SEBU8551-13 (en-us)
March 2020

Operation and Maintenance Manual

966K and 972K Wheel Loaders

Z4W 1-UP (972K)
PEM 1-UP (972K)
TFS 1-UP (966K)
PBG 1-UP (966K)

Language: Original Instructions

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

Important Safety Information

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

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

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

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

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

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

NOTICE

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

Other parts may not meet certain original equipment specifications.

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

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

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Foreword

California Proposition 65 Warning

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

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

www.P65Warnings.ca.gov

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

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

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

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

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

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

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

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

Safety

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

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

Operation

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

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

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

Maintenance

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

Maintenance Intervals

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

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

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

Certified Engine Maintenance

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

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

Machine Capacity

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

Product Identification Number

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

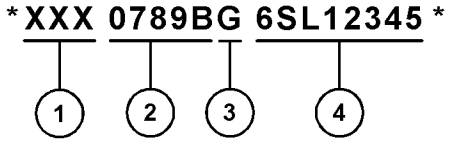

Illustration 1 g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i05874117

Safety Messages

SMCS Code: 7000

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 of 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 legible. 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 signs. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the warning sign. Loose adhesive will allow the warning sign to fall.

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

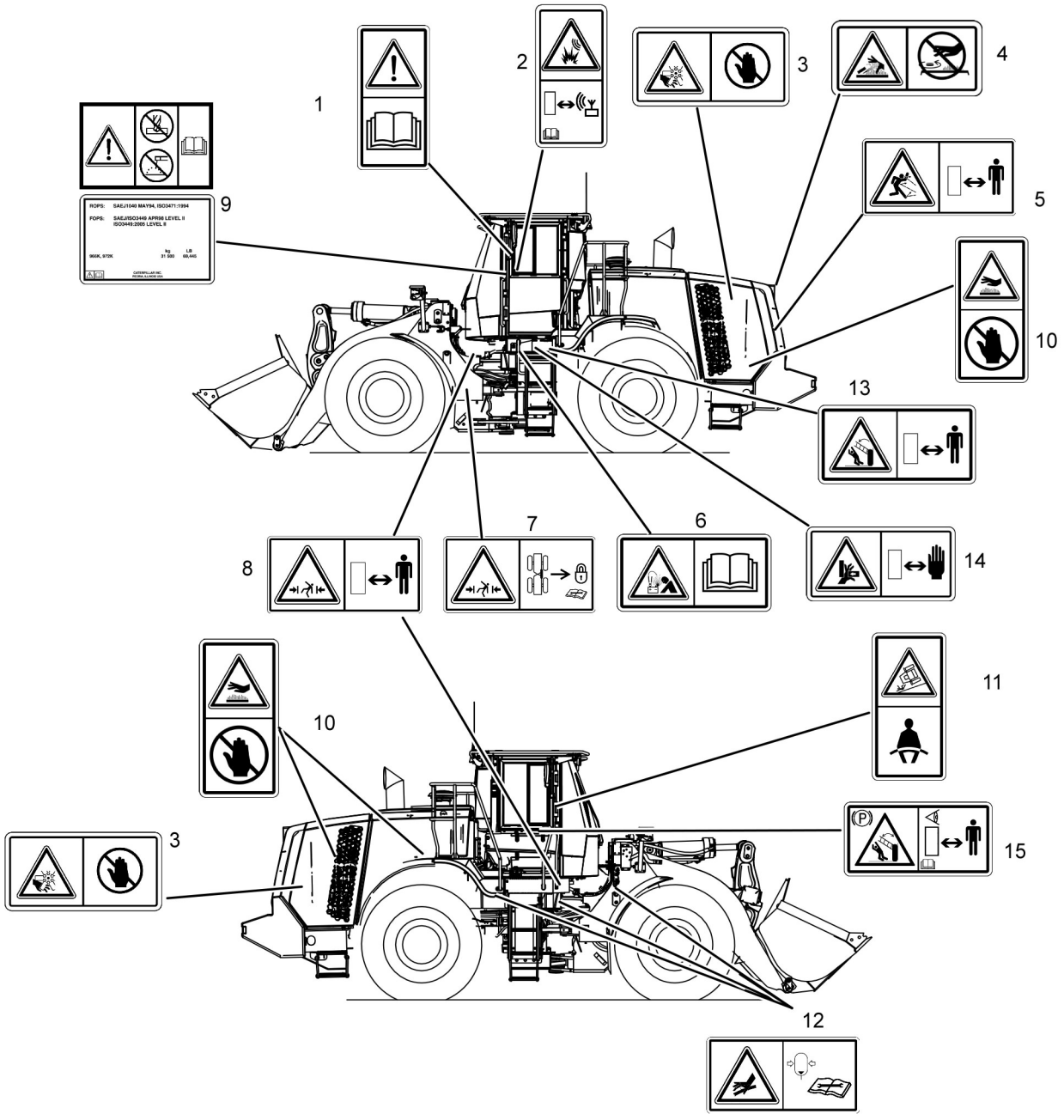

Illustration 2 g02910658

Do Not Operate (1)

This warning label is located inside the cab of the machine on the front left post.

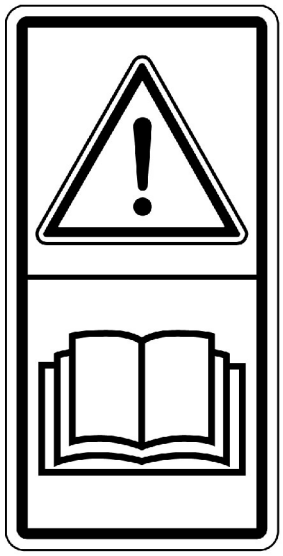

Illustration 3 g01379128

WARNING

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

Product Link (If Equipped) (2)

This warning label is located in the cab on the front left post.

Illustration 4 g01222611

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.

Rotating Fan (3)

This warning label is located under the clamshell on each side of the machine.

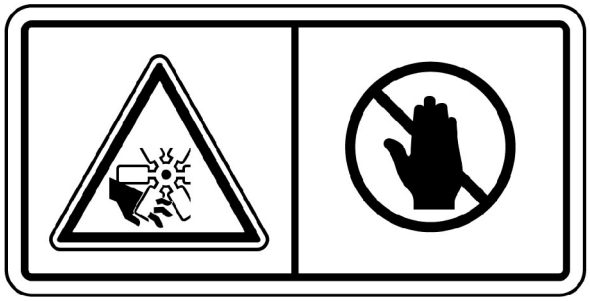

Illustration 5 g01383892

⚠ WARNING

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

Pressurized System (4)

This warning label is located near the cooling system pressure cap.

Illustration 6 g01371640

⚠ 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.

Fan (5)

This message is located at the rear of the hood on both sides of the machine.

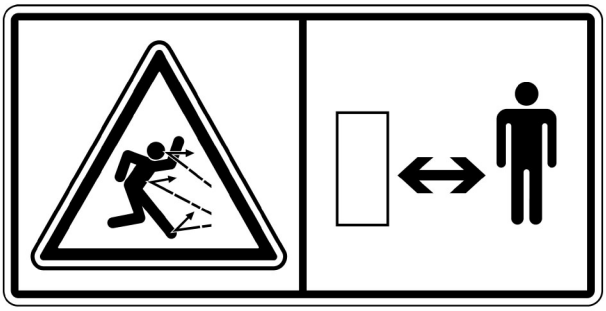

Illustration 7 g01404266

⚠ WARNING

Flying Debris Hazard! During operation of the engine fan, flying debris could be discharged from the radiator which could result in personal injury or death. Stay clear of the fan discharge area until the engine is stopped.

Battery (6)

This warning is located under the left ladder behind the top step of the ladder.

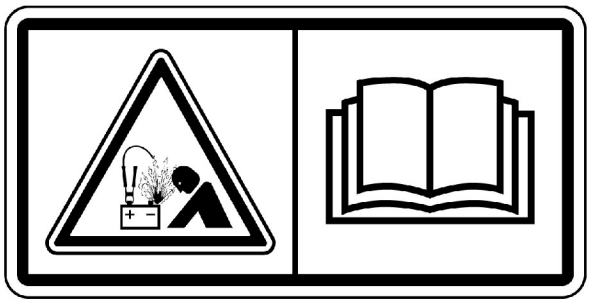

Illustration 8 g01370909

⚠ 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 more information.

Crush Hazard (7)

This warning is located on the side face of the loader frame near the steering frame lock on the left side of the machine.

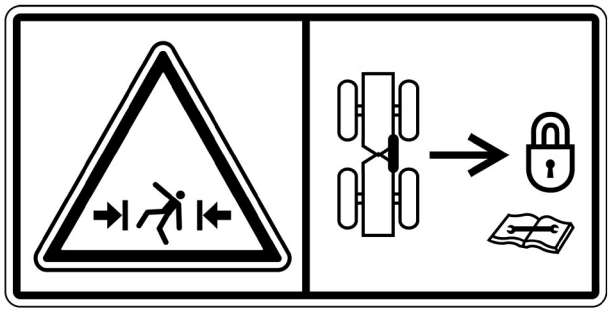

Illustration 9 g01371647

WARNING

Crushing Hazard. There is no clearance for a person in this area when the machine turns. Severe injury or death from crushing could occur. Connect the steering frame lock between front and rear frames before lifting, transporting, or servicing the machine in the articulation area.

Disconnect the steering lock and secure before resuming operation.

No Clearance (8)

This warning is located on the side face of the loader frame near the articulation hitch on both sides of the machine.

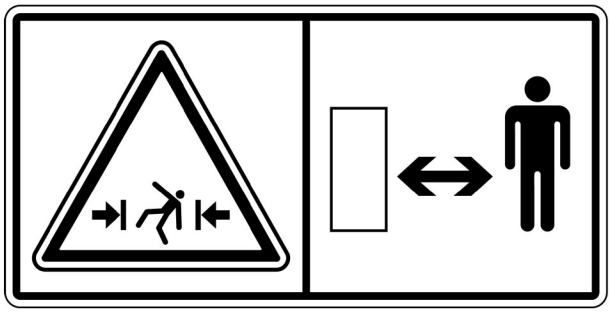

Illustration 10 g01371644

WARNING

Stay back a safe distance. No clearance for a person in this area when the machine turns. Severe injury or death from crushing could occur.

ROPS/FOPS Structure (9)

This warning label is located inside the cab of the machine on the front left post.

Illustration 11 g02106013

WARNING

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

Certification for Rollover Protective Structure (ROPS) and for Falling Object Protective Structure (FOPS)

The unaltered ROPS or the FOPS structure meets the following standards for the ROPS at the time of installation: SAE J1040 MAY94, ISO 3471:1994, SAE J397 OCT95 and ISO 3164:1995. Also, the FOPS canopy meets the following standards at the time of installation: SAE/ISO3449 APR98 LEVEL II and ISO 3449:1992 LEVEL II.

Hot Surface (10)

This warning is located inside the engine compartment on the left side near the fuel fill location and the hand rail. This warning is also located inside the engine compartment on the right side near the handrail and on the right side near the cover of the air cleaner.

Illustration 12 g01384734

WARNING

Avoid contact with hot surfaces. Exhaust piping and engine components become hot during engine operation and cool slowly after engine shutdown. Any contact with hot surfaces can cause severe burns.

Seat Belt (11)

This warning is located inside the cab on the right-hand cab post.

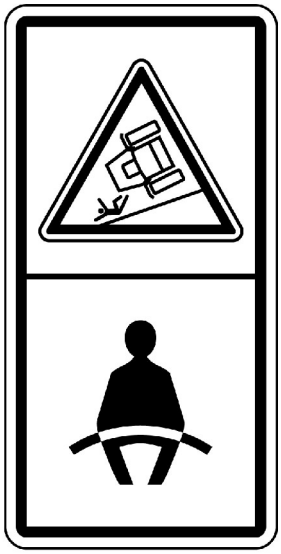

Illustration 13 g01371636

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.

High Pressure Cylinder (12)

This warning is located on the accumulator in the following three locations: the service center on the right side of the machine, in the right side of the non-engine end frame and near the main hydraulic control valve.

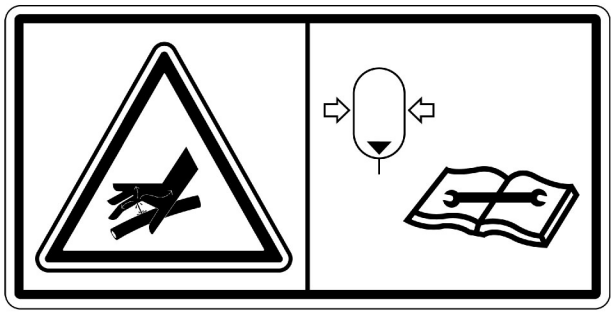

Illustration 14 g01370912

WARNING

Pressurized System!

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

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

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

Incline Ladder (If Equipped) (13)

This warning is located on the platform behind the ladder on the left side of the machine. When the parking brake is engaged, the ladder will incline. Ensure that no personnel are on the ladder when the parking brake is being engaged.

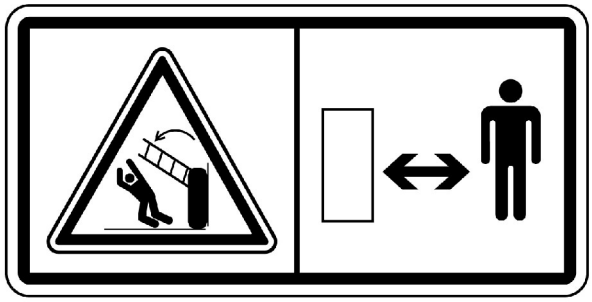

Illustration 15 g01814477

⚠ WARNING

Crush Hazard! Stay back a safe distance from the powered stairway when it is being raised or lowered. Failure to stay back may result in injury or death.

Incline Ladder (If Equipped) (14)

This warning is located on the cover behind the ladder on the left side of the machine. When the parking brake is engaged, the ladder will incline. Ensure that hands are kept clear of the ladder when the parking brake is being engaged.

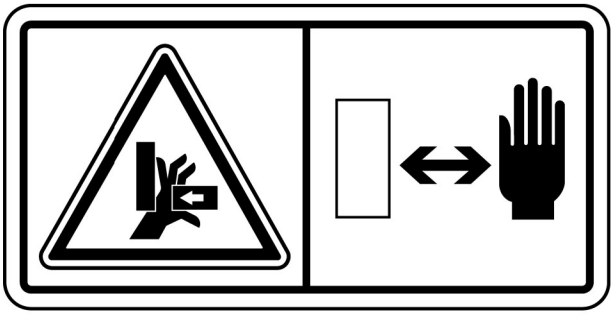

Illustration 16 g01768215

⚠ WARNING

Crush Hazard! Stay back a safe distance from the powered stairway when it is being raised or lowered. Failure to stay back may result in injury or death.

Incline Ladder (If Equipped) (15)

This warning is located in the cab on the right side near the parking brake. When the parking brake is engaged, the ladder will incline. Ensure that no personnel are on the ladder when the parking brake is being engaged.

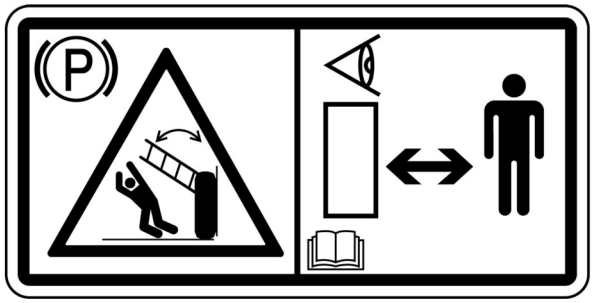

Illustration 17 g02728183

⚠ WARNING

Crush Hazard! Stay back a safe distance from the powered stairway when it is being raised or lowered. Failure to stay back may result in injury or death.

i04903781

Additional Messages

SMCS Code: 7000

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

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

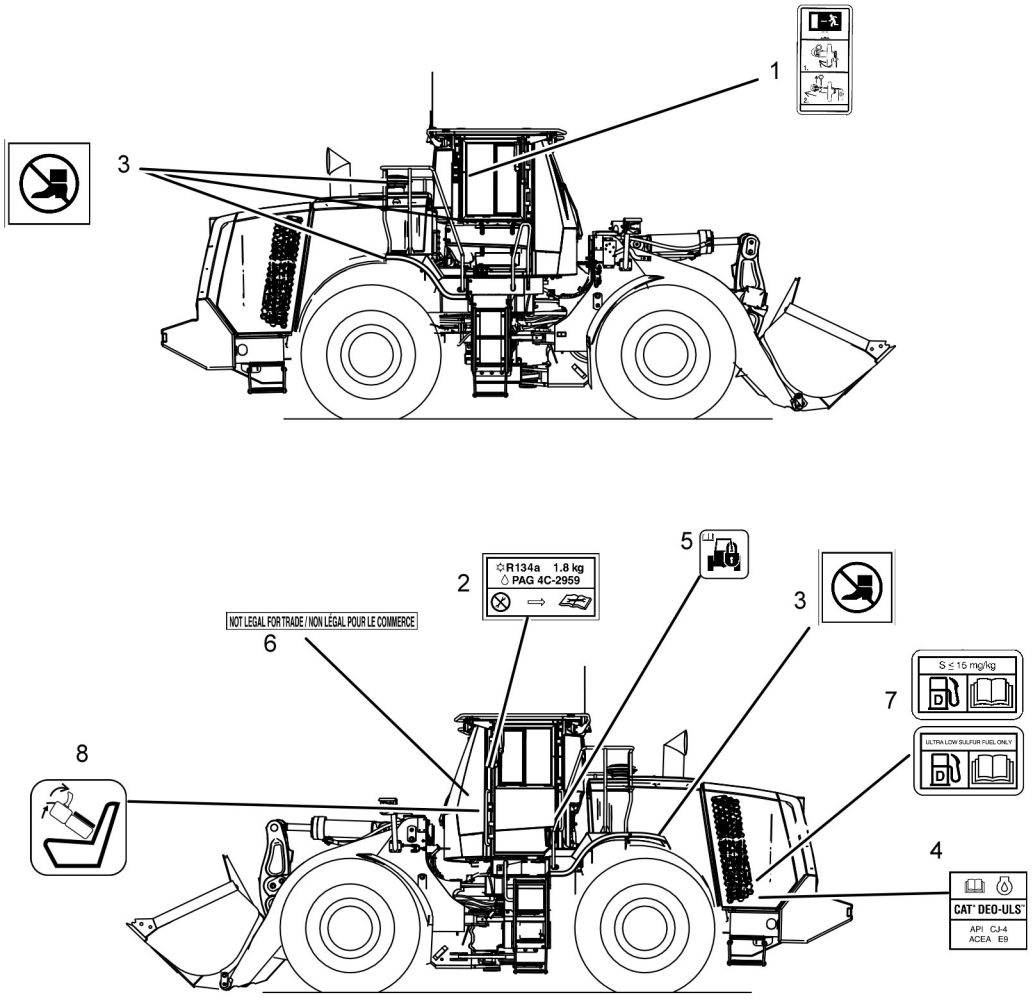

Illustration 18 g03058361

Alternate Exit (1)

This message is located inside the cab on the right side column next to the window latch.

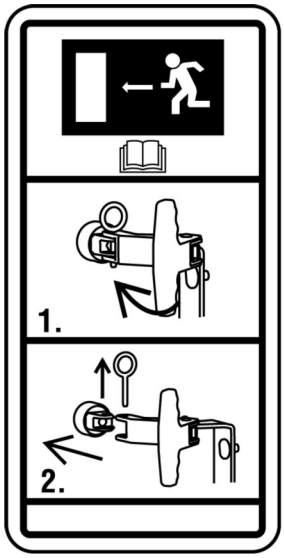

Illustration 19 g02728188

If the primary exit is blocked, the window on the right side may be used as an alternate exit. Pull latch backward and push the latch outward in order to open the window to the partial open position. Remove pin from the latch. Push the window open and exit the machine through the window.

Air Conditioner (2)

This message is located inside the cab on the left-hand post.

