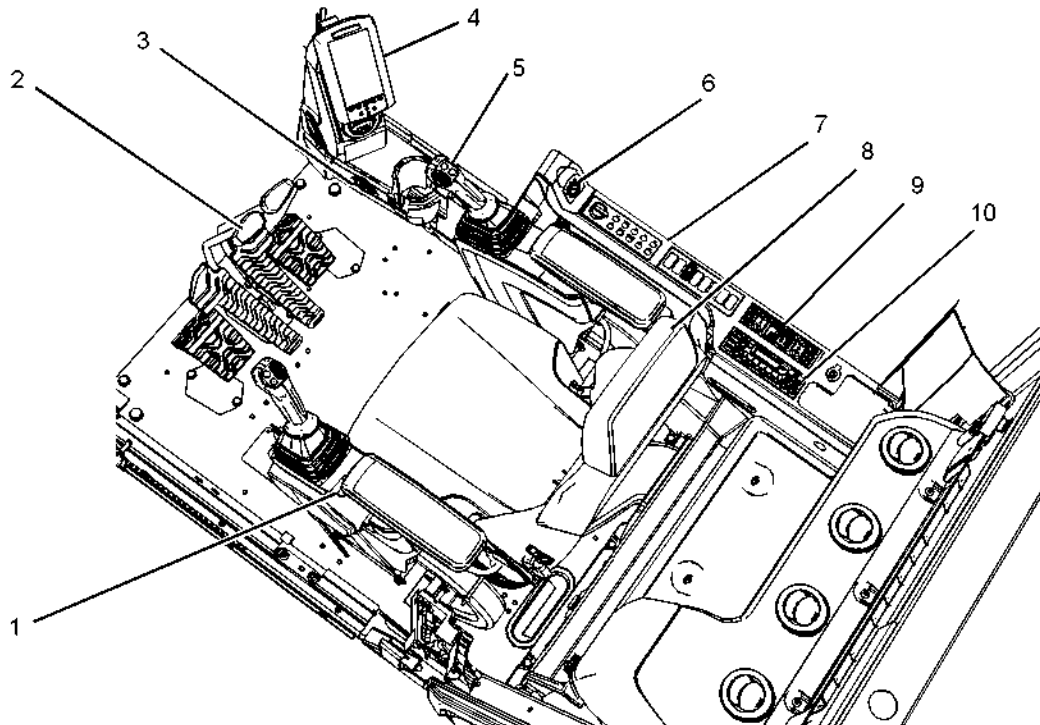


Illustration 142

g03071956

- (1) Hydraulic lockout control
- (2) Travel controls
- (3) Service hour meter
- (4) Monitor

- (5) Joystick controls
- (6) Engine start switch
- (7) Right side control panel
- (8) Operator seat

- (9) Air conditioning and heating control
- (10) Radio

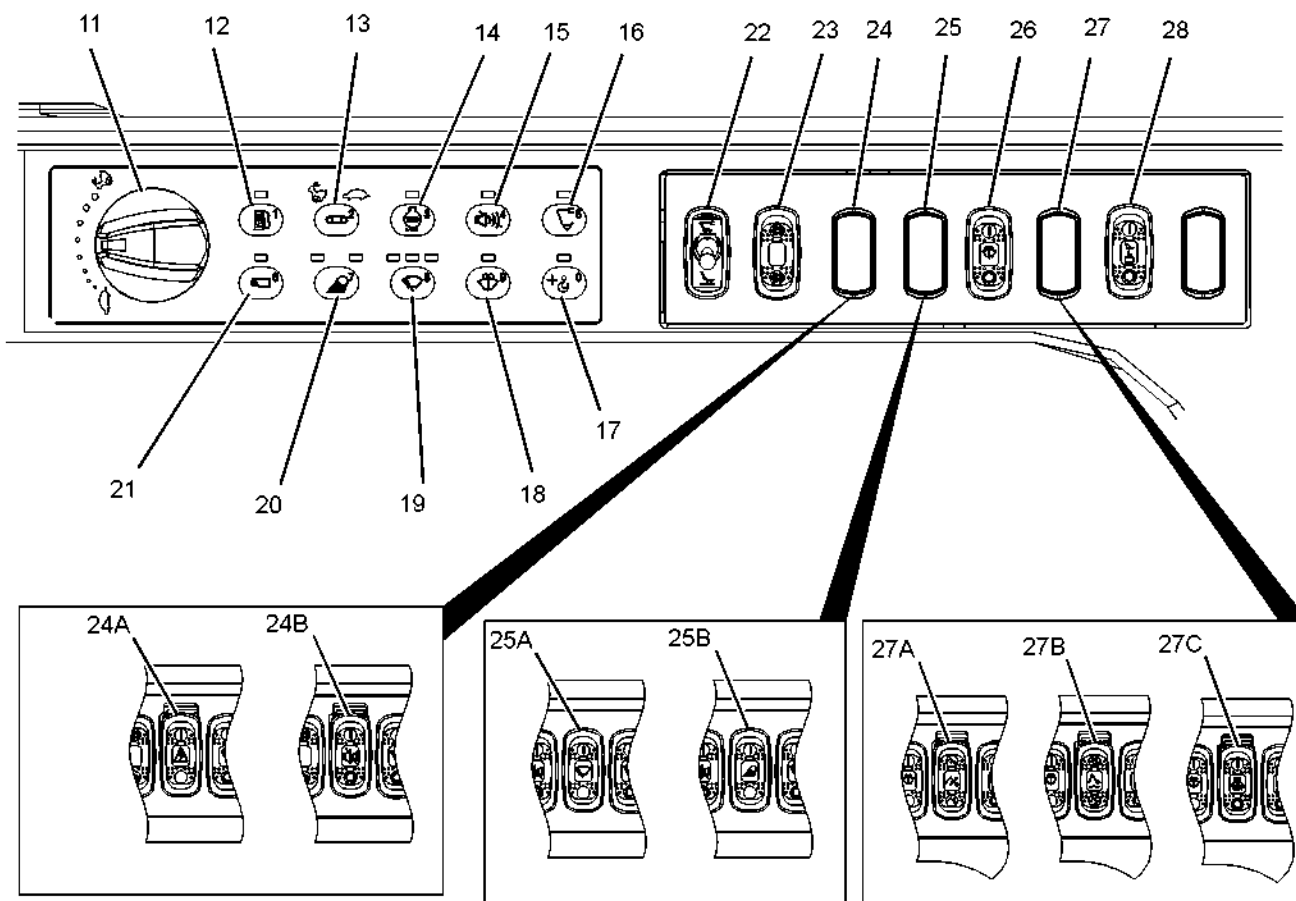


Illustration 143

g03629778

- (11) Engine speed control
- (12) Power mode
- (13) Travel speed control
- (14) Automatic engine speed control (AEC)
- (15) Travel alarm switch
- (16) Work tool control
- (17) Lift control
- (18) Window washer

- (19) Window wiper
- (20) Light switch
- (21) Rear/Side view camera
- (22) Quick coupler control
- (23) Cat Regeneration System (CRS) switch
- (24A) Crane switch
- (24B) Radio mute
- (25A) Lower window wiper

- (25B) Platform light
- (26) Lower window washer
- (27A) Boom pressure control switch
- (27B) SmartBoom control
- (27C) Fine swing control
- (28) Overload warning device

Note: Make sure that Switch is specified to each attachment. If the attachment is not ordered, Switch is not activated even though a dedicated symbol for related control is displayed.

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.

Hydraulic Lockout Control (1)

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



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



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

Travel Control (2)

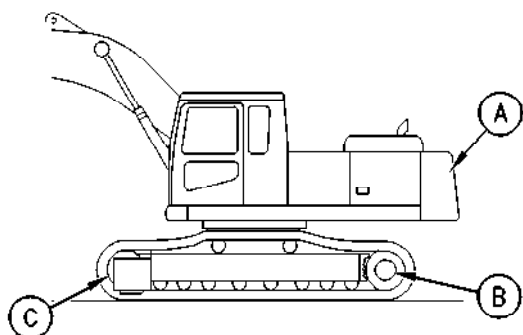


Illustration 144

g00753277

Position for normal travel

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

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

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

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

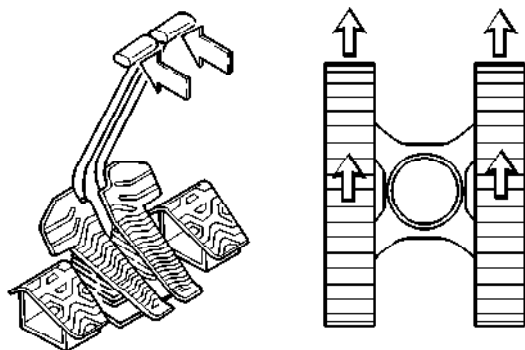


Illustration 145

g00731542

FORWARD travel

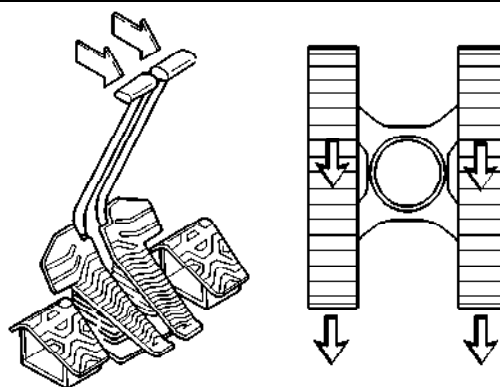


Illustration 146

g00731543

REVERSE travel

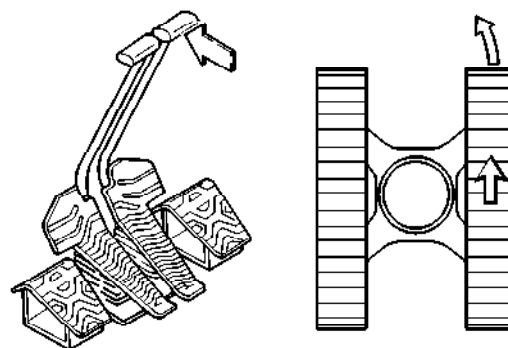


Illustration 147

g00731472

Pivot left turn (FORWARD)

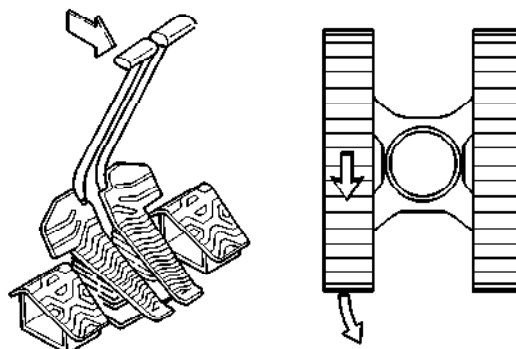


Illustration 148

g00731478

Pivot Left Turn (REVERSE)

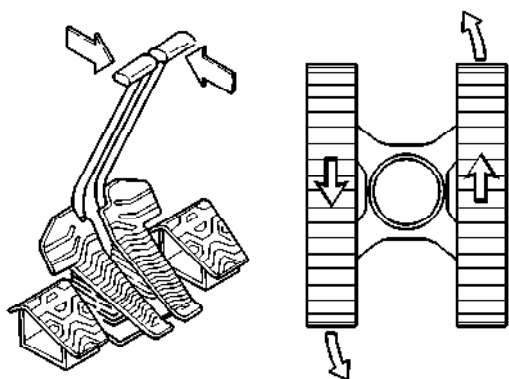


Illustration 149

g00731476

Counterrotate turn (LEFT)

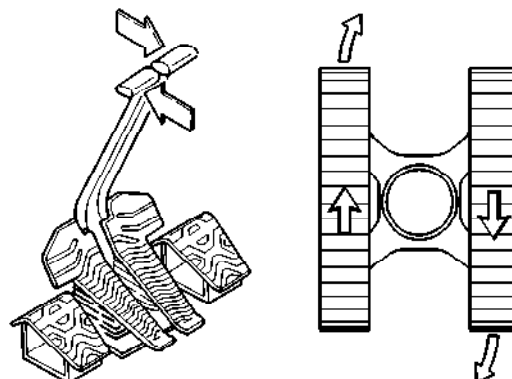


Illustration 152

g00731477

Counterrotate turn (RIGHT)

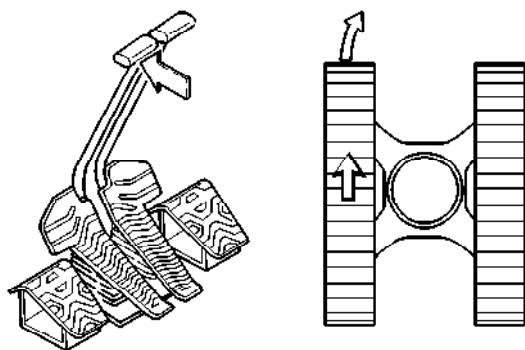


Illustration 150

g00731471

Pivot right turn (FORWARD)

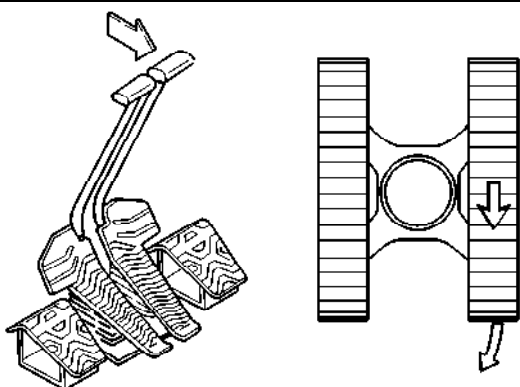


Illustration 151

g00731479

Pivot right turn (REVERSE)

Service Hour Meter (3)



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

Monitor (4)

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

Joystick Controls (5)

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

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

Engine Start Switch (6)

NOTICE

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

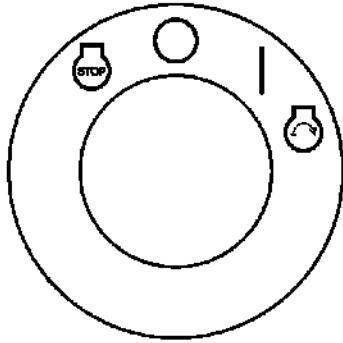


Illustration 153

g02362719



Engine Stop (Shutdown) – Turn the key to this position in order 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 – Insert the engine start switch key only while the start switch is in the OFF position. Remove the engine start switch key only while the engine start switch is in the OFF position. Turn the engine start switch to the OFF position before you attempt to restart the engine. Turn the engine start switch to the OFF position in order to stop the engine.



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



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

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

Engine Idle Shutdown (7)

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

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

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

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

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



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

Operators Seat (8)

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

Air Conditioning and Heating Control (9)

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

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

Radio (10)

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

Engine Speed Control (11)



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



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



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

Power Mode (12)



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

Travel Speed Control (13)

WARNING

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

Personal injury can result from sudden changes in machine stability.



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



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



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

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

Automatic Engine Speed Control (14)

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. The AEC system operates in three modes. Refer to Table 23 for a description of each mode.



Automatic Engine Speed Control (AEC) – The Automatic Engine Speed Control switch is activated when the engine start switch is turned to the ON position. The indicator lamp will turn on. When you press the AEC switch, the function of the AEC switch changes from ON to OFF. The operator can choose from three possible modes for automatic engine speed control. Refer to Table 23 for more details.

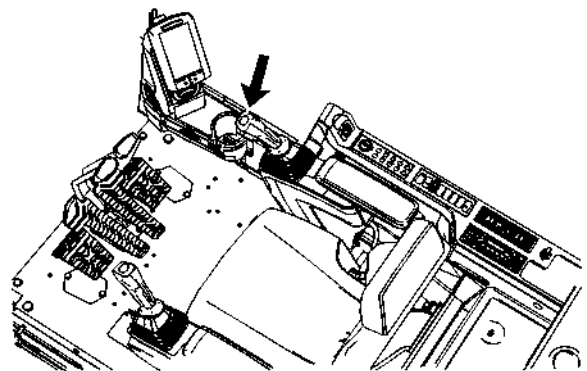


Illustration 154

g02050056

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

Manual Low Idle – Activate the manual low idle in order to reduce the engine speed to approximately 1060 rpm. Pressing the switch again will allow the engine speed to return to the original setting of the engine speed dial.

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

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

Table 23

AEC Mode	Position of AEC Switch	Setting of Engine Speed Dial	Position of Manual Low Idle Switch	Description of Mode
First stage	OFF	4 to 10	OFF	The electronic controller automatically reduces engine speed by 100 rpm after there has been no hydraulic demand for approximately 3 seconds.
Second stage	ON	4 to 10	OFF	The AEC system in the electronic controller will automatically reduce the engine rpm to approximately 1060 rpm after there has been no hydraulic demand for approximately 3 seconds.
Manual low Idle	ON or OFF	2 to 10	ON	The engine speed is reduced to approximately 1060 rpm.

Travel Alarm Cancel Switch (15)



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

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

Work Tool Control (16)



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

Lift Control (17)

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



Lift Mode – Decreased flow for fine control and usability. The cylinder speed is slower when this mode is selected.

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

Window Wiper and Window Washer (18-19)



Window Washer (18) – Push the switch in order to activate the window washer. While the switch is depressed, the indicator light will come on and washer fluid will spray from the nozzle. The window wiper will also operate while the switch is depressed. After the switch is released for approximately 3 seconds, the window wiper will stop.



Window Wiper (19) – Push the switch in order to activate the window wiper. Whenever the switch is depressed, the mode of the window wiper will change according to the indicator light that is illuminated.

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

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

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

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

NOTICE

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

NOTICE

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

Light Switch (20)

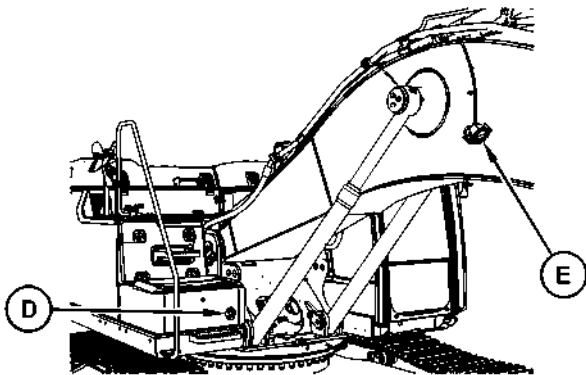


Illustration 155

g02049516

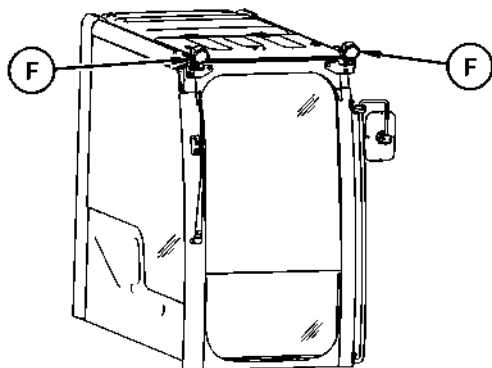


Illustration 156

g02049520



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

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

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

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

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

Note: Your machine may be equipped with a lighting system that has a time delay. When this system is installed, cab lights (F) and boom lights (E) will not turn off for a predetermined amount of time after the engine start key has been turned to the OFF position. The time delay can vary from 0 minutes to 5 minutes. For further details, consult your Cat dealer.

Rear/Side View Camera (21)



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

Quick Coupler Control (22)

Hydraulic Pin Grabber Quick Coupler

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



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



UNLOCKED – Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge.

Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized when the switch is in this position.

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

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

Quick Coupler



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



UNLOCKED – Move the switch for the quick coupler to the UNLOCKED position in order to extend the wedge.

Use this position only during the coupling or uncoupling of the work tool. The hydraulic system is pressurized when the switch is in this position.

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

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

Cat Regeneration System (CRS) Aftertreatment Switch (23)



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



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

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

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

Crane Auto Stop Cancel Switch (24A)



Crane Auto Stop Cancel – If equipped, press and hold this switch in order to turn off the crane auto stop function.

Radio Mute Switch (24B)



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

Lower Window Wiper (25A) (If Equipped)



Lower Window Wiper (25B) – Push down on the top of the switch in order to turn on the lower window wiper. Push down the bottom portion of the switch in order to turn off the lower window wiper.

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.

Platform Light (25B) (If Equipped)



Platform Light – Press the switch in order to turn on the platform light which is installed at the rear of the cab.

Lower Window Washer (26) (If Equipped)



Lower Window Washer (26) – Push down on the top of the switch and keep the switch depressed in order to activate the lower window washer. While the switch is depressed, the washer fluid will spray from the nozzle.

NOTICE

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

Boom Pressure Control (27A)

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

SmartBoom Control (27B)

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

Fine Swing Control (27C)
 WARNING

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

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

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



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

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

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

Overload Warning Device (28)

If equipped, the switch for the overload warning device is located on the right console.



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



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



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

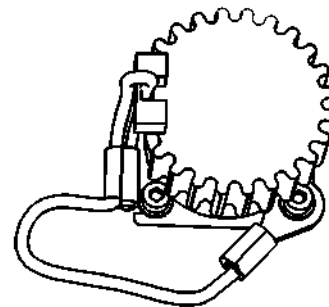
Service Port

Illustration 157

g03320855

Electronic Technician service port

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

Contact your Cat dealer for additional information.

i05621751

Battery Disconnect Switch

SMCS Code: 1411-B11

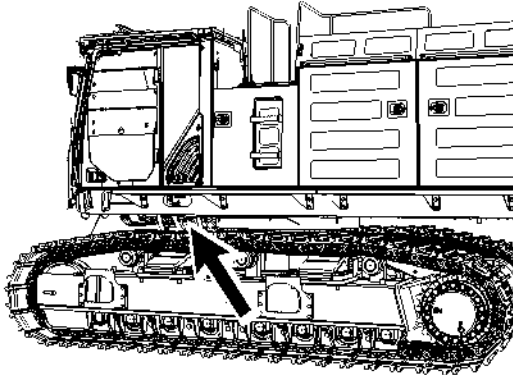


Illustration 158

g03569314

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

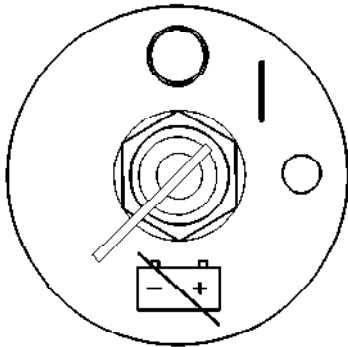


Illustration 159

g00406959



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



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

The battery disconnect switch and the engine start switch perform different functions. The entire electrical system is disabled when you turn the battery disconnect switch to the OFF position. The battery remains connected to the electrical system when you turn the engine start switch to the OFF position.

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

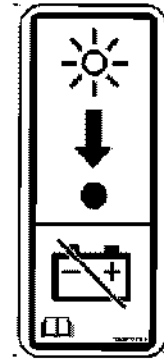


Illustration 160

g03382729

NOTICE

Do not turn off the battery disconnect switch until the indicator lamp has turned off. If the switch is turned off when the indicator lamp is illuminated the Diesel Exhaust Fluid (DEF) system will not purge the DEF. If the DEF does not purge, DEF could freeze and damage the pump and lines.

NOTICE

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

i05151989

Product Link (Product Link Japan)

SMCS Code: 7490; 7606

NOTICE

Vehicles equipped with Product Link Japan are equipped with wireless devices that use public wireless radio waves. Be sure to read and understand the following precautions for use of this system.

Product Link Japan uses public wireless networks and cannot be used in areas where radio wave cannot be received.

A machine may become inoperable if the antenna and corresponding equipment are removed or damaged. If the antenna or corresponding equipment need to be removed, consult with your Cat dealer.

Persons with an implantable cardiac pacemaker or implantable defibrillator must not approach within 22 cm (8 inch) of the antenna that is installed at the rear of an operator seat as such devices can be negatively affected by the radio waves.

Electronic devices can be negatively affected by radio waves. If electronic devices are used near this system, consult the manufacturer of the electronic device regarding the affects of radio waves on operation.

This system consumes power even when the engine start switch is turned "OFF". If storing a machine for an extended period, make sure that the battery is fully charged and turn the power disconnect switch to OFF.

Your machine may be equipped with the Cat[®] Product Link Japan system.

The Product Link Japan system is a remote management system in which machine information is automatically transmitted from a machine to a customers office.

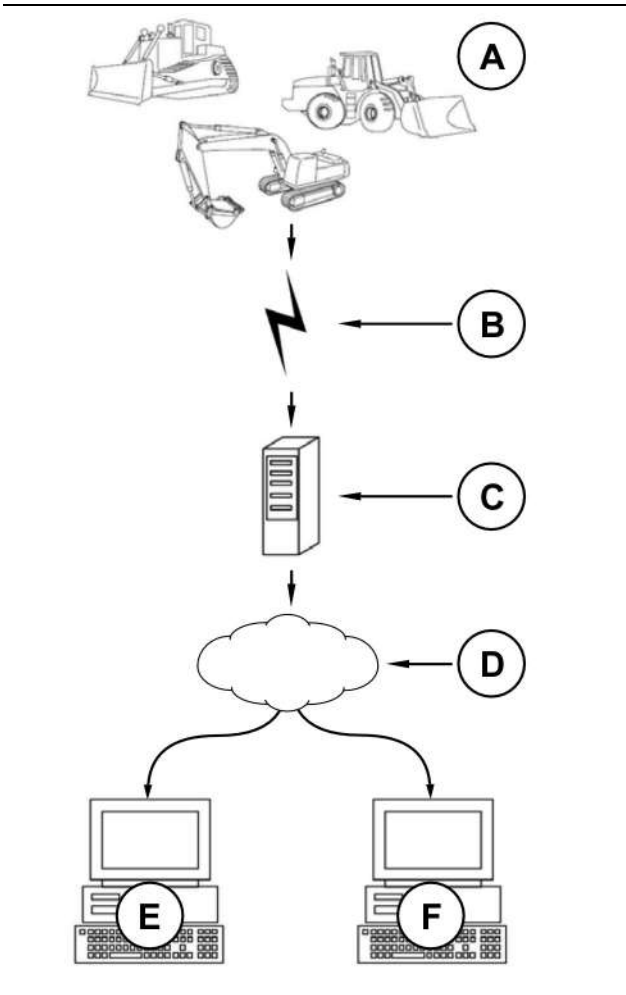


Illustration 161

g03317923

- (A) Machine (equipped with Product Link Japan)
- (B) Wireless network
- (C) Product Link Japan Center Sever
- (D) Internet
- (E) Customers computer or similar device
- (F) Cat dealer computer or similar device

For machines equipped with a wireless device the Product Link Japan system will send information from the machine to the Product Link Japan Center. The transmitted information can then be monitored through the Caterpillar website using a computer or similar device that is connected to the Internet.

Below is a list of items that can be monitored with the Product Link Japan system.

Table 24

Product Link Japan Functions	
Operating Information	Location information (latitude/longitude)
	Accumulated operating time
	Operating status by time period

(continued)

(Table 24, contd)

i08001446

	Fuel level
Maintenance Information	Engine coolant
	Engine oil
	Hydraulic oil
	Travel drive oil
	Swing drive oil
	Water separator (primary fuel filter)
	Secondary fuel filter
	Fuel pump screen filter
	Fuel tank cap
	Engine oil filter
	Pilot filter
	Drain filter
	Return filter
	Attachment filter
	Blowby gas filter
	Ignition plug
Warnings	Starting restrictions/Area warnings
	Other warnings
Starting Restrictions	Date conditions
	Day of the week conditions
	Time conditions
	Area conditions

Product Link Japan can also be used to specify and apply machine starting restrictions by using a personal computer or similar device that is connected to the Internet. Starting restrictions will prevent the engine from being started in accordance with the specified conditions. See your Cat dealer for additional information.

A "Security System Operating" message will appear on the monitor when a starting restriction has prevented the engine from being started.

Note: Starting restrictions can be temporarily canceled. Notify your site manager for more information or contact your Cat dealer.

Note: A machine may become inoperable if the antenna and corresponding equipment are removed or damaged. Contact your Cat dealer if starting restrictions have been applied when starting restrictions have not been specified.

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"

i02793352

Power Receptacle (If Equipped)

SMCS Code: 1436; 7451

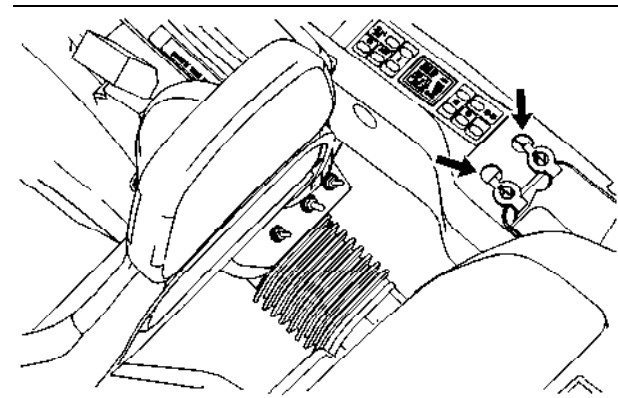


Illustration 162

g01073919

Power Receptacle – A twelve volt power receptacle is located on the right side console. This power receptacle can be used for powering automotive electrical equipment or accessories. Remove the cap before use. This machine can be equipped with one power receptacle or with two power receptacles.

i07037877

Machine Security System (If Equipped)

SMCS Code: 7631

Operation Section

NOTICE

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



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

Basic Operation

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

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

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

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

Security Management

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

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

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

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

Regulatory Compliance Section



Illustration 163

g00832427

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

CATERPILLAR

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

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

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

Has been manufactured in conformity with

— EC type-examination (1)

— EC self-certification (2)

as shown in the table below

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

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

6. Special Provisions...

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

Date
2001-10-03

Signature:

Mark Pfeleiderer
Administrative

Illustration 164

g00822256

i06649948

Camera

SMCS Code: 7347; 7348

Your machine may be equipped with two types of cameras.

Rear View Camera (If Equipped)

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

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

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

Side View Camera (If Equipped)

The side view camera system consists of a camera that is located on the top of the fuel tank and a “VIDEO MODE SETTING” menu on the monitor.

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

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

Work Area Vision System (WAVS) (If Equipped)

Operation

WAVS is a closed circuit video monitoring system. WAVS consists of a 178 mm (7 inch) LCD display and a camera. The display is mounted in the machine cab.

Power is supplied to the system when the operator turns the engine start switch to the ON position. The power ON/OFF button that is on the display is disabled.

The camera lens and the display screen will require periodic cleaning. Cleaning instructions for the camera lens and the display are described in the Maintenance section.

Automatic Mode

The single camera system is only available with the automatic mode. The single camera system can be placed in “Standby” .

Note: If the single camera system can be placed in manual mode, notify service personnel.

WAVS will automatically display the camera view which is based on current machine operation and the configuration of WAVS. For example, WAVS may be configured to display a side view from a side-mounted camera.

Camera

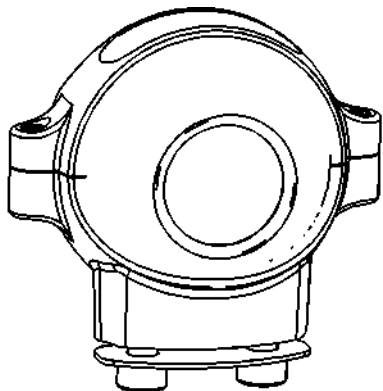


Illustration 165

g01223051

WAVS camera

The orientation of the camera is set during installation. After installation, there should be no need to make any physical adjustments to any of the cameras under normal operating conditions. WAVS uses a fixed-focused camera that has been installed at the factory, a Caterpillar dealer, or a qualified technician.

Display

Keypad

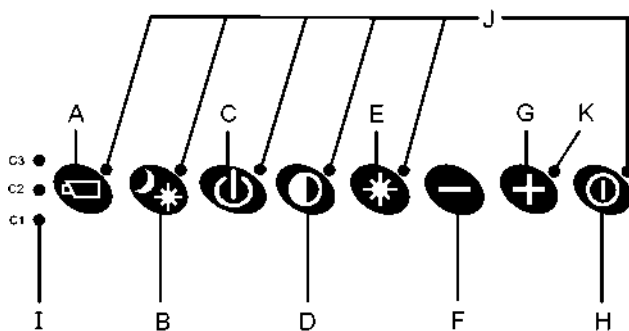


Illustration 166

g01291176

- (A) Camera Selection Button (multiple cameras only)
- (B) Automatic Brightness
- (C) Standby Function
- (D) Contrast Button
- (E) Brightness Button
- (F) Decrease Adjustment Button
- (G) Increase Adjustment Button
- (H) Power Button (disabled)
- (I) Camera Select LED Lights (multiple cameras only)
- (J) Button Status LED Lights
- (K) Light Sensor

Adjustment

The following selections for the WAVS display can be changed by the operator.

Table 25

Display Button Operation for single camera system		
Operation	Procedure	Notes
Brightness Adjustment	Press button (E) in order to enable the "Brightness Adjustment" . Then press either button (F) or (G) in order to adjust the brightness.	Press any other display button in order to exit brightness adjustment mode.
Contrast Adjustment	Press button (D) in order to enable the Contrast Adjustment. Then press either button (6) or (7) in order to adjust the contrast level.	Press any other display button in order to exit the adjustment for the contrast.
Automatic Brightness ON/OFF	Press button (B) in order to turn the automatic brightness ON/OFF.	When WAVS is placed in the "Automatic Brightness" mode, the display will illuminate or the display will dim automatically as the ambient light increases or decreases. The set point for the brightness can be changed by the operator. Turn the auto brightness on, and adjust the brightness to the desired level in order to change the starting set point.
Standby ON/OFF	Press button (C) in order to turn the standby ON/OFF.	Standby may be useful at night, when the display is not desired. If the standby mode is on, the display will remain dark until a WAVS input is detected, however, the power and standby LED should remain on.
LED Indicators		
If LED for button (H) and the LED (I) for the camera flash together, the image will turn off because the ambient temperature is below -25 °C (-13°F) or above 70 °C (158 °F).		

Marker Line

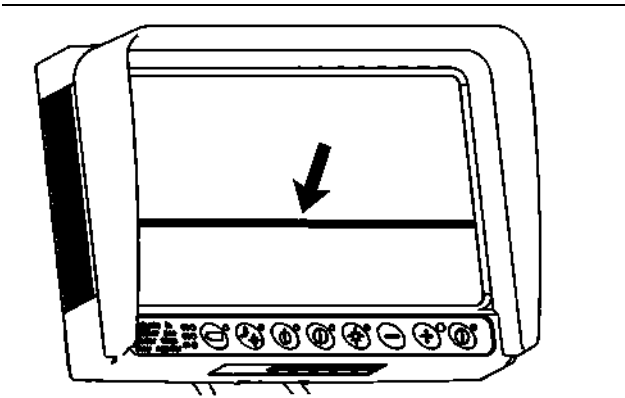


Illustration 167

g01291431

Display screen with marker line

The marker line option provides a green horizontal line on the display. The marker line can be configured by a Caterpillar technician. The marker line represents a fixed distance from the machine. The marker line is not adjustable by the operator.

Mounting Position

In order to adjust the position of the display , perform the following steps:

1. Hold the display securely and loosen the mounting clamp handle.
2. Adjust the display to the desired position.
3. Tighten the mounting clamp handle.

Note: Do not adjust the display in a position that would cause any of the following:

- Cover any warning films or other important information.
- Restrict access and exit procedures for the machine.
- Obstruct the operator's outside view.
- Obstruct the operator's view of instrumentation.
- Restrict the operation of any controls.

For more information about the WAVS system, refer to Operation and Maintenance Manual, SEBU8157, “Work Area Vision System”.

i06648776

Monitoring System

SMCS Code: 7451; 7490

NOTICE

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

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

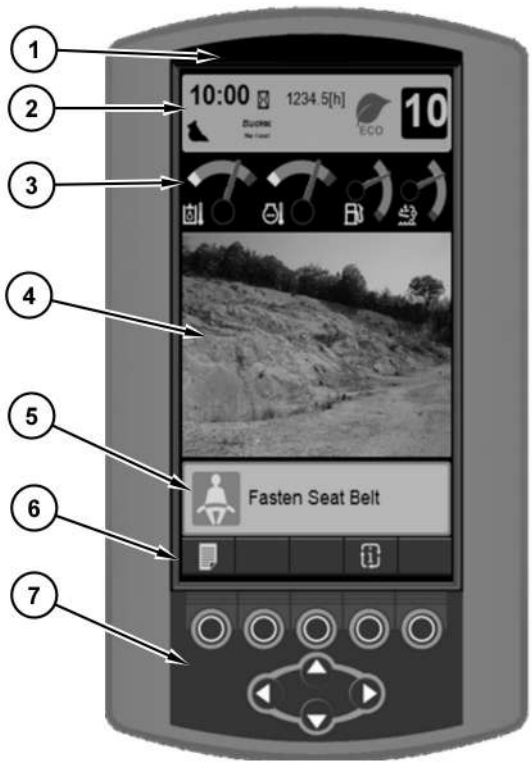


Illustration 168

g03510903

- (1) Alert Lamp
- (2) Clock bar
- (3) Gauges Area
- (4) Camera View
- (5) Warning Display area
- (6) Multi-information area
- (7) Keypad

Action Lamp (1)

This action lamp illuminates in order to show that a problem has occurred with the machine. The action lamp will flash red when a level 2 warning or level 3 warning is active.

Clock Bar (2)

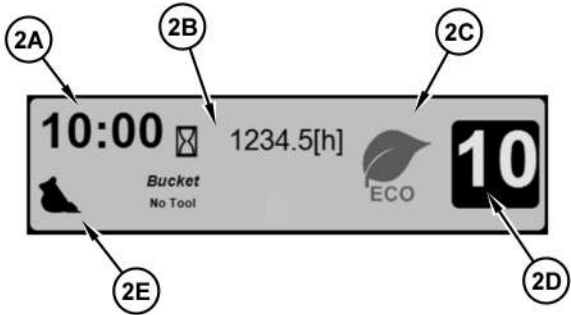


Illustration 169

g03510998

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

Service Hour Meter (2B) – This indicator shows the total operating hours of the engine. Use the display to determine the service hour maintenance intervals.

Fuel Consumption Rate (2B) – This indicator shows the rate of fuel consumption.

Fuel Remain Time (2B) – This indicator shows the fuel remaining time.

“ECONOMY MODE SELECTED” (2C) – The economy power mode has been selected.

HP+ **High Hydraulic Power Mode** – This indicator shows that the machine is set to operate in the high hydraulic power mode.

Throttle Dial (2D)

The throttle indicator shows the current position of the throttle dial on the right side panel.

Active Tool (2E)

This indicator shows the current work tool that is selected in the menu.

Gauges (3)



Hydraulic Oil Temperature – This gauge indicates the temperature of the hydraulic oil. The normal operating range is the green range. If the gauge is the white range, the engine and machine warm-up is required. Please refer to Operation and Maintenance Manual, "Engine and Machine warmup". 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 the white range, the engine and machine warmup is required. Please refer to Operation and Maintenance Manual, "Engine and Machine warmup". If the gauge reaches the red range, stop the machine and investigate the cause of the problem.



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

Camera View (4) (If Equipped)



Illustration 170

g06032090

- (1) Rear View
- (2) Side View

This area on the monitor displays the view of the camera. There may be two cameras, a rear view camera mounted on the top of the counterweight and a side view camera mounted on the top of the Fuel tank or Hydraulic oil tank.

If only the rear view camera is equipped, the monitor screen shows a rear view only.

If both rear view camera and side view camera are equipped, the monitor screen is split vertically and displays a rear view (left side on the monitor) and side view (right side on the monitor) simultaneously.

To change the camera view, refer to

Note: Horizontal guide lines can be enabled/disabled. Please consult your Cat dealer when you want to change the setting.

Warning Display Area (5)

The Monitoring System is designed to alert the operator to an immediate problem with any of the machine systems that are monitored. The Monitoring System is also designed to alert the operator to an impending problem with any of the machine systems that are monitored. The status of any of those monitored systems will be displayed in this area.

Multi-information Area (6)

This area displays miscellaneous information such as the various work tools or other options such as e-fence that are installed on the machine.

Key Pad (7)



Illustration 171

g03547409

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



Menu Key – Press the menu key in order to access the main menu.



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



Enter Key – Press the enter key in order to confirm an entry.



Screen Cycle Key – Press the screen cycle key in order to cycle the different screen views.



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



Reset Key – Press the reset key in order to set all counters back to zero.



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



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



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



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



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

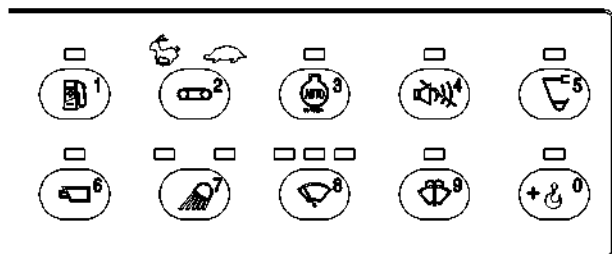


Illustration 172

Soft switch panel

g03294460

Note: The soft switch panel on the right side of the cab can also be used to input numerical values into the monitor.

Gain/Response Control

The Gain/Response function can change the controllability of the joysticks in order to match the machine to a particular task. In order to enable or disable the Gain/Response function, Flip the Gain/Response switch.

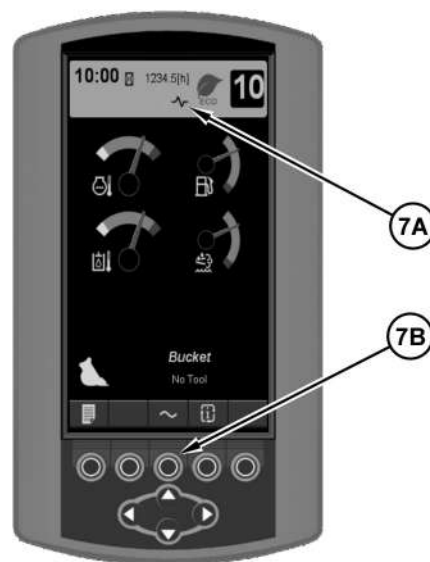


Illustration 173

g03514819

The Operator may select 1 of the following Gain/Response modes:

- Normal
- Soft
- Quick

Press the Gain key (7B) in order to change the Gain type to Normal / Soft / Quick.

Note: The Gain/Response setting (7A) can be continuously displayed on the monitor.



Illustration 174

g03512217

Normal

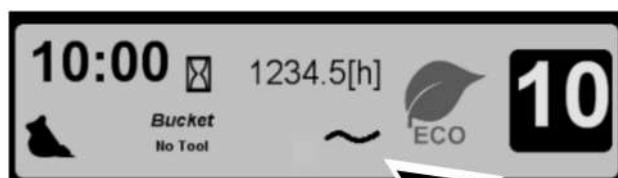


Illustration 175

g03514801

Soft



Illustration 176

g03514778

Quick



Soft – Push the Gain/Response key once on the monitor in order to select the soft mode. This mode slows down the movements of the boom, stick, work tool, and swing.



Quick – Push the Gain/Response key twice on the monitor in order to select the quick mode. This mode reduces the range of fine control of the joysticks.

Consult your Cat dealer in order to change the presets of the Gain/Response modes.

Prestart Monitoring Function

Turn the engine start switch to the ON position.

After approximately one second, Caterpillar appears in the display and the action lamp turns on.

The pattern for the joystick controls is indicated in the bottom of the display for 3 seconds.

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

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

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

Note: The service hours for the filters are checked. The service hours for the fluids are also checked. If a filter or a fluid is over the recommended change interval, “CHECK Service Parts INFO” appears on the display. Refer to filter and fluid Information located in this Operation and Maintenance Manual for more information. This message will disappear after 5 seconds.

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

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

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

Machine Warnings

Note: All of the warnings that are listed may not be applicable to all machine models.

The monitoring system provides three warning categories.

- The first warning category requires only operator awareness. This type of warning will be indicated by a message on the display screen.

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

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

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

Warning Category 1

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

Note: The warnings that are listed may not be applicable to all machine models.



“ENGINE FAULT CHECK ENGINE” – An abnormality has been detected in the engine. Stop the engine and contact your Cat dealer.



“ENGINE OVER SPEED WARNING” – The engine speed is too fast. Change the operating technique. If the situation continues, contact your Caterpillar Dealer.



“ENGINE SHUTDOWN ACTIVE” – An error has occurred with the engine and the engine is shutting down. Contact your Cat Dealer.



“ENGINE SHUTDOWN IDLE TIME EXCEEDED” – The engine is stopped by engine idle shutdown function. Machine shutdown such as air conditioner is pending. Turn the engine start key to the OFF position.



“1st FUEL FILTER PLUGGED” – Stop the engine and change the 1st filter (primary).



“2nd FUEL FILTER PLUGGED” – Stop the engine and change the 2nd filter (main filter).



“FUEL PRESSURE HIGH” – The fuel pressure is too high. Contact your Cat Dealer.



“Fuel Pressure Low” – The fuel pressure is very low. Stop the engine and contact your Caterpillar dealer



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



Machine Security – Contact your Caterpillar Dealer.



Security Pending – Contact your Caterpillar Dealer or change machine location to communicate via GPS/GSM.



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

Warning Category 2

Note: The warnings that are listed may not be applicable to all machine models.



1st Fuel Filter Power Derate – Stop the engine and change the 1st filter (primary filter) immediately.



2nd Fuel Filter Power Derate – Stop the engine and change the 2nd filter (main filter) immediately.



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



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



"COOLANT TEMP POWER DERATE" – The coolant temperature is too high. The engine will derate until the coolant temperature decreases to the correct level. If the warning stays on during low idle, stop the engine and inspect the cooling system. Perform any necessary repairs as soon as possible.



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



"ENGINE FAULT CHECK ENGINE" – An abnormality has been detected in the engine. Stop the engine and contact your Cat dealer.



"ENGINE OIL PRESS LOW" – The engine oil pressure is low. Stop the machine and check the engine oil level. If the engine has started in the cold ambient, warm up the machine properly. If the error disappears after warm-up, there is no engine oil pressure trouble.



"ENGINE SHUTDOWN PENDING" – The engine idle function will shut down the engine in 20 seconds. Operator can cancel the shutdown by pressing a button on the monitor or move one of the controls.



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



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



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



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



"Lever is Not Neutral" – The lever is not in the NEUTRAL position.



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



Reverse Fan Error – An error has occurred while the reverse fan is operating. Another warning should appear. This other warning will indicate a specific cause. Check this warning and take appropriate action. If the problem cannot be resolved. Stop the engine and contact your Caterpillar Dealer.



"SECURITY SYSTEM ACTIVE" – This machine is equipped with a Machine Security System. The key that is currently in the ignition switch is not an authorized key. Remove the key and insert an authorized key.



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



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



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

Warning Category 3

Note: The warnings that are listed may not be applicable to all machine models.



"COOLANT TEMP HIGH" – The coolant temperature is too high. Stop the engine immediately. Check the coolant level and check the radiator for debris. Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check". Check the fan drive belts for the water pump. Refer to Operation and Maintenance Manual, "Belts - Inspect/Adjust/Replace". Make any necessary repairs.



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



"ENGINE FAULT SHUTDOWN SAFELY" – An abnormality has been detected in the engine. Stop the engine immediately. Contact your Cat dealer.



"ENGINE OIL PRESSURE POWER DERATE" – The engine will derate until the engine oil pressure is at the correct level. If the warning stays on during low idle, stop the engine and check the engine oil level. Perform any necessary repairs as soon as possible.



"HYD OIL TEMP HIGH" – The hydraulic oil temperature is too high. Stop the engine. Check the hydraulic oil level and check the hydraulic oil cooler for debris. Perform any necessary repairs as soon as possible.



"INLET AIR TEMP POWER DERATE" – Inlet air temperature exceeds threshold. Engine speed is restricted. Stop the engine. Determine the cause of the fault and perform any necessary repairs.



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



"QUICK COUPLER UNLOCK" – The quick coupler is not locked. Lock the quick couple before operating the machine.



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



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

Other Messages

Prestart

Note: The warnings that are listed may not be applicable to all machine models.



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



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



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



"FASTEN SEAT BELT" – Fasten your seat belt.

Miscellaneous

Note: The warnings that are listed may not be applicable to all machine models.



"ECONOMY MODE SELECTED" – The economy power mode has been selected.



"HIGH POWER MODE SELECTED" – The high-power mode has been selected.



"POWER MODE LOCKING" – Power mode has been locked through the power mode setting menu. Refer to this Operation and Maintenance Manual, "Monitoring System"



"QUICK COUPLER LOCKING" – The quick coupler is locking. See this Operation and Maintenance Manual, "Quick Coupler Control"



"REVERSE FAN STARTING" – The reverse fan is currently operating. Do not operate the machine until the reverse fan has stopped.



“VERIFY TOOL LOCKING” – The quick couple has been locked. Verify that the quick coupler is securely fixed to the work tool.



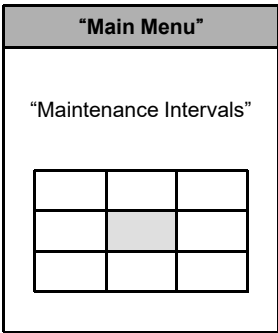
“WARM-UP MODE POWER DERATE” – If the joysticks are held for more than 30 seconds, the machine ECM will go into the warm-up mode power derate setting. The machine ECM limits the hydraulic pump torque to 50 percent. Release the joysticks in order to cancel this setting. Refer to Operation and Maintenance Manual, “Engine and Machine Warm-Up”.

Main Menu

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

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

Table 26



- 2. The “Main Menu” will be displayed with menu options that are installed on the machine. The number of choices can vary. For more information on these menus, refer to the respective descriptions below.
- 3. Press the right key or the left key in order to highlight the desired menu. Press the OK key in order to open the desired menu.

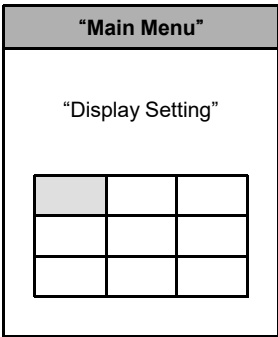
Note: Press the back key or the home key in order to exit this menu and return to the default display.

Display Setting

The “Display Setting” menu allows the operator to change the various display settings of the monitor.

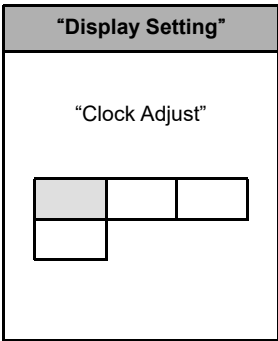
- 1. Press the menu key.

Table 27



- 2. Press any of the arrow keys in order to highlight the “Display Setting” menu. Press the OK key.

Table 28



- 3. The “Display Setting” menu will be displayed with four new menu options. For more information on these menus, refer to the respective descriptions below.
- 4. Press any of the arrow keys in order to highlight the desired menu. Press the OK key in order to open the desired menu.

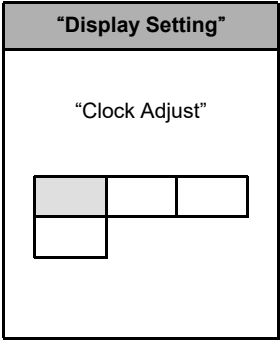
Note: Press the home key in order to return to the default display.

Adjusting the Clock

The “Clock Adjust” menu allows the operator to change the time on the clock.

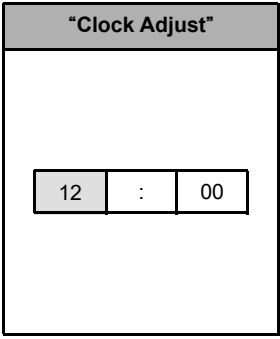
- 1. Press any of the arrow keys in order to highlight the “Clock Adjust” menu. Press the OK key.

Table 29



2. The "Clock Adjust" menu will be displayed with the current time. Press the left arrow key or the right arrow key in order to select the hour or the minute. Press the OK key.

Table 30



3. The hours or the minutes will be highlighted. Press the up arrow key in order to increase the value. Press the down arrow key in order to decrease the value.
4. When the clock is set to the desired time, press the OK key in order to save the new time in memory.

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

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

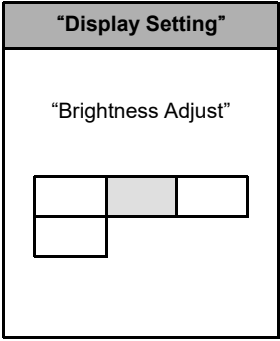
Adjusting the Brightness

The "Brightness Adjust" menu allows the operator to change the brightness of the monitor.

1. Press any of the arrow keys in order to highlight the "Brightness Adjust" menu. Press the OK key.

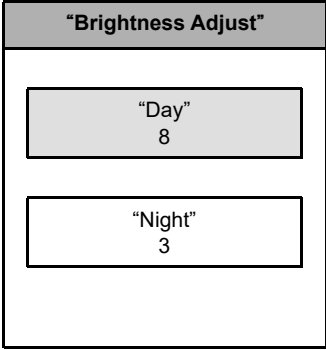
Note: There are two brightness settings. The first setting is used for machine operation during the day. The second setting is used for machine operation at night.

Table 31



2. Press the up arrow key or the down arrow key in order to select the "Day" setting or the "Night" setting. Press the OK key.

Table 32



3. Press the right key in order to increase the brightness. Press the left key in order to decrease the brightness. The brightness can be set between 1 and 10.

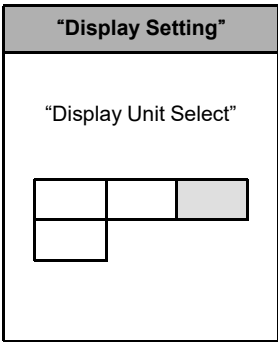
Note: Press the home key in order to return to the default display.

Display Unit Select

The "Display Unit Select" menu allows the operator to change the display units.

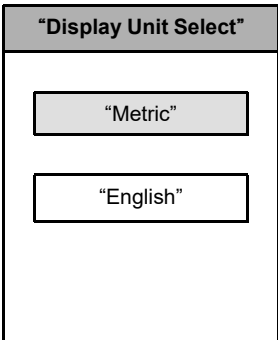
1. Press any of the arrow keys in order to highlight the "Display Unit Select" menu. Press the OK key.

Table 33



2. Press the up arrow key or the down arrow key in order to select the "Metric" setting or the "Imperial" setting. Press the OK key.

Table 34



3. Press the "Back" key in order to return to the previous screen or press the "Home" key in order to return to the main menu.

Default Screen Preset

The "Default Screen Preset" menu allows the operator to change the default screen image when the monitor is turned on.

Note: This menu function is only available when the machine is equipped with a rear view camera.

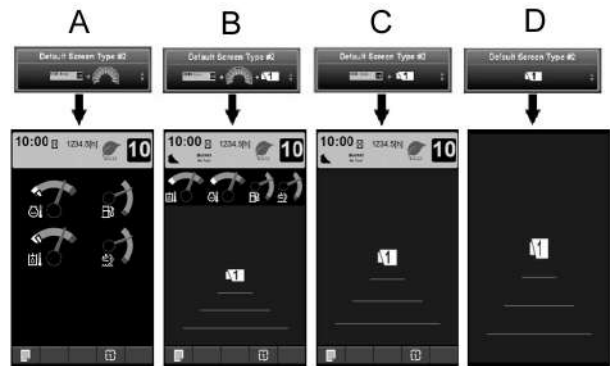


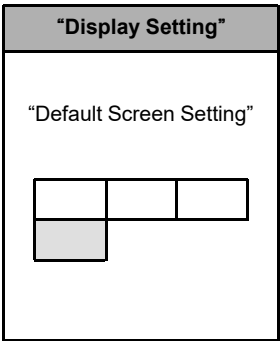
Illustration 177

g03512276

- (Pattern A) Camera view is not displayed, and gauges displayed in large view.
(Pattern B) Gauges and camera view displayed simultaneously. Pattern B is the default display if the rear view camera is equipped on the machine.
(Pattern C) Gauges are not displayed. Large view of rear view camera.
(Pattern D) Camera view displayed on full monitor screen. Any warnings or events will default to Pattern B.

1. Press any of the arrow keys in order to highlight the "Default Screen Setting" menu. Press the OK key.

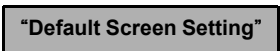
Table 35



2. Press the up arrow key or the down arrow key in order to select the default screen type. Press the OK key in order to enter the edit mode.

Note: Default screen #1 is preset at the factory and cannot be changed.

Table 36



(Table 36, contd)

“Default Screen Type #1”
“Default Screen Type #2”
“Default Screen Type #3”

3. Press the up arrow key or the down arrow key in order to select the default screen type. Press the OK key in order to highlight default screen type. Press the up arrow key or the down arrow key in order to set the display pattern.

Note: Press the monitor view key in order to preview the selected default screen.

4. Press the OK key in order to store the pattern that was selected.
5. Press the “Back” key in order to return to the previous screen or press the “Home” key in order to return to the main menu.

Language Selection

The “Language Select” menu allows the operator to change the language settings.

1. Press the menu key.

Table 37

“Main Menu”		
“Language Select”		

2. Press any of the arrow keys in order to highlight the “Language Select” menu. Press the OK key.

Table 38

“Language Select”
“ENGLISH”
“DANISH”
“FINNISH”
“ICELANDIC”
“NORWEGIAN”
“SWEDISH”

3. The “Language Select” menu will be displayed with a list of available languages. Press the up key or the down key in order to scroll through the available languages. Press the OK key in order to select the desired language.

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

Performance

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

1. Press the menu key.

Table 39

“Main Menu”		
“Performance”		

2. Press the right key or the left key in order to highlight the “Performance” menu. Press the OK key.

Table 40

“Performance”

(Table 40, contd)

	"Battery Voltage"
	"26.0 [V]"
	"Engine Speed"
	"1300 [RPM]"
	"Engine Coolant Temp"
	"20 [°C]"

3. The "Performance" menu will be displayed with a list of system components and measurements. Press the up key or the down key in order to scroll through the list.

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

Power Mode Setting

The "Power Mode Setting" menu allows the operator to change the various operating power modes.

Note: The mode(s) that are set to "Enabled" through this procedure can only be activated by the "Power Mode" switch on the right side control panel. For more information, refer to Operation and Maintenance Manual "Operator Controls".

1. Press the menu key.

Table 41

"Main Menu"		
"Power Mode Setting"		

2. Press any of the arrow keys in order to highlight the "Power Mode Setting" menu. Press the OK key.
3. You will be prompted to enter a password. After the password has been entered successfully, the "Power Mode Setting" menu will be displayed.

Note: When the machine leaves the factory, the password is initially set at 1.

Table 42

"Password Entry"				
"Enter your password"				
1	2	3	4	5
6	7	8	9	0

4. Press the up key or the down key in order to highlight the desired setting. Press the OK key in order to confirm the desired selection.

Note: Due to country-specific fuel consumption criteria, your machine may not be equipped with all Power Mode options.

Table 43

"Power Mode Setting"
"Standard Power Mode"
"Economy Mode"

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

Controllability Setting

Table 44

"Main Menu"		
"Controllability Setting"		

(continued)

(Table 44, contd)

Boom Swing Priority

Table 45

"Controllability Setting"
"Boom Swing Priority"

Boom Swing Priority – This feature allows you to adjust the flow balance with each actuator. If you want the swing faster and the boom slower, select a high "Swing Priority #". If you want the boom up faster and the swing slower, select a high "Boom Priority #".

Maintenance Intervals

The "Maintenance Intervals" menu allows the operator to view the current hours of use and the recommended change intervals for various system components.

1. Press the menu key.

Table 46

"Main Menu"		
"Maintenance Intervals"		

2. Press any of the arrow keys in order to highlight the "Maintenance Intervals" menu. Press the OK key.

Table 47

"Maintenance Intervals"
"Engine Coolantr" "100 / 12000 [HR]"
"Engine Oil" "100 / 500 [HR]"
"Hydraulic Oil" "100 / 2000 [HR]"

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

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

Selecting the Work Tool

The "Work Tool Select" menu allows the operator to change the settings for the work tool.

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

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

1. Press the menu key.

Table 48

"Main Menu"		
"Work tool Select"		

(continued)

(Table 48, contd)

2. Press any of the arrow keys in order to highlight the “Work Tool Select” menu. Press the OK key.

Table 49

“Work tool Select”
“Bucket / No Tool”
“Hammer” MKB 1500V
“Shear” MP-20

3. Press the up key or the down key in order to highlight the “Work Tool Select” menu. Press the OK key.

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

4. The “Work Tools Select” menu will be displayed with the current options for work tools. Press the up key or the down key in order to highlight the desired work tool. Press the OK key in order to select the new work tool.

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

Current Totals

The “Current Totals” menu allows the operator to view the current totals for the machines systems.

1. Press the menu key.

Table 50

“MAIN MENU”
“Current Totals”

(continued)

(Table 50, contd)

2. Press any of the arrow keys in order to highlight the “Current Totals” menu. Press the OK key.

Table 51

“Current Totals”
“Total Operating Hours” “12345.6 [hr]”
“Engine” “12345.6 [hr]”
“Hydraulic Pump” “12345.6 [hr]”

3. A list of system components will be displayed. Press the up key or the down key in order to scroll through the list.

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

Changing the Password

The “PASSWORD CHANGE” menu allows the operator to change the password.

Note: When the machine leaves the factory, the password is initially set at 1.

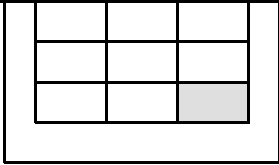
1. Press the menu key.

Table 52

“MAIN MENU”
“Password Change”

(continued)

(Table 52, contd)



2. Press any of the arrow keys in order to highlight the “Password Change” menu. Press the OK key.

Note: You will be prompted to enter a password.

Table 53

“Password Change”				
“Enter your password”				
1	2	3	4	5
6	7	8	9	0

3. After the password has been entered successfully, the “Enter new password” screen will appear.

Table 54

“Password Change”				
“Enter new password”				
1	2	3	4	5
6	7	8	9	0

4. Press any of the arrow keys in order to select the desired character.

Note: The password is numeric. You may choose from “0” to “9” .

5. Press the OK key in order to enter the character.

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

6. After you enter the password, you will be asked to confirm your selection. Press the “ENTER” key in order to save the password in memory and return to the “Main Menu” screen. Press the back key in order to return to the “Password Change” menu without saving the password.

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

Joystick Control Pattern

The “Controls Setup” menu allows the operator to change the settings for the joystick pattern.

Note: Before the joystick pattern is changed, park the machine on a firm level surface, lower the work tool to the ground, and place the hydraulic lockout control in the LOCKED position.

1. Press the menu key.

Table 55

“Main Menu”		
“Controls Setup”		

2. Press the arrow keys in order to scroll through the menu in order to find the “Controls Setup” menu. Highlight the “Controls Setup” menu and press the OK key.

Note: You will be prompted to enter a password. When the machine leaves the factory, the password is initially set at 1.

Table 56

“Controls Setup”
“SAE/JIS”
“MHI”
“KOB”
“Former SCM”

(continued)

(Table 56, contd)

3. The “Controls Setup” menu will be displayed with the current options for joystick patterns. Press the up key or the down key in order to highlight the desired joystick pattern. Press the OK key in order to select the new joystick pattern.

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

Password Entry

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

Table 57

PASSWORD
“ENTER PASSWORD”

< B C D E F 0 1 2 3 4 5 >

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

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

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

2. Press the OK key in order to enter the character.

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

3. After you enter 4 characters, the monitoring system checks the password. If the password is correct, you will have access to the menu.

Table 58

PASSWORD
“ENTER PASSWORD”

(Table 58, contd)

INVALID PASSWORD

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

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

Reverse Fan Setting

Note: Make sure that the hydraulic lockout control is in the LOCKED position before you activate the reverse fan function.

The “REVERSE FAN SETTING” menu allows the operator to set the reverse fan duration time.

Note: The reverse fan function is an optional attachment which may not be equipped on your machine.

1. Press the menu key.

Table 59

MAIN MENU			
Reverse Fan Setting			

2. Press the right key or the left key in order to highlight the “Reverse Fan Setting” menu. Press the OK key.

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

Table 60

Password Entry
Enter Your Password
"#-#-#-#"

3. After the password has been entered successfully, highlight the "Reverse Fan" menu. Press the OK key.

Table 61

REVERSE FAN
Step 1 : Set Duration Time
Read Screen

Note: Make sure that the hydraulic lockout control is in the LOCKED position before you activate the reverse fan function.

Table 62

REVERSE FAN
Step 2: Complete

4. The monitor should now indicate that the reverse fan function is "Complete" in active mode.

Note: The reverse fan function will automatically stop when the fan has completed a cycle. However, the reverse fan function can be stopped manually by pressing the left key.

5. Press the home key in order to return to the default display.

Error Messages for the Reverse Fan

Table 63

REVERSE FAN
ERROR
"-HYD OIL TEMP HIGH"

Typical example of an error message for the reverse fan function

Reverse Fan Function Will Not Start

The monitor will provide one of the following error messages if the reverse fan function does not start:

"NOT INSTALLED" – The reverse fan is not installed on this machine. If this message is received in error, consult your Caterpillar dealer.

"HYD OIL TEMP HIGH" – The hydraulic oil temperature is too high. Shut off the engine and do not operate the machine until the hydraulic oil temperature is below 85 °C (185 °F).

"COOLANT TEMP HIGH" – The coolant temperature is too high. Shut off the engine and do not operate the machine until the coolant temperature is below 95 °C (203 °F).

"HYD LOCK SW OFF" – The hydraulic lockout control is in the UNLOCKED position. Move the hydraulic lockout control to the LOCKED position.

"SOL MALFUNCTION" – The reverse fan is malfunctioning. Consult your Caterpillar dealer.

Table 64

REVERSE FAN
Error
"Error ID : \$0002"
Error ID : \$0003
Error ID : \$0004

(continued)

(Table 64, contd)

Error ID : \$0005

Reverse Fan Function Is Interrupted

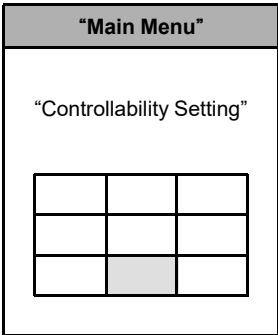
If one of the following conditions occur, the reverse fan function will stop, and regular operation of the radiator cooling fan will resume:

- The hydraulic lockout control is moved to the UNLOCKED position.
- The temperature of the hydraulic oil rises above 90 °C (194 °F).
- The coolant temperature rises above 100 °C (212 °F).

This event will be accompanied by a “REVERSE FAN ERROR” message.

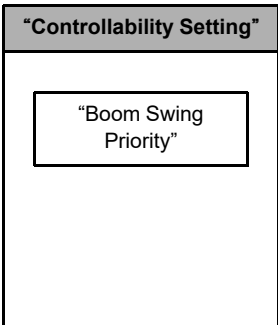
Controllability Setting

Table 65



Boom Swing Priority

Table 66



Boom Swing Priority – This feature allows you to adjust the flow balance with each actuator. If you want the swing faster and the boom slower, select a high "Swing Priority #". If you want the boom up faster and the swing slower, select a high "Boom Priority #".

i06260804

Production Measurement Application

SMCS Code: 7490; 7494

S/N: EBF10001–Up

S/N: XWL1–Up

S/N: DNM10001–Up

When enabled, the Cat Production Measurement Application provides production information to the operator and owner.

The Cat Production Measurement Application is composed of a monitoring system that tracks and displays payload data. The Application also includes a reporting system that uses collected payload data, along with fuel usage and machine operation profiles, in order to generate production values.

Payload data can be viewed on the monitor display.

The following information is a brief overview of the basic functions of the Cat Production Measurement Application:

- Monitor Display
- Cat Production Measurement Menu Screen
- Joystick Controls
- Basic Operation
- Work Monitor
- Preparing the System

Consult your Cat dealer in order to enable, or disable, the Cat Production Measurement Application.

Note: Complete the following Cat Grade Control settings before using the Cat Production Measurement Application:

- Machine dimension - Configure, except for bucket
- Bucket Measure-up

Reference: System Operation/Testing and Adjusting, UENR1725, "Cat Grade Control Depth and Slope for E-Series and F-Series Excavators".

Monitor Display

Note: For additional information regarding the monitor display, refer to Operation and Maintenance Manual, “Monitoring System”

The monitor display is the primary interface between the operator and the Cat Production Measurement Application. The display is used for the following purposes:

- Display bucket payload, bucket count, truck payload, truck count, weigh status, truck status, and remaining payload.
- Enter target payload
- Edit and select a pre-loaded truck ID.
- Display system messages to the operator

Press the pattern change key until the Production Measurement screen appears on the monitor.



Illustration 178

g06032618

Typical example of the Production Measurement screen

- (1) Key Pad
(2) Function Key Buttons
(3) Function Keys
(4) Cat Production Measurement Information Bar

Key Pad (1)

The keypad has four keys that are used in order to move and input information into the electronic monitoring system.



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



values.

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



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



values.

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

Function Key Buttons (2)

There are five function key buttons located above the key pad. These buttons allow you to select a function that is displayed in the function key area. In order to select a function that is displayed in the function key area, press the corresponding function key button located directly below the function key item.

Function Keys (3)

This area displays the functions that are available within a menu. Press the corresponding function key button in order to select the function.

Function keys specific to the Cat Production Measurement application are listed below:



Pattern Change Key – Press the pattern change key in order to cycle through different function key patterns.



Standby/Weigh Key – Press the standby/ weigh key in order to cycle between standby and weigh modes.



Site Configuration Key – Press the site configuration key in order to go to the site configuration menu.



Truck Store Key – Press the truck store key in order to store and save information. Truck payload and bucket count values will be cleared for the next truck.



Truck Cancel Key – Press the truck cancel key in order to clear information for a loaded truck. Truck Payload, Remaining Payload, Bucket Pass, and Bucket Payload values will be cleared. Truck Count value will remain the same.



Bucket Cancel Key – Press the bucket cancel key in order to subtract the previous bucket payload value from the current truck payload value. A bucket pass will also be subtracted from the bucket count value.

 **Bucket Recall Key** – Press the bucket recall key in order to add the previous bucket payload value to the current truck payload value. A bucket pass will also be added to the bucket count value.

 **Bucket Zero Key** – Press the Bucket Zero Key in order to go to the “Bucket Zero Adjustment” menu. The “Bucket Zero Adjustment” menu is used to Bucket zero the current bucket weight.

 **Reset Key** – Press the reset key in order to reset the work monitor information. The reset key is found on the “Work Monitor” menu.

 **Erase Key** – Press the erase key in order to erase the data stored in the system memory.

 **Tool Dimension** – Press the tool dimension key in order to advance to the tool dimension menu.

Note: Tool dimension is shown when the bucket is selected only

 **Bucket Measure-up** – Press the bucket measure-up key in order to advance to the bucket measure-up menu. The bucket measure-up key is found on the “Work Tool Select” menu.

 **Calibration** – Press the calibration key in order to advance to the calibration menu. The calibration key is found on the “Work Tool Select” menu.

Press the pattern change key until the desired function symbol appears on the monitor. Refer to Illustration 179

Key pattern 3 and 4 appear when CGC function is enabled.

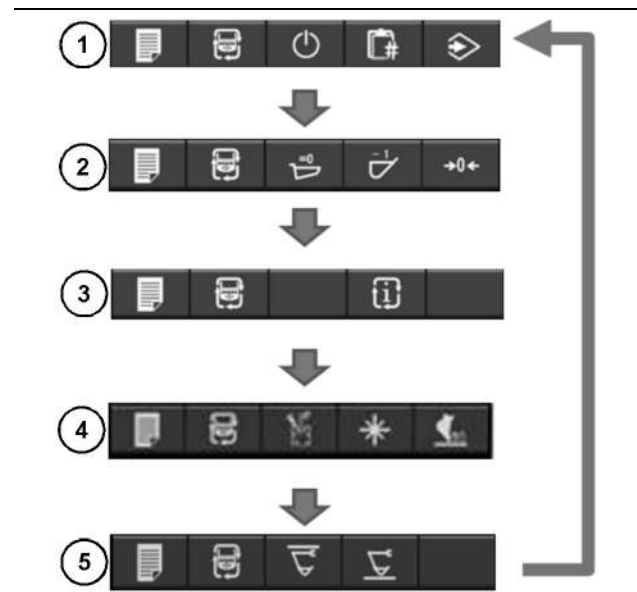


Illustration 179

g06026442

- (1) CPM1 (CAT Production Measurement 1)
 (2) CPM2 (CAT Production Measurement 2)
 (3) Standard Display
 (4) CGC1 (CAT Grade Control 1)
 (5) CGC2 (CAT Grade Control 2)

Status Bar (4)

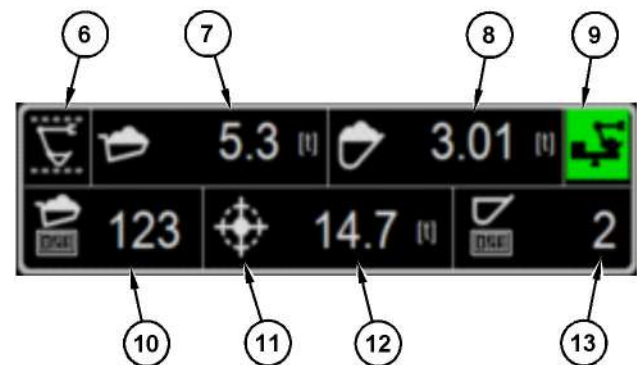


Illustration 180

g06026479

Typical example of the Cat Production Measurement Status Bar

(6) Cat Grade Control Linkage Elevation Monitor Status – See Operation and Maintenance Manual, SEBU8358, “Cat Grade Control Depth & Slope for E-Series and F-Series Excavators”

(7) Truck Payload – Displays the weight of material that has been added to the truck total.

(8) Bucket Payload – Displays the weight of material currently in the bucket.

(9) Weigh Status – Displays the bucket payload weigh status and the accuracy of the weigh.

(10) Truck Count – Displays the number of trucks that have been loaded.

(11) Truck Status – Displays the load status of the truck payload.

(12) Remaining Payload – Displays the remaining weight needed to reach the target payload for the truck.

(13) Bucket Count – Displays the number of buckets loaded to truck.

Warning Messages

Note: The warning message can be enabled or disabled within the “Reweigh Warning” menu. The “Reweigh Warning” menu is accessed through the “Operating Mode” menu.

Note: Refer to Operation and Maintenance Manual, “Monitoring System” for more information about warning categories.

Warning Category 1



“Weigh Calibration Required” – Calibration has not performed accurately. Perform accurate calibration.



“Inaccurate Weigh” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing.

This message instructs the operator to reweigh the previous bucket. This message is displayed immediately after the bucket has been weighed. This message is displayed when the application detects an error in the process of the lift.



“Inaccurate Weigh Boom Too High” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

Boom angle is greater than the maximum limits. Make sure that the boom angle is smaller than the limit. Swing the loaded bucket again.



“Inaccurate Weigh Stick Too Close” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

Stick angle is smaller than the minimum limits. Make sure that the angle of the stick is greater than the limits. Swing the loaded bucket again.



“Inaccurate Weigh Bucket Too Curl” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

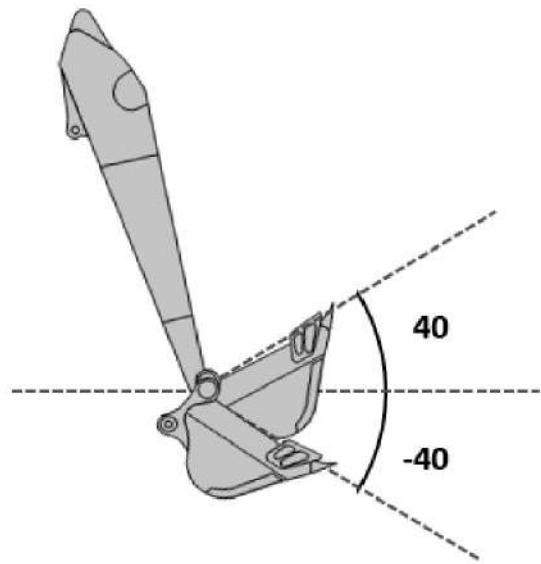


Illustration 181

g06089643

The bucket angle in relation to the ground is greater than 40 degrees. Adjust the bucket angle to less than 40 degrees against the ground. Swing the loaded bucket again. (Refer to Illustration 181).



“Inaccurate Weigh Bucket Too Open” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

The bucket angle in relation to the ground is less than -40 degrees. Adjust the bucket angle to greater than -40 degrees against the ground. Swing the loaded bucket again. (Refer to Illustration 181).



“Inaccurate Weigh Ground Unstable” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

The machine is operating on unstable ground. Reposition the machine or adjust the area under the machine (if possible). Swing the loaded bucket again.



Inaccurate Weigh Ground Too Tilt – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing with suitable position.

The machine is operating on a slope that is greater than 10 degrees. Reposition the machine or adjust the area under the machine (if possible). Swing the loaded bucket again.



“Inaccurate Weigh Swing Not Smooth” – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing.

The duration of the swing was not long enough in terms of time without slowing below 5 degrees per second. Swing the loaded bucket at a slower speed or larger swing angle without triggering bucket dump conditions. The swing time must exceed 2.4 seconds with the bucket in a carry position.



"Inaccurate Weigh Swing Too Short" – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing.

Swing operation duration is less than 2.4 seconds. The swing operation duration must exceed 2.4 seconds. Swing the loaded bucket again.



"Inaccurate Weigh Swing Too Slow" – Displayed payload may not be accurate. Reweigh by reoperating Lift-Swing.