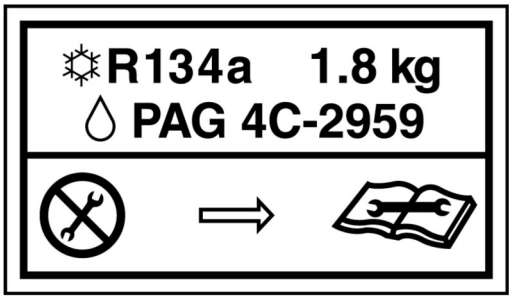

Illustration 20 g02448860

Read the service manual before you perform any maintenance on the air conditioner.

No Step (3)

These messages are located on the fenders, on the hood behind the cab, and on the housing below the right side window.

Illustration 21 g01206181

Do not step in these locations. Do not stand in these locations.

Engine Oil (4)

This message is located on the engine oil fill on the left side.

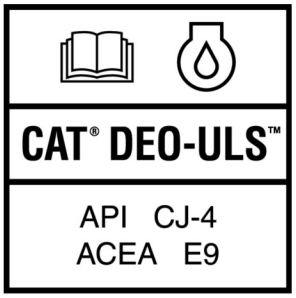

Illustration 22 g02448560

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 about the oil.

Machine Security System (5) (If Equipped)

If equipped, this message is located on the left side of the instrument panel below the engine start switch.

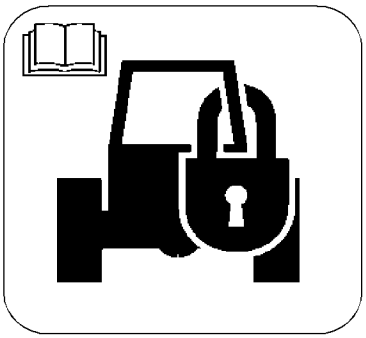

Illustration 23 g01213785

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

Payload Control System (PCS) (6) (If Equipped)

If your machine is equipped with PCS in Canada, this message will be located on the front dash panel.

Illustration 24 g02105956

Diesel Fuel Requirements (7)

This message is located by the fuel fill on the left side.

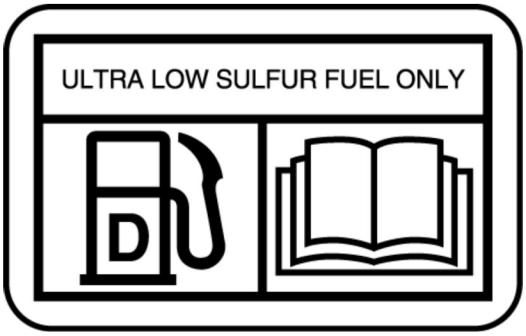

Illustration 25 g02157153

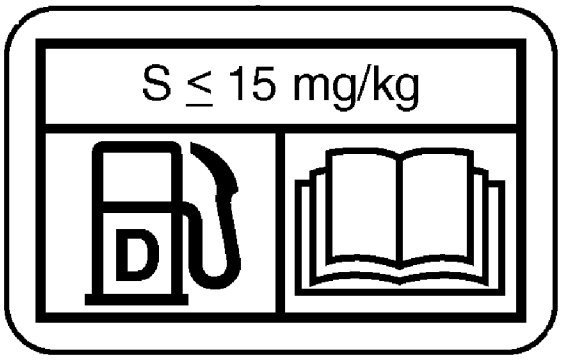

Illustration 26 g02052934

Use Ultra Low Sulfur Diesel (ULSD) fuel.

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

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

Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information about the fuel.

Also, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information about diesel fuels and sulfur for the Tier 4 requirements.

Left Hand Steering Console (8)

This message is located on the front of the left-hand steering console next to the latch to raise the console.

Illustration 27 g02109975

Pull up on the latch in order to release the lock. The left-hand console can be raised in order to exit the machine. The Left Hand Steering Control is locked out when the console is in the raised position unless the machine is moving.

Note: Do not use the latch in order to lift the armrest. The latch should release the armrest, then the armrest should be lifted to the stowed position.

Note: Do not pull up on the latch or raise the left console while the machine is in motion. Set the parking brake and shift transmission to neutral before you pull up on the latch or raise the left console.

i04556300

General Hazard Information

SMCS Code: 7000

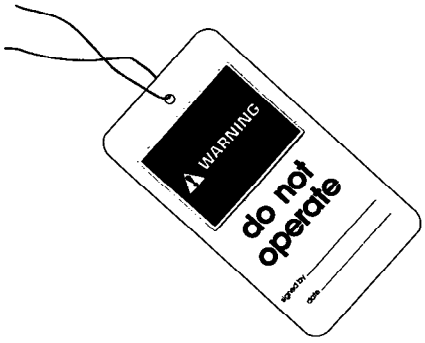

Illustration 28 g00104545

Attach a “Do Not Operate” warning tag or a similar warning tag to the start switch or to the controls before you service or repair the equipment. These warning tags (Special Instruction, SEHS7332) are available from your Cat dealer.

Know the width of your equipment in order 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.

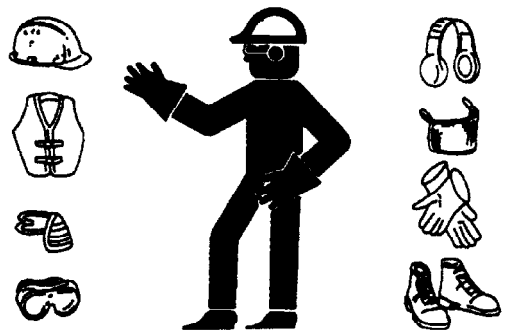

Illustration 29 g00702020

⚠ 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.

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. This action 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 protection equipment. The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi). Avoid directly spraying electronic components with pressurized water.

Avoid the entry of water into the Diesel Particulate Filter (DPF). The design of the exhaust stack will prevent the entry of precipitation into the DPF, but water can be introduced with a pressure washer. Do not use a pressure washer near the exhaust stack or near the DPF outlet. Precipitation can also enter the DPF if the hood is tilted. Cover the DPF outlet when the hood is tilted open and precipitation is present.

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 engine 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.

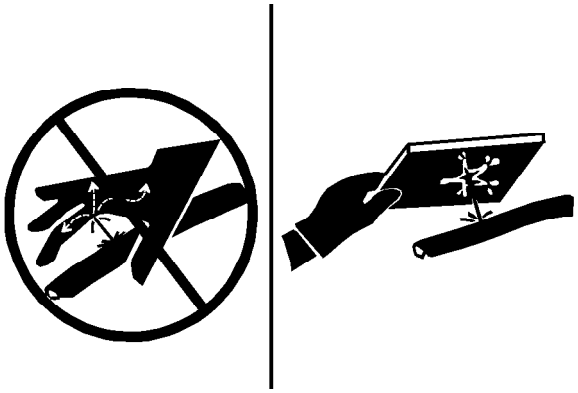

Illustration 30 g00687600

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, “Caterpillar 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.

Asbestos Information

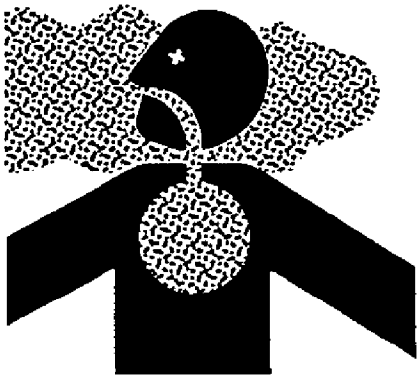

Illustration 31 g00702022

Caterpillar equipment and replacement parts that are shipped from Caterpillar are asbestos free. Caterpillar recommends the use of only genuine Caterpillar 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. Usually, 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”.
- Obey environmental regulations for the disposal of asbestos.
- Stay away from areas that might have asbestos particles in the air.

Dispose of Waste Properly

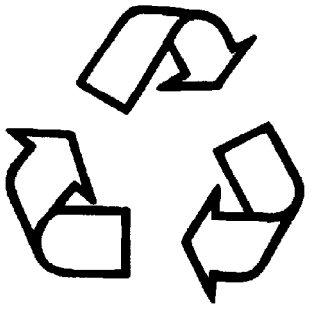

Illustration 32 g00706404

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

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

i01359664

Crushing Prevention and Cutting Prevention

SMCS Code: 7000

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

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

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

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

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

Stay clear of all rotating and moving parts.

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

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

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

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

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

i07399130

Burn Prevention

SMCS Code: 7000

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

Induction System

WARNING

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

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000

Illustration 33 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 34 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 35 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.

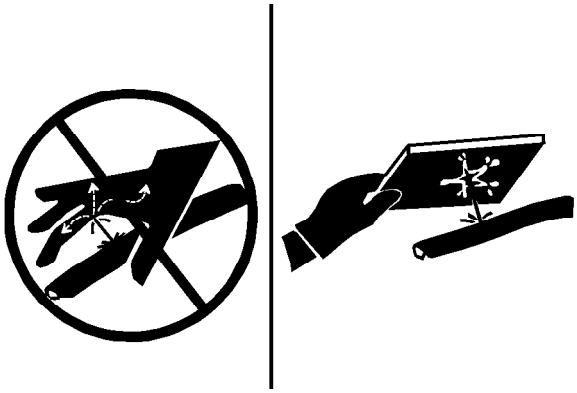

Illustration 36 g00687600

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.

i04281985

Fire Extinguisher Location

SMCS Code: 7000

Make sure that a fire extinguisher is on the machine. Make sure that you are familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher on a regular basis. Obey the recommendations on the instruction plate.

The recommended location for mounting the fire extinguisher is on the platform behind the cab.

If the weight of the fire extinguisher is more than 4.5 kg (10 lb), mount the fire extinguisher as low as possible.

Note: Do not weld the ROPS in order to install the fire extinguisher. Also, do not drill holes in the ROPS in order to mount the fire extinguisher on the ROPS.

i06164462

Tire Information

SMCS Code: 7000

Explosions of air inflated tires have resulted from heat-induced gas combustion inside the tires. Explosions can be caused by heat that is generated by welding, by heating rim components, by external fire, or by excessive use of brakes.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, the rim components, and the axle components from the machine. Stay out of the trajectory path. Both the force of the explosion and the flying debris can cause property damage, personal injury, or death.

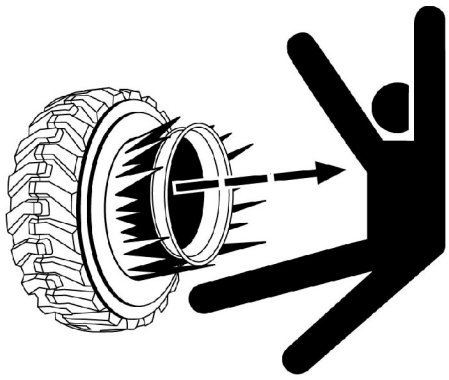

Illustration 37 g02166933

Typical example of tire is shown

Do not approach a hot or an apparently damaged tire.

Caterpillar recommends against using water or calcium as a ballast for the tires except in machines designed for this additional mass. For those applicable machines, the maintenance section will contain instructions on the correct tire inflation and filling procedures. Ballast, such as fluid in the tires, increases overall machine weight and may affect braking, steering, power train components, or the certification of the protective structure such as the ROPS. The use of tire/rim rust preventatives or other liquid additives is not required.

⚠ WARNING

Proper nitrogen inflation equipment, and training in using the equipment, are necessary to avoid over inflation. A tire blowout or rim failure can result from improper or misused equipment and personal injury or death can occur.

A tire blowout and/or rim failure can occur if the inflation equipment is not used correctly, due to the fact that a fully charged nitrogen cylinder's pressure is approximately 15000 kPa (2200 psi).

Dry nitrogen gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion because nitrogen does not aid combustion. Nitrogen helps to prevent oxidation of the rubber, deterioration of rubber, and corrosion of rim components.

To avoid overinflation, proper nitrogen inflation equipment and training in the usage of the equipment are necessary. A tire blowout or a rim failure can result from improper equipment or from misused equipment.

When you inflate a tire, stand behind the tread and use a self-attaching chuck.

Servicing tires and rims can be dangerous. Only trained personnel that use proper tools and proper procedures should perform this maintenance. If correct procedures are not used for servicing tires and rims, the assemblies could burst with explosive force. This explosive force can cause serious personal injury or death. Carefully obey the specific instructions from your tire dealer.

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.

i06648894

Before Starting Engine

SMCS Code: 1000; 7000

The steering frame lock must be in the UNLOCKED position in order to steer the machine.

Secure the hood in the fully closed position or the fully open position prior to starting the engine. Starting or operating the machine with the hood partially open can cause the exhaust to damage hood components.

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

Inspect the condition of the seat belt and the condition of mounting hardware. Replace any parts that are worn or damaged. Regardless of the appearance, replace the seat belt after 3 years of use. Do not use a seat belt extension on a retractable seat belt.

Adjust the seat so the operator has full pedal travel.

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

Before you start the engine or before you move the machine, ensure that no one else is on the machine. Check underneath the machine and around the machine. Ensure that there are no personnel in the area.

Note: Manually check engine oil before starting engine. Ensure that oil is in the safe range of the dipstick. For more information refer to Operation Maintenance Manual, “Engine Oil Level - Check” in the Maintenance Support Section.

i04490177

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. Identify potential hazards as hazards become visible around the machine.

Before operating the machine, ensure that the mirror and rear camera 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.

Direct visibility may not be possible 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 traffic to move when safe
- 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.

i04555163

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. Illustration 38 provides an approximate visual indication of areas of significant restricted visibility. Illustration 38 indicates restricted visibility areas at ground level inside a radius of 12 m (40 ft) from the operator on a machine without the use of optional visual aids. This illustration does not provide areas of restricted visibility for distances outside a radius of 12 m (40 ft).

Refer to this Operation and Maintenance Manual, “Mirror” for more information on visibility. Refer to this Operation and Maintenance Manual, “Operator Controls” for more information on visibility with the Rear Camera Monitor. For areas that are not covered by the visual aids, the job site organization must be utilized to minimize hazards of this restricted visibility. Refer to Operation and Maintenance Manual, “Visibility Information” for more information about job site organization.

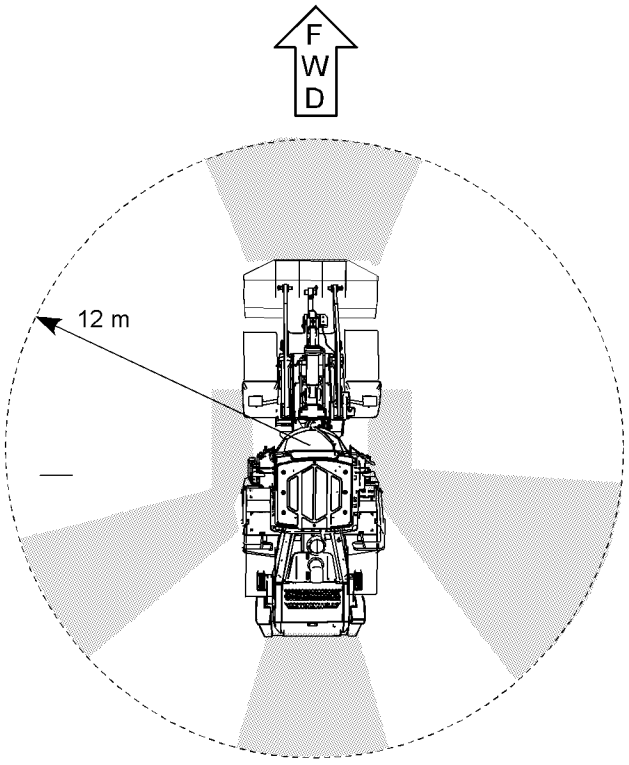

Illustration 38 g02099441

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

i03690423

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 and do not move any controls.

Move all hydraulic controls to the HOLD position before you start the engine.

Move the transmission control to the NEUTRAL position.

Engage the parking brake.

Diesel engine exhaust contains products of combustion which can be harmful to your health. Always operate 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.

Check for the presence of personnel. Ensure that all personnel are clear of the machine.

i04039346

Before Operation

SMCS Code: 7000

Ensure that there are no personnel on the machine or in the area around the machine.

Clear all obstacles from the path of the machine. Beware of overhead wires, ditches, and other hazards.

Ensure that all windows are clean. Secure the access doors and the cab door in the closed positon. Secure the windows in the open position or in the closed position.

Secure the hood, the engine side panels, the belly guard (if equipped), and the roading fenders (if equipped) in the closed position.

Adjust the rear view mirrors (if equipped) for the best vision of the area near the machine.

Ensure that the horn, the backup alarm (if equipped), and all other warning devices are working properly.

Fasten the seat belt securely.

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Operation

SMCS Code: 7000

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

While you operate the machine slowly in an open area, check for proper operation of all controls and all protective devices.

Before you move the machine, make sure that no one will be endangered.

Do not allow riders on the machine unless the machine has an additional seat with a seat belt. The rider must be seated and the seat belt must be fastened.

Never use the work tool for a work platform.

Note any needed repairs during machine operation. Report any needed repairs.

Carry work tools at approximately 40 cm (15 inches) above ground level.

Do not go close to the edge of a cliff, an excavation, or an overhang.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes. If the machine begins to sideslip on a downgrade, immediately remove the load and turn the machine downhill.

Avoid any conditions that can lead to tipping the machine. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip when you cross ditches, ridges, or other unexpected obstructions.

Maintain control of the machine. Do not overload the machine beyond the machine capacity.

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

Know the maximum dimensions of your machine.

Always keep the Rollover Protective Structure (ROPS) installed during machine operation.

Fueling Machine

⚠ WARNING

Ultra Low Sulfur Diesel (ULSD) poses a greater static ignition hazard than earlier diesel formulations, with a higher Sulfur content, which may result in a fire or explosion. Consult with your fuel or fuel system supplier for details on proper grounding and bonding practices.

⚠ WARNING

To avoid possible injury or death, do not smoke while in an area that contains flammable liquids.

All fuels, most lubricants, and some coolants are flammable.

Keep all fuels and lubricants stored in properly marked containers and away from unauthorized persons.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Store all oily rags or other flammable materials in a protective container in a safe place.

Remove all flammable materials such as fuel, oil, and other debris before they accumulate on the machine.

Do not expose the machine to flames, burning brush, etc., if at all possible.

Locate fuel fill on machine, and remove the fuel cap. When fueling the machine is complete, replace the fuel cap and lock into place.

Fuel cap may be hot. To avoid injury, use personal protective equipment. Allow the cap to cool before fueling the 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.

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Engine Stopping

SMCS Code: 1000; 7000

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

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

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Parking

SMCS Code: 7000

Park the machine on a level surface. If you must park on a grade, chock the wheels with suitable chocks. Take into account the following:

- tire size
- machine weight
- ground conditions

Apply the service brake in order to stop the machine. Move the transmission control to the NEUTRAL position. Move the throttle control to the LOW IDLE position.

Engage the parking brake.

Lower all equipment to the ground. Activate any control locks.

Stop the engine.

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

Ensure that the Left Hand Steering Control (if equipped) is tilted up and out of the way before you exit the cab.

Always turn the battery disconnect switch to the OFF position before leaving the machine.

If the machine will not be operated for a month or more, remove the battery disconnect switch key.

i03955549

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 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 traction and machine stability. Rocky surfaces may promote side slipping of the machine.

Slippage due to excessive loads – Slippage 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.

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: Safe operation on steep slopes may require special machine maintenance. Excellent skill of the operator and proper equipment for specific applications are also required. Consult the Operation and Maintenance Manual sections for the proper fluid level requirements and intended machine use.

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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 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 Cat machines to maximize the value customers receive from Cat products. Caterpillar understands that special circumstances may lead a customer to use tools outside of the specifications. In these cases, customers must be aware that such choices can reduce vehicle performance. Warranty claims will be affected 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.

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

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.

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Equipment Lowering with Engine Stopped

SMCS Code: 7000

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

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Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

The sound values indicated below are for specific operating conditions only. Machine and operator sound levels will vary at different engine and/or cooling fan speeds. The cab was properly installed and maintained. The tests were conducted with the cab doors and the cab windows closed. Hearing protection may be needed when the machine is operated with a cabin that is not properly maintained, or when the doors and/or windows are open for extended periods or in a noisy environment.

The declared dynamic operator Sound Pressure Level for a standard machine configuration, measured according to the procedures specified in “ISO6396:2008”, is 71 dB(A) with the cooling fan speed set at maximum value.

The declared average exterior sound pressure level for a standard machine configuration, measured according to the procedures specified in “SAEJ88:2006 - Constant Speed Moving Test”, is 76 dB(A). The measurement was conducted under the following conditions: distance of 15 m (49.2 ft), moving forward in an intermediate gear ratio, static hydraulic cycle (with no payload) and with the cooling fan speed set at maximum value.

The declared exterior sound power level for a standard machine configuration, measured according to the procedures specified in “ISO6395:2008”, is 111 dB(A) with the cooling fan speed set at maximum value.

The declared dynamic operator Sound Pressure Level for a machine installed with a Low Sound package, measured according to the procedures specified in “ISO6396:2008”, is 69 dB(A) with the cooling fan speed set at maximum value.

The declared exterior sound power level for a machine installed with a Low Sound package, measured according to the procedures specified in “ISO6395:2008”, is 108 dB(A) with the cooling fan speed set at maximum value.

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

The declared dynamic operator sound pressure level for a standard machine configuration, measured according to the procedures specified in “ISO6396:2008”, is 69 dB(A) with a cooling fan speed set at 70 percent of the maximum value.

The declared sound power level that is labeled on the machine is 108 L_{WA}. The measurement of the sound power level was made according to the test procedures and conditions that are specified in the European Union Directive “2000/14/EC” as amended by “2005/88/EC”.

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

Vibration Data for Wheel Loaders

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5 meter per second squared.

Information Concerning Whole Body Vibration Level

This section provides vibration data and a method for estimating the vibration level for wheel loaders.

Note: Vibration levels are influenced by many different parameters. Many items are listed below.

- Operator training, behavior, mode and stress
- Job site organization, preparation, environment, weather and material
- Machine type, quality of the seat, quality of the suspension system, attachments and condition of the equipment

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in Table 2 in order to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

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

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

Table 2

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."							
Machine Type	**Typical Operating Activity**	**Vibration Levels**			**Scenario Factors**		
		X axis	**Y axis**	**Z axis**	**X axis**	**Y axis**	**Z axis**
Wheel Loader	load and carry motion	0,84	0,81	0,52	0,23	0,20	0,14
	mining application(1)	1,27	0,97	0,81	0,47	0,31	0,47
	transfer(2)	0,76	0,91	0,49	0,33	0,35	0,17
	V-shape motion (3)	0,99	0,84	0,54	0,29	0,32	0,14

(1) Loading at the face
(2) Travel at high speed on the job site or on public roads
(3) Loading a truck in short cycles

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 Supplement , SEBU8257 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. This seat is tested with the input "spectral class EM3". The seat has a transmissibility factor of "SEAT<1.0".

The whole body vibration level of the machine varies. There is a range of values. The low value is 0.5 meter per second squared. The machine meets the short term level for the design of the seat in "ISO 7096". The value is 1.13 meter per second squared for this machine.

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

1. Use the right type and size of machine, equipment, and attachments.

2. Maintain machines according to the manufacturer recommendations.

a. Tire pressures

b. Brake and steering systems

c. Controls, hydraulic system, and linkages

3. Keep the terrain in good condition.

a. Remove any large rocks or obstacles.

b. Fill any ditches and holes.

c. Provide machines and schedule time in order to maintain the conditions of the terrain.

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

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

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

5. Perform the following operations smoothly.

a. Steer

b. Brake

c. Accelerate.

d. Shift the gears.

Note: There is no gear shift in XE machines.

6. Move the attachments smoothly.

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

a. Drive around obstacles and rough terrain.

b. Slow down when 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 wheel loaders.

c. If no ride control system is available, reduce speed in order to prevent bounce.

d. Haul the machines between workplaces.

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

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

b. Adjust the mirrors in order to minimize twisted posture.

c. Provide breaks in order to reduce long periods of sitting.

d. Avoid jumping from the cab.

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

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

Sources

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

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

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

Refer to Operation and Maintenance Manual 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 Cat dealer about safe machine operation.

Use the following web site in order to find your local dealer:

Caterpillar, Inc.
www.cat.com

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Operator Station

SMCS Code: 7000

Any modifications to the inside of the operator station should not project into the operator space. Modifications may not project 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 companion seat (if equipped) are 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.

Product Information Section

General Information

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Specifications

SMCS Code: 7000

Intended Use

This machine is classified as a Wheel Loader as described in “ISO 6165:2001”. This machine normally has a front mounted bucket. The principal intended functions are digging, loading, lifting, carrying, and moving material such as earth, crushed rock, or gravel. Additional work tools allow this machine to perform other specific tasks.

Application/Configuration Restrictions

Refer to “Machine Data” below for information about maximum machine weight.

Lift arm height restrictions will be found in the Operation and Maintenance Manual for the appropriate work tool.

With full fluids, the maximum fore and aft continuous slope operation for proper lubrication is 30 degrees.

This machine is approved for use in environments with no explosive gases.

Machine Data

This machine is equipped with a C9.3 Engine. Dimensions may vary with work tools.

Basic machine specifications include the following:

- Michelin L3 XHA2 tires or equivalent
- Full fuel tank
- 80 kg (176 lb) operator
- Full fluids
- Air conditioner
- Ride control
- General-purpose bucket with BOCE (966K 4.2 cubic meter (5.5 cubic yard) and 972K 4.8 cubic meter (6.3 cubic yard))

Shipping weight includes the following:

- Michelin L3 XHA2 tires or equivalent
- 10% fuel in the tank
- Full fluids
- Air conditioner
- Ride control
- General-purpose bucket with BOCE (966K 4.2 cubic meter (5.5 cubic yard) and 972K 4.8 cubic meter (6.3 cubic yard))

Basic machine specifications are listed in the following tables.

Table 3

966K Wheel Loader	
Operating Weight	23561 kg (51927 lb)
Shipping Weight	23177 kg (51096 lb)
Maximum Length	8692 mm (342 inch)
Width	3220 mm (126.8 inch)
Height to Top of ROPS	3547 mm (139.6 inch)

Table 4

972K Wheel Loader	
Operating Weight	25586 kg (56391 lb)
Shipping Weight	25202 kg (55560 lb)
Maximum Length	9225 mm (363 inch)
Width	3220 mm (126.8 inch)
Height to Top of ROPS	3547 mm (139.6 inch)

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Rated Load

SMCS Code: 6700

⚠ WARNING

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

Note: Rated loads should be used as a guide. Attachments, uneven ground conditions, soft ground conditions, or poor ground conditions have effects on rated loads. The operator is responsible for being aware of these effects.

Rated loads are based upon a standard machine with the following conditions:

- proper lubricants
- full fuel tank
- air conditioner
- Ride control
- Power train Guard
- enclosed ROPS
- 80 kg (176 lb) operator
- L3 Michelin XHA2 tires or equivalent

Rated loads will vary for different attachments. Consult your Cat dealer about the rated load for specific attachments.

The rated operating load is defined by “SAE J818” (May 1987) and by the “ISO 5998” (1986) as 50% of the full turn static tipping load.

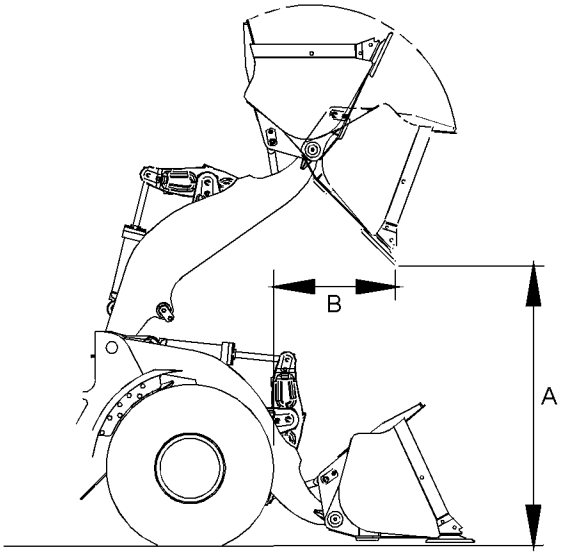

Illustration 39 g01963747

The dump clearance and the reach are given for each bucket at maximum lift height and at a 45 degree dumping angle. Dump clearance (A) is measured from the ground to the bucket edge. Reach (B) is measured from the front of the front tire to the bucket edge.

For North America, the rated operating load is defined by SAE “J1197” (February 1991) as 50% of the full turn static tipping load.

Buckets

966K

Table 5

966K Standard Linkage							
Bucket Type		Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose
Edge Type		Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth
Rated Capacity	m3	3.80	3.60	4.00	3.80	4.20	4.00
	yd3	4.97	4.71	5.23	4.97	5.49	5.23
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,067	2,915	3,058	2,905	2,991	2,837
	ft, in	10' 0	9' 6	10' 0	9' 6	9' 9	9' 3
Reach at Maximum Lift and 45° Discharge	mm	1,327	1,467	1,334	1,473	1,388	1,525
	ft, in	4' 4	4' 9	4' 4	4' 10	4' 6	5' 0
Reach at Level Lift Arm and Bucket Level	mm	2,739	2,943	2,750	2,955	2,838	3,043
	ft, in	8' 11	9' 7	9' 0	9' 8	9' 3	9' 11
Rated Load	kg	7,790	7,790	7,776	7,794	7,678	7,700
	lbs	17,169	17,169	17,138	17,178	16,922	16,971

Table 6

966K Standard Linkage									
Bucket Type		Hook On General Purpose	Hook On General Purpose	Hook On General Purpose	Hook On General Purpose	Pin On Material Handling	Pin On Material Handling	Pin On Rock	Pin On Rock
Edge Type		Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth
Rated Capacity	m3	3.80	3.60	4.20	4.00	4.20	4.00	3.40	3.20
	yd3	4.97	4.71	5.49	5.23	5.49	5.23	4.45	4.19
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,038	2,886	2,960	2,806	2,967	2,804	3,124	3,026
	ft, in	9' 11	9' 5	9' 8	9' 2	9' 8	9' 2	10' 2	9' 11
Reach at Maximum Lift and 45° Discharge	mm	1,362	1,501	1,433	1,571	1,263	1,390	1,454	1,576
	ft, in	4' 5	4' 11	4' 8	5' 1	4' 1	4' 6	4' 9	5' 2
Reach at Level Lift Arm and Bucket Level	mm	2,783	2,988	2,893	3,097	2,784	2,988	2,818	2,974
	ft, in	9' 1	9' 9	9' 5	10' 1	9' 1	9' 9	9' 2	9' 9
Rated Load	kg	7,494	7,571	7,363	7,436	7,665	7,752	6,283	6,413
	lbs	16,517	16,686	16,228	16,389	16,894	17,085	13,848	14,134

Table 7

966K Highlift Linkage								
Bucket Type		Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Hook On General Purpose	Hook On General Purpose	Pin On Material Handling	Pin On Rock
Edge Type		Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge
Rated Capacity	m^3	3.80	4.00	4.20	3.80	4.20	4.20	3.40
	yd^3	4.97	5.23	5.49	4.97	5.49	5.49	4.45
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,625	3,616	3,549	3,596	3,518	3,525	3,682
	ft, in	11' 10	11' 10	11' 7	11' 9	11' 6	11' 6	12' 0
Reach at Maximum Lift and 45° Discharge	mm	1,303	1,310	1,363	1,337	1,409	1,238	1,430
	ft, in	4' 3	4' 3	4' 5	4' 4	4' 7	4' 0	4' 8
Reach at Level Lift Arm and Bucket Level	mm	3,143	3,155	3,242	3,187	3,297	3,188	3,222
	ft, in	10' 3	10' 4	10' 7	10' 5	10' 9	10' 5	10' 6
Rated Load	kg	7,801	7,788	7,703	7,516	7,409	7,690	6,287
	lbs	17,193	17,165	16,977	16,565	16,329	16,949	13,857

Table 8

966K Roading Configuration			
Bucket Type		Pin On Material Handling	Pin On Material Handling
Edge Type		Back Grading Edge/Flush Mounted Teeth	Bolt on Cutting Edge
Rated Capacity	m3	4.20	4.20
	yd3	5.49	5.49
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,020	2,969
	ft, in	9' 10	9' 8
Reach at Maximum Lift and 45° Discharge	mm	1,428	1,441
	ft, in	4' 8	4' 8
Reach at Level Lift Arm and Bucket Level	mm	2,846	2,889
	ft, in	9' 4	9' 5
Rated Load	kg	7,606	7,560
	lbs	16,764	16,662

972K

Table 9

972K Standard Linkage							
Bucket Type		Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Pin On General Purpose
Edge Type		Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth
Rated Capacity	m3	4.40	4.20	4.60	4.40	4.80	4.60
	yd3	5.75	5.49	6.02	5.75	6.28	6.02
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,229	3,076	3,187	3,033	3,154	2,999
	ft, in	10' 7	10' 1	10' 5	9' 11	10' 4	9' 10
Reach at Maximum Lift and 45° Discharge	mm	1,327	1,465	1,363	1,500	1,392	1,528
	ft, in	4' 4	4' 9	4' 5	4' 11	4' 6	5' 0
Reach at Level Lift Arm and Bucket Level	mm	2,948	3,153	3,004	3,209	3,049	3,254
	ft, in	9' 8	10' 4	9' 10	10' 6	10' 0	10' 8
Rated Load	kg	8,620	8,644	8,542	8,571	8,558	9,476
	lbs	18,998	19,051	18,827	18,890	18,862	20,885

Table 10

972K Standard Linkage							
Bucket Type		Hook On General Purpose	Hook On General Purpose	Pin On Material Handling	Pin On Material Handling	Pin On Rock	Pin On Rock
Edge Type		Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth
Rated Capacity	m3	4.40	4.20	4.60	4.40	4.00	3.80
	yd3	5.75	5.49	6.02	5.75	5.23	4.97
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,200	3,047	3,120	2,957	3,233	3,142
	ft, in	10' 6	9' 11	10' 2	9' 8	10' 7	10' 3
Reach at Maximum Lift and 45° Discharge	mm	1,362	1,500	1,286	1,413	1,463	1,571
	ft, in	4' 5	4' 11	4' 2	4' 7	4' 9	5' 1
Reach at Level Lift Arm and Bucket Level	mm	2,993	3,198	3,014	3,219	3,073	3,214
	ft, in	9' 9	10' 5	9' 10	10' 6	10' 1	10' 6
Rated Load	kg	8,334	8,417	8,515	8,532	7,044	7,163
	lbs	18,368	18,551	18,767	18,805	15,525	15,787

Table 11

972K Highlift Linkage							
Bucket Type		Pin On General Purpose	Pin On General Purpose	Pin On General Purpose	Hook On General Purpose	Pin On Material Handling	Pin On Rock
Edge Type		Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge	Bolt on Cutting Edge
Rated Capacity	m3	4.40	4.60	4.80	4.40	4.60	4.00
	yd3	5.75	6.02	6.28	5.75	6.02	5.23
Dump Clearance at Maximum Lift and 45° Discharge	mm	3,565	3,523	3,490	3,536	3,456	3,568
	ft, in	11' 8	11' 6	11' 5	11' 7	11' 4	11' 8
Reach at Maximum Lift and 45° Discharge	mm	1,350	1,386	1,415	1,385	1,309	1,487
	ft, in	4' 5	4' 6	4' 7	4' 6	4' 3	4' 10
Reach at Level Lift Arm and Bucket Level	mm	3,222	3,278	3,323	3,267	3,288	3,347
	ft, in	10' 6	10' 9	10' 10	10' 8	10' 9	10' 11
Rated Load	kg	7,858	7,792	7,819	7,590	7,765	6,396
	lbs	17,319	17,174	17,233	16,728	17,114	14,097

Table 12

972K Extended Capacity Linkage									
Bucket Type		Pin On General Purpose	Pin On General Purpose	Hook On General Purpose	Hook On General Purpose	Pin On Material Handling	Pin On Material Handling	Pin On Rock	Pin On Rock
Edge Type		Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth	Bolt on Cutting Edge	Teeth
Rated Capacity	m3	4.90	4.70	4.90	4.70	4.80	4.63	3.40	3.20
	yd3	6.41	6.15	6.41	6.15	6.28	6.06	4.45	4.19
Dump Clearance at Maximum Lift and 45° Discharge	mm	2,920	2,765	2,899	2,744	2,866	2,703	3,124	3,026
	ft, in	9' 6	9' 0	9' 6	9' 0	9' 4	8' 10	10' 2	9' 11
Reach at Maximum Lift and 45° Discharge	mm	1,448	1,584	1,484	1,621	1,365	1,492	1,454	1,576
	ft, in	4' 9	5' 2	4' 10	5' 3	4' 5	4' 10	4' 9	5' 2
Reach at Level Lift Arm and Bucket Level	mm	2,933	3,138	2,975	3,180	2,929	3,133	2,818	2,974
	ft, in	9' 7	10' 3	9' 9	10' 5	9' 7	10' 3	9' 2	9' 9
Rated Load	kg	9,192	9,203	8,943	9,024	9,115	9,191	7,599	7,734
	lbs	20,259	20,283	19,710	19,889	20,089	20,257	16,748	17,046

Identification Information

i04614159

Plate Locations and Film Locations

SMCS Code: 1000; 7000; 7405

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

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

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

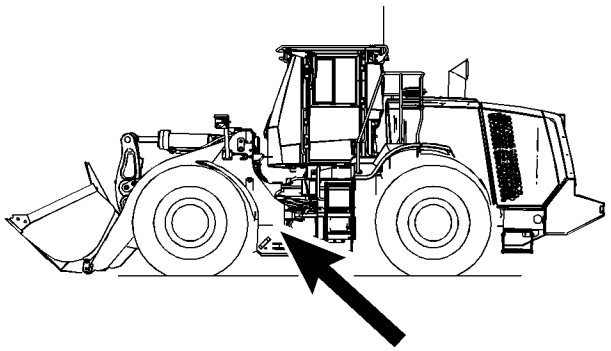

Illustration 40 g02101653

This plate is located on the left side of the front loader frame.

Machine PIN _____

SIN _____

Year of Manufacture _____

If the machine is equipped with the certification plate for the European Union, this plate will be attached to the PIN plate. The certification plate will contain the following information:

- Power (kW) _____
- Weight (kg) _____
- Year of Manufacture _____

The plate for the transmission serial number is located next to the sight gauge for the transmission oil level.

Transmission Serial Number _____

The engine label is located on the engine.

Engine Serial Number _____

Certification

ROPS/FOPS Plate

These messages are located on the front post on the left side in the cab.

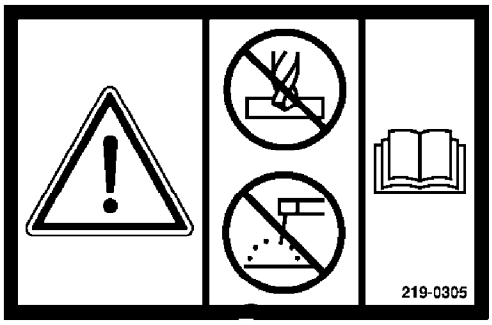

Illustration 41 g00902324

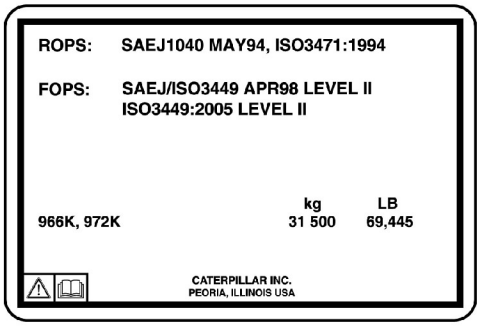

Illustration 42 g02105873

WARNING

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

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

Sound

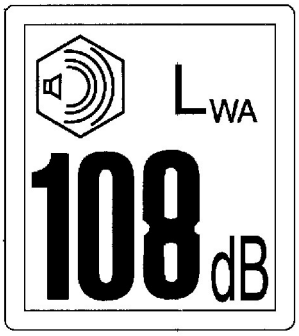

Illustration 43 g02763761

If equipped, the certification film 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”.

Machine Security System (If Equipped)

This message is located on the control group for the machine security system. The control group is located in the engine compartment.

Illustration 44 g00995393

Consult your Cat dealer with any questions that concern the operation of the MSS in a specific country.

i04563918

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

Certification Label for Emissions

Note: This information is pertinent in the United States, in Canada, and in Europe.