Swing speed is slower than 5 degrees per second. The swing speed must exceed 5 degrees per second. Swing the loaded bucket again.



"Do Not Tilt Bucket During Weigh" – Displayed payload may not be accurate when the bucket is tilted during weighing. Reweigh by reoperating Lift-Swing without tilting the bucket.

This message is shown when "Tilt Bucket" is selected on "Work Tool Select" menu.

Warning Category 2



"Check Sensor" – This indicates Production Measurement Monitoring malfunction is detected.



"Truck Overload" – Exceeded the truck target payload. Finish the loading to the truck. Press "Truck Store" to reset current truck. Load the payload into the last bucket to new truck.



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

Miscellaneous



"Cycle Data Transferring" – Transferring the Cycle Data to USB Memory. Cycle timer will stop recording.



"Weigh Calibration Recommend" – Calibration Recommended Interval is exceeded. Perform accurate calibration.



"Bucket Zero Recommend" – Zero Calibration Recommended Interval is exceeded. Perform accurate Zero calibration.



"Cycle Data Transfer Required" – Memory for Production Measurement Monitoring is full, old data is deleted automatically. Transfer the data to USB memory, and then delete all data.



"Cycle Data Transfer Recommend" – Remaining memory for Production Measurement Monitoring is low. Transfer the data to USB memory, and then delete all data.



"Reach Truck Target" – The Truck target payload has been reached. Finish the loading to the truck. Press "Truck Store" to reset current truck.



"Last 1 Pass for Target" – Will reach the Truck target payload by next bucket pass.

Cat Production Measurement Menu Screen

Note: For additional information regarding the monitoring system menu screens, refer to Operation and Maintenance Manual, "Monitoring System"



Illustration 182
Main Menu

The “Production Measurement” screen is found on the “Main Menu” of the monitoring system.

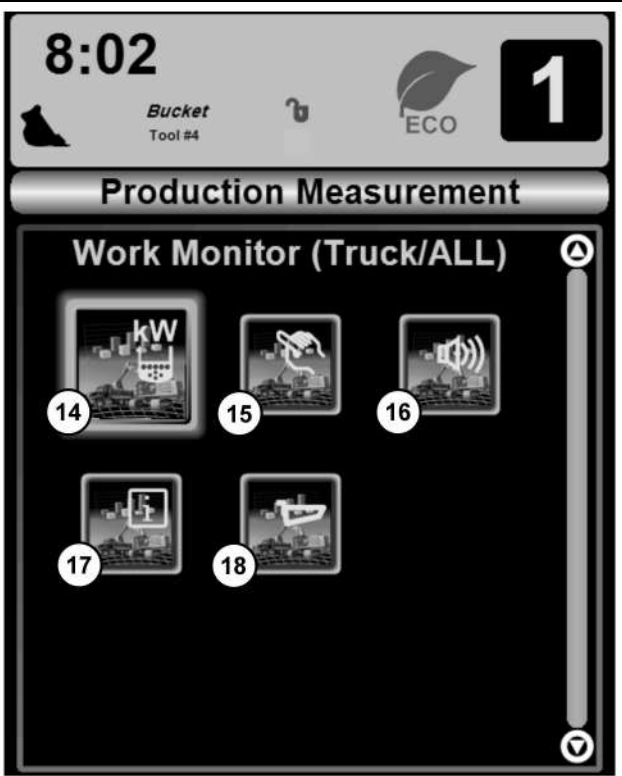


Illustration 183
“Production Measurement” Menu

The following menus are available in the “Production Measurement” menu:

- (14) **Work Monitor** – See “Work Monitor”
- (15) **Operating Mode** – See “Operating Mode”
- (16) **Sound Setup** – See “Sound Setup”
- (17) **Site Configuration** – See “Site Configuration”
- (18) **Truck List** – See “Select an ID Configuration”

Joystick Controls (If Enabled)

If enabled, the Cat Production Measurement Application is also capable of receiving inputs from the joystick controls.

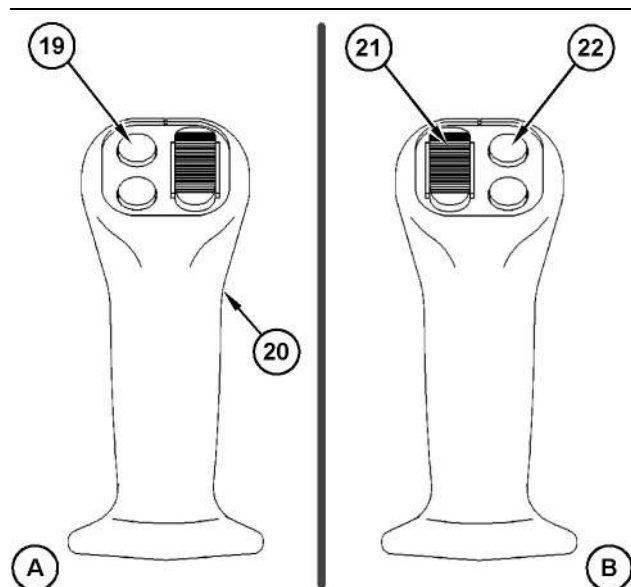


Illustration 184

g06090035

- (A) Left Joystick
(B) Right Joystick
(19) Weigh/Standby
(20) Trigger (not visible)
(21) Target Payload
(22) Truck Store

The function of the joystick control buttons can be enabled/disabled by navigating through the following menus (and settings) of the operator monitor

Refer to the Illustration 185 and 186 when navigating the menus:



Illustration 185

g06090093

- (23) Service
(24) Production Measurement



Illustration 186

g06090104

- (25) CPM Setting
(26) Remote Switch (Payload)

If enabled, the following functions can be performed using the joystick controls with pressing and holding the trigger button (20) on Left Joystick (A).

Standby/Weigh – When the Standby/Weigh key is available, press button (19) on the left joystick in order to cycle between standby and weigh modes.

Target Payload – When the Standby/Weigh key is available, move thumb wheel (21) on the right joystick in order to adjust the target payload.

Truck Store – When the truck store key is available, press button (22) on the right joystick in order to store and save information for a loaded truck. Truck payload and bucket count values will be cleared for the next truck.

Note: The “Standby/Weigh” and “Truck Store” functions can also be performed using the function keys when function “CPM 1” is selected. Refer to “Function Keys (3)”.

The “Target Payload” can also be adjusted with the monitor keypad. Refer to “Truck Payload and Remaining Truck Payload”

Basic Operation

The following is a brief review of the basic operation of the Cat Production Measurement Application including the following:

- Standby and Weigh Modes
- Weigh Bucket Payload

- Evaluate Bucket Payload Accuracy
- Bucket Count
- Truck Payload and Remaining Payload
- Evaluate Truck Status
- Truck Store
- Truck Cancel
- Bucket Cancel
- Bucket Recall
- Bucket Zero

Standby and Weigh Modes

The Cat Production Measurement Application has two operating modes:

Standby Mode – When in standby mode, the bucket payloads are still visible but will not transfer to the truck. The truck weights that were displayed when the system was placed into standby are retained until the system is placed back into weigh mode. Standby Mode should be used for non-productive work.

Note: The system will automatically switch to standby mode when an error is detected.

Weigh Mode – In this mode, a weight will be obtained after completing a steady lift through the weigh range. Weigh Mode should be used for productive work.

To change between weigh and standby modes, select the “Standby/Weigh” function key on the monitor, or select the “Standby/Weigh” button located on left joystick (if enabled).

Note: The Cat Production Measurement Application must be calibrated for the weigh mode to function. If not already calibrated, consult your local Cat dealer.

Weigh Bucket Payload

In order to obtain an accurate weigh of the bucket payload, observe the following:

- Ensure that the machine is not operating on a slope greater than 10 degrees.
- Ensure that the bucket is clean and free of material before loading.
- Ensure that the swing is smooth (not too slow or not too fast).
- Maintain continuous swing

- Ensure that the bucket payload is not too low
- Ensure that the boom and stick are operated within the certain range. Refer to illustration 187 .
- Ensure that the swing range is large enough to perform a weigh.

1. Ensure that the Cat Production Measurement Application is in the “Weigh Mode” .

2. Proceed to load the bucket with material.

3. Lift the bucket through the weigh range.

Note: Maintain consistent, smooth lift and swing speed through the weigh range.

4. The system will start to weigh the payload as soon as swing starts. A weigh status indicator will illuminate on the status bar while the bucket payload is being determined.

Evaluate Bucket Payload Accuracy

“Weigh Status” indicator (9), located on the status bar, displays the accuracy of the bucket payload.



Estimated Payload – A BLACK square with the weigh symbol will illuminate on the status bar while the bucket payload is being determined or when a scaled payload has not been determined.



Scaled Payload Obtained – A GREEN square with the weigh symbol will illuminate on the status bar when a scaled payload has been obtained.



Scaled Payload Complete – A GREEN square will be displayed when the truck has been loaded with a scaled payload. If enabled, an alarm may also sound. The status will remain until the next weigh operation.



Estimated Weigh Complete – A BLACK square will be displayed when the truck has been loaded with an Estimated payload. The status will remain until the next weigh operation.

Once a payload weight has been obtained, the value on the status bar display will remain until any of the following conditions occur:

- A new “Bucket Payload” is obtained
- Truck Store is selected
- Standby is selected
- Truck Cancel is selected

The monitoring system will notify the operator when the system detects a significant payload error or is unable to obtain a weight during the weighing process.



Perform Reweigh – A “Inaccurate Weigh” warning message will be displayed on the monitor. Move the payload through the weigh range again.

Note: Boom/stick/swing position shown at Red range below may cause inaccurate weigh during the bucket payload and “Perform Reweigh” warning message will be shown on the monitor. Make sure boom/stick/swing are moved inside the Green range.

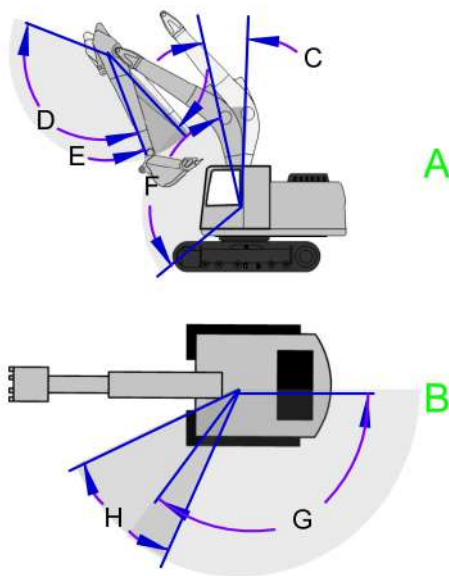


Illustration 187

g03826489

- (A) Boom angle is too high. Stick angle is too narrow.
- (B) Swing angle is too narrow. Slightly slower swing rate can produce good measurement.
- (C) Red
- (D) Green
- (E) Red
- (F) Green
- (G) Green
- (H) Red

Bucket Count

When the material is dumped into the truck, the bucket payload is transferred to the truck payload. The remaining truck payload is updated and the bucket count is increased by 1.

The value on the status bar display will remain until any of the following conditions occur:

- Truck Store is selected
- Truck Cancel is selected
- Bucket Cancel is selected

- Reset All Truck is selected

Truck Payload and Remaining Truck Payload

The Cat Production Measurement Application calculates and displays the truck payload and remaining payload with each increment of the bucket count.

The target weight value will change to reflect the remaining truck payload needed to reach the desired weight.

The value on the status bar display will remain until the bucket count updates and any of the following conditions occur:

- Truck Store is selected
- Truck Cancel is selected
- Bucket Cancel is selected
- Reset All Truck is selected

The target payload can be adjusted by pressing the “UP” arrow key on the monitor. Use the arrows on the keypad in order to adjust the target payload.

If enabled, the joysticks can also adjust the target truck payload. Refer to “Joystick Controls (If Enabled)”.

Evaluate Truck Status

“Truck Status” indicator (11), located on the status bar, displays the status of the truck payload.



Target Not Reached – The truck status indicator will not be illuminated when the target payload has not been reached.



Last Cycle – The center of the truck status indicator will illuminate GREEN when one cycle is needed to reach the target payload.



Reached Target – The entire truck status indicator will illuminate GREEN when the target truck payload is reached.



Over Load – The entire truck status indicator will illuminate RED when the bucket payload is heavier than the remaining truck payload.

Note: A continuous alarm will sound when the system detects a bucket weight that is heavier than the remaining truck payload.

Truck Store

Upon completion of loading the desired truck, press the truck store function key located on the monitor or on the right joystick (if enabled).

By selecting "Truck Store", the following information will be cleared on the status bar:

- Truck Payload
- Truck Count
- Remaining Payload
- Bucket Count
- Bucket Payload

The Truck Count will remain and a new weigh cycle can be started.

Truck Cancel

Select the "Truck Cancel" function key in order to reset the truck payload without storing weight to the ECM memory.

The following status bar measurements will be reset to 0:

- Truck Payload
- Remaining Payload
- Bucket Count
- Bucket Payload

Bucket Cancel

Select the "Bucket Cancel" function key in order to remove the last bucket weight that has been added to the truck total.

The truck payload will decrease by the last added bucket payload and the bucket count will decrease by 1.

Bucket Recall

Select the "Bucket Recall" function key in order to add the last bucket weight that has been added to the truck total.

The truck payload will increase by the last added bucket payload and the bucket count will increase by 1.

Bucket Zero

The "Bucket Zero Adjustment" menu will calibrate the weight of an empty bucket.

Select the "Bucket Zero" function key in order to open the "Bucket Zero Adjustment" menu. See "Bucket Zero Adjustment" for additional information.

Payload Cycle

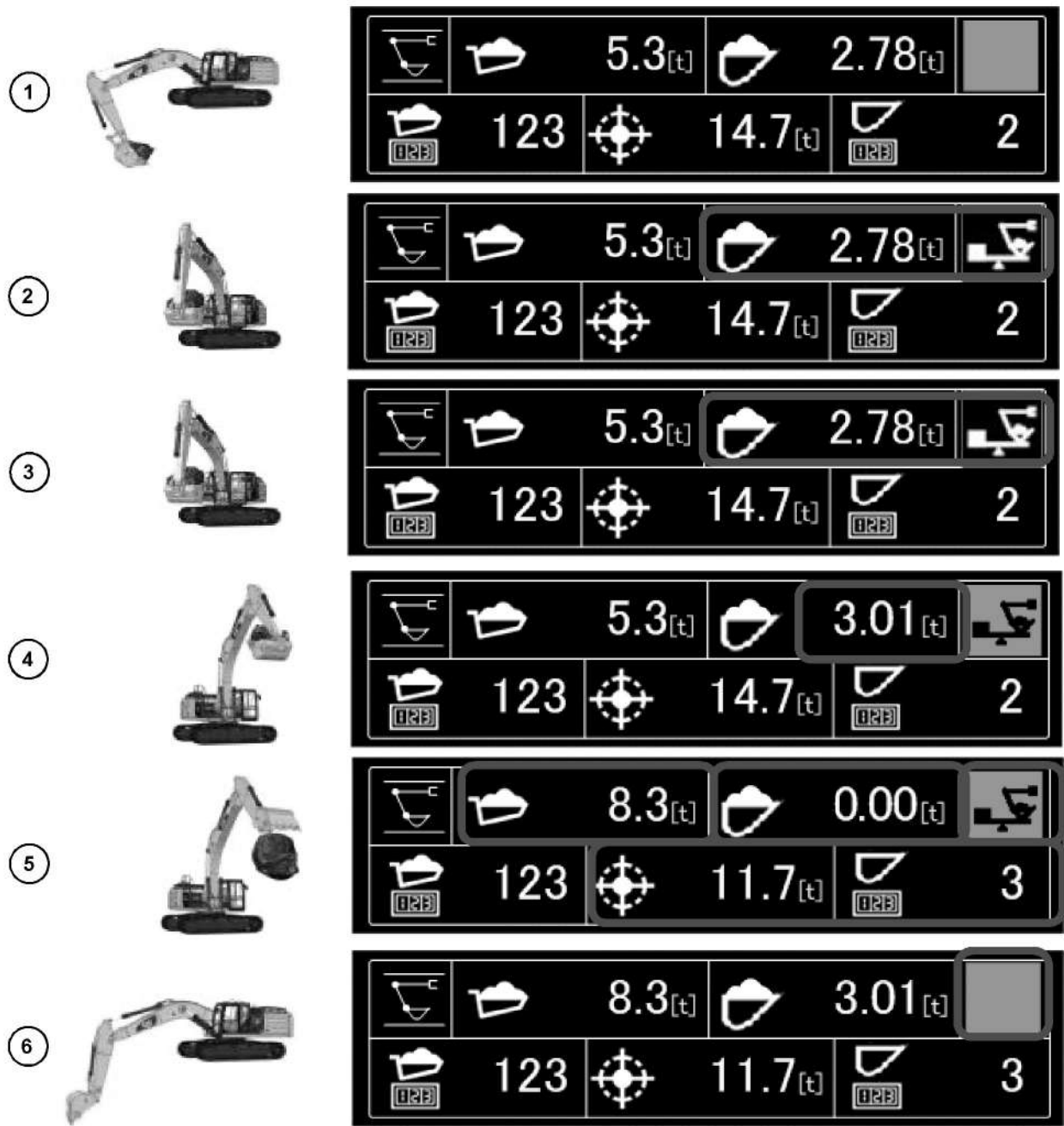


Illustration 188

g06025474

(1) Dig – The weight from the previous bucket is displayed. If the previous load only obtained a “Estimated Payload”, “Weigh status” shows solid black. If an “Scaled Payload Obtained”, “Weigh Status” shows the solid green.

(2) Lift – The bucket payload shows an Estimated Payload as soon bucket is closed and lifted. The

Weigh Status will show the “Estimated Payload Weigh Status” .

(3) Swing (Start) – Bucket payload weight begins to converge with swing data. Estimated bucket payload is displayed. “Weigh status” shows “Estimated Payload” status.

(4) Swing (End) – Weighing is completed. “Bucket Payload” for current cycle is updated and “Weigh status” shows “Scaled Payload Obtained” .

(5) Dump – When the material is dumped, “Truck Payload” / “Remaining Payload” / “Bucket Count” are updated.

(6) Return – Bucket is lowered to begin excavation. “Weigh Status” shows “Scale Payload Complete” .

Note: Between the “Lift” and “Swing (Start)” stages and “Dump” and “Return” stages, see “Bucket Tip-Off Function” section for more detailed system information and operator options about partial buckets during Dump action.

Bucket Tip-Off Function

The Bucket Tip-Off function is integrated as part of the payload weigh cycle. The Bucket Tip-Off function is a helpful feature when adjusting the bucket payload to reach a specific target weight.

The Bucket Tip-Off feature offers two ways to adjust the bucket payload depending on the operation and application:

Note: Of the two ways available for adjusting the bucket payload, the system will automatically select the way that matches the operators sequence of operation.

Estimated Bucket Payload

“Estimated Bucket Payload” is displayed on the monitor before obtaining a scaled payload or when starting a partial dump after obtaining a scaled payload.

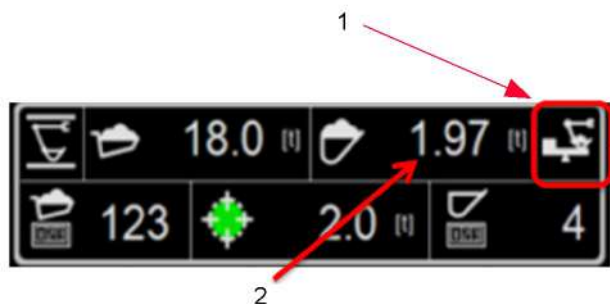


Illustration 189

g06017762

- (1) Indication that “Weigh Status” is an estimated payload.
(2) Display location for the “Estimated Payload” .

“Estimated Bucket Payload” is displayed on the monitor if:

- The Bucket Angle is in the “Carry Position” (Greater than -40 degrees against the ground)
- Estimated Payload is greater than 500 kg (1100 lb).

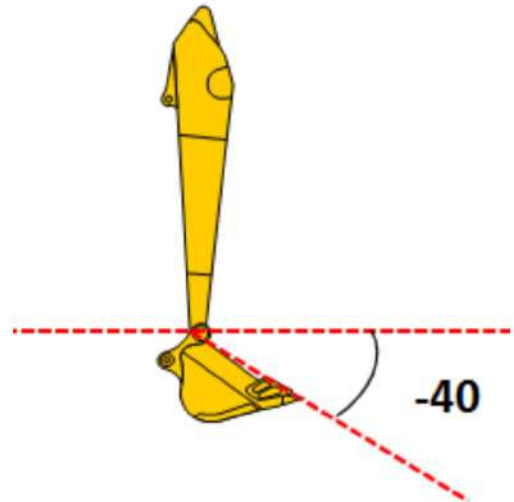


Illustration 190

g06017790

Note: “Estimated Bucket Payload” is a less accurate measurement used for estimation only.

Stockpile Tip-Off Function

Adjusting the Instantaneous Estimated Bucket Payload prior to swing by partial dump into the pile or digging location.

Prior to swinging the machine as soon as the bucket is in a carry position and a boom lift occurs, the system will display an Instantaneous Estimated Bucket Payload. The system shows the Instantaneous Estimated Bucket Payload and adjusts the Instantaneous Estimated Bucket Payload if material is dumped from the bucket.

This Tip-Off type of operation may be helpful when on the Last Pass and trying to load a truck close to the Target Payload with a final partial bucket. The same operation can be accomplished with the Trip-Off to Truck way of operation, but without the carry-back of material.

Note: The minimum threshold of material that can be weighed in the bucket is still 500 kg (1100 lb).

The following process details the Stockpile Tip-Off Operation:



Illustration 191

g06017820

Bucket Payload: 4.52 t (Estimated)
Weigh Status: Estimated Payload

1. Dig a material and lift until "Weigh Status" indicator displays "Estimated Payload". "Bucket Payload" shows a "Estimated Bucket Payload".



Illustration 192

g06017822

Bucket Payload 4.52 t (Estimated) > remaining
Payload 2.00 t
Truck Status: Overload

2. If "Bucket Payload" is greater than "Remaining Payload", "Truck Status" indicates "Overload".



Illustration 193

g06017840

Bucket Payload 1.98 t (Estimated)
Bucket Payload 1.98 t < Remaining Payload 2.00 t
Truck Status: Target Reached

3. Slowly dump a partial material bucket to stockpile until desired payload is reached. "Truck Status" indicates "Target Reached".



Illustration 194

g06017842

Bucket Payload: 1.96 t (Scaled)
Weigh Status: Scaled Payload Obtained

4. Obtain an accurate "Bucket Payload" by swinging to approach truck. "Bucket Payload" indicates a scaled value and "Weigh Status" indicates "Scaled Payload Obtained".

Note: If a "Scaled Bucket Payload" is greater than "Remaining Payload", return to Step 3 of "Stockpile Tip-Off" or Proceed to "Truck Tip-Off". (Refer to "Truck Tip-Off" procedure in this manual.)



Illustration 195

g06017881

Weigh Status: Estimated Payload
Bucket Payload: 1.96 t -> 0.96 t (Estimated)
Truck Payload: 18.0 t + 1.0 t = 19.0 t (Estimated)
Remaining Payload: 2.0 t - 1.0 t = 1.0 t (Estimated)

5. Once the operator begins dumping material to the truck, "Weigh Status" indicates "Estimated Payload", "Bucket Payload" is moving to "Truck Payload" and "Remaining Payload" decreases based on the amount dumped.

Note: If "Estimated Bucket Payload" drops below 500 kg (1100 lb), assume 100% of the bucket is transferred to the truck.



Illustration 196

g06017886

Truck Payload: 19.0 t + 0.96 t = 20.0 t
Bucket Payload: 1.0 t -> 0.0 t -> 1.96 t (Scaled)
Weigh Status: Scaled Payload Obtained
Remaining Payload: 2.0 t - 2.0 t = 0.0 t

6. After all material is dumped to the truck, “Bucket Payload” displays “0” for a moment. The “Bucket Payload” “Truck Payload/Weigh Status/Remaining Payload/Bucket Count” are then updated.

Note: “Last Bucket Payload” is shown on the Monitor when the bucket is fully opened or estimated “Bucket Payload” is less than 500 kg (1100 lb).



Illustration 197 g06017967

Bucket Payload: 1.96 t (last scaled payload)
Weigh Status: Scaled Payload Complete

7. Return to Digging position. “Weigh Status” indicated “Scaled Payload Complete” and “Bucket Payload” displays back to last bucket payload.



Illustration 198 g06017971

Truck Payload: Reset to 0
Truck Count: $123 + 1 = 124$
Truck Status: Target Not Reached
Remaining Payload: Reset to Target Payload
Bucket Count: Reset to 0

8. Press “Truck Store” button to record the data and “Truck Payload” / “Truck Count” / “Truck Status” / “Remaining Payload” / “Bucket Count” are updated.

Truck Tip-Off Function

Adjusting the Instantaneous Estimated Bucket Payload to reach the Target Truck Payload by dumping a partial bucket into the Truck after obtaining a Scaled Bucket Payload from swing.

After swinging the machine and obtaining a Scaled Bucket Payload, an estimated amount of material may be dumped from the bucket. The system shows and adjusts the Instantaneous Estimated Bucket Payload as material is dumped from the bucket. The system shows the Estimated Weigh Status for partial bucket dumps due to the limitations on obtaining enough data to scale the payload.

The system will start to register material leaving the bucket when the bucket passes and will register a complete material dump when the bucket reaches -40 degree angle. After registering a partial bucket payload dump, a swing return to the pile or dig location will scale the remaining bucket payload. Once the system scales the remaining bucket payload on the swing return, it will adjust the partial bucket dumped into the truck with a scaled value from the swing return.

Note: A best accuracy practice for storing Truck Payload would be to press the Truck Store only after completing a swing return to scale the partial bucket.

This Tip-Off type of operation may be helpful when on the Last Pass and trying to load a truck close to the Target Payload and bucket.

The Truck Tip-Off operation is detailed in the following steps:



Illustration 199 g06017990

Bucket Payload: 4.52 t (Estimated)
Weigh Status: Estimated Payload

1. Dig a material and lift until “Weigh Status” indicator shows “Estimated Payload”. “Bucket Payload” shows a “Estimated Bucket Payload”.



Illustration 200 g06017995

Bucket Payload 4.52 t (Estimated) > Remaining Payload 2.00 t
Truck Status: Overload

2. If “Bucket Payload” is greater than “Remaining Payload”, “Truck Status” indicates “Overload”.



Illustration 201

g06018021

Bucket Payload: 4.46 t (Scaled)
Weigh Status: Scaled Payload Obtained

3. Obtain an accurate "Bucket Payload" by swinging to approach truck. "Bucket Payload" indicates a scaled value and "Weigh Status" indicates "Scaled Payload Obtained".



Illustration 202

g06018022

Bucket Count: $4 + 1 = 5$
Weigh Status: Estimated Payload
Bucket Payload: 4.46 t $\rightarrow$ 3.46 t (Estimated)
Truck Payload: 18.0 t + 1.0 t = 19.0 t
Remaining Payload: 2.0 t - 1.0 t = 1.0 t (Estimated)

4. After the operator starts dumping material to the truck, "Bucket Count" is updated, "Weigh Status" indicates "Estimated Payload", "Bucket Payload" transfers to "Truck Payload" and "Remaining Payload" is decreasing based on how much is available to be dumped.



Illustration 203

g06018026

Truck Payload: 19.0 t + 1.0 t = 20.0 t (Temporary)
Bucket Payload: 3.46 t $\rightarrow$ 2.46 t (Estimated)
Remaining Payload: 1.0 t - 1.0 t = 0.0 t (Estimated)

5. Stop a partial dump when "Target Payload" is reached. "Remaining Payload" is updated but "Truck Status" is still "Overloaded". The leftover "Bucket Payload" is a live value and "Weigh Status" is equal to "Estimated Payload". "Truck Payload" is a temporary value until obtaining an accurate "Bucket Payload".



Illustration 204

g06020688

Bucket Payload: 2.57 t (Scaled)
Weigh Status: Scaled Payload Obtained
Truck Payload: 20.0 t (Temp) - 2.57 t - 2.46 t = 19.9 t
Remaining Payload: 20.0 t (Target) - 19.9 t = 0.1 t

6. Swing back and reweigh the leftover material to obtain a scaled payload. Bucket Payload becomes a scaled value and Weigh Status indicates Scaled Payload Obtained. Truck Payload and Remaining Payload are also determined.



Illustration 205

g06018048

Truck Payload: Reset to 0
Truck Count: $123 + 1 = 124$
Truck Status: Target Not Reached
Remaining Payload: Reset to Target Payload
Bucket Count: Reset to 0

7. Press "Truck Store" button to record the data and "Truck Payload" / "Truck Count" / "Truck Status" / "Remaining Payload" / "Bucket Count" are updated.



Illustration 206

g06018056

Truck Payload: $0\text{ t} + 2.7\text{ t} = 2.57\text{ t}$
 Bucket Payload: $2.57\text{ t} \rightarrow 0.00\text{ t} \rightarrow 2.57\text{ t}$
 Remaining Payload: $20.0\text{ t} - 2.57\text{ t} = 17.43\text{ t}$
 Bucket Count: $0 + 1 = 1$

8. Dump the leftover material to the next truck when the next truck is ready. "Bucket Payload" transfers to "Truck Payload". "Bucket Payload" shows "0" for a moment then displays the last "Bucket Payload". "Remaining Payload" and "Truck Count" are updated.



Illustration 207

g06018059

Weigh Status: Scaled Payload Complete

9. Return to digging position. "Weigh Status" indicates "Scaled Payload Complete" and ready for next cycle.

Note: Reweigh step (Step 6) is necessary to obtain an accurate "Truck Payload". The Reweigh could be skipped to avoid "irregular" operation. In this case, Bucket Payload and Truck Payload are the estimated value and the payload accuracy is not guaranteed. Avoiding the Reweigh step may also affect the accuracy of both the last "Truck Payload" and the next "Truck Payload" readings. However Total Payload of last "Truck Payload" and next "Truck Payload" must be accurate.

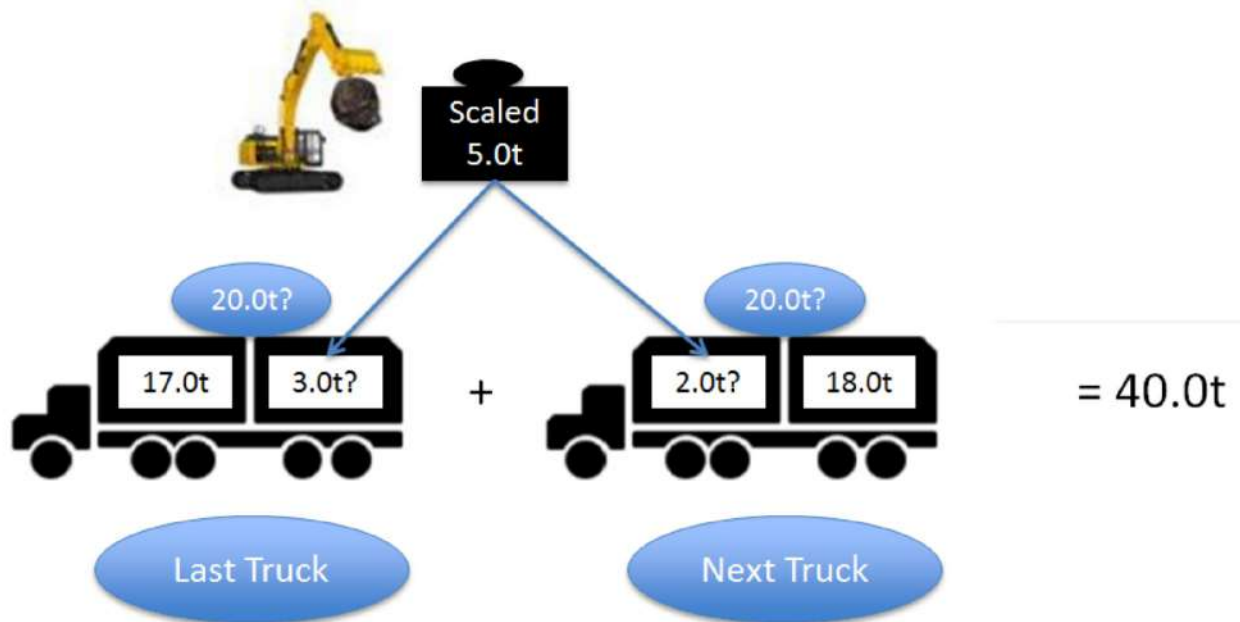


Illustration 208

g06018078

Each Truck has an estimated payload (3.0 t / 2.0 t) but total payload (5.0 t) is scaled and accurate.

Work Monitor

The "Work Monitor" screen provides additional productivity information calculated by the Cat Production Measurement Application.

The "Work Monitor" menu can be accessed from the "Production Measurement" menu. Refer to "Cat Production Measurement Menu Screen, and Cat".



Illustration 209

g03879266

The Work Monitor menu displays the following:

- (1) "Average Fuel Rate" = Total Fuel (L) / Machine Operating Hours (h).
- (2) "Average Productivity (t/h)" = Total Payload (t) / Machine Operating Hours (h).
- (3) "Average Efficiency (t/L)" = (2) Average Productivity / (1) Average Fuel Rate.
- (4) "Total Payload (t)" = Total Payload Loading.
- (5) "Truck Count" = Total Number of Trucks loaded.
- (6) "Total Bucket Count" = Total Number of Bucket Loads.
- (7) "Idle Time Rate (%)" = Machine Idle Time (h) / Machine Operating Hours (h).
- (8) "Reset Key" - Press the "Reset Key" to reset all information to "0".



Illustration 210

g03838925

(9) "Truck" - Calculates Productivity Information during "Weigh" mode only.

(10) "All" - Calculates Productivity information at whole cycle ("Weigh" mode and "Standby" mode).

Note: "Truck" (9) is the information stored since the last reset. "All" (10) is the information stored in total lifetime, which is the whole machine life.

Note: “Lifetime Payload” and “Lifetime Bucket Count” are sent to “VisionLink”. The data contained in “VisionLink” is not reset.

Preparing the System

Site Configuration

The site configuration menu displays the current configuration of the following:

- Truck ID

The “Site Configuration” menu can be accessed from the “Production Measurement” menu. Refer to “Cat Production Measurement Menu Screen, and Cat”.

Note: The “Site Configuration” function key may also be used to access this menu.

Note: If “Automatic ID” feature is enabled, the “Site Configuration” menu will be displayed when the “Truck Store” key is selected.

Select an ID Configuration

In order to select, or change, an ID configuration:

1. Navigate to the “Site Configuration” menu. Refer to “Cat Production Measurement Menu Screen, and Cat”.
2. Use the keypad to highlight the ID configuration to be changed and press the “OK” function key.
3. Select the desired ID configuration and press the “OK” function key.

Edit an ID Configuration

In order to edit an ID configuration.

1. Navigate to the “Production Measurement” menu. Refer to “Cat Production Measurement Menu Screen, and Cat”.

The following ID lists are available on the “Production Measurement” menu.

- Truck ID List
2. Use the keypad in order to select the desired ID list to edit. Press the “OK” function key.
 3. Use the keypad in order to edit an item and/or parameter and press the “OK” function key when complete.

Bucket Measure-Up

The dimensions of the excavator bucket must be recorded for the Cat® “Production Measurement Application” to function correctly.

Prior to beginning this process, review Operation and Maintenance Manual, SEBU8358, “Cat® Grade Control Depth & Slope (E-Series and F-Series HEX)”.

Attaching A New Or Different Bucket

Each time that a new or different bucket is attached to the machine, measurements must be entered into the “Bucket Measure-Up” submenu. The submenu is part of the overall menu for the Cat® “Production Measurement Application”.

The dimension of each bucket must be defined to aid the measurement system in determining the load status of the truck.

Gathering and Entering Data

After attaching the bucket to the machine, measure the distance between the points displayed in Illustration 211.

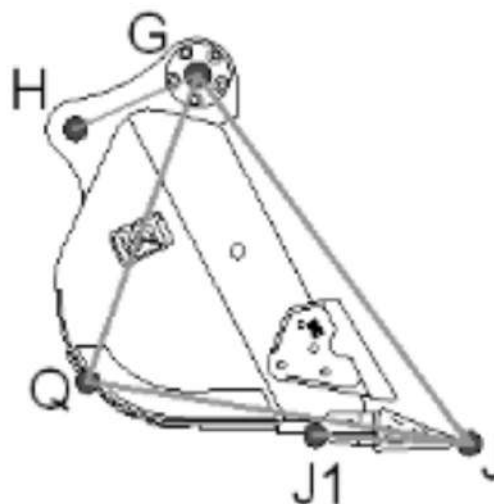


Illustration 211

g03823697

Measure and record the distances between “G” and “H”, “G” and “Q”, “Q” and “J”, and “J” and “J1”. (All measurements must be metric.)

Enter the “Work Tool Select” menu. Locate and select the “Bucket Measure-Up” menu.

Follow the prompts to enter the required measurements. The measurements are entered into the submenu to define the volume of the bucket.

Note: The “Bucket Measure-Up” information must be entered or the Cat® “Production Measurement Application” will not function properly.

Calibration

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.

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.

Specific system calibrations are required for the Cat Production Measurement Application to provide proper accuracy of the payload control system.

Observe the following conditions when performing calibrations.

- Ensure that the machine is at operating temperature.
- Ensure that the engine speed is at operating speed.
- Ensure that the work tool is free of material and debris.
- Ensure that the work tool does not touch the ground.

The order of calibration should be;

1. Boom Single Operation
2. Front Multi Operation
3. Bucket Zero Adjustment

Boom Single Operation

Perform the “Boom Single Operation” calibration every 6 months for each work tool, or when one of the following conditions apply:

- The front linkage is changed
- A work tool is used for the first time
- A calibration alert is displayed on the monitor

In order to perform the “Boom Single Operation” calibration:

1. Navigate to the “Work Tool Select” menu. Refer to “Cat Production Measurement Menu Screen, and Cat”.
2. Press the “Calibrate” function key.
3. Use the keypad in order to select “Boom Single Operation”. Press the “OK” function key in order to start the calibration.

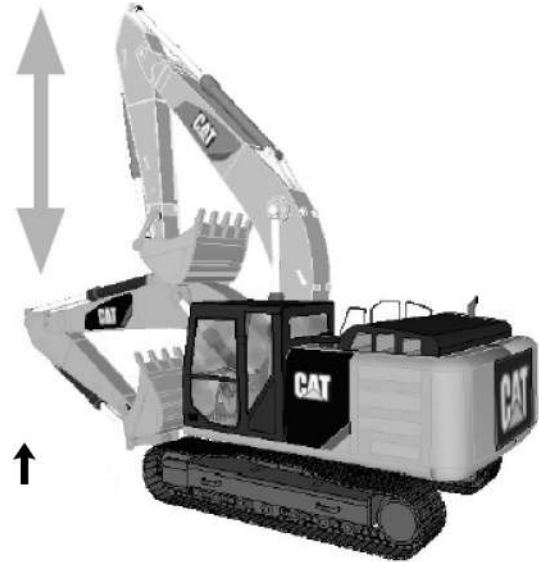


Illustration 212

g03842137

4. Follow the instruction and refer to illustration 212 :

Raise and lower the boom slowly at minimum reach.

START POSITION - Stick in and bucket closed.
Refer to the black arrow on illustration 212 .

END POSITION - Stick in and bucket closed.

- Boom movement ONLY
- Constant speed
- Boom up: 30 seconds (towards end of cylinder stroke/success)
- Boom down: 30 seconds (return to start position, bucket near ground/success)

Note: Repeat until “Success” is shown on display. When the calibration is completed successfully, a buzzer will sound.

Note: Hydraulic speed may change, moving boom lever slightly might be needed to maintain constant boom angle speed.

Note: Boom cylinder speed is displayed on the monitor during “Boom Single Calibration” . Try to keep the boom moving between 5 mm/s and 30 mm/s.

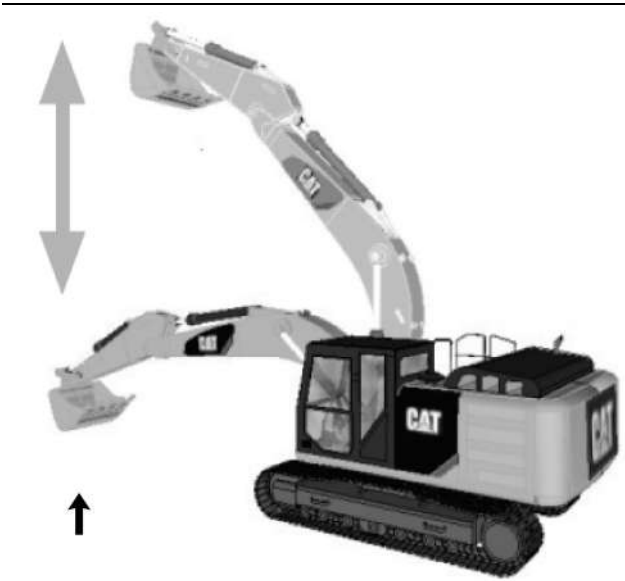


Illustration 213 g03842146

5. Follow the instruction and refer to illustration 213 :

Raise and lower boom slowly at maximum reach.

START POSITION - Stick out and bucket closed.
Refer to the black arrow on illustration 213 .

END POSITION - Stick out and bucket closed.

- Boom movement ONLY
- Constant speed
- Boom up: 30 seconds (towards end of cylinder stroke/success)
- Boom down: 30 seconds (return to start position, bucket near ground/success)

Note: Repeat until “Success” is shown on display. When the calibration is completed successfully, a buzzer will sound.

Note: Hydraulic speed may change, moving boom lever slightly might be needed to maintain constant boom angle speed.

Note: Boom cylinder speed is displayed on the monitor during “Boom Single Calibration” . Try to keep the boom moving between 5 mm/s and 30 mm/s.

6. Once the “Boom Single Operation” calibration is complete, perform the “Front Multi Operation” calibration.

Log Failed Message for Boom Single Operation Calibration

Table 67

Log Failed Message	Reason / Required Operation
Boom speed too slow.	Keep Boom speed between 5 mm/s and 30 mm/s. Please retry this cycle from start position.
Boom speed too fast.	Keep Boom speed between 5 mm/s and 30 mm/s. Please retry this cycle from start position.
Front linkage position is invalid.	Do not operate Stick and Bucket during Boom operation. Please retry this cycle from start position.

Front Multi Operation

Note: The “Boom Single Operation” calibration should be performed before the “Front Multi Operation” calibration.

Perform the “Front Multi Operation” calibration every 6 months for each work tool, or when one of the following conditions apply:

- The front linkage is changed.
- A work tool is used for the first time.
- A calibration alert is displayed on the monitor.

Before performing Front Multi Operation Calibration, Read hints listed below.

- Strive for doing this process smoothly over 180° to 270°
- No need to try and stop at 180°
- At Phase 3 and 4, low trajectory condition is that the stick nose pin must be lower than 1m above the boom foot pin when the stick is vertical or “Outside Vertical” . If the stick is “Inside Vertical” , then the low trajectory is not active.

World stick angle (against Ground) is wider than vertical.

Bucket pin height (from Boom foot) is higher than 1m.

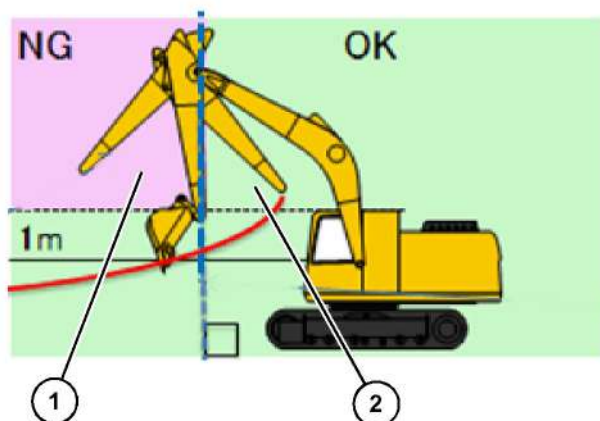


Illustration 214

g06003422

The Red line indicates the ideal trajectory for operation described in this section.

- (1) Outside Vertical Range
- (2) Inside Vertical Range

In order to perform the “Front Multi Operation” calibration:

1. Navigate to the “Work Tool Select” menu. Refer to “Cat Production Measurement Menu Screen, and Cat”.
2. Press the “Calibrate” function key.
3. Use the keypad in order to select “Front Multi Operation” . Press the “OK” function key in order to start the calibration.

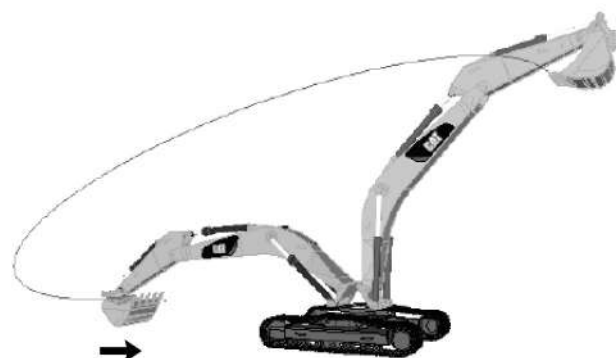


Illustration 215

g03842148



Illustration 216

g03842149

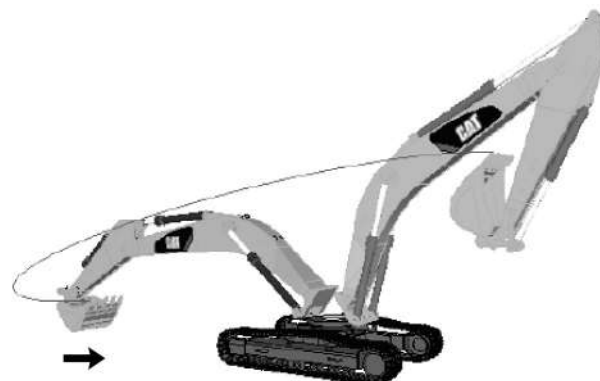


Illustration 217

g03842150

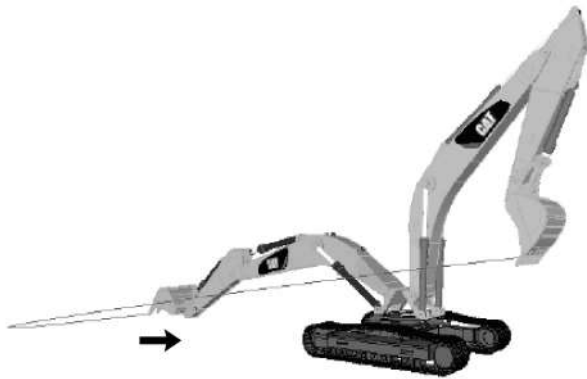


Illustration 218

g03842151

4. Follow the instruction (Each operation should be repeated for five times):

Phase 1 – Raise the Boom Up and Swing 180° to 270° (simultaneously). Refer to illustration 215 .

- **START POSITION** - Stick Out; Bucket Closed; Near Ground. Refer to the black arrow on illustration 215
- **END POSITION** - Stick Out; Bucket Closed; Boom Up
- **RETURN** - Swing Back & Boom Down; To start position



Illustration 219

g06026464

Boom Angle is shown on the screen during the calibration. The calibration must start with the boom angle less than 15 deg and end boom angle at more than 45 deg.

Note: The bucket function is not moved during Phase 1.

Note: Repeat until "Success" is shown on display, minimum 5 times. When the calibration is succeeded, a buzzer will sound each time.

Phase 2 – Raise the Boom and Swing 180° to 270° and Open Bucket (simultaneously). Refer to illustration 216 .

- **START POSITION** - Stick out; Bucket closed ; on ground. Refer to the black arrow on illustration 216
- **END POSITION** - Stick out; Bucket Open; Boom Up
- **RETURN** - Swing Back & Boom Down & Close Bucket; To start position

Note: Repeat until "Success" is shown on display, minimum 5 times. When the calibration is succeeded, a buzzer will sound each time.

Phase 3 – Raise the Boom Up and Swing 180° to 270° and Stick In (simultaneously). Refer to illustration 217 .

- **START POSITION** - Stick out; Bucket Closed; Near Ground. Refer to the black arrow on illustration 217
- **END POSITION** - Stick in; Bucket Closed; Boom Up
- **RETURN** - Swing Back & Boom Down & Stick Out; To start position

Note: Repeat until "Success" is shown on display, minimum 5 times. When the calibration is succeeded, a buzzer will sound each time.

Phase 4 – Raise the Boom Up and Swing 180° to 270° and Stick In (simultaneously). Refer to illustration 218 .

- **START POSITION** - Stick Out; Bucket Open, Near Ground. Refer to the black arrow on illustration 218
- **END POSITION** - Stick In; Bucket Open; Boom Up
- **RETURN** - Swing Back & Boom Down & Stick Out; To start position

Note: Repeat until "Success" is shown on display, minimum 5 times. When the calibration is succeeded, a buzzer will sound each time.

Recommended AFTER each Bucket change.

Simulates truck loading (boom Lift / swing) with empty bucket

Operation Section
Production Measurement Application

- Raise and swing boom at least 90°
- Swing back & Boom Down in opposite direction to start position

5. Once the “Front Multi Operation” calibration is complete, perform the “Bucket Zero Adjustment” calibration.

Log Failed Message for Front-Multi Operation Calibration

Table 68

Log Failed Message	Reason / Required Operation	Phase			
		1	2	3	4
Boom movement wrong direction is detected.	At Boom Up step, do not lower the Boom. At Boom Down step, do not raise the Boom.	X	X	X	X
Boom operation is too slow. Calibration time out.	Boom stops 30 sec after calibration start(Displaying "Calibrating..."). Start Boom Operation in 30 sec.	X	X	X	X
Boom start delayed from Swing start.	Boom does not start to move within 5 seconds of Swing movement. Start to move Boom and Swing simultaneously. Swing speed must be faster than 11.5 degrees per second.	X	X	X	X
Boom finish delayed from other function finish or Boom did not reach target angle.	Boom does not reach target within 10 seconds from Stick and Bucket reaching target. Operator Boom more quickly.		X	X	X
Stick operation is detected.	Cease operation of the Stick.	X	X		
Stick finish delayed from other function finish or Stick did not reach target angle.	Stick does not reach target within 5 sec from Boom and Bucket reaches each target. Operate Stick more quickly.			X	X
Detected Stick nose position above low trajectory limit when Stick orientation is greater than XX degrees.	Maintain Stick nose position (negative) under low trajectory limit (1m lower than Boom foot) until Stick orientation is less than XX degrees. (XX is depending on Stick Length)			X	X
Bucket operation is detected.	Cease operation of the Bucket.	X		X	X
Bucket finish delayed from other function finish or Bucket did not reach target angle.	Bucket does not reach target within 4 sec from Boom and Stick reaches each target. Operate Bucket more quickly.		X		
Swing operation is too slow or too short.	Swing stops 10 sec after calibration start (Displaying "Calibrating..."). Swing operation time does not reach target within 3 sec from Boom, Stick, and Bucket reaches each target Operate more quickly.	X	X	X	X
Calibration time out.	No transition in 60 sec after calibration start (Displaying "Calibrating..."). Start Calibration in 60 sec.	X	X	X	X

Bucket Zero Adjustment

Perform the "Bucket Zero Adjustment" calibration daily or when one of the following conditions apply:

- The "bucket Zero Interval" has expired
- The work tool is changed
- A calibration alert is displayed on the monitor
- A calibration of the "Boom Single Operation" and "Front Multi Operation" has been performed.

In order to perform the "Bucket Zero Adjustment" calibration:

1. Navigate to the "Work Tool Select" menu. Refer to "Cat Production Measurement Menu Screen, and Cat".
2. Select the work tool.
3. Press the "Calibrate" function key.
4. Use the keypad in order to select "Bucket Zero Adjustment". Press the "OK" function key in order to start the calibration.

Note: The "Bucket Zero" function key can also be selected from any screen in order to open the "Bucket Zero Adjustment" menu.



Illustration 220

g03842147

5. Follow the instruction on the monitor screen and refer illustration 220 in order to:

- Calibrate the weight of an empty bucket. Gradually raise and swing the bucket at least 90 degrees to simulate truck loading. Each calibration requires five cycles in order to complete the "Bucket Zero Adjustment" calibration.

Log Failed Message for Bucket Zero Adjustment

Table 69

Log Failed Message	Reason / Required Operation
Boom is too high	Please retry this cycle from initial position with care like Start Boom operation from lower position. Raise Boom more slowly.
Swing operation time is too short.	Please retry this cycle from initial position with care like Maintain swing speed slower and longer time.
Bucket is not level.	Please retry this cycle from initial position with care like Maintain the bucket angle similar to loading operation (Carry position).
Boom operation is too slow.	Calibration timeout. Please retry this cycle from initial position with care like Raise Boom faster. Start Boom operation from lower position.

Simple Calibration

Simple calibration will adjust the system calibration to match a reference scale. Simple calibration can be performed on as few as 1 or as many as 15 trucks. The more trucks used, the better the calibration will be fine-tuned. The recommended number of trucks for most applications is 5.

Note: The simple calibration update cannot be performed unless the operator presses the store button after each truck load. The simple calibration truck list is remained when the machine is keyed OFF.

- A new simple calibration erases all prior simple calibrations.
- Only the latest simple calibration on one or more trucks is used to fine-tune the scale system.
- Once a simple calibration is started, additional trucks may be adjusted in the simple calibration until a new truck is stored.
- A simple calibration will begin adjusting the next weight measurement, but will not affect any weights previously measured.
- For best results, the system should be zeroed when requested through the display.

Simple calibration adjustment method is

$$W = (W_R - Z) * A$$

Where:

W – Adjusted and Zeroed Weight

W_R – Raw Weight

A – Adjustment Factor

* Adjustment Factor = $\Sigma(\text{Last 15 Scale Weight}) / \Sigma(\text{Last 15 Raw Payload})$

Z – Zero Weight

To Perform a "Simple Calibration", record

The weight of the trucks at the scale house.

The weight that is displayed by the scale system for the trucks.

A recent tare weight of the trucks being used for the simple calibration.



Illustration 221

g06023396

1. Go to **Main Menu > Work Tool Select > Weighing Calibration** and select **“Simple Calibration”** and push **“OK”** key.
2. Select and input the scale weight for the appropriate truck number. Continue to input the scale weight if you have multiple data.
3. Push **“OK”** key when finish to input all scale weight.
4. Bucket Payload will be adjusted from the next Bucket.

Calibration alerts

Below are common calibration alerts that may be displayed on the monitor:



“ZERO ADJUSTMENT RECOMMENDED”
– A set interval has expired or if a significant condition has changed.

Select **“OK”** on the monitor in order to perform the calibration. Refer to **“Operating Mode”**.



“WEIGH CALIBRATION RECOMMENDED” – A set interval has expired or if a significant condition has changed. Select **“OK”** on the monitor in order to perform the calibrations.



“WEIGH CALIBRATION REQUIRED” – A set interval has expired or if a significant condition has changed. Select **“OK”** on the monitor in order to perform the calibrations.

Sound Setup

The Cat Production Measurement Application includes audible sound alerts for the following:

- Last 1 Pass
- reach Target
- Weighing Status

In order to enable or disable the audible sound alerts:

1. Navigate to the **“Sound Setup”** menu. Refer to **“Cat Production Measurement Menu Screen, and Cat”**.
2. Use the keypad to highlight the sound to be changed and press the **“OK”** function key.
3. Use the keypad in order to select **“ENABLED”** or **“DISABLED”**.
4. Press the **“OK”** function key in order to confirm your selection.

Operating Mode

Navigate to the **“Operating Mode”** menu. Refer to **“Cat Production Measurement Menu Screen, and Cat”**.

The following parameters can be adjusted:

- CPM Enable Status
- Automatic ID Feature
- Bucket Zero Interval

Note: The **“Operating Mode”** menu can be accessed from the **“Production Measurement”** menu. The **“Production Measurement”** menu is found on the **“Main Menu”** of the monitoring system.

CPM Enable Status

1. Use the keypad in order to select **“Production Measurement Enable”** and press the **“OK”** function key.
2. Use the keypad in order to select **“ENABLED”** or **“DISABLED”**.
3. Press the **“OK”** function key in order to confirm your selection.

Automatic ID Feature

1. Navigate to the **“Operating Mode”** menu
2. Use the keypad in order to select **“Automatic ID Feature”** and press the **“OK”** function key.
3. Use the keypad in order to select **“ENABLED”** or **“DISABLED”**.

4. Press the "OK" function key in order to confirm your selection.

Bucket Zero Interval

1. Use the keypad in order to select "Bucket Zero Interval" and press the "OK" function key.
2. Use the keypad in order to select the desired interval and press the "OK" function key.

3. Press the "OK" function key in order to confirm your selection.

i05454870

Storage Box

SMCS Code: 7268

Interior Storage Box

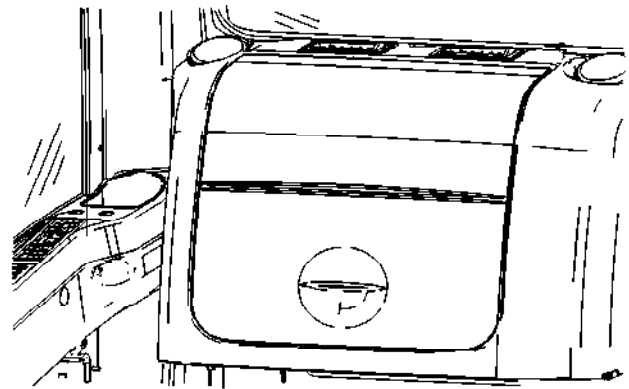


Illustration 222

g01096952

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

Exterior Storage Box

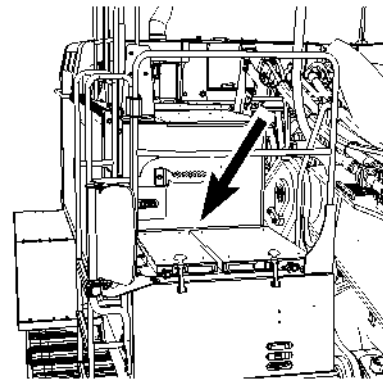


Illustration 223

g03444862

The storage box is used to store the refueling pump and the automatic lubrication system. The storage box is also used to store miscellaneous tools.

i05192538

Storage and Literature Compartment (If Equipped)

SMCS Code: 7268

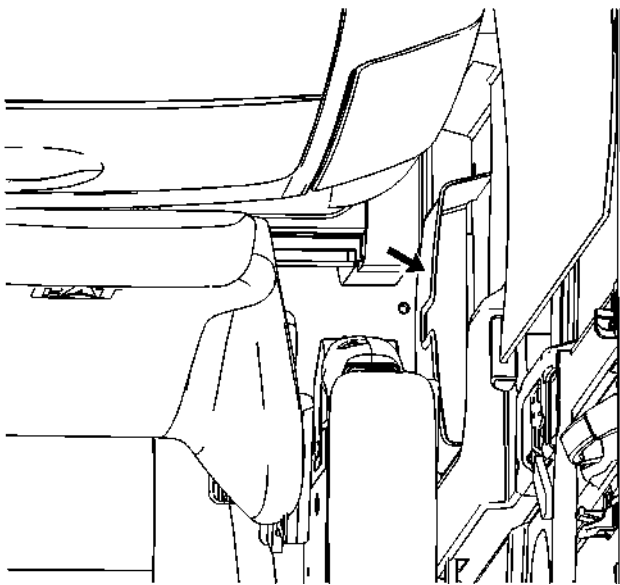


Illustration 224

g01160959

A storage compartment is located inside the cab on the left side. Use the compartment to store the literature for the machine.

Note: Do not store tools in the storage compartment. Tools stored in the compartment could damage the compartment.

i05622032

Fuel Transfer Pump (Refueling) (If Equipped)

SMCS Code: 1256

S/N: EBF1-10000

S/N: XLW1-Up

S/N: DNM1-10000

The fuel transfer pump pumps fuel into the fuel tank.

NOTICE

Do not continuously operate the refueling pump for more than 30 minutes. Do not operate the refueling pump more than a few seconds without fuel. Pump damage can result.

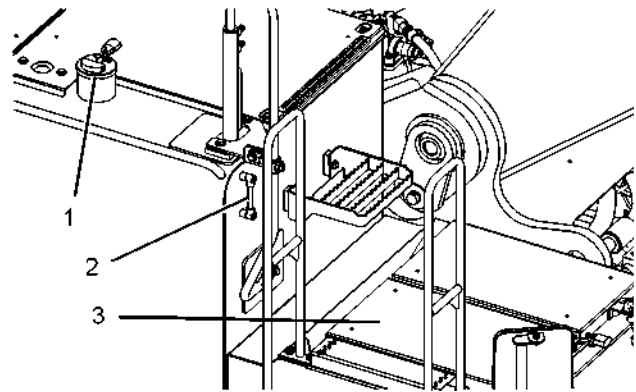


Illustration 225

g03377367

- (1) Cap
- (2) Sight gauge
- (3) Storage box

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

1. Open the outside cover of the storage box (3) that is located at the front of the machine.
2. Remove cap (1) from the fuel tank, in order to allow proper ventilation.

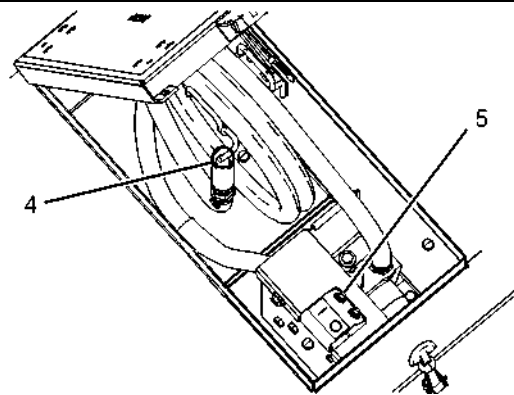


Illustration 226

g03377379

Fuel transfer pump is located next to the storage box.

- (4) Hose end
- (5) On switch

3. Insert the free end of the suction hose (4) into a container of fuel.
4. Push the on switch (5) in order to supply the fuel to the tank. When the tank is full, the pump stops refueling.

Note: Check sight gauge (2) in order to determine the fuel level.

5. After refueling, install the cap on the fuel tank.

6. Make sure that excess fuel is drained from the suction hose before storing the suction hose.
7. Wind the hose on the bracket. Place the end of the hose onto the holder.

NOTICE

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

8. Close the outside cover of the storage box.

i06789912

Fuel Transfer Pump (Refueling) (If Equipped)

SMCS Code: 1256

S/N: EBF10001–Up

S/N: XWL1–Up

S/N: DNM10001–Up

The fuel transfer pump (5) pumps fuel into the fuel tank. The fuel transfer pump (5) is located in the storage box on the right side of the machine and in front of the fuel tank.

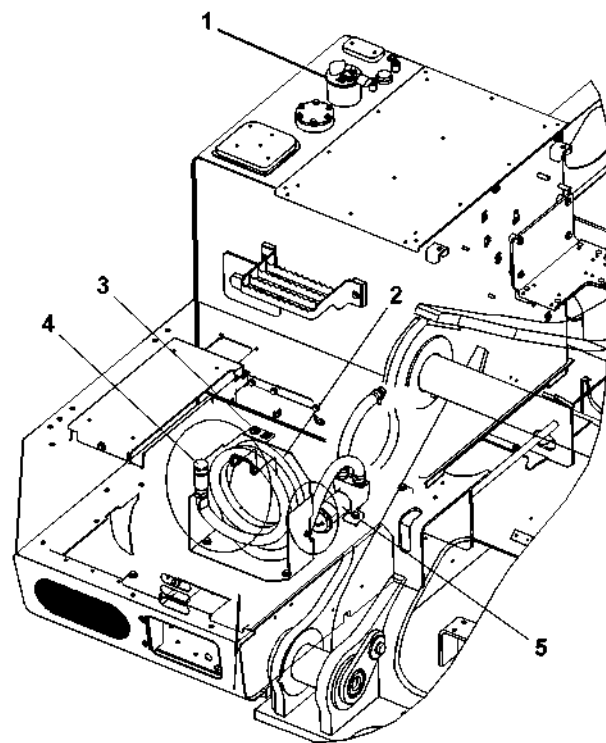


Illustration 227

g06115708

- (1) Fuel tank cap
- (2) Hose
- (3) ON/OFF switch
- (4) Suction valve
- (5) Fuel transfer pump



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 fuel tank cap (1) from the fuel tank.
4. Open the storage box that is on the right side of the machine.

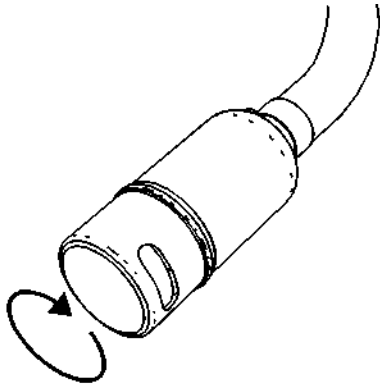


Illustration 228

g03660074

Suction valve (4) is at the end of hose (2).

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

5. Uncoil hose (2) and turn the end of suction valve (4) clockwise to open the suction valve.
6. Properly insert the end of suction valve (4) into a container of fuel.
7. Push switch (3) 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 switch (3) 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 switch (3) 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 hose (2) and turn the end of suction valve (4) counter-clockwise to close the suction valve.
10. When you store hose (2), wind the hose on the bar. Secure the suction valve in place.

NOTICE

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

11. Close the cover of the storage box.
12. install fuel tank cap (1) to the fuel tank.
13. Turn the engine start switch to the OFF position.

i03912100

Radio (If Equipped)

SMCS Code: 7338

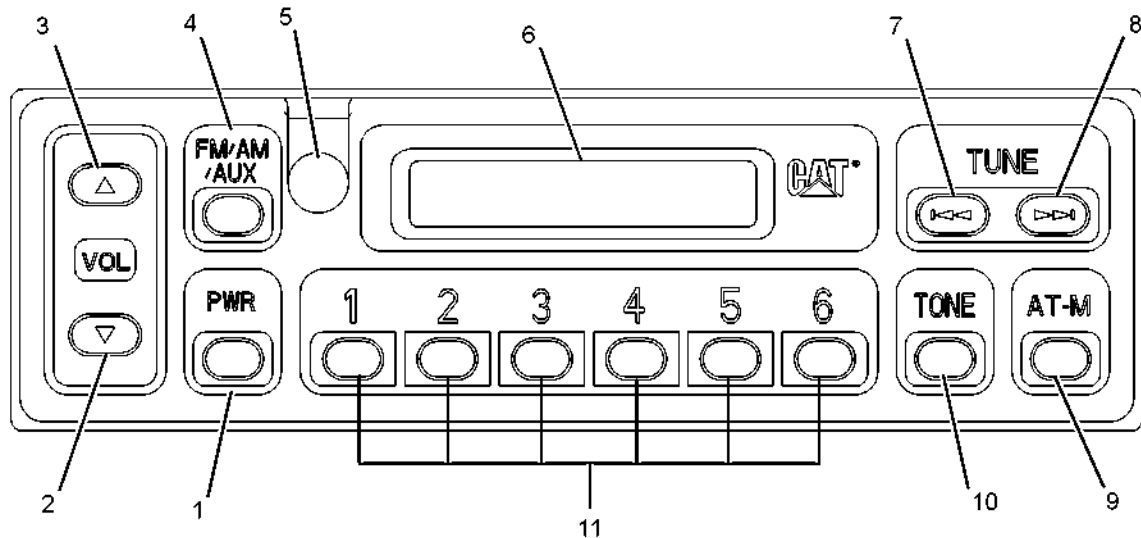


Illustration 229

g02117159

- (1) Power switch
- (2) Volume control
- (3) Volume control
- (4) "AM/FM/AUX" selector

- (5) Auxiliary plug
- (6) Display panel
- (7) "Tune" button
- (8) "Tune" button

- (9) Button for scan and auto memory function
- (10) "Tone" control
- (11) Preset buttons

Note: When the machine is in operation, turn down the volume of the radio.

Note: The radio can be used only when the battery disconnect switch and the engine start switch are in the ON position.

Note: When a button is pushed, a beep will occur.

(1) Power Switch – Push the power switch in order to turn on the radio. Push the power switch again in order to turn off the radio.

(2) and (3) Volume Control – Push the volume control in order to control the volume. Push the upper volume control in order to increase the sound level and push the lower volume control in order to decrease the sound level.

(4) "AM/FM/AUX" Selector – After you push the "AM/FM/AUX" selector, the selected radio band appears on display panel (6). This button is also used to activate the auxiliary function.

(5) Auxiliary Plug – The front auxiliary plug allows for the connection of a portable audio device.

(6) Display – The display shows various functions such as the station frequency, band, and the volume level.

(7) and (8) "Tune" Buttons – Push the "tune" buttons in order to select a radio station. Pressing "tune" button (7) will decrease the frequency. Pressing "tune" button (8) will increase the frequency. Pressing the "tune" button for less than 0.5 seconds changes the radio station one at a time. Pressing the "tune" buttons for more than 0.5 seconds will change the frequency automatically until a radio station is found.

(9) Scan and Auto Memory – Press button (5) for less than 0.5 seconds in order to listen to 5 seconds of each preset radio station. Press button (5) at least 1.5 seconds in order to store the radio stations with the six strongest signals.

(10) Tone Control – Music is optimized by pressing the tone control so that display (C) will show "MUSIC".

(11) Preset Buttons – The circuitry in the memory system allows you to preset six radio stations. To preset any of the "preset" buttons, follow the "Presetting Radio Stations" procedure.

Presetting Radio Stations

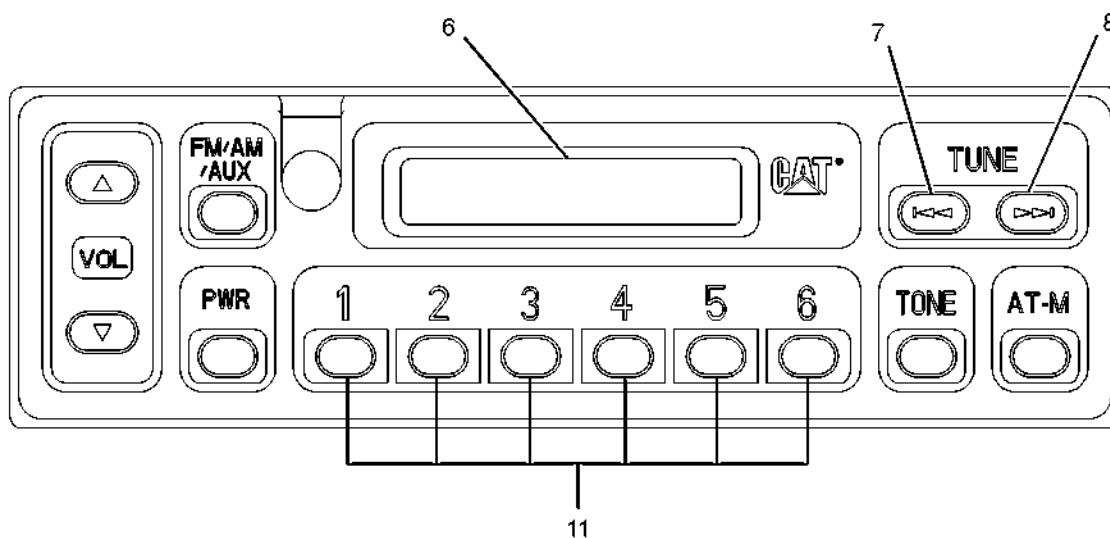


Illustration 230

g02117163

(6) Display
(7) "Tune" button

(8) "Tune" button
(11) Preset buttons

1. Turn on the radio. Select the AM band or the FM band.
2. Select the first radio station by using tuning switch (7) or tuning switch (8).
3. Depress one of preset buttons (11) for more than 1.5 seconds. The radio station will be stored in the memory for the selected preset.
4. Push preset button (11) in order to tune in the radio station.
5. Repeat the same procedure for the remaining preset switches.

Note: When the preset station is faint, use the “tune” buttons to locate a stronger signal.

Scan and Auto Memory

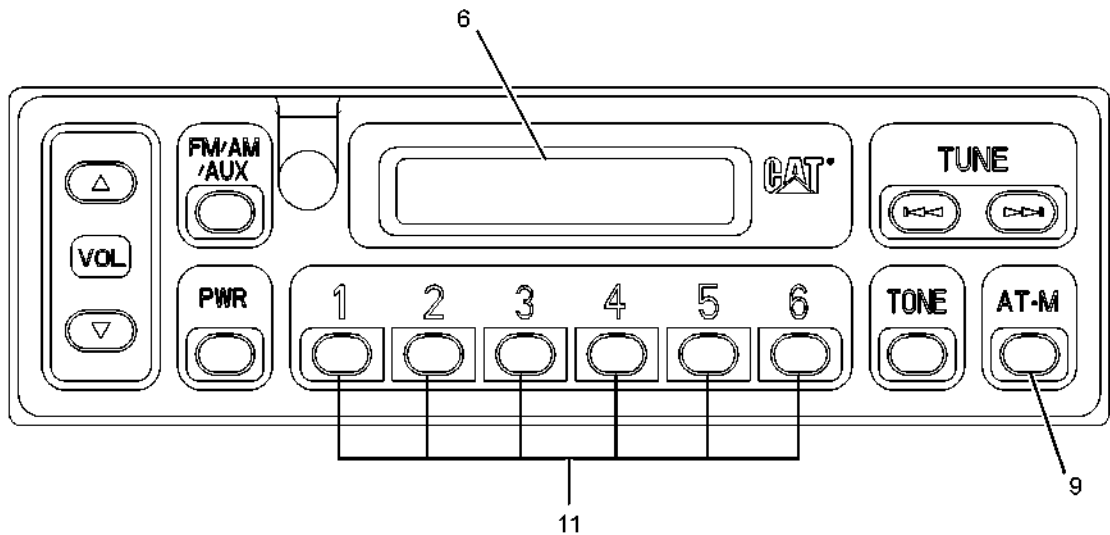


Illustration 231

g02117175

(6) Display (Frequency)

(9) Button for scan and auto memory function

(11) Preset buttons

Scan – Press button (9) for less than 0.5 seconds in order to listen for 5 seconds to each of the preset radio stations. Press button (9) again in order to stop scanning through the preset stations and keep listening to the current station. When this function is used “SCAN” is shown on display (6). The frequency of the radio station is also shown on the display.

Auto Memory – Press button (9) for more than 1.5 seconds in order to store the radio stations that have the strongest signal. The radio stations are stored in the six presets (11). Stations that are already stored in the memory will be erased.

Loss of Memory

The memory system is erased after a few days if the battery is disconnected.

Radio Reception

Note: The radio must be connected to a power source in order to set the area of reception.

Set the area of reception according to the following table:

Table 70

AREA	Display Setting	
	EU	US
North America		X
Central and South America		X
European Union	X	
Asia / Oceania	X	

Use the following procedure in order to set the desired area.

1. Turn off the radio.
2. Press preset button “1” , preset button “4” and button (9) at the same time. Hold until “EU” or “US” is displayed on the display panel.

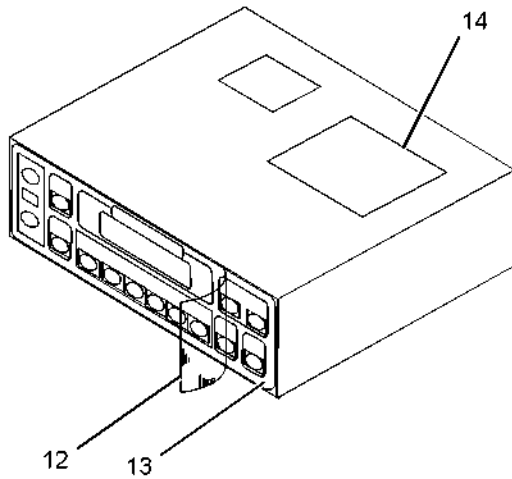


Illustration 232

g02117176

- (12) Protective film
(13) Control panel
(14) Method of selection

Note: Remove the film from the radio. Remove the vinyl from the operator seat. The film and vinyl may cause noise interference in the radio.

i05377826

Air Conditioning and Heating Control

SMCS Code: 7304; 7320; 7337

All machines are equipped with a heater. Only certain machines are equipped with an air conditioner. Those machines that are not equipped with an air conditioner also are not equipped with a compressor switch.

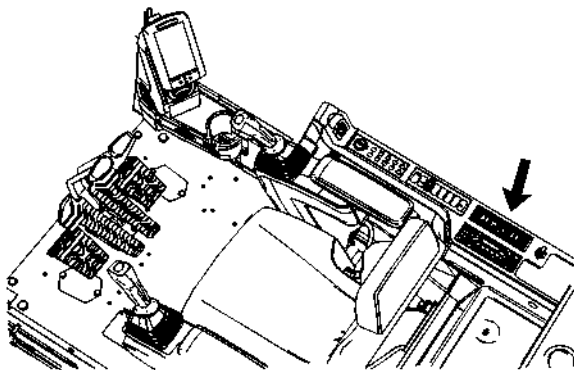


Illustration 233

g03402787

The climate control panel is located under the right window inside the cab:

Redirect the louvers for air outlets by hand to the desired direction. Some of the louvers for air outlet cannot be redirected.