Consult your Caterpillar dealer for an Emission Control Warranty Statement.

This label is located on the front cover of the engine at the rear of the machine.

Declaration of Conformity

SMCS Code: 1000; 7000

Table 13

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

ORIGINAL EC or EU DECLARATION OF CONFORMITY

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

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

Standards & Regulations Manager, Caterpillar France S.A.S
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth moving Equipment
	Function:	Wheeled loader
	Model/Type:	966K Wheel Loader 972K Wheel Loader
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfils all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2000/14/EC amended by 2005/88/EC, Note (1)		
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 April 2010, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Operation Section

Before Operation

i04407212

Mounting and Dismounting

SMCS Code: 7000

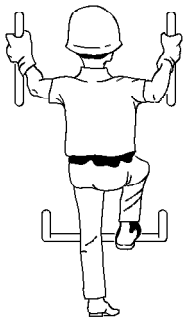

Illustration 45 g00037860
Typical example

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 2 feet and one hand. Three-point contact can also be 1 foot and two hands.

To access the rear of the machine. Fully raise the hood and use the handrails under the hood to maintain three points of contact.

Do not mount a moving machine. Do not dismount a moving machine. Ensure that the work tool is fully lowered to the ground, the transmission is in neutral, and the parking brake is applied. Ensure that the Left Hand Steering Control (if equipped) is tilted up and out of the way before you enter or exit the cab. 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 the maintenance section.

Alternate Exit

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

i07581816

Daily Inspection

SMCS Code: 1000; 7000

For a maximum service life of the machine, complete a thorough walk-around inspection before you mount the machine and before you start the engine.

Inspect the area around the machine and under the machine. Inspect the machine components and lines for defects. Look for loose bolts, trash buildup, oil, coolant, fuel, or exhaust leakage, broken parts, or worn parts.

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.

Inspect the condition of the equipment and of the hydraulic components.

Check the condition of the tires. Adjust the inflation pressure, if necessary.

Check all of the oil levels, all of the coolant levels, and all of the fuel levels.

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

Ensure that all covers and guards are securely attached.

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

Grease the work tool on a daily basis.

Check the hood lamps and head lamps.

Ensure that the rear view camera is working properly (if equipped).

Daily, perform the procedures that are applicable to your machine. Refer to the Operation and Maintenance Manual, “Maintenance Interval Schedule” “Every 10 Service Hours or Daily” category for the list of procedures.

i03879681

Steering Frame Lock

SMCS Code: 7506

⚠ WARNING

No clearance for person in this area when machine turns. Severe injury or death from crushing could occur.

The steering frame lock is located on the left side of the machine.

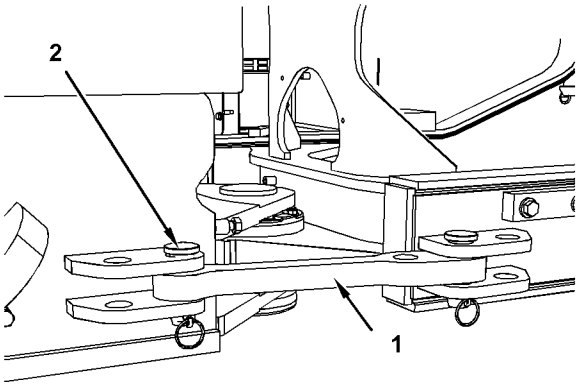

Illustration 46 g02125794

Steering frame lock in the locked position

Connect steering frame lock (1) when the machine is being lifted and when the machine is being transported. Also connect the steering frame lock if you are performing service work near the articulation joint. Install pin (2) in order to secure the steering frame lock.

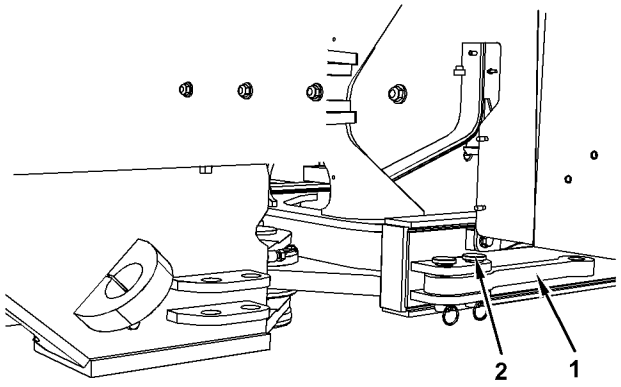

Illustration 47 g02125796

Steering frame lock in the unlocked position

Separate steering frame lock (1) before the machine is operated.

Move the steering frame lock into the unlocked position and install pin (2).

Machine Operation

i04562492

Alternate Exit

SMCS Code: 7310

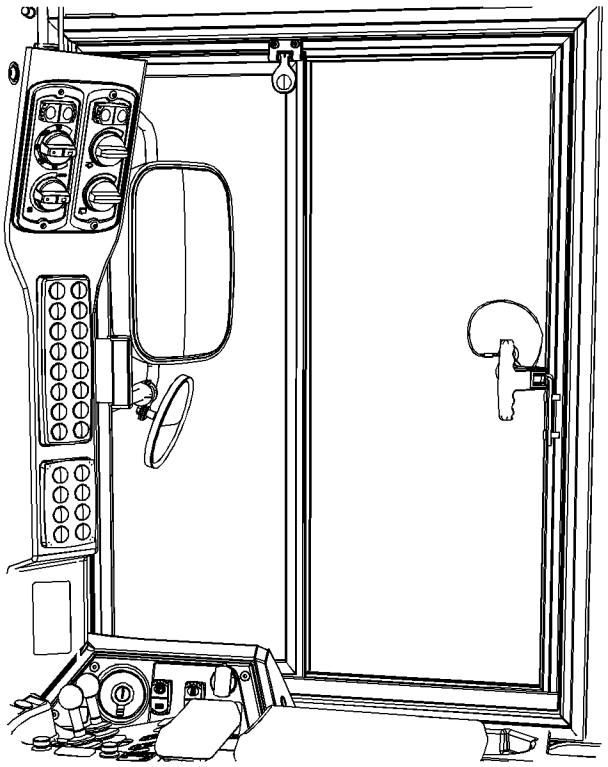

Illustration 48 g02728267

The right side cab window can be used as an alternate exit. The window can only be opened from the inside of the cab.

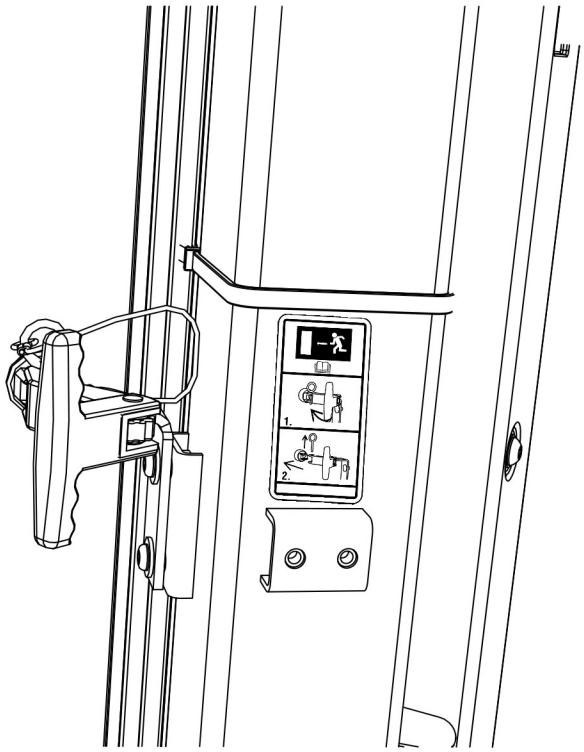

Illustration 49 g02728272

Pull latch backward and push the latch outward in order to open the window to the partial open position. Remove pin from the latch. Push the window to the fully open position.

Open the window periodically in order to ensure proper operation. Lubricate or repair the window as necessary.

If your machine is equipped with window guards, swing the window guards open first.

i07672528

Seat

SMCS Code: 7312

Note: The operator seat that is provided with this machine is in compliance with the appropriate class of ISO 7096.

Adjust the seat to allow full travel of the pedals. Make the seat adjustments when the operator is sitting against the back of the seat. The seat is equipped with a sensor to determine if the operator is present in the seat. Certain functions in the cab will not operate if the operator is not sitting in the seat.

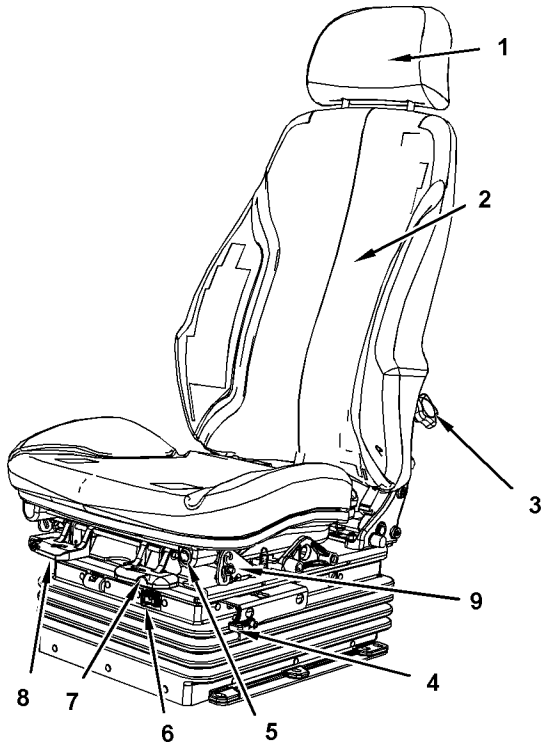

Illustration 50 g02456757

(1) Headrest
(2) Seat with Lumbar Support
(3) Lumbar Adjustment
(4) Seat Height Firmness (If Equipped)
(5) Seat Heater (If Equipped)
(6) Air Suspension Switch/Knob
(7) Fore and Aft Adjustment
(8) Seat Backrest Angle Adjustment
(9) Seat Cushion Angle Adjustment

Headrest (1) – Pull up on the headrest to remove extension. The headrest can be pulled forward to support the head at an angle. Pull fully forward to return to the original position.

Lumbar Support (3) – Rotate knob to adjust the lumbar support.

Seat Firmness (If Equipped) (4) – Pull the lever upward to increase the firmness. Push the lever down to decrease the firmness.

Seat Heater (If Equipped) (5) – Push the top of the switch to turn on the heater. Push the bottom of the switch to turn off the heater.

Air Suspension Switch/Knob Raise (6) – Push the left side of the switch to raise the height of the seat. If equipped with the air valve knob, push in the knob to raise the height of the seat.

Air Suspension Switch/Knob Lower (6) – Push the right side of the switch to lower the height of the seat. If equipped with the air valve knob, pull out the knob, to lower the height of the seat.

Fore and Aft Position (7) – Pull the lever upward. Hold the lever upward and slide the seat forward or backward to the desired position. Release the lever to lock the seat into position.

Seat Backrest Angle Adjustment (8) – Pull the lever upward. Hold the lever upward and adjust the backrest to the desired angle. Release the lever to lock the backrest into position.

Seat Cushion Angle Adjustment (9) – To raise the angle of the seat, pull upward on the front of the seat and push the seat rearward. To lower the angle of the seat, pull upward and pull forward.

i03916430

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. See your Cat dealer for all replacement parts.

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

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

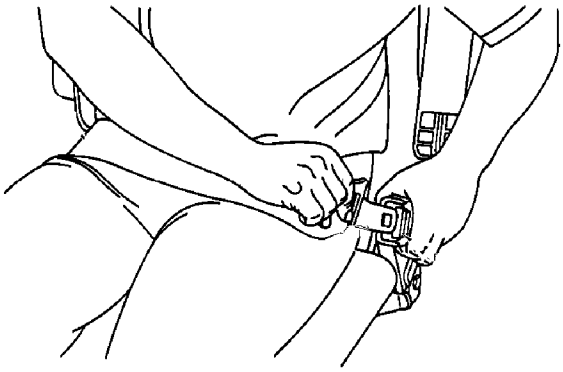

Illustration 51 g02150795

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

Fasten seat belt catch into buckle. 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

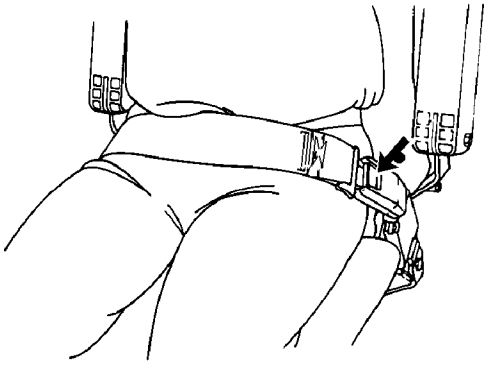

Illustration 52 g02150800

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

i04526418

Mirror

SMCS Code: 7319

⚠ WARNING

Adjust all mirrors as specified in the Operation and Maintenance Manual. Failure to heed this warning can lead to personal injury or death.

⚠ WARNING

Slips and falls can result in personal injury. Use the machine's access systems when adjusting the mirrors. If the mirrors cannot be reached using the machine access systems follow the instructions found within the Operation and Maintenance Manual, “Mirror” in order to access the mirrors.

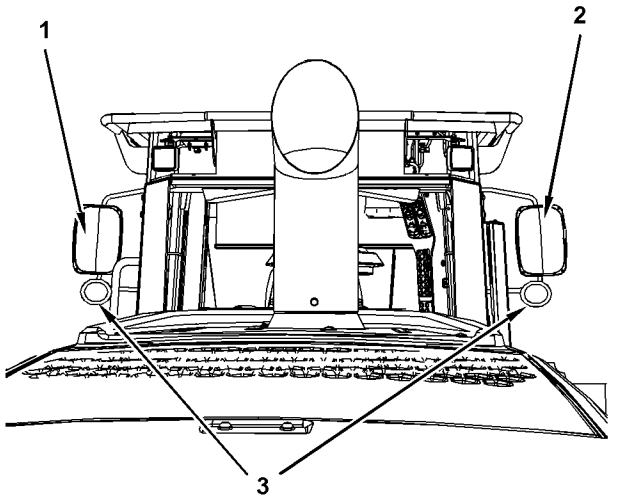

Illustration 53 g02456797

(1) Left Outside Mirror
(2) Right Outside Mirror
(3) Left and Right Spot 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.

The appropriate organization of the job site is also recommended in order to minimize hazards due to visibility. Refer to this Operation and Maintenance Manual, “Visibility Information” for more information about the mirrors.

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. Refer to Operation and Maintenance Manual, “Operator Controls” for more information about the lockout control.
- Stop the engine.
- Adjust the mirrors in order to provide visibility behind the machine at a maximum distance of 30 m (98 ft) from the rear corners of the machine.

Note: You may need to use hand tools in order to adjust certain types of mirrors.

Left Outside Mirror (1)

Illustration 54 g01631656

Adjust the left outside mirror (1) so that an area of at least 1 m (3.3 ft) from the rear of the machine can be seen from the operator seat.

Right Outside Mirror (2)

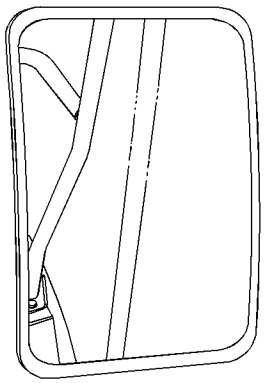

Illustration 55 g01631673

Adjust the right outside mirror (2) so that an area of at least 1 m (3.3 ft) from the side of the machine can be seen from the operator seat. Additionally, provide as much visibility to the rear as possible.

Spot Mirrors (3) Adjustment

The spot mirrors should be adjusted to see the area near the machine (1 m (3.3 ft) from the side of the machine and 1.5 m (4.9 ft) up from the ground) from the back of the seat to the counterweight.

Heated and Powered Mirrors (If Equipped)

Heat for the Mirror

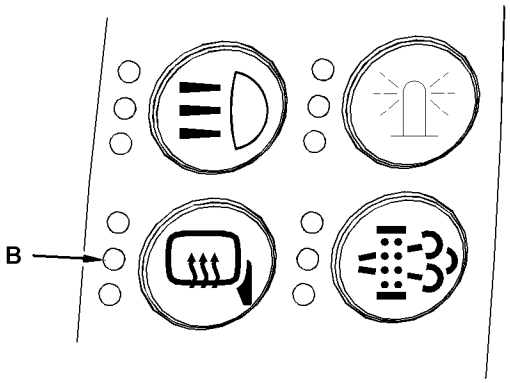

Illustration 56 g02154909

Push the button on the button panel in order to turn on the heated mirrors. The middle light (B) will illuminate. Push the button again in order to turn off the heated mirrors.

Note: The heated mirrors are on a timed cycle. The heat will turn off automatically when time has elapsed.

Adjust the Mirror

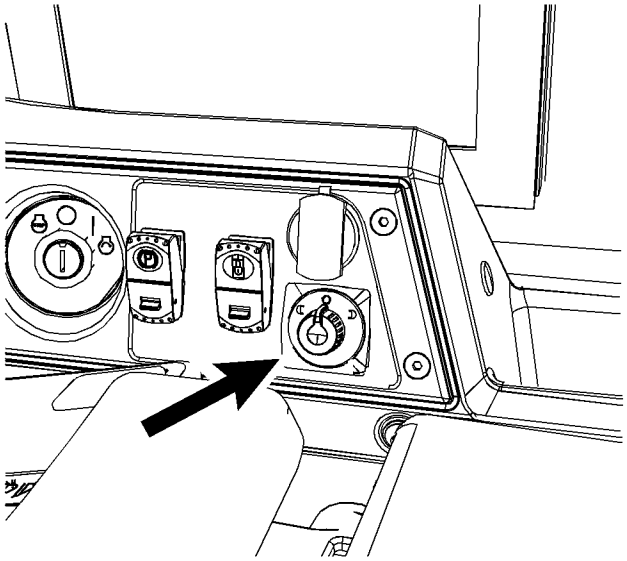

Illustration 57 g02154851

Powered Mirror Switch on the Right-hand Console

Turn the knob to the left in order to control the left-hand mirror.

Turn the knob to the right in order to control the right-hand mirror.

To adjust the mirror position, move the adjustment knob in the desired direction of mirror movement. Adjust each mirror so that an area of at least 1 m (3.3 ft) from the side of the machine can be seen from the operator seat.

i06601908

Operator Controls

SMCS Code: 7300; 7301; 7451

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

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

Illustrations guide the operator through correct procedures of checking, starting, operating, and stopping the machine. Operating techniques that are outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the machine and the capabilities of the machine.

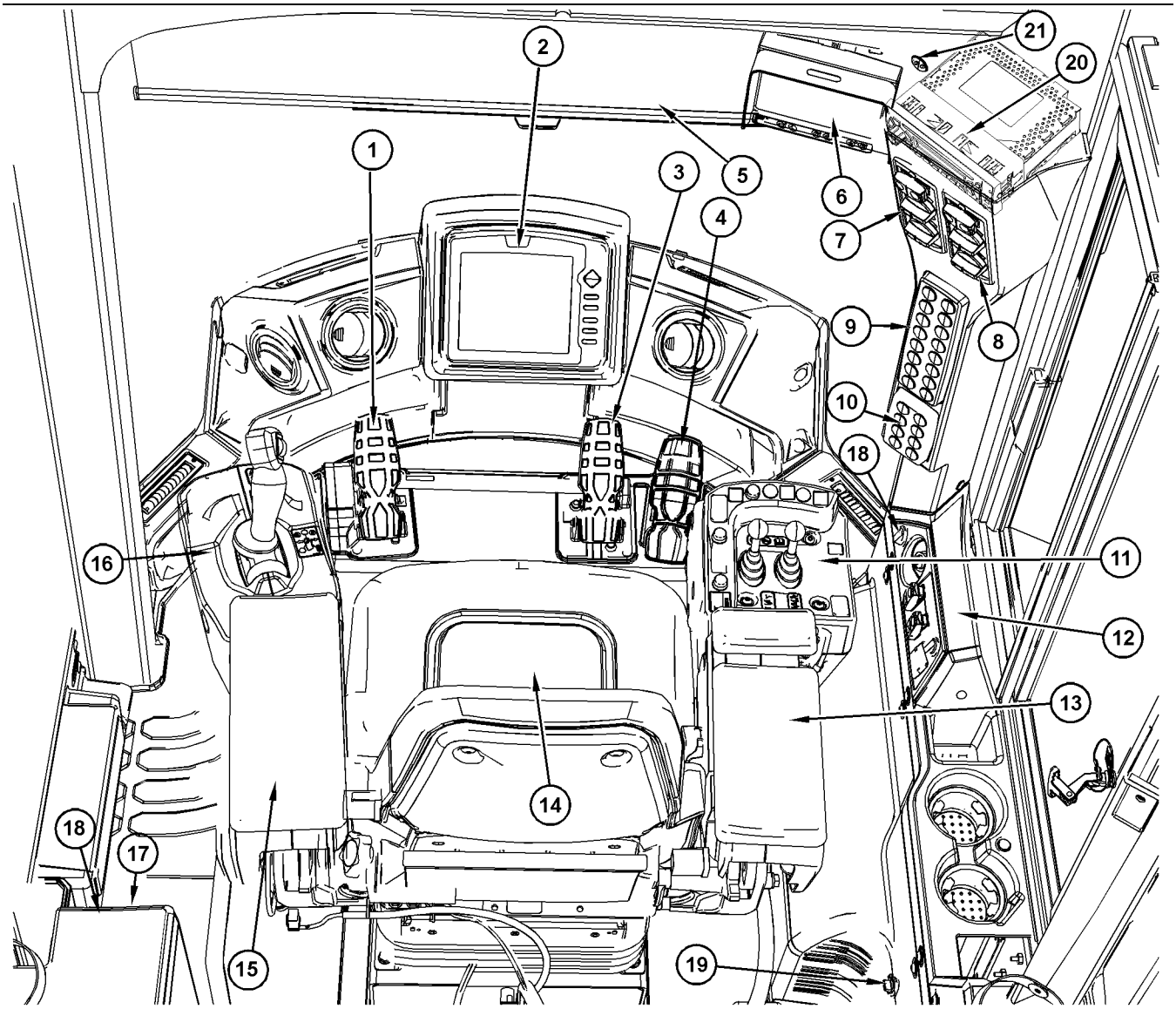

Illustration 58 g02715598

Overview of the Cab

(1) Left Service Brake
(2) Monitoring System on the Front Dash
(3) Right Service Brake
(4) Throttle Control
(5) Visor
(6) Rear Camera Monitor
(7) Heating and Air Conditioner Controls
(8) Front and Rear Window Wiper Controls
(9) Keypad 1
(10) Keypad 2
(11) Implement Controls
(12) Right Side Control Panel
(13) Right Side Armrest
(14) Seat
(15) Left Side Armrest
(16) Left-Hand Steering Control Console
(17) VIMS Connector
(18) 12 V Socket
(19) Service Connector
(20) Radio (If Equipped)
(21) Bluetooth Microphone (If Equipped)

Service Brake Control (1 & 3)

Reference: Refer to Operation and Maintenance Manual, “Service Brake Control” for more information.

Monitoring System on the Front Dash (2)

Reference: Refer to Operation and Maintenance Manual, “Monitoring System” for more information.

Throttle Control (4)

Depress the pedal to increase the speed of the engine. Release the pedal to allow the speed of the engine to decrease.

Rear Camera Monitor (6)

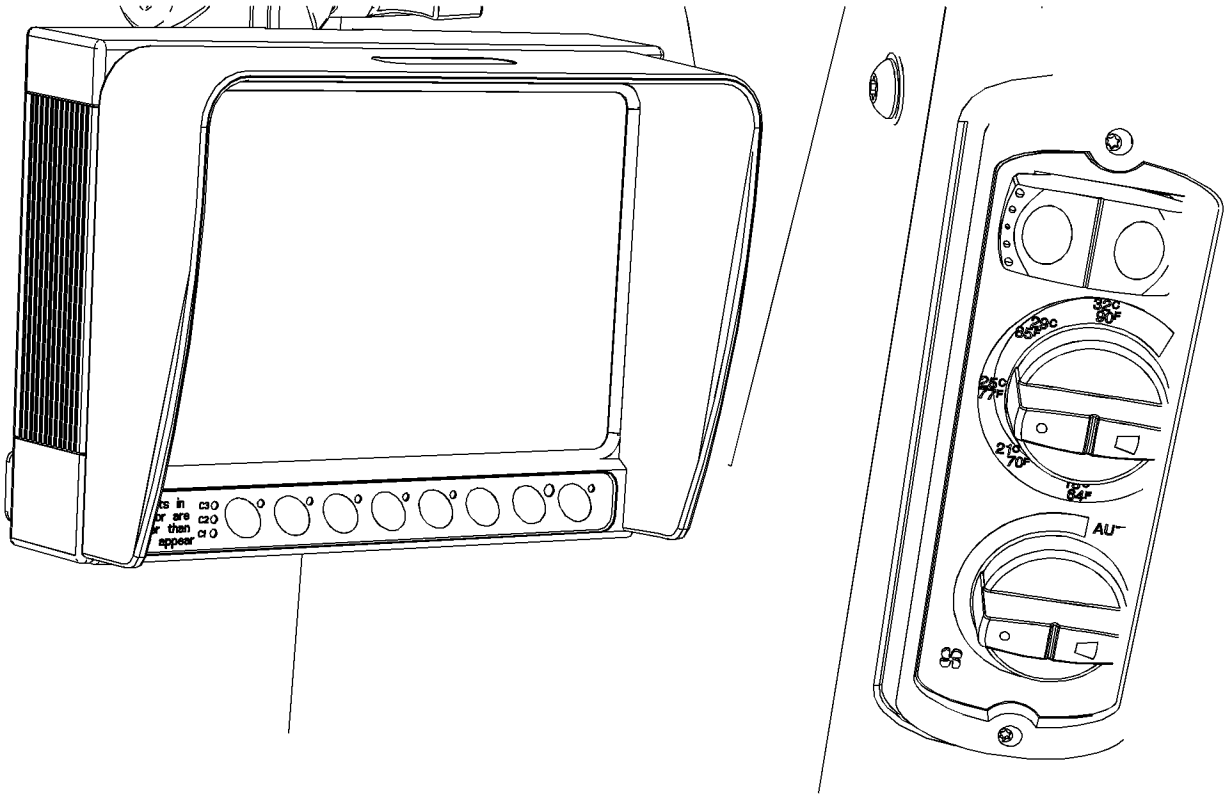

Illustration 59 g02726869

This machine is equipped with the Cat Work Area Vision System (WAVS). WAVS is a closed circuit video monitoring system. WAVS is made up of a video display and a camera. The display is mounted in the machine cab. The camera is mounted on the rear of the machine.

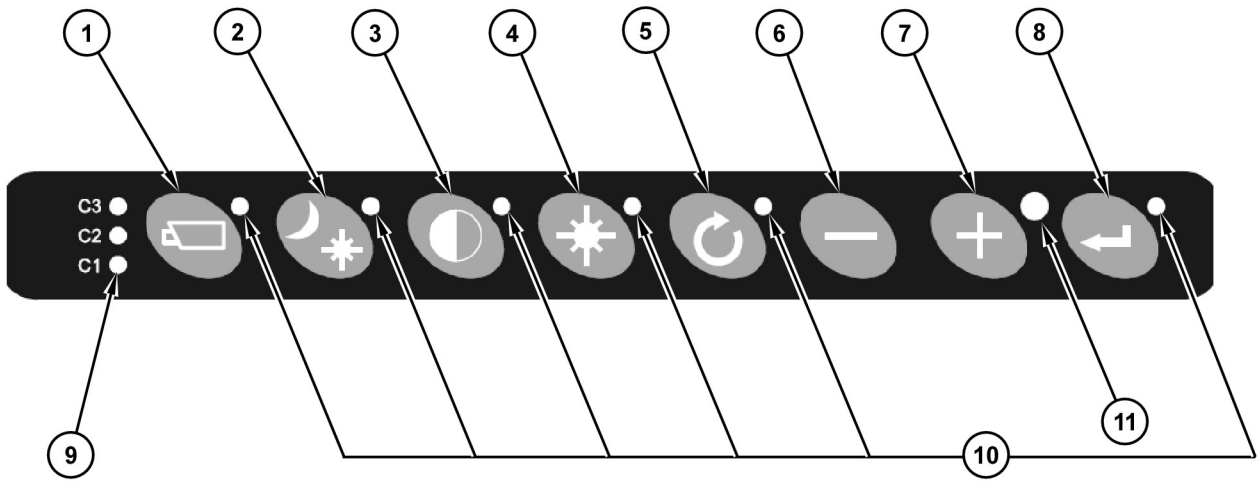

Illustration 60 g02474556

(1) Camera Selection
(2) Auto Backlight Control/Day/Night Mode
(3) Contrast
(4) Brightness
(5) Option
(6) Selection/Minus
(7) Selection/Plus
(8) Enter/ON/Standby
(9) Camera Select LEDs
(10) Button Status LEDs
(11) Light Sensor

Operation of the Keyboard

Camera Selection (1)

Pressing this button will switch between camera 1, 2 and 3. For standard machines with one camera use C1 (9). The display is a mirrored image from the camera, that is comparable to a rearview mirror. On one camera machines, C2 will show a non-mirrored image. The display is not comparable to a rearview mirror and should not be used during normal operation.

Auto Backlight Control/Day/Night Mode (2)

Press this button to switch between the ABC (Auto Backlight Control) Mode, the backlight Day Mode, and backlight Night Mode. The ABC Mode adjusts the backlight setting depending on the amount of available ambient light. The Day and Night mode brightness settings can be manually adjusted by pushing the plus or minus button (settings will be saved).

Contrast (3)

Press the Contrast button once to enter the Contrast Adjustment Mode. Use the plus button (7) and minus (6) button to adjust the image contrast.

Brightness (4)

Press the Brightness button once to enter Brightness Adjustment Mode. Use the plus button (7) and minus (6) button to adjust the image brightness.

Saturation Adjustment Mode

Press the Contrast (3) and Brightness (4) buttons at the same time to enter Saturation Adjustment Mode. Use the plus button (7) and minus (6) button to adjust the image saturation.

Enter/ON/Standby (8)

Press the ON/Standby button to switch between ON and Standby. If the monitor is configured to ON, the display will be active at all times during the machine operation. If the monitor is configured to Standby, the display will only be ON when you put the machine in reverse.

Operator Menu

Press the plus and minus buttons at the same time to open the Operator Menu. The following buttons are used to navigate through the menus:

Option (5) – Return to the previous menu

Selection/Minus (6) – Next menu option.

Selection/Plus (7) – Previous menu option.

Enter (8) – Select or activate the highlighted option.

Language

This option allows selection of the display language.

Camera settings

Note: If you leave a menu item highlighted without pressing the enter button, help text will be displayed.

Horizontal Marker

Enable this option to display a horizontal reference line. The marker will be displayed as a horizontal green line. Use the Marker Position under Horizontal marker to adjust the horizontal position of the marker. Use the plus button (7) and minus (6) button to adjust the marker position.

Vertical marker

Enable this option to display a vertical reference line. The marker will be displayed as a vertical green line. Use the Marker Position under Vertical marker to adjust the vertical position of the marker. Use the plus button (7) and minus (6) button to adjust the marker position.

Graticule

Enable this option to display a series of points on each side of the machine projecting backward. The points represent a straight projection from the back of the machine.

Service Connector (19)

This service port allows service personnel to connect a laptop computer to the machine electronics using Cat Electronic Technician. This connection will allow service personnel to interrogate the machine systems and engine systems.

Radio (If Equipped) and Bluetooth Microphone (20 and 21)

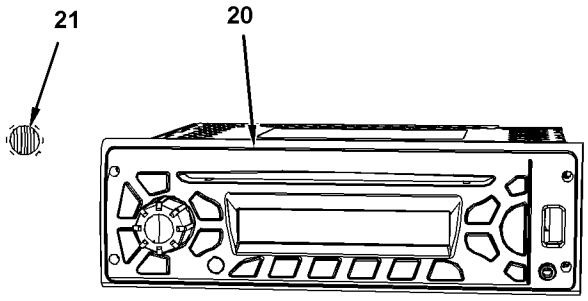

Illustration 61 g02708356

If the machine is equipped with a radio that has Bluetooth available, it is possible to sync another Bluetooth device with the radio. Reference the radio manual for instructions on detecting and setting up the Bluetooth device. A microphone for the Bluetooth is located to the left of the radio in the headliner of the cab.

Seat (14)

For information regarding the adjustment of the seat and the features of the seat, refer to Operation and Maintenance Manual, “Seat”.

Left-Hand Steering Control Console (16)

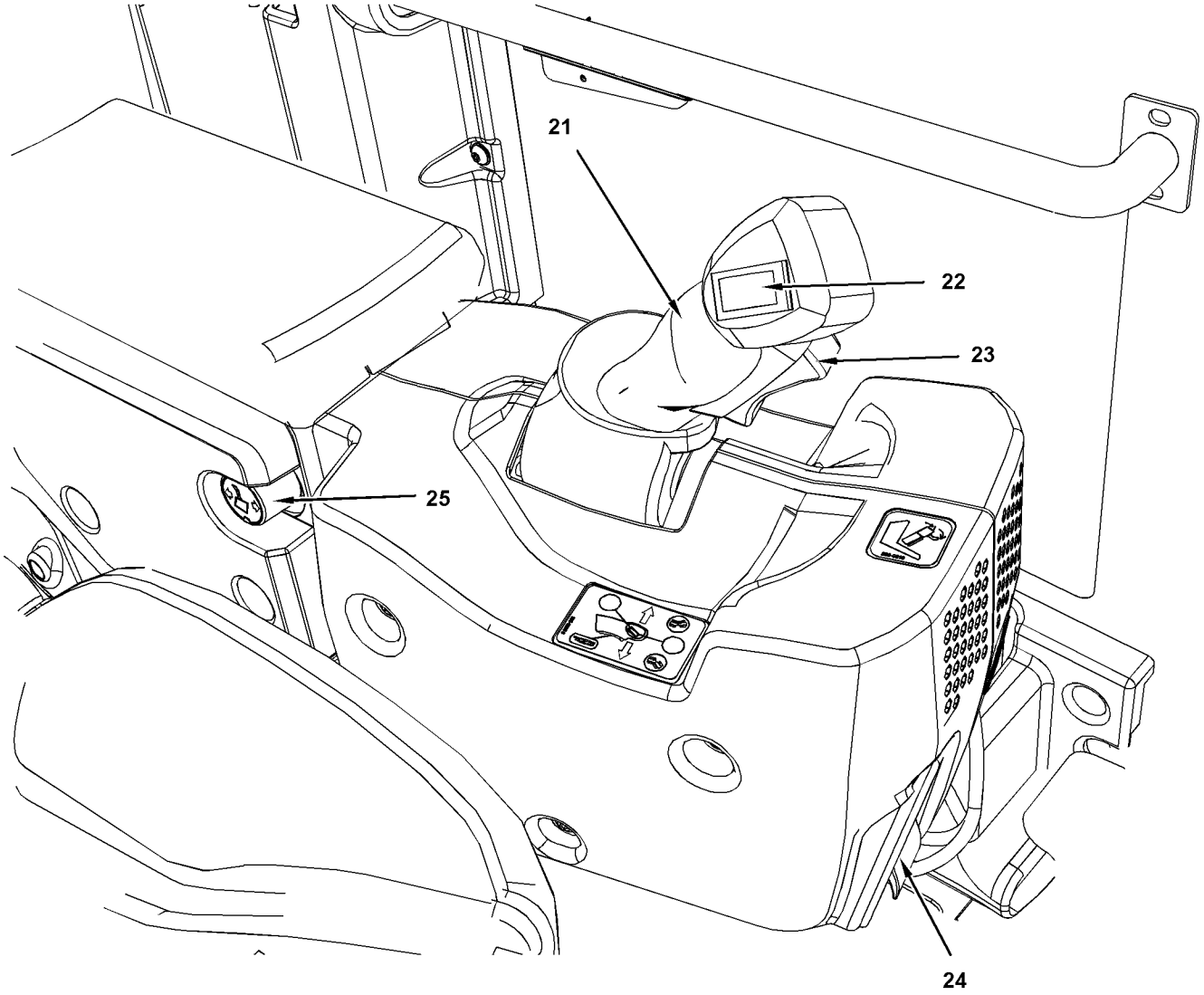

Illustration 62 g02560285

(21) Left-Hand Steering Control
(22) Upshift/Downshift Roller
(33) Direction Control (FNR)
(24) Latch for the Steering Console
(25) Fore/Aft Adjustment

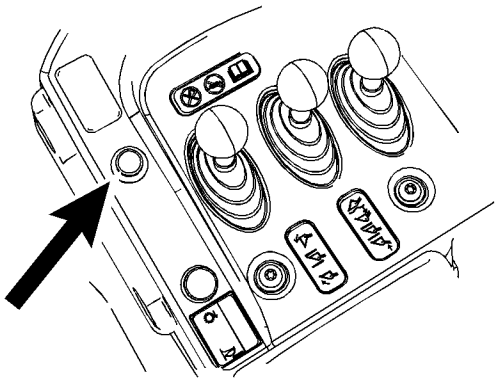

Illustration 63 g02163446

Transmission Downshift Button

Left-Hand Steering Console

Latch for the steering console (24)

Illustration 64 g02109975

Pull up on the latch to release the lock. The Left-Hand Steering Control can be raised to exit the machine. The Left-Hand Steering Control is locked out when the console is in the RAISED position unless the machine is moving.

Note: Do not use the latch to lift the armrest. The latch should release the armrest, then the armrest should be lifted to the stowed position.

Note: Do not pull up on the latch or raise the left console while the machine is in motion. Set the parking brake and shift transmission to neutral before you pull up on the latch or raise the left console.

Fore/Aft Adjustment (25)

Push the knob to slide the entire control console and arm rest back and forth. Release the knob and ensure that the arm rest is down and locked into position.

Vertical Adjustment

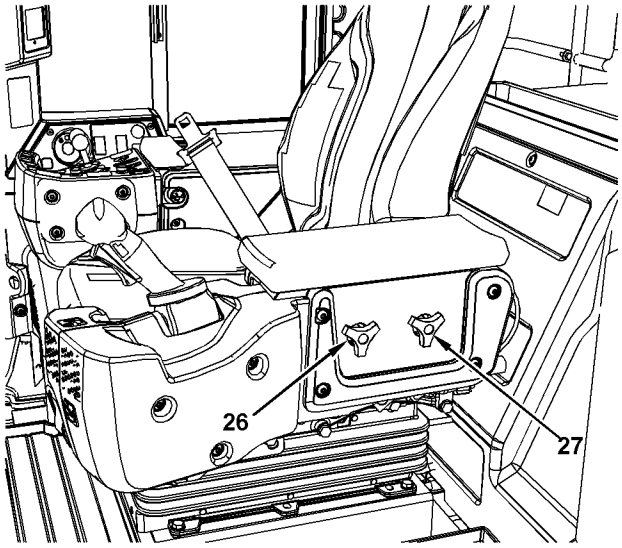

Illustration 65 g02726870

(26) Armrest Adjustment Knob
(27) Armrest Adjustment Knob

Left-Hand Steering Control (21)

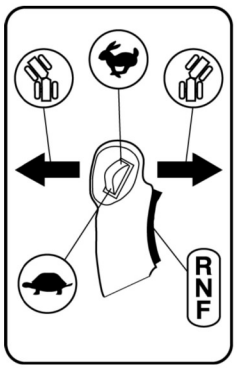

Illustration 66 g02109977

Steering will be enabled after several conditions have been met:

- Engine is ON - The engine must be running.
- Parking brake is engaged
- Transmission is in NEUTRAL
- Machine speed is zero
- Operator is present - The machine must detect that an operator is present
- Steering control is aligned

Note: The parking brake will not release and the transmission will not shift out of NEUTRAL until the steering system is enabled.

Move the left-hand arm rest to the LOWERED position and lock the arm rest in position.

To enable steering, the Left-Hand Steering Control must be aligned to the steering articulation angle of the machine.