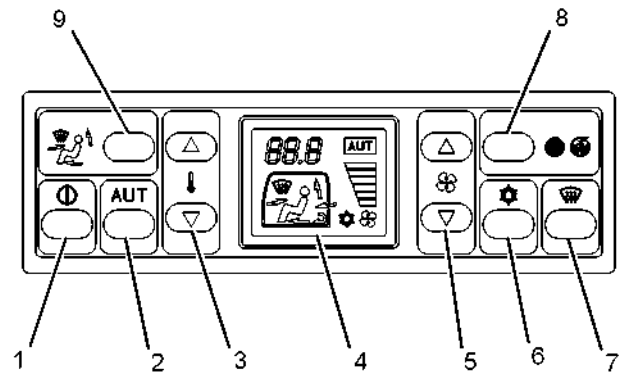


Illustration 234

g01106999

- (1) On/Off switch
(2) Automatic control switch
(3) Temperature switch
(4) LCD panel
(5) Fan switch
(6) Compressor switch
(7) Defrost mode
(8) Air inlet select switch
(9) Air outlet select switch



Main Power ON/OFF Switch (1) – Push the ON/OFF switch in order to power on the system. Push the switch again in order to power off the system.



Automatic Control Switch (2) – In order to enter the full “AUT” mode for automatic climate control, push this switch. However, if you push the switch again, you cannot turn off the air conditioning. When the system is in full “AUT” mode, you can manually change specific functions by pushing another switch. If you manually change a specific function, “AUT” does not appear in the display, but the unchanged functions will remain in “AUT” mode. Even on a day that is sunny, a climate control system with only a heater can cool the cab in full “AUT” mode if the ambient temperature is no more than 20 °C (68 °F).

The climate control unit provides excellent operator comfort in the full “AUT” setting. Press the “AUT” switch for full “AUT” mode. Push temperature switch (3) in order to set the desired temperature. The temperature is only shown in metric values. All other functions of climate control will be handled automatically.

In order to take advantage of the full "AUT" setting of the climate control system, always keep the sunlight sensor clean. Do not obstruct the sunlight sensor. If the climate control system is in the full "AUT" setting at engine start-up and the temperature inside the cab is too warm or too cool, the damper for fresh air ventilation may automatically close for a few minutes. This will help to bring the air temperature to the preset temperature more quickly.



Temperature Switch (3) – These switches control the temperature of the air that is coming from the air outlets in order to achieve the preset temperature. This preset temperature appears on LCD panel (4). If the heating and air conditioning system is in the automatic mode, pushing these switches changes the preset temperature.



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



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



Fan Switch (5) – The fan switch directly controls the fan speed. If the climate control system is operating in the automatic mode, pushing this switch overrides the automatically selected fan speed.



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



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



Compressor Switch (6) – Push the switch in order to turn on the compressor or push the switch in order to turn off the compressor. In humid conditions, the compressor may be used to remove moisture from the air in the cab. In cool weather, operate the compressor weekly in order to prevent leakage of the refrigerant gas. This will also help to maintain the compressor in optimum working order.



Defrost (7) – Depressing this switch will defog the windows. The air will also be dehumidified while the compressor is running. This selection directs air flow out of air outlet (C) and air outlet (D).

Air Inlet Select Switch (8) – This switch selects the position of the air inlet.



Recirculate – When this position is selected, the air inlet is closed. The air will recirculate inside the cab.



Fresh Air – When this position is selected, the air inlet is open. Fresh air will circulate into the cab.

Air Outlet Select Switch (9) – This switch selects the position of each air outlet. Each switch controls a different air outlet.



Upper Body – Selecting this switch will open air outlet (A) and air outlet (D).



Upper Body and Floor – Selecting this switch will open air outlet (A), air outlet (B) and air outlet (D).



Floor – Selecting this switch will open air outlet (B).



Floor and Defroster – Selecting this switch will open air outlet (B) and air outlets (C) and (D).

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

English Versus Metric Toggle

In order to convert the temperature reading from Degrees Celsius to Degrees Fahrenheit, depress both keys of the fan switch at the same time for five seconds. The same action is used for converting the temperature reading from Degrees Fahrenheit to Degrees Celsius.

i03267463

Mirror (If Equipped)

SMCS Code: 7319



WARNING

Adjust all mirrors as specified in the Operation and Maintenance Manual. Failure to heed this warning can lead to personal injury or death.

WARNING

Slips and falls can result in personal injury. Use the machine access systems when adjusting the mirrors. If the mirrors cannot be reached using the machine access systems follow the instructions found within the Operation and Maintenance Manual, "Mirror" in order to access the mirrors.

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

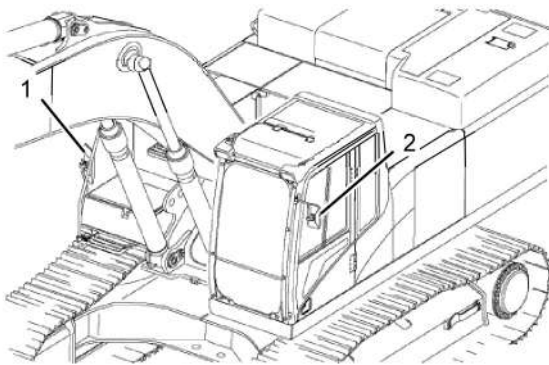


Illustration 235

g01598160

- (1) Right side rear view mirror
(2) Left side rear view mirror

Mirrors provide additional visibility around your machine. Make sure that the mirrors are in proper working condition and that the mirrors are clean. Adjust all mirrors at the beginning of each work period and adjust the mirrors when you change operators.

An appropriate job site organization is also recommended in order to minimize visibility hazards. For more information regarding job site organization refer to this Operation and Maintenance Manual, "Visibility Information"

Modified Machines or machines that have additional equipment or attachments may influence your visibility.

Mirror Adjustment

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the hydraulic lockout control to the LOCKED position. For further details on this procedure, refer to Operation and Maintenance Manual, "Operator Controls"
- Stop the engine.

Note: You may need to use hand tools in order to adjust certain types of mirrors.

Right Side Rear View Mirror (1)

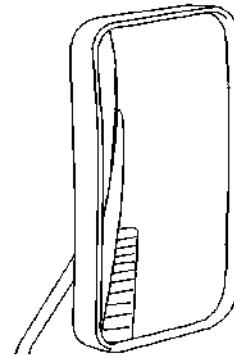


Illustration 236

g01665875

- (1) Right side rear view mirror

Adjust the side mirror (1) on the storage box so that the right side access door and the right side track can be seen from the operator seat. Additionally, provide as much visibility to the rear of the machine as possible.

Left Side Rear View Mirror (2)

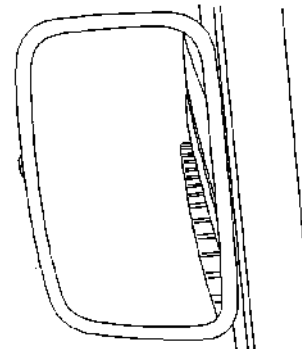


Illustration 237

g01666174

- (2) Left side rear view mirror

Adjust the left mirror (2) on the cab so that the left access door and the left side track can be seen from the operator seat. Additionally, provide as much visibility to the rear of the machine as possible.

i02630263

Window (Front)

SMCS Code: 7310-FR

Note: The sun visor (if equipped) must be down before the front window is raised. The front window will not lock in the overhead storage position with the sun visor in the raised position.

To provide full ventilation inside the cab, the upper window and the lower window can be fully opened.

WARNING

When opening or closing the windows, be extra careful to prevent any personal injury. The hydraulic lockout control must be in the **LOCKED** position in order to prevent any possibility of sudden movement of the machine due to inadvertent contact with the hydraulic control(s).

Do not change the position of the window until the following items have been done:

- Park the machine on a level surface.
- Lower the work tool to the ground.
- Move the lever for the hydraulic lockout control to the **LOCKED** position.
- Stop the engine.

50/50 Window

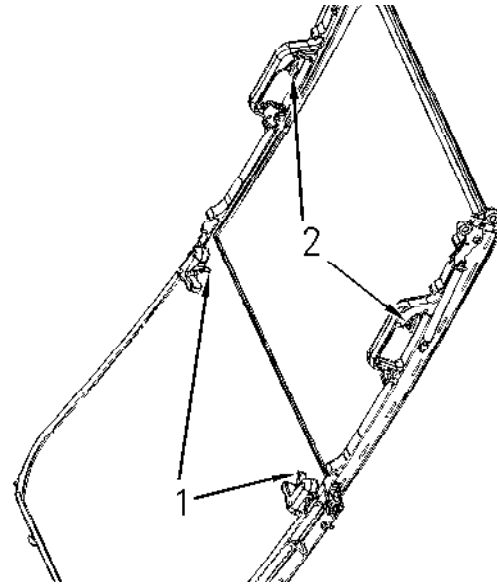


Illustration 238

g00888387

- (1) Latches for the lower window
(2) Latches for the upper window

Open the Lower Window

Use the following procedure in order to open the lower window:

1. Squeeze latches (1) on each side of the lower window.
2. Lift up on the lower window.

Note: When the lower window is fully opened, latches (1) will lock in place. This will secure the lower window into position.

Close the Lower Window

Use the following procedure in order to close the window:

1. Squeeze latches (1) on each side of the lower window.
2. Lower the lower window into position.

Note: Hold the lower window. This will prevent the window from falling.

Note: When the lower window is fully closed, latches (1) will lock in place. This will secure the lower window into position.

Open the Upper Window

Use the following procedure in order to open the upper window:

Note: Before you open the upper window, fully close the sun screen.

1. Squeeze latches (2) on each side of the upper window.
2. Pull the upper window into the overhead position.
3. When the upper window is fully opened, latches (2) will lock in place. This will secure the upper window into position.

Close the Upper Window

Use the following procedure in order to close the upper window:

1. Squeeze latches (2) on each side of the upper window and pull down on the upper window.
2. Push the upper window toward the front of the machine.

Note: When the upper window is fully closed, latches (2) will lock in place. This will secure the upper window into position.

Open Both Windows Together

1. Follow the procedure for opening the lower window. The lower window will latch to the upper window.
2. Follow the procedure for opening the upper window.

Close Both Windows

1. Squeeze latches (2) on each side of the upper window and pull down on the upper window.
2. Push the upper window toward the front of the machine until the window latches in place.
3. Squeeze latches (1) on each side of the lower window.
4. Lower the lower window into position.

Note: Hold the lower window. This will prevent the window from falling.

Note: When the lower window is fully closed, latches (1) will lock in place. This will secure the lower window into position.

70/30 window

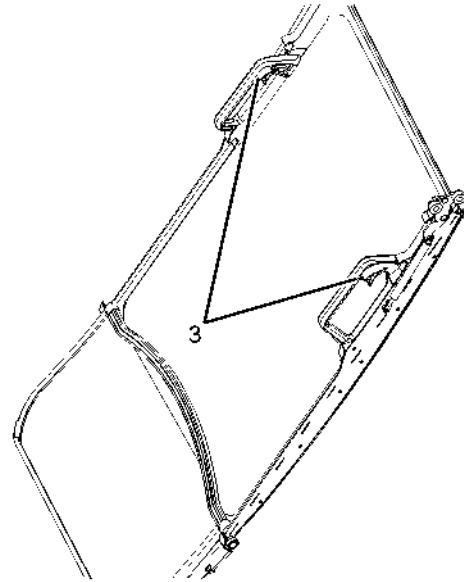


Illustration 239

g01214362

Open the Upper Window

Use the following procedure in order to open the upper window:

Note: Before you open the upper window, fully close the sun screen.

1. Squeeze latches (3) on each side of the upper window.
2. Pull the upper window into the overhead position.
3. When the upper window is fully opened, latches (3) will lock in place. This will secure the upper window into position.

Close the Upper Window

Use the following procedure in order to close the upper window:

1. Squeeze latches (3) on each side of the upper window and pull down on the upper window.
2. Push the upper window toward the front of the machine.

Note: When the upper window is fully closed, latches (3) will lock in place. This will secure the upper window into position.

Open the Lower Window and Close the Lower Window

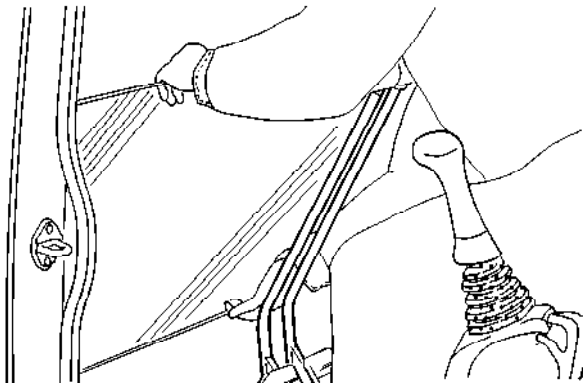


Illustration 240

g00103837

1. Open the upper window.
2. Raise the lower window out of the window frame.

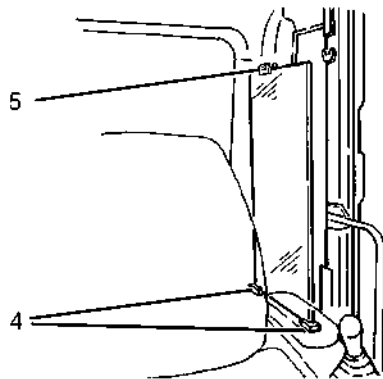


Illustration 241

g01319054

- (4) Brackets
(5) Catch

3. Store the lower window in the holder that is located in the rear of the left side cab frame. In order to store the lower window, locate one end of the lower window into brackets (4). Secure the opposite end of the lower window with catch (5).
4. In order 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.

i01557158

Cab Visor (If Equipped)

SMCS Code: 7301-ZZ

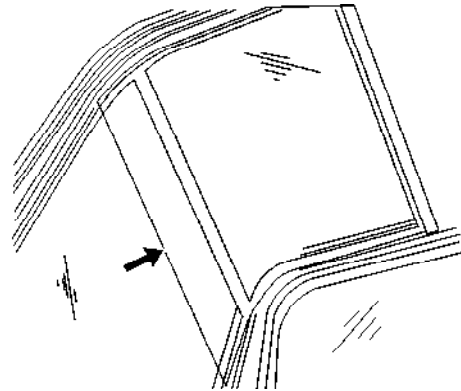


Illustration 242

g00751923

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

i02500596

Sun Screen (If Equipped)

SMCS Code: 7165-ZZ

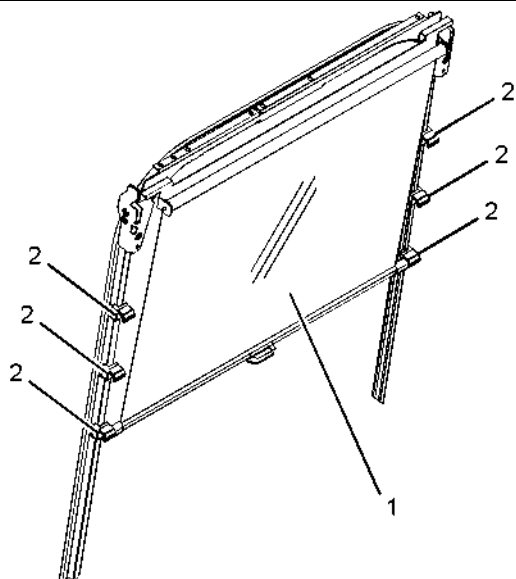


Illustration 243

g01250563

Pull out the sun screen (1). Hook the sun screen to the bracket (2). The sun screen may be positioned in 3 different places.

i01463742

Roof Hatch

SMCS Code: 7303

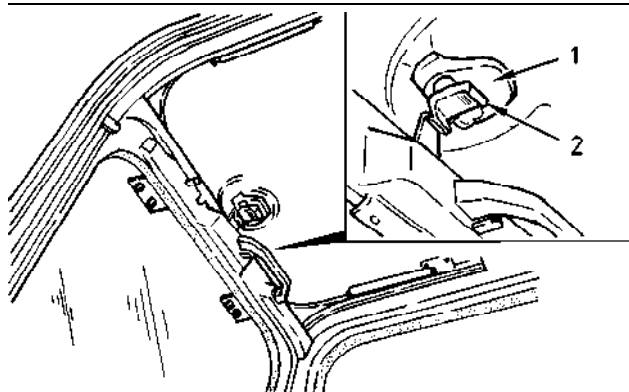


Illustration 244

g00681034

- (1) Grip
- (2) Lock

In order to open the roof hatch, release lock (2). Hold grip (1) and push the roof hatch backward.

To close the roof hatch, hold grip (1) and pull the roof hatch forward. Engage lock (2) securely.

i05353017

Cab Door

SMCS Code: 7308

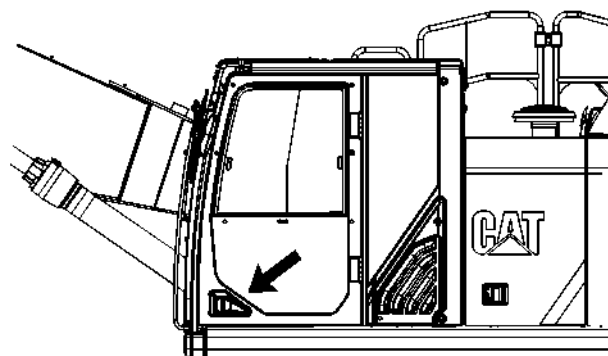


Illustration 245

g02041761

In order to open the cab door from the outside of the cab, pull outward on the door handle.

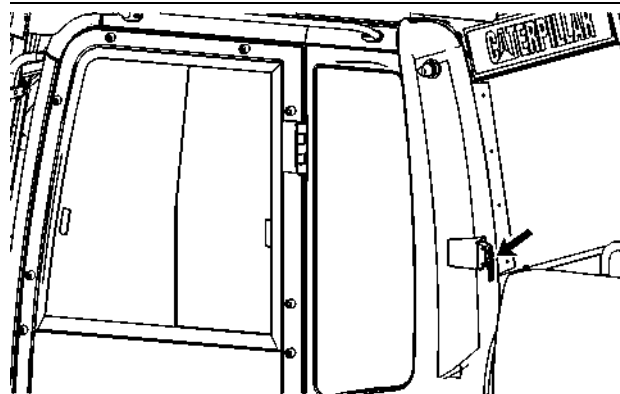


Illustration 246

g01141925

The cab door can also be opened from the outside of the cab by pulling upward on the handle that is located behind the cab.

i01447292

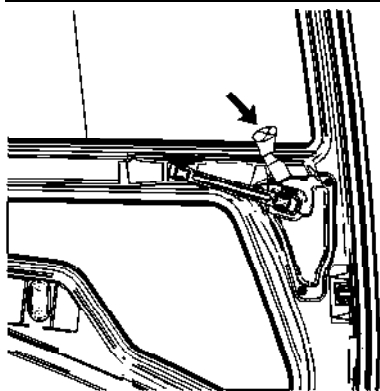


Illustration 247

g01095780

In order to open the cab door from the inside of the cab, push forward on the lever for the cab door latch.

For additional ventilation, open the cab door all the way in order to engage the catch on the exterior wall of the cab.

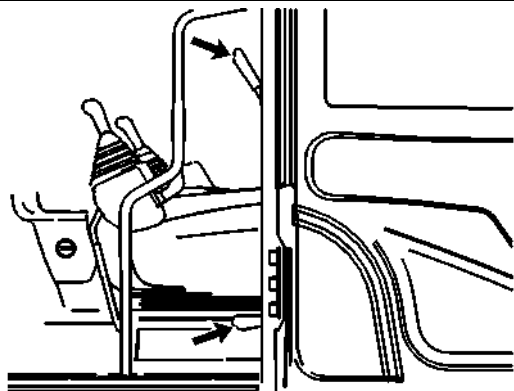


Illustration 248

g01121189

In order to release the cab door from the catch, pull downward on one of the two cab door release levers.

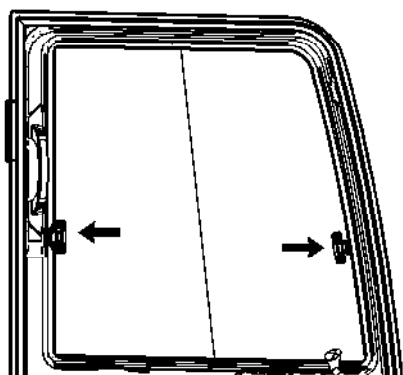


Illustration 249

g01096005

In order to open a window, release the window latch, and then slide the window to the desired position.

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.

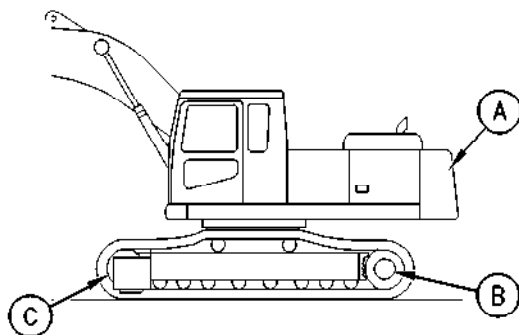


Illustration 250

g00753277

Position for normal travel

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

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

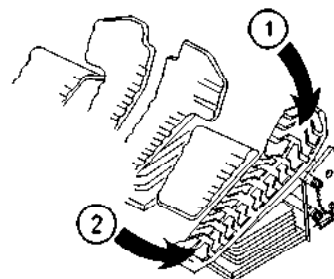


Illustration 251

g00757775

- (1) Forward Travel
- (2) Reverse Travel

The third pedal is to the right of the right travel pedal. The third pedal controls the forward and backward movement of the machine.

Note: If the third pedal is depressed and a travel pedal or a travel lever is operated, the machine will turn accordingly.

i05378013

Work Tool Control Pedal

SMCS Code: 5059-P9

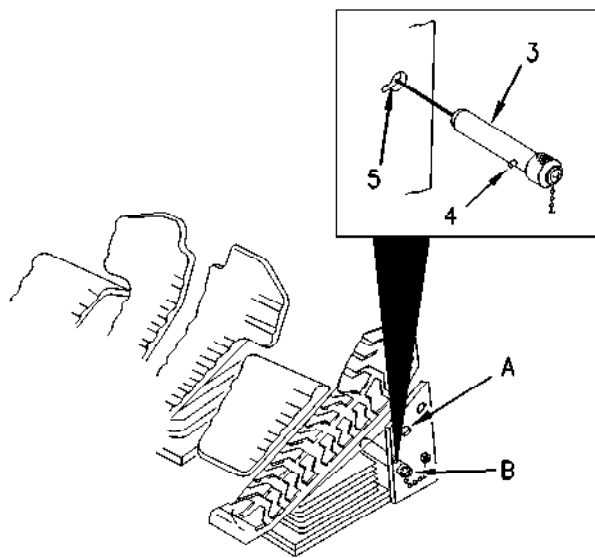


Illustration 252

g00555934

- (3) Lock pin
- (4) Pin
- (5) Notch
- (A) LOCKED position
- (B) UNLOCKED position (STORAGE position)

When the machine is not operated with the third pedal, install lock pin (3) at the LOCKED position in order to prevent accidental operation.

Note: To prevent lock pin (3) from being pulled out, insert pin (4) through notch (5) and turn lock pin (3) counterclockwise by 1/4 turn.

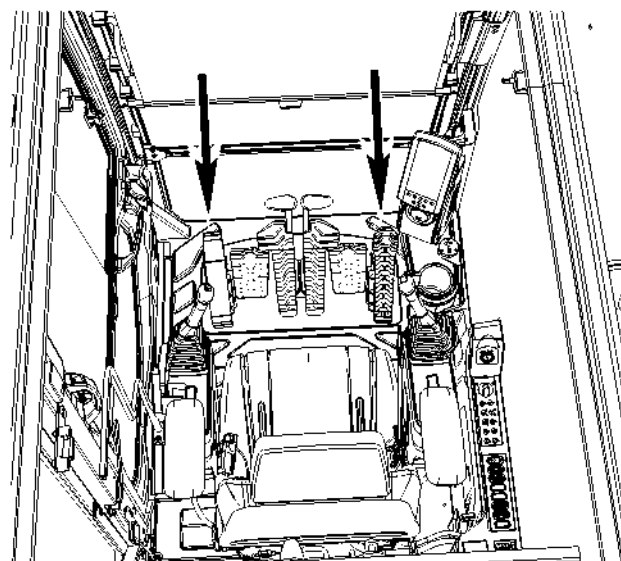


Illustration 253

g03402923

The pedal for work tool control can be located on either side of the travel pedals or located on both sides of the travel pedals. The pedal can be used to actuate work tools that require hydraulic flow in one direction or both directions. The pedal allows modulation of the speed of the work tool. To cause the work tool to move faster, push down on the pedal more.

Push down on the front of the pedal in order to activate the work tool. Push down on the rear of the pedal in order to activate the work tool in the opposite direction.

Note: There is a lock pin in the right pedal (if equipped) and there is a lock pin in the left pedal (if equipped). When you are changing the position of one of the lock pins, you must also change the position of the other lock pin.

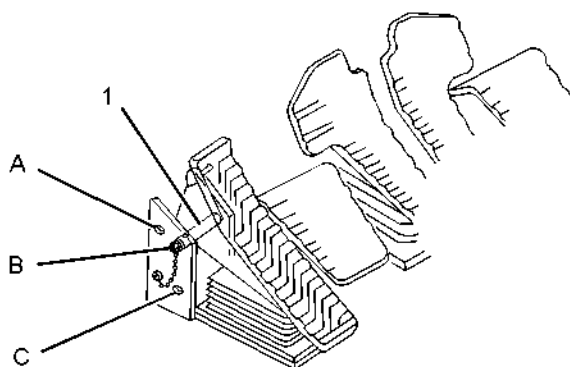


Illustration 254

g01622566

- (1) Lock pin
- (A) One-way flow
- (B) Locked
- (C) Two-way flow

In order to use the work tool, remove lock pin (1) from LOCKED position (B) and place lock pin (1) in UNLOCKED position (A) or (C).

When you are not using the work tool, put lock pin (1) in LOCKED position (B) on both the left pedal (if equipped) and the right pedal (if equipped). This will lock the pedals in order to help prevent any unexpected operation of the work tool.

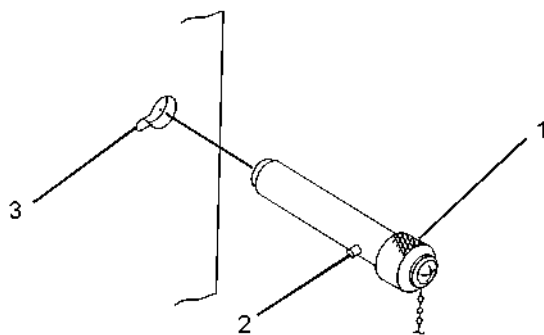


Illustration 255

g01622575

- (1) Lock pin
- (2) Pin
- (3) Notch

Note: To prevent lock pin (1) from being accidentally pulled out, insert pin (2) through notch (3). Turn lock pin (2) counterclockwise by 1/4 turn. Repeat for the other pedal.

One-way Flow

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.

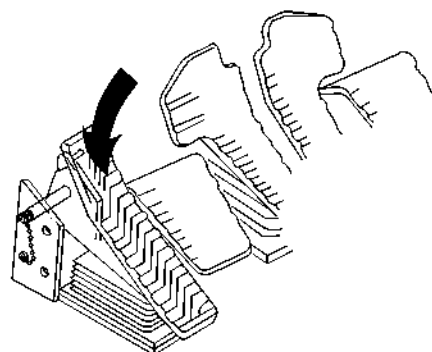


Illustration 256

g01622588



Variable Speed – Push down on the front of the pedal in order to activate the work tool. Push the pedal further in order to increase the speed of the work tool. Release the pedal in order to turn off the work tool.

Two-way Flow

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.

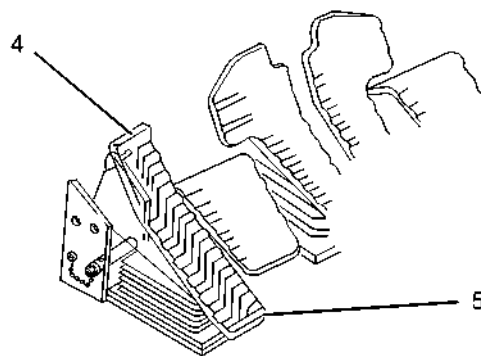


Illustration 257

g01622577



(4) CLOSE – Push down on the front of the pedal in order to close the work tool.



(5) OPEN – Push down on the rear of the pedal in order to open the work tool.

i03764090

Joystick Controls (Medium Pressure (If Equipped))

SMCS Code: 5705

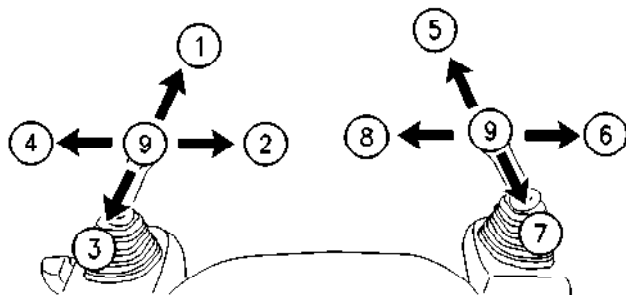


Illustration 258

g00559405

- (1) STICK OUT
- (2) SWING RIGHT
- (3) STICK IN
- (4) SWING LEFT
- (5) BOOM LOWER
- (6) TOOL OPEN
- (7) BOOM RAISE
- (8) TOOL CLOSE
- (9) HOLD

WARNING

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

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

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

When you release the joysticks from any position, the joysticks will return to HOLD position (9). Movement of the upper structure will stop unless the fine swing control (if equipped) is ON. When the fine swing control is ON, the swing parking brake will not activate until 6.5 seconds after the joystick control for the swing function returns to the HOLD position.

The machine control pattern is initially set at the factory to the SAE system, as shown. The pattern on the left pertains to the left joystick and the pattern on the right pertains to the right joystick.

The machine control pattern can be varied. Refer to Operation and Maintenance Manual, "Joystick Controls Alternate Patterns" for more information.

Two functions may be performed at the same time by moving a joystick diagonally.

Rotating Tool Control

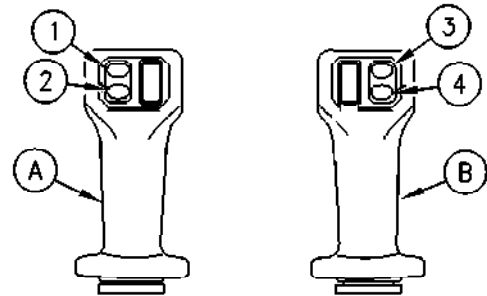


Illustration 259

g00875108

- (A) Left joystick
- (B) Right joystick
- (1) Medium pressure switch
- (2) Horn switch
- (3) Medium pressure switch
- (4) AEC switch



Rotate Clockwise – Press the medium pressure switch (1) on the left joystick in order to rotate the tool clockwise.



Horn – Press the horn switch (2) on the left joystick in order to activate the horn.



Rotate Counterclockwise – Press the medium pressure switch (3) on the right joystick in order to rotate the tool counterclockwise.



AEC Switch – Press the AEC switch (4) on the right joystick in order to activate low engine speed. Press the switch again in order to activate high engine speed.

i04036189

Joystick Controls

SMCS Code: 5705

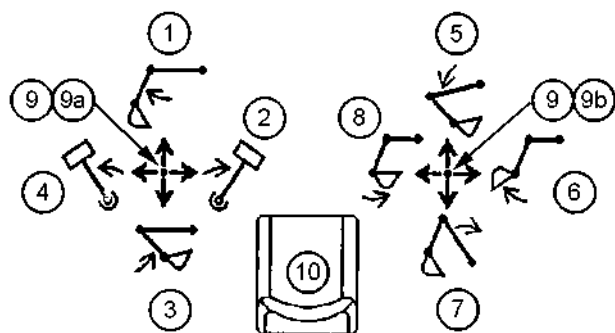


Illustration 260

g02233473

- (1) STICK OUT
- (2) SWING RIGHT
- (3) STICK IN
- (4) SWING LEFT
- (5) BOOM LOWER
- (6) BUCKET DUMP
- (7) BOOM RAISE
- (8) BUCKET CLOSE
- (9) HOLD
- (9a) HORN (IF EQUIPPED)
- (9b) AUTOMATIC ENGINE SPEED CONTROL SWITCH (IF EQUIPPED)
- (10) Seat

WARNING

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

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

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

When you release the joysticks from any position, the joysticks will return to HOLD position (9). Movement of the upper structure will stop unless the fine swing control (if equipped) is ON. When the fine swing control is ON, the swing parking brake will not activate until 6.5 seconds after the joystick control for the swing function returns to the HOLD position.

Two functions may be performed at the same time by moving a joystick diagonally.

The machine control pattern is initially set at the factory to the SAE system, as shown. The pattern on the left pertains to the left joystick and the pattern on the right pertains to the right joystick.

The machine control pattern can be varied. Refer to Operation and Maintenance Manual, "Joystick Controls Alternate Patterns" for more information.

i06836341

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.

The switches for the SmartBoom are on the right side instrument panel and on the right joystick.

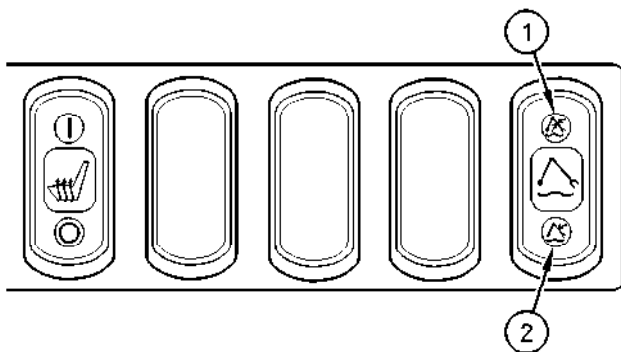


Illustration 261

g00753781

Right side instrument panel



(1) **SmartBoom UP AND DOWN** – Push down on the top of the rocker switch to activate the SmartBoom UP AND DOWN mode. When the boom control joystick is moved to the BOOM DOWN position, the boom will lower by the weight of the boom. The boom can move upward freely.



(2) **SmartBoom DOWN** – Push down on the bottom of the rocker switch to activate the SmartBoom DOWN mode. The boom will lower by the weight of the boom when the control lever is moved to the BOOM LOWER position. This mode prevents the boom from moving upward. To move the boom upward, the operator must use the boom control joystick to activate the BOOM UP mode.

Note: When the rocker switch for the SmartBoom is in the CENTER position, the SmartBoom is no longer functional.

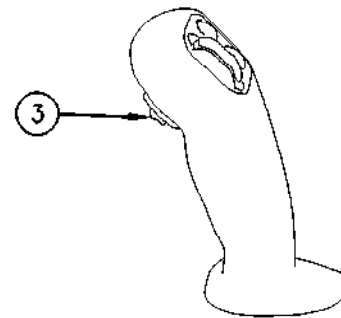


Illustration 262

g00753783

Right Joystick



(3) **SmartBoom TEMPORARY DISABLE** – Press the trigger switch on the front of the right joystick to temporarily override the SmartBoom function. Release the trigger switch to return to the selected SmartBoom function.

During operation of the SmartBoom, the operator may wish to apply downward force to the boom. When the rocker switch is in the SmartBoom DOWN position or the rocker switch is in the SmartBoom UP AND DOWN position, the operator can disable the SmartBoom function temporarily with the SmartBoom DISABLE switch. While the trigger switch is pressed, BOOM RAISE and BOOM LOWER will operate in the normal modes.

Note: Smart Boom Control function is deactivated when "Reach Front" is selected at "Boom Configuration" on Monitor menu.

i02868544

Joystick Controls Alternate Patterns

SMCS Code: 5059; 5137

WARNING

Whenever a change is made to the machine control pattern, also exchange the pattern card in the cab to match the new pattern.

Check the machine control pattern for conformance to the pattern on the card in the cab. If the pattern does not match, change the card to match the machine control pattern before you operate the machine. Failure to do so could result in personal injury.

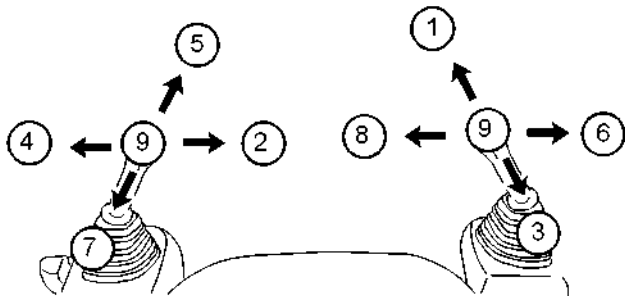


Illustration 263

g01163836

In order to switch the joystick controls between the patterns, refer to Operation and Maintenance Manual, "Monitoring System".



STICK OUT (1) – Move the control lever to this position in order to move the stick outward.



SWING RIGHT (2) – Move the control lever to this position in order to swing the upper structure to the right.



STICK IN (3) – Move the control lever to this position in order to move the stick inward.



SWING LEFT (4) – Move the control lever to this position in order to swing the upper structure to the left.



BOOM LOWER (5) – Move the control lever to this position in order to lower the boom.



BUCKET DUMP (6) – Move the control lever to this position in order to dump the bucket.



BOOM RAISE (7) – Move the control lever to this position in order to raise the boom.



BUCKET CLOSE (8) – Move the control lever to this position in order to close the bucket.

HOLD (9) – When the control lever is released from any position, the control lever will return to the HOLD position. Movement of the upper structure will stop.

Two functions may be performed at the same time by moving a control lever diagonally.

If the machine is equipped with a hydraulic hammer, the function of position (6) and of position (8) is different.

HYDRAULIC HAMMER RAISE (6) – Move the control lever to this position in order to raise the hydraulic hammer.

HYDRAULIC HAMMER LOWER (8) – Move the control lever to this position in order to lower the hydraulic hammer.

i02276685

Fuel Tank Shutoff and Drain Control

SMCS Code: 1273

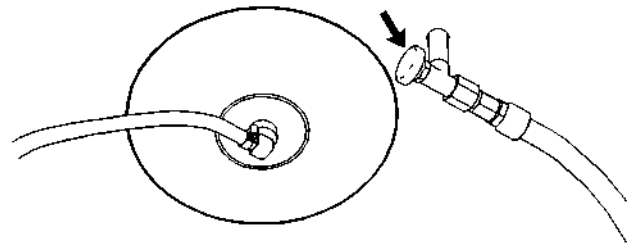


Illustration 264

g01139594

Fuel shutoff valve

The fuel shutoff valve is located under the fuel tank.

Fuel Shutoff Valve – To shut off the fuel supply, turn the fuel shutoff valve clockwise. To turn on the fuel supply, turn the fuel shutoff valve counterclockwise.

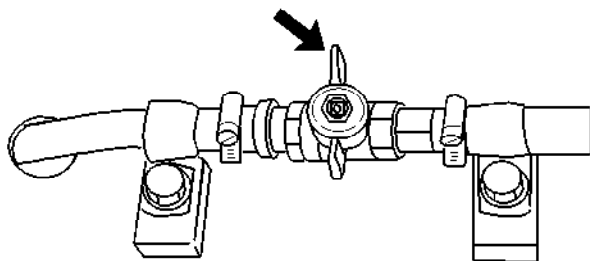


Illustration 265

g01043694

Fuel tank drain valve

The fuel tank drain valve is located on the side of the machine under the fuel tank.

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

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

i04947264

Engine Starting

SMCS Code: 1000; 1090; 1456; 7000

NOTICE

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

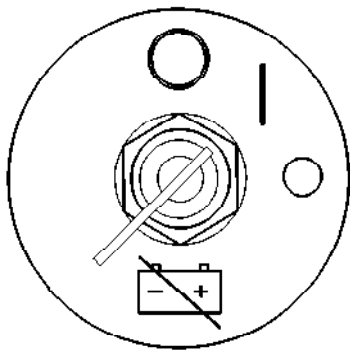


Illustration 266

g00406959

1. Turn the battery disconnect switch to the ON position.
2. Make sure that the reset button for the circuit breaker remains depressed. Refer to Operation and Maintenance Manual, "Circuit Breakers - Reset".
3. Move the hydraulic lockout control to the LOCKED position.

This machine is equipped with an engine neutral start system. The system only allows the engine to start when the lever for the hydraulic lockout control is in the LOCKED position.

4. Move the joysticks to the HOLD position.
5. Before you start the engine, check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine. Briefly sound the horn before you start the engine.

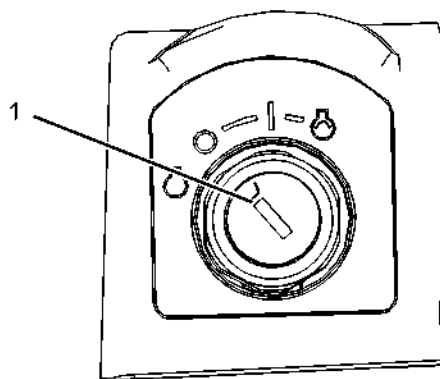


Illustration 267

g02041555

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

7. The monitoring system starts.

Note: For more information on the monitoring system, refer to Operation and Maintenance Manual, "Monitoring System".

8. If the engine start switch is placed in the ON position for 2 seconds or more, the prestart check of the monitoring system will be activated. If any fluid levels are low, the low fluid level will be shown on the message display. Refer to Operation and Maintenance Manual, "Monitoring System" for more information on the prestart monitoring function.

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

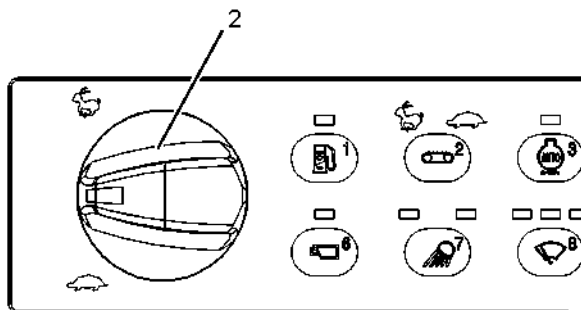


Illustration 268

g02204433

9. Turn engine speed dial (2) to speed position "1".

NOTICE

Do not crank the engine for more than 30 seconds. If the engine does not start, allow the starter to cool for two minutes before cranking again. The engine start switch must be turned to the OFF position before trying to restart.

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

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

This machine's engine with standard specifications can start in areas that have temperatures as low as -18°C (0°F). For areas that are cooler, a starting kit for cold weather is available.

i06954976

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

NOTICE

Keep engine speed low and do not operate until the message "Warm-Up Mode Power Derate" on the monitor goes out. If it does not go out within thirty seconds, stop the engine and investigate the cause before starting again. Failure to do so, can cause engine damage.

NOTICE

Always run the engine at low idle for at least ten minutes before performing any other operations in cold conditions or each time the engine oil and oil filter are changed in order to protect your engine and hydraulic components.

NOTICE

Depending on the ambient temperature, in order to prevent the machine operation with high speed without sufficient lubrication at the turbo bearing, the engine speed may be set to low speed and the hydraulic power minimized for a pre-determined time after the engine starts. Refer to turbo protection feature.

The engine may automatically change speeds when the machine is stationary and idling in cold ambient temperature for an extended time. This is to:

- Maintain desired coolant temperature.
- Maintain desired operation of engine systems.
- Maintain desired operation of the regeneration system.

During extended idling in cold ambient conditions, engine speed may operate between 900 rpm and 1000 rpm. Operation at 1000 rpm is minimal and will only last for up to 20 minutes. The regeneration active indicator may also illuminate during extended idling conditions to signal that a regeneration is in progress.

Hydraulic System

WARNING

When you cycle the machine controls, the machine can move suddenly. Contact between the machine and external objects or ground personnel can result in serious injury or death. Before you cycle the machine controls, the machine should be located in an unobstructed, hazard-free work area that is away from external objects and ground personnel.

1. Make sure that the area is clear of personnel and equipment.

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

2. Allow the engine to warm up at low idle for at least 5 minutes. Engage the work tool controls and disengage the work tool controls. This will speed up the warm-up of the hydraulic components.

When you idle the machine for warm-up, observe the following recommendations:

- If the temperature is greater than 0°C (32°F), warm up the engine for approximately 15 minutes.
- If the temperature is less than 0°C (32°F), warm up the engine for approximately 30 minutes.
- If the temperature is less than -18°C (0°F) or if hydraulic functions are sluggish, additional time may be required.

NOTICE

The hydraulic oil temperature should be higher than 25°C (77°F) before performing work with the machine. Make sure that the warm-up procedure is performed.

If the hydraulic oil temperature is less than 25°C (77°F) and the machine is operated abruptly, serious damage to the hydraulic components may occur.

Note: The recommended operating temperature of the hydraulic fluid for this machine is 55°C (131°F).

3. To warm up the hydraulic oil, turn the engine speed dial to the medium engine speed. Run the engine for approximately 5 minutes and move the joystick intermittently from the BUCKET DUMP position to the HOLD position. Do not hold the joystick in the BUCKET DUMP position with the bucket cylinder fully extended for more than 10 seconds.

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

Note: If the joysticks are held for more than 30 seconds, the machine ECM will go into a "Warm-Up Mode Power Derate" setting. "Warm-Up Mode Power Derate" will be shown on the monitor screen. When "Warm-Up Mode Power Derate" is active, the machine ECM limits the hydraulic pump torque to 50 percent. Release the joysticks in order to cancel the "Warm-Up Mode Power Derate" setting.

4. Turn the engine speed dial to the maximum engine speed and repeat step 3.
5. Cycle all controls in order to circulate warm oil through all hydraulic cylinders and all hydraulic lines, and through the swing motor and travel motors.
6. Observe the gauges and the indicators frequently during the operation.



Turbo Protection Power Derate – After an engine start, the engine speed will be set to dial one position and the hydraulic power limited for a time period. During this period, the monitor displays the message "Warm-Up Mode Power Derate". (Maximum is around 30 seconds). After the turbo bearing lubrication is sufficient, the engine speed goes to the setting dial speed and the monitor stops to display the message.

Hydraulic System Automatic Warm-up



Hydraulic System Automatic Warm-up – When the hydraulic oil is below operating temperature, the automatic warm-up function will automatically circulate hydraulic oil through the hydraulic circuits. Circulating the hydraulic oil through the hydraulic circuits will accelerate the warm-up of the hydraulic oil.

Note: The automatic warm-up feature can be enabled or disabled through the monitoring system. consult your Cat dealer for additional information.

The following conditions must be met in order for the automatic warm-up to operate after the machine has been started:

- Automatic Hydraulic System Warm-up function must be enabled
- Hydraulic Lockout Control is in the LOCKED position
- Hydraulic oil temperature is below operating temperature.

When conditions are met, a "START AUTO WARMING UP?" message will appear on the monitor and a hydraulic warm-up icon will appear as a selection on the monitor.

1. Lower the work tools to the ground and place the hydraulic lockout control in the LOCKED position.
2. Press the automatic warm-up key on the monitor.
3. Press the automatic warm-up key again in order to start the automatic warm-up function.

Note: A "AUTO WARMING UP STARTING" message will appear on the monitor when the automatic warm-up function is active.

The automatic warm-up will stop once the temperature of the hydraulic oil has reached operating temperature or when the hydraulic lockout control is moved to the UNLOCKED position.

Note: If any warning message or system event message are active on the monitor, "AUTO WARMING UP" cannot be active. If any event occurred during "AUTO WARMING UP", the system is stopped.

WARNING

Always make sure that the work tool is lowered to the ground and deactivate all work tools before activating the Hydraulic System Automatic Warm-up. Activating the system with the work tool not on the ground could result in unexpected machine movement which could result in personal injury or death.

Dynamic Cool Engine Elevated Idle (DCEEI)

The Dynamic Cool Engine Elevated Idle (DCEEI) feature will temporarily increase the low idle engine speed when the engine coolant is below normal operating temperature. Increasing the low idle speed will accelerate the warm-up of the engine and fluids. When the engine coolant reaches normal operating temperature, the engine speed returns to the low idle speed.

Extended periods of low engine idle can also result in lower coolant temperatures. During extended periods of low engine idle, the engine idle speed will automatically increase if the engine coolant drops below the operating temperature. This increase in the engine idle speed will prevent overcooling of the engine.

Improve Cold Weather Performance

Covers installed over the vents in the radiator compartment door will help to control overcooling in ambient temperatures below -15°C (5°F).

The materials used for the covers and the method used to install the covers is at the installers discretion.

Install the covers if overcooling is observed while the machine is idling in ambient temperatures below -15°C (5°F).

Stop the machine, and remove the covers under the following conditions:

- The ambient temperature is above -15°C (5°F).
- The engine temperature gauge indicates overheating.
- The hydraulic oil temperature gauge indicates overheating.

Installation



Illustration 269

g03707408

Typical example of cover location on the radiator compartment door

(1) Covers

1. Clean the surface of the radiator compartment door.
2. Install the covers in the location shown in Illustration 269 . The covers should fully cover the door vents.

Operation

i06231546

Operation Information

SMCS Code: 7000

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

Make sure that no personnel are on the machine or near the machine in order to prevent any personal injury. Keep the machine under control at all times in order to prevent injury.

Sound the horn and allow adequate time for bystanders to clear the area before moving the machine into a restricted visibility area. Follow local practices for your machine application. For more information refer to Operation and Maintenance Manual, "Restricted Visibility".

Reduce the engine speed when you maneuver the machine in tight quarters and when you drive over an incline.

Select the necessary travel speed range before you drive downgrade. Do not change the travel speed range while you drive downhill.

Use the same travel speed on a downgrade and on an upgrade.

When you travel for any distance, keep the stick inward and carry the boom in a low position.

When you drive up a steep grade, keep the boom as close to the ground as possible.

When you travel uphill or you travel downhill, keep the boom on the uphill side of the machine.

1. Adjust the operator seat.
2. Fasten the seat belt.

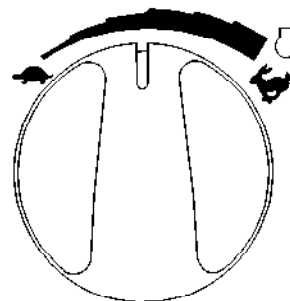


Illustration 270

g00732198

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

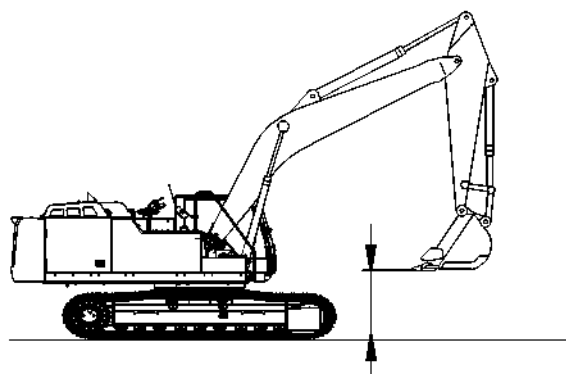


Illustration 271

g02145475

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

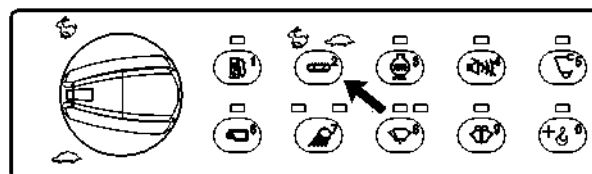


Illustration 272

g03262356

6. Select the desired travel speed by operating the travel speed control switch.

7. Make sure that the position of the upper structure and of the undercarriage is known before you move the machine. The drive sprockets should be at the rear of the machine.

Note: The directional steering controls will operate normally if the drive sprockets are at the rear of the machine and the idlers are at the front of the machine and under the cab. When the sprockets are under the cab, the travel controls will operate backward.

8. Turn the engine speed dial in order to increase the engine speed (rpm) to the desired speed.
9. Push both travel levers forward at the same time in order to travel forward. If both travel levers are pushed farther, the travel speed at the selected engine speed (rpm) will be faster.

Note: If the machine does not operate or if the machine does not travel in a straight line, consult your Caterpillar dealer.

10. See Operation and Maintenance Manual, "Operator Controls" for information about spot turning and about pivot turns.
11. When you make turns in soft material, travel in a forward direction occasionally in order to clear the tracks.
12. Slowly move both of the travel levers or both of the travel pedals to the CENTER position in order to stop the machine.

Lifting Objects

If the machine is equipped with the CE plate per requirements for the European Union, used to lift objects, then the machine must be equipped with the optional boom lowering control valve and an overload warning device.

A fit for purpose test was completed in order to confirm that a properly equipped machine meets the requirements of the European Union Machinery Directive "2006/42/EC" for lifting objects.

The overload warning device (if equipped) must be adjusted for the bucket linkage and bucket size that is installed on the machine. Adjust the overload warning device for proper operation.

The setting for the overload warning device (if equipped) should be checked by an authorized dealer.

i00059294

Frozen Ground Conditions

SMCS Code: 7000

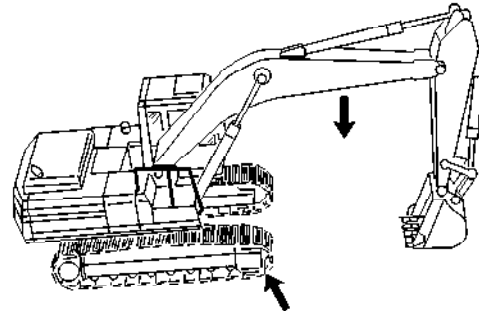


Illustration 273

g00101468

To free the tracks from frozen ground, swing the boom to the front of the machine. Use boom down pressure to free the idler end of the machine.

Swing the boom to the rear of the machine. Use boom down pressure to free the sprocket end of the machine.

i03599804

Equipment Lowering with Engine Stopped

SMCS Code: 7000

In order to lower the boom, place the hydraulic lockout control in the UNLOCKED position. Move the joystick to the BOOM LOWER position. If the accumulator is still charged, the boom will lower.

If the boom does not lower, the accumulator is empty. Use one of the following methods to lower the boom.

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

Machine Without a Boom Lowering Control Valve

WARNING

Be sure no one is under or near the work tools before manually lowering the boom. Keep all personnel away from the boom drop area when lowering the boom with the engine stopped in order to avoid possible personal injury.

When you must manually lower the boom due to engine shutdown, use the following procedure:

Note: Keep all personnel away from the boom when you are lowering the boom.

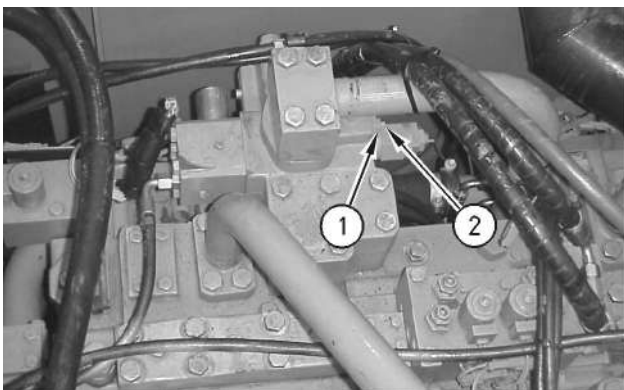


Illustration 274

g00580815

Rear of the Main Control Valve

- (1) Locknut
(2) Screw

1. Slowly loosen locknut (1).
2. Loosen screw (2) to a maximum of 1/2 turn. The boom will now start to lower.
3. After the work tools have been lowered to the ground, tighten the screw and the locknut.
4. Consult your Caterpillar dealer and make any necessary repairs.

After completion of the manual boom lowering, make necessary repairs before you operate the machine again.

Machine With a Boom Lowering Control Valve (If Equipped)

WARNING

Boom load may cause cylinder oil pressure to reach relief pressure of the boom lowering control device when the boom is supported by one cylinder. Boom can lower suddenly, causing possible injury or death.

To avoid possible injury or death, be sure no one is under or near the work tool before manually lowering the boom.

Keep all personnel away from the boom drop area when lowering the boom with the engine stopped.

If the engine is shut down or the hydraulic system is disabled, the operator can still lower the boom. The boom lowering control valve allows the operator to manually lower the boom. Use the following procedure if the machine is equipped with a boom lowering control valve.

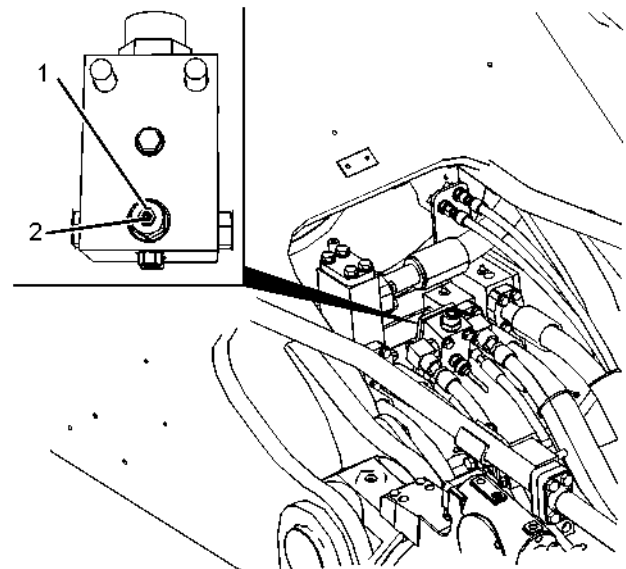


Illustration 275

g01924625

The boom lowering control valve is located near the base of the boom.

1. Loosen locknut (1).
2. Slowly turn check valve (2) counterclockwise until the check valve stops. The boom will lower to the ground.

3. Make sure that the work tool has been lowered onto the ground. Tighten check valve (2) to a torque of $2.25 \pm 0.25 \text{ N}\cdot\text{m}$ ($1.66 \pm 0.18 \text{ lb ft}$).
4. Tighten locknut (1) to a torque of $4 \pm 0.5 \text{ N}\cdot\text{m}$ ($3 \pm 0.37 \text{ lb ft}$).
5. Before you begin operating the machine, make any necessary repairs.

For additional information, consult your Caterpillar dealer.

Operating Techniques

i05125989

Operating Technique Information

SMCS Code: 7000

WARNING

Know the maximum height and the maximum reach of your machine. Serious injury or death by electrocution can occur if the machine or the work tools are not kept a safe distance from electrical power lines. Keep a distance of at least 3000 mm (118 inch) plus an additional 10 mm (0.4 inch) for each 1000 volts over 50000 volts.

For safety, one of the following may require a greater distance:

- Local codes
- State codes
- Requirements of the job site

NOTICE

When swinging into a ditch, do not use the ditch to stop the swinging motion. Inspect the machine for damage if the boom is swung into a bank or an object.

Repeated stopping by an object can cause structural damage if the boom is swung into a bank or an object.

With certain boom-stick-bucket combinations, the bucket or worktool can hit the cab and/or the front structure of the machine. Always check for interference when first operating a new bucket or a new work tool. Keep the bucket or work tool away from the cab and away from the front structure during operation.

Whenever the tracks of the machine raise off the ground while digging, lower the machine back to the ground smoothly. **DO NOT DROP OR CATCH IT WITH THE HYDRAULICS.** Damage to the machine can result.

With certain combinations of work tools, the third pedal can have different functions. Always check the function of the third pedal before you use the third pedal.

Know the location of any buried cables. Mark the locations clearly before you dig.

Consult your Caterpillar dealer for special work tool tips that are available for use in severe applications.

Move the machine whenever the position for operating the machine is not efficient. The machine can be moved forward or backward during the operating cycle.

When you operate the machine in close places, utilize the bucket or the other work tool in order to perform the following functions:

- Pushing the machine
- Pulling the machine
- Lifting the tracks

Use a comfortable travel speed while you operate the machine.

Operating efficiency can be increased by using more than one machine control to perform a task.

Never swing a load over a truck cab or workers.

Position the truck so that material can be loaded from the rear of the truck or from the side of the truck. Load the truck evenly so that the rear axles are not overloaded.

An oversize bucket or a bucket that is equipped with side cutters should not be used in rocky material. These types of buckets slow down the cycle. Damage to the bucket and to other machine components could result.

Restricted Operation

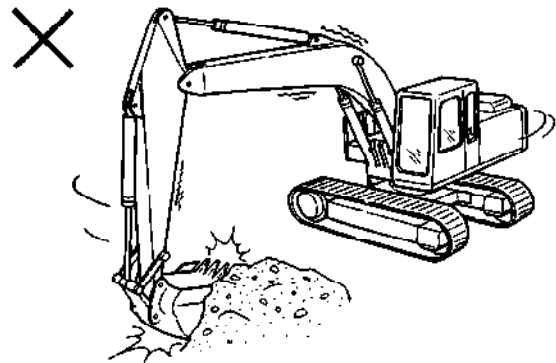


Illustration 276

g00529436

Do not use the swing force to perform the following operations:

- Soil compaction
- Ground breaking
- Demolition

Do not swing the machine while the bucket tips are in the soil.

These operations will damage the boom, the stick, and the work tool and the operations will reduce the life of the equipment.

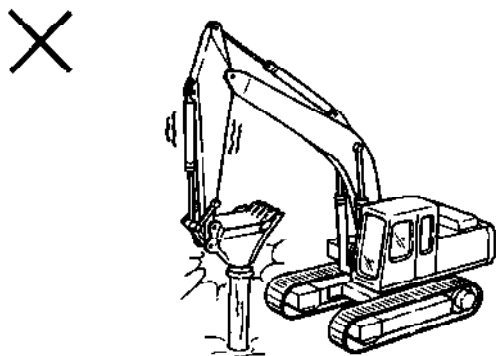


Illustration 277

g00529457

Do not use the dropping force of the bucket or work tool as a hammer. This will bring excessive force on the rear of the machine. Possible damage to the machine could result.

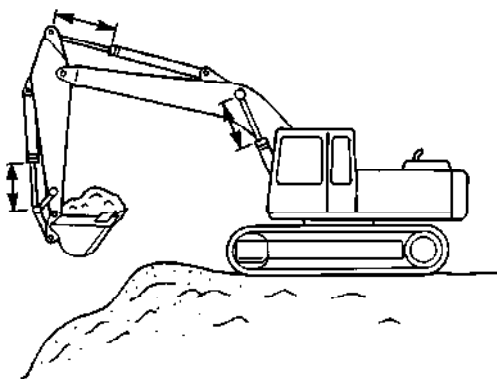


Illustration 278

g00529458

If the cylinder is operated at the end of the stroke during operations, excessive force will occur on the stopper on the inside of the cylinder. This will reduce the life of the cylinder and structures. To avoid this problem, always leave a small margin of play when the cylinder is operated.

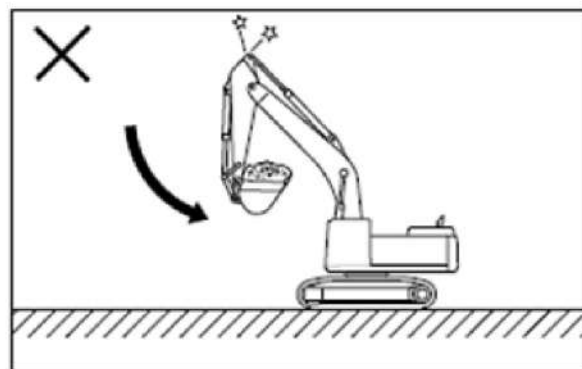


Illustration 279

g03286378

If the stick IN function is operated at full speed with a fully loaded bucket or heavy work tool attachment to the end of the cylinder stroke, excessive force will occur inside the stick cylinder. This action will reduce the life of the stick cylinder. To avoid this problem, always operate a stick IN function with moderate speed towards the end of cylinder stroke.

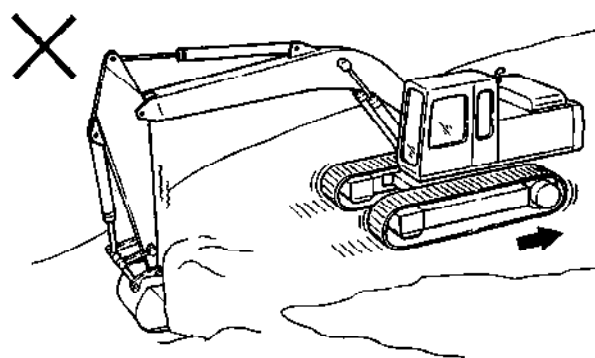


Illustration 280

g00529459

While the bucket is in the ground, do not use the travel force for any excavation. This operation will cause excessive force on the rear of the machine.

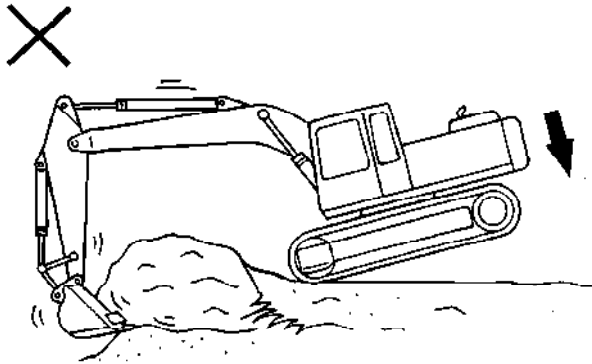


Illustration 281

g00529460

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

Operating Precaution

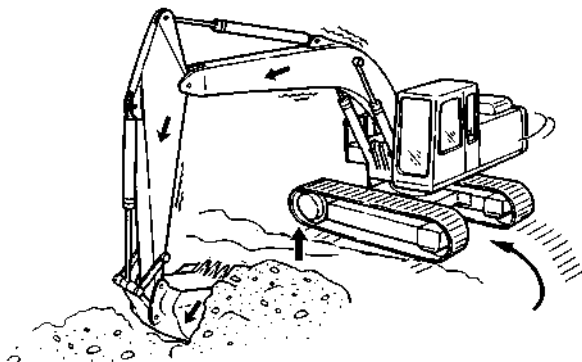


Illustration 282

g01250228

NOTICE

Do not allow the machine to swing from the force of traveling when you use the bucket, the stick, or the boom to assist in travel. If the force from traveling causes the machine to swing, damage may occur to the swing motor and to the swing drive.

Do not use the force of the bucket, the stick, or the boom to assist in turning the machine while the machine is traveling. This technique is referred to as "jump steering". This technique will damage the swing motor and the swing brake.

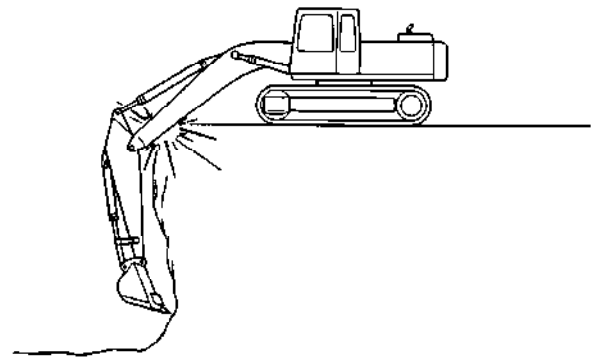


Illustration 283

g00529462

When deep holes are dug, do not lower the boom so that the bottom side of the boom touches the ground.

When deep holes are dug, do not allow the boom to interfere with the tracks.

i05032265

Travel in Water and Mud

SMCS Code: 7000-V6

NOTICE

When working in or around any body of water, around a stream or river, or in conditions of heavy mud, be careful that the swing bearing, the swing drive gear, and the swivel joint do not dip into water, mud, sand, or gravel. If the swing bearing dips into water, mud, sand, or gravel, immediately grease the swing bearing until the used grease leaks from the outer circle of the swing bearing. Failure to carry out this procedure may cause premature wear in the swing bearing.

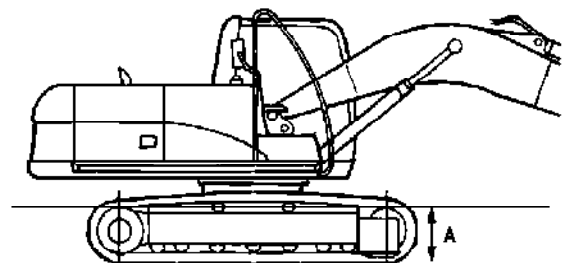


Illustration 284

g00807842

Depth of water to the center of the track carrier roller

The following guidelines pertain to travel across water and travel through mud, sand, or gravel.

The machine can travel across a river only under the following conditions:

- The bed of the river is flat.
- The flow of the river is slow.
- The machine dips into the water only to the center of the track carrier roller (dimension A).

NOTICE

Do not allow the fan on the engine to contact the water while the machine travels through the water. Do not allow the fan on the engine to contact the water during a swing while the machine is in the water. Damage to the fan may occur if the fan contacts the water.

While you cross the river, carefully confirm the depth of the water with the bucket. Do not move the machine into an area that has a water depth that is greater than Dimension A.

The machine may sink gradually on soft ground. Therefore, you should frequently check the height of the undercarriage from ground level and the depth of water on the ground.

Check the swing gear by looking through the port for inspection that is on the upper frame. If there is water in the swing gear, contact your Cat dealer for the required maintenance on the swing gear.

After you travel through water, carefully clean the machine in order to remove any salt, sand, or other foreign matter.

Procedure for Removing the Machine from Water or Mud

NOTICE

Do not allow the machine to swing from the force of traveling when you use the bucket, the stick, or the boom to assist in travel. If the force from traveling causes the machine to swing, damage may occur to the swing motor and to the swing drive.

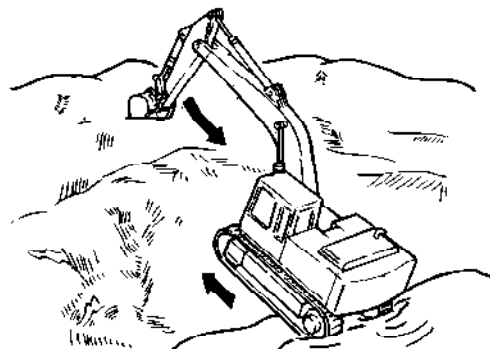


Illustration 285

g00808148

1. You may not be able to move the machine by using the travel controls only. In this case use both the travel control levers/pedals and the stick to pull the machine out of the water or ground.

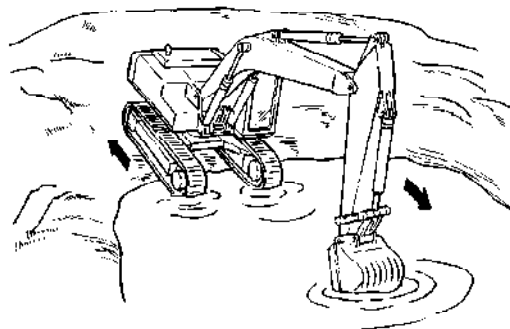


Illustration 286

g00808151

2. The machine may slip because of a steep slope. The procedure in Step 1 may not work. In this case, first rotate the upper structure by 180°. Then use both the travel control levers/pedals and the stick to move the machine up the slope.

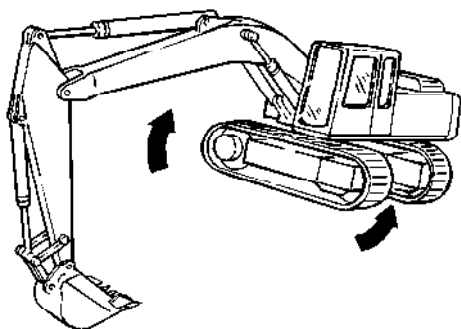


Illustration 287

g00808152

3. It may be impossible to travel because the bottom of the frame comes into contact with the ground or the undercarriage is clogged with mud or gravel. In this case, operate the boom and the stick together. Raise the track and rotate the track forward and backward in order to remove the mud and the gravel.

i05150572

Boom, Stick and Bucket Operation

SMCS Code: 7000

Digging

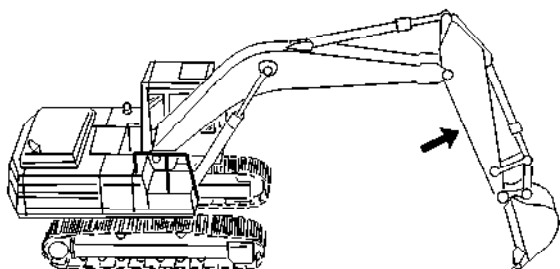


Illustration 288

g00101523

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

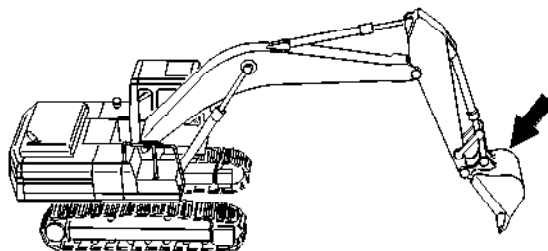


Illustration 289

g00101525

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

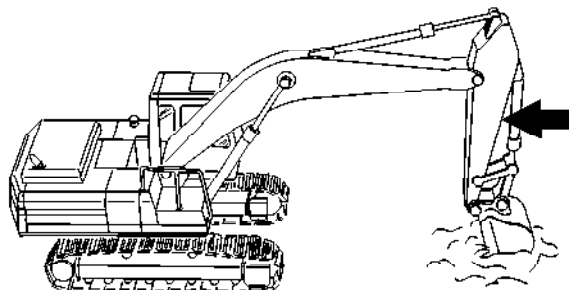


Illustration 290

g00101526

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

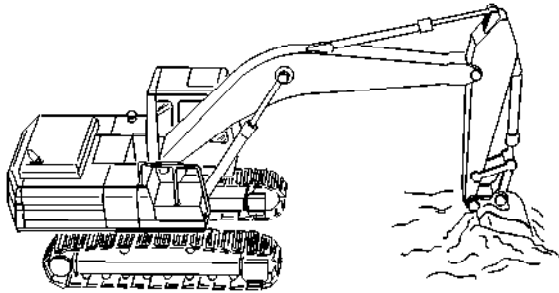


Illustration 291

g00101527

4. If the stick stops due to the load, raise the boom and/or perform a curl in order to adjust the depth of the cut.
5. To apply the greatest force at the cutting edge, decrease the down pressure as you move the stick toward the cab.
6. Maintain a bucket attitude that ensures a continuous flow of material into the bucket.
7. Continue the pass in a horizontal direction so that material peels into the bucket.

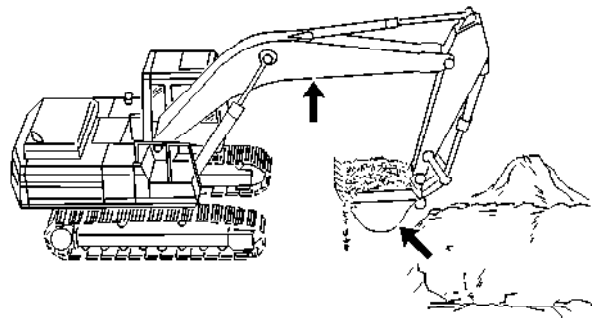


Illustration 292

g00101528

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

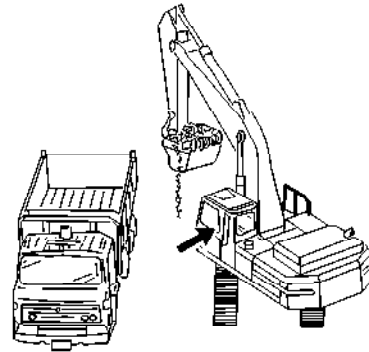


Illustration 293

g00101529

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

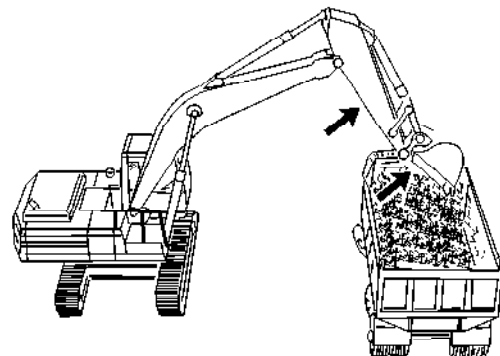


Illustration 294

g00101530

10. To dump a load, move the stick outward and open the bucket in a smooth motion.

Lifting Objects

WARNING

To prevent injury, do not exceed the rated load capacity of the machine. If the machine is not on level ground, load capacities will vary.

NOTICE

Damage to bucket cylinder, bucket or linkage could result if slings are placed incorrectly.

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

Operation Section
Boom, Stick and Bucket Operation

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

Japan regulations require some machines to use a shovel crane configuration in order to lift certain objects.

Contact your Cat dealer for additional information.

Short slings will prevent excessive load swing.

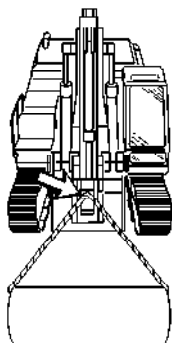


Illustration 295

g00101531

Use the lifting eye that is provided on the linkage to lift objects.

If the lifting eye is used, the connection must be made with a sling or with a shackle.

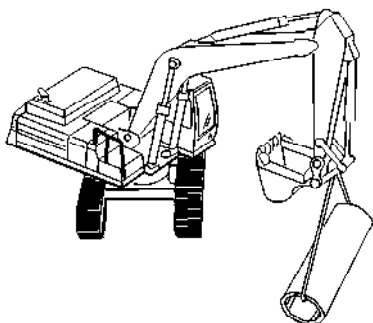


Illustration 296

g00101532

An unstable condition can exist if a load exceeds the machine load rating or if a heavy load is swung over an end or over a side.