The Left-Hand Steering Control will automatically align with the articulation angle of the machine when the following conditions are met:

- The armrest must be down and latched.
- The operator must be considered present (see below for conditions).
- Engine must be running.

Note: Ensure that the Left-Hand Steering Control is free to move to the articulation angle of the machine. Do not stop the movement of the device.

Note: If the Left-Hand Steering Control motor is disabled or unable to meet the articulation angle of the machine, manual alignment can be achieved. Slowly sweep the Left-Hand Steering Control angle to match the machine articulation angle.

When the Left-Hand Steering Control has been properly aligned, the articulation angle of the machine will move with the movement of the left-hand control.

Once this alignment is completed, steering will be enabled.

Move the Left-Hand Steering Control to the left to articulate the machine to the left. Move the Left-Hand Steering Control to the right to articulate the machine to the right. The Left-Hand Steering Control will provide a force proportional to the difference between the machine articulation angle and the Left-Hand Steering Control. The larger the difference between the machine articulation angle and the Left-Hand Steering Control the greater the force will be. If the Left-Hand Steering Control is released in the desired position when there is a force, the Left-Hand Steering Control will move in the direction of the force until the articulation angle of the machine is met. When the Left-Hand Steering Control is released in the desired position, and there is no force, the Left-Hand Steering Control will remain in that position.

Steering will remain enabled until machine speed is zero and one of the following conditions is met:

- the left armrest is raised
- the operator is not present

Steering must be enabled to release the parking brake. Steering must be enabled to move the direction control into FORWARD or REVERSE. During machine operation do not raise the Left-Hand Steering Control. Before raising the armrest, ensure that the implements are fully lowered, the transmission is in NEUTRAL, and the parking brake is applied.

Note: Detection of an operator in the seat is determined by a sensor in the seat. In the case of a failed or malfunctioned operator seat sensor, depressing the left brake pedal more than 10% can be used as an override to create operator presence. This override should only be used for temporarily moving the machine and not during normal operation. Once you override the machine, move the machine to a secure location and consult your Cat dealer.

The operator is considered present if any of the following conditions are true:

- The operator is seated in the seat
- The transmission is in gear
- The left service brake is depressed more than 10 percent
- There is detectable ground speed

The operator is considered not present if all the following are true:

- The operator is not in the seat
- The transmission is in NEUTRAL
- The left service brake is not depressed
- The ground speed is zero

Note: Any machine speed will make the machine attempt to align the Left-Hand Steering Device. The steering will enable after alignment is successful or after 2 seconds of machine speed is detected if alignment is unsuccessful.

Steering Control Alignment Override

This procedure should only be used to place the machine in a secure location and not during normal operation.

⚠ WARNING

Personal injury or death can result from sudden machine movement.

Personnel can be injured during the steering check.

To help prevent possible personal injury, keep all personnel away from the machine or in clear view of the operator when the machine is in operation during steering checks.

Detection of the Left-Hand Steering Console in the lowered and locked position is determined by a switch. In the case of a failed or malfunctioning switch, the left-hand steering device will not be enabled. The transmission shifting into Forward or Reverse will not be allowed and the Parking Brake cannot be released. If the machine must be moved, the following override procedure can be used to initiate steering alignment and move the machine to the nearest possible secure location.

1. Start the machine.

2. Move the Left-Hand Steering Console to the lowered position and lock the arm rest in position.

3. Place the Direction Control (FNR) switch on the Left-Hand Steering Control in the Neutral Position.

4. Use the Auto/Manual Transmission button to put the transmission in Manual shifting mode.

5. Use the Upshift/Downshift Roller on the Left-Hand Steering Control to put the machine into First gear Neutral (1N).

6. Use the Direction Control (FNR) switch on the Left-Hand Steering Control to quickly cycle to FNF. This action allows the machine to go into First gear Forward (1F) and allow machine to drive through the parking brake.

7. Slowly increase the throttle until machine begins to move forward.

8. When the machine speed is greater than zero, the Left-Hand Steering Control will attempt to align with the machine articulation angle. Once this alignment is achieved, steering will be enabled.

Note: If alignment does not occur within 2 seconds of the machine speed being greater than zero, the steering will be enabled and the machine will articulate to the Left-Hand Steering Control position.

9. Move the machine to a secure location.

10. Place the Direction Control (FNR) switch on the Left-Hand Steering Control into the Neutral (N) Position.

Note: Once you override the steering, move the machine to the nearest possible secure location and consult your Cat dealer.

Note: The same procedure can also be utilized in the reverse direction.

Transmission Control

Upshift/Downshift Roller (22)

Move the thumb wheel upward to upshift the transmission.

Move the thumb wheel downward to downshift the transmission.

Note: In cold conditions, the transmission will not allow usage of 3rd or 4th gear until the hydraulic oil is warm.

Direction Control (23)

Note: Steering must be enabled to shift out of neutral.

The direction control is on the front side of the Left-Hand Steering Control.

FORWARD – Push the bottom of the switch to place the transmission in FORWARD.

NEUTRAL – Push the switch to the middle position to place the transmission in NEUTRAL.

REVERSE – Push the top of the switch to place the transmission in REVERSE.

Direction Control – The machine may be placed into gear by using the forward/neutral/reverse on the Left-Hand Steering Control or the implement control joystick or pod if equipped. To use the transmission control on the Left-Hand Steering Control, ensure that the forward/neutral/reverse switch on the right implement control joystick is in the NEUTRAL position. To use the switch on the implement control joystick, ensure that the forward/neutral/reverse lever on the Left-Hand Steering Control is in the NEUTRAL position.

Neutral Coast Inhibit

Coasting in neutral is not recommended at high speeds. This feature inhibits the operator from shifting the transmission from engaged to neutral at high vehicle speed. This feature does not interfere with normal machine operations at low vehicle speeds. The operator is provided with a warning that the transmission is locked out of neutral by flashing the gear display. The transmission will not shift into NEUTRAL if the machine speed is above 10 km/h (6.2 mph).

Downshift Inhibit

This feature inhibits the operator from downshifting the transmission to a lower gear if the machine speed is too high and will cause an engine or transmission overspeed. A warning is shown that the transmission is locked out of the lower gear by flashing the actual gear on the display. The transmission will not downshift until ground speed conditions are met that will not allow an engine or transmission overspeed.

Transmission Mode

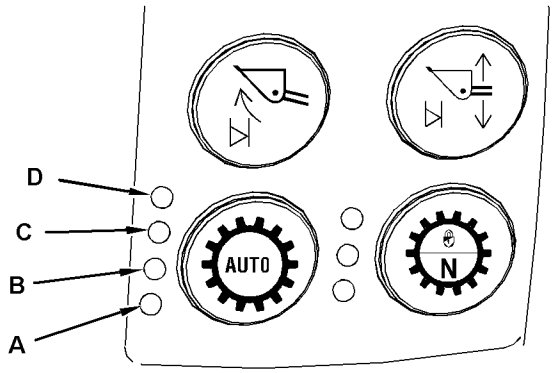

Illustration 67 g02723042

The following modes can be selected with the auto/ manual transmission select button:

Manual – Manual shifting mode. No indicators will be illuminated.

Auto 2-4 – Autoshifting from gears 2 to 4. No auto downshift to first gear. Indicators B, C, D will be illuminated.

Auto 1-4 – Autoshifting from gears 1 to 4. First gear downshift is based on torque required. Indicators A, B, C, D will be illuminated.

Auto 1- 3 – Autoshifting from gears 1 to 3. First gear downshift is based on torque required. Indicators A, B, C will be illuminated.

Auto 1- 2 – Autoshifting from gears 1 to 2. First gear downshift is based on torque required. Indicators A, B will be illuminated.

Note: The auto/manual maximum gear will not exceed the maximum forward gear or the maximum reverse gear setting configured in the software. The machine can be electronically adjusted by a Cat dealer.

Manual Shift Control

When the auto/manual transmission mode is set to manual, the operator selects the travel gear. The gear is determined by the gear selected with the up/ down shift roller and the down shift switch. The manual shifting will not exceed the maximum forward gear or the maximum reverse gear that is configured in the software.

When a change in direction occurs, the machine will maintain the current gear, unless the gear is above the maximum configured gear.

The use of the left service brake pedal will cause the transmission to downshift, if IBS has not been disabled in Manual mode. If the transmission neutralizer has not been disabled, the transmission will also neutralize as the machine slows down. Fully release the left service brake pedal to return to manual shifting.

Automatic Shift Control

When the auto/manual transmission mode is set to one of the automatic shifting modes, the transmission will automatically upshift and downshift the transmission one gear at a time. Automatic shifting is determined by the engine speed and the torque converter speed. Automatic downshift from second to first gear is designed to shift into first gear only when the required torque is high. The following are examples of high torque situations:

- dozing
- digging
- climbing a steep grade

The upper and lower limits of the gear shifting are controlled by the automatic transmission mode setting and the programmable maximum forward gear and the maximum reverse gear.

A manual downshift can occur by pressing the downshift button or by pressing downshift on the upshift/ downshift roller. The downshift button or the upshift/downshift roller will manually downshift the transmission one gear at a time, if the conditions are allowed. Manual downshifting from second to first is common for bucket loading. Manually downshifting will also inhibit an automatic upshift. Automatic upshifting can be re-enabled with the following actions:

- press the upshift on the upshift/downshift roller
- allow the transmission to downshift automatically to a lower gear
- make a directional change

When a change in direction occurs, the machine will shift to second gear for 3 seconds if the machine was in third or fourth gear. If the machine was in first or second gear, the machine will shift to second gear.

The use of the left service brake pedal will also cause the transmission to downshift. If the transmission neutralizer has not been disabled, the transmission will also neutralize as the machine slows down. An upshift will not be allowed if the neutralizer is active. Fully release the left service brake pedal to return to automatic shifting.

Steering Wheel (If Equipped)

If your machine is configured with a steering wheel, the following cab overview shows the changes from the Left-Hand Steering Control.

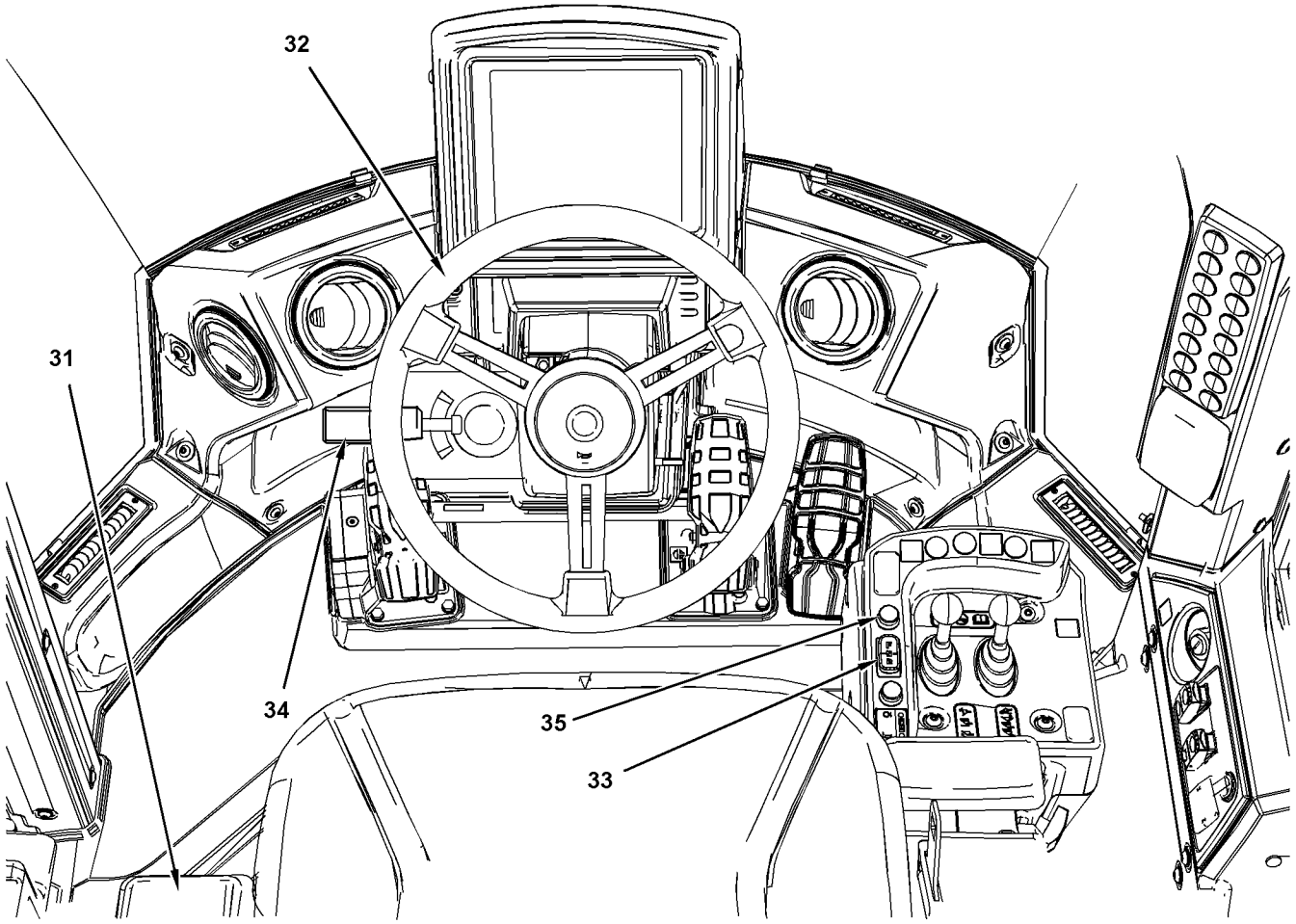

Illustration 68 g02560296

(31) Left side armrest
(32) Steering Wheel
(33) Direction Control
(34) Transmission and Direction Control
(35) Transmission Downshift

Note: The steering wheel uses the same steering system as the Left-Hand Steering Control. The wheel controls the steering system in place of the Left-Hand Steering Control.

To enable steering, the steering wheel must be aligned to the steering articulation angle of the machine.

The direction of the machine is determined by the position of the lever that is located on the left side of the steering column. The alternate forward/neutral/reverse switch may be located next to the implement controls.

FORWARD – Push the lever forward in order to place the transmission in FORWARD.

NEUTRAL – Push the lever to the middle position in order to place the transmission in NEUTRAL.

REVERSE – Push the lever rearward in order to place the transmission in REVERSE.

Direction Control – The machine may be placed into gear by using the forward/neutral/reverse on either the transmission control or the implement control console. In order to use the transmission control lever, ensure that the forward/neutral/reverse switch on the right implement control console is in the NEUTRAL position. In order to use the switch on the implement control console, ensure that the forward/neutral/reverse lever on the steering wheel is in the NEUTRAL position.

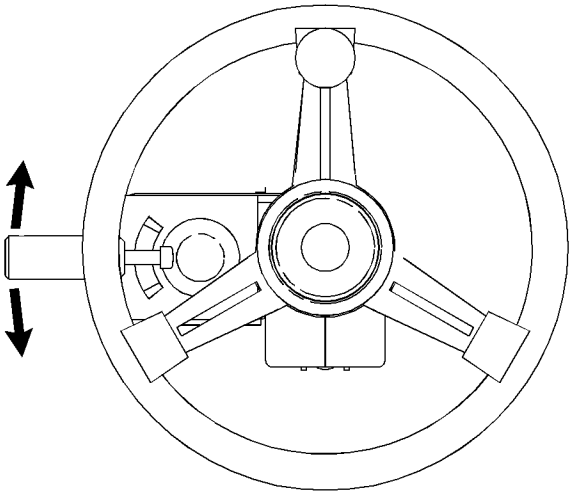

Illustration 69 g02160021

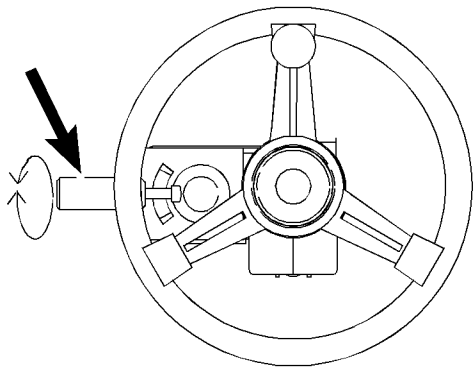

Illustration 70 g02160023

Rotate the transmission shift lever to shift the transmission.

Note: In cold conditions the transmission will remain in second gear until the transmission oil is warm.

Transmission Mode

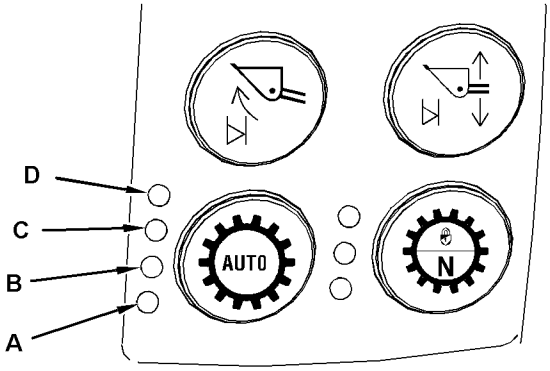

Illustration 71 g02723042

The following modes can be selected with the auto/manual transmission select button:

Manual – Manual shifting mode. No indicators will be illuminated.

Auto 2-4 – Autoshifting from gears 2 to 4. No auto downshift to first gear. Indicators B, C, D will be illuminated.

Auto 1-4 – Autoshifting from gears 1 to 4. First gear downshift is based on torque required. Indicators A, B, C, D will be illuminated.

Note: The auto/manual maximum gear will not exceed the maximum forward gear or the maximum reverse gear setting configured in the software. The machine can be electronically adjusted by a Cat dealer. With the steering wheel the maximum gear is also limited by the gear selected with the transmission shift lever.

Manual Shift Control

When the auto/manual transmission mode is set to manual, the operator selects the travel gear. The gear is determined by the gear selected with the transmission shift lever and the down shift switch. The transmission sets the machine gear to the gear number selected on the transmission shift lever. The manual shifting will not exceed the maximum forward gear or the maximum reverse gear that is configured in the software.

If the transmission shift lever is set to second gear and the downshift button is pressed, the gear will change to first gear. The shift only occurs if the conditions allow for a downshift at the time. The machine will remain in first gear until the transmission shift lever position increases or the machine direction is changed. The machine will shift to the gear equal to the gear selected by the transmission shift lever.

When a change in direction occurs, the machine will shift to the gear select on the transmission shift lever.

The use of the left service brake pedal will also cause the transmission to downshift, if IBS has not been disable in Manual mode. If the transmission neutralizer has not been disabled, the transmission will also neutralize as the machine slows down. Fully release the left service brake pedal in order to return to manual shifting and the gear selected on the transmission shift lever.

Automatic Shift Control

When the auto/manual transmission mode is set to one of the automatic shifting modes, the transmission will automatically upshift and downshift the transmission one gear at a time. Automatic shifting is determined by the engine speed and the torque converter speed. Automatic downshift from second to first gear is designed to shift into first gear only when the required torque is high. The following are examples of high torque situations:

- dozing
- digging
- climbing a steep grade

The upper and lower limits of the gear shifting are controlled by the following settings.

- The programmable maximum reverse gear
- The programmable maximum forward gear
- The transmission shift lever position

A manual downshift can occur by pressing the downshift button. The downshift button will manually downshift the transmission one gear at a time, if the conditions are allowed. Manual downshifting from second to first is common for bucket loading. Manually downshifting will also inhibit an automatic upshift. Automatic upshifting can be re-enabled with the following actions:

- Allow 5 seconds to pass following a manual downshift
- Make a directional change
- An automatic downshift occurs
- The gear number selector position changes

When a change in direction occurs, the machine will shift to second gear for 3 seconds if the machine was in second, third, or fourth gear. The machine will shift to first if the machine was in first.

The use of the left service brake pedal will also cause the transmission to downshift. If the transmission neutralizer has not been disabled, the transmission will also neutralize as the machine slows down. Fully release the left service brake pedal in order to return to automatic shifting.

Right Side Control Panel (12)

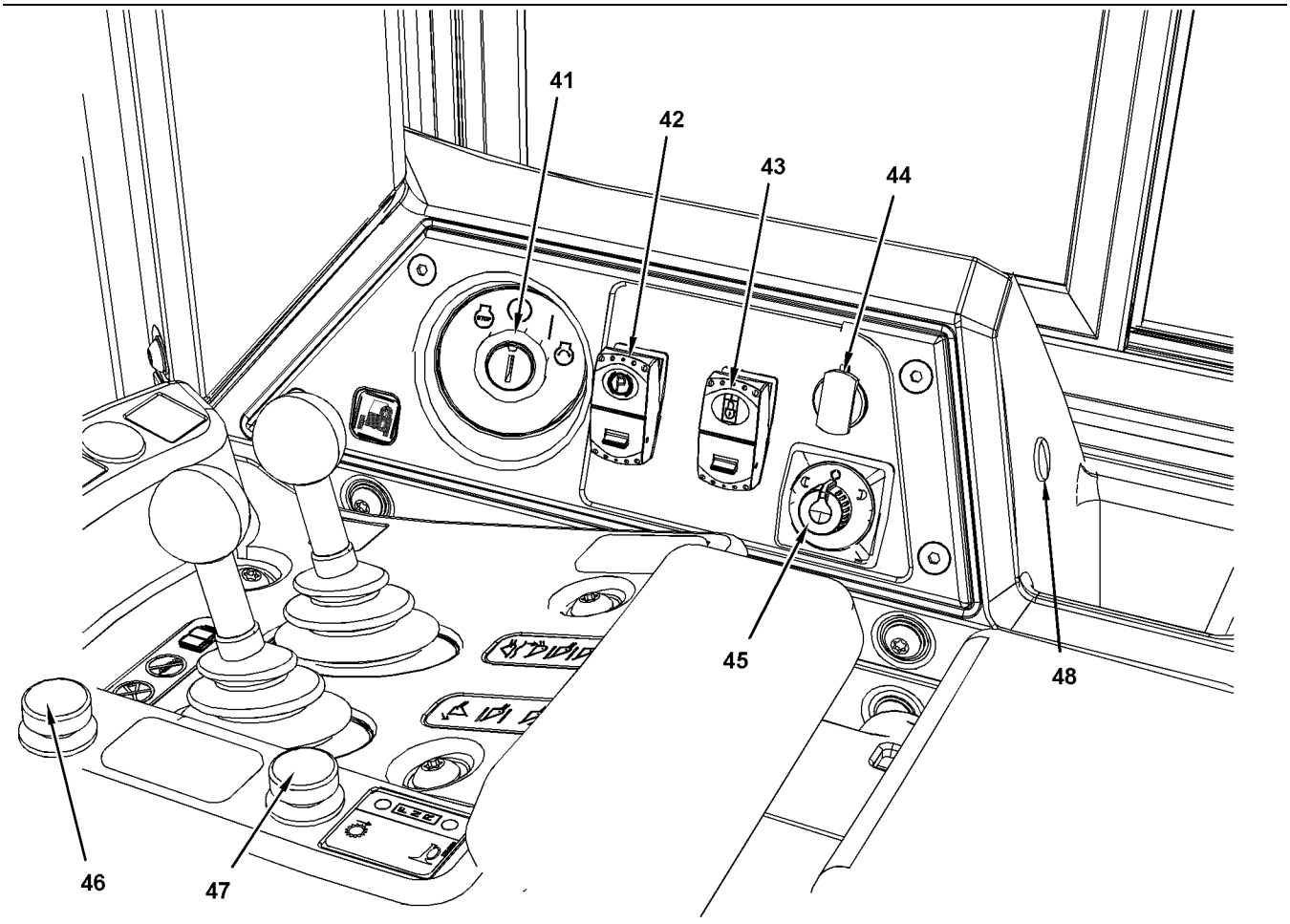

Illustration 72 g02560299

(41) Ignition Keyswitch
(42) Parking Brake Switch
(43) Implement Lockout Switch
(44) 12 Volt Socket
(45) Power Mirror Switch (If Equipped)
(46) Transmission downshift
(47) Horn
(48) Auxiliary Audio Input (If Equipped)

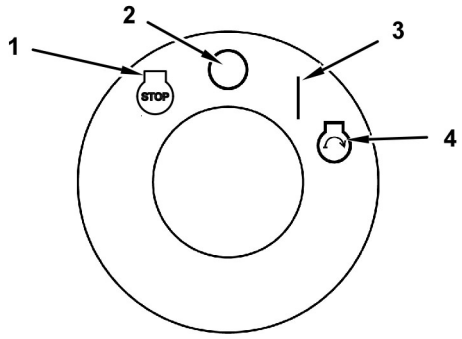

Illustration 73 g02110334

Ignition Keyswitch

(1) Engine Forced Shut down -Stop
(2) Off
(3) On
(4) Start

Ignition Keyswitch (41)

Key On

When the ignition key switch is turned to the ON position, the Cat Monitoring System will perform a power-up sequence self test during engine start-up. The power-up sequence will include a functional test of the system. The alert indicators will come on for 3 seconds in order to verify the system. The action alarm will sound until the end of the self test or until the engine is started.

Fluids Check

The system will display the status for the engine oil, coolant, and the fuel filter water separator. The monitoring system display will show each compartment with either an “OK” or “CHECK” if a given fluid is low for the engine oil level or the coolant. The display will show an “OK” or “Check” if water needs to be drained from the fuel filter water separator.

Note: Fluid status is only available at key on, the check is disabled if the machine is immediately started

Key Off Regeneration Cycle (If Enabled)

When the ignition key switch is turned to the OFF position, the system will determine if a regeneration is possible. If the soot level is above 15 percent, the operator will be prompted to initiate a regeneration, if desired. If initiated, the cycle will run for 15 minutes. The regeneration cycle may be stopped by pressing the “Disable Regeneration” button.

Key Off Cab Features

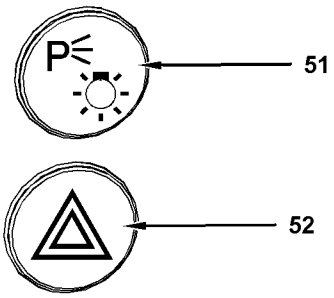

Illustration 74 g02726871

If the parking, hazard, or low-beam lights are on when the machine is keyed off the lights will remain on. The parking, hazard, or low-beam lights will remain functional after the machine has been keyed off. To turn on the parking, hazard or low-bean light, after the machine has been keyed off. Push any button on the 16 button keypad in illustration 80 . The back lighting will illuminate the parking (51), hazard (52), and low-beam light buttons. Press the button to turn on the parking lights, the hazard lights, or the low beam head lights. These lights will stay on with the key switch in OFF position.

The entertainment radio will turn off with key off. The entertainment radio can be turned on after key off and will automatically turn off after 1 hr.

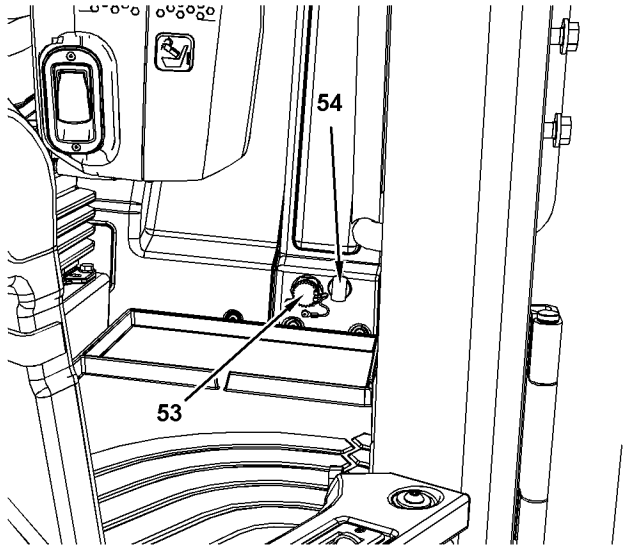

Illustration 75 g02560317

(53) VIMS Connector
(54) 12 Volt Socket

Only the 12 volt socket by the fuse panel and VIMs connector will remain powered after key off.

Note: In order to prevent the discharge of the battery, limit the use of the lights, entertainment radio, and 12 volt sockets without the engine running.

Parking Brake Switch (42)

Parking Brake – The parking brake will release only if the steering is enabled.

In order to begin operation of the machine, the operator must be in the seat. If the parking brake is engaged, the parking brake light will be illuminated. If the parking brake switch is not in the ENGAGED position at start-up, you must cycle the parking brake switch in order to release the parking brake.

While the parking brake is applied, the machine will not be able to shift into first gear.

Note: Detection of the parking brake released is determined by a switch. In the case of a failed or malfunctioning switch, the FNR switch can be quickly cycled between FNF or RNR to initiate steering alignment.

If the parking brake cannot be released but the machine must be moved, the following override can be used to put the transmission into gear and drive through the parking brake.

1. Put the transmission into manual transmission shifting mode.

2. Place the transmission into first gear.

3. Quickly cycle FNF or RNR.

This override should only be used for temporarily moving the machine and not during normal operation. Once you override the machine, move the machine to a secure location and consult your Cat dealer.

Note: Always engage the parking brake when you shut down the machine.

Note: Do not engage the parking brake while the machine is in motion during normal operation. If the parking brake is applied when machine is in motion, the transmission will downshift to second gear in order to help slow the machine.

Implement Lockout Switch (43)

Implement Lockout – Push the red locking tab upward and press the top of the switch in order to disable the implement controls.

Push the red locking tab upward and press the bottom of the switch in order to enable the implement controls.

Note: The detents will not function unless the lockout control is in the unlocked position.

Power Mirror Switch (If Equipped) (45)

Refer to the Operation and Maintenance Manual, “Mirror” section for more information on the power mirror switch.

Auxiliary Audio Input (If Equipped) (48)

If the machine is equipped with a radio that is compatible with an auxiliary device, the Auxiliary Audio Input can be used.

To run a portable device, plug the cable into the headphone jack of the portable device. Plug the other end into the Auxiliary Audio Input. To connect to the portable device, switch the stereo to AUX mode. Refer to the Operation and Maintenance Manual for the radio for instructions about selecting the Auxiliary mode on the radio.

Heating and Air Conditioner Controls (7)

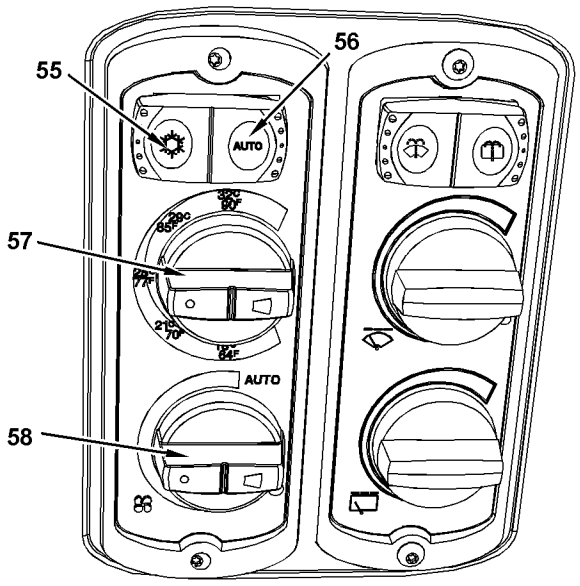

Illustration 76 g02726872

(55) Air Conditioner
(56) Auto
(57) Temperature Control
(58) Fan Control

Air Conditioner Switch

Air Conditioner – Push the left side of the switch in order to turn on the air conditioner.

The Air Conditioner switch is used to determine the operating mode for the heating and air conditioning system. The rocker switch has three positions.

Left Position (A/C) (55) – This position sets the heating and air conditioning system to manual mode. The switch turns on the compressor for the air conditioning. The switch allows temperature control to control the water valve.

Center Position (OFF Mode) – This position sets the air conditioning system into off mode. The switch allows temperature control to control the water valve.

Right Position (AUTO Mode) (56) – This position sets the heating and air conditioning system to automatic temperature control. The ECM on the machine controls the compressor clutch for the air conditioning and the position of the water valve automatically.

Fan control (58)

Fan control – The fan speed switch controls the blower fan motor from infinitely variable speeds to AUTO fan control when in AUTO Mode. Turn the knob clockwise from the OFF position for the desired setting. Turn the knob clockwise to the AUTO position. The fan will run in automatic mode when the air conditioner switch is in the AUTO mode.

OFF – Turn the fan speed switch counterclockwise to this position in order to stop the blower fan.

Temperature Control (57)

Temperature Control – The temperature knob controls the position of the water valve when the automatic air conditioning switch is in the A/C or OFF position. When the automatic air conditioning switch is in the AUTO position, the temperature dial determines the desired cab temperature. The temperature range for this dial in the AUTO position is 10° C (50° F) in the full cold position and 32° C (90° F) in the full hot position.

Adjusting the Cab Louvers

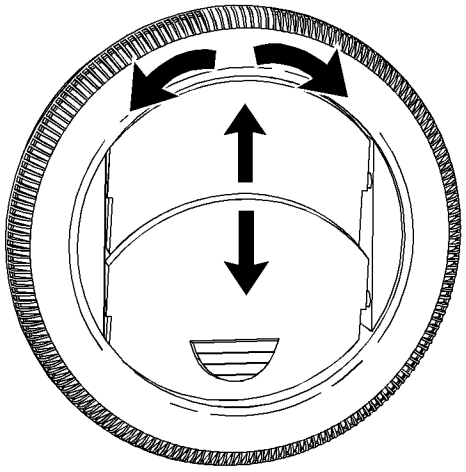

Illustration 77 g02059241

Round louver (A). Two round louvers are located on the dash beside the Monitoring System Display. There is also a round louver located on the far left side of the front dash panel.

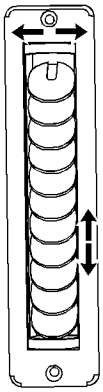

Illustration 78 g01537234

Rotating louver (B). Four rotating louvers are located on the top of the front dash. Two are located under the front dash.

Round Louvers – Adjust the round louvers (A) in order to circulate air in the cab. Adjustments are rotating clockwise or counterclockwise and adjusting from top to the bottom.

Rotating Louvers – Adjust the louvers (B) in order to sweep air evenly across the window. Adjustments are rotating from the side to the side and adjusting from left to the right.

Heating and Air Conditioning System Operation (Manual Mode)

Note: The operator will set the fan speed to the maximum. This setting allows the system to achieve the desired environment in the cab in the shortest amount of time. After the cab reaches the desired temperature, the operator can change the position of the fan speed. The temperature of the cab is regulated with the fan control and the temperature control.

Heating

Achieving the maximum heat

- Fully open all louvers.
- Place the Air Conditioner switch to the OFF position.
- Turn temperature control clockwise until the dial stops. The indicator should be in the red.
- Set the fan control to the high position for the maximum fan speed.

Air Conditioning

Achieving maximum cooling

- Fully open all louvers.
- Place the Air Conditioner switch to the A/C position.
- Turn the temperature control counterclockwise until the dial stops. The indicator should be in the blue.
- Set the fan control to the high position for the maximum fan speed.

Defogging

- Direct all louvers to the nearest window. Close all louvers that are designed to blow air directly onto the operator.
- Turn the temperature control clockwise until the dial stops. The indicator should be in the red.
- Set the fan control to the high position for the maximum fan speed.
- Place the Air Conditioner switch to the A/C position.

Heating and Air Conditioning System Operation (Auto Mode)

The temperature control switch communicates the requested cab temperature to the ECM when the Air Conditioner switch is in the AUTO position.

The automatic temperature control system maintains the requested cab temperature by increasing the air temperature or decreasing the air temperature from the louvers. The adjustment of the air temperature from the louvers is based on the existing air temperature of the cab.

- Open all louvers. Direct all air flow away from the operator.
- Place the Air Conditioner switch to the AUTO position.
- Set the fan control to the AUTO position.
- After the machine has been operating at the rated engine temperature and speed, slightly rotate the temperature control in order to change the temperature setting. Clockwise rotation increases the temperature setting of the cab up to 32° C (90° F). Counterclockwise rotation decreases the temperature setting of the cab to 10° C (50° F).
- Adjust the fan control to desired fan speed. When the outside ambient temperature is warm or cold, set fan speed to HIGH. When the outside ambient temperature is close to the temperature setting of the cab, set fan speed to LOW. If the heating and air conditioning system is not controlling cab temperature effectively, increase fan speed.

Note: After changing the position of the temperature control, allow several minutes for the heating and air conditioning system to modify the cab temperature.

Note: During the machine start-up in cold temperature conditions, the blower speed may not go to maximum speed in the AUTO mode. There must be heat available through the heater core in the HVAC system. When heat is available in the heater core, the blower speed will switch to AUTO blower speed in order to warm up the cab quickly.

Note: When the AIR CONDITIONER switch is in AUTO position, you may control the speed of the fan manually. Turn the Fan Control counterclockwise from AUTO position to the INFINITELY VARIABLE position. The system maintains AUTO temperature control of the cab.

Front and Rear Window Wiper Controls (8)

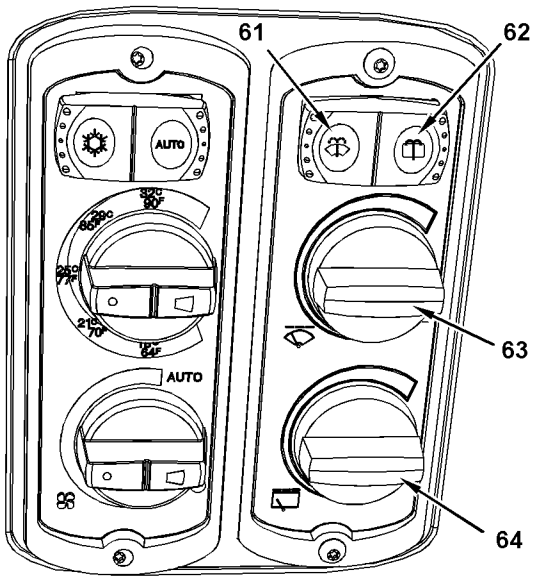

Illustration 79 g02726873

(61) Front Washer
(62) Rear Washer
(63) Front Wiper
(64) Rear Wiper

Front Wiper – Turn the knob (63) in order to turn on the window wiper.

Turn the knob clockwise from the OFF position for the desired speed. The delay speed of the wiper can be adjusted by turning the knob clockwise through the INTERMITTENT position from a low to high setting.

Front Washer – Push the button (61) in order to activate the window washer.

Rear Wiper – Turn the knob (64) in order to turn on the rear window wiper. Turn the knob clockwise from the OFF position for the desired speed. The delay speed of the wiper can be adjusted by turning the knob clockwise through the INTERMITTENT position from low to high setting.

Rear Washer – Push the button (62) in order to activate the rear window washer.

Automatic Rear Wiper Feature (If Enabled)

This feature can be enabled in the monitoring system. When the front wiper is on, the rear wiper will automatically turn on to the front setting when the machine is shifted into reverse. When the machine is shifted into neutral or forward, the rear wiper automatically turns off.