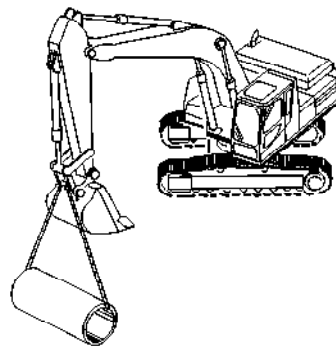


Illustration 297

g00101533

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

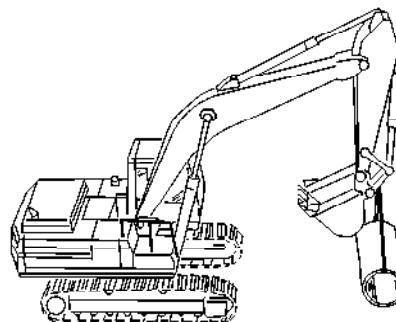


Illustration 298

g00101534

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

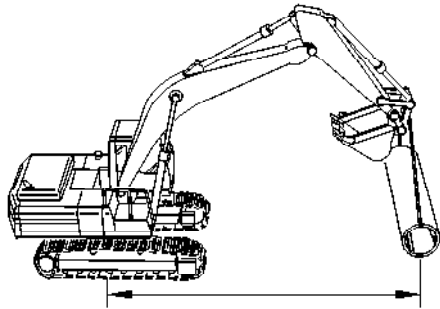


Illustration 299

g00101535

Lift capacity decreases as the distance from the swing centerline is increased.

Machines that are Equipped with a Long Reach Configuration

Machines with a long reach configuration require larger swing drift than standard machines when stopping, because inertial force in time of swing is large. Taking this into account, adjustments are made in timing for applying the swing brakes and speed of swinging.

Machines with a long reach configuration could be damaged and stability of the machine would be adversely affected if a control was suddenly operated, because inertial force of work tool is large.

i03875131

SmartBoom Operation (If Equipped)

SMCS Code: 5461-ZS; 7332

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.

i03122643

Quick Coupler Operation (Circuit for Universal Coupler (If Equipped))

SMCS Code: 6129; 6522; 7000

Operation

This procedure describes the use of the hydraulic circuit with a Caterpillar dedicated quick coupler. If a different quick coupler is used, please contact your Caterpillar dealer for pressure adjustment and consult the documentation for the quick coupler for proper operation.

- The engine start switch is on.
- The engine is running.
- The hydraulic lockout control must be in the UNLOCKED position in order to operate the quick coupler controls.
- During the operation, the alarm will sound.

When the above conditions are achieved, the system will perform the desired operation. A warning alarm will sound if the switch for the quick coupler is turned to the LOCKING position or the UNLOCKING position as long as the hydraulic lockout control is in the UNLOCKED position.

Resetting the Quick Coupler Controls

Operation of the quick coupler may be interrupted by deactivating the hydraulic lockout control. The quick coupler controls will be disabled. Use the following procedure to reset the quick coupler control.

1. Return the quick coupler switch to the LOCKED position.
2. Turn the engine start switch to the OFF position and then turn the engine start switch to the ON position.

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

Securing the Work Tool

WARNING

Inspect the coupler wedge engagement before you operate the excavator.

Serious injury or death may result from an improperly engaged coupler.

Inspect coupler wedge engagement from the cab by rotating the bucket or the work tool inward. Extend the bucket cylinder to bring the coupler actuator into view and bring the stick in until the wedges are visible.

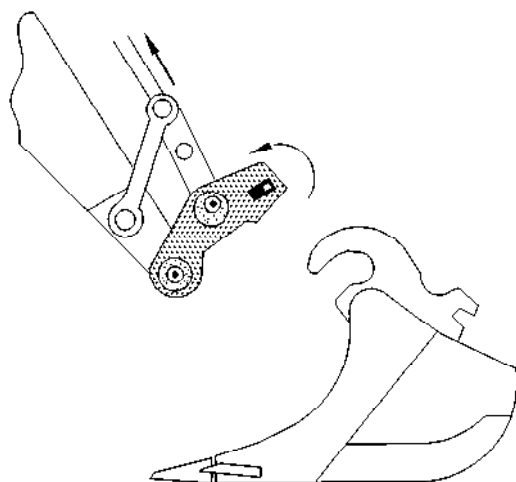


Illustration 300

g00104707

1. Position the work tool on a level surface.
2. Retract the bucket cylinder. Position the quick coupler in alignment between the hinges of the work tool.

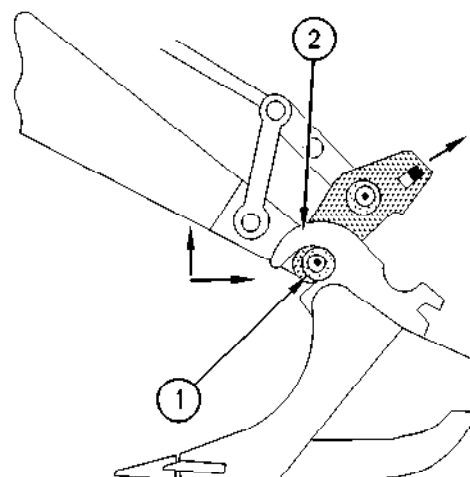


Illustration 301

g00104708

- (1) Lower bosses
- (2) Hinges

3. Move the stick forward and raise the stick until the lower bosses (1) engage the hinges (2) of the work tool.

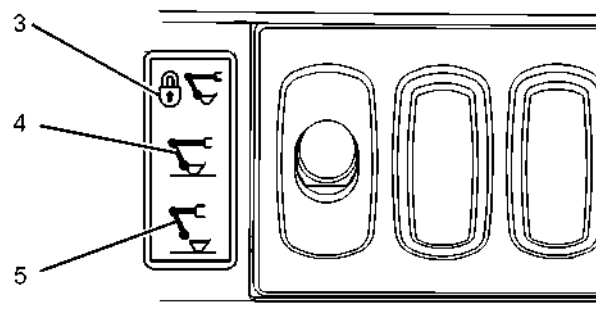


Illustration 302

g01599774

- (3) Locked
- (4) Locking
- (5) Unlocking

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

Note: Whenever the wedge is extended, a warning alarm will sound.

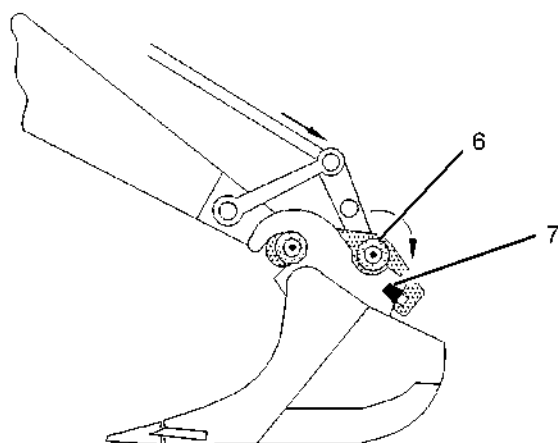


Illustration 303

g01620262

- (6) Center bosses
(7) Locking area

5. Extend the bucket cylinder in order to rotate the quick coupler toward the work tool.

Center bosses (6) must engage with the cutout of the hinge.

6. Move the switch for the quick coupler to the LOCKING position in order to retract the wedge.

The springs in the quick coupler will move the wedge into the locking area (7).

Note: Hold the switch in this position for about 5 seconds. This will make sure that the wedge is secured in position by keeping the system pressurized. Do not Keep the switch in this position for a longer period of time. The warning alarm will sound as a reminder.

7. Return the switch to the LOCKED position. The alarm will turn off.

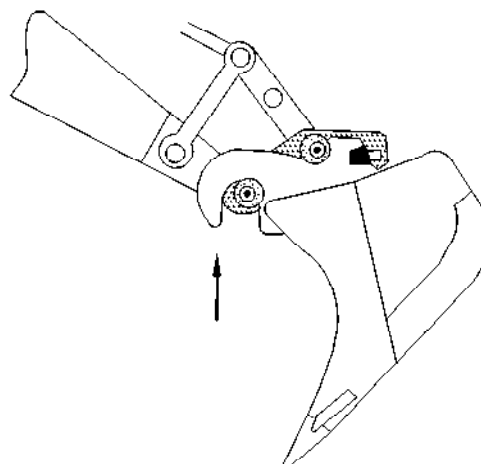


Illustration 304

g00104710

8. Raise the boom or raise the stick. Retract the bucket cylinder in order to confirm that the wedge is fully engaged. If the wedge is fully engaged, the work tool is locked in place. The work tool is ready to use.

Releasing the Work Tool

WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

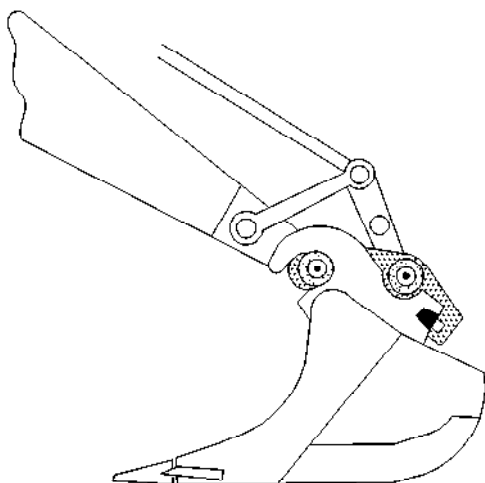


Illustration 305

g00104711

1. Level the bucket or level the work tool on the ground.

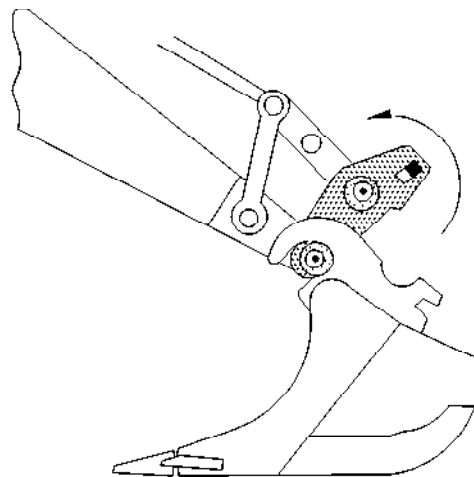


Illustration 307

g00104713

3. Retract the bucket cylinder in order to move the quick coupler toward the machine.
4. Move the switch for the quick coupler to the LOCKED position in order to retract the wedge. The alarm will turn off.

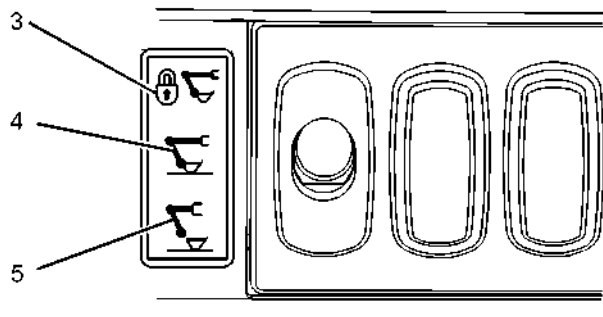


Illustration 306

g01599774

- (3) Locked
(4) Locking
(5) Unlocking

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

Note: The warning alarm will sound.

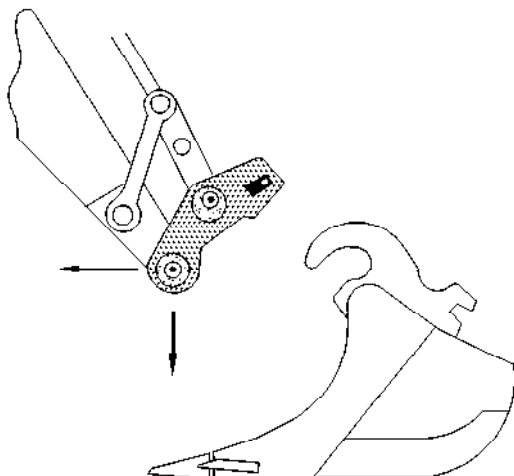


Illustration 308

g00104714

5. Lower the stick and move the stick toward the machine in order to disengage the quick coupler.

i06139647

Bucket - Remove and Install

SMCS Code: 6001; 6001-011; 6001-012; 6101; 6102; 6523

Captured Flag

WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- Confirm the verbal communication and the hand signals that will be used during the installation.
- Be alert for sudden movement of the front linkage and the work tool.
- Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.

NOTICE

To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

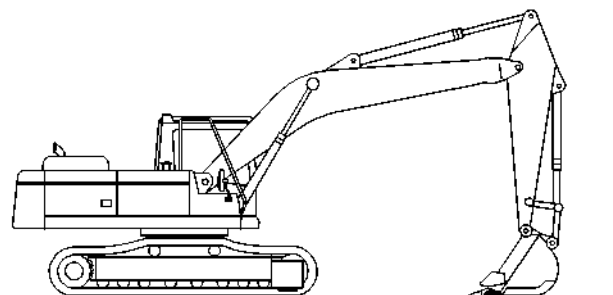


Illustration 309

g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

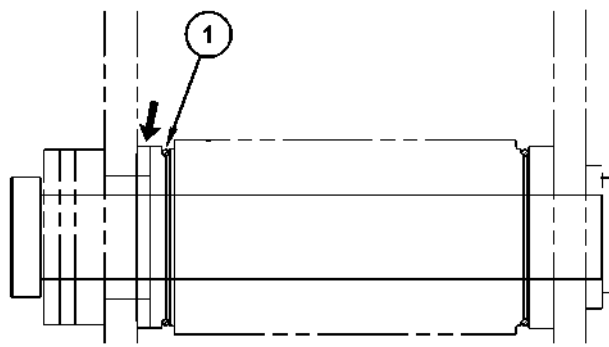


Illustration 310

g03822729

2. Slide O-ring seals (1) off the pin joints and onto the flanges of the bucket.

WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

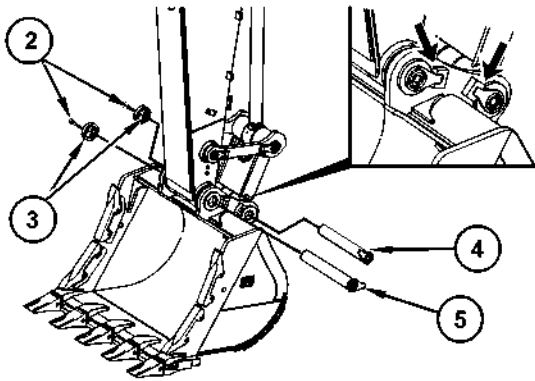


Illustration 311

g03822731

3. Remove bolts (2) and retaining plates (3). Then remove support pin (4) and support pin (5).
4. Start the engine and raise the stick out of the bucket.
5. Remove the O-ring seals (1) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

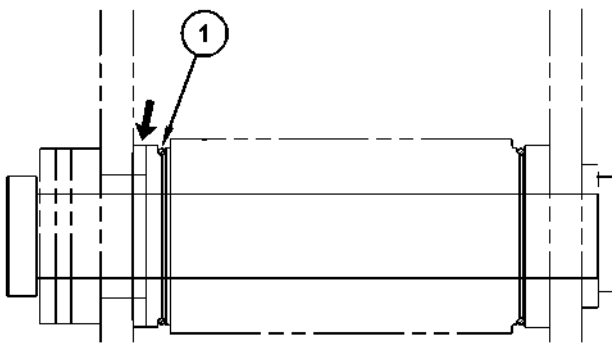


Illustration 312

g03822729

2. Position the O-ring seals (1) onto the flanges of the bucket.
3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

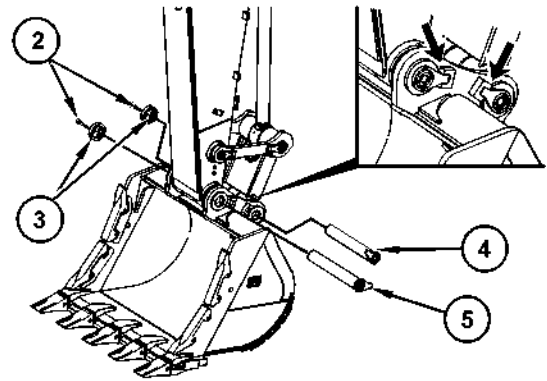


Illustration 313

g03822731

4. Insert support pin (5) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.
5. Refer to Operation and Maintenance Manual, "Bucket Linkage - Inspect/Adjust" in order to adjust the bucket clearance.
6. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.
7. Slide O-ring seals (1) in position over the pin joints between the bucket and the stick.
8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.
9. Insert support pin (4) into the pin bore. Make sure that the flange of the support pin rest inside the support on the side of the bucket.
10. Install retaining plate (3). Install bolts (2). Tighten bolts (2) evenly.
11. Slide the O-ring seals (1) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, "Bucket Linkage - Lubricate" or Operation and Maintenance Manual, "Boom, Stick, and Bucket Linkage - Lubricate".

Bolted Flag

WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- Confirm the verbal communication and the hand signals that will be used during the installation.
- Be alert for sudden movement of the front linkage and the work tool.
- Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.

NOTICE

To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

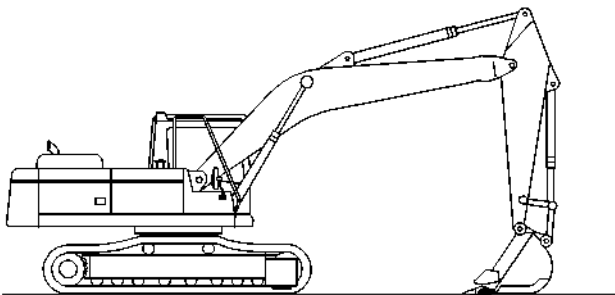


Illustration 314

g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

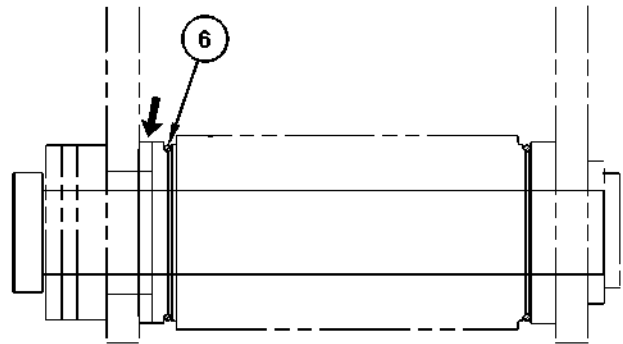


Illustration 315

g03822734

2. Slide O-ring seals (6) off the pin joints and onto the flanges of the bucket.

WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

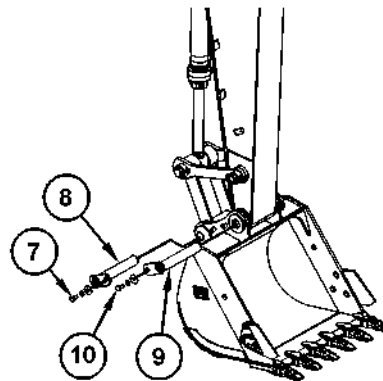


Illustration 316

g03822736

3. Remove bolt (7). Remove support pin (8).
4. Remove bolt (10). Remove support pin (9).
5. Start the engine and raise the stick out of the bucket.
6. Remove the O-ring seals (6) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

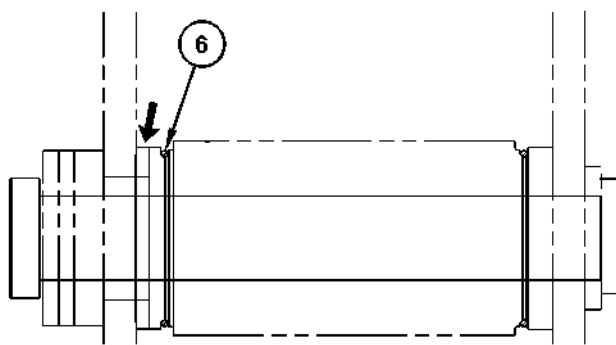


Illustration 317

g03822734

2. Position the O-ring seals (6) onto the flanges of the bucket.

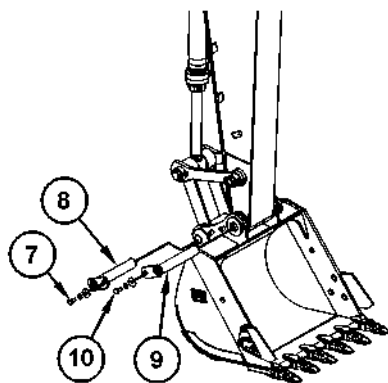


Illustration 318

g03822736

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.
4. Install support pin (9) into the pin bore.
5. Install bolt (10).
6. Refer to Operation and Maintenance Manual, "Bucket Linkage - Inspect/Adjust" in order to adjust the bucket clearance.
7. Slide O-ring seals (6) in position over the pin joints between the bucket and the stick.

8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.

9. Install support pin (8) into the pin bore.

10. Install Bolt (7).

11. Slide the O-ring seals (6) over the pin joints between the bucket and the link assembly.

12. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, "Bucket Linkage - Lubricate" or Operation and Maintenance Manual, "Boom, Stick, and Bucket Linkage - Lubricate".

Crossbolt

WARNING

Failure to follow the instruction below for the installation of a work tool may result in personal injury or death. Special care must be taken if more than one person is installing the work tool.

- Confirm the verbal communication and the hand signals that will be used during the installation.
- Be alert for sudden movement of the front linkage and the work tool.
- Do not insert fingers into the bores of the support pins when the support pins and the bores are being aligned.

NOTICE

To facilitate removal of the bucket pins without causing damage to the pins, the bearings, and/or the O-ring seals put the bucket on the floor and the stick in a vertical position, as shown.

Removal Procedure

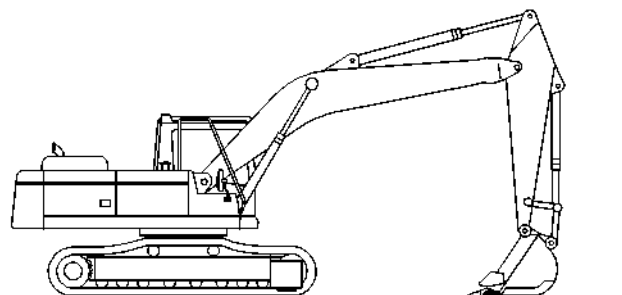


Illustration 319

g02154493

1. Start the engine. Park the machine on a hard, level surface. Position the bucket, the stick, and the bucket control linkage, as shown. Shut off the engine.

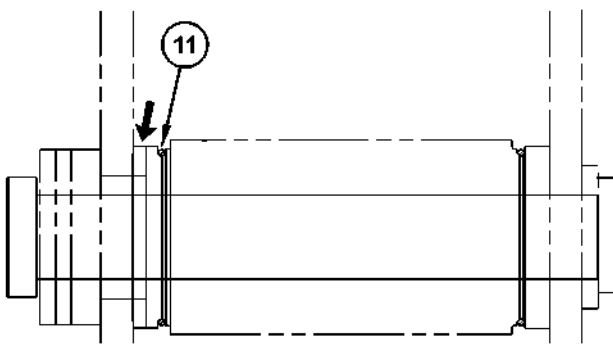


Illustration 320

g03822738

2. Slide O-ring seals (11) off the pin joints and onto the flanges of the bucket.

WARNING

When the pin assembly is removed, the linkage assembly may swing out of the bucket. To prevent possible personal injury, do not stand in front of the linkage assembly when the pin assembly is being removed.

Note: Removing the support pin may be difficult due to excessive pressure on the support pin. Remove the pressure on the support pin by adjusting the front linkage.

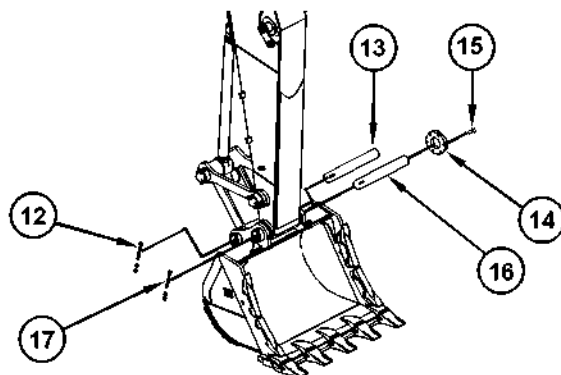


Illustration 321

g03822739

3. Remove nuts and retaining bolt (12) from support pin (13). Remove support pin (13).
4. Remove bolts (15) and adapter plate (14). Remove the shims.
5. Remove nuts and retaining bolt (17) from support pin (16). Remove support pin (16).
6. Start the engine and raise the stick out of the bucket.
7. Remove the O-ring seals (11) from the flanges on the bucket.

Note: After the support pins have been removed, make sure that the support pins do not become contaminated with sand or dirt. Make sure that the seals on the end of the stick and the seals on the end of the link do not become damaged.

Installation Procedure

1. Clean each pin and each pin bore. Lubricate each pin bore with molybdenum grease.

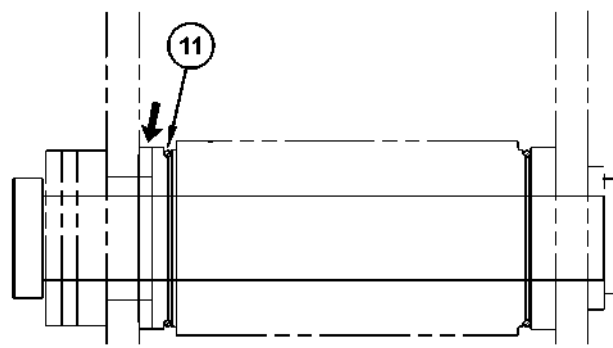


Illustration 322

g03822738

2. Position the O-ring seals (11) onto the flanges of the bucket.

3. Start the engine and lower the stick into the bucket until the pin bores are in alignment with each other. Stop the engine.

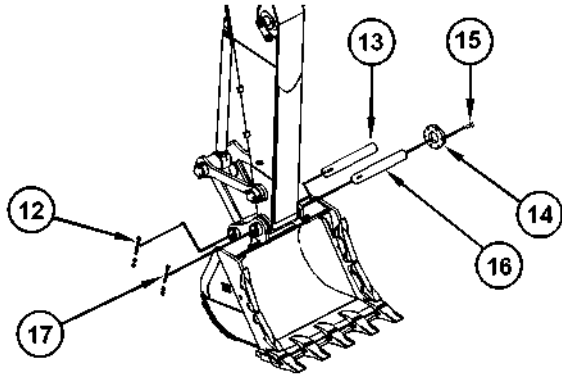


Illustration 323

g03822739

4. Install support pin (16). Put the retaining bolt hole that is in support pin (16) in alignment with the retaining bolt hole that is in the bucket.
5. Install the retaining bolt and nuts (17). Install adapter plate (14) without the shims, and without bolts (15) that hold adapter plate (14).
6. Refer to Operation and Maintenance Manual, "Bucket Linkage - Inspect/Adjust" in order to adjust the bucket clearance.
7. Slide O-ring seals (11) in position over the pin joints between the bucket and the stick.
8. Start the engine and position the bucket linkage into the bucket until the pin bores are in alignment with each other. Stop the engine.
9. Install support pin (13). Put the retaining bolt hole that is in the bucket pin in alignment with the retaining bolt hole that is in the bucket.
10. Install the retaining bolt and nuts (12).
11. Slide the O-ring seals (11) over the pin joints between the bucket and the link assembly.

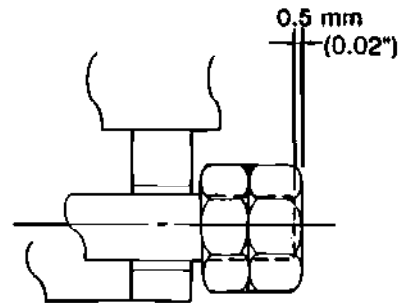


Illustration 324

g00510030

12. Tighten retaining nuts (12) and (17). Position the outside nut even with the end of the retaining bolt or 0.5 mm (0.02 inch) beyond the end of the retaining bolt. Tighten the inside nut against the outside nut.
13. Lubricate the bucket pins. Refer to Operation and Maintenance Manual, "Bucket Linkage - Lubricate" or Operation and Maintenance Manual, "Boom, Stick, and Bucket Linkage - Lubricate".

i03548680

Hammer Operation (If Equipped)

SMCS Code: 5705-WTL

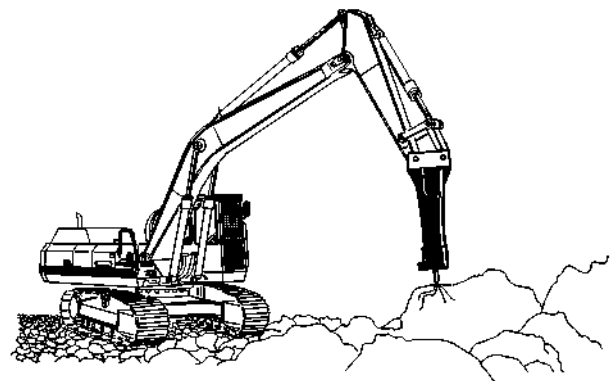


Illustration 325

g01876560

NOTICE

Use only a hydraulic hammer that is recommended by Caterpillar. The use of a hydraulic hammer that is not recommended by Caterpillar could damage your machine. Consult your Caterpillar dealer for information on recommended hydraulic hammers.

Operation Section If Equipped

Only use the hydraulic hammer to break rocks, concrete, and other hard objects. Before you start hydraulic hammer operation, place the machine on a level, stable surface.

Before you start hydraulic hammer operation, close the front window. Caterpillar recommends the installation of a window guard on the front window for protection from flying debris.

NOTICE

In order to avoid structural damage to the host machine or the hydraulic hammer, comply with the following:

Do not attempt to break rocks or concrete by burying the hammer tool completely into the rocks or concrete.

Do not apply a prying force to the hammer tool in order to remove the hammer tool from the material.

Do not allow the hydraulic hammer to continuously operate at one location and for more than 15 seconds. Change the location of the hydraulic hammer and repeat the procedure. Failure to change the location of the hydraulic hammer could cause the hydraulic oil to overheat. Overheated hydraulic oil could cause damage to the accumulator.

Stop the hydraulic hammer immediately if the jumper lines are pulsating violently. This indicates that the accumulator nitrogen charge is lost. Consult your Caterpillar dealer for the necessary repair.

NOTICE

Do not use the dropping force of the hydraulic hammer to break rocks or other hard objects. This could cause structural damage to the machine.

Do not use the sides or back of the hydraulic hammer to move rocks or other hard objects. Doing this could cause damage not only to the hammer but to stick or boom cylinder.

Do not operate the hydraulic hammer with any of the cylinders fully retracted or extended. Doing this could cause structural damage to the machine, resulting in reduced machine life.

Do not use the hydraulic hammer to lift an object.

Do not operate the hydraulic hammer while the stick is vertical to the ground. This could allow the stick cylinder to vibrate excessively.

Operate the attachment control levers carefully in order to keep the hydraulic hammer's tool from hitting the boom.

Do not operate the hydraulic hammer under water unless the hydraulic hammer is properly equipped. Operating the hydraulic hammer under water could cause serious damage to the machine hydraulic system. Consult your Caterpillar dealer for information on underwater operation.

Do not operate the hydraulic hammer with the upper structure sideways to the undercarriage. Before you start hydraulic hammer operation, place the upper structure in the recommended positions that are shown in illustration 326. Any other operating positions could make the machine unstable. Any other operating positions could place excessive loads on the undercarriage.

Refer to the following for any additional questions about the operation and care of your Caterpillar hydraulic hammer: Operation and Maintenance Manual, SEBU7346, "Hydraulic Hammers", Operation and Maintenance Manual, HEP09000, "Hydraulic Hammers" and Decal, SMEU7397, "Hammer Operation/Maintenance".

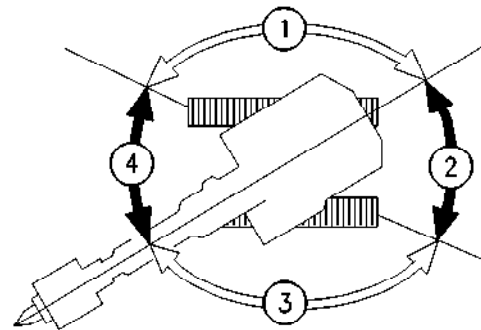


Illustration 326

g00101503

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

i03578566

Shear Operation (If Equipped)

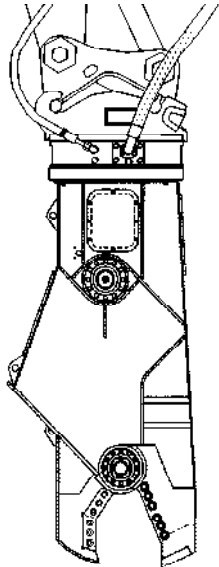
SMCS Code: 5705-WTL

Illustration 327

g00763823

WARNING

Do not operate or work on this work tool unless you have read and understand the instructions and warnings in the Operation And Maintenance Manual for both the work tool and the host machine.

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

Contact your Caterpillar dealer for replacement manuals. Proper care is your responsibility.

NOTICE

Selection of a hydraulic shear must be done with extra care.

Use of a hydraulic shear not recommended by Caterpillar could result in structural damage to the machine.

Consult your Caterpillar dealer for hydraulic shear information.

Be sure that no one is near the work tool in order to prevent injury. Keep the work tool under control at all times in order to prevent injury. When a demolition tool is used, all personnel should maintain a minimum distance of 10 m (33 ft).

Close all windows. Make sure that all required guards are in place. Wear all required protective equipment. Follow the instructions in the Operation and Maintenance Manual for the work tool.

WARNING

Serious injury or death could occur from the demolition of pipes, vessels, tanks or other containers that may contain gas, flammable materials or hazardous chemicals.

Do not perform any demolition work on these items until all of their contents have been removed.

Follow all regulations for the removal and disposal of these materials.

NOTICE

Using the demolition tool to level the work site or push over standing structures may damage the machine or the demolition tool. Use appropriate equipment to do site preparation or maintenance operations.

NOTICE

To avoid structural damage to the machine, do not break road surfaces by placing the cutting edge of the hydraulic shear on the ground and moving the machine.

Parking

i01871055

Stopping the Machine

i04176310

SMCS Code: 7000

WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the travel controls, lower the work tools to the ground and deactivate all work tools, and place the lever for the hydraulic lockout control in the LOCKED position.

Note: There may be regulations that define the requirements for the operator and/or support personnel to be present when the engine is running.

Park on a level surface. If the machine must be parked on a grade, chock the tracks securely.

Note: The swing parking brake is automatically applied when the machine is stopped. The swing parking brake is released when the engine is running and the joystick is activated.

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

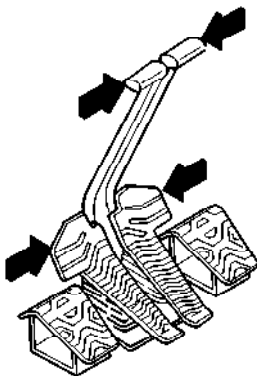


Illustration 328

g00560313

2. Release the travel levers/pedals in order to stop the machine.
3. Lower the work tool to the ground. Apply a slight downward pressure.
4. Move the hydraulic lockout control to the LOCKED position.

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.

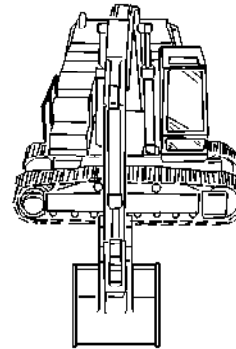


Illustration 329

g00101644

1. Position the boom over one side of the machine.
2. Use boom down pressure in order to lift the track on one side off the ground. Operate the track in the forward direction. Then operate the track in reverse. Continue this procedure until the maximum amount of material is thrown off the track.
3. Lower the track onto the wood planks.
4. Repeat the procedure for the other track.
5. Clean the area around the carrier rollers and around the track rollers.
6. Lower the work tool onto a wood plank in order to prevent the work tool from touching the ground.

i05340390

Stopping the Engine

SMCS Code: 1000; 7000

NOTICE

Stopping the engine immediately after it has been working under load can result in overheating and accelerated wear of engine components.

Refer to the following procedure to allow the engine to cool and to prevent excessive temperatures in the turbocharger housing, which could cause oil coking problems.

1. Stop the machine and run the engine at low idle for 5 minutes.

NOTICE

Never turn the battery disconnect switch to the OFF position while the engine is running. Serious damage to the electrical system may result.

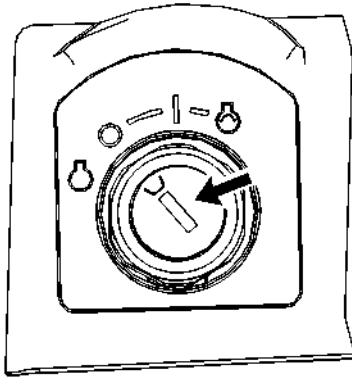


Illustration 330

g02038994

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

Delayed Engine Shutdown

The Delayed Engine Shutdown allows the engine to run for a time after the engine start switch is turned to the OFF position to cool the engine and system components. The engine start switch key may be removed.

Note: There may be regulations that define the requirements for the operator and/or support personnel to be present when the engine is running.

WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the travel controls, lower the work tools to the ground and deactivate all work tools, and place the lever for the hydraulic lockout control in the LOCKED position.

Note: Leaving the engine unattended while running may result in property damage in the event of a malfunction.

Turn the engine start switch to the OFF position.



Delayed Engine Shutdown – The delayed engine shutdown indicator will illuminate or the following text will be displayed, ENGINE COOLDOWN ACTIVE.

Delayed engine shutdown will run for a minimum of 30 seconds and will continue to run until the engine and system components are cooled. The maximum run time is 10 minutes,

Note: To override delayed engine shutdown and stop the engine, turn the engine start switch to the STOP position. Overriding delayed engine shutdown may reduce engine and system component life. A warning message and/or audible alarm will be initiated and a fault code will be logged for improper engine shutdown.

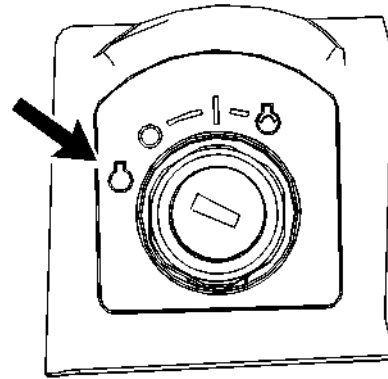


Illustration 331

g03382715

Note: At any time during a delayed engine shutdown, the engine start switch may be turned to the ON position. The engine may be placed back into service.

Engine Stop Control

Turn the engine start switch to the OFF position. If the engine does not stop, perform the following procedure.

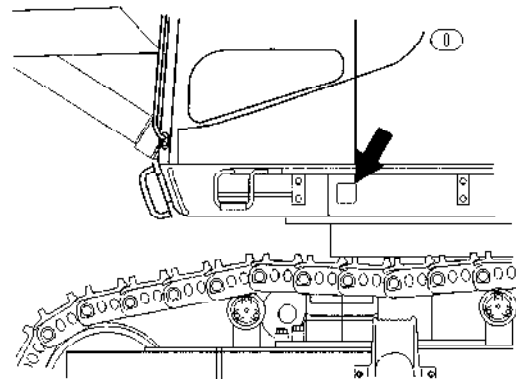


Illustration 332

g00837903

1. The switch is located below the cab on the left side of the machine.

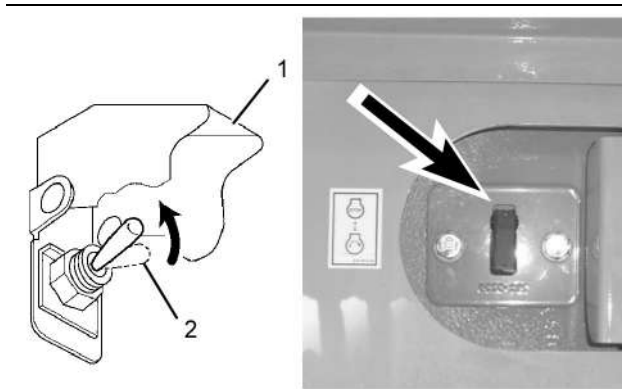


Illustration 333

g03374841

2. Lift cover (1).
3. Push switch (2) upward. This should stop the engine.

Note: Use the engine start switch to stop the engine first. Use the engine stop control as an alternate method to stop the engine.

4. Return the switch to the original position. The engine will be enabled to start.

Note: Do not operate the machine again until the malfunction has been corrected.

5. Use the method that follows if the previous steps do not stop the engine.

Stop the Engine if an Electrical Malfunction Occurs

Turn the engine start switch to the OFF position. If the engine does not stop, perform the procedure that follows.

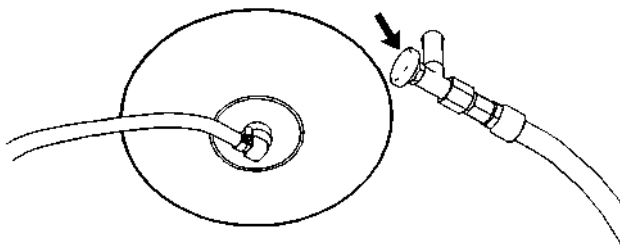


Illustration 334

g01139594

The fuel shutoff valve is located under the fuel tank.

Shut off the fuel supply by turning the fuel shutoff valve clockwise. The engine will stop after consuming the fuel in the fuel line. The engine may continue to run for a few minutes.

Repair the engine before you restart the engine. The fuel system may need to be primed. See Operation and Maintenance Manual, "Fuel System - Prime" for instructions.

i05716125

Leaving the Machine

SMCS Code: 7000

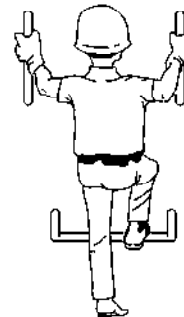


Illustration 335

g00037860

1. Use the steps and the handholds when you dismount. When you dismount, face the machine and use both hands.
2. Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire hazard.
3. Remove all flammable debris from the front bottom guard through the access doors in order to reduce a fire hazard. Discard the debris properly.
4. Always turn the battery disconnect switch to the OFF position before leaving the machine.
5. If the machine will not be operated for a month or more, remove the battery disconnect switch key.
6. Lock all vandalism covers and all compartments.
7. Open the middle access door on the left side of the machine.

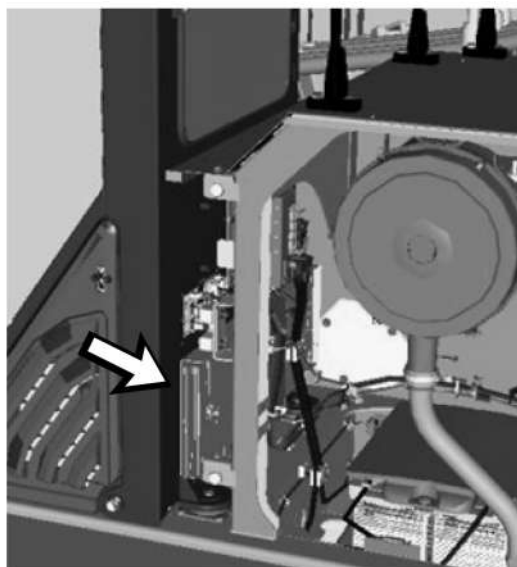


Illustration 336

g03632898

8. Loosen the clamp that holds the vandalism guards in place. Remove the vandalism guards from the storage area.

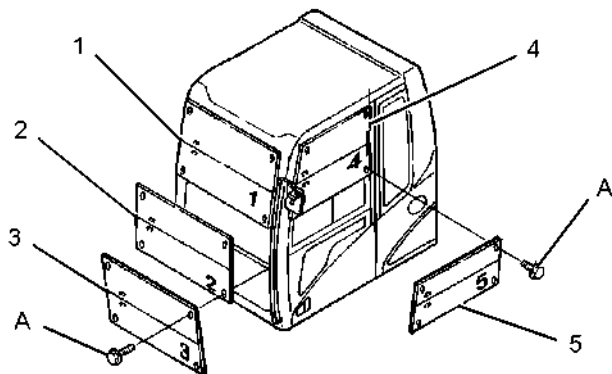


Illustration 337

g02038846

9. Install the vandalism guards on the front window and on the cab door. An identification number is stamped on each of the vandalism guards. Install the vandalism guards in the correct sequence. Use bolts (A) only for vandalism guard (3) and for vandalism guard (5).

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

Transportation Information

i02067410

Disconnecting Hydraulic Hoses and Lines

SMCS Code: 5057

Release the pressure in the implement hydraulic circuits (boom, stick and bucket) before any hydraulic lines or components are disconnected or removed.

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, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

1. Fully retract the stick cylinder rod.
2. Adjust the position of the bucket so that the bucket is parallel to the ground.
3. Lower the boom until the bucket is flat on the ground.
4. Stop the engine.
5. Turn the engine start switch to the ON position without starting the engine.
6. Place the hydraulic lockout (lever) in the UNLOCKED position.

7. Move the joysticks and pedals to FULL STROKE position in all directions. This will release any pressure that might be present in the pilot system.
8. Turn the engine start switch to the OFF position.
9. Slowly loosen the fill/vent plug on the hydraulic tank and release the pressure.
10. Tighten the fill/vent plug on the hydraulic tank.

Note: If a hydraulic line for the boom, the stick or the bucket must be disconnected, utilize the purge screws.

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the pilot pressure is released. Serious injury can result if this remaining pressure is not released before any service is done on the hydraulic system.

Make sure that the remaining pressure has been released by utilizing the purge screws that are located on the boom, stick and bucket lines. Before any purge screw is turned, the bucket and or all of the attachments must be lowered to the ground or properly supported.

11. Locate a section of hose that will tightly fit over one of the purge screws.

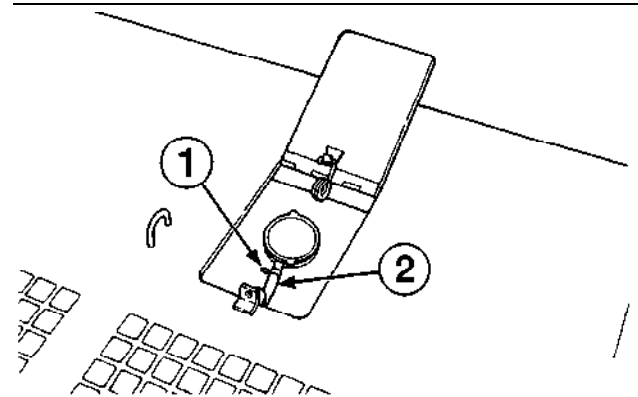


Illustration 338

g00583861

- (1) Hose clamp
(2) Hose

12. If a section of hose cannot be located, loosen clamp (1) and disconnect hose (2) from the radiator.

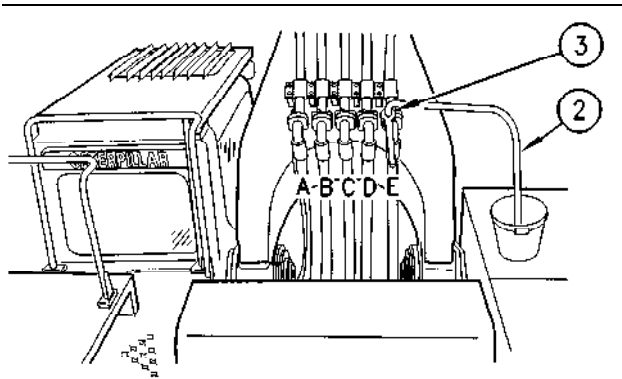


Illustration 339

g00836573

- (2) Hose
- (3) Purge screws (one on each line)
- (A) Line for the bucket
- (B) Line for the stick
- (C) Line for the stick
- (D) Line for the stick
- (E) Line for the bucket

13. Connect one end of drain hose (2) to purge screw (3). Insert the other end of drain hose (2) into an empty container.

14. Loosen purge screw (3) by 1/2 turn. Hydraulic oil will be drained from the drain hose to the container.

Note: Dispose of drained fluid according to local regulations.

15. Tighten purge screw (3) to a torque of 13 ± 2 N·m (9.6 ± 1.5 lb ft) after all of the hydraulic oil has been drained from the line.

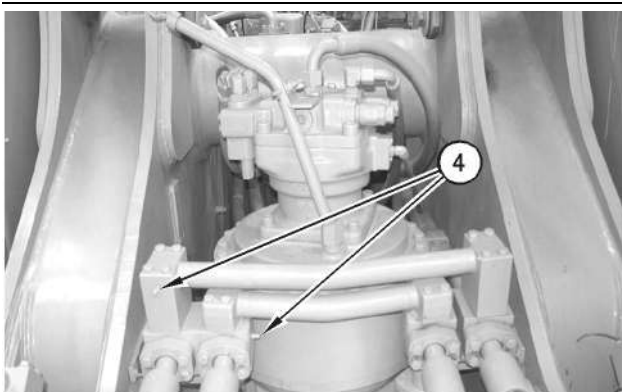


Illustration 340

g00836574

- (4) Purge screws for the boom

Note: Purge screws (4) for the boom are located on the boom cylinder lines. The above procedure should be used to drain the hydraulic oil from the boom lines as well.

16. After the hydraulic oil is drained, tighten the purge screw. Then disconnect hose (2) from the purge screw on the hydraulic line that is being drained.

17. If the hose from the radiator was used, replace the hose with a new hose. Connect the new hose (2) and tighten clamp (1).

18. Pressure in the hydraulic system should now be released and lines and components can be removed.

i08036521

Shipping the Machine

SMCS Code: 7000; 7500

WARNING

Automatic Engine Speed Control (AEC) will increase engine speed automatically when you operate the control levers and/or travel pedals with AEC switch on.

When loading and unloading the machine from the truck or working in close quarters always turn AEC switch off to prevent any possibility of sudden movement of machine, which could result in serious injury or death.

Set the travel speed control switch to LOW before loading the machine. Never operate this switch when loading the machine on a trailer.

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance for the machine.

Remove ice, snow, or other slippery material from the loading dock and from the truck bed before you load the machine onto the transport machine. Removing ice, snow, or other slippery material will help to prevent the machine from slipping in transit.

Note: Obey all laws that govern the characteristics of a load (height, weight, width, and length). Observe all regulations that govern wide loads. Certain regions may require the removal of door hooks and cab bumpers, if equipped. Consult all local and regional regulations

Choose the flattest ground when you load the machine or when you unload the machine.

- 1.** Before you load the machine, chock the trailer wheels or the rail car wheels.
- 2.** When you use loading ramps, make sure that the loading ramps have adequate length, adequate width, adequate strength, and an adequate slope.
- 3.** Maintain the slope of the loading ramps within 15 degrees of the ground.

Operation Section
Shipping the Machine

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.

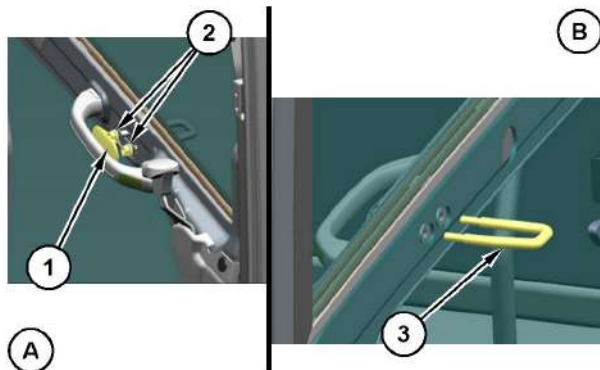


Illustration 341

g06516462

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

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

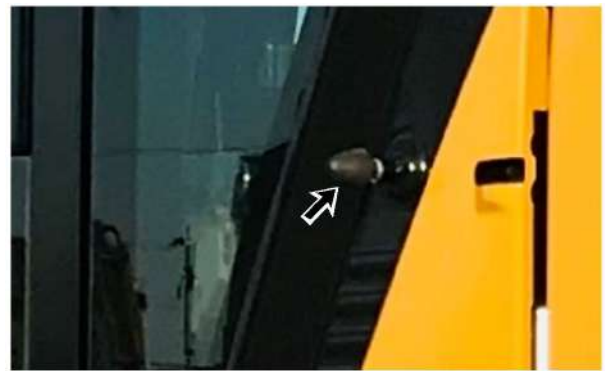


Illustration 342

g06516469

- b. Remove any bumpers on your cab.

NOTICE

Do not allow the chrome surface of the bucket cylinder rod to touch any part of the trailer. Damage to the rod can occur from impact with the trailer during transport.

Note: Refer to Operation and Maintenance Manual, "Specifications".

Shipping a Machine that is not Completely Assembled

If the machine must be shipped when the boom, stick, or counterweight is not assembled on the machine, follow the instructions in Operation and Maintenance Manual, "Operation".

WARNING

The ROPS structural certification depends on the support of the boom, stick, and counterweight in the event of a machine tip over or a machine rollover incident.

When the machine needs to be moved without the boom, stick, or counterweight being installed, avoid any machine operations which could affect machine stability as a machine tip over or a machine rollover incident could result in serious injury or death.

The machine should be operated slowly on flat, stable ground or pavement by qualified operators.

i06650188

Securing the Machine

SMCS Code: 7000

NOTICE

Never transport the machine with the engine running.

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

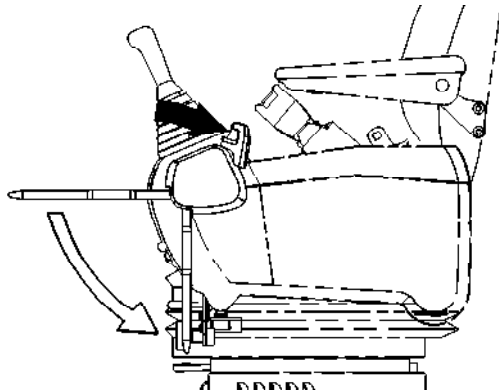


Illustration 343

g00543871

1. Move the hydraulic lockout control to the LOCKED position.
2. Turn the engine start switch to the OFF position in order to stop the engine. Remove the engine start switch key.
3. Turn the battery disconnect switch to OFF and remove the disconnect switch key.
4. Remove the ether starting aid cylinder.

Reference: Refer to Operation and Maintenance Manual, "Ether Starting Aid Cylinder - Replace" for the removal procedure.

5. Lock the door and the access covers. Attach any vandalism protection.
6. The Product Link antenna (if equipped) may be repositioned in order to meet the regulations regarding height of some locations. The Product Link antenna is located on top of the cab. Perform the following procedure in order to move the Product Link antenna to the transport position.

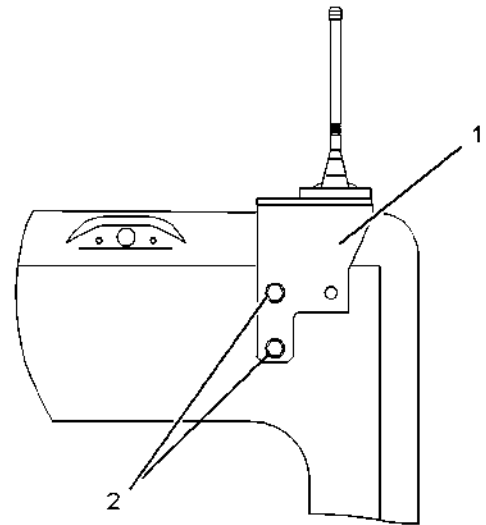


Illustration 344

g02263573

Bracket in normal operating position.

- a. Remove bolts (2) from bracket (1).

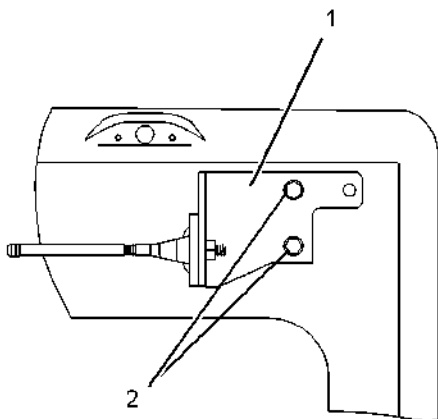


Illustration 345

g02270173

- b. Reinstall bracket (1) with bolts (2) located in the top two holes of the bracket. Refer to illustration 345 .

Note: The bracket for the Product Link antenna must be place back into the normal operating position before the machine can be placed back into service.

7. The side view camera is located on top of the fuel tank and it must be repositioned for transport. Perform the following procedure in order to move the camera to the transport position.

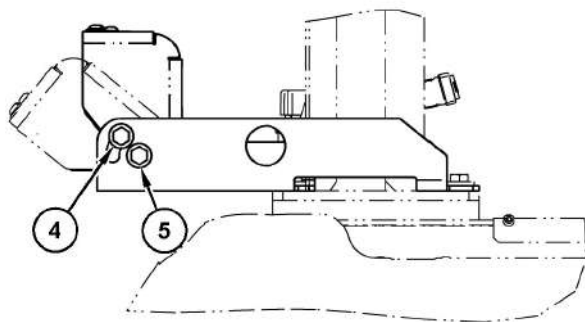


Illustration 346

g06051521

Side view camera in position for transport

- a. Loosen bolts (4) and (5) and slide the camera upward to the transport position.

8. Tighten bolts (4) and (5).

Note: The side view camera must be placed back into the normal operating position before the machine can be placed back into service.

9. The platform light (if equipped) may be repositioned in order to meet the regulations regarding height of some locations. The platform light is located on top of the cab. Perform the following procedure in order to move the platform light to the transport position.

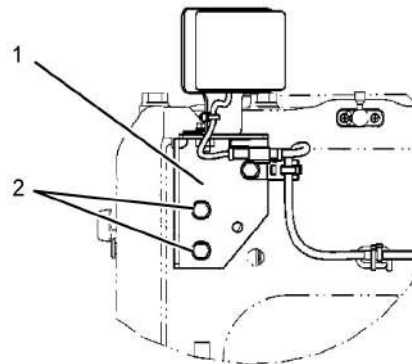


Illustration 347

g03670580

- a. Remove bolts (2) from bracket (1).

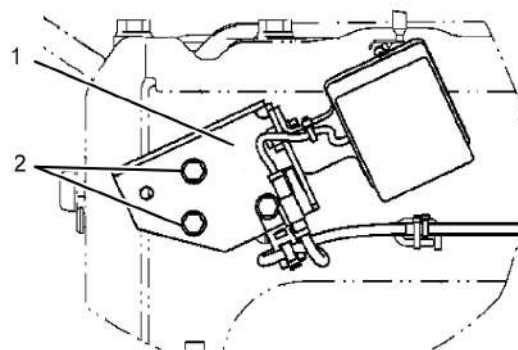


Illustration 348

g03670582

- b. Reinstall bracket (1) with bolts (2) located in the top two holes of the bracket. Refer to illustration 348 .

Note: The bracket for the platform light must be place back into the normal operating position before the machine can be placed back into service.

10. Cover the exhaust opening.

NOTICE

Do not allow the turbocharger to rotate while the engine is not operating. Damage to the turbocharger can result.

Note: Before you remove the excavator from the transport machine, remove the protective covering from the exhaust opening.

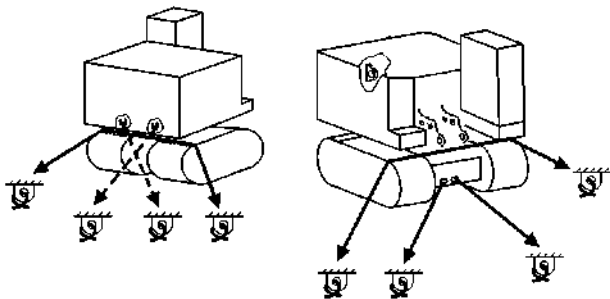


Illustration 349

g02142926

11. 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. Also use 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 parking brake will prevent the upper structure from swinging.

NOTICE

In freezing weather, protect the cooling system with antifreeze, to the lowest outside expected temperature on the travel route. Or, drain the cooling system completely.

i02238094

Mirror Installation

SMCS Code: 7319

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

After you transport the machine, reinstall the rearview mirror. Use the following procedure.

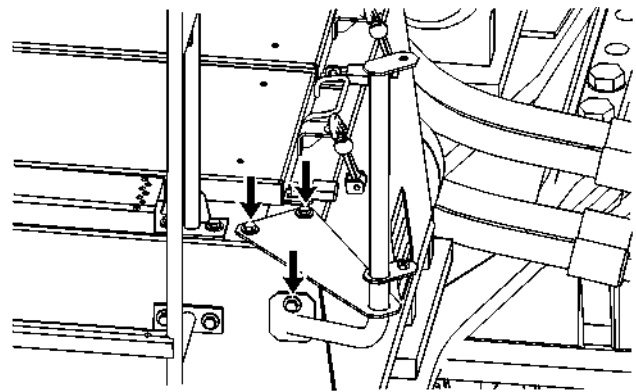


Illustration 350

g01128822

Mounting bolts and washers

1. Use three mounting bolts and three washers to install the bracket on the right side of the storage box.

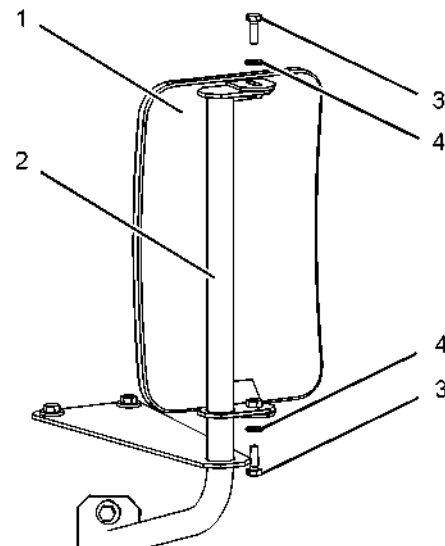


Illustration 351

g01129011

- (1) Mirror
- (2) Bracket
- (3) Bolt
- (4) Washer

2. Position mirror (1) on support bracket (2), and install bolts (3) and washers (4) on each end.

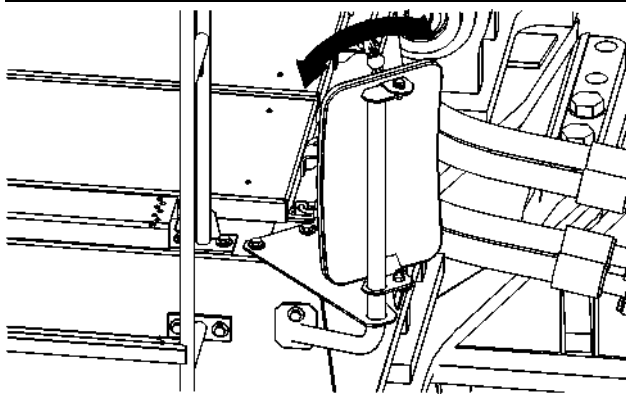


Illustration 352

g01129042

3. To adjust the angle of the mirror, loosen bolts (3). Rotate the mirror by hand to the desired angle. Tighten the bolts securely.

i05328212

Adjustable Gauge Undercarriage Frame

SMCS Code: 4150-VAR

WARNING

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

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

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

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

WARNING

Do not operate the machine if both track frames are retracted. Do not operate the machine if one track frame is retracted. The machine is unstable if either track frame is retracted. If either track frame is retracted, the machine could rollover, resulting in serious injury or death. If the machine is unstable, damage could occur to bolts connecting the car body and the track frames.

Fully extend the track frames when the machine is operated. Retract the track frames when the machine is unloaded. Retract the track frames when the machine is loaded.

Do not operate the machine if both track frames are retracted. Do not operate the machine if one track frame is retracted. The machine is unstable if either track frame is retracted.

NOTICE

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

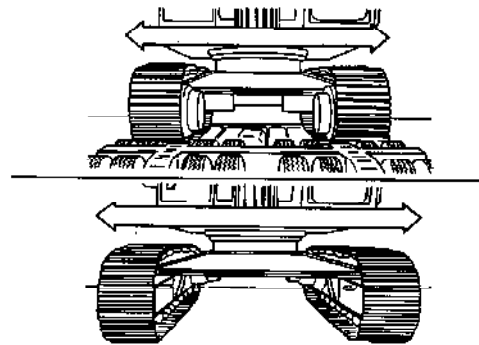


Illustration 353

g00285692

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

Extending

NOTICE

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

1. Park the machine on a hard, level surface. Extend the track frames one at a time.
2. Stop the engine.

Note: If the tracks have never been extended before, remove the 12 corks that are in bolt holes (6). There are six corks installed on the side with the idler and six corks installed on the side with the final drive.

3. Remove 12 bolts (3) and 12 spacers (4). The bolts hold track frame (2) to carbody (1).

Note: Six bolts (3) and 6 spacers (4) are installed on the side with the idler and six bolts (3) and 6 spacers (4) are installed on the side with the final drive.

Note: When track frame (2) is moved in order to extend the overall width, do not loosen two bolts (5) that are for the track guide.

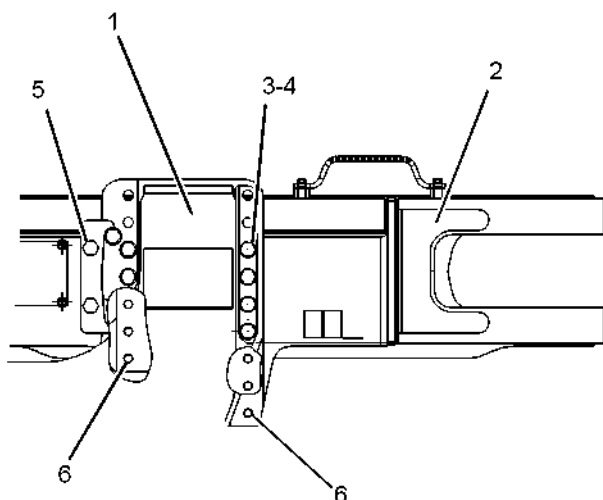


Illustration 354

g02720211

- (1) Carbody
- (2) Track frame
- (3) Bolts
- (4) Spacers
- (5) Bolts
- (6) Corks

4. Start the engine. Position the boom over the opposite track frame with the stick at an approximate 80 degree angle to the ground. Place the bucket teeth into the ground, as shown. This machine position provides the best stability for extending the track frames.
5. Apply a downward pressure with the boom in order to raise the track slightly.

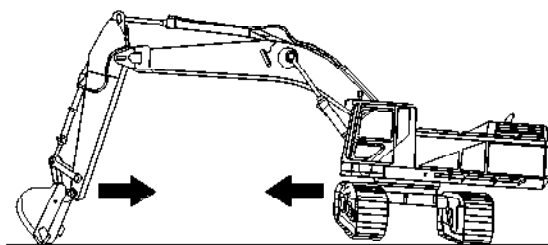


Illustration 355

g00286117

6. Use the STICK IN position to extend the track frame by moving the carbody away from the track.
7. After the track frame has been correctly extended, lower the raised track frame to the ground.
8. Align the bolt holes of carbody (1) and track frame (2). Install 20 bolts (3) and 20 spacers (4). If necessary, slowly operate the machine back and forth until the bolt holes are aligned. Tighten the bolts to $2800 \pm 350 \text{ N}\cdot\text{m}$ ($2000 \pm 220 \text{ lb ft}$).

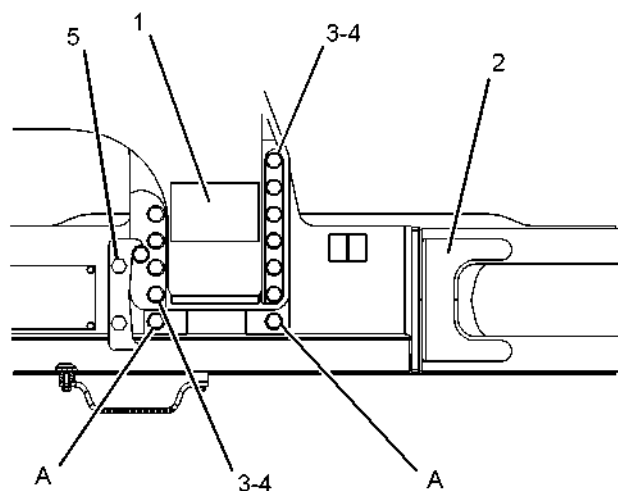


Illustration 356

g02720218

- (1) Carbody
- (2) Track frame
- (3) Bolts
- (4) Spacers
- (5) Bolt

9. Install four bolts (3) and four spacers (4) to protect non-used threads (A).

Note: Two bolts (3) and two spacers (4) are installed on the side with the idler. Two bolts (3) and two spacers (4) are installed on the side with the final drive.

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

Retracting

1. Park the machine on a hard, level surface. Retract the track frames one at a time.

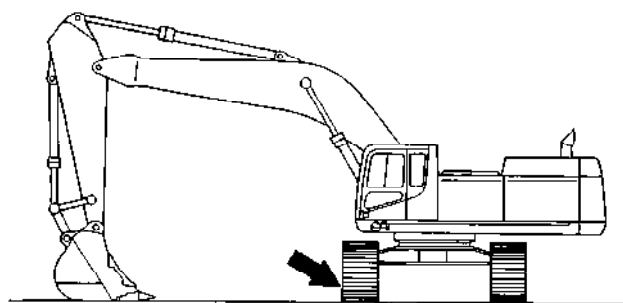


Illustration 357

g00581851

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

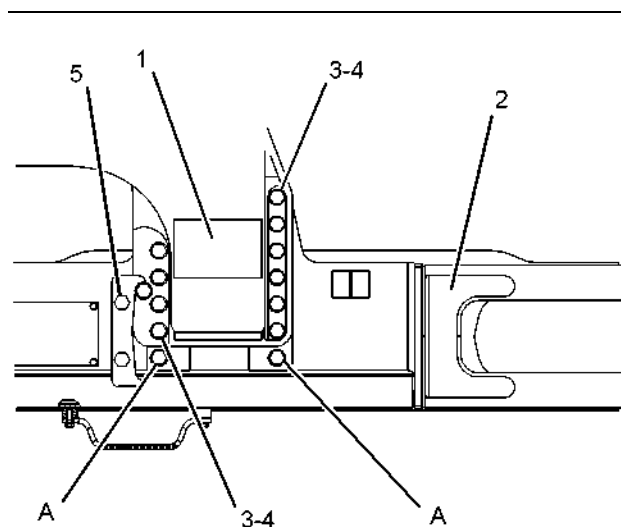


Illustration 358

g02720218

- (1) Carbody
(2) Track frame
(3) Bolts
(4) Spacers
(5) Bolt

4. Remove four bolts (3) and four spacers (4), which protect non-used threads (A).

Note: Two bolts (3) and two spacers (4) are installed on the side with the idler. Two bolts (3) and two spacers (4) are installed on the side with the final drive. Put these parts into storage.

5. Remove 20 bolts (3) and 20 spacers (4). The bolts hold track frame (2) to carbody (1).

Note: When you move track frame (2) in order to retract the overall width, do not loosen two bolts (5) that are for the guide.

Note: Ten bolts (3) and ten spacers (4) are installed on the side with the idler and ten bolts (3) and ten spacers (4) are installed on the side with the final drive.

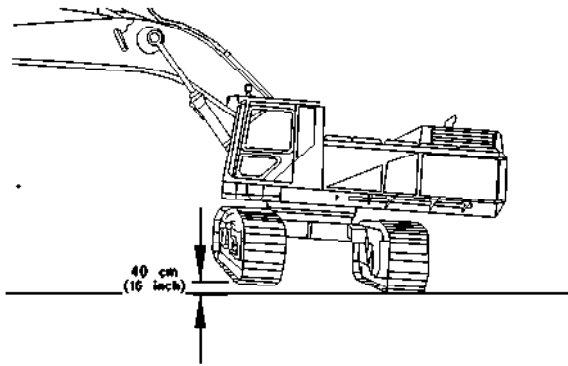


Illustration 359

g00697383

6. Start the engine. Apply downward pressure with the boom in order to raise the track approximately 40 cm (16 inch) above ground level.
7. Slowly run the raised track at a low idle. This will cause the raised track to slide toward the center of the machine. The full sliding distance should be 250 mm (10 inch).
8. After the raised track frame has been correctly retracted, lower the track frame to the ground.

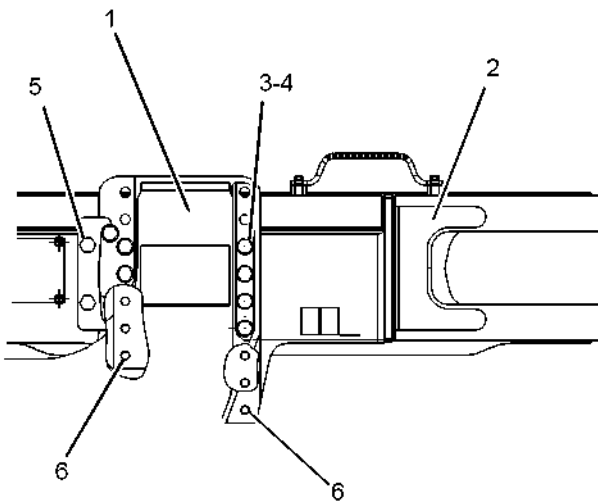


Illustration 360

g02720211

- (1) Carbody
- (2) Track frame
- (3) Bolts
- (4) Spacers
- (5) Bolts
- (6) Corks

9. Align the bolt holes of carbody (1) and track frame (2). Install 12 bolts (3) and 12 spacers (4). If necessary, slowly operate the machine back and forth until the bolt holes are aligned. Tighten the bolts to $2800 \pm 350 \text{ N}\cdot\text{m}$ ($2000 \pm 220 \text{ lb ft}$).

Note: To protect the bolt holes that are in the track frame from debris and mud, insert corks into five bolt holes (A).

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

i05718713

Camera Harness - Disconnect and Connect

SMCS Code: 1408; 7348

WARNING

Working on the wiring harness for the rear camera during the removal and installation of the counterweight could result in a crushing hazard. The counterweight could fall, and the falling of the counterweight could cause personal injury or death. Disconnect the wiring harness to the rear camera before you remove the counterweight. Reconnect the wiring harness to the rear camera after you install the counterweight.

WARNING

Unexpected machine movement can cause injury or death.

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

1. Park the machine on level ground.
2. Lower the work tool to the ground.
3. Move the hydraulic lockout control to the LOCKED position.
4. Turn the engine start switch to the OFF position in order to stop the engine. Remove the engine start switch key.
5. Turn the battery disconnect switch to OFF and remove the disconnect switch key.

Disconnection of the Harness for the Rear View Camera

Disconnect the harness for the rear view camera before removing the counterweight.

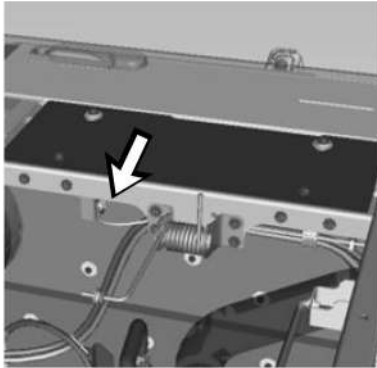


Illustration 361

g03635422

1. Open the engine hood.

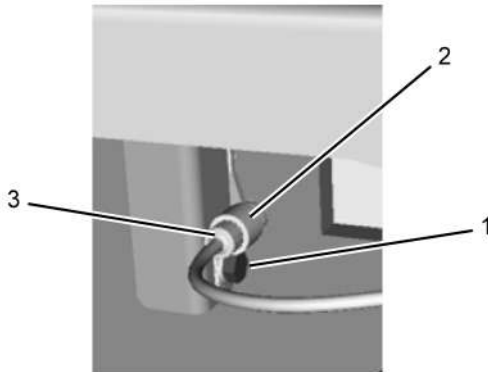


Illustration 362

g03635400

2. Remove bolt (1) and clip (2).
3. Turn plug(3) and pull apart.
4. Pull the wiring for the rear view camera until plug (3) comes in to the pump compartment.

5. Close the engine hood.

Connection of the Harness for the Rear View Camera

Reconnect the harness for the camera in the reverse order.

i08134287

Counterweight Removal and Installation

SMCS Code: 7056

Counterweight Removal and Installation for Standard Machines

WARNING

Unexpected machine movement can cause injury or death.

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

WARNING

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

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

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

WARNING

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

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

WARNING

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

⚠ WARNING

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

⚠ WARNING

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

⚠ WARNING

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

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

Machines Equipped with Endless Links

Reference: Refer to Operation and Maintenance Manual, "Specifications" for specific weight information.

Note: Before you remove the counterweight, disconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, "Camera Harness - Disconnect and Connect" for more information.

1. Position the machine on a surface that is hard and level. Lower the work tool to the ground.
2. Move the hydraulic lockout control to the LOCKED position.

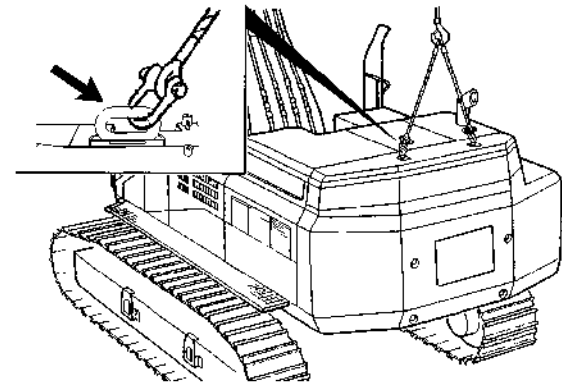


Illustration 363

g03485178

3. Fasten a proper rated wire cable with shackles to the link on the counterweight. Use an appropriate lifting device to tension the cable.
4. Lift the counterweight enough so that there is no load on the retaining Links.

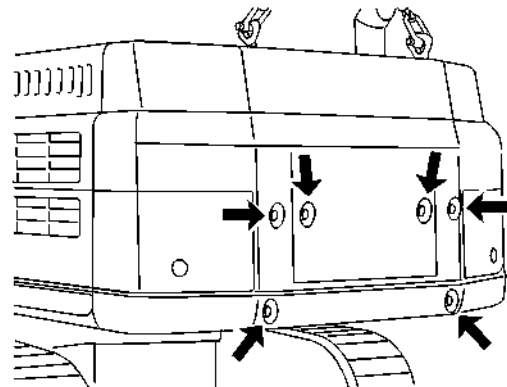


Illustration 364

g03437997

5. Remove six counterweight mounting bolts and washers. Inspect the bolts for damage. If the bolts are damaged, replace the bolts.

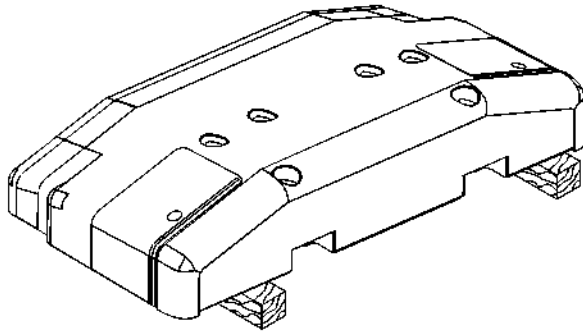


Illustration 365

g03438036

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

Counterweight Installation

Perform the installation procedure in reverse order.

Note: Temporarily tighten the six counterweight mounting bolts. Decrease the tension on the lifting cable. Make sure that the counterweight is correctly positioned on the retaining pins. Tighten the bolts to a torque of $2800 \pm 350 \text{ N}\cdot\text{m}$ ($1990 \pm 220 \text{ lb}\cdot\text{ft}$).

Machines Equipped with Counterweight Removal System

WARNING

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

WARNING

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

WARNING

Inadequate linkage cylinder pressure can cause the counterweight to lower quickly. This may result in personal injury or death.

Before removing bolts, make certain the lamp and system are working properly by following the established procedure.

Contact your Cat dealer for service.

Counterweight Removal

Reference: Refer to Operation and Maintenance Manual, "Specifications" for specific weight information.

Note: Before you remove the counterweight, disconnect the wiring for the rear view camera. Refer to Operation and Maintenance Manual, "Camera Harness - Disconnect and Connect" for more information.

1. Position the machine on a surface that is hard and level.
2. Position the upper structure parallel to the tracks. Lower the work tool to the ground.
3. Start the engine. Adjust the engine speed to one-third of full throttle engine speed.

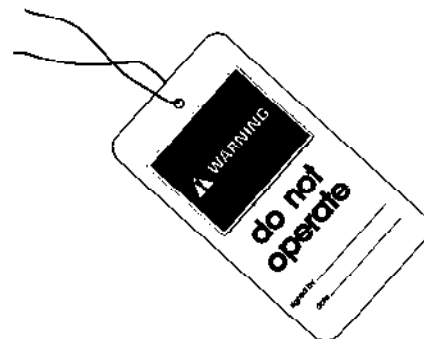


Illustration 366

g00104545

4. Move the hydraulic lockout control to the LOCKED position. Attach a "Do Not Operate" warning tag or a similar warning tag to the start switch or to the controls.

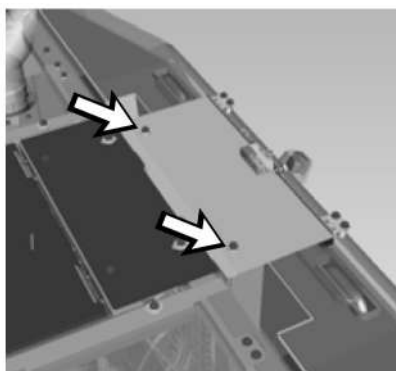


Illustration 367

g03640796

5. Remove two bolts from the top of the counterweight cover plate.
6. Open the rear access door on the right side of the machine.

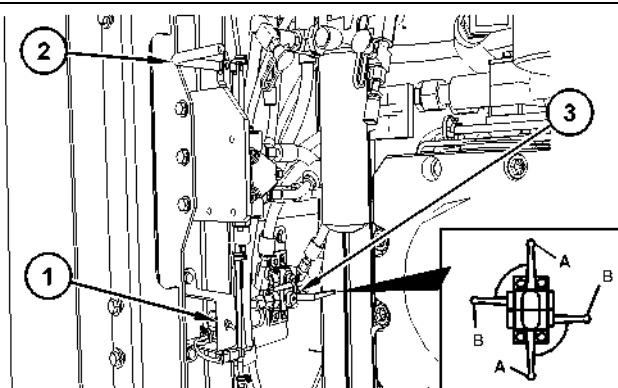


Illustration 368

g03485316

- (1) Switch
- (2) Control lever
- (3) Stop valves
- (A) CLOSED position
- (B) OPEN position

7. Place stop valves (3) in OPEN position (B).
8. Move switch (1) upward to the ON position.
9. Move control lever (2) upward to support the counterweight and relieve the weight on the counterweight mounting bolts. This will keep the counterweight from possibly sliding off when the counterweight mounting bolts are removed.

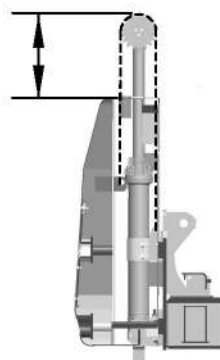


Illustration 369

g06510567

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

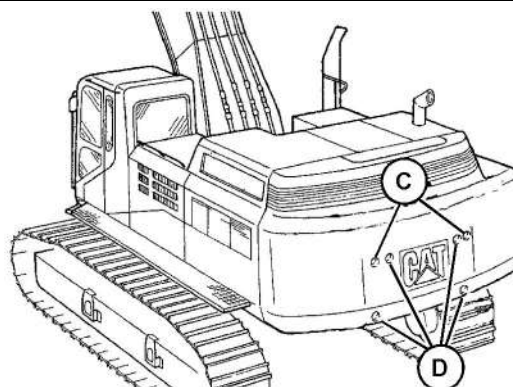


Illustration 370

g06548425

11. Remove bolts (C) from the counterweight.
12. Reinstall bolts (C) and tighten by hand until the bolts are fully engaged.

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

13. Loosen bolts (C) two full revolutions.

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

14. Remove remaining bolts (D).

15. Remove bolts (C) by hand .

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

Operation Section
Counterweight Removal and Installation

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

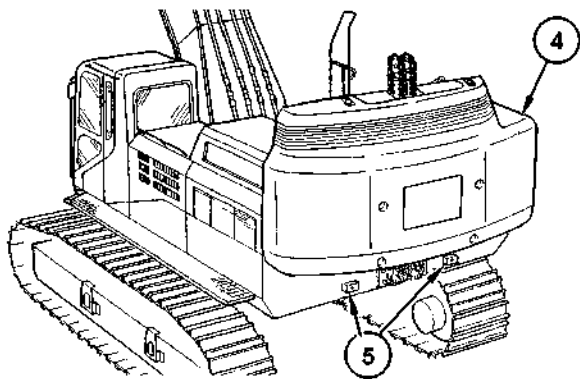


Illustration 371

g03485336

- (4) Counterweight
(5) Retaining pin

16. Move control lever (2) upward to raise the counterweight (4) until access to the retaining pins (5) can be gained.

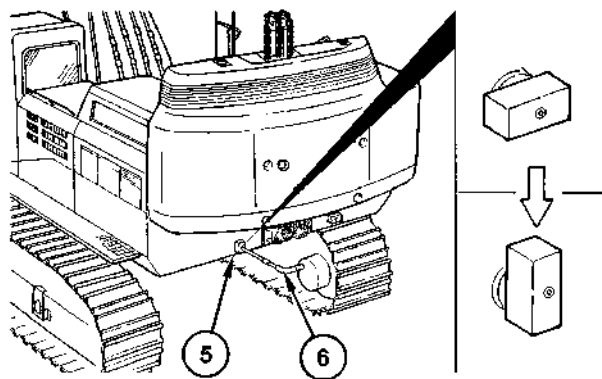


Illustration 372

g03485358

- (5) Retaining pin
(6) Extension

17. Use a ratchet wrench and an extension (6) to rotate each retaining pin (5). Retaining pins (5) require 90 degrees of rotation. The retaining pins (5) are now in the UNLOCKED position.

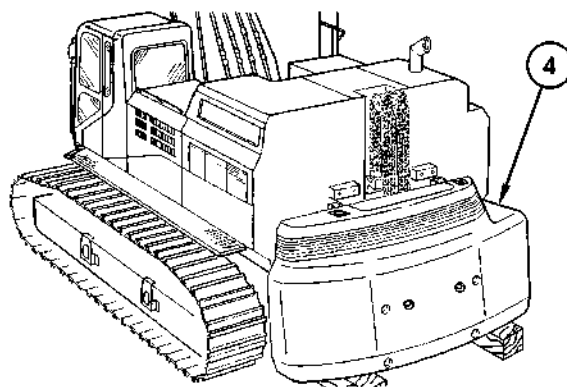


Illustration 373

g03485378

- (4) Counterweight

⚠ WARNING

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

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

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

18. Move control lever (2) downward to lower counterweight (4) onto supports on the ground.

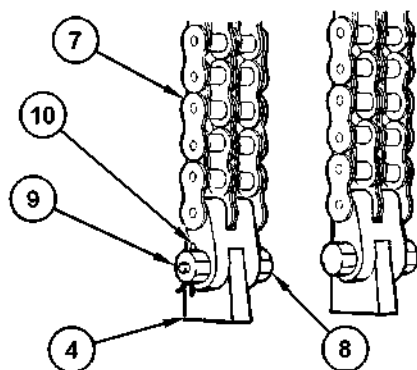


Illustration 374

g03485456

- (4) Counterweight
- (7) Chains
- (8) Pins
- (9) Nuts
- (10) Cotter pins

19. Remove cotter pins (10). Loosen nuts (9).

20. Remove pins (8) to disconnect chains (7) from counterweight (4).

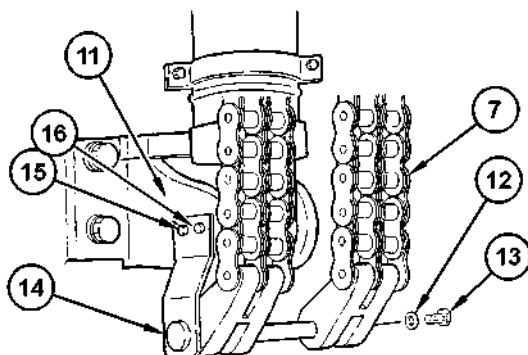


Illustration 375

g03485485

- (7) Chain
- (11) Bracket
- (12) Washer
- (13) Bolt
- (14) Pin
- (15) Bolt
- (16) Washer

21. Pin (14) should be located in the storage box. Remove pin (14) from the storage box.

22. Install pin (14) into chains (7).

23. Install bolts (15) and washers (16) to attach pin (14) to bracket (11).

24. At the end of pin (14), install washer (12) and bolt (13).

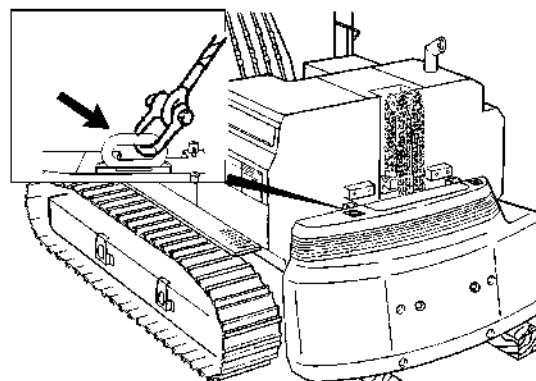


Illustration 376

g03485518

25. Fasten a proper rated wire cable with shackles to the link on the counterweight. Use an appropriate lifting device to tension the cable.

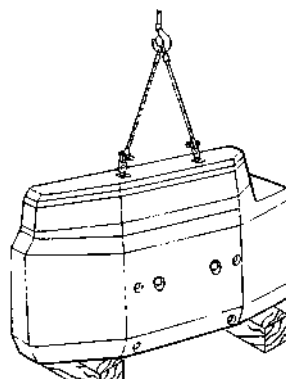


Illustration 377

g03438601

26. Lift the counterweight enough so that there is no load on the retaining Links.

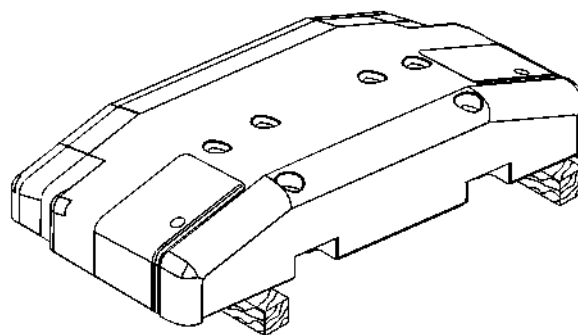


Illustration 378

g03438036

27. Use an appropriate lifting device to put the counterweight on suitable supports.

Counterweight Installation

Perform the installation procedure in reverse order.

Note: Make sure that you remove pin (14), bolt (13), washer (12), bolt (15), and washer (16). Return these parts to the storage box.

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

Tighten the counterweight mounting bolts to a torque of 2800 ± 350 N·m (1990 ± 220 lb ft).

i08118445

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

To properly lift the machine, the counterweight, and the front parts must be disassembled.

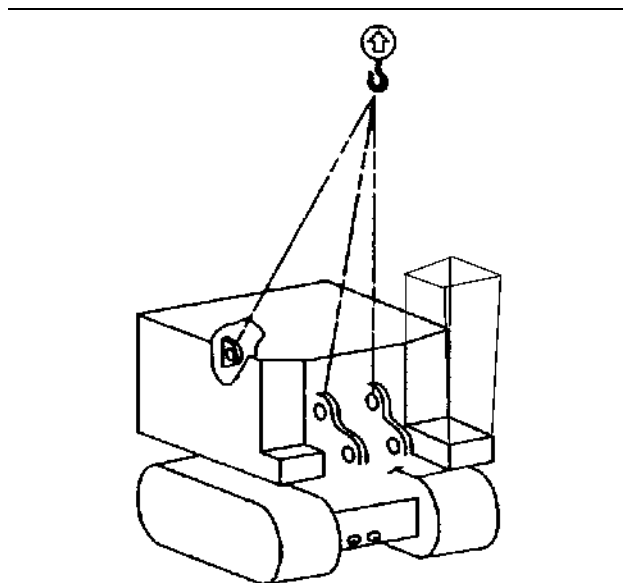


Illustration 379

g03368287

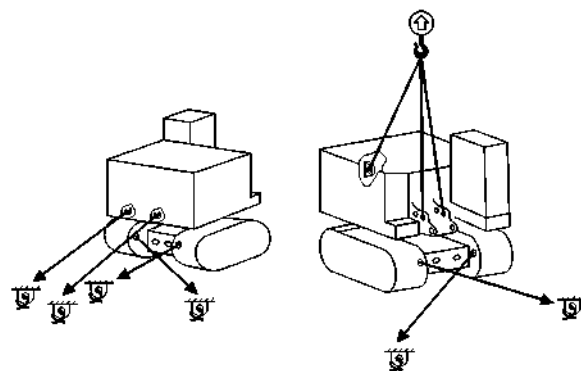


Illustration 380

g03374854

NOTICE

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

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

Reference: Refer to the Operation and Maintenance, "Specifications" for specific weight information.

1. Use proper rated cables and slings for lifting. The crane should be positioned so that the machine is lifted parallel to the ground.
2. To prevent contact with the machine, lifting cables should have sufficient length.

3. Use the rear eyes and the front eyes that are provided on the lower frame to fasten tie-downs. Use corner protectors for sharp corners.
4. Move the hydraulic lockout control to the LOCKED position.

Tying Down the Machine

There are two methods that can be used to tie down a machine. Local and/or regional regulations will determine which method to use.

Note: Obey all local and regional governmental regulations.

Frictional and Direct Lashing

When allowed, a combination of frictional lashing and direct lashing is the preferred method to tie down a machine.

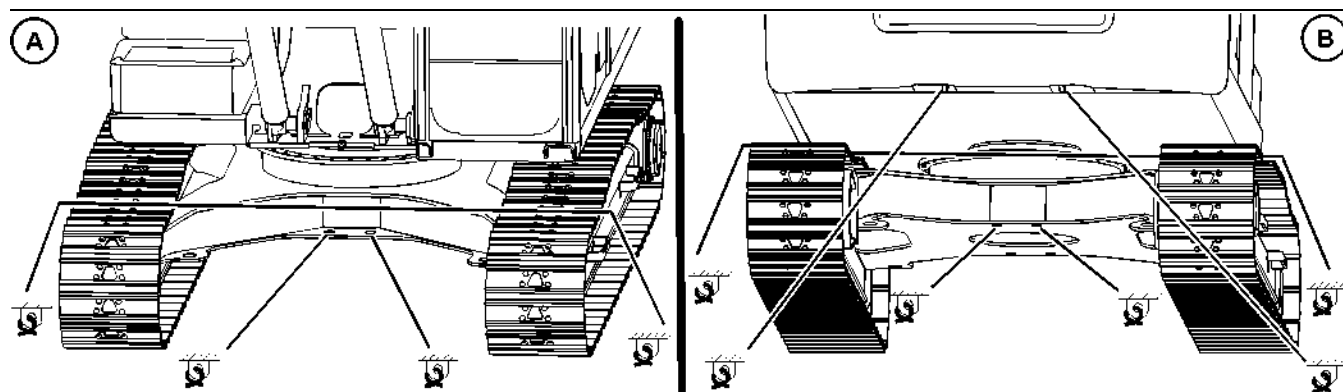


Illustration 381

g02793465

(A) Front of the machine

(B) Rear of the machine

Diagonal Lashing

In areas where frictional lashing is not allowed, direct lashing can be used as shown below.

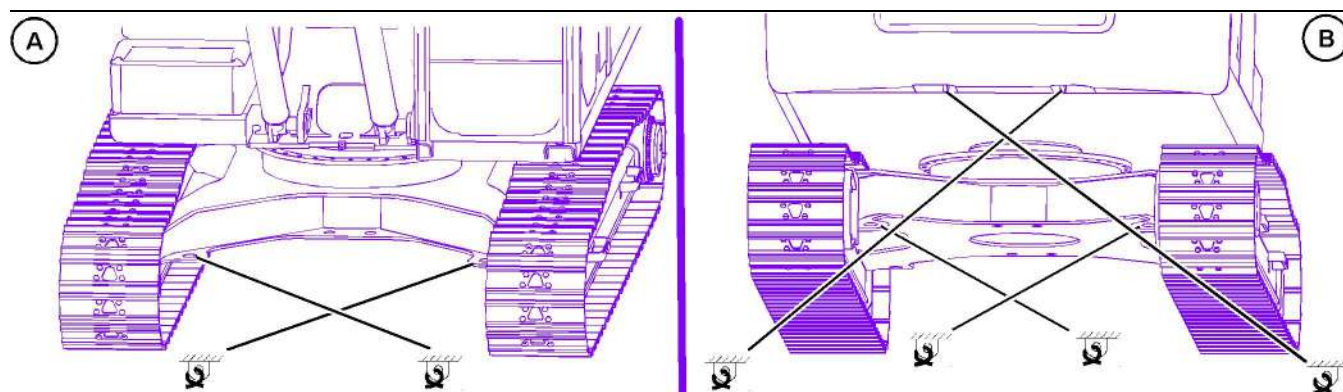


Illustration 382

g06553236

(A) Front of the machine

(B) Rear of the machine

Tying Down the Machine



Tie Down Point – To tie down the machine, attach the tie-downs to the tie-down points.

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

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

1. Use proper rated cables and shackles for tying down the machine.
2. Use the rear eyes and the front eyes that are provided on the lower frame to fasten tie-downs. Use corner protectors for sharp corners.
3. Move the hydraulic lockout control to the LOCKED position.
4. If there is a requirement of diagonal lashing for tying down, use the proper tie-down point on the lower frame. Set the lashing angle which is on the longitudinal axis of the machine and the cable, at 30 to 50 degrees.

Lifting the Machine Segments

Machine Without Components



Illustration 383

g03638002

1. Remove engine hood (1).

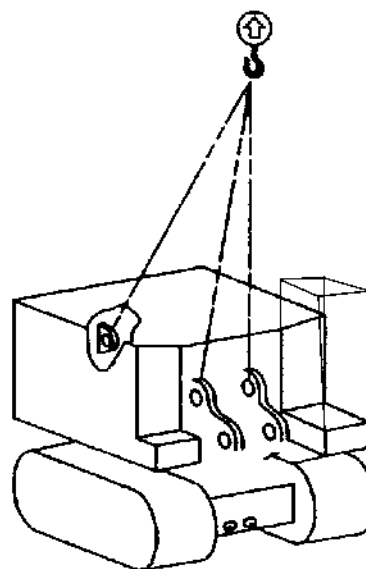


Illustration 384

g03368309

Fasten a proper rated wire cable to each lifting eye with a shackle. This machine has four lifting points on the front of the machine. The machine also has one lifting point on the rear of the machine.

By using an appropriate lifting device, put tension on the lifting cables and slowly lift the machine.

Counterweight

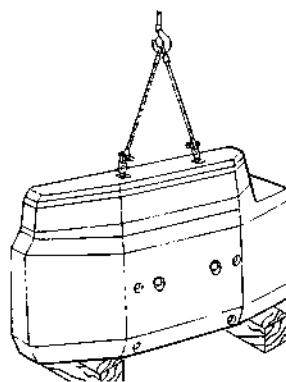


Illustration 385

g03438601

Refer to Operation and Maintenance Manual, "Counterweight Removal and Installation" for specific information.

Stick with Bucket Cylinder

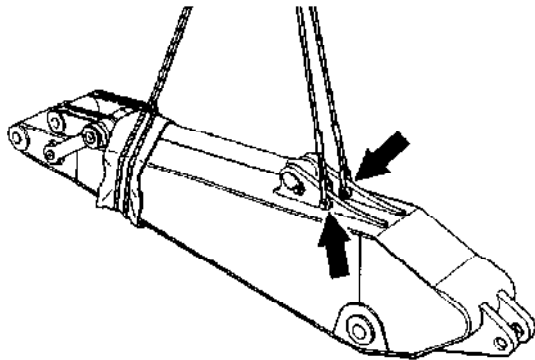


Illustration 386

g00581738

Use the two lifting eyes that are provided in the brackets on the top of the stick. Install shackles through the lifting eyes and fasten properly rated wire cable to the front section of the stick. Use a cloth to protect the lifting cable from being damaged by the edges of the stick.

Slowly lift the stick with the bucket cylinder.

Bucket

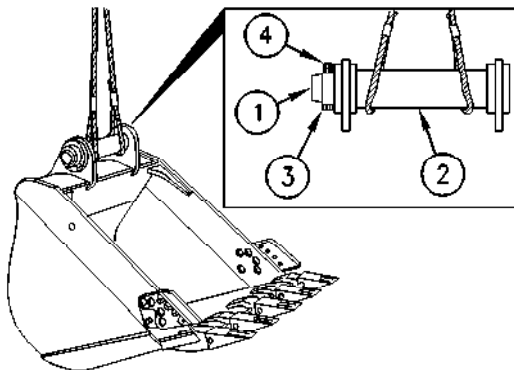


Illustration 387

g00115251

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

Install pin (1) and sleeve (2) in the brackets of the bucket. Illustration 387 indicates the method to secure pin (1) with bolts (3) and nuts (4). Fasten two proper rated wire cables to pin (1).

Boom with Stick Cylinder

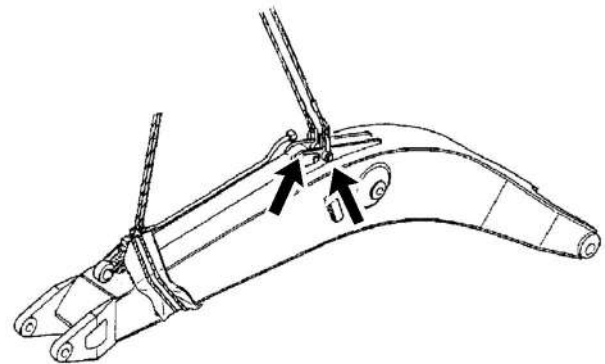


Illustration 388

g06229426

Use the two lifting eyes that are provided in the brackets on the top of the Boom. Install shackles through the lifting eyes and fasten properly rated wire cable to the front section of the Boom. Use a cloth to protect the lifting cable from being damaged by the edges of the Boom.

Slowly lift the stick with the bucket cylinder.

Boom Cylinder

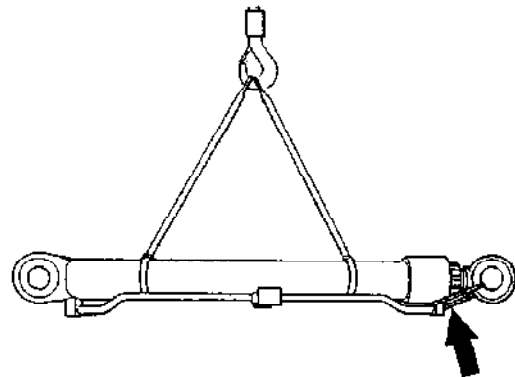


Illustration 389

g00581741

Fasten two properly rated wire cables to the boom cylinder and secure the piston rod to the cylinder tube.

Slowly lift the boom cylinder.

Walkway

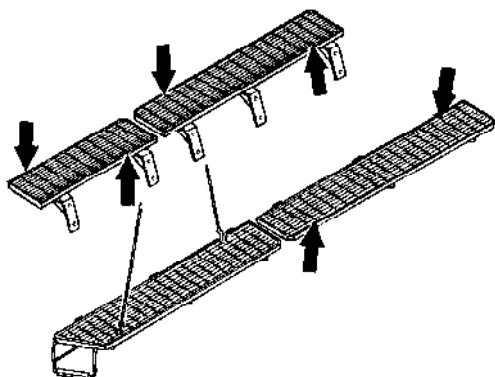


Illustration 390

g00581742

Use two properly rated wire cables. Fasten the lifting cables to the positions that are indicated in Illustration 379 .

Lift the walkways one at a time.

Towing Information

i07816489

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. The shields 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. Personal injury may be caused if a link breaks. Use a wire rope with ends that have loops or rings. Put an observer in a safe position in order to watch the pulling procedure. The observer can stop the procedure if the wire rope starts to break. Stop pulling whenever the towing machine moves without moving the towed machine.

During towing, do not allow anyone to step between the towing and the towed machines.

Do not allow the wire rope to be straddled while the machine is being towed.

Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

Avoid towing the machine on a slope.

Quick machine movement could overload the tow line or the tow bar. This could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.

Normally, the towing machine should be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade that is involved and for the distance that is involved.

Provide sufficient control and sufficient braking when you are moving a disabled machine downhill. A larger towing machine may be required or additional machines that are connected to the rear of the disabled machine. This will prevent the machine from rolling away out of control.

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. Maximum towing machine capacity is required on an incline or on a surface that is in poor condition.

Do not tow a loaded machine.

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

Prior to releasing the brake of the final drive, firmly lock both tracks in order to prevent the machine from moving suddenly. When the machine is ready to be towed, release the brake of the final drive.

Parking Brake Release

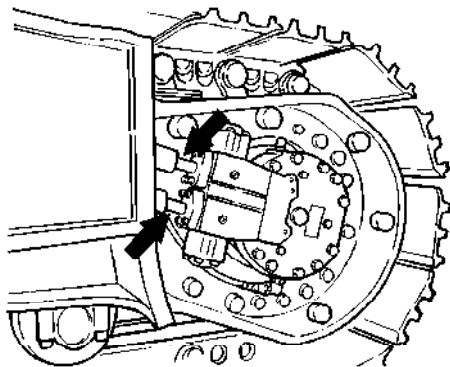


Illustration 391

g00692529

1. Remove the travel drive covers from the base frame.
2. Clean the travel motors, travel brake valves, and nearby areas.
3. Disconnect the hydraulic lines from the brake valve. Plug the disconnected line.

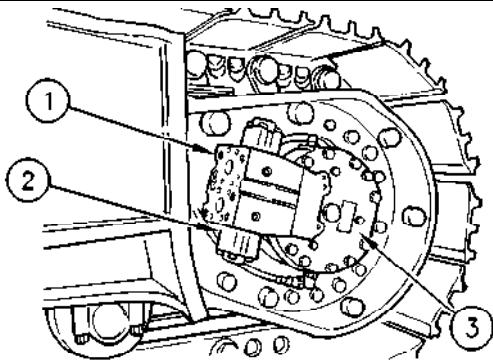


Illustration 392

g00692530

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

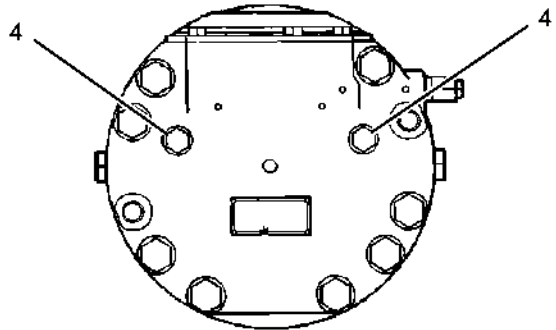


Illustration 393

g02409157

5. Remove plugs (4).

Table 71

Washer Dimensions			
Callout	Inner diameter (I.D.)	Outer Diameter (O.D.)	Thickness
(5)	11 mm (0.43 inch)	25 mm (0.98 inch)	3 mm (0.12 inch)
(6)	11 mm (0.43 inch)	19 mm (0.75 inch)	6 mm (0.24 inch)
Bolt			
(7)	M8 x 1.25 x 90 mm		

6. Install one washer (5) in each hole.
7. Install one washer (6) on top of each washer (5).
8. Insert one M8 x1.25 x 90 mm bolt (7) into each hole and tighten until snug against the washers and travel motor head.
9. Alternately turn each bolt one half turn until each bolt has been rotated two turns.

Note: If longer bolts are used, install the appropriate thicker washers in order to maintain required spacing.

 WARNING

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

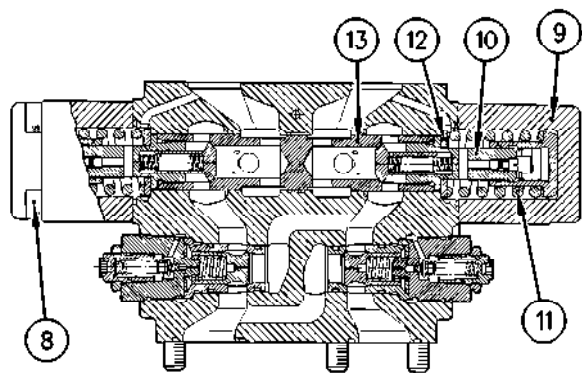


Illustration 394 g00692532

- 10. Remove bolts (8) in order to remove cover (9) of brake valve (2). To remove bolts (8), remove the two bolts that are separated by 180 degrees. Install two replacement M12 bolts in the removed bolt holes. Tighten the bolts.
- 11. Remove the remaining two bolts (8). Slowly remove the replacement M12 bolts.
- 12. Remove bushing (10), spring (11), washer(12) and spool (13) from the brake valve.
- 13. Install cover (9) to the valve body. Tighten bolts (8).

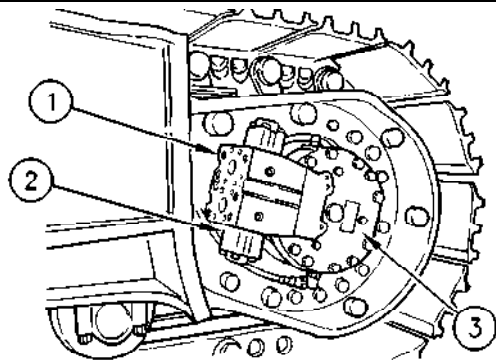


Illustration 395 g00692530

- 14. Install brake valve (2) to motor (3) with bolts (1). Reconnect the two lines to brake valve (2).
- 15. Repeat Steps 1 through 14 for the other travel motor.

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

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

Table 72

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

Retrieval of Machine

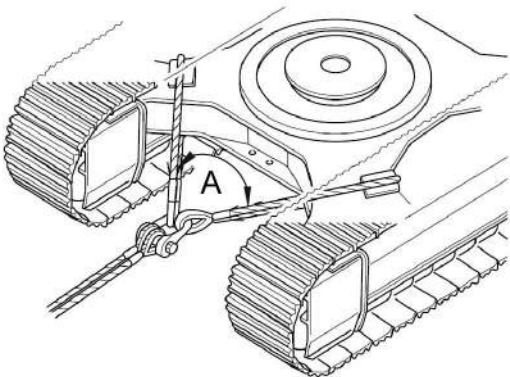


Illustration 396 g02533437

Note: Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. The permissible force for the lower frame is 100 percent of the gross weight of the towed machine.

Note: In order to prevent damage to the wire rope or the lower frame of the machines, use protective sleeves on the corners of the lower frame.

Retrieve the disabled machine carefully. The applied load for each wire rope should be equal. The angle (A) between each wire rope should be 60 degree maximum. Operate the machine at a low speed.

Lightweight Towing

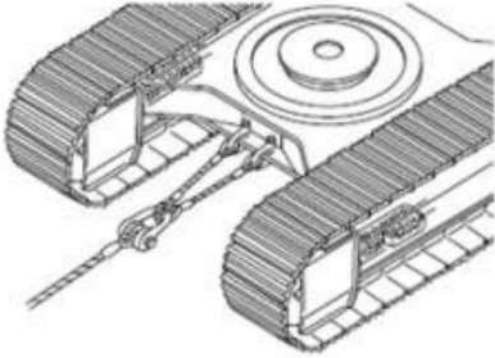


Illustration 397

g03204763

The maximum load for lightweight towing is 246000 N (55303 lb).

Shackles must be used for towing the machine. The wire rope should be horizontal and straight to the track frame.

Install a properly rated wire rope to the lower frame of the towing machine and the lower frame of the towed machine. Operate the machine at a low speed.

Engine Starting (Alternate Methods)

i05974849

Engine Starting with Jump Start Cables (If Equipped)

SMCS Code: 1000; 7000

WARNING

Failure to properly service the batteries may cause 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.
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.

Operation Section

Engine Starting with Auxiliary Start Receptacle

7. The positive ends of the jump-start cable are red. Connect one positive end of the jump-start cable to the positive cable terminal of the discharged battery. Some machines have battery sets.

Note: Batteries that are in series may be in separate compartments. Use the terminal that is connected to the starter solenoid. This battery or battery set is normally on the same side of the machine as the starter.

Do not allow the positive cable clamps to contact any metal except for the battery terminals.

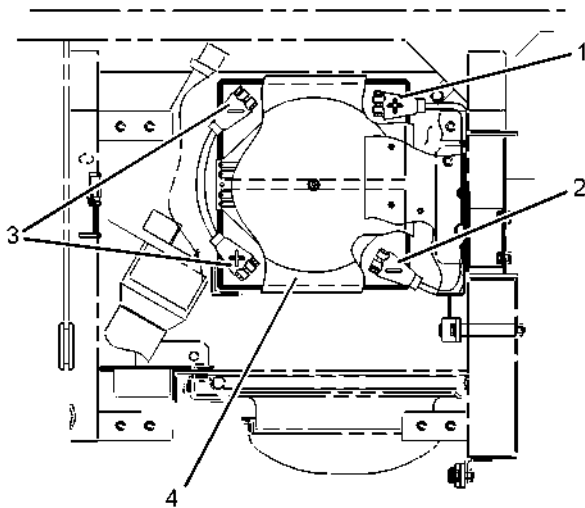


Illustration 398

g01226420

Typical example of the location of the batteries in an excavator

- (1) Red positive post to starter
- (2) The black negative post connects to the battery disconnect switch.
- (3) Do not use these two connections for jump starting. The red positive post is connected in series to the black negative post.
- (4) Cover

8. Connect the other positive end of the jump-start cable to the positive cable terminal of the electrical source.
9. Connect one negative end of the jump-start cable to the negative cable terminal of the electrical source.
10. Finally, connect the other negative end of the jump-start cable to the frame of the stalled machine. Do not connect the jump-start cable to the battery post. Do not allow the jump-start cables to contact the battery cables, the fuel lines, the hydraulic lines, or any moving parts.

11. Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.
12. Wait at least two minutes before you attempt to start the stalled machine. This will allow the batteries in the stalled machine to partially charge.
13. Attempt to start the stalled engine. See Operation and Maintenance Manual, "Engine Starting" for the correct starting procedure.
14. Immediately after you start the stalled engine, disconnect the jump-start cables in reverse order.

i06697121

Engine Starting with Auxiliary Start Receptacle (If Equipped)

SMCS Code: 1000; 7000

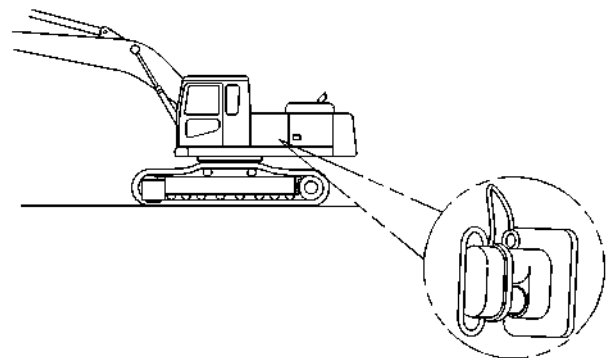


Illustration 399

g01122769

Typical location

Some Caterpillar products may be equipped with an auxiliary start receptacle as a standard part. If your machine is not equipped with an auxiliary start receptacle, the machine can be equipped with an auxiliary start receptacle from parts service. This will ensure that a permanent receptacle is always available to jump-start the machine.

There are two cable assemblies that can be used to jump-start the stalled machine. You can jump-start the stalled machine from another machine that is equipped with an auxiliary start receptacle or with an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

1. Determine the reason that the engine will not start.

Reference: Refer to Special Instruction, SEHS7633, "Battery Test Procedure" for more information.

2. Ensure that the travel control levers on the stalled machine are in the CENTER position. Engage the hydraulic lockout control. Lower all work tools to the ground. Move all controls to HOLD.
3. Turn the engine start switch key on the stalled machine to the OFF position. Turn off all accessories.
4. Turn the battery disconnect switch on the stalled machine to ON.
5. Move the machine that is being used as a power source close to the stalled machine. The jump-start cables should reach the batteries on both machines. **DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.**
6. Stop the engine on the machine that is being used as a power source. If you use an auxiliary power source, turn off the charging system.
7. Connect the appropriate jump-start cable to the auxiliary start receptacle on the stalled machine.
8. Connect the other end of the jump-start cable to the auxiliary start receptacle of the machine that is being used as a power source.
9. Start the engine on the machine that is being used as a power source or energize the charging system on the auxiliary power source.
10. Wait for a minimum of 2 minutes while the batteries in the stalled machine partially charge.
11. Attempt to start the stalled engine.
12. Immediately after the stalled engine starts, disconnect the jump-start cable from the power source.
13. Disconnect the other end of the jump-start cable from the stalled machine.
14. Conclude the failure analysis on the starting charging system of the stalled machine, as required. Check the machine while the engine is running and the charging system is in operation.

Maintenance Section

Maintenance Access

i05331621

Access Door and Cover Locations

SMCS Code: 726A-CH

Engine Hood

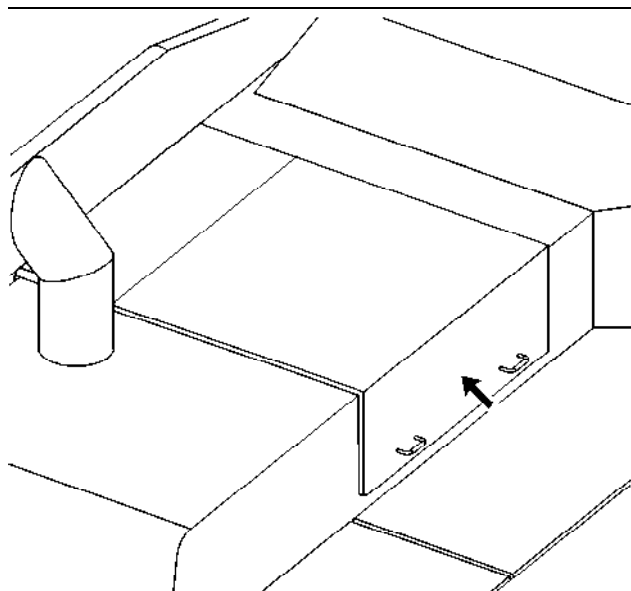


Illustration 400

g01103254

Left Front Access Door

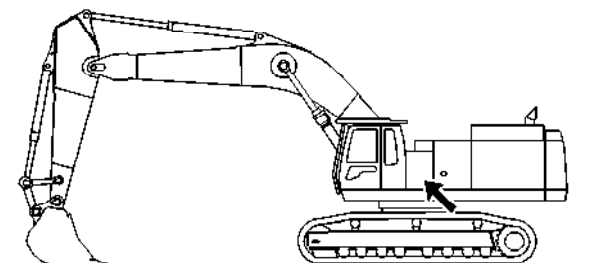


Illustration 401

g01103128

Left Middle Access Door

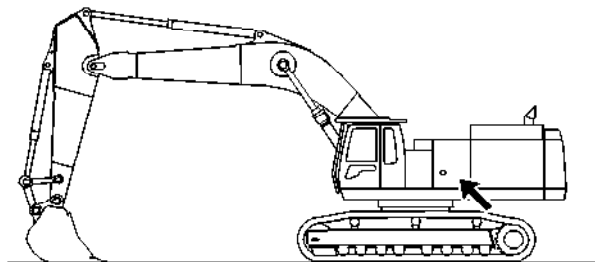


Illustration 402

g01103134

Left Rear Access Door

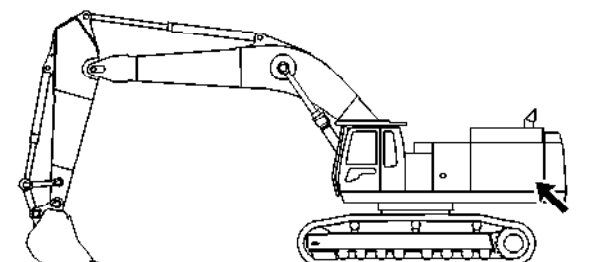


Illustration 403

g01103253

Right Front Access Door

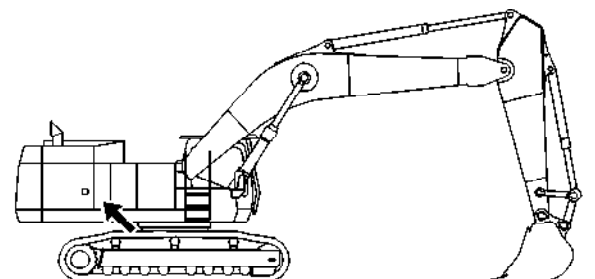


Illustration 404

g01103135

Right Rear Access Door

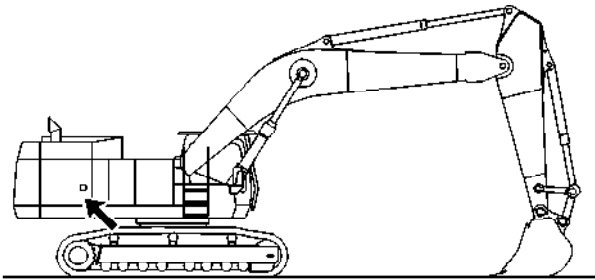


Illustration 405

g01103194

Lubricant Viscosities and Refill Capacities

i07419350

Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 7581

General Information for Lubricants

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

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

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

Selecting the Viscosity

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

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

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

NOTICE

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

Engine Oil

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

Cat DEO-ULS or oils that meet the Cat ECF-3 specification, API CJ-4, and the newer API CK-4, are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification, API CJ-4, the newer API CK-4, and ACEA E9 oil categories have been developed with limited sulfated ash, phosphorus, and sulfur. These chemical limits are designed to maintain the expected aftertreatment devices life, performance, and service interval. If oils meeting the Cat ECF-3 specification, API CJ-4, the newer API CK-4 specifications are not available, oils meeting ACEA E9 may be used. ACEA E9 oils meet the chemical limits designed to maintain aftertreatment device life. ACEA E9 oils are validated using some but not all ECF-3 and API CJ-4 standard engine performance tests. Consult your oil supplier when considering use of an oil that is not Cat ECF-3, API CJ-4, or the newer API CK-4 qualified.

Failure to meet the listed requirements will damage aftertreatment-equipped engines and can negatively impact the performance of the aftertreatment devices. The Diesel Particulate Filter (DPF) if equipped, will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems may include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)
- Selective Catalytic Reduction (SCR)
- Lean NOx Traps (LNT)

Other systems may apply.

Oils that are per API CI-4 or prior categories are not allowed. These oils have high ash and are not appropriate for use in engines with aftertreatment devices.

Table 73

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Engine Crankcase for all Machines	Cat DEO-ULS Cold Weather	SAE 0W-40	-40	40	-40	104
	Cat DEO-ULS SYN	SAE 5W-40	-30	50	-22	122
	Cat DEO-ULS	SAE 10W-30	-18	40	0	104
		SAE 15W-40	-10	50	14	122
Pump Coupling (If Equipped)	Cat DEO-ULS	SAE 10W-30	-18	40	0	104

Hydraulic Systems

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

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

- Cat HYDO Advanced 10 SAE 10W
- Cat HYDO Advanced 20 SAE 20W
- Cat HYDO Advanced 30 SAE 30
- Cat BIO HYDO Advanced, Multigrade

Cat HYDO Advanced oils allow 6000 hours or higher oil drain intervals for most applications. S·O·S Services oil analysis is recommended when the oil drain interval is increased to 6000 hours or higher. In comparison, non-Cat commercial hydraulic oils (second choice oils) allow 2000 hours oil drain interval. 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 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 74

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Hydraulic System	Cat HYDO Advanced 10 Cat TDTO	SAE 10W	-20	40	-4	104
	Cat HYDO Advanced 20 Cat TDTO	SAE 20W	-5	45	23	113
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	10	50	50	122
	Cat BIO HYDO Advanced	"ISO 46" Multi-Grade	-30	50	-22	122
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	-20	40	-4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	-15	50	5	122
	Cat TDTO-TMS	Multi-Grade	-15	50	5	122
	Cat DEO-ULS SYN	SAE 5W-40	-25	40	-13	104
	Cat DEO-ULS Cold Weather	SAE0W-40	-40	40	-40	104
	Cat TDTO Cold Weather	SAE 0W-20	-40	40	-40	104

For applications requiring the use of fire-resistant hydraulic fluids, Caterpillar recommends the use of EcoSafe FR-46. This product is a fully synthetic, non-aqueous hydraulic fluid. Water based and glycol-based hydraulic products are not recommended for use in Cat machine hydraulic systems. EcoSafe FR-46 is an ISO 46 multi-grade product. For more information refer to the product information provided by the manufacturer of EcoSafe hydraulic oil. Refer to your Cat dealer for availability.

Other Fluid Applications

Table 75

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
Final Drives and Swing Drives	Cat TDTO Cold Weather	SAE 0W-20	-40	0	-40	32
	Cat TDTO	SAE 10W	-30	0	-22	32
		SAE 30 ⁽¹⁾	-30	35	-22	95
		SAE 50	-15	50	5	122
	Cat TDTO-TMS	Multi-Grade	-25	25	-13	77
Track Roller Frame Recoil Spring and Pivot Shaft Bearings	Cat TDTO Cold Weather	SAE 0W-20	-40	0	-40	32
	Cat TDTO	SAE 10W	-30	0	-22	32
		SAE 30 ⁽¹⁾	-20	25	-4	77

(continued)

(Table 75, contd)

Excavators, Front Shovels, Mass Excavators, Demolition Excavators, and Track Material Handlers Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosity Grade	°C		°F	
			Min	Max	Min	Max
		SAE 50	0	50	32	122
	Cat TDTO-TMS	Multi-Grade	-25	25	-13	77
Track Idlers and Track Rollers	Cat DEO-ULS Cat DEO	SAE 15W-40 ⁽¹⁾	-10	50	14	122
	Cat DEO Cold Weather	SAE 0W-40	-40	40	-40	104
	Cat DEO-ULS SYN	SAE 5W-40	-35	40	-31	104
	Cat FDAO SYN	Multi-Grade	-30	50	-22	122

⁽¹⁾ Factory fill oil for standard configuration machines.

Special Lubricants

Grease

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

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

Table 76

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
External Lubrication Points	Cat Prime Application Grease	NLGI Grade 2	-20	140	-4	284
	Cat Extreme Application Grease	NLGI Grade 1	-20	140	-4	284
		NLGI Grade 2	-15	140	+5	284
	Cat Extreme Application Grease-Artic	NLGI Grade 0.5	-50	130	-58	266
	Cat Extreme Application Grease-Desert	NLGI Grade 2	-10	140	+14	284
	Cat Utility Grease	NLGI Grade 2	-20	140	-4	284
	Cat Ball Bearing Grease	NLGI Grade 2	-20	160	-4	320

Diesel Fuel Recommendations

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

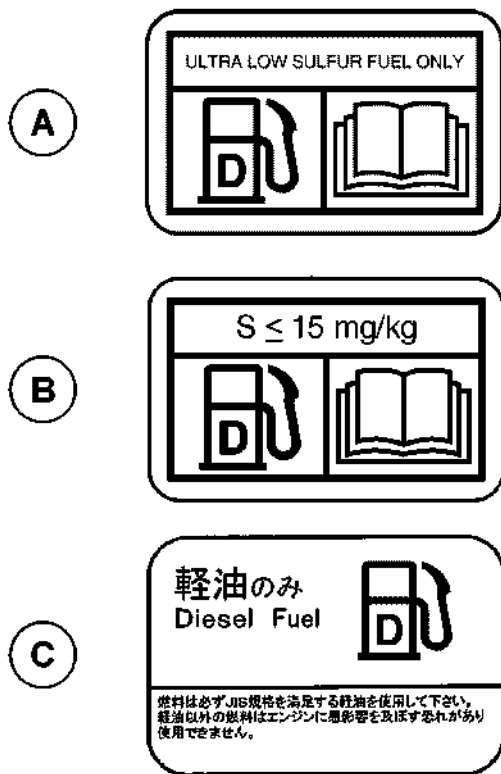


Illustration 406

g03218956

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

NOTICE

Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤ 15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤ 10 ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European Stage V type-approved nonroad engines. Additionally, the Cetane number should not be less than 45, and the bio-diesel content should not be greater than 20% volume/volume.

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

- Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)
- Adversely impact the performance and life of aftertreatment devices (cause loss of performance)
- Reduce regeneration intervals of aftertreatment devices
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

Failures that result 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 non-road and machine applications that are not Tier 4/Stage V certified engines and are not equipped with aftertreatment devices. For Tier 4/Stage V certified engines, always follow operating instructions to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more details about fuels, lubricants, and Tier 4/Stage V requirements. This manual may be found on the web at Safety.Cat.com.

Diesel Exhaust Fluid

General Information

Diesel Exhaust Fluid (DEF) is a liquid that is injected into the exhaust system of engines equipped with Selective Catalytic Reduction (SCR) systems. SCR reduces emissions of nitrogen oxides (NOx) in diesel engine exhaust.

Diesel Exhaust Fluid (DEF) is also known under other names including Aqueous Urea Solution (AUS) 32, AdBlue, or generically referred to as urea.

In engines equipped with SCR emissions reduction system, DEF is injected in controlled amounts into the engine exhaust stream. At the elevated exhaust temperature, urea in DEF is converted to ammonia. The ammonia chemically reacts with NOx in diesel exhaust in the presence of the SCR catalyst. The reaction converts NOx into harmless nitrogen (N₂) and water (H₂O).

DEF Recommendations

For use in Cat engines, DEF must meet all the requirements defined by "ISO 22241-1" Requirements.

Caterpillar recommends the use of DEF available through the Cat parts ordering system for use in Cat engines equipped with SCR systems.

In North America, commercial DEF that is API approved and meets all the requirements defined in "ISO 22241-1" may be used in Cat engines that are equipped with SCR systems.

Outside of North America, commercial DEF that meets all requirements defined in "ISO 22241-1" may be used in Cat engines that are equipped with SCR systems.

The supplier should provide documentation to prove that the DEF is compliant with the requirements of "ISO 22241-1".

NOTICE

Cat does not warrant the quality or performance of non-Cat fluids.

NOTICE

Do not use agriculture grade urea solutions. Do not use any fluids that do not meet "ISO 22241-1" Requirements in SCR emissions reduction systems. Use of these fluids can result in numerous problems including damage to SCR equipment and a reduction in NOx conversion efficiency.

DEF is a solution of solid urea that is dissolved in demineralized water to produce a final concentration of 32.5% urea. DEF concentration of 32.5% is optimal for use in SCR systems. DEF solution of 32.5% urea has the lowest attainable freeze point of -11.5°C (11.3°F). DEF concentrations that are higher or lower than 32.5% have higher freeze points. DEF dosing systems and "ISO 22241-1" specifications are designed for a solution that is approximately 32.5%.

Caterpillar offers a refractometer, Cat part number 360-0774, that can be used to measure DEF concentration. Follow the instructions provided with the instrument. Appropriate commercial portable refractometers can be used to determine urea concentration. Follow the instructions from the manufacturer.

DEF Guidelines

DEF solution is typically colorless and clear. Changes to color or clarity are indicators of quality issues. Quality of DEF can degrade when stored and handled inappropriately or if DEF is not protected from contamination. Details are provided below.

If quality issues are suspected, testing of DEF should focus on urea percentage, alkalinity as NH_3 and biuret content. DEF that does not pass all these tests or that is no longer clear should not be used.

Materials compatibility

DEF is corrosive. Due to the corrosion caused, DEF must be stored in tanks constructed of approved materials. Recommended storage materials:

Stainless Steels:

- 304 (S30400)
- 304L (S30403)
- 316 (S31600)
- 316L (S31603)

Alloys and metals:

- Chromium Nickel (CrNi)
- Chromium Nickel Molybdenum (CrNiMo)
- Titanium

Non-metallic materials:

- Polyethylene
- Polypropylene
- Polyisobutylene
- Teflon (PFA)
- Polyfluoroethylene (PFE)
- Polyvinylidene fluoride (PVDF)
- Polytetrafluoroethylene (PTFE)

Materials NOT compatible with DEF solutions include Aluminum, Magnesium, Zinc, Nickel coatings, Silver and Carbon steel, and Solders containing any of the above. Unexpected reactions may occur if DEF solutions come in contact with any non-compatible material or unknown materials.

Bulk storage

Follow all local regulations covering bulk storage tanks. Follow proper tank construction guidelines. Tank volume typically should be 110% of planned capacity. Appropriately vent indoor tanks. Plan for control of overflow of the tank. Heat tanks that dispense DEF in cold climates.

Bulk tank breathers should be fitted with filtration to keep airborne debris from entering the tank. Desiccant breathers should not be used because water will be absorbed, which potentially can alter DEF concentration.

Handling

Follow all local regulations covering transport and handling. DEF transport temperature is recommended to be -5°C (23°F) to 25°C (77°F). All transfer equipment and intermediate containers should be used exclusively for DEF. Containers should not be reused for any other fluids. Ensure that transfer equipment is made from DEF-compatible materials. Recommended material for hoses and other non-metallic transfer equipment includes:

- Nitrile Rubber (NBR)
- Fluoroelastomer (FKM)
- Ethylene Propylene Diene Monomer (EPDM)

The condition of hoses and other nonmetallics that are used with DEF should be monitored for signs of degradation. DEF leaks are easily recognizable by white urea crystals that accumulate at the site of the leak. Solid urea can be corrosive to galvanized or unalloyed steel, aluminum, copper, and brass. Leaks should be repaired immediately to avoid damage to surrounding hardware.

Cleanliness

Contaminants can degrade the quality and life of DEF. Filtering DEF is recommended when dispensed into the DEF tank. Filters should be compatible with DEF and should be used exclusively with DEF. Check with the filter supplier to confirm compatibility with DEF before using. Mesh-type filters using compatible metals, such as stainless steel, are recommended. Paper (cellulose) media and some synthetic filter media are not recommended because of degradation during use.

Care should be taken when dispensing DEF. Spills should be cleaned immediately. Machine or engine surfaces should be wiped clean and rinsed with water. Caution should be used when dispensing DEF near an engine that has recently been running. Spilling DEF onto hot components will cause harmful vapors.

Stability

NOTICE

Storing Diesel Exhaust Fluid in high heat areas is not recommended. Do not store DEF in high heat generating areas on the machine, such as the pump compartment or the engine compartment. The quality of the DEF can degrade when exposed to high temperatures.

DEF fluid is stable when stored and handled properly. The quality of DEF rapidly degrades when stored at high temperatures. The ideal storage temperature for DEF is between -9° C (15.8° F) and 25° C (77° F). DEF that is stored above 35° C (95° F) for longer than 1 month must be tested before use. Testing should evaluate Urea Percentage, Alkalinity as NH₃ and Biuret content.

The length of storage of DEF is listed in the following table:

Table 77

Storage Temperature	Expected DEF Life
Below 25° C (77° F)	18 months
25° C (77° F) to 30° C (86° F)	12 months
30° C (86° F) to 35° C (95° F)	6 months
Above 35° C (95° F)	test quality before use

Refer to "ISO 22241" document series for more information about DEF quality control.

Note: Dispose of all fluids according to applicable regulations and mandates.

Fuel Additives

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

Biodiesel

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

U.S. distillate diesel fuel specification "ASTM D7467" includes up to B20 (20 percent) biodiesel. Any diesel fuel in the U.S. may contain up to B20 biodiesel fuel.

European distillate diesel fuel specification "EN16709:2015" includes up to B20 (20 percent) biodiesel. Any diesel fuel in Europe may contain up to B20.

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (15 ppm sulfur or less, per "ASTM D975"). In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel (10 ppm sulfur or less, per "EN 590"). The final blend must have 15 ppm sulfur or less.

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

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

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

Coolant Information

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

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

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/Coolant)

NOTICE

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

Table 78

Recommendations for Finished Coolants for use in Cat engines				
Coolant Type	Recommendations	Product	Service hours ⁽¹⁾⁽²⁾	Required Maintenance ⁽³⁾
Cat ELC, Cat ELI, or commercial coolant that meets Cat EC-1	Preferred	Cat ELC	12000 hours or 6 years	Add Cat ELC Extender at 6000 service hours or one half of service life
		Cat ELI (water based) ⁽⁴⁾	12000 hours or 6 years	Add Cat ELC Extender at 6000 service hours or one half of service life
	Min requirements	Cat EC-1 specification and "ASTM D6210" and Organic Additive Technology (OAT) based on a combination of a monocarboxylic acid and a dicarboxylic acid. Free of phosphate, borate, and silicate. Tolyltriazole: minimum typical concentration of 900 ppm Nitrite: minimum typical concentration of 500 ppm in new coolants	6000 hours or 6 years	Add Extender at 3000 service hours or one half of service life
Cat DEAC, Cat SCA, conventional coolants, and commercial extended life coolants that do not meet EC-1	Acceptable	Cat DEAC	3000 hours or 3 years	SCA at maintenance intervals
		Cat SCA (water based) ⁽⁴⁾	3000 hours or 2 years	SCA at maintenance intervals

(continued)

Maintenance Section
Capacities (Refill)

(Table 78, contd)

Recommendations for Finished Coolants for use in Cat engines				
	Min requirements for fully formulated Heavy-Duty Commercial coolants	"ASTM D6210" and Nitrite (as NO ₂) concentration: Minimum of 1200 ppm (70 grains/US gal) and maximum of 2400 ppm (140 grains/US gal) Silicon concentration: minimum of 100 ppm and maximum of 275 ppm	3000 hours or 2 years	SCA at maintenance intervals
	Min requirements for SCA and water ⁽⁴⁾ ⁽⁵⁾	Commercial supplemental coolant additive and water having Nitrite (as NO ₂) concentration: Minimum of 1200 ppm (70 grains/US gal) and maximum of 2400 ppm (140 grains/US gal) Silicon concentration: minimum of 100 ppm and maximum of 275 ppm	3000 hours or 1 year	Per manufacturer recommendations

- (1) New Coolants at 50 volume percent diluted. Coolants that are prediluted at the coolant manufacturer must be diluted with water that meets Reagent 4 "ASTM D1193" requirements.
- (2) Maintain the in-service coolant at the given limits.
- (3) For appropriate maintenance procedures, refer to the details given in this Chapter. For applications that allow the use of Cat ELI in water, a minimum of 7.5 percent of Cat ELI is recommended. For applications that allow the use of SCA and water, a minimum of 6 percent to a maximum of 8 percent concentration of Cat SCA are recommended.
- (4) Water-based coolants are not allowed for use in machines that has NO_x reduction aftertreatment devices, in engines that has AATAC and in Marine engines that have SWAC
- (5) There are currently no industry standards to define the quality of water-based conventional coolants. To control the quality of SCA and water coolants, the commercial SCA additive package should pass ASTM D6210 when this package is used in a glycol-based coolant. Do not use a commercial SCA additive package that only meets the ASTM D3306 or equivalent specification when used in a glycol-based coolant.

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Capacities (Refill)

SMCS Code: 1000; 7000

Table 79

Approximate Refill Capacities			
Component or System	Liters	US gal	Recommended Type
Fuel Tank	920	243	Refer to Operation and Maintenance Manual, "Lubricant Viscosities".
Cooling System	72	19	
Coolant Reservoir	4.5	1.2	
Engine Crankcase with Filter	60	15.5	
Hydraulic System ⁽¹⁾	427	113	
Diesel Exhaust Fluid Tank	48	12.5	
Each Swing Drive	12	3	
Each Final Drive	22	5.5	
Swing Gear	38	10	

(continued)

(Table 79, contd)

Approximate Refill Capacities			
Component or System	Liters	US gal	Recommended Type
	kg	lbs	
Refrigerant ⁽²⁾	1.1	2.4	R-134a

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

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

i07445339

S·O·S Information

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

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

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

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

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

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

Maintenance Support

i05785641

Service Interval Chart

SMCS Code: 7000

The service interval chart is located inside the cab and on the window.

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

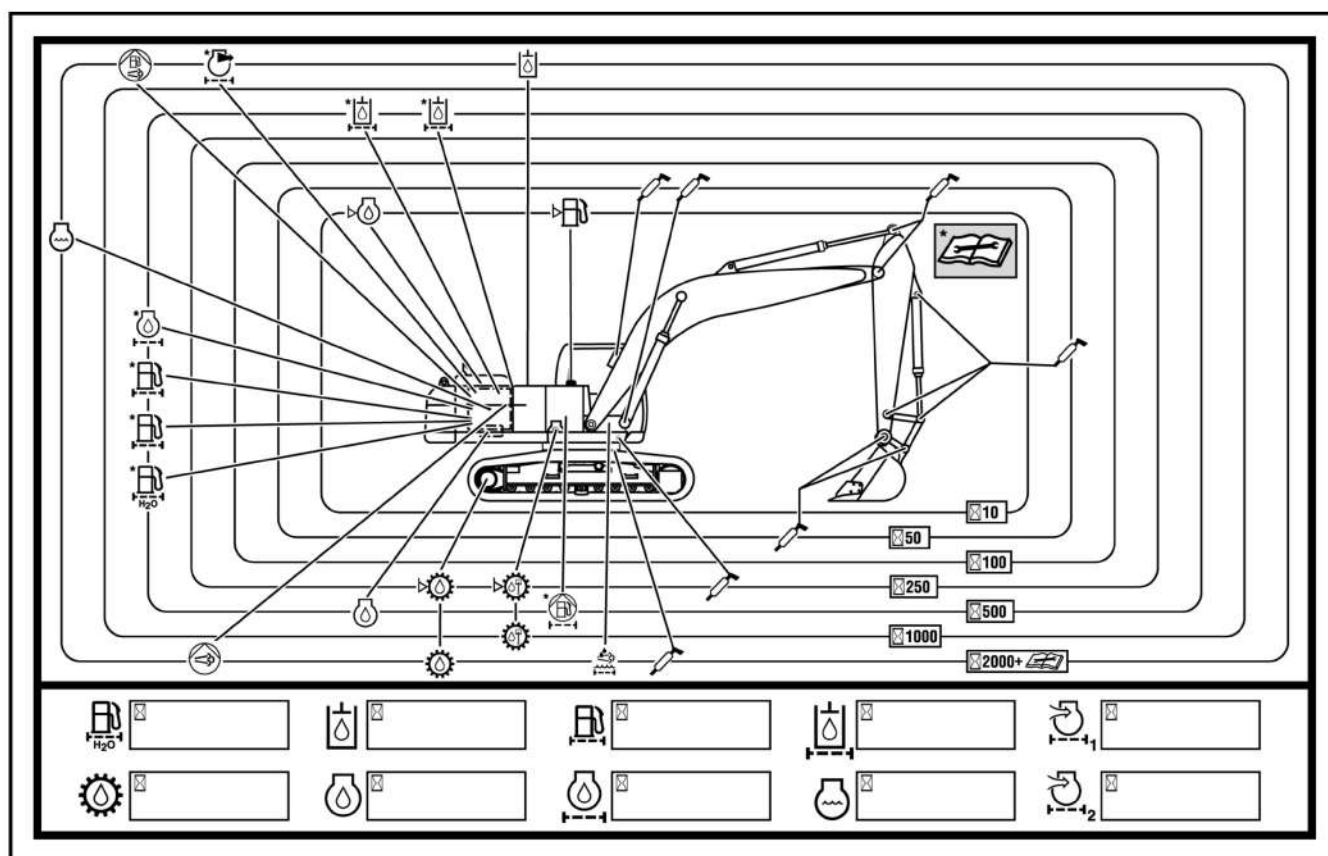


Illustration 407

g03668448



Engine oil – Change the engine oil.



Engine oil filter – Change the engine oil filter.



Final drive oil level – Check the final drive oil level.



Final drive oil – Change the final drive oil.



Fuel level – Check the fuel level.



Fuel system filter – Replace the fuel system filters.



Fuel system water separator – Drain the water separator.



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



Grease zerk – Lubricate the designated locations.



Hydraulic oil level – Check the hydraulic oil level.



Hydraulic oil – Change the hydraulic oil.



Hydraulic oil filter – Change the hydraulic oil filter.



Swing drive oil level – Check the swing drive oil level.



Swing drive oil – Change the swing drive oil.

i07327912

System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

WARNING

Personal injury or death can result from sudden machine movement.

Sudden movement of the machine can cause injury to persons on or near the machine.

To prevent injury or death, make sure that the area around the machine is clear of personnel and obstructions before operating the machine.

Coolant System

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

To relieve the pressure from the coolant system, turn off the machine. Allow the cooling system pressure cap to cool. Remove the cooling system pressure cap slowly in order to relieve pressure.

Hydraulic System

The release of hydraulic pressure in a hydraulic circuit is required before service is performed to that hydraulic circuit. Release the pressure in the following hydraulic circuits before any hydraulic lines are disconnected or removed from that hydraulic circuit.

- Boom hydraulic circuit
- Stick hydraulic circuit
- Bucket hydraulic circuit
- Swing hydraulic circuit
- Travel hydraulic circuit
- Attachment hydraulic circuits (if equipped)
- Pilot hydraulic circuit
- Return hydraulic circuit

Note: Refer to the Disassembly and Assembly Manual for additional information concerning service of the components of specific hydraulic circuits.

Release of Hydraulic Pressure from the Main Hydraulic System

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the work tools have been lowered to the ground, and the oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

Perform the following steps to release the hydraulic system pressure from the main hydraulic system. For information on any fluids and capacities, refer to this Operation and Maintenance Manual, "Lubricant Viscosities" and "Capacities (Refill)" for more information.

Note: For additional safety, wrap hydraulic joint with material that could absorb/reduce any residual pressure of oil when released. Loosen the joint slowly, pause, and carefully check hydraulic joint for tensions indicating presence of pressure or spring force in lines or components.

1. Position the machine on level ground.

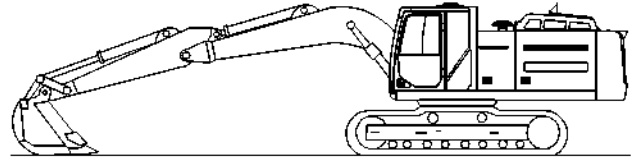


Illustration 408

g02137969

2. Fully retract the stick cylinder rod. Adjust the position of the bucket so that the bucket is parallel to the ground. Lower the boom until the bucket is flat on the ground. Refer to Illustration 408.

3. Release the system pressure from the implement and swing hydraulic circuits.

a. Shut off the engine.

Note: Perform Step 3b through Step 3d immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

b. Turn the engine start switch to the ON position without starting the engine.

c. Place the hydraulic activation control lever in the UNLOCKED position.

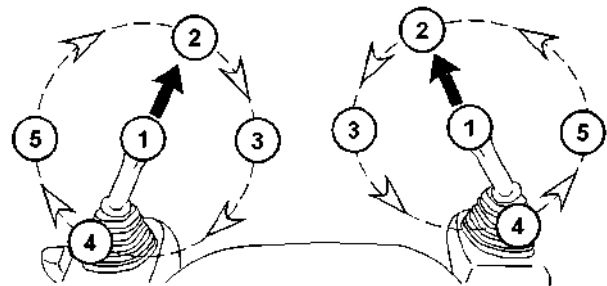


Illustration 409

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d. Move both joysticks in a circular motion to the FULL STROKE positions multiple times until the pilot accumulator has been exhausted.

Note: Pilot pressure is required to relieve hydraulic system pressure.

- e. Place the hydraulic activation control lever in the LOCKED position.
- f. Start the engine to recharge pilot accumulator.

Note: Do not activate any levers when recharging pilot accumulator.

- g. Shut off the engine.
- h. Repeat Step 3b through Step 3g until the high-pressure lines have been released.

Each time the accumulator is recharged, start the joysticks at different positions or rotate in the reverse direction. Doing so will ensure that the same circuit is not being relieved each time.

Note: Pressure could build on these circuits after pressure is released due to linkage settling or bucket rolling.

Note: To release pressure in a single circuit, move the joysticks or pedals of the hydraulic circuit that requires service to the full stroke positions after moving joysticks in a circular motion. Moving the joysticks or pedals to the full stroke position will release the high pressure only in that single hydraulic circuit. Moving the joysticks or pedals to the full stroke position will also release any pressure that might be present in the pilot hydraulic circuit.

4. Release hydraulic system pressure in the attachment circuits, if equipped.

- a. Start the engine to charge pilot accumulator.
- b. Shut off the engine.

Note: Perform Step 4c through Step 4e immediately after the engine is shut off to insure adequate pilot system pressure is available to release the pressure in the hydraulic circuits.

- c. Turn the engine start switch to the ON position without starting the engine.
- d. Place the hydraulic activation control lever in the UNLOCKED position.
- e. Activate the switch or pedal for the attachment circuit.
- f. Place the hydraulic activation control lever in the LOCKED position.
- g. Repeat Step 4a through Step 4f for each attachment circuit.

5. After releasing the hydraulic pressure in each of the desired hydraulic circuits, place the hydraulic activation control lever in the LOCKED position.

6. Turn the engine start switch to the OFF position.

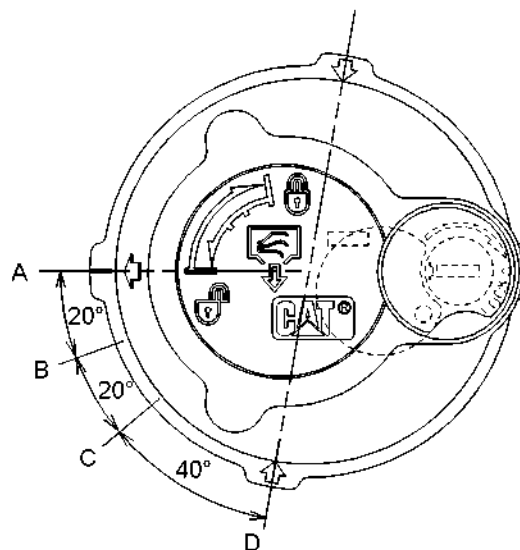


Illustration 410

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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 410 for filler cap positions.

- a. Turn the filler cap counterclockwise and move the arrow from position (A) to position (B).
- b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
- c. Push the filler cap down and move the arrow from position (C) to position (D).

Note: The travel hydraulic circuit is open to the hydraulic tank. Pressure from the travel circuit is released by releasing pressure from the return circuit.

Note: If a hydraulic line for the boom, the stick or the bucket must be disconnected, utilize the purge screws. Refer to Purge Screws (Boom, Stick and/or Bucket Hydraulic Circuits).

Purge Screws (Boom, Stick and/or Bucket Hydraulic Circuits)

If a hydraulic line for the boom, the stick or the bucket must be disconnected, utilize the purge screws.

⚠ WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the pilot pressure is released. Serious injury can result if this remaining pressure is not released before any service is done on the hydraulic system.

Make sure that the remaining pressure has been released by utilizing the purge screws that are located on the boom, stick and bucket lines. Before any purge screw is turned, the bucket and or all of the attachments must be lowered to the ground or properly supported.

1. Locate a section of hose that will tightly fit over one of the purge screws.

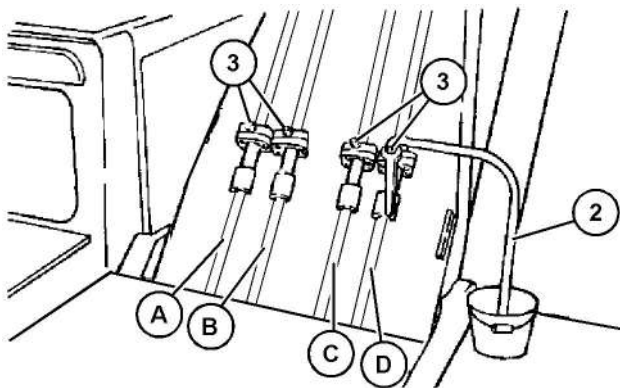


Illustration 411

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374 Stick and Bucket circuits

- (2) Hose
- (3) Purge screws (one on each line)
- (A) Line for Stick In
- (B) Line for Bucket Open
- (C) Line for Bucket Close
- (D) Line for Stick Out

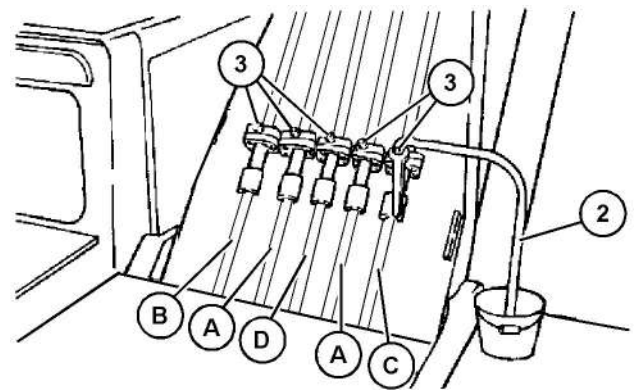


Illustration 412

g06235851

390 Stick and Bucket circuits

- (2) Hose
- (3) Purge screws (one on each line)
- (A) Lines for Stick In
- (B) Line for Bucket Open
- (C) Line for Bucket Close
- (D) Line for Stick Out

2. Connect one end of drain hose (2) to purge screw (3). Insert the other end of drain hose (2) into an empty container.

3. Loosen purge screw (3) by 1/2 turn. Hydraulic oil will be drained from the drain hose to the container.

Note: Dispose of drained fluid according to local regulations.

4. Tighten purge screw (3) to a torque of $13 \pm 2 \text{ N}\cdot\text{m}$ ($9.6 \pm 1.5 \text{ lb}\cdot\text{ft}$) after all of the hydraulic oil has been drained from the line.

5. Repeat Step 2 through Step 4 for all the stick and bucket circuits.

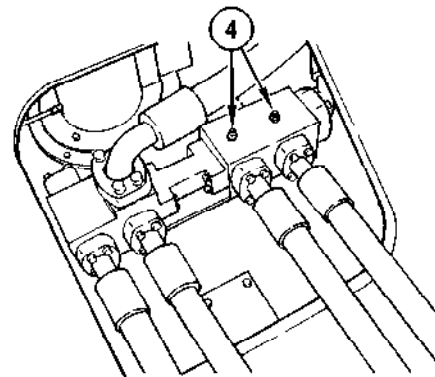


Illustration 413

g00582502

- (4) Purge screws for the boom

6. Locate the purge screws for the boom circuit on the boom cylinder lines.
7. Repeat Step 2 through Step 4 for all the boom circuits.
8. Remove the drain hose and install the hydraulic tank fill cap.
9. The pressure in the multiple hydraulic circuits that require service is now released and lines and components can be disconnected or removed from those hydraulic circuits.

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Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

Proper welding procedures are necessary in order to avoid damage to the electronic controls and to the bearings. The following steps should be followed in order to weld on a machine or an engine with electronic controls.

1. Turn off the engine.
2. Turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.
3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure in order to reduce the possibility of damage to the following components:
 - Bearings of the drive train
 - Hydraulic components
 - Electrical components
 - Other components of the machine

NOTICE

Do NOT use electrical components (ECM or sensors) or electronic component grounding points for grounding the welder.

4. Protect any wiring harnesses from the debris which is created from welding. Protect any wiring harnesses from the splatter which is created from welding.

5. Use standard welding procedures in order 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")

i08134286

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, **WHICH EVER OCCURS FIRST**, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

Note: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Cat dealer for details.

When Required

" Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace"	276
" Battery - Recycle"	277
" Battery or Battery Cable - Inspect/Replace"	278
" Bucket Linkage - Inspect/Adjust"	281
" Bucket Tips - Inspect/Replace"	282
" Bucket Tips - Inspect/Replace"	285
" Cab Air Filter (Fresh Air) - Clean/Replace"	289
" Cab Door Latch - Inspect/Adjust/Replace"	289
" Camera - Clean"	291
" Circuit Breakers - Reset"	292

" Counterweight Removal Chain - Clean"	297
" DEF Filler Screen - Clean"	299
" Diesel Exhaust Fluid - Fill"	303
" Engine Air Filter Primary Element - Clean/Replace"	304
" Engine Air Filter Secondary Element - Replace"	307
" Engine Air Precleaner - Clean"	307
" Engine Oil Level - Check"	308
" Ether Starting Aid Cylinder - Replace"	313
" Film (Product Identification) - Clean"	314
" Fuel System - Prime"	316
" Fuel System Water Separator - Drain"	319
" Fuses - Replace"	321
" High Intensity Discharge Lamp (HID) - Replace"	323
" Oil Filter - Inspect"	339
" Radiator Core - Clean"	339
" Track Adjustment - Adjust"	346
" Window - Check"	349
" Window Washer Reservoir - Fill"	348
" Window Wiper - Inspect/Replace"	349
" Windows - Clean"	349

Every 10 Service Hours or Daily for First 100 Hours

" Boom, Stick and Bucket Linkage - Lubricate"	279

Every 10 Service Hours or Daily

" Air Cleaner Dust Valve - Clean/Inspect"	276
" Cooling System Coolant Level - Check"	295
" Fuel Tank Water and Sediment - Drain"	320
" Hydraulic System Oil Level - Check"	335
" Indicators and Gauges - Test"	337
" Seat Belt - Inspect"	340
" Track Adjustment - Inspect"	347
" Travel Alarm - Test"	347

“ Undercarriage - Check” 348

Every 10 Service Hours or Daily for Machines Used in Severe Applications

“ Boom, Stick and Bucket Linkage - Lubricate” . . 279

Every 50 Service Hours or Weekly

“ Boom, Stick and Bucket Linkage - Lubricate” . . 279

Every 100 Service Hours of Continuous Hammer Use

“ Hydraulic System Filter Element (Fine Filtration) - Replace” 323

“ Hydraulic System Oil Filter - Replace” 332

“ Oil Filter (Hydraulic Hammer) - Replace” 337

Initial 250 Service Hours

“ Final Drive Oil - Change” 315

“ Hydraulic System Filter Element (Fine Filtration) - Replace” 323

“ Hydraulic System Oil Filter (Return) - Replace” 328

“ Hydraulic System Oil Filter - Replace” 332

“ Swing Drive Oil - Change” 342

Every 250 Service Hours

“ Counterweight Removal Chain - Inspect” 298

“ Engine Oil Sample - Obtain” 309

“ Final Drive Oil Sample - Obtain” 316

Every 250 Service Hours or Monthly

“ Condenser (Refrigerant) - Clean” 292

“ Final Drive Oil Level - Check” 315

“ Swing Bearing - Lubricate” 341

“ Swing Drive Oil Level - Check” 343

Every 250 Service Hours of Partial Hammer Use (50% of Service Hours)

“ Hydraulic System Filter Element (Fine Filtration) - Replace” 323

“ Hydraulic System Oil Filter - Replace” 332

“ Oil Filter (Hydraulic Hammer) - Replace” 337

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

“ Cooling System Coolant Sample (Level 2) - Obtain” 297

Every 500 Service Hours

“ Hydraulic System Oil Sample - Obtain” 336

“ Swing Drive Oil Sample - Obtain” 344

Every 500 Service Hours or 3 Months

“ Belt - Inspect/Adjust/Replace” 278

“ Cooling System Coolant Sample (Level 1) - Obtain” 296

“ Engine Oil and Filter - Change” 309

“ Fuel System Primary Filter (Water Separator) Element - Replace” 317

“ Fuel System Secondary Filter - Replace” 318

“ Fuel Tank Cap and Strainer - Clean” 319

“ Fuel Tank Strainer - Clean” 320

“ Hydraulic System Filter Element (Fine Filtration) - Replace” 323

“ Hydraulic System Oil Filter - Replace” 332

Every 600 Service Hours of Continuous Hammer Use

“ Hydraulic System Oil - Change” 324

“Hydraulic System Oil Filter (Return) - Replace” 328

Every 1000 Service Hours or 6 Months

“Battery - Clean” 277

“Battery Electrolyte Level - Check” 277

“Battery Hold-Down - Tighten” 278

“Counterweight Removal Chain - Lubricate” 298

“Fuel Tank Cap Filter - Replace” 320

“Rollover Protective Structure (ROPS) - Inspect” 340

“Swing Drive Oil - Change” 342

Every 1000 Service Hours of Partial Hammer Use (50% of Service Hours)

“Hydraulic System Oil - Change” 324

“Hydraulic System Oil Filter (Return) - Replace” 328

Every 2000 Service Hours or 1 Year

“Engine Valve Lash and Fuel Injector Timing - Check” 312

“Engine Valve Rotators - Inspect” 312

“Final Drive Oil - Change” 315

“Hydraulic System Oil Filter (Return) - Replace” 328

“Receiver Dryer (Refrigerant) - Replace” 340

“Swing Gear - Lubricate” 344

Every Year

“Cooling System Coolant Sample (Level 2) - Obtain” 297

Every 3 Years After Date of Installation or Every 5 Years After Date of Manufacture

“Seat Belt - Replace” 341

Every 5000 Service Hours

“ARD Spark Plug - Clean” 276

“Diesel Exhaust Fluid Filter - Replace” 302

“Diesel Exhaust Fluid Injector - Replace” 303

“Diesel Particulate Filter - Clean” 304

Every 6000 Service Hours or 3 Years

“Cooling System Coolant Extender (ELC) - Add” 294

“Hydraulic System Oil - Change” 324

Every 10 000 Service Hours

“DEF Manifold Filters - Replace” 299

Every 12 000 Service Hours or 6 Years

“Cooling System Coolant (ELC) - Change” 292

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Air Cleaner Dust Valve - Clean/Inspect

SMCS Code: 1051-571-VL

1. Open the left side access door.

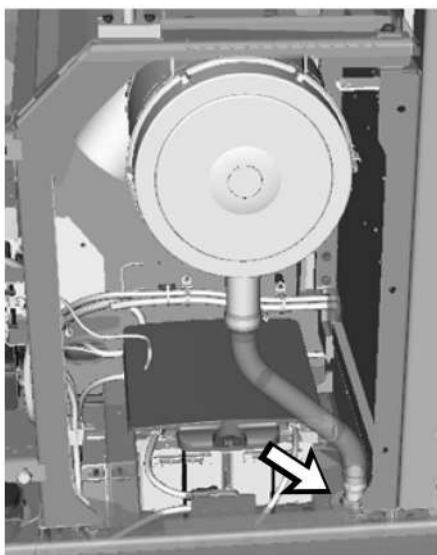


Illustration 414

g03640096

2. Check the dust valve after every 10 service hours or at the end of each day. Actuate the valve by squeezing the lips of the valve in order to remove any accumulated debris. Collect the debris into a suitable container.
3. Close the left side access door.

i05331650

Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace

SMCS Code: 1054-040-A/C; 1054-510-A/C

NOTICE

An air recirculation filter element plugged with dust will result in decreased performance and service life to the air conditioner or cab heater.

To prevent decreased performance, clean the filter element, as required.

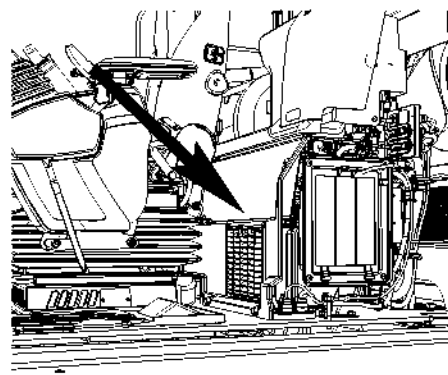


Illustration 415

g03377457

The air conditioner filter is located on the lower left side of the cab behind the seat.

1. Slide the operator seat forward.
2. Slide the filter element upward.
3. Tap the air filter in order to remove the dirt. Do not use compressed air to clean the filter.
4. After you clean the filter element, inspect the filter element. If the filter element is damaged or badly contaminated, use a new filter element. Make sure that the filter element is dry.
5. Install the filter element.

NOTICE

Failure to reinstall the filter element for the air conditioning system will contaminate and damage the system components.

i05985684

ARD Spark Plug - Clean

SMCS Code: 1555-070

⚠ WARNING

Engine hood and engine hood parts can be hot while engine is running or immediately after engine shutdown. Hot parts or hot components can cause burns or personal injury. Do not allow these parts to contact your skin, when engine is running or immediately after engine shutdown. Use protective clothing or protective equipment to protect your skin.

NOTICE

If the engine is running or the key is in the ON position the ARD plug will continue to fire. Turn the key to the OFF position before servicing the ARD plug.

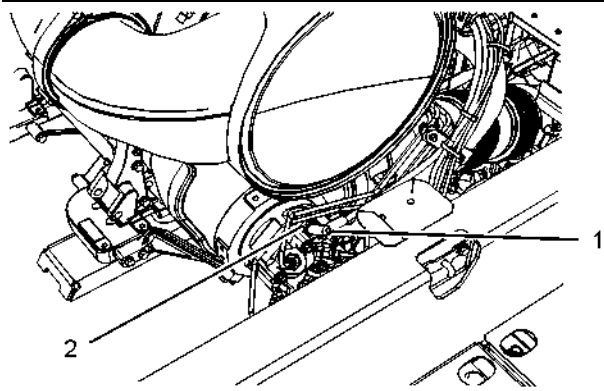


Illustration 416

g02113380

- (1) Wiring harness
(2) Spark plug

1. Position the machine on a level surface and lower the bucket to the ground.
2. Move the hydraulic lockout control to the LOCKED position. Stop the engine.
3. Allow the exhaust system to cool before performing this procedure.
4. Unlatch the engine hood and raise the engine hood.
5. Remove any dirt or debris from the area around the spark plug.
6. Remove wire harness (1) from spark plug (2).
7. Use a deep well socket and a breaker bar to loosen the spark plug. If necessary, see your Caterpillar dealer for the part number of the socket. After the spark plug has been loosened, use the socket to remove the spark plug by hand in order to detect problems with the threads.
8. After removing spark plug, clean the ground probe inside the ARD combustion head by running a Plug Bore Brush through the hole in the ARD combustion head. Run the brush through the hole several times.
9. Carefully clean the spark plug using a nonmetallic cleaning pad. If the probe appears to be bent, replace the spark plug. Otherwise, install the original spark plug.

Note: The spark plug may be damaged if the spark plug is dropped. Do not install a spark plug that has been dropped.

NOTICE

Do not overtighten the spark plug. The shell can be cracked and the gasket can be deformed. The metal can deform and the gasket can be damaged. The shell can be stretched. This will loosen the seal that is between the shell and the insulator, allowing combustion pressure to blow past the seal. Serious damage to the engine can occur.

Use the proper torque.

10. Install the spark plug by hand until the spark plug contacts the ARD. Tighten the spark plug to a torque of 43.4 N·m (32 lb ft) to 51.5 N·m (38 lb ft).
11. Connect the wiring harness.
12. Close the engine hood and latch the engine hood.

i00934864

Battery - Clean

SMCS Code: 1401-070

Clean the battery surface with a clean cloth. Keep the terminals clean and keep the terminals coated with petroleum jelly. Install the post cover after you coat the terminal post with petroleum jelly.

i07746330

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i06019968

Battery Electrolyte Level - Check

SMCS Code: 1401-535; 1401-535-FLV; 1401

WARNING

All lead-acid batteries contain sulfuric acid which can burn the skin and clothing. Always wear a face shield and protective clothing when working on or near batteries.

Note: If the machine is operated in extreme temperatures, check the electrolyte level Every 500 Service Hours or 3 months.

When the engine is not run for long periods of time or when the engine is run for short periods, the batteries may not fully recharge. Ensure a full charge in order to help prevent the battery from freezing.

1. Clean the battery surface with a clean cloth. Clean the terminals and the cable clamps. Coat the clamps and the terminals with silicone lubricant or petroleum jelly. Install the post cover.
2. Inspect the electrolyte level in each battery cell. Maintain the electrolyte level to the bottom of the filler openings. Use distilled water. If distilled water is not available, use clean drinking water.

i00934872

Battery Hold-Down - Tighten

SMCS Code: 7257

Tighten the hold-downs for the battery in order to prevent the batteries from moving during machine operation.

i04064489

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401; 1401-040; 1401-561; 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 of the switches to the OFF position. Turn the engine start switch key to the OFF position.
2. Turn the battery disconnect switch to the OFF position. Remove the key.

3. Disconnect the negative battery cable at the battery.
4. Disconnect the positive battery cable at the battery.
5. Disconnect the battery cables at the battery disconnect switch. The battery disconnect switch is connected to the machine frame.
6. Make necessary repairs or replace the battery.
7. Connect the battery cable at the battery disconnect switch.
8. Connect the positive battery cable of the battery.
9. Connect the negative battery cable of the battery.
10. Install the key and turn the battery disconnect switch to the ON position.

i04779186

Belt - Inspect/Adjust/Replace

SMCS Code: 1357-040; 1357-510; 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.
2. Inspect the belt for wear and for cracking.
3. If the belt requires replacement, perform Step 3a through Step 3c.

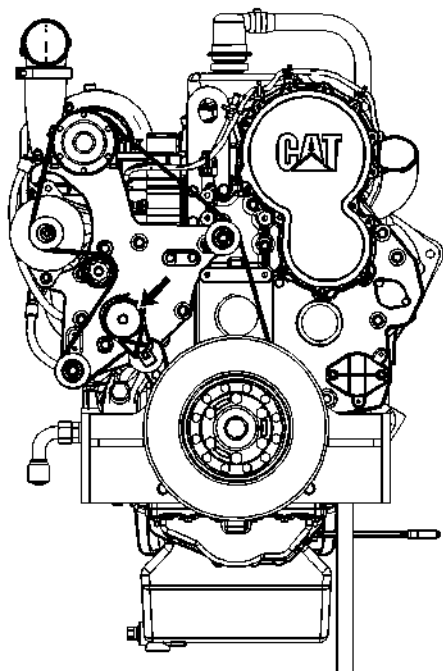


Illustration 417

g01127241

- a. Turn the belt tensioner in order to release the tension from the belt.
- b. Remove the belt.
- c. Install a new belt.

Note: Refer to Disassembly and Assembly, "Belt - Remove and Install" for the procedure to replace the belt.

4. Close the engine hood.

i03865613

Boom, Stick and Bucket Linkage - Lubricate

SMCS Code: 6501-086; 6502-086; 6513-086

Note: Caterpillar recommends the use of 5% molybdenum grease for lubricating the boom, stick, and bucket linkage. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on molybdenum grease.

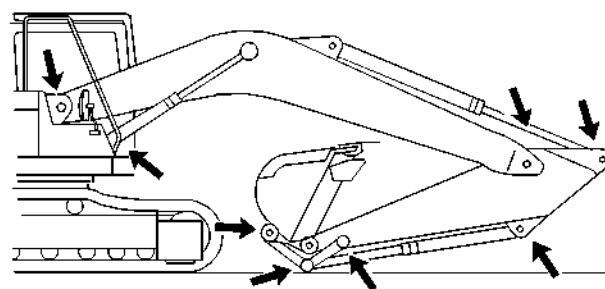


Illustration 418

g02109428

Wipe all fittings before you apply lubricant.

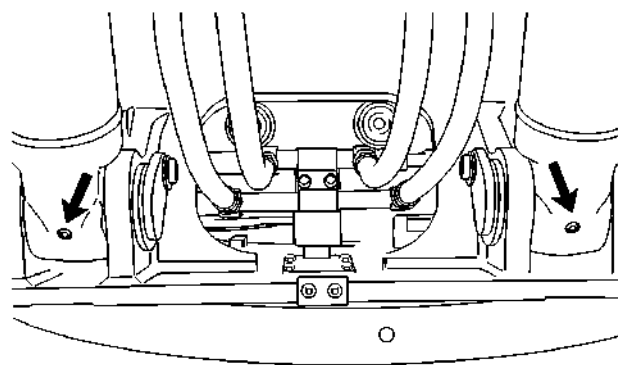


Illustration 419

g01122104

1. Apply lubricant through the fitting at the base of each boom cylinder.

Maintenance Section
Boom, Stick and Bucket Linkage - Lubricate

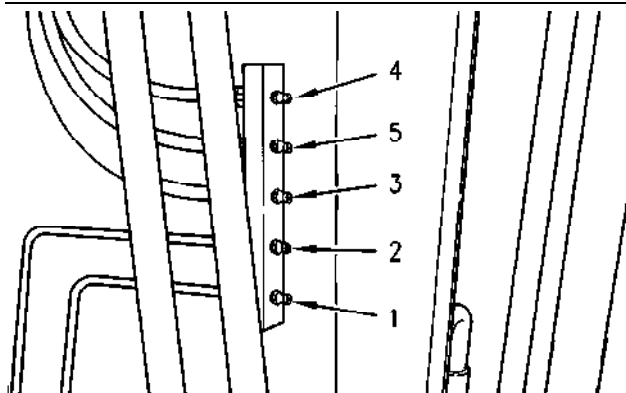


Illustration 420

g00685798

2. The fittings are at the base of the boom. The fittings can be serviced from the platform on the storage box. To lubricate the lower boom bearings, apply lubricant through fittings (1) and (2). To lubricate the boom cylinder rod, apply lubricant through fittings (3) and (4). To lubricate the stick cylinder head, apply lubricant through fitting (5).

Note: To ensure proper lubrication of the lower boom bearings and of the boom cylinder rod end bearings, lubricant should be applied through fittings (1), (2), (3), and (4). Apply lubricant first when the boom is raised and any work tool is suspended. Then apply lubricant when the boom is lowered and the work tool is rested on the ground with a slight downward pressure.

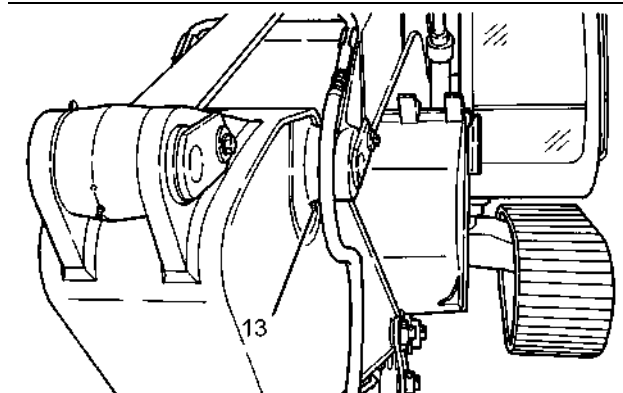


Illustration 422

g01122102

6. Apply lubricant through fitting (13). Fitting (13) is at the connection point of the boom and of the stick.

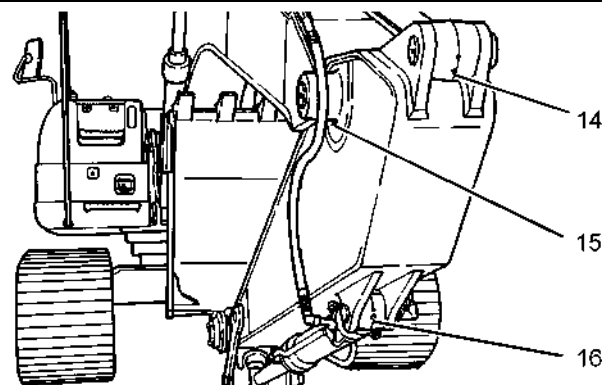


Illustration 423

g01122103

7. Apply lubricant through fitting (14) on the stick cylinder rod. Apply lubricant through fitting (15). Fitting (15) is at the connection point of the boom and of the stick. Apply lubricant through fitting (16) on the bucket cylinder head end.

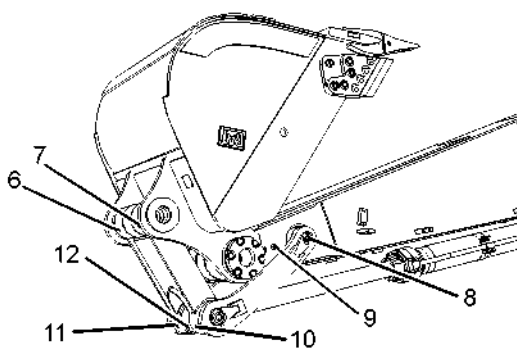


Illustration 421

g01396856

3. Apply lubricant through fittings (6) and (7). These fittings are on the bucket.
4. Apply lubricant through fittings (8) and (9). These fittings are on the stick.
5. Apply lubricant through fittings (10), (11), and (12). These fittings are on the link.

Grease Block on the Stick

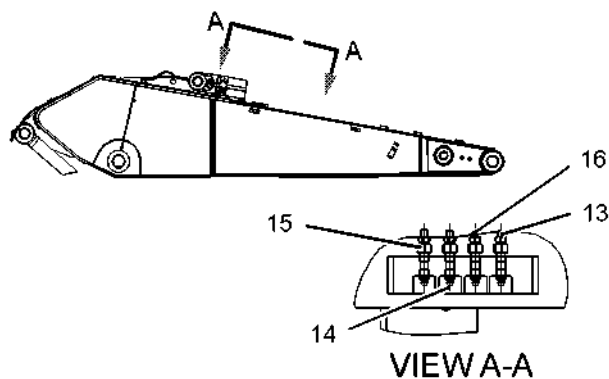


Illustration 424

g01396894

- (13) Left side connection point of boom and stick
- (14) Stick cylinder rod
- (15) Right side connection point of boom and stick
- (16) Bucket cylinder head end

Some machines may be equipped with a grease block that is located on the stick. Apply lubricant through the fittings.

i03933249

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.

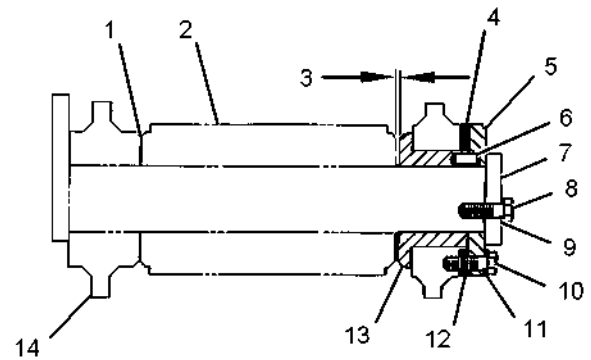


Illustration 425

g01141595

- (1) No gap
- (2) Stick boss
- (3) Bucket clearance
- (4) Shims
- (5) Plate
- (6) Pin
- (7) Plate
- (8) Bolts
- (9) Washers
- (10) Bolts
- (11) Washers
- (12) Location
- (13) Flange
- (14) Bucket boss

The clearance of the bucket control linkage on this machine can be adjusted by shimming. If the gap between the bucket and the stick becomes excessive, adjust bucket clearance (3) to 0.5 to 1 mm (0.02 to 0.04 inch).

Two shims of different thickness are used at location (12). The thicknesses of the shims are 0.5 mm (0.02 inch) and 1.0 mm (0.04 inch).

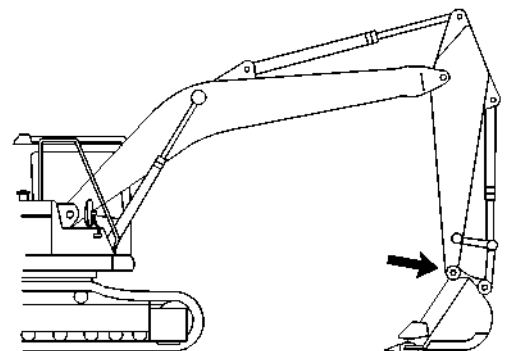


Illustration 426

g02109636

Area for linkage adjustment

1. Position the machine on a level surface and lower the bucket to the ground.

2. Slowly operate the swing control lever until stick boss (2) and the bucket boss (14) are in full face contact at no gap (1). This will help to determine the total clearance of the connection point of the stick and of the bucket.
3. Move the hydraulic lockout control to the LOCKED position. Stop the engine.
4. Measure bucket clearance (3), which is the existing total clearance.
5. Determine the number of shims that need to be removed from shims (4) by using the following calculation:

Subtract 0.5 mm (0.02 inch) or 1.0 mm (0.04 inch) from bucket clearance (3).
6. Remove the appropriate number of shims at location (12) in order to meet the above thickness. Make sure that you use a minimum of three 0.5 mm (0.02 inch) shims. To remove the shims, remove bolts (8), washers (9), plate (7), bolts (10), washers (11), and plate (5).
7. After the correct number of shims has been removed and pin (6) is aligned with the pin hole, install plate (5), washers (11), bolts (10), plate (7), washers (9), and bolts (8). Tighten the bolts to a torque of $240 \pm 40 \text{ N}\cdot\text{m}$ ($175 \pm 30 \text{ lb ft}$).
8. After installation, make sure that bucket clearance (3) is still correct.

i03574842

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Block the bucket before changing the bucket teeth.

To prevent possible injury to the eyes, wear a protective face shield when striking the pin.

The pin, when struck, can fly out and cause injury to nearby personnel.

Bucket Tips

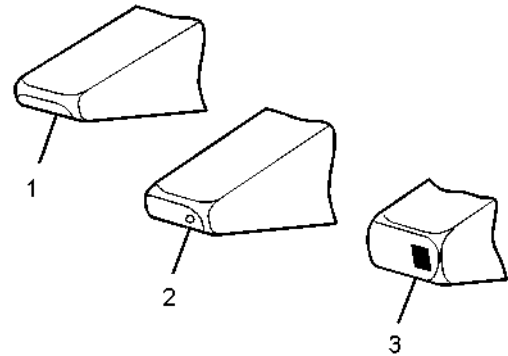


Illustration 427

g01577934

- (1) Usable tip
(2) Replaceable bucket tip
(3) Overworn tip

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.
 - Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
 - Use a Pin-Master. Follow Step 1a through Step 1c for the procedure.

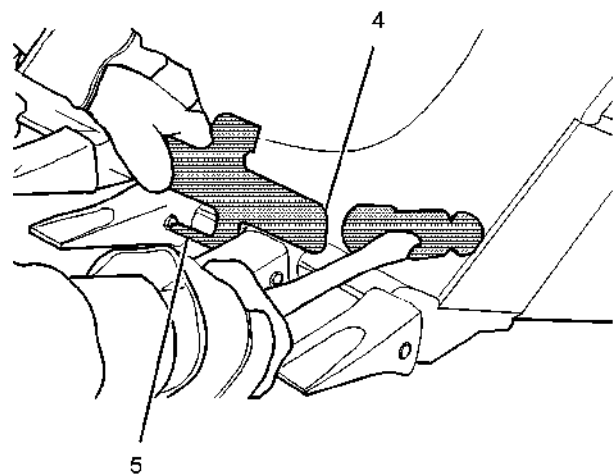


Illustration 428

g01577993

- (4) Back of Pin-Master
(5) Extractor

- a. Place the Pin-Master on the bucket tip.
- b. Align extractor (5) with the pin.

- c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

Note: Discard the old pin and the retainer assembly. When you change tips, use a new pin and a new retainer assembly. Refer to the appropriate parts manual for your machine.

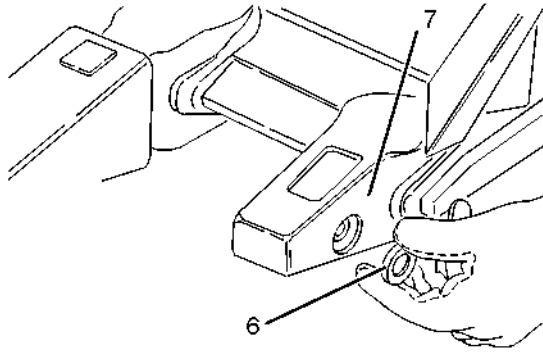


Illustration 429

g01577913

(6) Retainer assembly
(7) Adapter

2. Clean the adapter and the pin.
3. Fit retainer assembly (6) into the counterbore that is in the side of adapter (7). Make sure that the face of the retainer assembly with the marking "OUTSIDE" is visible.

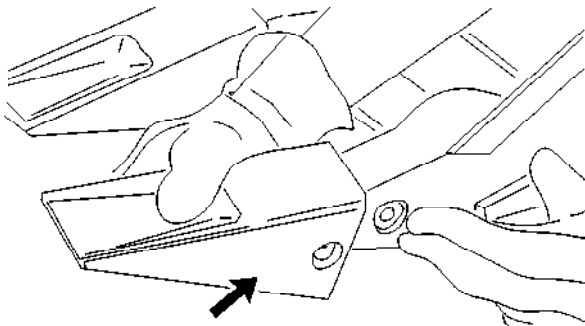


Illustration 430

g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tips can be rotated by 180 degrees in order to allow the tip to wear evenly. You may also move the tips from the outside teeth to the inside teeth. Check the tips often. If wear is present on the tips, rotate the tips. The outside teeth generate the most wear.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the same side of the retainer, drive the pin through the bucket tip, the retainer assembly, and the adapter.
- Use a Pin-Master. Follow Step 5a through Step 5e for the procedure.

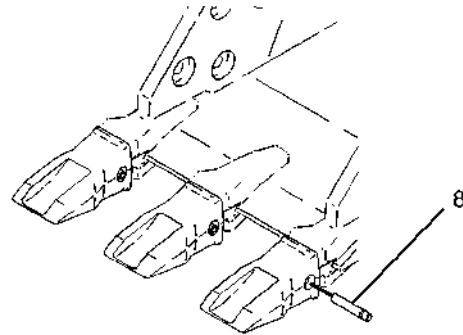


Illustration 431

g01578233

(8) Pin

- a. Insert pin (8) through the bucket tip.

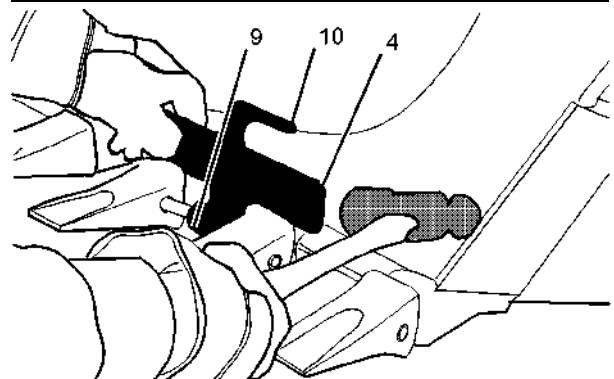


Illustration 432

g01578342

- b. Place the Pin-Master over the bucket tips so that the pin will fit into the counterbore of the pin holder (9).
- c. Strike the Pin-Master with a hammer at the back of the tool (4) in order to insert the pin.
- d. Slide pin holder (9) away from the pin and rotate the tool slightly in order to align pin setter (10) with the pin.

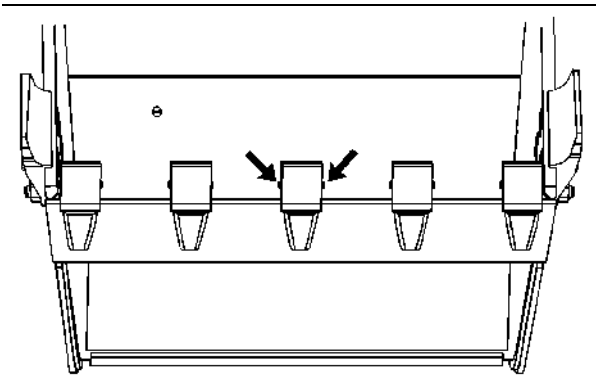


Illustration 433

g01209159

Final assembly of pin into bucket tip

- e. Strike the end of the tool until the pin is fully inserted.

Side Cutters

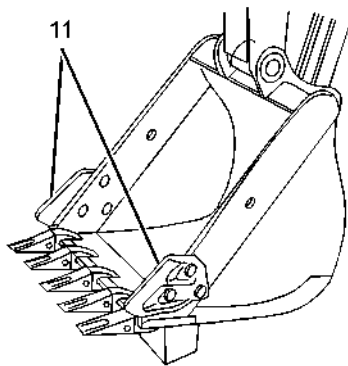


Illustration 434

g01579693

Bucket With Side Cutters

1. Remove the mounting bolts and the side cutters (11).
2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

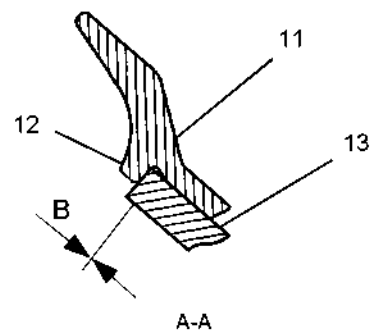
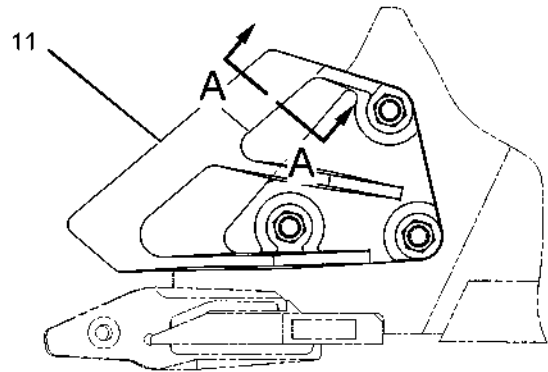


Illustration 435

g01579713

- (12) Shear ledge on a side cutter
(13) Side plate on a bucket
(B) 0.0 mm (0.0 inch)

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.
5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.
6. Torque the mounting bolts to the correct specification.

Side Protectors (If Equipped)

Inspect the wear of the side protector. When too much wear is present, replace the protector.

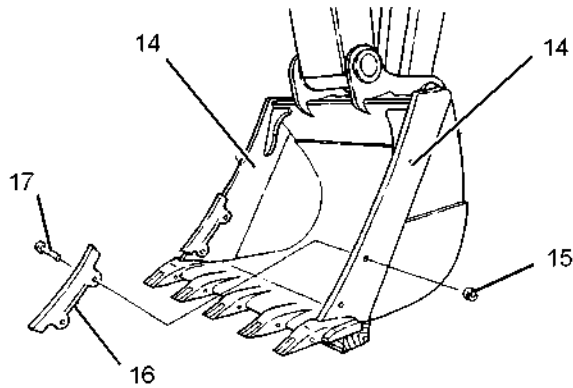


Illustration 436

g01592996

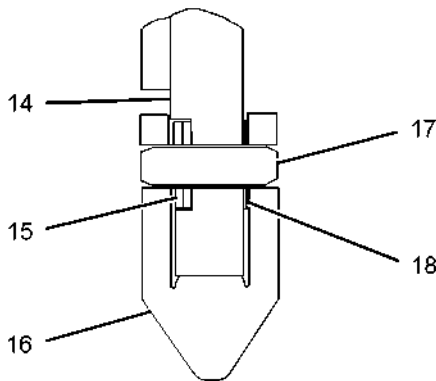


Illustration 437

g01903678

- (14) Side plate
- (15) Retainer
- (16) Side protector
- (17) Pin
- (18) Shim

1. Hit pin (17) from the side of the bucket without the retainer in order to remove side protector (16) from side plate (14).
2. Clean side protector (16), pin (17), retainer (15) and side plate (14) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims (18) may be required in order to decrease the lateral clearance which will decrease movement. Install the shims (18) between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (15) in side plate (14).

4. Align two pin holes of the new protector and the side plate. Hit the pin from the retainer side of the bucket.

Note: If the pin and/or the retainer are worn, replace the pin and/or the retainer.

i07114992

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Note: In order to maximize the life of the bucket tip and the penetration of the bucket tip, the bucket tip can be rotated.

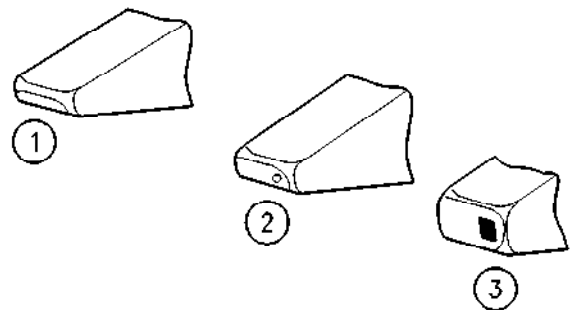


Illustration 438

g00101352

- (1) Usable
- (2) Replace
- (3) Overworn

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

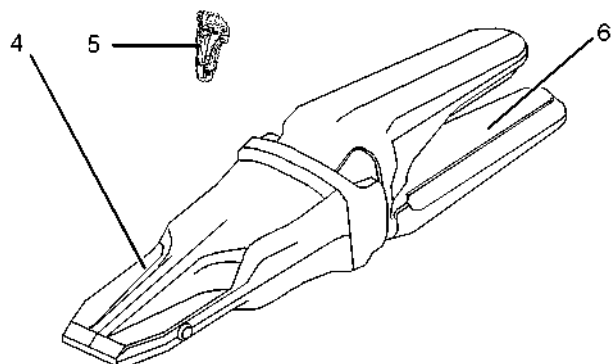


Illustration 439

g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

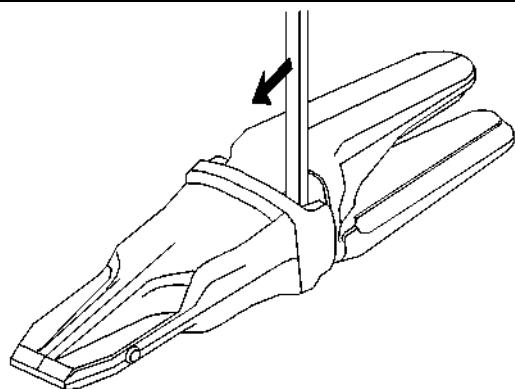


Illustration 440

g01175361

1. Use a pry bar in order to disengage retainer (5).
2. Use the pry bar in order to remove retainer (5) from bucket tip (4).
3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.
4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

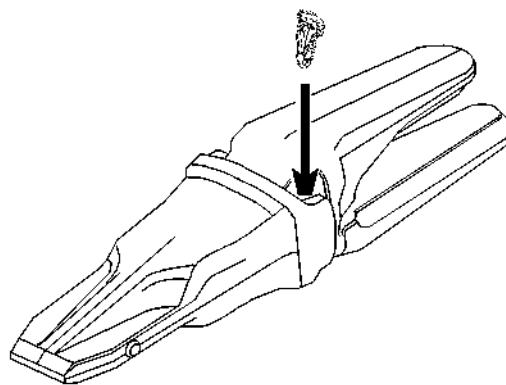


Illustration 441

g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.
4. Make sure that the latch is properly seated by trying to remove the bucket tip.

Bucket Tips (Cat® Advansys) - If Equipped

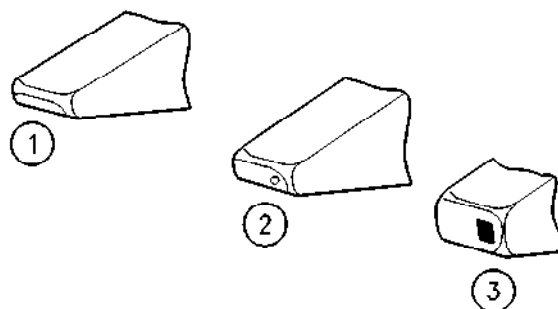


Illustration 442

g00101352

- (1) Usable
- (2) Removal Procedure
- (3) Removal Procedure

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

Removal

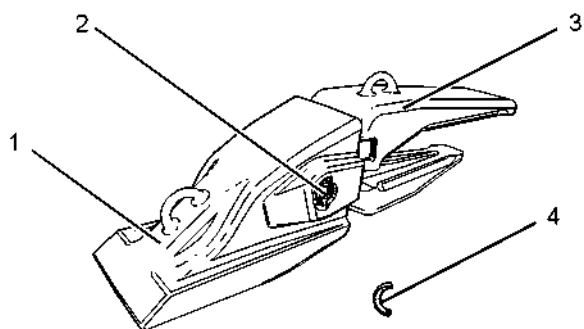


Illustration 443

g03830653

- (1) Bucket Tip
- (2) Retainer
- (3) Adapter
- (4) Compression Sleeve

1. Use a 3/4" ratchet and rotate the retainer (2) 180 degrees to the unlocked position.
2. Remove the bucket tip (1) from adapter (3).
3. Clean adapter (3).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip (1) onto the adapter (3).

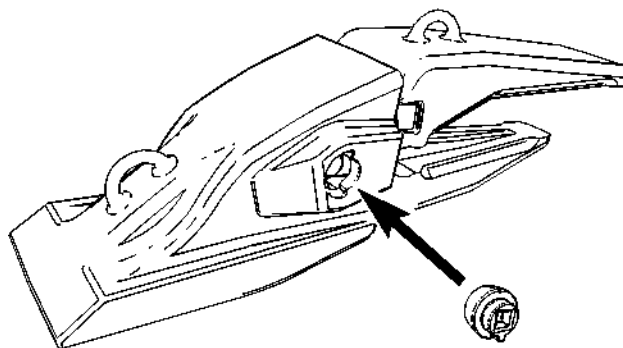


Illustration 444

g03832654

3. Use a 3/4" ratchet to rotate the retainer (2) 180 degrees to the locked position.

Side Cutters (If Equipped)

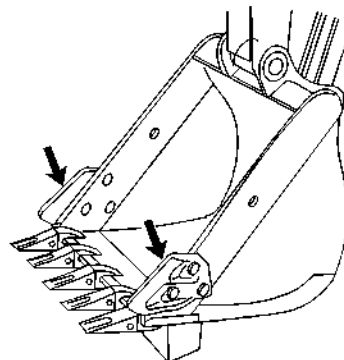


Illustration 445

g01389740

Bucket with side cutters

Side cutters

1. Remove the mounting bolts and the side cutters.
2. Clean the mounting surface of the side plate on the bucket and of the side cutter. Remove any burrs or protrusions on the mating surfaces.

Maintenance Section
Bucket Tips - Inspect/Replace

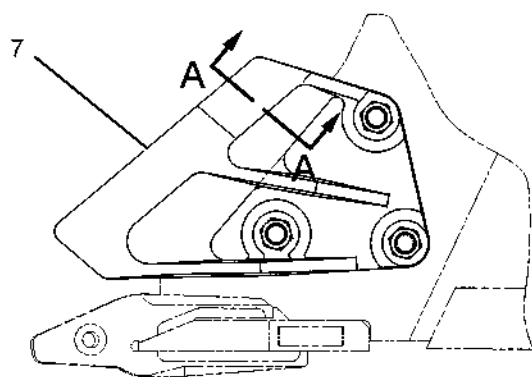


Illustration 446

g01389456

(7) Side cutter

Note: Some side cutters may be rotated for additional wear.

3. Install the side cutter.

Note: Certain bolts may require thread compound.

4. Hand tighten the bolts.

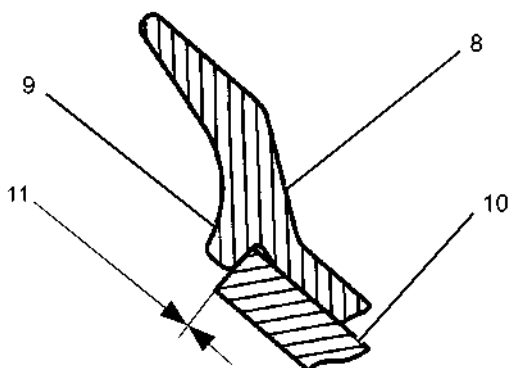


Illustration 447

g01389457

Section A-A From Illustration 446

(8) Side cutter

(9) Shear ledge on a side cutter

(10) Side plate on a bucket

(11) 0.0 mm (0.0 inch)

5. Make sure that there is not a gap between the side plate on the bucket and the shear ledge on the side cutter.

6. Torque the mounting bolts to the correct specification.

Side Protectors (If Equipped)

Inspect the wear of the side protector. When too much wear is present, replace the protector.

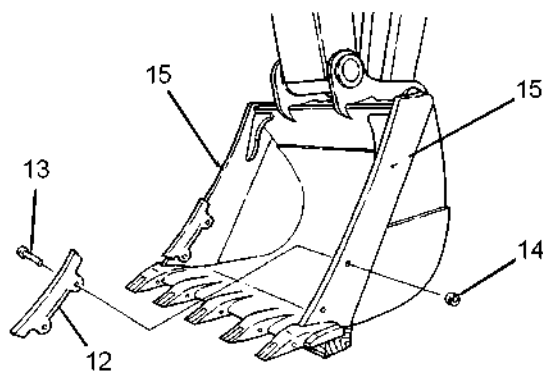


Illustration 448

g01389458

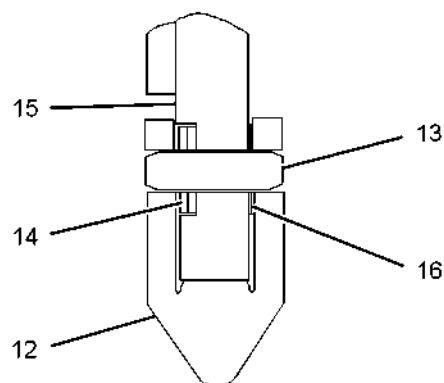


Illustration 449

g01903698

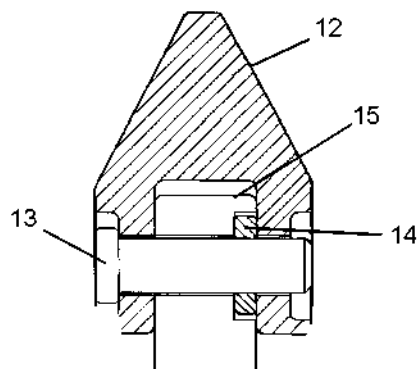


Illustration 450

g01389459

(12) Side protector

(13) Pin

(14) Retainer

(15) Side plate

(16) Shim

1. Hit pin (13) from the side of the bucket without the retainer in order to remove side protector (12) from side plate (15).

2. Clean side protector (12), pin (13), retainer (14) and side plate (15) before installation.

Note: Lateral clearance between the side plate and the side protector should not exceed 1 mm (0.04 inch). Shims (16) may be required in order to decrease the lateral clearance which will decrease movement. Install the shims (16) between the side plate and the side protector on the opposite side of the retainer.

3. Put retainer (14) in side plate (15).
4. Align two pin holes of the new protector and the side plate. Hit the pin from the retainer side of the bucket.

Note: If the pin and/or the retainer are worn, replace the pin and/or the retainer.

i03901495

Cab Air Filter (Fresh Air) - Clean/Replace

SMCS Code: 7342-510; 7342-070

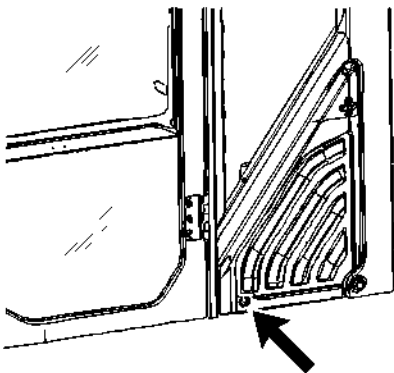


Illustration 451

g01973174

The cab air filter is located on the left side of the cab.

1. Use the ignition key in order to open the access panel.

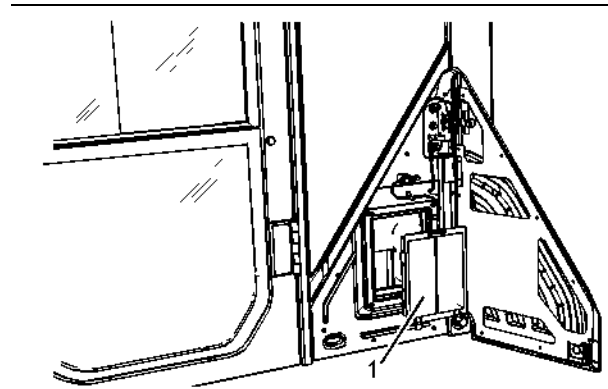


Illustration 452

g02144326

(1) Air filter

2. Remove air filter (1).
3. Clean the air filter with a maximum of 200 kPa (30 psi) pressure air.
4. After you clean the air filter, inspect the air filter. If the air filter is damaged or badly contaminated, use a new air filter.
5. Install the air filter and the filter cover.

i04281350

Cab Door Latch - Inspect/Adjust/Replace

SMCS Code: 7308-LX

Cab Door Latch Inspect

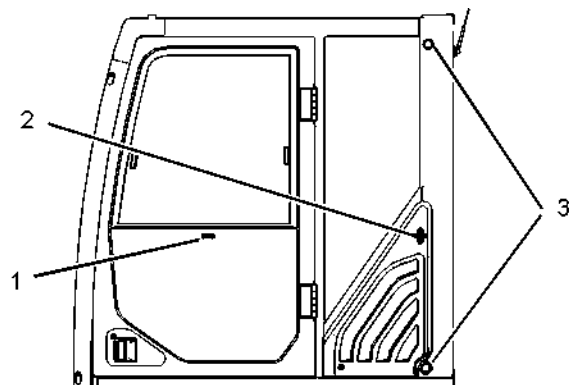


Illustration 453

g02449296

- (1) Cab Door Striker
(2) Cab Door Latch
(3) Cab Door Stop

1. Open the cab door and latch the door in the open position.

2. Inspect door stops (3) for proper adjustment. The cab door should contact the door stops and slightly compress the rubber stoppers.

Note: Refer to “Cab Door Stop Adjust” if the door stops require adjustment.

3. Inspect the operation of the door latch. The latch should not release the door unless you pull down on one of the door release levers located in the cab. When the door is closed, the door should release from the latch smoothly.

Note: If needed, spray an appropriate lubricant throughout the latch in order to clean and lubricate the latch mechanism.

4. Inspect the cab door striker (1) and the cab door latch (2). Ensure that the striker is properly aligned with the latch.

5. Close the cab door.

Note: If the door does not latch properly or if the door does not release from the latch properly, refer to “Cab Door Latch Adjust” for the adjustment procedure.

Cab Door Stop Adjust

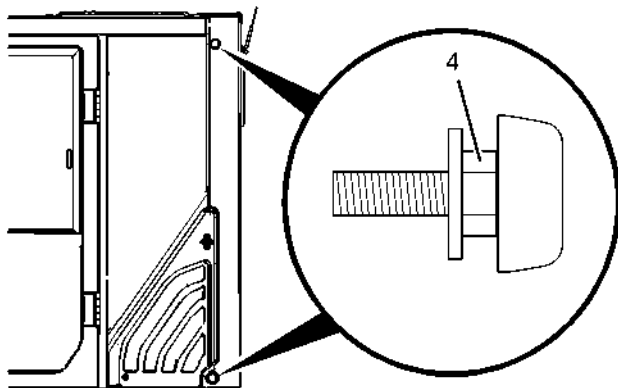


Illustration 454

g02449162

1. Completely loosen nut (4) and rotate the door stop clockwise.
2. Carefully open the cab door and latch the door in the open position.
3. Rotate the door stop counter clockwise until the door stop contacts the door.
4. Close the cab door.

5. Rotate the door stop counter clockwise an additional 1 to 1 1/4 revolutions and tighten nut (4).

Cab Door Latch Adjust

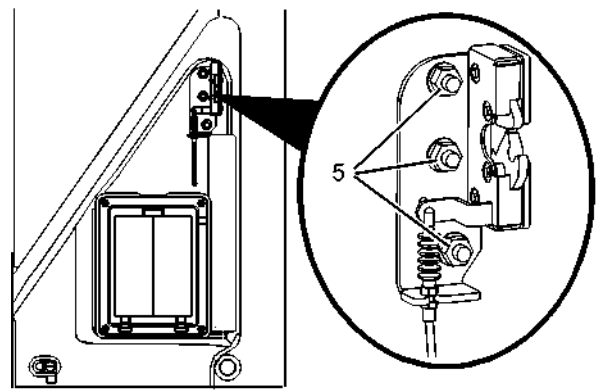


Illustration 455

g02449164

1. Use the ignition key in order to open the access panel for the cab air filter.
2. Loosen bolts (5) and align the striker on the cab door with the latch mechanism.
3. Tighten bolts (5) and close the access panel.

Cab Door Latch Replace

Cab Door Latch Removal

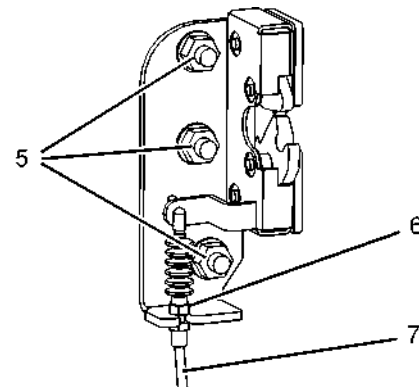


Illustration 456

g02449166

1. Use the ignition key in order to open the access panel for the cab air filter.
2. Loosen nut (6) and disconnect cable (7) from the latch assembly.
3. Remove bolts (5) in order to remove the entire latch assembly.

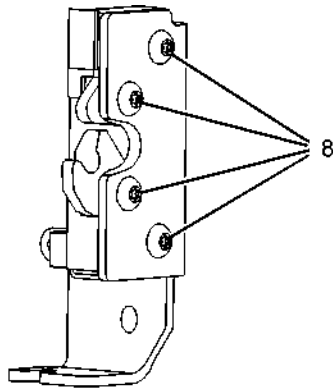


Illustration 457

g02449276

4. Remove bolts (8) and remove the latch mechanism from the assembly.

Cab Door Latch Installation

1. Perform the installation procedure in reverse order.

Note: Make sure that the striker and the latch are properly aligned. Refer to “Cab Door Latch Adjust”.

i06587366

Camera - Clean (If Equipped)

SMCS Code: 7348-070

WARNING

Failure to use an appropriate external ladder or an appropriate platform for direct access to the cameras could result in slipping and falling which could result in personal injury or death. Be sure to use an appropriate external ladder or an appropriate platform for direct access to the cameras.

The counterweight of the machine and the engine hood of the machine are not approved as maintenance platforms.

WARNING

Unexpected machine movement can cause injury or death.

In order to avoid possible machine movement, move the hydraulic lockout control to the LOCKED position and attach a Special Instruction, SEHS7332, “Do Not Operate” or similar warning tag to the hydraulic lockout control.

Note: When you access the cameras for cleaning, be sure to observe safe procedures for access. Maintain a three-point contact and/or use a body harness.

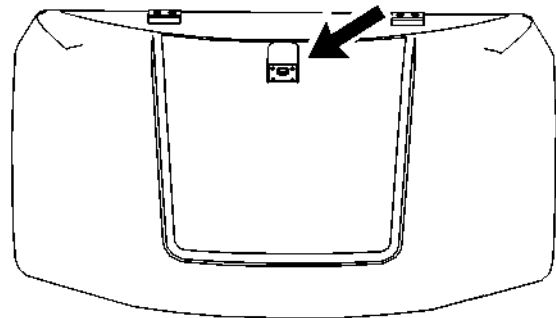


Illustration 458

g02158495

The rear view camera is located on top of the counterweight.



Illustration 459

g06035100

The side view camera is located on top of Fuel Tank.

If necessary, use a damp cloth in order to clean the glass of the camera. The camera is sealed. The camera is not affected by a wash with high-pressure spray.

Note: Alternatively, cameras may be cleaned from ground level by using a wash with a high-pressure spray or a damp rag on a wand.

i05333373

Circuit Breakers - Reset

SMCS Code: 1420-529



Main Circuit – This circuit breaker is designed to protect the wires between the batteries and the fuses. If the wires are shorted to the machine's body, this circuit breaker would minimize the damage to the wires.

The main circuit breaker has a capacity of 80 Amp.

Circuit Breaker Reset – Push in the button in order to reset the circuit breaker. If the electrical system is working properly, the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.

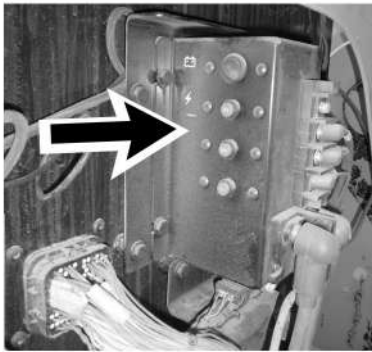


Illustration 460

g03378496

The circuit breaker is located behind the front left access door.

i02189743

Condenser (Refrigerant) - Clean

SMCS Code: 1805-070

NOTICE

If excessively dirty, clean condenser with a brush. To prevent damage or bending of the fins, do not use a stiff brush.

Repair the fins if found defective.

1. Open the middle access door on the left side of the machine. The condenser is located behind the engine air precleaner.

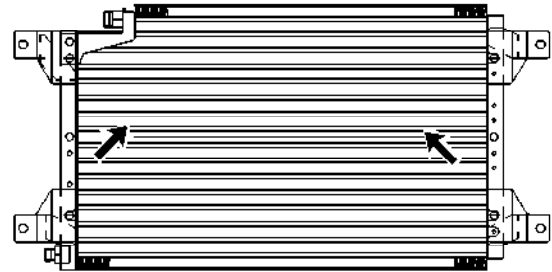


Illustration 461

g00537515

2. Inspect the condenser for debris. Clean the condenser, if necessary.
3. Use clean water to wash off all dust and dirt from the condenser.
4. Close the access door.

i05331702

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044

NOTICE

Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, "Cat Extended Life Coolant (ELC)".

This machine was factory filled with Extended Life Coolant.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

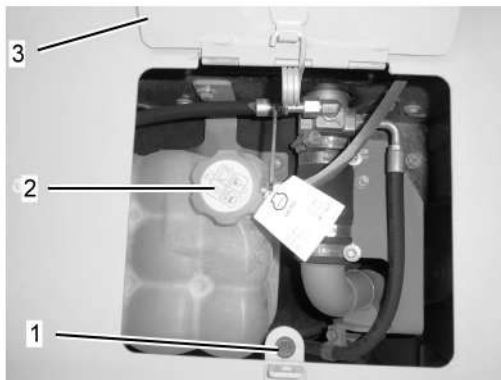


Illustration 462

g03377499

1. Open the access cover by removing the bolt. (1) Lift the access cover to the open position. (3) The cooling system pressure cap is located on top of the machine above the left rear access door. (2).
2. Slowly loosen the cooling system pressure cap (2) in order to release pressure. Remove the cooling system pressure cap.
3. Open the left rear access panel by removing the bolts that secure the panel to the machine.

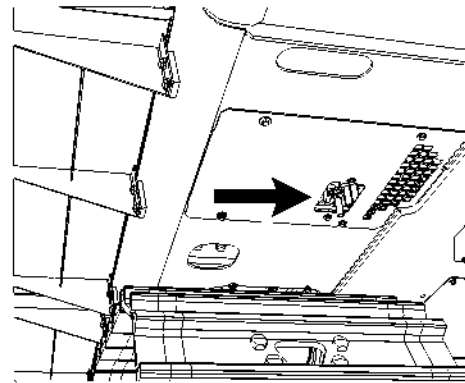


Illustration 463

g03377715

4. Remove the access cover that is under the radiator.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

5. Open the drain valve that is on the bottom of the radiator. Allow the coolant to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

6. Flush the cooling system with clean water until the draining water is clean.
7. Close the drain valve.
8. Add the Extended Life Coolant. See Operation and Maintenance Manual, "Capacities (Refill)".
9. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.
10. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.
11. Check the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.
12. Install the cooling system pressure cap and close the access cover for the cooling system pressure cap. Install the bolts for the access cover.
13. Stop the engine.
14. Open the left middle access door.

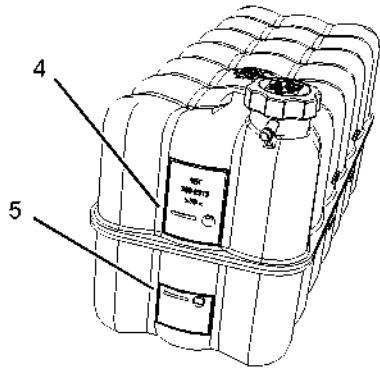


Illustration 464

g03377742

Coolant reservoir

- (4) "FULL"
(5) "LOW"

15. Check the coolant reservoir. Maintain the coolant level between the "FULL" mark (A) and the "LOW" mark (B).
16. If additional coolant is necessary, remove the reservoir cap on top of the coolant reservoir and add the appropriate coolant solution.
17. Install the reservoir cap.
18. Close the left middle access door.
19. Close the left rear access panel and install the bolts for the left rear access panel.
20. Install the access cover that is under the radiator.

i05331973

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

NOTICE

Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, "Cat Extended Life Coolant (ELC)".

This machine was factory filled with Extended Life Coolant.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system. See Special Publication, SEBU6250, "Cooling Recommendations" for all cooling system requirements.

Use a coolant conditioner test kit in order to check the concentration of the coolant.

NOTICE

Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling systems components.

If ELC cooling system contamination occurs, refer to Special Publication, SEBU6250, "Cat Extended Life Coolant (ELC)".

This machine was factory filled with Extended Life Coolant.

i05333384

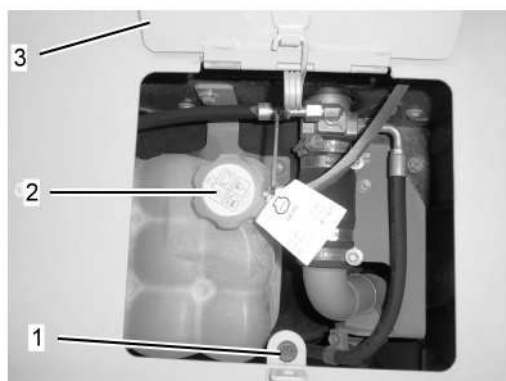


Illustration 465

g03377757

1. Open the access cover (3) for the cooling system pressure cap (2). The access cover for the cooling system pressure cap is located on top of the machine above the left rear access door. Remove bolt (1) to open the access cover.

2. Slowly loosen the cooling system pressure cap in order to release system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

3. You may have to drain some coolant from the radiator so that Caterpillar Extender can be added to the cooling system.

Note: Always discard drained fluids according to local regulations.

4. Add Extender to the cooling system. Refer to the following topics for the proper amount of Caterpillar Extender:

- Special Publication, SEBU6250, "Cat Extended Life Coolant (ELC)"
- Operation and Maintenance Manual, "Capacities (Refill)"

5. Inspect the gasket of the cooling system pressure cap. If the gasket is damaged, replace the pressure cap.

6. Install the cooling system pressure cap.

7. Close the access door for the cooling system pressure cap.

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV; 1350-040; 1395-535-FLV

1. Open the middle access door on the left side of the machine.

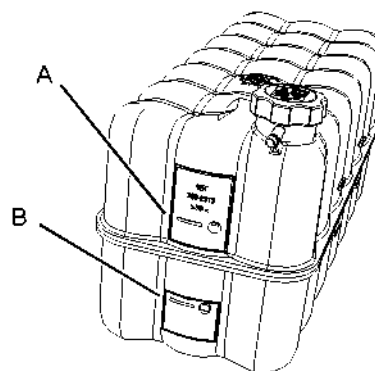


Illustration 466

g03378511

Coolant reservoir

(A) "FULL"
(B) "LOW"

2. Check the coolant level of the coolant reservoir. Maintain the coolant level between the "FULL" mark and the "LOW" mark. If the coolant reservoir is empty, follow Steps 2a through 2i.

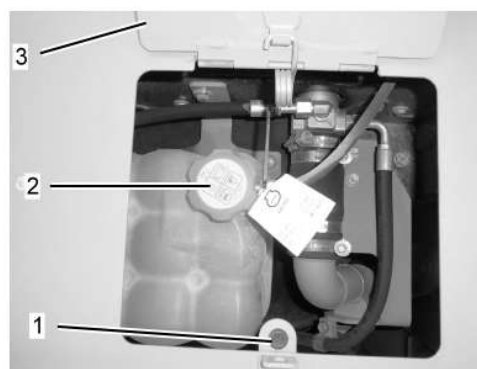


Illustration 467

g03378512

a. Open the access cover (3) for the cooling system pressure cap (2). The access cover for the cooling system pressure cap is located on top of the machine above the left rear access door. Remove bolt (1) and slide the access cover open.

Maintenance Section

Cooling System Coolant Sample (Level 1) - Obtain

- b. Slowly loosen the cooling system pressure cap in order to relieve system pressure. Remove the pressure cap.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

- c. Add the appropriate coolant solution to the cooling system. Refer to the following topics:

- Operation and Maintenance Manual, SEBU6250, "Cooling System Specifications"
- Operation and Maintenance Manual, "Capacities (Refill)"

- d. Start the engine. Operate the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

- e. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

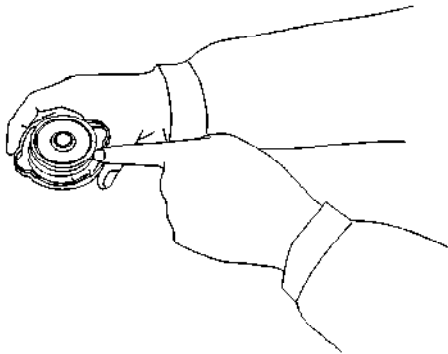


Illustration 468

g00102170

- f. Inspect the condition of the gasket on the pressure cap. If the gasket is damaged, replace the pressure cap.
- g. Install the cooling system pressure cap.
- h. Stop the engine.
- i. Close the access cover for the cooling system pressure cap. Install and tighten bolts (1) and (2).

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

3. If additional coolant is necessary, remove the reservoir cap and add the appropriate coolant solution.

4. Install the reservoir cap.

5. Close the left access door.

i02786578

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1395-008; 1395-554; 7542

Note: It is not necessary to obtain a Coolant Sample (Level 1) if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

Note: Obtain a Coolant Sample (Level 1) if the cooling system is filled with any other coolant instead of Cat ELC. This includes the following types of coolants.

- Commercial long life coolants that meet the Caterpillar Engine Coolant Specification -1 (Caterpillar EC-1)
- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty coolant/antifreeze

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

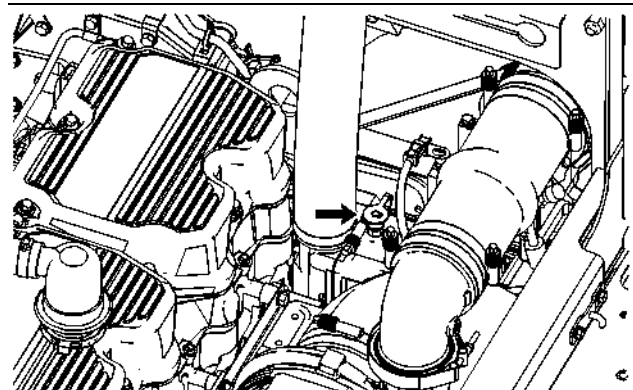


Illustration 469

g01100386

Coolant sample port

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

i07349178

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1395-554; 1395-008; 7542

Reference: Refer to Operation and Maintenance Manual, "Cooling System Coolant Sample (Level 1) - Obtain" for the guidelines for proper sampling of the coolant.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Cat dealer.

Submit the sample for Level 2 analysis.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Cat dealer.

i03591653

Counterweight Removal Chain - Clean (If Equipped)

SMCS Code: 7056-070-CX

WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. If necessary, remove the entire chain assembly in order to properly clean the chain assembly of rust and foreign contaminants.
2. Clean the chain assembly with a clean, nonflammable solvent and a wire brush.
3. Allow the chain assembly to dry. Lubricate the counterweight removal chain. Refer to Operation and Maintenance Manual, "Counterweight Removal Chain - Lubricate" for the proper procedure.
4. If the chain assembly was removed, install the chain assembly.

Note: Always clean the chain of rust and foreign contaminants.

i03481843

Counterweight Removal Chain - Inspect (If Equipped)

SMCS Code: 7056-040-CX

WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. Inspect the chain.
2. Make sure that the chain is properly lubricated.
3. Make sure that the chain is free of defects, rust, or foreign contaminants.

i03591620

Counterweight Removal Chain - Lubricate (If Equipped)

SMCS Code: 7056-086-CX

WARNING

Proper operation of the Counterweight Removal System depends on a properly lubricated counterweight chain. If the chain is not lubricated properly, the chain may rust and seize during the removal operation. A seized chain can fracture and result in complete failure of the chain. The counterweight can then suddenly fall which can result in personal injury or death.

Use an approved ladder or platform when lubricating the upper portion of the chain.

If seizure of the chain occurs during counterweight removal, stop the operation of the counterweight removal system and contact your nearest dealer for chain replacement.

The counterweight removal chain must be clean and free from rust. A chain with dirt or rust cannot be wound correctly.

1. Inspect the chain.
2. Remove any foreign material and rust from the chain.

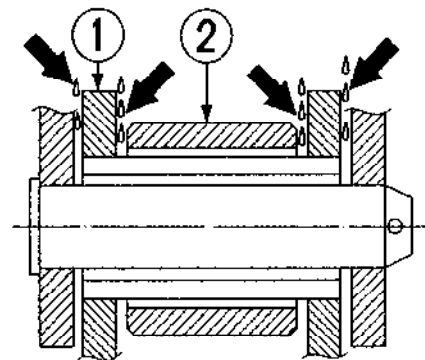


Illustration 470

g00115489

(1) Link plate edge. (2) Roller.

3. Lubricate the surfaces between each link plate edge (1) and roller (2) with SAE 30 engine oil.

Note: Always lubricate the chain during removal of the counterweight, after the counterweight is lowered to the blocks on the ground.

i08057952

DEF Filler Screen - Clean ((Emission Related Component))

SMCS Code: 108K-070-Z3

NOTICE

Ensure that the engine is stopped before any servicing or repair is performed.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Cat Dealer Service Tool Catalog" or refer to Special Publication, PECJ0003, "Cat Shop Supplies and Tools Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

The filler neck adapter filter screen in the diesel exhaust fluid tank will need to be cleaned or replaced if contaminated.

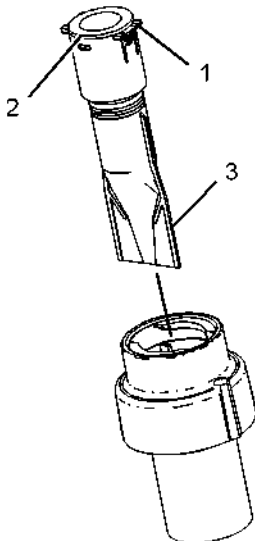


Illustration 471

g03618438

1. Use a screwdriver or pick to press the tabs (1).
2. Pull the screen assembly (2) upward from both sides and remove from the fill neck adapter

3. Use water or compressed air to clean out the filter screen (3). If there is any debris inside, let dry and remove the debris by turning the screen upside down and dumping debris out. If the debris cannot be removed or the filter screen is damaged, replace the filler neck adapter filter screen.

i07443771

DEF Manifold Filters - Replace (Emission Related Component)

SMCS Code: 108K-510-FI

NOTICE

Ensure that the engine is stopped before any servicing or repair is performed.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Cat Dealer Service Tool Catalog" or refer to Special Publication, PECJ0003, "Cat Shop Supplies and Tools Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

Note: Refer to Special Instruction, REHS8231, "Removal Procedures for Diesel Exhaust Fluid (DEF) Connectors" for the correct removal procedure of hose assemblies (1) and (5).

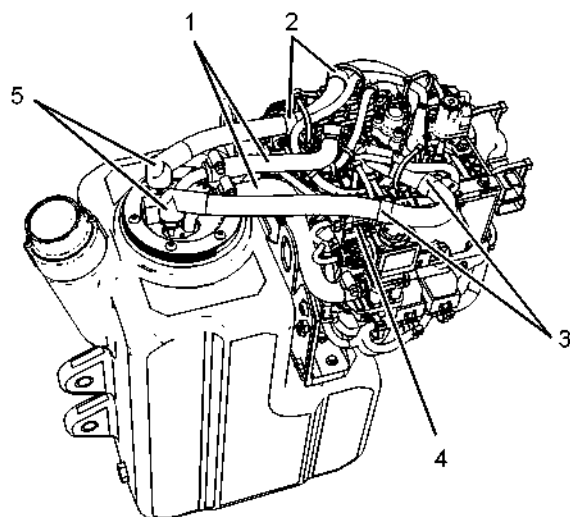


Illustration 472

g03662693

Typical Example

1. Clamp off hoses (1).
2. Remove clips (2) and (3). Disconnect harness assemblies (4). Remove hose assemblies (1) and (5).

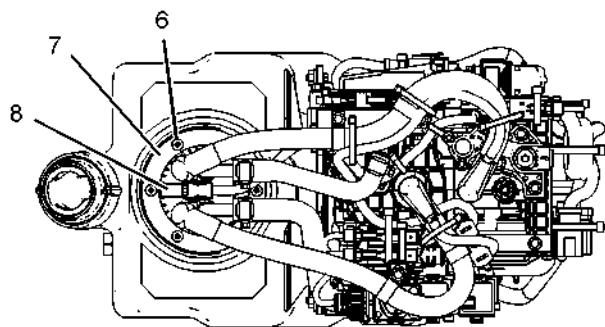


Illustration 473

g03665701

Typical Example

3. Remove bolts (6), plate (7), tank manifold (8), and gasket (not shown).

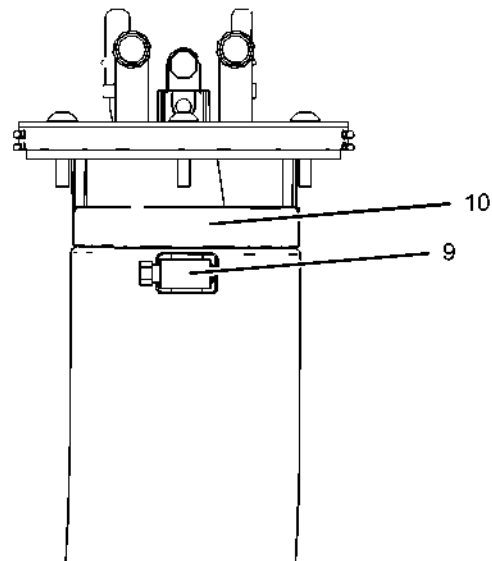


Illustration 474

g03665737

4. Unscrew the band clamp (9) and remove the band clamp from the filter base (10).

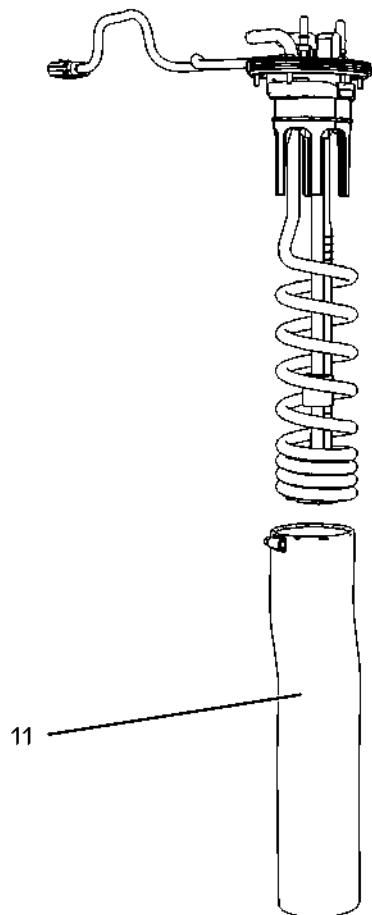


Illustration 475

g03664911

5. Remove the filter (11) from the filter base.

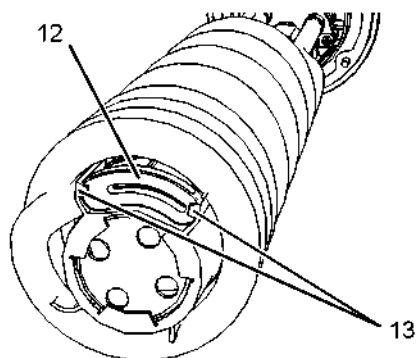


Illustration 476

g03666075

6. Remove the suction filter (12) at the bottom of the header coils by pulling tabs (13). Replace with a new suction filter.

7. Install new filter by pulling filter over the manifold coils up to the bottom of the assembled filter base.

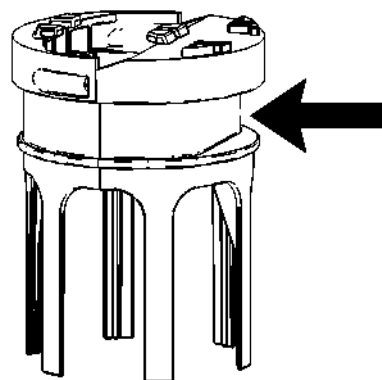


Illustration 477

g03665754

- 8. Tighten the band clamp 4.5 ± 0.7 N·m (40 ± 6 lb in), ensuring that the band clamp is aligned, as shown in illustration 477, to the flat spot on the base. Ensure that the filter does not bunch when tightening the band clamp.**
- 9. Install the tank manifold following steps 3 through 5 in reverse order with a new gasket.**
- 10. Tighten bolts (6) in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Tighten bolts (6) a second time in an alternating sequence to 5 ± 1 N·m (44 ± 9 lb in). Apply rubber lubricant to the o-ring seal inside of hose assemblies (1).**

i05626950

Diesel Exhaust Fluid Filter - Replace

SMCS Code: 108K-510-FI

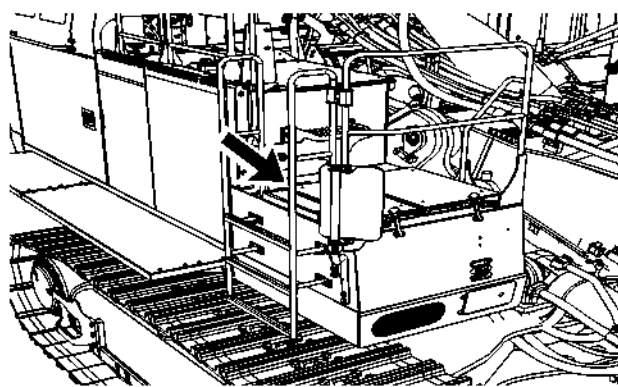


Illustration 478

g03573976

The Diesel Exhaust Fluid (DEF) filter is located on the DEF tank. The DEF tank is located next to the storage box on the right side of the machine.

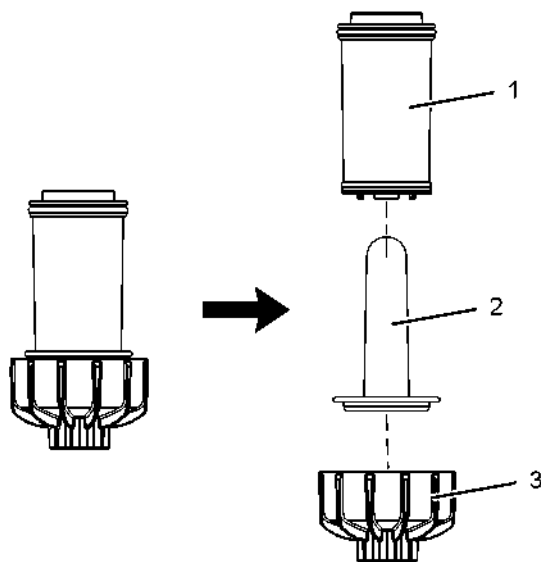


Illustration 479

g03332612

Typical Example

NOTICE

Ensure that the engine is stopped before any servicing or repair is performed.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Cat Dealer Service Tool Catalog" or refer to Special Publication, PECJ0003, "Cat Shop Supplies and Tools Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. Remove the diesel exhaust fluid (DEF) filter cap (3) with a 27 mm (1.06 inch) wrench.
2. Remove the rubber cone insert (2) from the DEF filter (1).

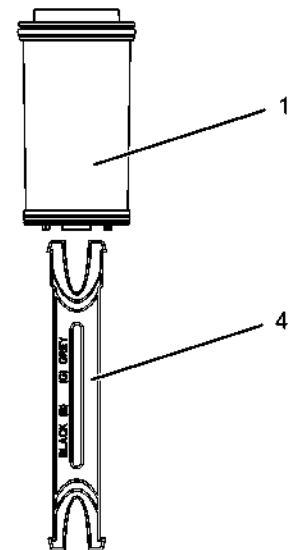


Illustration 480

g03332637

Typical Example

3. Insert the DEF filter removal tool (4) into the DEF filter (1) and remove the DEF filter (1).

Note: Wear gloves when you handle the DEF filter removal tool (4).

4. Clean the area around the filter housing.

5. Apply a thin coat of 207 - 1601 Lubricant to the seals of the new DEF filter (1).

6. Install new DEF filter (1) and rubber cone insert. Torque the filter to 20 ± 5 N·m (14.8 ± 3.7 lb ft) with a 27 mm (1.06 inch) wrench.

i07400077

i05622145

Diesel Exhaust Fluid Injector - Replace

(Emission Related Component)

SMCS Code: 108I-510

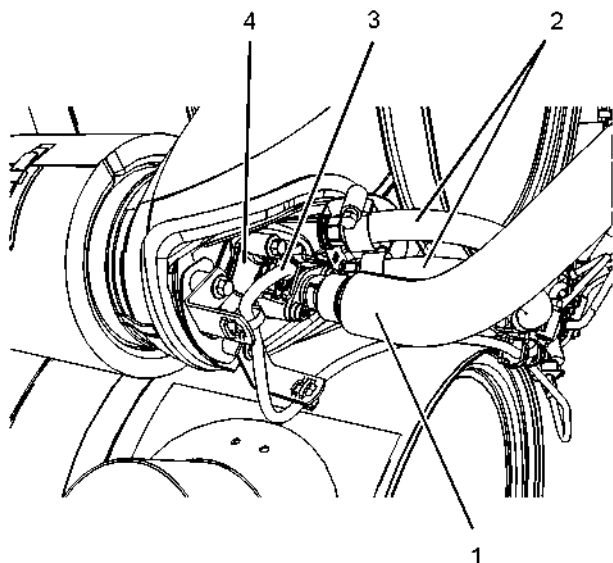


Illustration 481

g03363165

Typical example shown

1. Remove the diesel exhaust fluid (DEF) line (1) from the injector (4).
2. Remove the coolant lines (2) from the injector.
3. Remove the electrical connector (3) from the injector.
4. Remove the bolts from the injector and remove the injector.
5. Replace gasket. The steel side of the gasket should face towards diesel particulate filter (DPF) outlet.
6. Replace the injector.
7. Apply anti-seize to bolt threads.
8. Torque the bolts of the injector to 5 N·m (3.7 lb ft). Retighten all bolts to 5 N·m (3.7 lb ft), then turn 90°.
9. Connect the electrical connector.
10. Connect the coolant lines.
11. Connect the DEF line.

Diesel Exhaust Fluid - Fill

SMCS Code: 108K-544

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

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Reference: See Operation and Maintenance Manual, "Capacities (Refill)" for the capacity of the fuel tank for your machine.

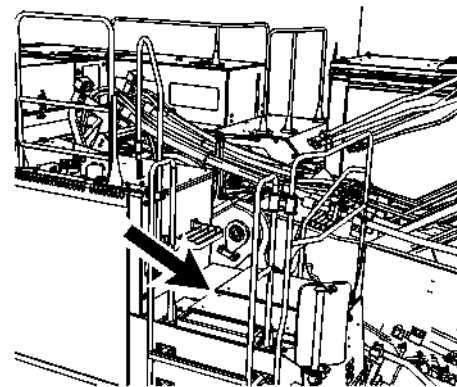


Illustration 482

g03569489

The DEF tank is located in storage box on the right side of the machine.

1. Open the right side storage box.
2. Clean filler cap and the surrounding area.
3. Remove the filler cap.
4. Fill tank with diesel exhaust fluid.

Note: Overfilled DEF will cause the possibility of freezing in remote tube. To avoid this problem, Stop refilling when DEF is filled up to top of remote hose. DEF fluid inside remote tube will drop into the tank.

Note: Do not refill DEF fluid again once DEF is filled up to top of remote hose.

5. Install the filler cap.
6. Close the right side storage box.

i07400083

Diesel Particulate Filter - Clean (Emission Related Component)

SMCS Code: 108F-070; 1091-070

Consult your Cat dealer when the DPF needs to be cleaned.

The approved Caterpillar DPF maintenance procedure requires that one of the following actions be taken when the DPF needs to be cleaned:

- The DPF from your machine can be replaced with a new DPF
- The DPF from your machine can be replaced with a remanufactured DPF
- The DPF from your machine can be cleaned by your local authorized Cat dealer, or a Caterpillar approved DPF cleaning machine, and reinstalled

Note: To maintain emissions documentation, the DPF that is removed from the machine when the DPF is cleaned must be reinstalled on the same machine.

Note: A specific ash service regeneration must be performed before removing a DPF that will be cleaned. All three scenarios listed above require a reset of the ash monitoring system in the engine ECM.

i05770381

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-510; 1054-070

Check the primary filter if a message or a warning is displayed on the monitor display.

1. Open the front access door on the left side of the machine.

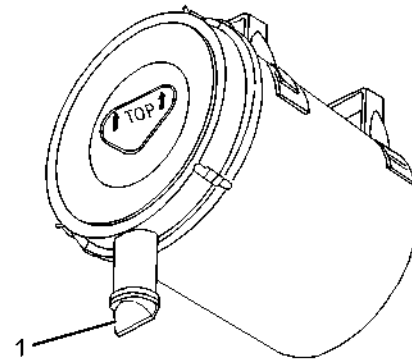


Illustration 483

g01266485

2. Squeeze the outlet tube (1) slightly in order to purge the dirt from the outlet tube.

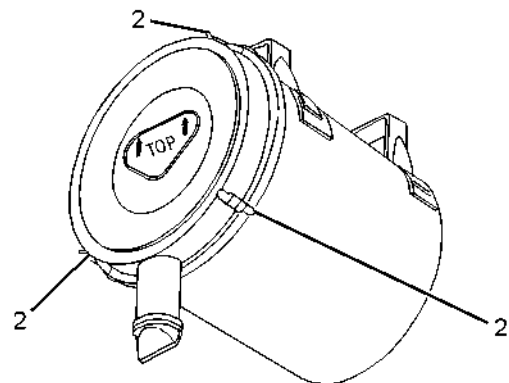


Illustration 484

g01266486

3. Loosen the cover latches (2) and remove the air cleaner cover.

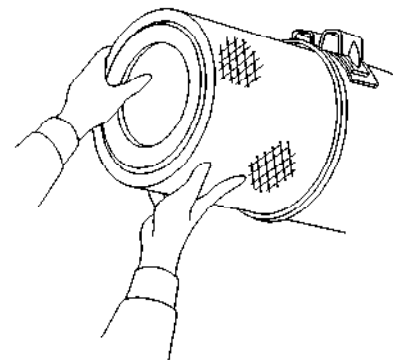


Illustration 485

g00101415

4. Remove the primary filter element from the air cleaner housing.

5. Clean the air cleaner cover and the inside of the air cleaner housing.
6. Inspect the O-ring seal on the air cleaner cover.
Replace the O-ring seal if the O-ring seal is worn or damaged.
7. Install the clean primary filter.

Note: Refer to “Cleaning Primary Air Filter Elements”.

8. Install the air cleaner cover and close the latches securely.



Illustration 486

g00101416

Note: Install the air cleaner cover properly. The arrows must point upward.

9. Replace the filter if the “Restricted Air Filter ” indicator on the monitor display still comes on.
10. Close the access door.

Cleaning Primary Air Filter Elements

NOTICE

Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

When the primary air filter element is cleaned, check for rips or tears in the filter material. Replace the primary air filter element after the primary air filter element has been cleaned six times. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless how many times the filter was cleaned.

NOTICE

Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

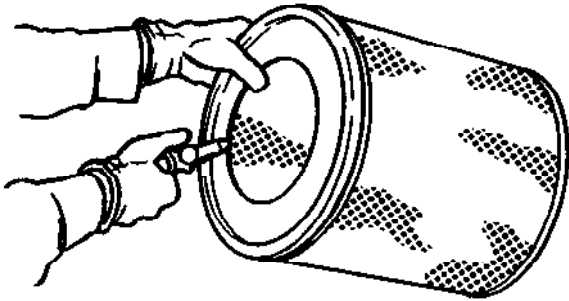


Illustration 487

g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) in order to force dirt particles toward the dirty side (outside).

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning primary air filter elements which require daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

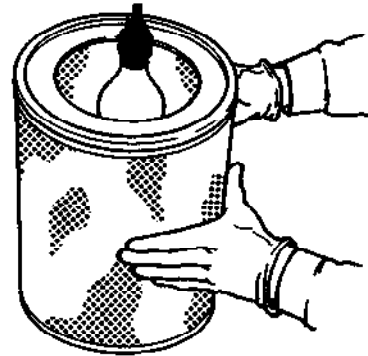


Illustration 488

g00281693

Inspect the clean, dry primary air filter element. Use a 60 W blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If necessary, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets, or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

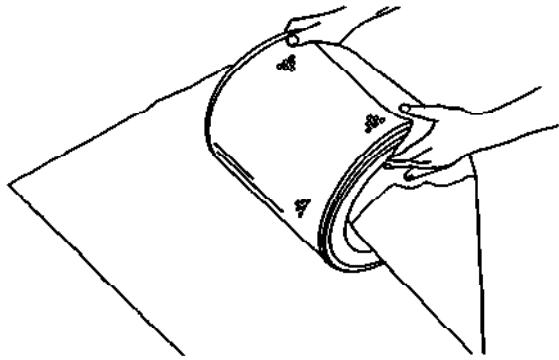


Illustration 489

g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An air flow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- The date that the filter was cleaned
- Number of times the filter has been cleaned

Store the box in a dry location.

i03900450

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510

NOTICE

Always replace the secondary filter element. Never attempt to reuse the secondary filter element by cleaning the element.

When the primary filter element is replaced, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the restricted Air Filter indicator comes on after the installation of a clean primary filter element or if the exhaust smoke is still black.

1. Open the middle access door on the left side of the machine.
2. See Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace". Remove the air cleaner cover from the air cleaner housing. Remove the primary filter element from the air cleaner housing.

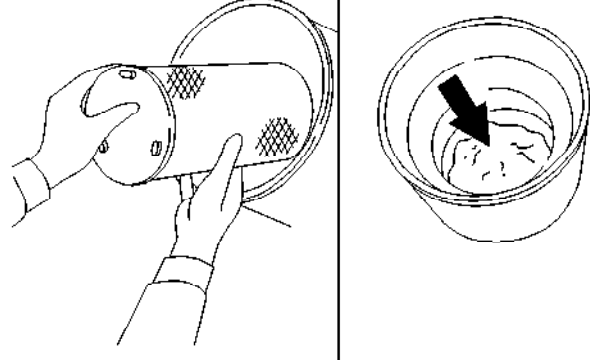


Illustration 490

g00101451

3. Remove the secondary filter element.
4. Cover the air inlet opening. Clean the inside of the air cleaner housing.
5. Remove the cover from the air inlet opening.
6. Install the new secondary filter element.
7. Install the primary filter element.
8. Install the air cleaner cover and close the latches securely.
9. Close the access door.

i05336738

Engine Air Precleaner - Clean

SMCS Code: 1055-070-DJ

Check the engine air precleaner for accumulation of trash and dirt.

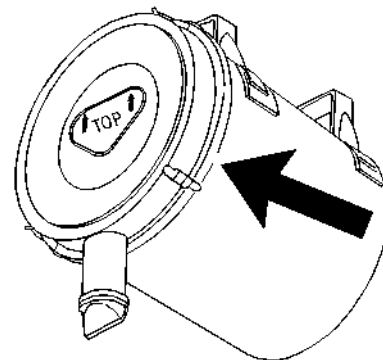


Illustration 491

g03380935

1. Loosen the latch and remove the cover from the precleaner.
2. Clean the cover.

3. Clean the precleaner. The precleaner can be cleaned with pressure air, pressure water, or a detergent. When pressure water is used, the maximum pressure should not exceed 280 kPa (40 psi).

Refer to Operation and Maintenance Manual, "General Hazard Information" before you use pressure air in order to clean the precleaner.

Note: Do not clean the precleaner by bumping or tapping the precleaner.

i05353055

Engine Oil Level - Check

SMCS Code: 1000-535

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

NOTICE

Do not overfill the crankcase. Engine damage can result.

Note: This machine is equipped with both an automated function for checking fluid levels and a dipstick. Refer to Operation and Maintenance Manual, "Monitoring System" regarding the automated system. If the machine is on an incline or the engine has been stopped only for a short time, the engine oil does not return to the crankcase and the fluid level cannot be properly checked by either method. Park the machine on level ground. The engine oil level can be checked after the engine has been stopped for at least 30 minutes.

Check the oil level while the engine is stopped. Do not check the oil level while the engine is running.

1. Open the engine hood.

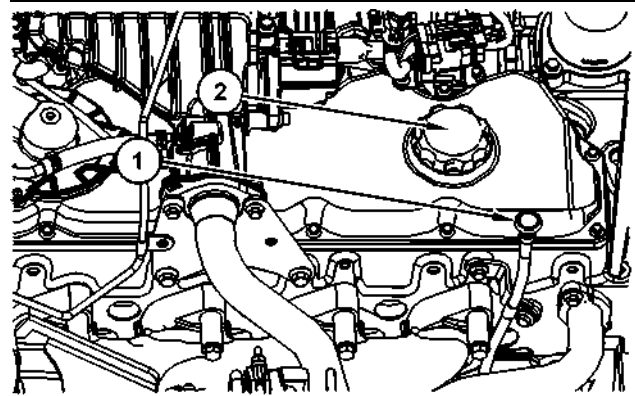


Illustration 492

g02519379

2. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

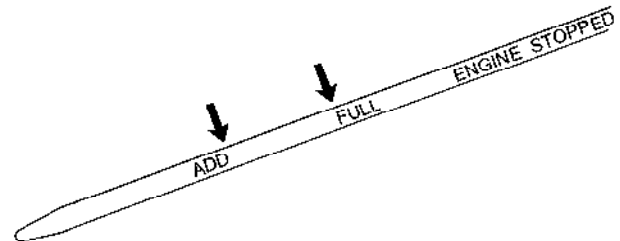


Illustration 493

g03390535

3. Remove the dipstick and check the dipstick. The oil level should be between the "Add" mark and the "Full" mark.

NOTICE

Operating your engine when the oil level is above the "H" mark could cause the crankshaft to dip into the oil. This could lead to excessively high oil temperatures which can reduce the lubricating characteristics of the oil, lead to bearing damage, and could result in loss of engine power.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

4. Remove oil filler plug (2) in order to add oil, if necessary. See Operation and Maintenance Manual, "Lubricant Viscosities".

Note: If the oil is deteriorated or badly contaminated, change the oil regardless of the maintenance interval.

5. Clean the oil filler plug. Install the oil filler plug.
6. Close the engine hood.

i05785517

Engine Oil Sample - Obtain

SMCS Code: 1000-008; 1000; 1348-008; 1348-554-SM; 7542-554-OC; 7542-008; 7542-554-SM

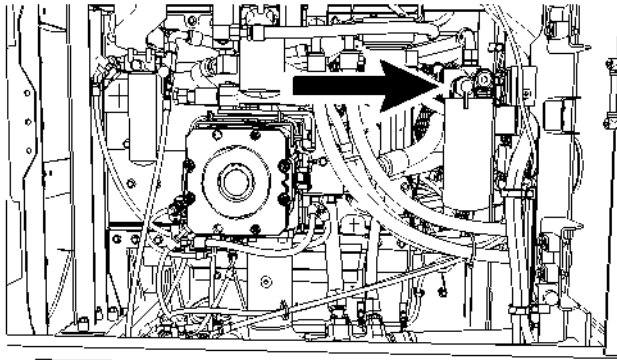


Illustration 494

g03445017

Obtain a sample of the engine oil from the engine oil sampling valve that is located on the engine oil filter housing. In the right rear access compartment. Refer to Special Publication, SEBU6250, "S·O·S Oil Analysis" for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample" for more information about obtaining a sample of the engine oil.

i06657353

Engine Oil and Filter - Change

SMCS Code: 1318-510

Selection of the Oil Change Interval

NOTICE

This machine is equipped with an engine that meets EPA Tier 3, Euro Stage III, or MOC Step 3 emission regulations. A 500 hour engine oil change interval is available, if the following conditions are met. Acceptable operating conditions, recommended multigrade oil types, and an S·O·S oil sampling and analysis program are used. Otherwise, use a 250 hour engine oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

CAT oil filters are recommended.

Recommended multigrade oil types are listed in Table 80. Do not use single grade oils.

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or extremely dusty conditions may require a reduction in engine oil change intervals from the recommendations in Table 80. Also refer to Manual, SEBU5898, "Cold-Weather Recommendations". Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. See your Caterpillar dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Table 80

Engine Oil Change Interval ⁽¹⁾				
Multigrade Oil Type	Operating Conditions			
	Standard ⁽¹⁾	Extended ⁽¹⁾	Severe	
			Fuel Sulfur above 0.3% ⁽²⁾	Altitude above 1830 m (6000 ft)
Cat DEO Preferred	250 hr	500 hr	250 hr	250 hr ⁽³⁾
ECF-2 Preferred	250 hr	500 hr	250 hr	250 hr
ECF-1-a	250 hr	250 hr	150 hr ⁽³⁾	250 hr ⁽³⁾

⁽¹⁾ The standard oil change interval for engines is 250 hours. The extended oil change interval in this machine is 500 hours if the following conditions are met. Acceptable operating conditions, recommended oil types, and an S·O·S oil sampling and analysis program are used. This extended interval is not permitted for other machines. Refer to the applicable Operation and Maintenance Manuals for the other machines.

⁽²⁾ For sulfur content above 0.1%, refer to this topic in the Manual, SEBU6250, "Caterpillar Machine Fluid Recommendations".

⁽³⁾ Use Program B below to determine an appropriate interval.

Adjustment of the Oil Change Interval

Note: Your Cat dealer has additional information on this program.

Program B

Optimizing Oil Change Intervals

Begin with a standard oil change interval. The oil change intervals are adjusted by increments. Each interval is adjusted an additional 50 hours. Periodic oil sampling and analysis are done during each interval. The analysis includes oil viscosity and infrared (IR) analysis of the oil. Repeat Program B if you change the application of the machine.

If an oil sample does not pass the analysis, shorten the oil change interval.

References

Reference: Form, PEDP7035, "Optimizing Oil Change Intervals"

Reference: Form, PEDP7036, "S·O·S Fluid Analysis"

Reference: Form, PEHP7076, "Understanding the S·O·S Oil Analysis Tests"

Procedure for Changing the Engine Oil and Filter

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

Park the machine on a level surface. Stop the engine.

Note: Drain the crankcase while the oil is warm. This allows waste particles that are suspended in the oil to drain. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

Note: Run the engine at low idle for at least ten minutes before performing any other operations everytime the engine oil and oil filter are changed in order to protect your engine. Refer to "Operation Maintenance Manual" Engine and Machine Warm-up.

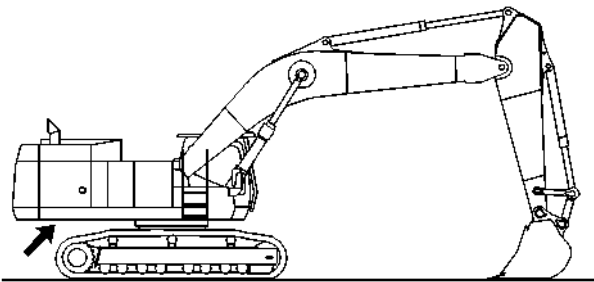


Illustration 495

g01105786

The crankcase drain valve is located under the rear of the upper structure.

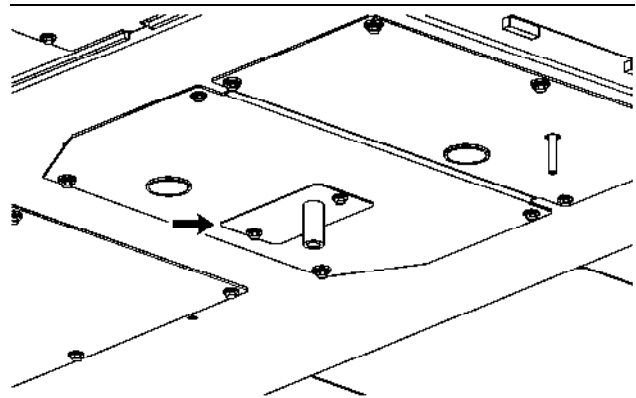


Illustration 496

g01100921

1. Remove the bolts and the washers. Remove the crankcase drain valve access cover.

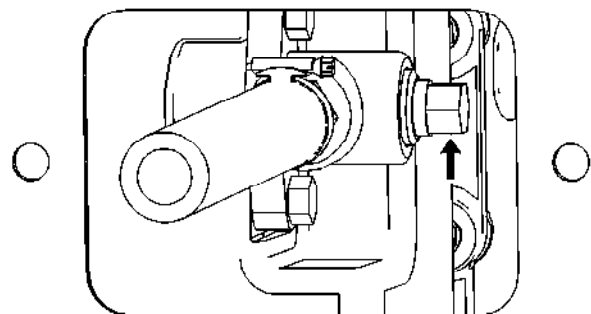


Illustration 497

g01100960

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

2. Open the crankcase drain valve. Allow the oil to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

3. Close the drain valve.

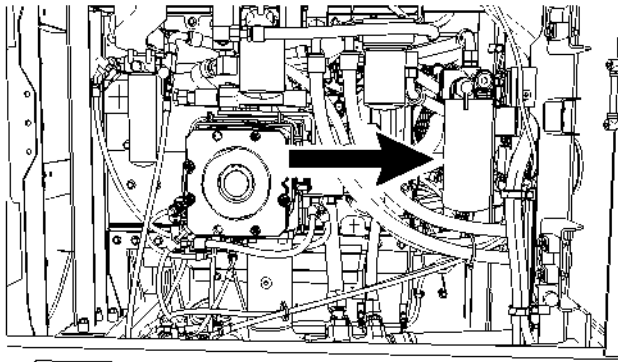


Illustration 498

g03445156

4. Open the access door on the right side of the machine.

5. Remove the oil filter with a strap type wrench.

Note: Dispose of the used oil filter according to local regulations.

6. Inspect the oil filter. See Operation and Maintenance Manual, "Oil Filter - Inspect".

7. Clean the filter housing base. Make sure that all of the old filter gasket is removed.

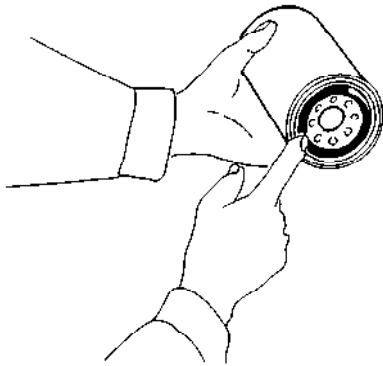


Illustration 499

g00101634

8. Apply a thin coat of engine oil to the gasket of the new filter.

9. Install the new filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

10. Close the access door on the left side of the machine.

11. Install the crankcase drain valve access cover with the bolts and the washers.

12. Unlatch the engine hood and raise the engine hood.

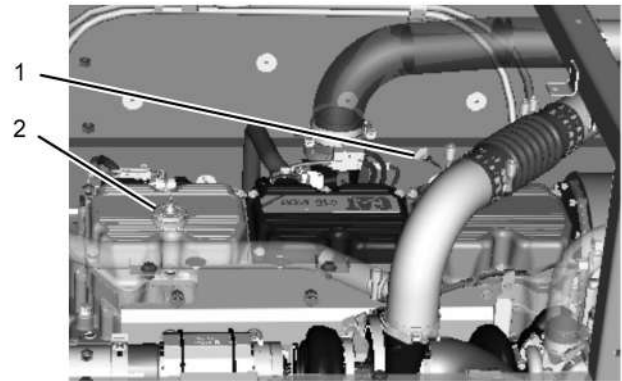


Illustration 500

g03381776

(1) Dipstick for the engine oil
(2) Filler plug for the engine oil

13. Unscrew oil filler plug (2) and remove the oil filler plug.

14. Fill the crankcase with new oil. See Operation and Maintenance Manual, "Capacities (Refill)".

15. 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.

NOTICE

Operating your engine when the oil level is above the "FULL" mark could cause your crankshaft to dip into the oil. The air bubbles created from the crankshaft dipping into the oil reduces the oil's lubricating characteristics and could result in the loss of power or engine failure.

16. Start the engine and allow the oil to warm. Check the engine for leaks. Stop the engine.

17. Wait for 30 minutes so that the oil can drain back into the crankcase, before you check the oil.

18. Remove dipstick (1). Wipe the oil off the dipstick and reinsert the dipstick.

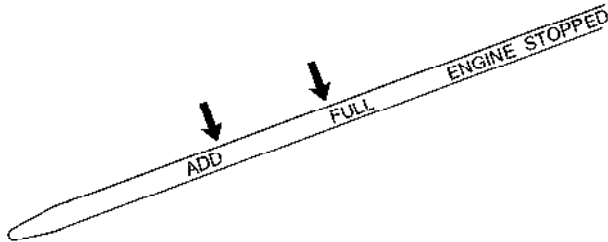


Illustration 501

g01100724

19. Remove the dipstick again. Make sure that the oil level is between the "ADD" and "FULL" marks on the "ENGINE STOPPED" side of the dipstick.
20. 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 502

g03381169

1. Open the access door on the right side of the machine.
2. Remove the dust cover (1).
3. Attach the hose to the male coupling.

Note: Make sure that the coupling and receiver are free from debris before attaching. Reinstall the dust covers when done.

4. Drain the oil or add the oil, as needed.

5. Install the dust cover.

i00707053

Engine Valve Lash and Fuel Injector Timing - Check

SMCS Code: 1105-025; 1209-535; 1290-531-FT

Refer to the Service Manual for the complete procedure for checking the engine valve lash. This procedure lists the steps for the engine valve lash adjustment and the steps in order to check the engine valve lash.

Note: Make sure that a qualified mechanic works on the injector fuel timing. Special tools and training are required.

Refer to the Service Manual for the complete procedure for checking the injector fuel timing or for adjusting the injector fuel timing.

Note: The correct fuel timing specification is given on the Engine Information Plate. Fuel timing specifications may differ for distinct engine applications and/or power ratings.

i00059702

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn to prevent being burned by hot oil spray.

1. Start the engine and run the engine at low idle.

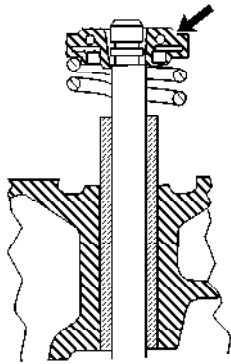


Illustration 503

g00102025

2. Watch the top surface on each valve rotator. Each valve rotator should turn slightly whenever the cylinder valve closes.

If a cylinder valve fails to rotate, consult your Caterpillar dealer.

i04688455

Ether Starting Aid Cylinder - Replace (If Equipped)

SMCS Code: 1456-510-CD

WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

To avoid possible injury, be sure the brakes are applied and all controls are in HOLD or NEUTRAL when starting the engine.

The ether cylinder is located inside the rear access door on the left side of the machine.

Refer to Operation and Maintenance, "Fire Prevention and Explosion Prevention" before you replace the ether cylinders.

1. Open the rear access door on the left side of the machine.

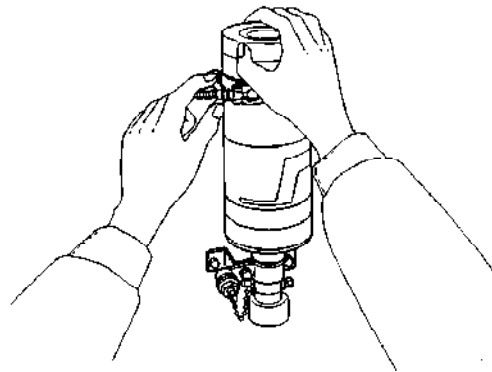


Illustration 504

g00751767

2. Loosen the cylinder retaining clamp.
3. Unscrew the empty ether starting aid cylinder and remove the empty ether starting aid cylinder.

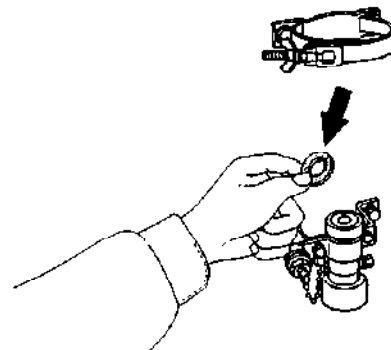


Illustration 505

g00751769

4. Remove the used gasket.
5. Install a new gasket.

Note: A new gasket is provided with each new ether starting aid cylinder.

6. Install the new ether starting aid cylinder.
7. Tighten the ether starting aid cylinder hand tight.
8. Tighten the cylinder retaining clamp securely.
9. Close the access door.

i07681009

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070

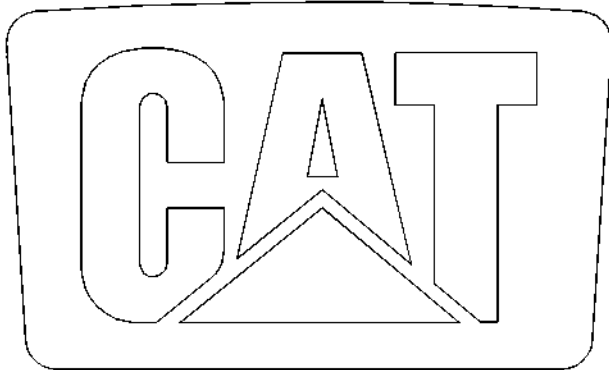


Illustration 506

g02174985

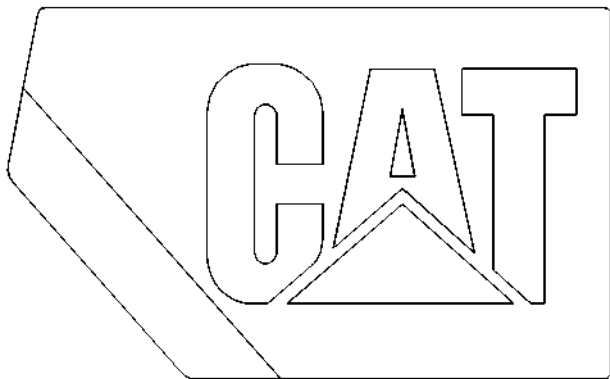


Illustration 507

g02175297



Illustration 508

g06394021

Typical example of the Product Identification Films.

Cleaning of the Films

Make sure that all of the product identification films are legible. Make sure that the recommended procedures are used in order to clean the product identification films. Ensure that all the product identification films are not damaged or missing. Clean the product identification films or replace the films.

Hand Washing

Use a wet solution with no abrasive material that contains no solvents and no alcohol. Use a wet solution with a "pH" value between 3 and 11. Use a soft brush, a rag, or a sponge in order to clean the product identification films. Avoid wearing down the surface of the product identification films with unnecessary scrubbing. Ensure that the surface of the product identification films is flushed with clean water and allow the product identification films to air dry.

Power Washing

Power washing or washing with pressure may be used in order to clean product identification films. However, aggressive washing can damage the product identification films.

Excessive pressure during power washing can damage the product identification films by forcing water underneath the product identification films. Water lessens the adhesion of the product identification film to the product, allowing the product identification film to lift or curl. These problems are magnified by wind. These problems are critical for the perforated film on windows.

To avoid lifting of the edge or other damage to the product identification films, follow these important steps:

- Use a spray nozzle with a wide spray pattern.
- A maximum pressure of 83 bar (1200 psi)
- A maximum water temperature of 50° C (120° F)
- Hold the nozzle perpendicular to the product identification film at a minimum distance of 305 mm (12 inch).

- Do not direct a stream of water at a sharp angle to the edge of the product identification film.

i06882903

Final Drive Oil - Change

SMCS Code: 4050-044-FLV

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

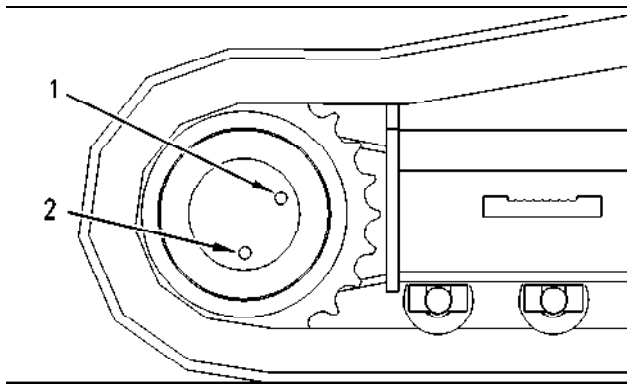


Illustration 509

g00822278

- (1) Oil level plug
(2) Oil drain plug

- 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.

- Remove drain plug (2) and level plug (1). Allow the oil to drain into a suitable container.
- 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.
- Install drain plug (2).
- 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.

- Install level plug (1).
- 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.
- Completely remove the oil that has spilled onto surfaces.
- Start the machine and allow the final drives to run through several cycles.
- Stop the machine. Check the oil level.
- Check the drained oil for metal chips or for particles. If there are any chips or particles, consult your Cat dealer.
- Properly dispose of the drained material. Obey local regulations for the disposal of the material.

i03914051

Final Drive Oil Level - Check

SMCS Code: 4050-535-FLV

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

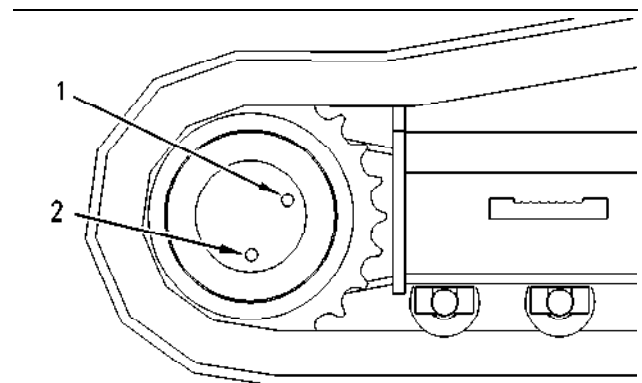


Illustration 510

g00822278

- (1) Oil level plug
(2) Oil drain plug

- Position one final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

2. Remove oil level plug (1).
3. Check the oil level. The oil should be near the bottom of the level plug opening.
4. Add oil through the level plug opening, if necessary. See Operation and Maintenance, "Lubricant Viscosities".

Note: If the oil fills slowly, the fill hole may be blocked by the planetary gear. Rotate the final drive in order to move the planetary gear away from the fill hole.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive. The final drive may become contaminated.

5. Clean oil level plug (1). Inspect the O-ring seal. Replace the O-ring seal if the O-ring seal is worn or damaged.
6. Install oil level plug (1).
7. Repeat the procedure for the other final drive.

i03756611

Final Drive Oil Sample - Obtain

SMCS Code: 4011-008; 4050-008; 4050-SM; 7542-008

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

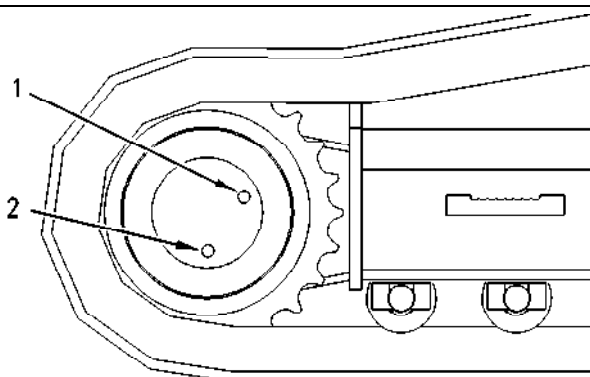


Illustration 511

g00822278

- (1) Oil level plug
(2) Oil drain plug

1. Position the final drive so that oil drain plug (2) is at the bottom.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

2. Remove oil level plug (1).
3. Obtain a sample of the final drive oil through the hole for the oil level plug.
4. Install oil level plug (1).

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" "S·O·S Oil Analysis" for more information on obtaining a sample of the final drive oil. For additional information about taking an oil sample, refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample".

i07318401

Fuel System - Prime

SMCS Code: 1250-548

WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. To help prevent possible injury, turn the start switch off when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not loosen the fuel lines at the fuel manifold. The fittings may be damaged and/or a loss of priming pressure may occur when the fuel lines are loosened.

NOTICE

Do not allow dirt to enter the fuel system. Thoroughly clean the area around a fuel system component that will be disconnected. Fit a suitable cover over any disconnected fuel system components.

Prime the fuel system to fill the fuel filter, and prime the fuel system to purge trapped air. The fuel system should be primed under the following conditions:

- The fuel tank is running low.
 - The machine has been stored.
 - The fuel filter is being replaced.
 - The fuel system has been repaired.
1. Turn the engine start switch to the ON position. Leave the engine start switch in the ON position for 4 minutes.
 2. Verify that the water separator is full of fuel.
 3. If the water separator is not full of fuel, turn the engine start switch OFF and then turn the engine start switch ON. Turning the engine start switch off and on will cycle the fuel priming pump again.
 4. When the water separator is full of fuel, attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate at low idle until the engine is running smoothly. If the engine cannot be started, or if the engine continues to misfire or smoke, repeat Step 1.

i05785593

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1263-510-FQ

WARNING

Personal injury or death may result from failure to adhere to the following procedures.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE

Do not fill the fuel filters with fuel before installing the fuel filters. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts.

1. Remove the cover above the left side access door.

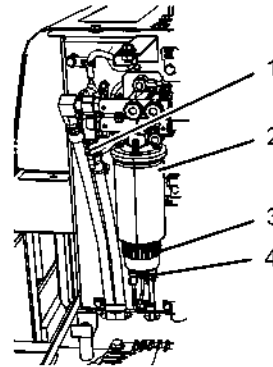


Illustration 512

g03231938

- (1) Shutoff valve
(2) Filter
(3) Bowl
(4) Drain valve

2. Turn off the fuel supply to the fuel filter by turning the shutoff valve (1) clockwise.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" that pertains to containing fluid spillage.

3. Turn drain valve (4) counterclockwise in order to open. The drain valve is located on the bottom of the water separator.
4. Drain the water and sediment into a suitable container.

Note: Dispose of drained fluids and used filters according to local regulations.

5. Close drain valve (4).
6. Remove the filter (2) from the filter base. A filter wrench may be used to loosen the filter.
7. Remove the bowl (3) from the filter (2). Discard the used filter.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

8. Clean the inside surface of the filter head and of bowl (3).
9. Inspect the O-ring on bowl (3). Also inspect the seal on the filter head. Replace these seals if the seals are worn or damaged.
10. Lubricate the O-ring seal for the bowl (3) with clean diesel fuel or lubricate the O-ring seal with motor oil. Place the O-ring seal in the groove in the bowl.

Maintenance Section
Fuel System Secondary Filter - Replace

11. Install the bowl (3) onto the new filter element by hand until the bowl is snug. Tighten the bowl to 7.3 N·m (5.0 lb ft) to approximately 1/6 of a turn. Do not use tools to tighten the bowl to the new filter element.

12. Lubricate the O-ring seal on the new filter element with clean diesel fuel or lubricate the O-ring seal with motor oil.

13. Install the new filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

14. Turn on the fuel supply to the filter by turning the shutoff valve (1) counterclockwise.

Note: Do not start the engine until all service to the fuel system is complete. For instructions about priming the fuel system, refer to Operation and Maintenance Manual, "Fuel System - Prime".

15. Remount the cover over the filters.

i05065833

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510

WARNING

Personal injury or death can result from a fire.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

1. Remove the cover.

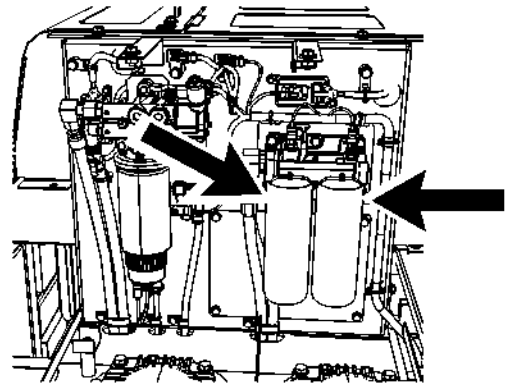


Illustration 513

g03232057

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

2. Remove the fuel filter.

Note: The fuel filter has not been drained. The filter contains fuel. When you remove the filter, use caution in order to avoid spilling the fuel.

3. Inspect the fuel filter for debris by cutting the fuel filters open.

Note: Dispose of used filters and used fluids according to local regulations.

4. Clean the mounting base of the fuel filter. Make sure that all of the old seal is removed from the mounting base.

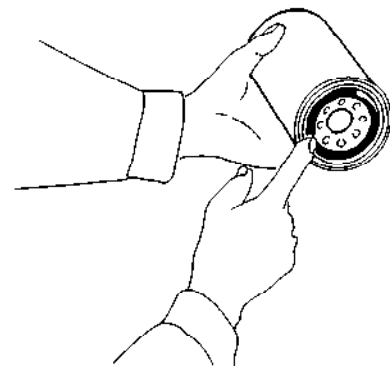


Illustration 514

g00101634

5. Apply a thin coat of clean diesel fuel to the sealing surface of the new fuel filter.

6. Install the new filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

7. Prime the fuel system. Refer to Operation and Maintenance, "Fuel System - Prime".
8. Reattach the cover.

i05065911

Fuel System Water Separator - Drain

SMCS Code: 1263

1. Remove the cover above the access door on the left side of the machine.
2. Provide a suitable container for used fluid.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on Containing Fluid Spillage.

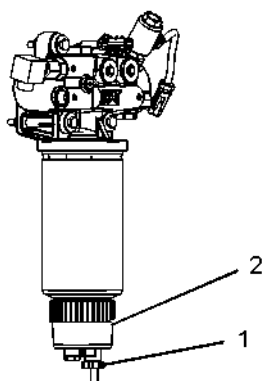


Illustration 515

g02022485

- (1) Drain valve
(2) Bowl

3. Check bowl (2) in the bottom of the water separator. Open drain valve (1). Drain the water and sediment in the bowl.

Note: Dispose of used fluids according to local regulations.

4. Close drain valve (1).
5. Replace cover over filters.

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-STR

1. The fuel tank is located on the right side of the machine.

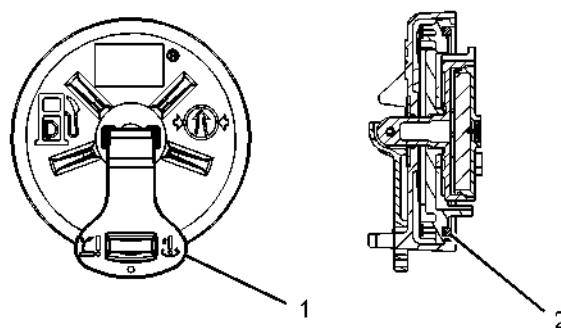


Illustration 516

g02022539

2. Lift lever (1) and turn lever (1) counterclockwise until the lever stops. Remove the cap.
3. Inspect seal (2) for damage. Replace the seal, if necessary.

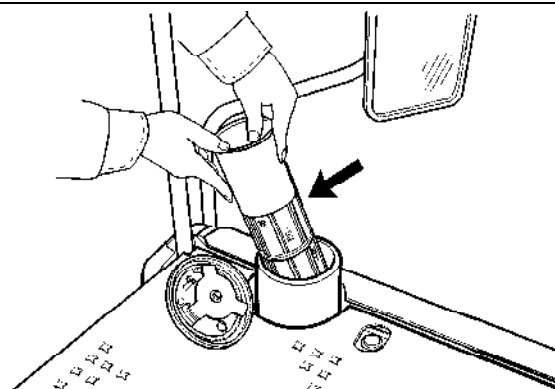


Illustration 517

g00824196

4. Remove the strainer that is located in the filler opening.
5. Wash the strainer and the fuel tank cap in a clean, nonflammable solvent.
6. Apply a thin film of fuel to the gasket of the fuel tank cap.
7. Install the strainer into the filler opening.
8. Install the fuel tank cap.

i04421489

Fuel Tank Cap Filter - Replace

SMCS Code: 1273-510-FI; 1273-510-Z2

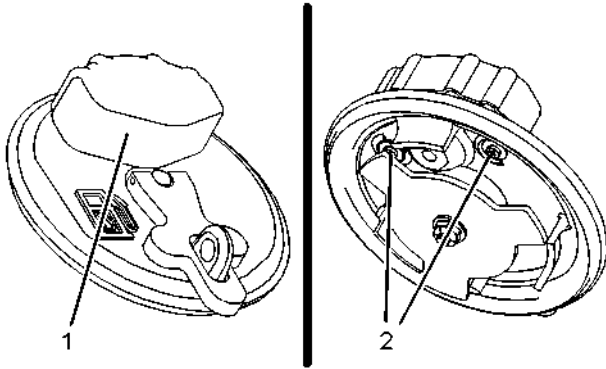


Illustration 518

g02612539

1. Remove the fuel cap.
2. Remove filter element screws (2) from the underside of the fuel cap and remove old filter element (1).
3. Wash the fuel tank cap in a clean, nonflammable solvent.
4. Install a new fuel cap filter element.
5. Install filter element screws (2) in order to secure filter element (1) to the fuel cap.
6. Install the fuel tank cap

i04462462

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

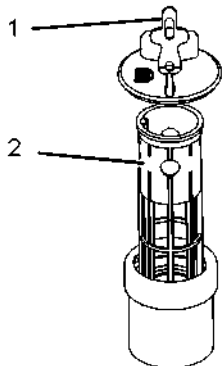


Illustration 519

g02609604

1. Remove fuel tank cap (1).

2. Remove strainer (2) from the filler opening.
3. Wash the strainer in a clean, nonflammable solvent.
4. Install the strainer into the filler opening.
5. Install the fuel tank cap.

i06061288

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543

The fuel tank drain valve is located on the right side of the machine under the fuel tank.

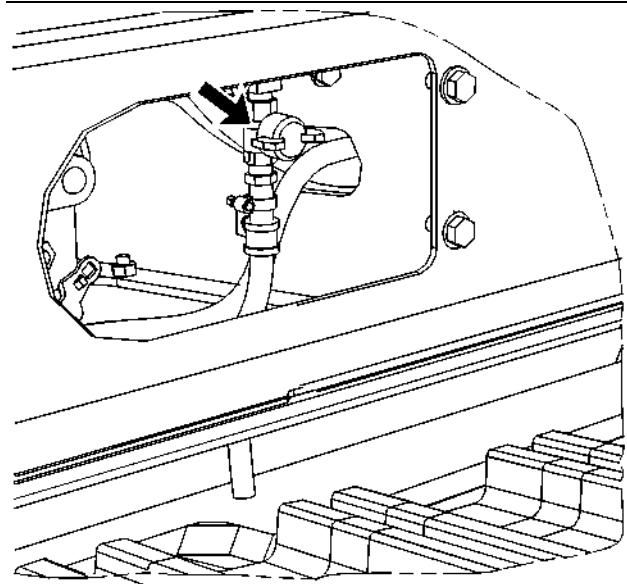


Illustration 520

g03795583

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

1. Open the drain valve by turning the valve counterclockwise. Allow the water and the sediment to drain into a suitable container.

Note: Dispose of drained fluids according to local regulations.

2. Close the drain valve by turning the valve clockwise.

Fill the Fuel Tank

You can now add fuel to the fuel tank, if necessary. Remove the fuel tank cap and pump fuel through the opening.

Make sure that you lock the fuel tank cap after the refueling is complete.

Note: For machines equipped with fast fill fuel attachment, when the fuel is refilled from the top fuel port, stop refilling as the indicator starts to appear in order to avoid fuel spilling from the breather.

i05337713

Fuses - Replace

SMCS Code: 1417-510

Open the access door on the left side of the machine.

The fuse panel is located on the circuit breaker panel. Open the access cover for fuse access.



Fuses – Fuses protect the electrical system from damage that is caused by overloaded circuits. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit and/or repair the circuit.

NOTICE

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

NOTICE

If it is necessary to replace fuses frequently, an electrical problem may exist.

Contact your Cat dealer.

To replace a fuse, use the puller that is stored in the fuse panel. The following spare fuses are stored in the fuse panel: one fuse of 5 A, two fuses of 10 A, two fuses of 15 A and one fuse of 30 A.

The following list identifies the circuits that are protected by each fuse. The amperage for each fuse is included with each circuit.

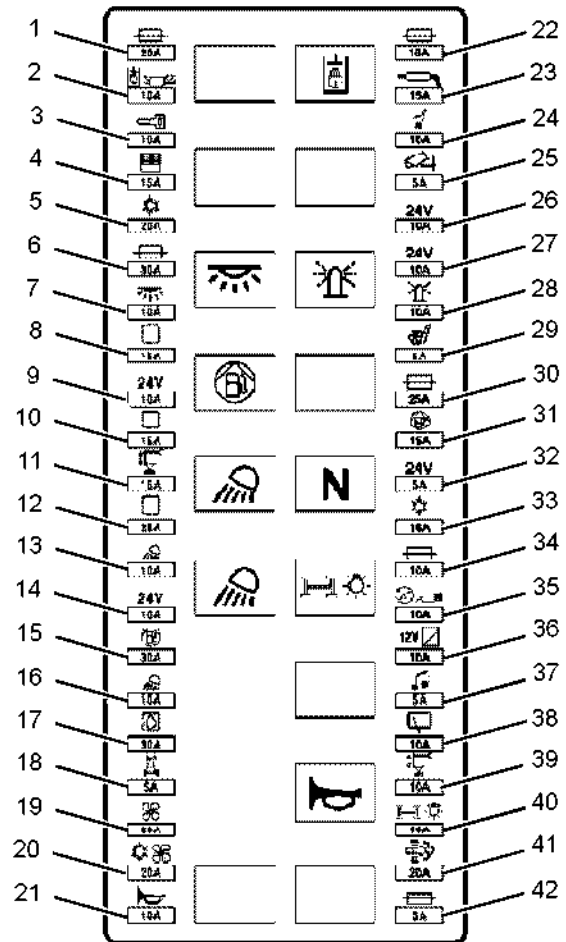


Illustration 521

g03381186

- (1) Spare – 20 Amp
- (2) Hydraulic Lock – 10 Amp
- (3) Engine Start Switch – 10 Amp
- (4) Monitor – 15 Amp
- (5) Air Conditioner Condenser Blower – 20 Amp
- (6) Engine Control Module (ECM) – 30 Amp
- (7) Spare – 15 Amp
- (8) Fan – 20 Amp
- (9) Auxiliary – 10 Amp
- (10) Electronic Control Module – 15 Amp
- (11) Cat Grade Control – 15 Amp
- (12) Excavator Control Module – 25 Amp
- (13) Cab Light – 10 Amp
- (14) Engine Electronic Control Module (ECM) – 30 Amp

- (15) Electric Refueling Pump – 30 Amp**
- (16) Boom Light – 10 Amp**
- (18) Product Link – 5 Amp**
- (19) Lifting Pump – 5 Amp**
- (20) Heater and Air Conditioner Blower Fan – 20 Amp**
- (21) Horn – 10 Amp**
- (22) Spare – 15 Amp**
- (23) Spare – 15 Amp**
- (24) Air Suspension Seat – 10 Amp**
- (25) Camera – 5 Amp**
- (26) Auxiliary – 10 Amp**
- (27) Auxiliary – 10 Amp**
- (28) Beacon – 10 Amp**
- (29) Seat Heater – 5 Amp**
- (30) Spare – 25 Amp**
- (31) Priming Pump – 15 Amp**
- (32) Auxiliary – 5 Amp**
- (33) Air Conditioner – 5 Amp**
- (34) Spare – 10A**
- (35) Attachment Solenoid – 10 Amp**
- (36) 12V Converter – 10 Amp**
- (37) Radio – 5 Amp**
- (38) Window Wiper – 10 Amp**
- (39) Cat Grade Control – 15 Amp**
- (40) Chassis Light – 10 Amp**
- (41) Clean Emissions Module (ECM) – 20 Amp**
- (42) Warning Light – 5 Amp**

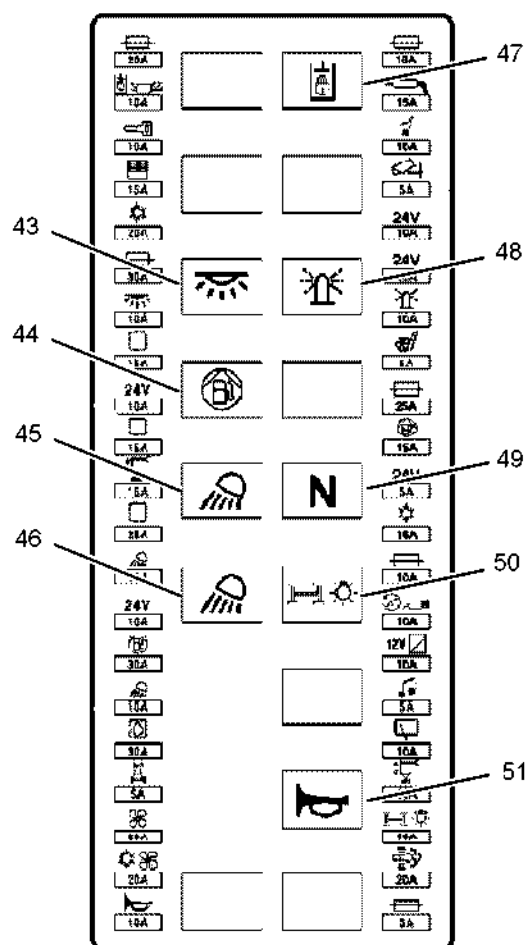


Illustration 522

g03381411

- (43) Travel Alarm – Relay**
- (44) Priming Pump – Relay**
- (45) Boom Light 1 – Relay**
- (46) Boom Light 2 – Relay**
- (47) Hydraulic Lock – Relay**
- (48) Chassis Lamp – Relay**
- (49) Neutral Start – Relay**
- (50) Chassis Light – Relay**
- (51) Horn – Relay**

i08067436

High Intensity Discharge Lamp (HID) - Replace (If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE

Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, "Prepare the Machine for Maintenance".
2. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least 5 minutes, to ensure that the bulb is cool.
3. Disassemble the housing for the HID lamp to have access to the bulb.

Note: On some HID lamps, the bulb is a part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

4. Remove the bulb from the HID lamp.
5. Install the replacement bulb in the HID lamp.

If the bulb is a part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: To avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

6. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly for the HID lamp's mounting position on the machine.
7. Reattach the electrical power to the HID lamp.
8. Check the HID lamp for proper operation.

Note: Consult your Cat dealer for additional information on HID lamps.

i03997397

Hydraulic System Filter Element (Fine Filtration) - 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.

1. Park the machine on level ground.
2. Place the machine in the servicing position.
3. Move the hydraulic lockout control to the LOCKED position. Stop the engine.
4. Slowly loosen the filler plug in order to relieve any pressure.
5. Tighten the filler plug after the pressure is relieved.
6. Open the access door on the right side of the machine. The filter is located near the hydraulic tank.

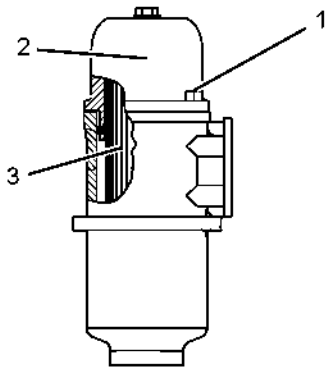


Illustration 523

g02175170

7. Remove four bolts (1) and cover (2) from the fine filtration filter.
8. Remove element (3) from the filter assembly.
9. Install a new filter element.
10. Install cover (2) and four bolts (1).
11. Close the access door.

i05626750

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 3000 service hours or 18 months.

A maintenance interval of 6000 service hours or 3 years for changing the hydraulic oil is available. The extended interval requires S·O·S monitoring of the hydraulic oil. The interval for S·O·S monitoring is every 500 hours. The maintenance interval for the hydraulic oil filter is not changed.

Machines with hammers are not included in the maintenance interval of 6000 service hours or 3 years. Machines with hammers must use the intervals that are listed in the Maintenance Interval Schedule. Machines that are used in severe conditions are not included in the maintenance interval of 6000 service hours or 3 years. Machines that are used in severe conditions must use the interval in the Maintenance Interval Schedule.

Drain the Oil

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

1. Park the machine in the servicing position on level ground.
2. Clean the top of the hydraulic tank thoroughly in order to keep dirt out of the hydraulic tank.

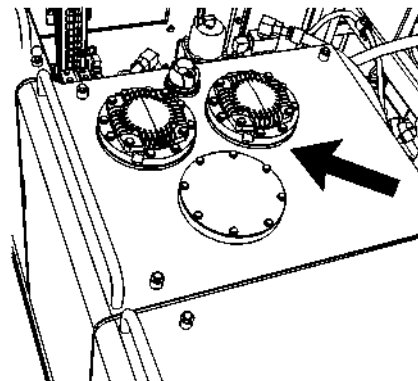


Illustration 524

g03241185

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.

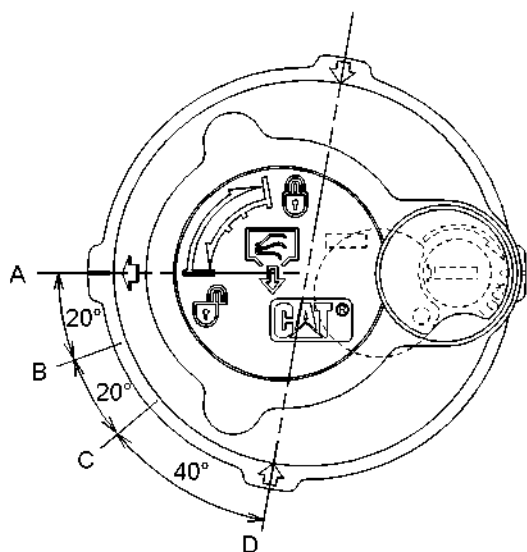


Illustration 525

g02275615

Filler cap

- (A) LOCK position
- (B) PRESSURE RELEASE - START position
- (C) PRESSURE RELEASE - END position
- (D) OPEN position

3. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 525 for filler cap positions.
 - a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).
 - b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
 - c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).
 - d. The hydraulic tank pressure is relieved. The filler cap can now be removed if needed.
 - e. Tighten the filler cap on the hydraulic tank to position (A).
4. After the pressure is relieved, tighten the filler cap.

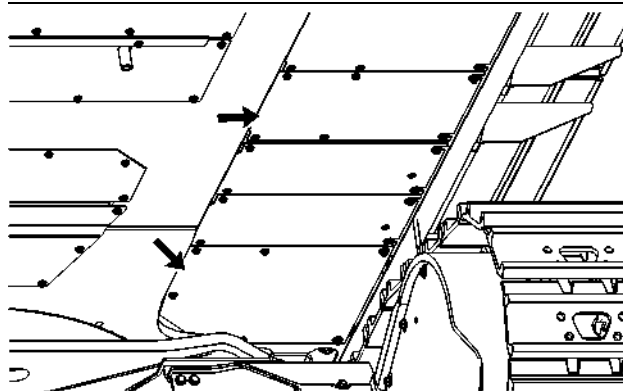


Illustration 526

g01137581

5. Remove the two access covers that are located under the hydraulic tank. This will allow access to the drain valve and the pipe.

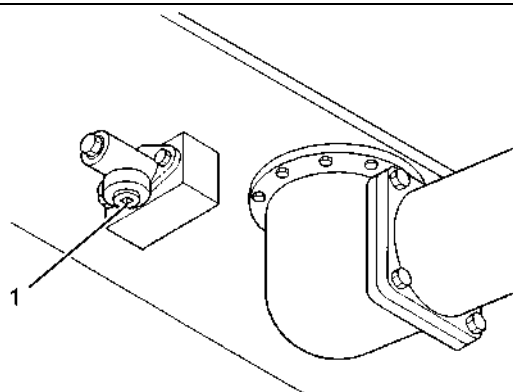


Illustration 527

g01137579

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

6. Remove plug (1).

Maintenance Section
Hydraulic System Oil - Change

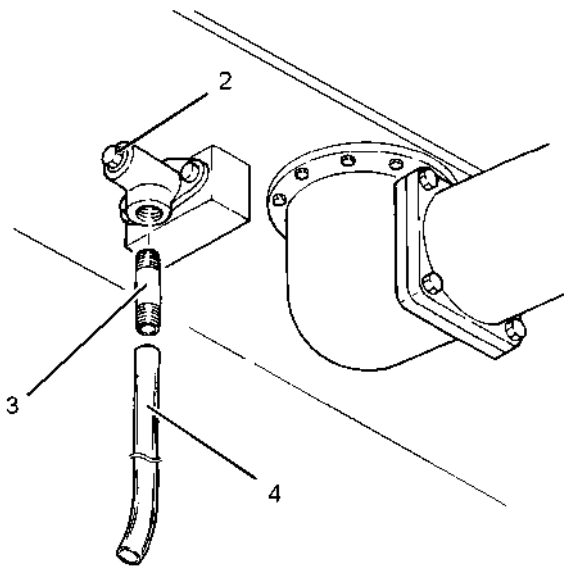


Illustration 528

g01137580

- (2) Drain plug
(3) Pipe Nipple
(4) Tube

7. Install a pipe nipple (3) with a clear plastic tube (4) into the hole on the bottom of the hydraulic tank.
8. Loosen drain plug (2) in order to drain the oil.
9. Drain the oil into a suitable container.
10. After the oil has been drained, tighten drain plug (7) to a torque of $110 \pm 15 \text{ N}\cdot\text{m}$ ($81 \pm 11 \text{ lb ft}$).
11. Remove the pipe nipple.
12. Clean plug (1) and install the plug. Tighten the plug to a torque of $75 \pm 5 \text{ N}\cdot\text{m}$ ($55 \pm 48 \text{ lb ft}$).

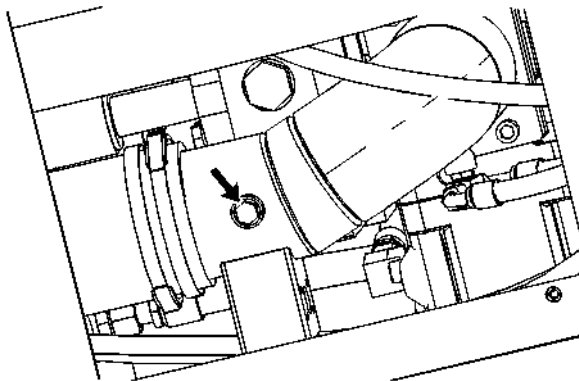


Illustration 529

g01137392

13. Remove the plug from the tube. Allow the oil to drain into a container.

14. Inspect the O-ring. Replace the O-ring if wear or damage is evident.

15. Clean the plug. Install the plug and the O-ring into the drain port.

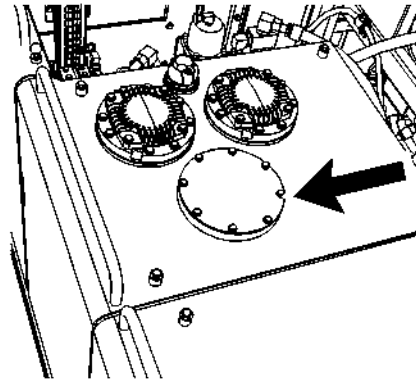


Illustration 530

g03241237

16. Remove the cover to the hydraulic tank screen.

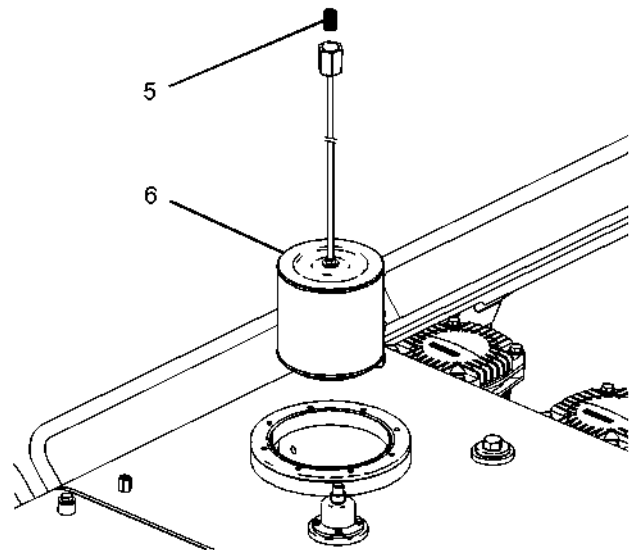


Illustration 531

g01137588

- (5) Spring
(6) Screen

Note: Do not allow spring (5) to fall back into the tank.

17. Remove spring (5) and screen (6).

Note: Refer to Operation and Maintenance, "General Hazard Information" for information on containing fluid spillage.

18. Wash the screen in a clean nonflammable solvent. Allow the screen to dry. Inspect the screen. Replace the screen, if the screen is damaged.
19. There is an O-ring seal on the bottom of the screen. There is also an O-ring seal on the hydraulic tank around the opening for the screen. Inspect the O-ring seals. Replace the O-ring seals if wear or damage is evident.
20. Install the screen and the spring. Then install the cover.

Note: Make sure that the O-ring seals and the spring are properly positioned during installation.

Service the Hydraulic System Filters

Note: The hydraulic oil system must be empty when the filters are being serviced. Service the filters before refilling the machine with hydraulic oil.

Note: Dispose of used filters and used fluids according to local regulations.

Refer to the following topics in order to service the hydraulic system filters:

- Operation and Maintenance Manual, "Hydraulic System Filter Element (Fine Filtration) - Replace (If Equipped)"
- Operation and Maintenance Manual, "Hydraulic System Oil Filter (Return) - Replace"
- Operation and Maintenance Manual, "Hydraulic System Oil Filter (Case Drain) - Replace"
- Operation and Maintenance Manual, "Hydraulic System Oil Filter (Pilot) - Replace"

Fill the Hydraulic Tank

1. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Capacities (Refill)".
2. Inspect the O-ring seal on the filler plug for damage. Replace the O-ring, if necessary. Clean the filler plug. Install the filler plug.

Note: Make no attempt to start the engine until the pump has been filled with hydraulic oil. Serious damage to the hydraulic components can result.

When the hydraulic oil has been replaced, the air must be removed from the hydraulic oil system. To remove the air from the hydraulic oil system, follow Step 2a through Step 2d.

- a. Start the engine.

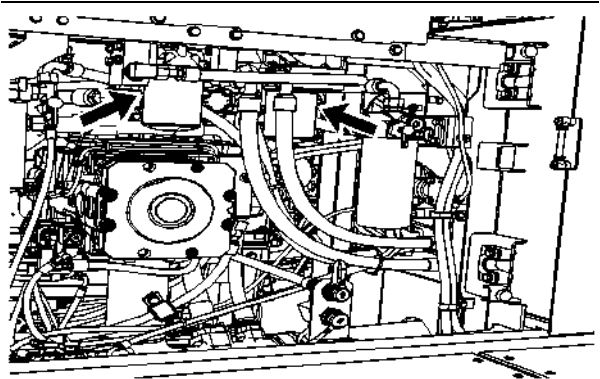


Illustration 532

g03573781

- b. Slowly loosen the vent plug on top of the case drain filter until hydraulic oil flows out of the vent plug.
- c. After oil flows out of the vent plug without any air bubbles, tighten the vent plug. This indicates that the air has been purged from the drain lines for the main pump and the drain line for the swing pump. Tighten the vent plug to a torque of $11 \pm 1 \text{ N}\cdot\text{m}$ ($97 \pm 9 \text{ lb in}$).
- d. Stop the engine.

3. Start the engine. Operate the engine at idling speed for five minutes.
4. Operate the joysticks in order to circulate the hydraulic oil. Return the machine to the servicing position. Stop the engine.

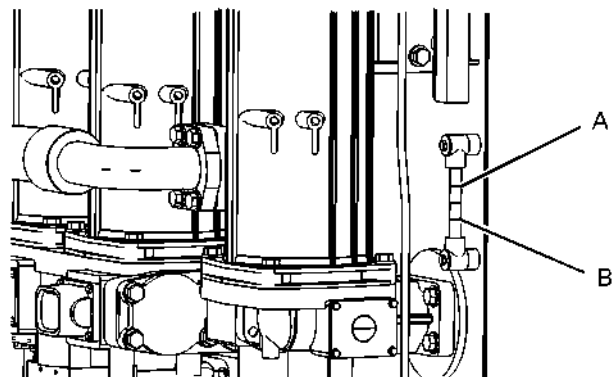


Illustration 533

g01137399

- (A) High temperature range
- (B) Low temperature range

5. Maintain the oil level between the marks on the sight gauge in the appropriate temperature range.

i05055829

Hydraulic System Oil Filter (Return) - Replace

SMCS Code: 5068-510-RJ

The return filter is a cartridge type filter. By using a cartridge type filter, the amount of foreign material that enters the hydraulic system is reduced when the filter element is replaced.

Note: If the display shows that the hydraulic return filter is plugged, push the reset switch. Run the machine on level ground for approximately 10 seconds. If the error is still present, inspect the filter and replace the filter, if necessary.

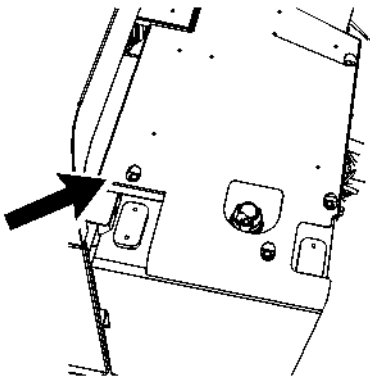


Illustration 534

g03225276

1. Remove the cover in order to access the return filters.

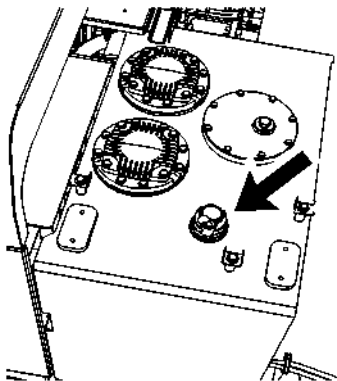


Illustration 535

g03225283

2. Hydraulic Cap is located on top of hydraulic tank.

WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

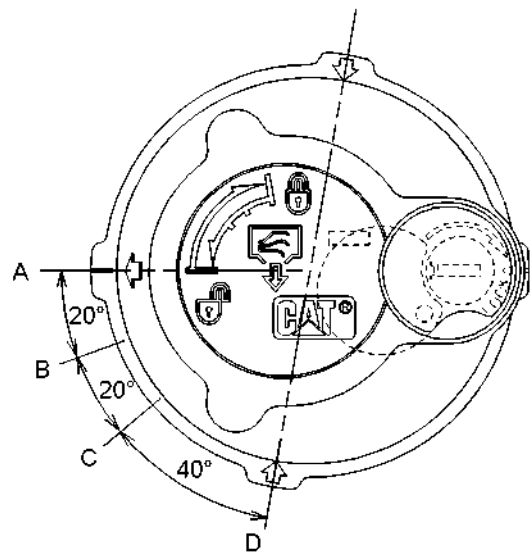


Illustration 536

g02275615

Filler cap

- (A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

3. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 536 for filler cap positions.
 - a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).
 - b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
 - c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).
 - d. The hydraulic tank pressure is relieved. The filler cap can now be removed if needed.
 - e. Tighten the filler cap on the hydraulic tank to position (A).

4. After the pressure is relieved, tighten the filler cap.

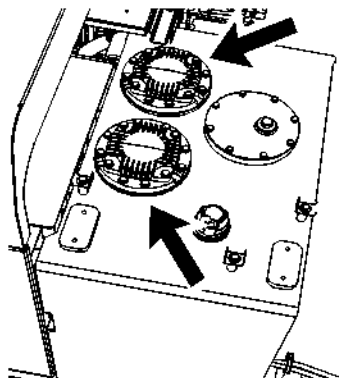


Illustration 537

g03225316

5. Remove the filter cartridge. Perform Step 5a through Step 5f in order to remove the filter cartridge.

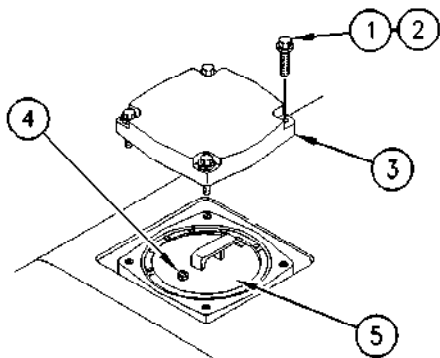


Illustration 538

g00102211

- (1) Bolts
- (2) Washers
- (3) Cover
- (4) Plug
- (5) Filter cartridge

a. Remove bolts (1), washers (2), and cover (3).

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

b. Remove plug (4) in order to release the pressure in filter cartridge (5).

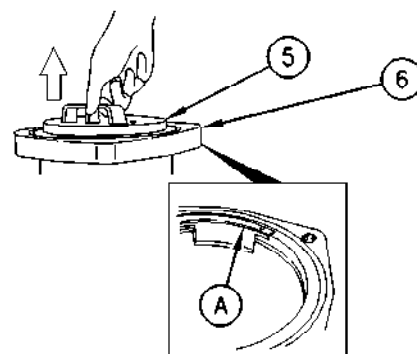


Illustration 539

g00102212

- (5) Filter cartridge
- (6) Filter case
- (A) Guide

c. Pull up the handle at the top of filter cartridge (5) until the filter cartridge contacts guide (A) on filter case (6).

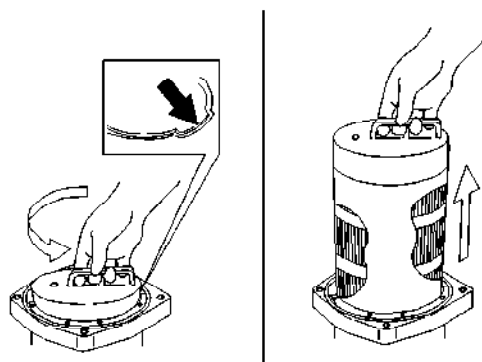


Illustration 540

g00102214

d. Turn the filter cartridge counterclockwise by 180 degrees in order to align the projection of the filter cartridge with the notch of the filter case. Pull out the filter cartridge.

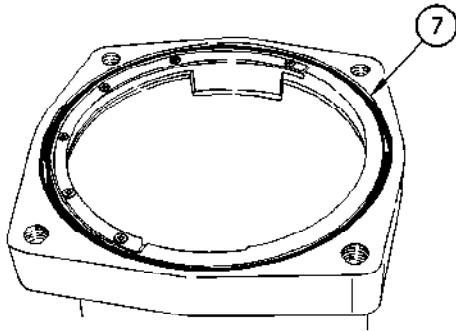


Illustration 541

g00102219

(7) O-ring

- e. Inspect the cover and O-ring (7). If either part is damaged, replace the part.
- f. Inspect the filter cartridge for debris and for damage. If necessary, replace the filter cartridge.
- g. Repeat Step 5a through Step 5f for the other filter groups.

- 6. Remove the filter element. Perform Step 6a through Step 6f in order to remove the filter element.

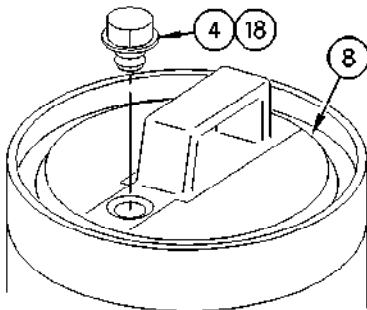


Illustration 542

g00104507

(4) Plug
(8) Plate
(18) O-ring

- a. Make sure that plug (4) is removed. Make sure that all of O-ring (18) is removed from plate (8).

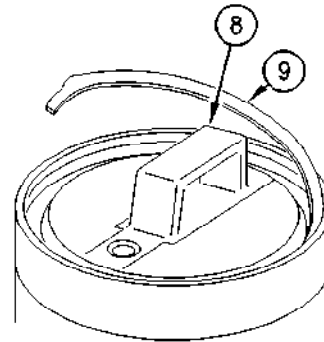


Illustration 543

g00918893

(8) Plate
(9) Spiral retaining ring

- b. Remove spiral retaining ring (9).

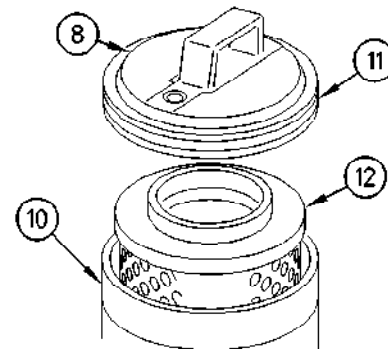


Illustration 544

g00104510

(8) Plate
(10) Shell
(11) O-ring
(12) Filter element

- c. Hold the filter cartridge with one hand. Grasp the grip of plate (8) with your other hand. Lift plate (8) in order to separate plate (8) from the filter cartridge.
- d. Remove O-ring (11) from plate (8).
- e. Lift filter element (12) from shell (10).
- f. Pour the remaining oil into a suitable container.

Note: Dispose of used oil according to local regulations.

- g. Repeat Step 6a through Step 6f for the other filter groups.

- 7. Clean the shell of the filter cartridge. Perform Step 7a through Step 7d in order to clean the shell of the filter cartridge.

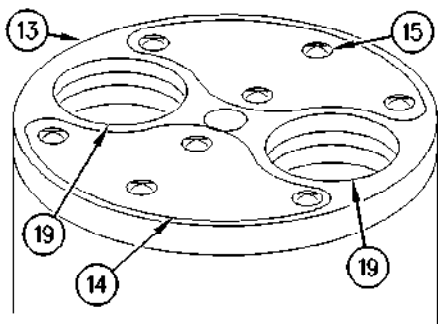


Illustration 545

g00104511

- (13) Slide plate
- (14) Pads
- (15) Screws
- (19) Port

- a. Turn shell (10) upside-down.
 - b. Remove screws (15).
 - c. Remove Pads (14) from slide plate (13).
 - d. Wash the following parts in a clean nonflammable solvent: plug (4), plate (8), spiral retaining ring (9), shell (10) and Pads (14). Dry the parts.
 - e. Repeat Step 7a through Step 7d for the other filter groups.
- 8.** Install the filter elements. Perform Step 8a through Step 8k in order to install the filter elements.

Note: Consult a Caterpillar dealer for the Service Kit that is needed to install the filter element and the filter cartridge.

- a. Apply spray type oil to the inside of shell (10) in order to prevent rust.
- b. Apply grease to a new O-ring (11).
- c. Plate (8) will contact the inside of shell (10). Apply grease to this point.
- d. Apply grease to O-rings inside ports (19) at the bottom of shell (10).
- e. Install new Pads (14). Tighten the screws to a torque of 0.4 N·m (3.5 lb in).
- f. Apply spray type oil into the clearance between shell (10) and slide plate (13).

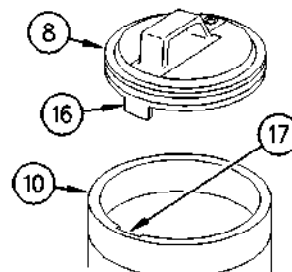


Illustration 546

g00104512

- (8) Plate
- (10) Shell
- (16) Boss
- (17) Notch

- g. Turn over shell (10). Apply grease to the two O-rings on new element (12). Install element (12) into shell (10).
 - h. Move boss (16) in alignment with notch (17). Install plate (8) into shell (10).
 - i. Install spiral retaining ring (9) into the groove in shell (10).
 - j. Apply grease to new O-ring (18). Install O-ring (18) on plug (4).
 - k. Install plug (4) into plate (8).
 - l. Repeat Step 8a through Step 8k for the other filter groups.
- 9.** Install the filter cartridge. Perform Step 9a through Step 9e in order to install the filter cartridge.

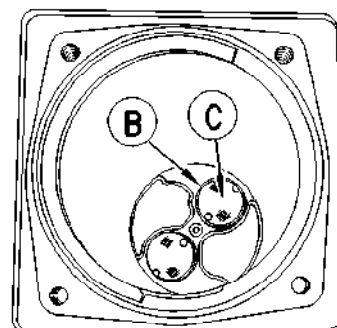


Illustration 547

g00102220

- (B) Port
- (C) Slide plate

- a. Check that ports (B) at the bottom of the filter case are closed.

Maintenance Section
Hydraulic System Oil Filter - Replace

Note: If the ports are open, rotate slide plate (C) counterclockwise to the stopper in order to fully close the ports. When the ports are fully closed, any remaining oil in the filter case should be completely removed.

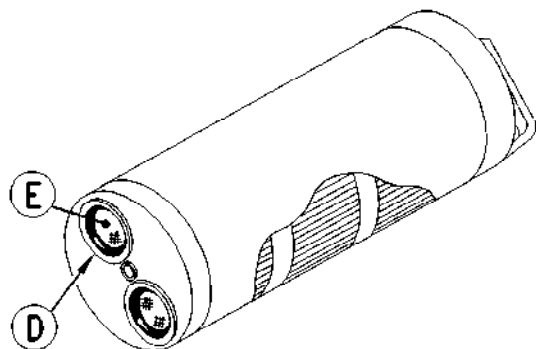


Illustration 548

g00102221

(E) Slide plate
(D) Port

- b. Check that ports (D) of the filter cartridge are fully closed.

Note: The filter cartridge cannot be installed unless the ports are fully closed. If the ports are open, rotate slide plate (E) counterclockwise to the stopper in order to fully close the ports.

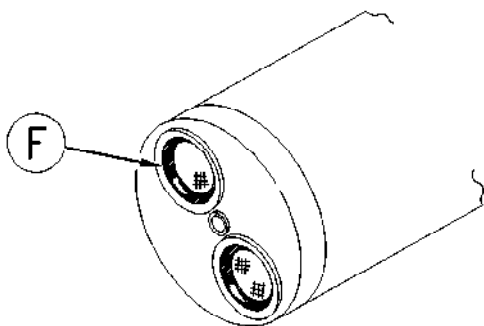


Illustration 549

g00102222

(F) O-rings

- c. Check that O-rings (F) have been installed and that oil has been applied to O-rings (F).

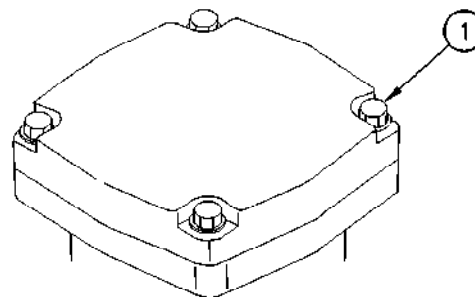


Illustration 550

g00102225

(1) Bolts

- d. Install the filter cartridge into the filter case.
Turn the filter cartridge clockwise by 180 degrees and push down the filter cartridge when the filter cartridge contacts guide (A).
- e. Install plug (4), cover (3), washers (2), and bolts (1). Tighten bolts (1) to a torque of $29 \pm 5 \text{ N}\cdot\text{m}$ ($22 \pm 4 \text{ lb}\cdot\text{ft}$).
- f. Repeat Step 9a through Step 9e for the other filter groups.

i05622834

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

Pilot Filter

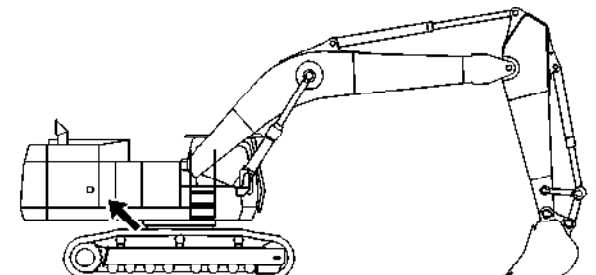


Illustration 551

g01103135

1. Open the front access door on the right side of the machine.

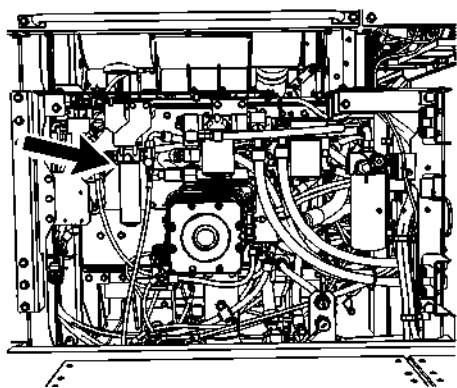


Illustration 552

g03570316

2. Clean the area in order to keep dirt out of the filter base.
3. Remove the used pilot filter element from the filter base.

Note: Dispose of used filters according to local regulations.

4. Clean the filter base.

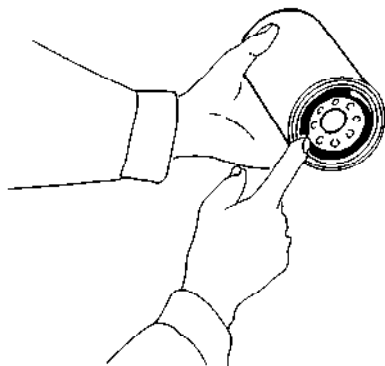


Illustration 553

g00101502

5. Coat the seal of a new pilot filter with clean hydraulic oil. Tighten the pilot filter hand tight.
6. Install the new pilot filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

7. Close the access door.

Case Drain Filters

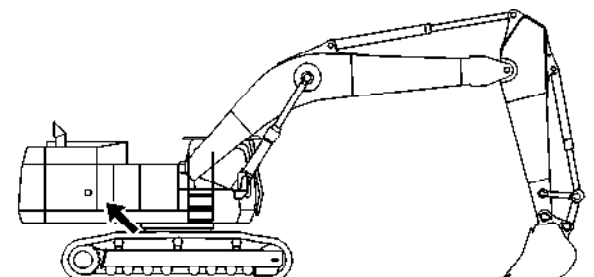


Illustration 554

g03225501

The case drain filters are on the inside of the access door.

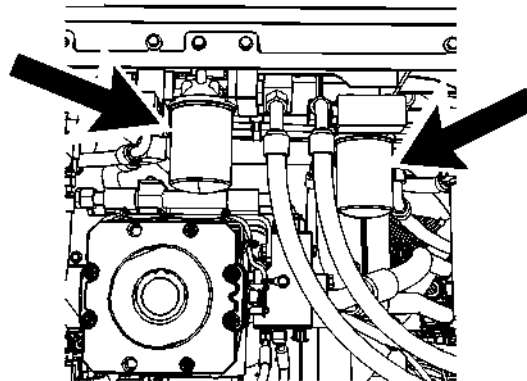


Illustration 555

g03225517

1. Clean the area in order to keep dirt out of the filter base.
2. Remove the used case drain filter from the filter base.

Note: Dispose of used filters according to local regulations.

3. Clean the filter base.

Maintenance Section
Hydraulic System Oil Filter - Replace

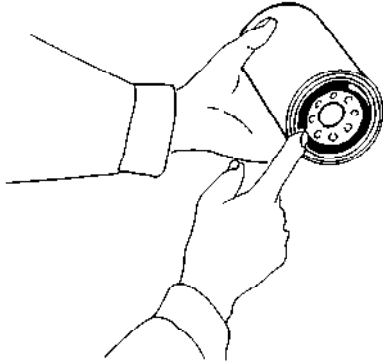


Illustration 556

g00101502

4. Coat the seal of a new case drain filter with clean hydraulic oil.

5. Install the new case drain filter by hand.

Instructions for the installation of the filter are printed on the side of each Caterpillar spin-on filter. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

6. Start the engine.

7. Drive the machine slowly for 10 to 15 minutes.
Move each cylinder evenly through several cycles.

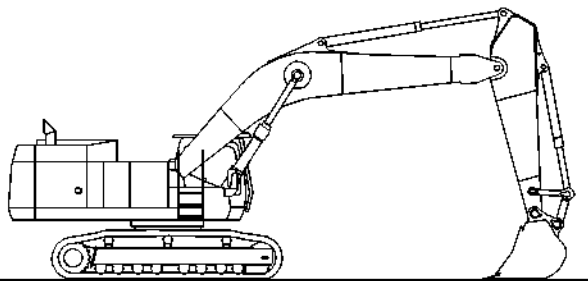


Illustration 557

g02154822

8. Return the machine to the servicing position.
Check the machine for oil leaks.
9. Stop the engine.

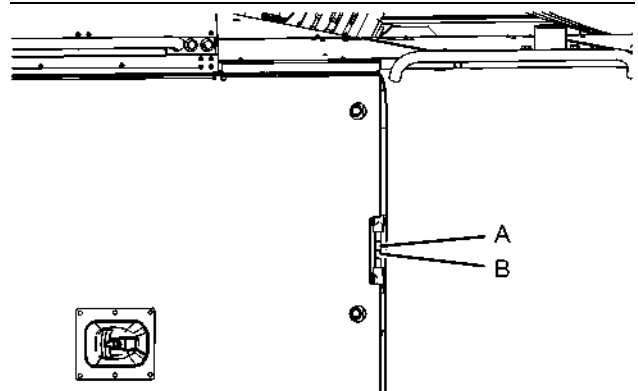


Illustration 558

g03447276

- (A) High temperature range
(B) Low temperature range

10. Maintain the oil level in the low temperature range for a cold machine. Maintain the oil level in the high temperature range for a machine that is at a normal operating temperature.

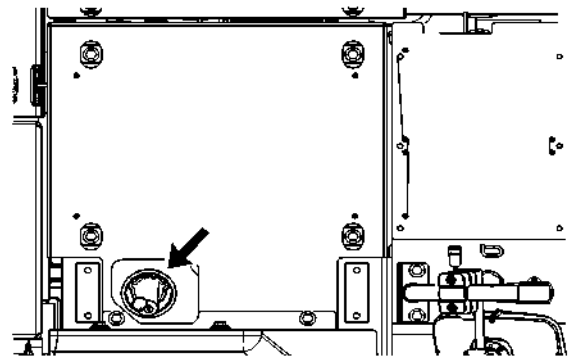


Illustration 559

g02024028

⚠ 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.

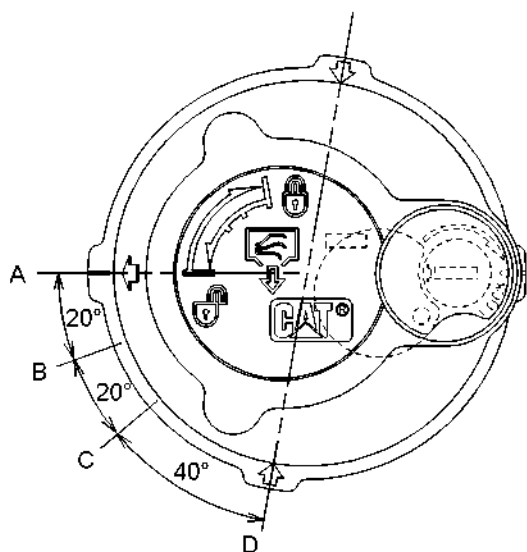


Illustration 560

g02275615

Filler cap

- (A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

11. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 560 for filler cap positions.

- 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. The filler cap can now be removed if needed.
- Tighten the filler cap on the hydraulic tank to position (A).

12. After the pressure is relieved, tighten the filler cap.

i05457469

Hydraulic System Oil Level - Check

SMCS Code: 5050-535

NOTICE

Never remove the fill/vent plug from the hydraulic tank if the oil is hot.

Air can enter the system and cause pump damage.

1. Park the machine in the servicing position on level ground.

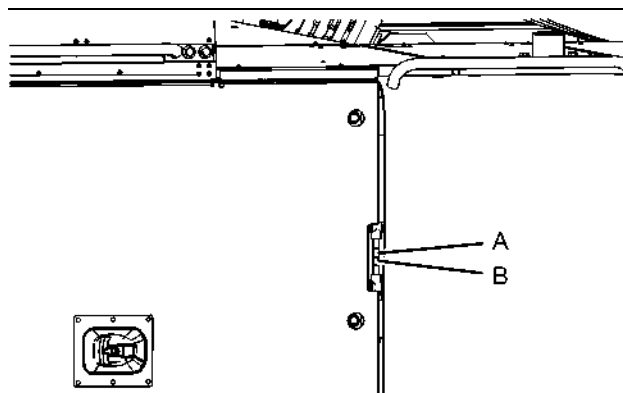


Illustration 561

g03447317

- (A) High temperature range
(B) Low temperature range

2. For a machine that is at normal operating temperature, maintain the hydraulic oil level in the high temperature range. For a cold machine, maintain the hydraulic oil level in the low temperature range.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

3. The Hydraulic fill cap is located on top of the Hydraulic tank.

Maintenance Section
Hydraulic System Oil Sample - Obtain

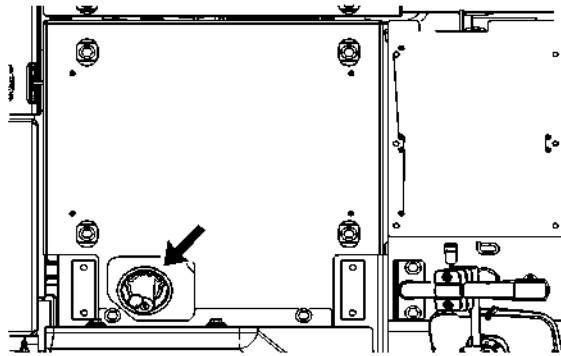


Illustration 562

g02024028

⚠ 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.

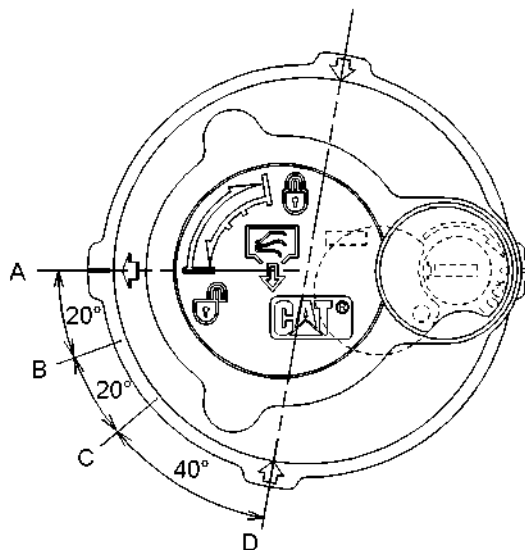


Illustration 563

g02275615

Filler cap

- (A) LOCK position
- (B) PRESSURE RELEASE - START position
- (C) PRESSURE RELEASE - END position
- (D) OPEN position

4. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 563 for filler cap positions.

- a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).
- b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).
- c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).
- d. The hydraulic tank pressure is relieved. The filler cap can now be removed if needed.
- e. Tighten the filler cap on the hydraulic tank to position (A).

5. After the pressure is relieved, tighten the filler cap.

i05785514

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008-OC; 5095-SM; 5095-008; 7542-008; 7542

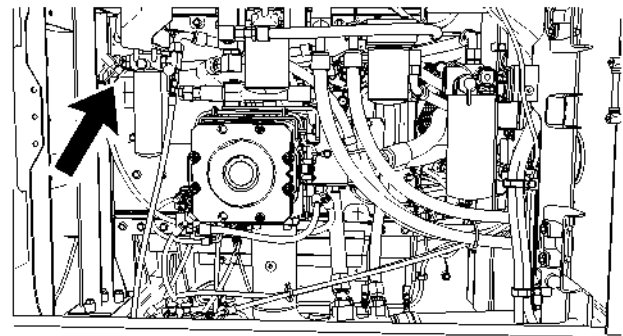


Illustration 564

g03570397

The hydraulic oil sampling valve is near the swing pump in the right rear access compartment. Obtain a sample of the hydraulic oil from the hydraulic oil sampling valve. Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining a sample of the hydraulic oil. Refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample" for more information about obtaining a sample of the hydraulic oil.

i05623032

Indicators and Gauges - Test

SMCS Code: 7450-081; 7490-081

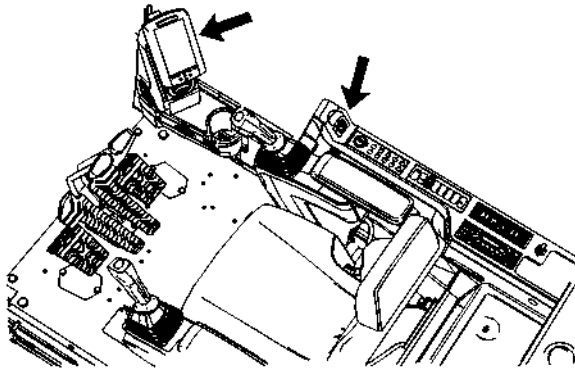


Illustration 565

g03570421

1. Look for broken lenses on the gauges, broken indicator lights, broken switches, and other broken components in the cab.
2. Start the engine.
3. Look for inoperative gauges.
4. Turn on all machine lights. Check for proper operation.
5. Move the machine forward. Release the travel levers and the travel pedals. The machine should stop.
6. Stop the engine.
7. Make any repairs that are required before operating the machine.

i04882709

Oil Filter (Hydraulic Hammer) - Replace

SMCS Code: 5068-510

WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

1. Park the machine on level ground in the service position.
2. Move the hydraulic lockout control to the UNLOCKED position.

3. Turn the engine start switch to the ON position.
4. Move the joysticks and the travel levers/pedals to the full stroke positions in order to relieve the pressure in the hydraulic lines.
5. Turn the engine start switch to the OFF position and return the lever for the hydraulic lockout control to the LOCKED position.

WARNING

Pressurized system!

The hydraulic tank contains hot oil under pressure. To prevent burns from the sudden release of hot oil, relieve the tank pressure with the engine off by slowly turning the cap approximately 1/8 of a turn until the cap reaches the secondary stop.

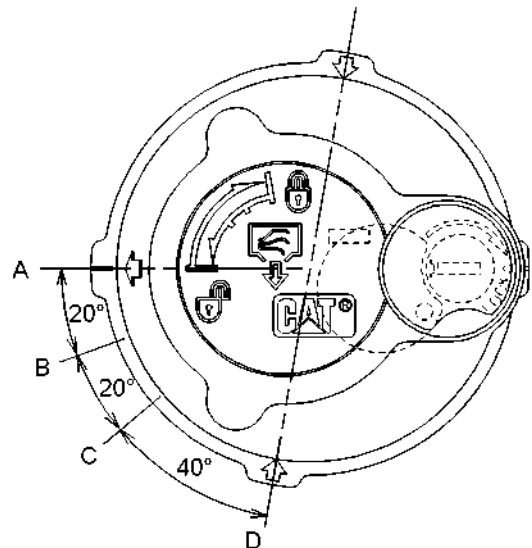


Illustration 566

g02275615

Filler cap

- (A) LOCK position
(B) PRESSURE RELEASE - START position
(C) PRESSURE RELEASE - END position
(D) OPEN position

6. Release the pressure that may be present in the return hydraulic circuit with the following procedure. Refer to Illustration 566 for filler cap positions.
 - a. Turn the filler cap counterclockwise, with no downward force applied, and move the arrow from position (A) to position (B).
 - b. Release the pressure for a minimum of 45 seconds by moving the arrow from position (B) to position (C).

Maintenance Section
Oil Filter (Hydraulic Hammer) - Replace

- c. Push the center of the filler cap down. Without tilting the filler cap, move the arrow from position (C) to position (D).
 - d. The hydraulic tank pressure is relieved. Tighten the filler cap on the hydraulic tank to position (A).
7. The oil filter for the hammer is located near the base of the boom.

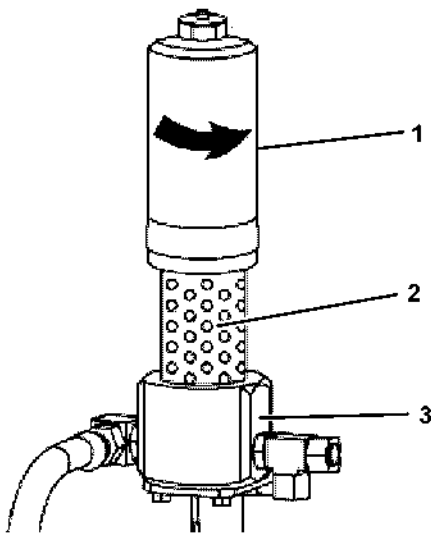


Illustration 567

g02902799

- (1) Filter case
(2) Filter element
(3) Filter base

8. Position a suitable container in order to contain the oil.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information on containing fluid spillage.

9. Loosen filter case (1).

10. Lift filter case (1) in order to remove filter element (2).

11. Remove the used filter element from filter base (3).

Note: The element cannot be reused.

Note: Used filter elements should always be disposed of according to local regulations.

12. Clean filter case (1) and inspect the O-ring for damage. Replace the O-ring if necessary.

13. Install the new filter element.

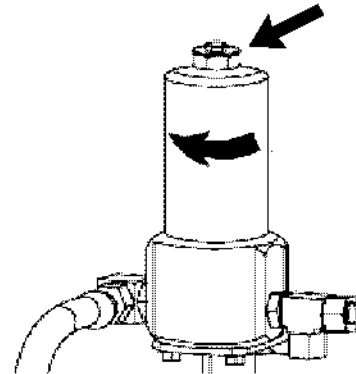


Illustration 568

g02909599

14. Assemble filter case (1). Tighten the nut on the filter case to a torque of $100 \pm 10 \text{ N}\cdot\text{m}$ ($74 \pm 7 \text{ lb ft}$).

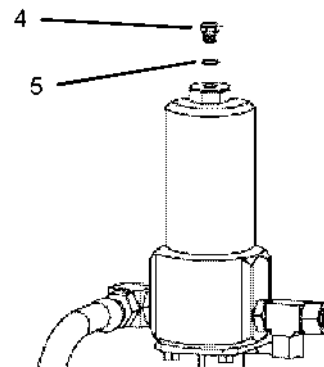


Illustration 569

g02909737

15. Remove plug (4) and inspect O-ring (5) for damage. Replace the O-ring if necessary. Tighten plug (4) to a torque of $13 \pm 2 \text{ N}\cdot\text{m}$ ($10 \pm 1.5 \text{ lb ft}$).

16. Start the engine and operate the machine slowly for 10 to 15 minutes. Move each cylinder evenly through several cycles and operate the hammer.

17. Return the machine to the service position. Check the machine for oil leaks.

18. Stop the engine.

19. Check the hydraulic oil level.

Reference: For the correct procedure, refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check".

i01909798

Oil Filter - Inspect

SMCS Code: 1308-507; 5068-507

Inspect a Used Filter for Debris

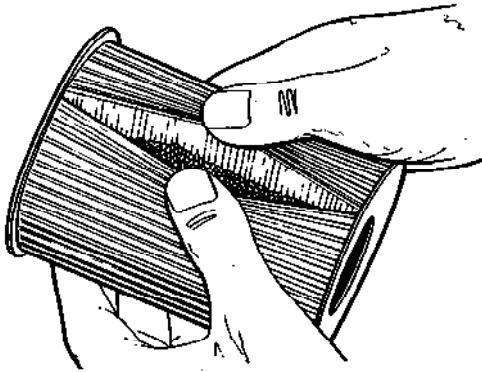


Illustration 570

g00100013

The element is shown with debris.

Use a filter cutter in order to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your authorized dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended 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.

i05353276

Radiator Core - Clean

SMCS Code: 1353-070

1. Open the rear access door's on the left side of the machine.

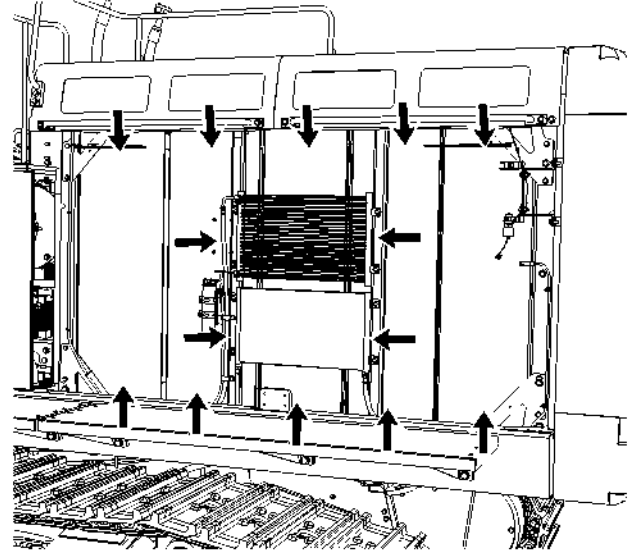


Illustration 571

g03390696

2. Check all of the core fins for debris.
3. Remove dust and debris from all of the core fins and from the screens.

Compressed air is preferred, but high-pressure water or steam can be used to remove dust and general debris from a core.

See Special Publication, SEBD0518, "Know Your Cooling System" for more detailed information about cleaning core fins.
4. Close the rear access door's on the left side of the machine.

i05805860

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510; 7322-710

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

Refer to Service Manual, "Air Conditioning and Heating R-134a for All Caterpillar Machines" for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

i05252968

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

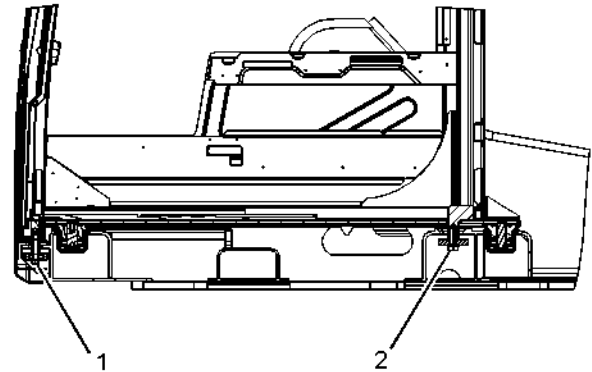


Illustration 572

g02008734

Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

- Tighten the M16 bolt (1) to $125 \pm 20 \text{ N}\cdot\text{m}$ ($92 \pm 15 \text{ lb ft}$).
- Tighten the M24 bolt (2) to $425 \pm 50 \text{ N}\cdot\text{m}$ ($315 \pm 40 \text{ lb ft}$).

Do not straighten the ROPS. Do not repair the ROPS by welding reinforcement plates to the ROPS.

Consult your Cat dealer for inspection of any potential damage or repair of any damage to any operator protective structure. (Including ROPS, FOPS, TOPS, OPS, and OPG) Refer to Special Instruction, SEHS6929, "Inspection, Maintenance, and Repair of Operator Protective Structures (OPS) and Attachment Installation Guidelines for All Earthmoving Machinery"

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.



Illustration 573

g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i06891605

Seat Belt - Replace**SMCS Code:** 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

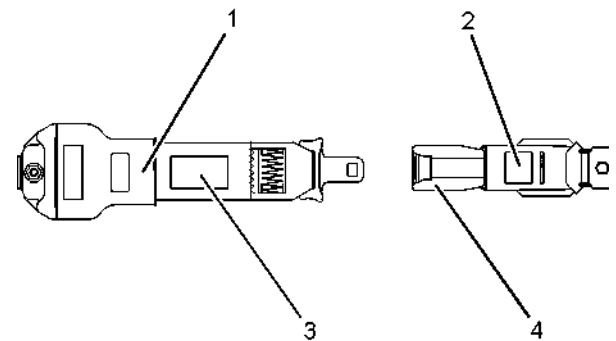


Illustration 574

g01152685

Typical Example

- (1) Date of installation (retractor)
- (2) Date of installation (buckle)
- (3) Year of manufacture (tag) (fully extended web)
- (4) Year of manufacture (underside) (buckle)

Consult your Cat dealer for the replacement of the seat belt and the mounting hardware.

Determine age of new seat belt before installing on seat. A manufacture label is on belt webbing and imprinted on belt buckle. Do not exceed install by date on label.

Complete seat belt system should be installed with new mounting hardware.

Date of installation labels should be marked and affixed to the seat belt retractor and buckle.

Note: Date of installation labels should be permanently marked by punch (retractable belt) or stamp (non-retractable belt).

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

i03867596

Swing Bearing - Lubricate**SMCS Code:** 7063-086

Note: Caterpillar recommends the use of multipurpose lithium grease NLGI Grade 2 for lubricating the swing bearing. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on multipurpose lithium grease.

Note: Do not overgrease the swing bearings. Do not grease more than the recommended maintenance interval. Refer to Operation and Maintenance Manual, "Maintenance Interval Schedule" for more information.

Wipe the fittings before you lubricate the swing bearings.

i02496710

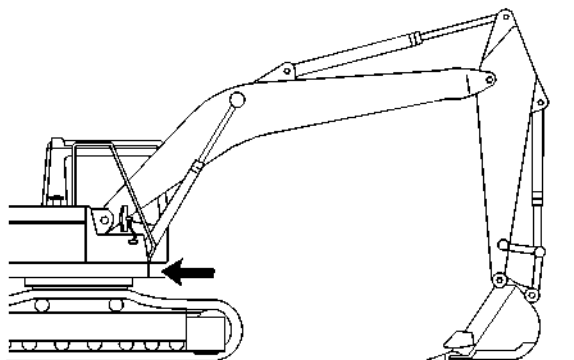


Illustration 575

g02110713

The swing bearings are under the base of the boom.

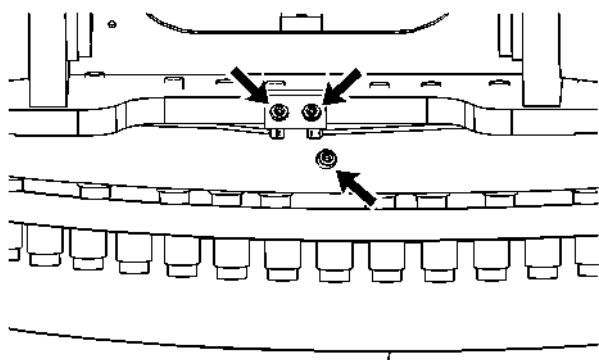


Illustration 576

g01106319

Apply lubricant through the fittings until the lubricant overflows the bearing seals.

Swing Drive Oil - Change

SMCS Code: 5459-044

Drain the Swing Drives

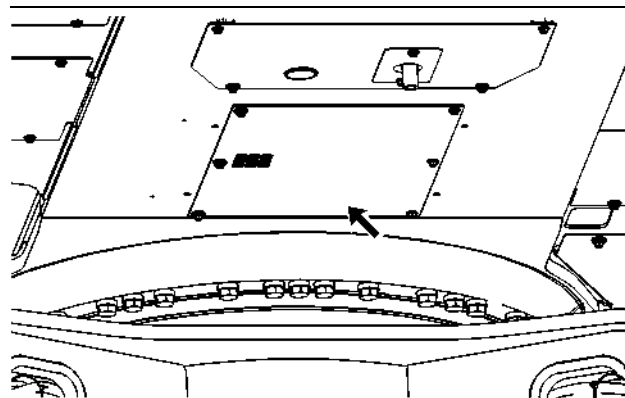


Illustration 577

g01131530

1. Remove the access cover that is located under the machine, near the swing gear.

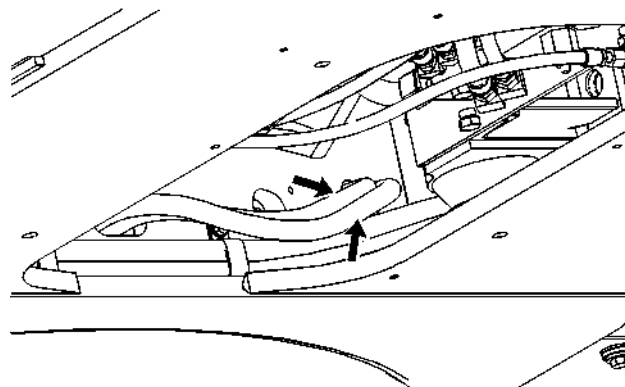


Illustration 578

g01131532

2. Pull out the ends of the drain hoses from the upper frame. Face the ends of the hoses toward the container.

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

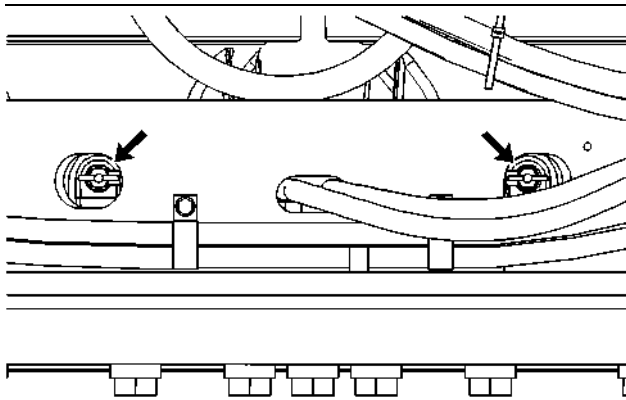


Illustration 579

g01131534

3. Reach through the access holes and open the drain valves. Drain the oil into a suitable container.

Note: Dispose of drained fluids according to local regulations.

4. Tighten the drain valves.
5. Return the ends of the drain hoses to the upper frame. Make sure that the ends of the hoses are facing upward.
6. Install the access cover.

Refill the Swing Drives

Note: Perform this procedure for each swing drive.

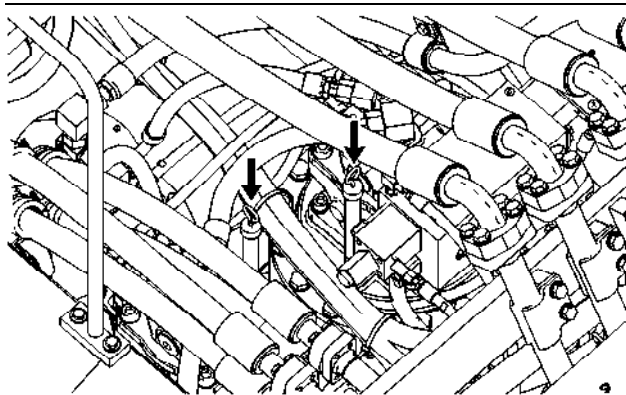


Illustration 580

g01100385

1. Remove the dipstick.
2. Add the specified quantity of oil through the dipstick tube. See Operation and Maintenance, "Capacities (Refill)".



Illustration 581

g01106973

3. Make sure that the oil level is maintained between the marks on the dipstick.

4. Check the oil that has been drained for metal chips or metal particles. Consult your Caterpillar dealer if any metal chips or metal particles are found.

Note: Dispose of drained materials according to local regulations.

i02789834

Swing Drive Oil Level - Check

SMCS Code: 5459-535-FLV

The dipstick for the swing drive oil is on the swing drive near the right rear corner of the cab.

Note: There are two swing drives that are located between the swivel joint and the main control valve. Perform the same procedure for both swing drives.

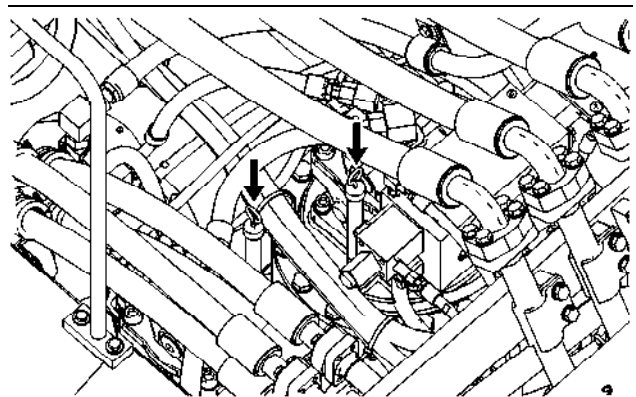


Illustration 582

g01100385

1. Remove the dipstick.

i05785504



Illustration 583

g01106973

Note: Refer to Operation and Maintenance Manual, "General Hazard Information" for information that pertains to containing fluid spillage.

2. Check the dipstick. Maintain the oil level between the marks on the dipstick. Add oil through the dipstick tube, if necessary.
3. Insert the dipstick.
4. Check the dipstick again.
5. Reinsert the dipstick.

Swing Drive Oil Sample - Obtain

SMCS Code: 5459-554-OC; 5459-008; 5459-OC; 5459-008-OC; 7542-008

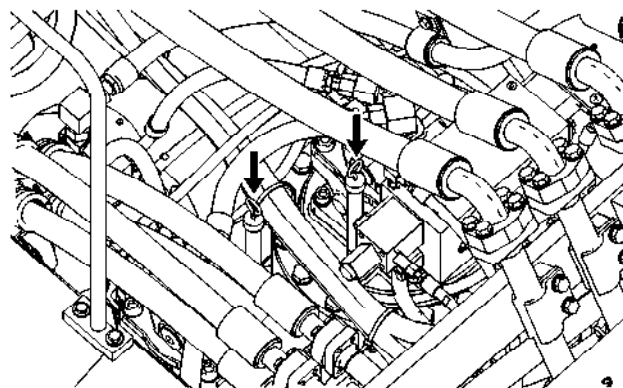


Illustration 584

g01100385

Obtain an oil sample of the swing drive oil through the opening for the dipstick. Refer to Special Publication, SEBU6250, "S-O-S Oil Analysis" for information that pertains to obtaining an oil sample from the swing drive housing. Refer to Special Publication, PEGJ0047, "How To Take A Good Oil Sample" for more information about obtaining an oil sample from the swing drive housing.

i03804517

Swing Gear - Lubricate

SMCS Code: 7063-086

NOTICE

Improper lubrication can cause damage to machine components.

To avoid damage, make sure that the proper amount of grease is applied to the swing drive.

When the amount of grease in the compartment becomes too large, the agitation loss becomes large, thereby accelerating grease deterioration.

Grease deterioration can cause damage to the pinion gear of the swing drive and swing internal gear.

Not enough grease will result in poor gear lubrication.

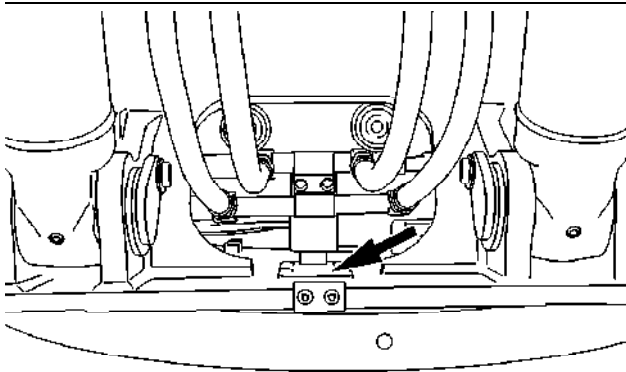


Illustration 585

g00834990

Remove the inspection cover that is located near the boom base. Inspect the grease.

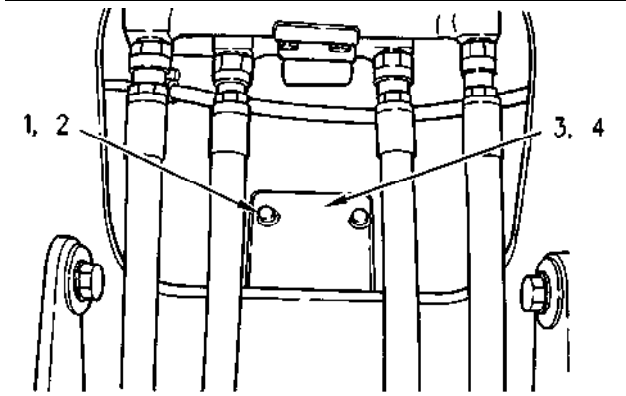


Illustration 586

g00688056

1. Remove bolts (1) and washers (2). Remove cover (3) and gasket (4).

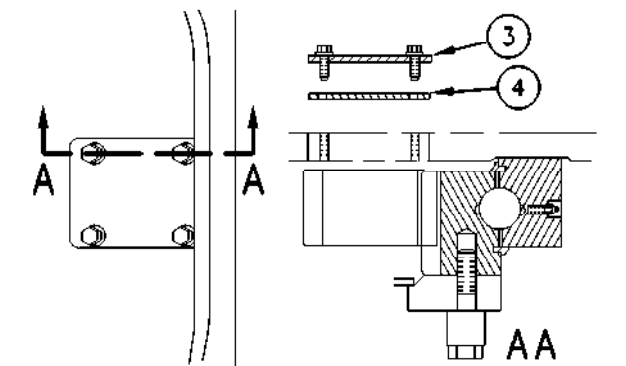


Illustration 587

g00115464

2. Inspect gasket (4). Replace the gasket if damage is evident.
3. Check the level of the grease. The grease should be evenly distributed on the floor of the pan.

Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the capacity of the swing gear.

Add grease, as needed. Remove grease, as needed. Too much grease will result in the deterioration of the grease that is caused by excessive movement of the grease. Too little grease will result in poor lubrication of the swing gear.

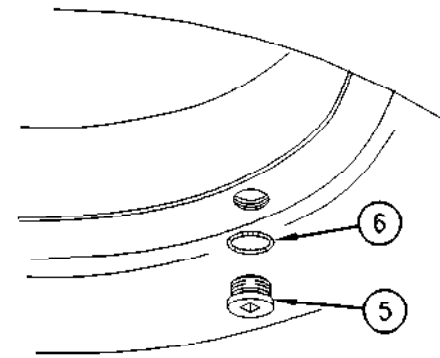


Illustration 588

g00101653

4. Check for contamination and for discolored grease.
5. If the grease is contaminated or discolored with water, change the grease. Remove plug (5) in order to allow the water to drain. When you reinstall plug (5), inspect O-ring seal (6). Replace the O-ring seal if damage is evident.

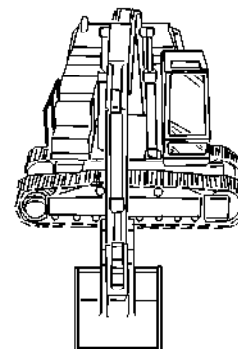


Illustration 589

g00101644

6. Raise the boom and turn the upper structure by 90 degrees. Lower the bucket to the ground.
7. Repeat Step 6 at every 90 degrees in 4 places. Add grease, as needed.

i05647259

Track Adjustment - Adjust

SMCS Code: 4170-025

WARNING

Personal injury or death can result from grease under pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not watch the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

Loosen the relief valve one turn only.

If track does not loosen, close the relief valve and contact your Caterpillar dealer.

NOTICE

Keeping the track properly adjusted will increase the service life of the track and drive components.

Note: The track tension must be adjusted according to the current operating conditions. Keep the track as slack as possible if the soil is heavy.

Measuring Track Tension

1. Operate the machine in the direction of the idlers.

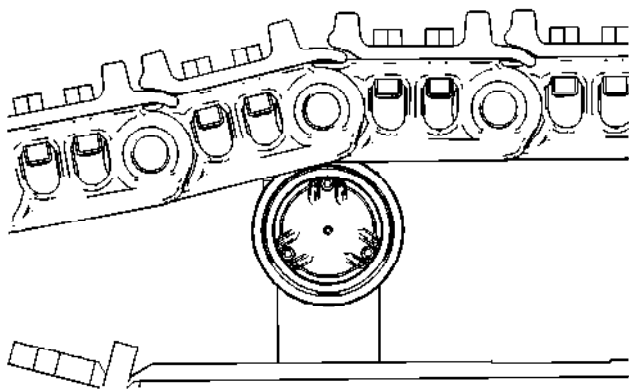


Illustration 590

g01103855

2. Stop with one track pin directly over the front carrier roller. Park the machine and turn off the engine.

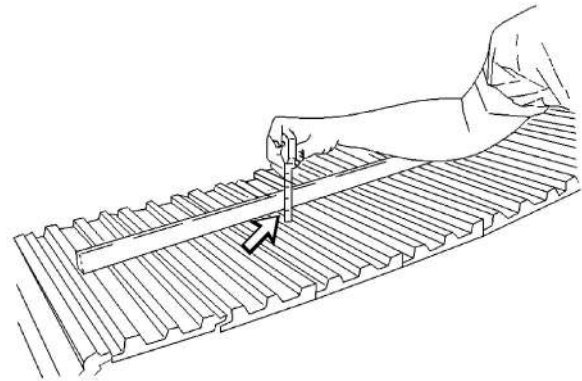


Illustration 591

g03472827

3. Place a straight edge on top of the track grousers between the front carrier roller and the idler. The straight edge should be long enough to reach from the front carrier roller to the idler.

Note: If your machine is equipped with three carrier rollers, place a straight edge on the tracks between the carrier rollers. The straight edge should be long enough to reach from one carrier roller to another carrier roller.

4. Measure the maximum amount of sag in the track. The sag is measured from the highest point of the track grouser to the bottom of the straight edge. A track that is properly adjusted will have a sag of 40.0 to 55.0 mm (1.57 to 2.17 inch).
5. If the track is too tight, or if the track is too loose, adjust the track tension according to the appropriate procedure below.

Adjusting Track Tension

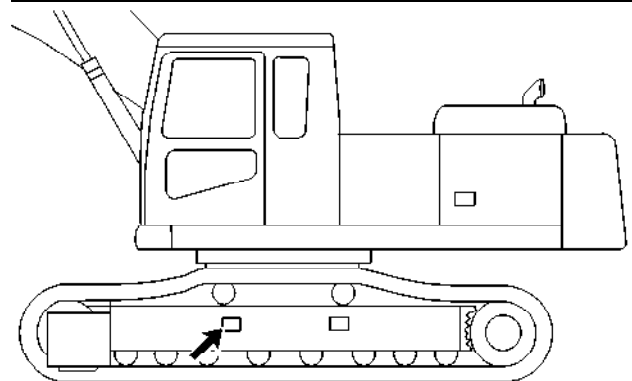


Illustration 592

g00270405

Typical example

The track adjuster is located on the track frame.

Tightening the Track

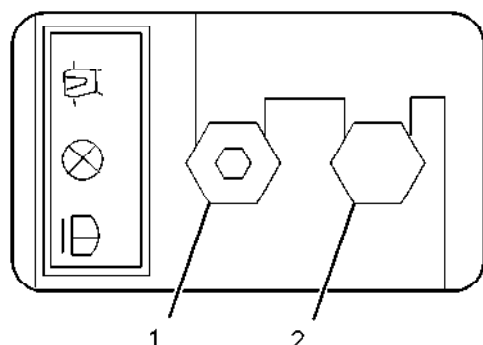


Illustration 593

g01091134

- (1) Grease fitting
(2) Relief valve

Wipe the fitting before you add grease.

1. Add grease through grease fitting (1) until the correct track tension is reached.
2. Operate the machine back and forth in order to equalize the pressure.
3. Check the amount of sag. Adjust the track, as needed.

Loosening the Track

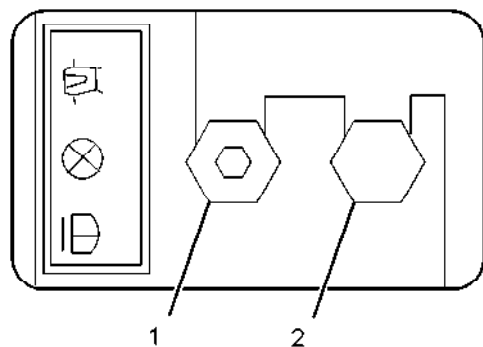


Illustration 594

g01091134

- (1) Grease fitting
(2) Relief valve

1. Loosen relief valve (2) carefully until the track begins to loosen. One turn should be the maximum.
2. Tighten relief valve (2) to $34 \pm 5 \text{ N}\cdot\text{m}$ ($25 \pm 4 \text{ lb ft}$) 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.

i00370385

Track Adjustment - Inspect

SMCS Code: 4170-040

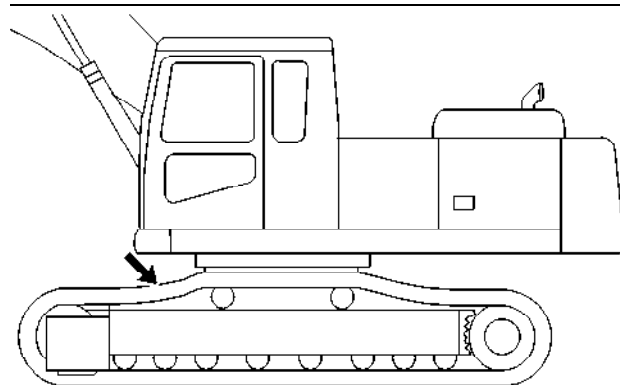


Illustration 595

g00270359

Check the track adjustment. Check the track for wear and for excessive dirt buildup.

If the track appears to be too tight or too loose, see Operation and Maintenance Manual, "Track Adjustment - Adjust".

i04571216

Travel Alarm - Test (If Equipped)

SMCS Code: 7429-081

Move the machine in order to test the travel alarm.

1. Start the engine. Move the hydraulic lockout control to the UNLOCKED position.
2. Raise the work tool in order to avoid any obstacles. Make sure that there is adequate overhead clearance.

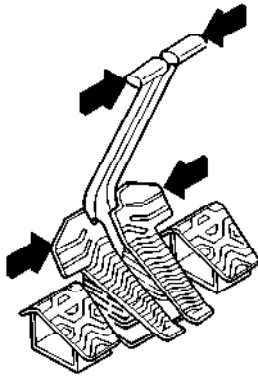


Illustration 596

g00560313

3. Use the travel levers or the travel pedals to move the machine forward. The travel alarm should sound.
4. Release the travel levers and the travel pedals in order to stop the machine.
5. Use the travel levers and the travel pedals to move the machine backward. The travel alarm should sound.

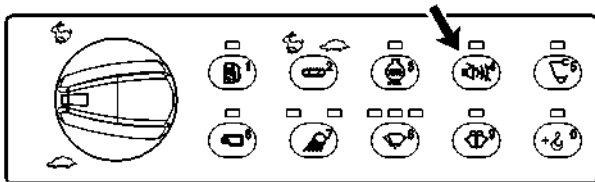


Illustration 597

g02730938

6. Push the alarm cancel switch. The travel alarm should shut off.
7. Stop the machine. Lower the work tool to the ground. Move the hydraulic lockout control to the LOCKED position. Stop the engine.

i03934011

Undercarriage - Check

SMCS Code: 4150-535

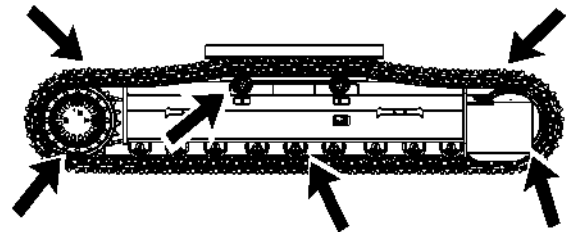


Illustration 598

g02154815

1. Check the carrier rollers, the track rollers, and the idler wheels for possible leakage.
2. Check the surface of the track, the carrier rollers, the track rollers, the idler wheels, the track shoes, and the drive sprockets. Look for signs of wear and loose mounting bolts.
3. Listen for any abnormal noises while you are moving slowly in an open area.
4. If abnormal wear exists or abnormal noises or leaks are found, consult your Caterpillar dealer.

i03754181

Window Washer Reservoir - Fill

SMCS Code: 7306-544-KE

NOTICE

When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

1. Open the rear access door on the left side of the machine.

i05867976

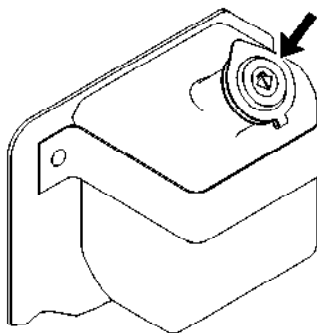


Illustration 599

g00688996

2. Remove the filler cap.
3. Fill the window washer reservoir with washer fluid through the filler opening.
4. Install the filler cap.
5. Close the access door.

i01258249

Window Wiper - Inspect/Replace

SMCS Code: 7305-510; 7305-040

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

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.

Windows - Clean

SMCS Code: 7310-070; 7340-070

Clean the outside of the windows from the ground, unless handholds are available.

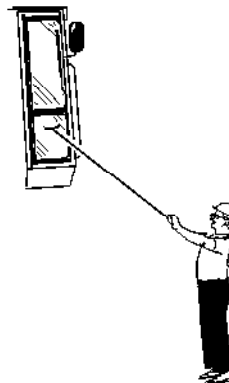


Illustration 600

g00566124

Typical example

Cleaning Methods

Aircraft Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.

Polycarbonate Windows (If equipped)

Special care is needed in order to clean polycarbonate windows.

Wash polycarbonate windows with mild soap and warm water that does not exceed 50° C (122° F). Use a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows. Rinse the windows with a sufficient amount of clean cold water.

Note: Naphtha or kerosene can be used in order to remove labels, films, paint, or marking pen from polycarbonate windows.

Note: Do not use abrasive, or highly alkaline cleaners. Do not use sharp instruments, such as squeegees or razor blades on polycarbonate windows. Do not clean polycarbonate windows in the hot sun or at elevated temperatures.

Warranty Section

Warranty Information

i06044323

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.
- b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).
- b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems ("emission related components"), are:

- a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.
- b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

The aftertreatment system can be expected to function properly for the lifetime of the engine (emissions durability period) subject to prescribed maintenance requirements being followed.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i07422648

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting publications.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

publications.cat.com

i07743978

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

Improperly disposing of waste can threaten the environment. Obey all local regulations for the decommissioning and disposal of materials.

Utilize appropriate personal protective equipment when decommissioning and disposing product.

Consult the nearest Cat dealer for additional information. Including information for component remanufacturing and recycling options.

Index

A

Access Door and Cover Locations.....	254
Engine Hood	254
Left Front Access Door	254
Left Middle Access Door.....	254
Left Rear Access Door.....	254
Right Front Access Door	254
Right Rear Access Door	255
Additional Messages	19
Adjustable Gauge Undercarriage Frame (20).....	26
Air Conditioner (9), (10), (11)	23
Alternate Exit (6)	23
Alternate Exit Lock/Unlock (5)	22
Clean the Windows (1)	21
Counterweight (7)	23
Data Privacy (4)	22
Diesel Engine Fuel (15)	25
Diesel Exhaust Fluid Fill (16)	25
Diesel Fuel Requirements (17).....	25
Engine Oil (8)	23
Hydraulic Oil (19)	26
Joystick Controls Alternate Patterns (2)	22
Machine Security System (3).....	22
No Step (12).....	24
Oil Biodegradable (18).....	26
Radial Air Cleaner (14)	25
Wait to Disconnect Lamp (13)	24
Adjustable Gauge Undercarriage Frame	232
Extending	232
Retracting	234
Air Cleaner Dust Valve - Clean/Inspect.....	276
Air Conditioner/Cab Heater Filter (Recirculation) - Inspect/Replace	276
Air Conditioning and Heating Control.....	179
English Versus Metric Toggle	180
Alternate Exit	95
FOGS (If Equipped)	96
Front Window (If Equipped).....	95
Roof Hatch (If Equipped)	95–96
ARD Spark Plug - Clean.....	276

B

Battery - Clean.....	277
Battery - Recycle	277
Battery Disconnect Switch	120
Battery Electrolyte Level - Check	277

Battery Hold-Down - Tighten	278
Battery or Battery Cable - Inspect/Replace...	278
Before Operation	39, 93
Before Starting Engine	36
Belt - Inspect/Adjust/Replace	278
Boom, Stick and Bucket Linkage - Lubricate	279
Grease Block on the Stick	281
Boom, Stick and Bucket Operation	206
Digging.....	206
Lifting Objects	207
Machines that are Equipped with a Long Reach Configuration	209
Boom/Stick/Bucket Combinations.....	66
Bucket - Remove and Install	214
Bolted Flag.....	216
Captured Flag	214
Crossbolt.....	217
Bucket Linkage - Inspect/Adjust.....	281
Bucket Tips - Inspect/Replace	282, 285
Bucket Tips	282
Bucket Tips (Cat® Advansys) - If Equipped.....	286
Installation.....	286
Removal.....	286
Side Cutters	284
Side Cutters (If Equipped)	287
Side Protectors (If Equipped)	284, 288
Burn Prevention.....	30
Batteries.....	30
Coolant	30
Oils.....	30

C

Cab Air Filter (Fresh Air) - Clean/Replace	289
Cab Door	185
Cab Door Latch - Inspect/Adjust/Replace.....	289
Cab Door Latch Adjust.....	290
Cab Door Latch Inspect.....	289
Cab Door Latch Replace	290
Cab Door Stop Adjust.....	290
Cab Visor (If Equipped)	184
Camera.....	125
Rear View Camera (If Equipped).....	125
Side View Camera (If Equipped)	125
Work Area Vision System (WAVS) (If Equipped).....	125
Camera - Clean (If Equipped)	291

Camera Harness - Disconnect and Connect	235
Connection of the Harness for the Rear View Camera	236
Disconnection of the Harness for the Rear View Camera	236
Capacities (Refill)	264
Circuit Breakers - Reset	292
Condenser (Refrigerant) - Clean	292
Cooling System Coolant (ELC) - Change	292
Cooling System Coolant Extender (ELC) - Add	294
Cooling System Coolant Level - Check	295
Cooling System Coolant Sample (Level 1) - Obtain	296
Cooling System Coolant Sample (Level 2) - Obtain	297
Counterweight Removal and Installation	236
Counterweight Removal and Installation for Standard Machines	236
Machines Equipped with Counterweight Removal System	238
Counterweight Removal Chain - Clean (If Equipped)	297
Counterweight Removal Chain - Inspect (If Equipped)	298
Counterweight Removal Chain - Lubricate (If Equipped)	298
Crushing Prevention and Cutting Prevention ..	29

D

Daily Inspection	93
Declaration of Conformity	92
Decommissioning and Disposal	352
DEF Filler Screen - Clean ((Emission Related Component))	299
DEF Manifold Filters - Replace (Emission Related Component)	299
Diesel Exhaust Fluid - Fill	303
Diesel Exhaust Fluid Filter - Replace	302
Diesel Exhaust Fluid Injector - Replace (Emission Related Component)	303
Diesel Particulate Filter - Clean (Emission Related Component)	304
Diesel Particulate Filter Regeneration	102
Delayed Engine Shutdown	103
Modes of Regeneration	102
Regeneration	102
Regeneration Indicators	102
Regeneration Switch	102

Regeneration System Warning Indicators	103
Regeneration Triggers	102
Disconnecting Hydraulic Hoses and Lines	226

E

Electrical Storm Injury Prevention	36
Emissions Certification Film	91
Emissions Warranty Information	351
Engine Air Filter Primary Element - Clean/ Replace	304
Cleaning Primary Air Filter Elements	305
Inspecting the Primary Air Filter Elements	306
Engine Air Filter Secondary Element - Replace	307
Engine Air Precleaner - Clean	307
Engine and Machine Warm-Up	195
Dynamic Cool Engine Elevated Idle (DCEEI)	196
Hydraulic System	195
Hydraulic System Automatic Warm-up	196
Improve Cold Weather Performance	197
Engine Oil and Filter - Change	309
Fast Fill	312
Procedure for Changing the Engine Oil and Filter	310
Selection of the Oil Change Interval	309
Engine Oil Level - Check	308
Engine Oil Sample - Obtain	309
Engine Starting	39, 194
Engine Starting (Alternate Methods)	251
Engine Starting with Auxiliary Start Receptacle (If Equipped)	252
Engine Starting with Jump Start Cables (If Equipped)	251
Engine Stopping	43
Engine Valve Lash and Fuel Injector Timing - Check	312
Engine Valve Rotators - Inspect	312
Equipment Lowering with Engine Stopped	45, 199
Machine With a Boom Lowering Control Valve (If Equipped)	200
Machine Without a Boom Lowering Control Valve	200
Ether Starting Aid Cylinder - Replace (If Equipped)	313

F

Film (Product Identification) - Clean.....	314
Cleaning of the Films	314
Final Drive Oil - Change	315
Final Drive Oil Level - Check	315
Final Drive Oil Sample - Obtain	316
Fire Extinguisher Location.....	35
Fire Prevention and Explosion Prevention.....	31
Battery and Battery Cables.....	32
Ether	34
Fire Extinguisher.....	34
General	31
Lines, Tubes, and Hoses	33
Regeneration	31
Wiring.....	33
Fire Safety	34
Foreword	5
California Proposition 65 Warning	5
Certified Engine Maintenance	6
Literature Information	5
Machine Capacity	6
Maintenance	5
Operation	5
Product Identification Number	6
Safety.....	5
Freezing Conditions	222
Frozen Ground Conditions	199
Fuel System - Prime	316
Fuel System Primary Filter (Water Separator) Element - Replace.....	317
Fuel System Secondary Filter - Replace	318
Fuel System Water Separator - Drain	319
Fuel Tank Cap and Strainer - Clean	319
Fuel Tank Cap Filter - Replace.....	320
Fuel Tank Shutoff and Drain Control	192
Fuel Tank Strainer - Clean.....	320
Fuel Tank Water and Sediment - Drain	320
Fill the Fuel Tank.....	320
Fuel Transfer Pump (Refueling) (If Equipped)	173
Fuel Transfer Pump (Refueling) (If Equipped)	174
Fuses - Replace	321

G

General Hazard Information.....	27
Containing Fluid Spillage	28
Dispose of Waste Properly	29
Fluid Penetration	28
Inhalation	29

Pressurized Air and Water	28
Trapped Pressure	28
General Information	50
Guards.....	48
Guards (Operator Protection)	
Other Guards (If Equipped)	49
Rollover Protective Structure (ROPS), Falling Object Protective Structure (FOPS) or Tip Over Protection Structure (TOPS).....	48

H

Hammer Operation (If Equipped).....	219
High Intensity Discharge Lamp (HID) - Replace (If Equipped).....	323
High Pressure Fuel Lines	35
Hydraulic System Filter Element (Fine Filtration) - Replace (If Equipped)	323
Hydraulic System Oil - Change	324
Cat HYDO Advanced 10 Oil Change Interval	324
Drain the Oil	324
Fill the Hydraulic Tank.....	327
Service the Hydraulic System Filters.....	327
Hydraulic System Oil Filter - Replace	332
Case Drain Filters	333
Pilot Filter	332
Hydraulic System Oil Filter (Return) - Replace	328
Hydraulic System Oil Level - Check.....	335
Hydraulic System Oil Sample - Obtain.....	336

I

Identification Information	89
Important Safety Information.....	2
Indicators and Gauges - Test	337

J

Joystick Controls	190
Joystick Controls (Medium Pressure (If Equipped))	189
Rotating Tool Control	189
Joystick Controls Alternate Patterns	192

L

Leaving the Machine	224
Lifting and Tying Down the Machine	242
Lifting the Machine Segments	244
Tying Down the Machine	243

Lifting Capacities	69	Every 50 Service Hours or Weekly	274
Mass Boom	82, 85	Every 500 Service Hours	274
Reach Boom	70, 73, 76, 79	Every 500 Service Hours or 3 Months	274
Symbols Found in the Lifting Capacity		Every 5000 Service Hours	275
Charts	69	Every 600 Service Hours of Continuous	
Lifting Objects	43	Hammer Use	274
Lubricant Viscosities (Fluids		Every 6000 Service Hours or 3 Years	275
Recommendations)	256	Every Year	275
Biodiesel	262	Initial 250 Service Hours	274
Coolant Information	263	Initial 500 Hours (for New Systems, Refilled	
Diesel Exhaust Fluid	260	Systems, and Converted Systems)	274
Diesel Fuel Recommendations	259	When Required	273
Engine Oil	256	Maintenance Section	254
Fuel Additives	262	Maintenance Support	266
General Information for Lubricants	256	Mirror (If Equipped)	180
Hydraulic Systems	257	Mirror Adjustment	181
Other Fluid Applications	258	Mirror Installation	231
Selecting the Viscosity	256	Monitoring System	128
Special Lubricants	259	Action Lamp (1)	128
Lubricant Viscosities and Refill Capacities ...	256	Camera View (4) (If Equipped)	129
		Changing the Password	141
M		Clock Bar (2)	128
Machine Operation	95	Controllability Setting	139, 145
Machine Security System (If Equipped)	123	Current Totals	141
Basic Operation	124	Display Setting	135
Operation Section	123	Gain/Response Control	130
Regulatory Compliance Section	124	Gauges (3)	129
Security Management	124	Joystick Control Pattern	142
Maintenance Access	254	Key Pad (7)	129
Maintenance Interval Schedule	273	Language Selection	138
Every 10 000 Service Hours	275	Machine Warnings	131
Every 10 Service Hours or Daily	273	Main Menu	135
Every 10 Service Hours or Daily for First 100		Maintenance Intervals	140
Hours	273	Multi-information Area (6)	129
Every 10 Service Hours or Daily for Machines		Other Messages	134
Used in Severe Applications	274	Password Entry	143
Every 100 Service Hours of Continuous		Performance	138
Hammer Use	274	Power Mode Setting	139
Every 1000 Service Hours of Partial Hammer		Prestart Monitoring Function	131
Use (50% of Service Hours)	275	Reverse Fan Setting	143
Every 1000 Service Hours or 6 Months	275	Selecting the Work Tool	140
Every 12 000 Service Hours or 6 Years	275	Warning Display Area (5)	129
Every 2000 Service Hours or 1 Year	275	Mounting and Dismounting	93
Every 250 Service Hours	274	Alternate Exit	93
Every 250 Service Hours of Partial Hammer		Machine Access System Specifications	93
Use (50% of Service Hours)	274		
Every 250 Service Hours or Monthly	274	O	
Every 3 Years After Date of Installation or		Oil Filter - Inspect	339
Every 5 Years After Date of		Inspect a Used Filter for Debris	339
Manufacture	275	Oil Filter (Hydraulic Hammer) - Replace	337

Operating Technique Information.....	202
Operating Precaution.....	204
Restricted Operation.....	202
Operating Techniques	202
Operation.....	40, 198
Critical Failures	40
Limiting Conditions and Criteria	40
Machine Operating Temperature Range	40
Machine Operation	42
Machine Operation when the Machine is not Completely Assembled	43
Operation Information	198
Lifting Objects	199
Operation Section.....	93
Operator Controls.....	109
Air Conditioning and Heating Control (9)....	114
Automatic Engine Speed Control (14).....	115
Boom Pressure Control (27A)	119
Cat Grade Control (If Equipped).....	109
Cat Regeneration System (CRS) Aftertreatment Switch (23).....	118
Crane Auto Stop Cancel Switch (24A)	118
Engine Idle Shutdown (7)	114
Engine Speed Control (11)	115
Engine Start Switch (6).....	113
Fine Swing Control (27C)	119
Hydraulic Lockout Control (1).....	111
Joystick Controls (5)	113
Lift Control (17)	116
Light Switch (20).....	117
Lower Window Washer (26) (If Equipped...)	118
Lower Window Wiper (25A) (If Equipped).....	118
Monitor (4)	113
Operator Controls	110
Operators Seat (8).....	114
Overload Warning Device (28)	119
Platform Light (25B) (If Equipped).....	118
Power Mode (12)	115
Quick Coupler Control (22).....	117
Radio (10)	115
Radio Mute Switch (24B).....	118
Rear/Side View Camera (21).....	117
Service Hour Meter (3)	113
Service Port	119
SmartBoom Control (27B)	119
Travel Alarm Cancel Switch (15)	116
Travel Control (2).....	112
Travel Speed Control (13)	115
Window Wiper and Window Washer (18- 19).....	116

Work Tool Control (16).....	116
Operator Station	48

P

Parking	43, 222
Plate Locations and Film Locations	89
Electromagnetic Emissions	90
Engine Serial Number	90
Product Identification Number (PIN) and Regional Certification Plate	89
Sound Certification Film	90
Power Receptacle (If Equipped)	123
Product Information Section.....	50
Product Link	122
Data Broadcasts	122
Operation in a Blast Site for Product Link Radios.....	123
Product Link (Product Link Japan).....	121
Production Measurement Application	145
Basic Operation	151
Bucket Tip-Off Function	156
Cat Production Measurement Menu Screen.....	149
Joystick Controls (If Enabled).....	150
Monitor Display	146
Preparing the System	163
Warning Messages	148
Work Monitor	161

Q

Quick Coupler Operation (Circuit for Universal Coupler (If Equipped)).....	210
Operation	210
Releasing the Work Tool.....	212
Resetting the Quick Coupler Controls	210
Securing the Work Tool.....	211

R

Radiator Core - Clean	339
Radio (If Equipped)	176
Loss of Memory	178
Presetting Radio Stations	177
Radio Reception	178
Scan and Auto Memory	178
Receiver Dryer (Refrigerant) - Replace	340
Reference Information Section	352
Reference Material.....	352
Reference Materials	352
Regulatory Information (Japan)	50

Industrial Safety and Health Act	54	Securing the Machine.....	229
Operation of Construction Equipment and the Governing Laws and Regulations.....	51	Selective Catalytic Reduction Warning System.....	104
Qualifications for Machine Operation	50	Definitions	105
Standard Certificate of Transfer	53	Inducement Emergency Override for Cat Engines Equipped with Selective Catalytic Reduction Systems (If Equipped)	107
Trailer Transportation	50	Inducement Strategy for DEF Level	105
Restricted Visibility	37	Inducement Strategy for DEF Quality, Tampering, SCR System Fault, and Impeded EGR	106
Rollover Protective Structure (ROPS) - Inspect	340	Service Interval Chart.....	266
Roof Hatch.....	185	Severe Service Application	271
S		Improper Maintenance Procedures (Maintenance Procedures Which May Contribute to a Severe Service Application)	272
S·O·S Information	265	Severe Environmental Factors	271
Safety Messages	7	Severe Operating Conditions	271
Aerosol Starting Aid (13)	15	Shear Operation (If Equipped)	221
Crushing Hazard (11).....	14	Shipping the Machine.....	227
Crushing Hazard (19)	17	Shipping a Machine that is not Completely Assembled	228
Crushing Hazard (2)	11	Slope Operation	44
Crushing Hazard (22)	18	SmartBoom Control (If Equipped).....	190
Crushing Hazard (3)	11	SmartBoom Operation (If Equipped).....	209
Crushing Hazard (8)	13	Advantages.....	210
Crushing Hazard (Counterweight) (23)	19	Excavation and Loading	210
Crushing Injury (5)	12	Hammering	210
Do Not Operate (1)	10	Sound Information and Vibration Information.....	45
Electrical Power Lines (7).....	12	Sound Level Information.....	45
Flying Debris (12)	14	Sound Level Information for Machines in Eurasian Economic Union Countries.....	45
High-Pressure Cylinder (20).....	17	Sound Level Information for Machines in European Union Countries and in Countries that Adopt the “EU Directives”	45
High-Pressure Gas (21).....	18	Sources.....	48
Hot Surface (16)	16	“The European Union Physical Agents (Vibration) Directive 2002/44/EC”	46
Hot Surface (18)	16	Specifications	55
Joystick Controls Alternate Patterns (10)....	14	Application/Configuration Restrictions	56
Jump-Start Cables (14)	15	Basic Machine	59
Lifting Restriction/Counterweight Only (17).....	16	Boom Cylinders	64
Overload Warning Device (9) (If Equipped).....	13	Boom with Stick Cylinder	61
Product Link (4)	11	Bucket.....	63
Relieve Hydraulic Tank Pressure (15)	15	Carbody	59
Seat Belt (6)	12	Counterweight	60
Safety Section	7	Expected Life	55
Seat	98	Intended Use	55
Heated Seat and Ventilated Seat (If Equipped).....	99	Miscellaneous	65
Seat Belt	99		
Extension of the Seat Belt	101		
Seat Belt Adjustment for Non-Retractable Seat Belts.....	99		
Seat Belt Adjustment for Retractable Seat Belts	101		
Seat Belt - Inspect	340		
Seat Belt - Replace	341		

Specification Data	56
Step for Track Frame	65
Stick with Bucket Cylinder	62
Track Frame	60
Walkway	64
Working Ranges	58
Stopping the Engine	222
Delayed Engine Shutdown	223
Engine Stop Control	223
Stop the Engine if an Electrical Malfunction Occurs	224
Stopping the Machine	222
Storage and Literature Compartment (If Equipped)	173
Storage Box	172
Exterior Storage Box	172
Interior Storage Box	172
Sun Screen (If Equipped)	185
Swing Bearing - Lubricate	341
Swing Drive Oil - Change	342
Drain the Swing Drives	342
Refill the Swing Drives	343
Swing Drive Oil Level - Check	343
Swing Drive Oil Sample - Obtain	344
Swing Gear - Lubricate	344
System Pressure Release	267
Coolant System	267
Hydraulic System	267
Purge Screws (Boom, Stick and/or Bucket Hydraulic Circuits)	269

T

Table of Contents	3
Towing Information	247
Towing the Machine	247
Lightweight Towing	250
Parking Brake Release	248
Retrieval of Machine	249
Track Adjustment - Adjust	346
Adjusting Track Tension	346
Measuring Track Tension	346
Track Adjustment - Inspect	347
Track Information	35
Transportation Information	226
Travel Alarm - Test (If Equipped)	347
Travel Control (Straight Travel Pedal (If Equipped))	186
Travel in Water and Mud	204
Procedure for Removing the Machine from Water or Mud	205

U

Undercarriage - Check	348

V

Visibility Information	36

W

Warranty Information	351
Warranty Section	351
Welding on Machines and Engines with Electronic Controls	271
Window - Check	349
Window (Front)	182
50/50 Window	182
70/30 window	183
Window Washer Reservoir - Fill	348
Window Wiper - Inspect/Replace	349
Windows - Clean	349
Cleaning Methods	349
Polycarbonate Windows (If equipped)	349
Work Tool Control Pedal	187
One-way Flow	188
Two-way Flow	188
Work Tools	39

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:	_____	_____	_____