Keypad (9 and 10)

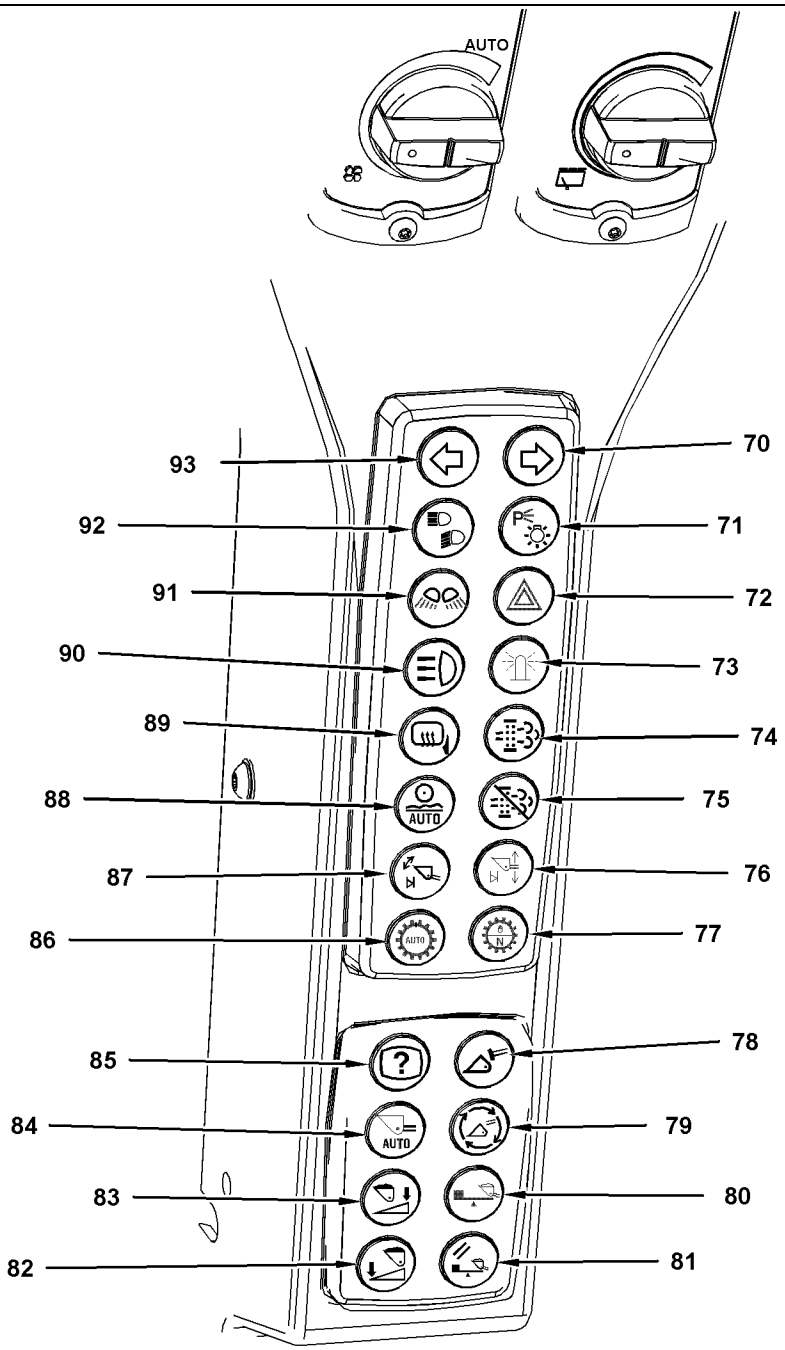

Illustration 80 g02560358

(70) Right Turn Signal
(71) Parking Lights and Headlights
(72) Hazard Lights
(73) Beacon (If Equipped)
(74) Manual Regeneration
(75) Auto Regeneration Disable
(76) Implement Lift Kickout
(77) Transmission Neutralizer
(78) Quick Coupler (If Equipped)
(79) Work Tool Control (If Equipped)
(80) PCS Reweigh (If Equipped)
(81) PCS Clear/Zero (If Equipped)
(82) Autodig Material Mode Decrease (If Equipped)
(83) Autodig Material Mode Increase (If Equipped)
(84) Autodig Operation Mode (If Equipped)
(85) Keypad Help
(86) Auto/Manual Transmission Select
(87) Implement Tilt Kickout
(88) Ride Control
(89) Heated Mirror (If Equipped)
(90) Auxiliary Work Lights (If Equipped)
(91) Work Lights
(92) Low/High Beam Select
(93) Left Turn Signal

Push the button in order to set the function. Push the button and hold the button in order to enable the function or disable the function. The operator display and cab lights will change the backlight mode based on the external lighting status. When any of the headlight, marker lights, work lights, or long-distance lights are on, the display and cab lights will enter night mode. When all of these lights are off, then the display and cab lights will change to day mode.

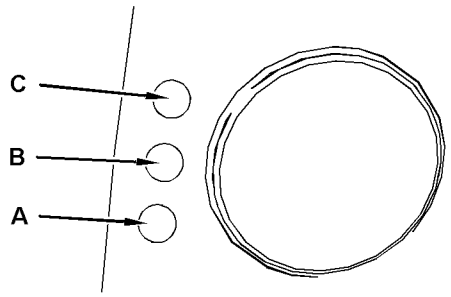

Illustration 81 g02458177

The indicator lights next to each button are described in the following method:

(C) top light
(B) middle light
(A) bottom light

Cab

Keypad Help (85) – Push the button in order to enable the help assistance feature. The alarm will sound a single beep. All of the button indicator lights that have help information available will be illuminated. The help assistance feature will be active for 10 seconds. Push any flashing button in order to receive help information on the display panel. Push the help button again in order to cancel the help assistance feature.

Note: Only active buttons on your machine will flash. The help assistance feature only provides information for button functions on the button key pads.

Ride Control (88) – Push the button and release the button in order to enable the automatic ride control. Indicator B will also be illuminated. Push the button again in order to disable the ride control. The system will remember the position at the next start-up cycle. Push the button and hold the button for 2 seconds in order to put the ride control in service mode. If ride control is in service mode when you shut off the machine, ride control will be disabled at start-up.

Note: Do not run the machine in a normal work cycle with ride control in service mode.

Heated Mirror (If Equipped) (89) – Push the button in order to enable the heated mirror. The alarm will sound a single beep. Indicator B will also be illuminated. Push the button again in order to disable the heated mirror. The heated mirror will shut off automatically after a designated time.

Lighting

Right Turn Signal (70) – Push the button in order to turn on the right turn signal. The Indicator light will be illuminated. Push the button again in order to turn off the right turn signal.

Parking Lights (71) – Push the button once in order to turn on the parking lights. Indicator B will also be illuminated.

Headlights (71) – Push the button twice in order to turn on the headlights. Indicator A will also be illuminated. Push the button again in order to turn off the lights.

Hazard Lights (72) – Push the button in order to turn on the hazard lights. Indicator B will also be illuminated. Push the button again in order to turn off the hazard lights.

Beacon (If Equipped) (73) – Push the button in order to turn on the beacon light. Indicator B will also be illuminated. Push the button again in order to turn off the beacon.

Auxiliary Work Lights (If Equipped) (90) – Push the button once in order to turn on the front Auxiliary work lights. Indicator B will also be illuminated. Push the button again in order to turn on the front and rear Auxiliary work lights. Indicator A and indicator B will also be illuminated. Push the button again in order to turn off the Auxiliary work lights.

Work Lights (91) – Push the button once in order to turn on the front work lights. Indicator B will also be illuminated. Push the button again in order to turn on the front and rear work lights. Indicator A and indicator B will also be illuminated. Push the button again in order to turn off the work lights.

Low/High Beam Select (92) – This button is active only when the headlights are on. Indicator B will be illuminated. Push the button once in order to turn on the high beam headlights. Push the button again in order to turn off the high beam headlights.

Left Turn Signal (93) – Push the button in order to turn on the left turn signal. The Indicator light will be illuminated. Push the button again in order to turn off the left turn signal.

Transmission

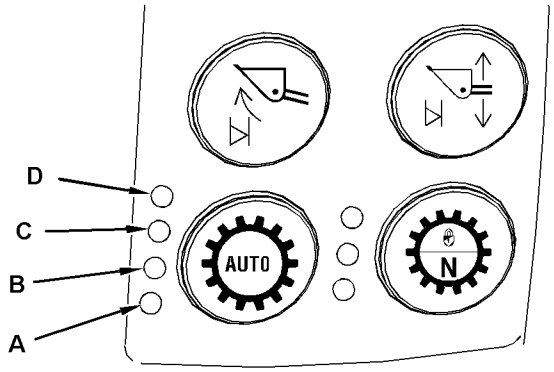

Illustration 82 g02723042

Auto/Manual Select

Auto/Manual Transmission Select (86) – This button controls the manual and automatic shift modes of the transmission. The system will remember your transmission mode at the next start-up cycle. The transmission menu will display the mode information on the front panel as the button is repeatedly pushed. The corresponding indicators will be illuminated next to the button. Push the button in order to select the desired transmission mode.

The Left Hand Steering Control modes are listed as follows:

Manual – No indicators will be illuminated.

Auto 2-4 – Indicators B, C, D will be illuminated.

Auto 1-4 – Indicators A, B, C, D will be illuminated.

Auto 1-3 – Indicators A, B, C will be illuminated.

Auto 1-2 – Indicators A, B will be illuminated.

The steering wheel control modes are listed as follows:

Manual – No indicators will be illuminated.

Auto 2-4 – Indicators B, C, D will be illuminated.

Auto 1-4 – Indicators A, B, C, D will be illuminated.

Reference: Refer to the “Left Hand Steering Control” section or the “Steering Wheel” section for more information.

Transmission Neutralizer

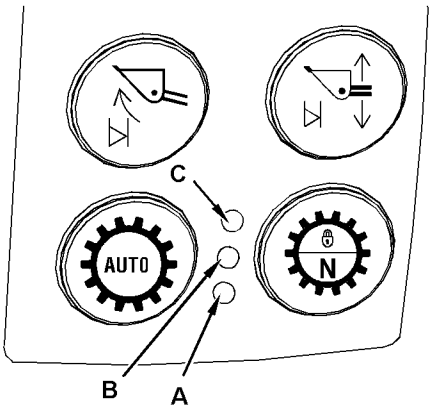

Illustration 83 g02726874

Transmission Neutralizer (77) – This button will allow the operator to disable or change the mode of the neutralizer. The system will remember your transmission mode at the next start-up cycle.

Press the transmission neutralizer button in order to set the transmission neutralizer to the desired mode. If the neutralizer is set to the disabled setting, the Transmission Neutralizer Disabled light in the dash will be illuminated. Depressing the left service brake pedal will not neutralize the transmission.

When the operator presses the Neutralizer Disable button on the keypad, the feature will cycle through the available modes. The lights will illuminate as follows:

- Disabled - no lights
- Level Operation - C

- Moderate Slope Operation - B, C
- Aggressive Slope Operation - A, B, C

Caterpillar Regeneration System (CRS) Aftertreatment Operation

The Caterpillar Regeneration System is the process of converting the waste products of the diesel engine into carbon dioxide and water. The process uses high temperatures in the Diesel Particulate Filter (DPF) in order to facilitate the chemical reaction.

Refer to Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration” for an overview of the CRS operation. This article explains how the system works in all Cat machines.

The default regeneration mode at start-up is set for automatic regeneration. In the automatic mode the regeneration system on the engine will trigger regeneration when regeneration is appropriate. The operator may override the automatic regeneration cycle if needed.

Manual Regeneration (74) – Push the button and hold the button for 2 seconds in order to start a manual regeneration cycle.

In order to stop the manual regeneration cycle, push the button at any time during the cycle.

Auto Regeneration Disable (75) – Push the button and hold the button for 2 seconds in order to disable the automatic regeneration cycle.

There may be times that the operator determines that a regeneration cycle is not appropriate. Use the disable auto regeneration button in order to disable the automatic mode.

For more information about the CRS and the messages that are displayed, refer to the Operation and Maintenance Manual, “Monitoring System”.

Work Tool

The Work Tool Control System is described in more detail in the Operation and Maintenance Manual, “Work Tool Control System” section.

Implement Lift Kickout (76) – Push the button and release the button in order to enable the lift kickouts. The lift kickouts include kickouts in both the raise direction and the lower direction. Indicator B will also be illuminated. Push the button and release the button again in order to disable the lift kickout.

Push the button and hold the button for 2 seconds in order to set the kickout positions. The indicator light will flash and the alarm will beep twice when the position is set. In order to set the raise kickout, first raise the work tool to the desired position above 35% lift height. Push the button and hold the button. In order to set the lower kickout, first lower the work tool to the desired position below 35% lift height. Then push the button and hold the button.

The system will remember the kickout positions at the next start-up cycle.

Note: If the lift kickouts are disabled when you push the button and hold the button, the lift kickouts will be enabled when you release the button. No position will be set.

Note: When the lift kickouts are disabled and the lift lever is moved into the lower detent, the valve will go to the float position. When the lever is moved out of the detent position, the valve will move to the power down position.

Note: The raise kickout position and the lower kickout position will be stored for the active work tool if the Work Tool Control System is enabled. Kickout positions can be stored and recalled for each available work tool selection within the Work Tool Control System.

Implement Tilt Kickout (87) – Push the button and release the button in order to enable the tilt kickout. The tilt kickouts include kickouts in the rackback and in the dump direction. Indicator B will also be illuminated. Push and release the button again in order to disable the tilt kickouts. Push the button and hold the button for 2 seconds in order to set the tilt kickout position. The kickout position set will be the same for the rackback kickout and the dump kickout. The indicator light will flash and the alarm will beep twice when the position is set. The system will remember this position at the next start-up cycle.

Note: If the tilt kickout is disabled when you set the tilt kickout position, the tilt kickout will be enabled when you release the button. No position will be set.

Note: The tilt kickout position will be stored for the active work tool if the Work Tool Control System is enabled. Kickout positions can be stored and recalled for each available work tool selection within the “Work Tool Control System”.

Work Tool Control (If Equipped) (79) – Push the Work Tool Control button in order to display the current work tool selection. Push the button again in order to cycle through the available work tools. Push the button and hold the button for 2 seconds in order to activate the selected work tool. The system will remember the position at the next start-up cycle. The middle light B next to the button will illuminate for 10 seconds after the selection is made.

Note: A Work Tool Control System is available if the machine is equipped with a third function valve or a quick coupler. The Implement System settings for each work tool are changed within the Settings menu on the display for each Work Tool.

Quick Coupler (If Equipped) (78) – The middle light B next to the button will be illuminated when the button is depressed or when the quick coupler is disengaged. When the quick coupler is disengaged, a feature alarm will also sound in the cab. Push the button in order to display the status of the quick coupler. Push the button again in order to cycle through the available settings. Push the button and hold the button for 2 seconds in order to set the status.

Note: When using the quick coupler to engage a work tool, always verify that the coupler wedges are engaged in the proper position to lock the work tool. Visually inspect the coupler wedge position or manipulate the tool in a manner that will confirm that the tool is locked in place.

If your machine is equipped with a quick coupler, refer to the Operation and Maintenance Manual, “Quick Coupler Operation” for more details on the operation.

Aggregate Autodig System (If Equipped)

The Aggregate Autodig System is described in detail in the Operation and Maintenance Manual, “Aggregate Autodig” section.

Autodig Operation Mode (84) – The autodig system is designed to perform the operations of a loading cycle of an aggregate mix with minimal effort by the operator. Loading this type of material is repetitive. A high level of skill is required to maintain a consistent level of productivity during such loading cycles. This feature will fully load a bucket at consistent loading times.

Press the button and release this button in order to cycle through the operational modes that Autodig may use to load the bucket. The indicator lights next to the button are described in the following method:

- Automatic Pile Detection Mode - Light (A)
- Operator Triggered Pile Detection - Light (A and B)
- Record Cycle Mode - Light (A, B, and C)
- Autodig Disabled - no lights

Note: In order to enter into Record Mode, the Autodig Material Mode Increase button must be pressed so that Record/Playback mode is active. This mode is active when only the bottom light (A) and the top light (G) are illuminated.

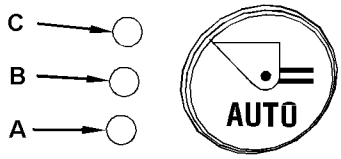

Illustration 84 g02726876
Autodig Operation Mode Button

The Autodig Decrease/Increase select buttons use seven indicator lights.

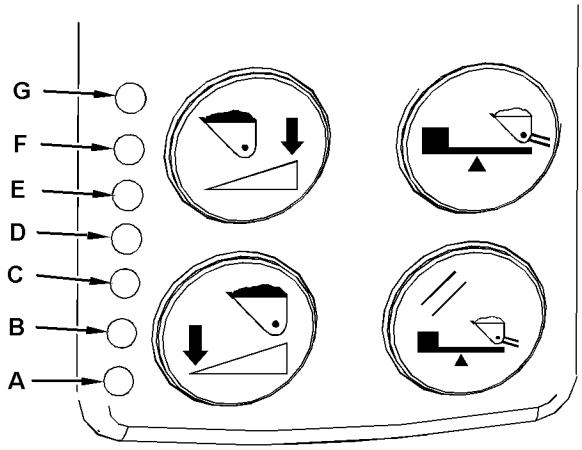

Illustration 85 g02726879

The Autodig Material Mode Increase/Decrease indicator lights next to the two buttons are described in the following method:

(G) top light
(F) next middle light
(E) next middle light
(D) next middle light
(C) next middle light
(B) next middle light
(A) bottom light

Autodig Material Mode Increase (83) – Push this button in order to increase the aggressiveness of the autodig cycle. Repeat presses of the button increase the dig cycle until all of the lights are turned on. When the Autodig Increase button is pushed again, only the top light (G) and bottom light (A) will be illuminated. This mode activates the Record/ Playback mode of Autodig. In Record/Playback mode, Autodig will repeat a previously recorded bucket loading cycle.

Autodig Material Mode Decrease (82) – Push this button in order to decrease the aggressiveness of the autodig cycle. Repeat presses of the button decrease the dig cycle until the bottom light (A) is the only light illuminated.

Payload Control System (If Equipped)

The Payload Control System is described in more detail in this Operation and Maintenance Manual, “Payload Control System (PCS)” section.

PCS Reweigh (80) – Press this button in order to reweigh the current material in the bucket.

The reweigh function allows the operator to subtract the previous bucket weight from the total truck weight. The reweigh function is used when the operator must add or remove material from the last bucket in order to achieve the correct truck weight.

PCS Clear/Zero (81) – Push this button in order to clear the current weight. Hold this button for 2 seconds in order to zero the system.

The clear function allows the operator to clear the display without storing data into the ECM memory. Momentarily push the clear/zero button to set the bucket weight and the truck weight to “0.00” on the display. A new weigh cycle can be started.

Note: If storing the truck weight data into memory is desired, the clear function should not be used. Once the display has been cleared, the data cannot be stored or recovered. The store switch must be used to store data to memory.

The zero function is used to adjust for changes in the empty bucket weight due to bucket wear or excess material stuck in the bucket. The operator should perform a zero on a regular basis or when prompted by the display. A zero of the system is performed in order to improve the accuracy of the PCS.

In order to zero the system, perform the following steps:

1. Empty the bucket.

2. Fully rackback the bucket to the stops.

3. Lower the bucket to the ground.

4. Hold the throttle steady at a normal operating engine speed.

5. Ease the lift lever into the DETENT position and allow the lift lever to kick out.

6. Press and hold the Clear/Zero button to bring the bucket weight and the truck weight to “0.00” on the display.

Note: When the bucket has reached the end of the weigh range, a small weight may be displayed on the screen. This value will vary depending on the oil temperature, the amount of material that is left in the bucket, and the condition of the linkage. Press and hold the clear/zero button until the “Zero Accepted” message is shown on the display.

Note: Press the PCS Reweigh and the PCS Clear/ Zero buttons simultaneously for PCS standby mode. When the machine is turned off, PCS will default to weigh mode when the machine is started again.

VIMS Connector (17)

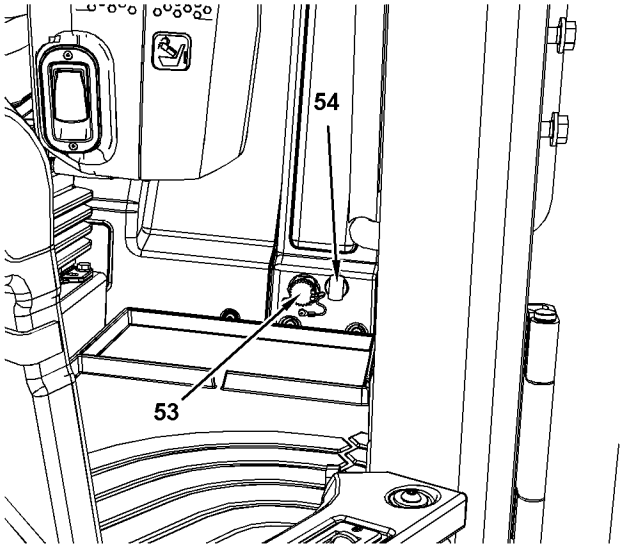

Illustration 86 g02560317

(53) VIMS Connector
(54) 12 Volt Socket

Additional software is available to download machine information from the VIMS Connector. This software can also be used to download and upload information to the Payload Control System. Consult your Cat dealer for more information about the VIMS software.

Implement Controls (11)

Your machine is equipped with one of the following work tool control configurations:

Lever Controls

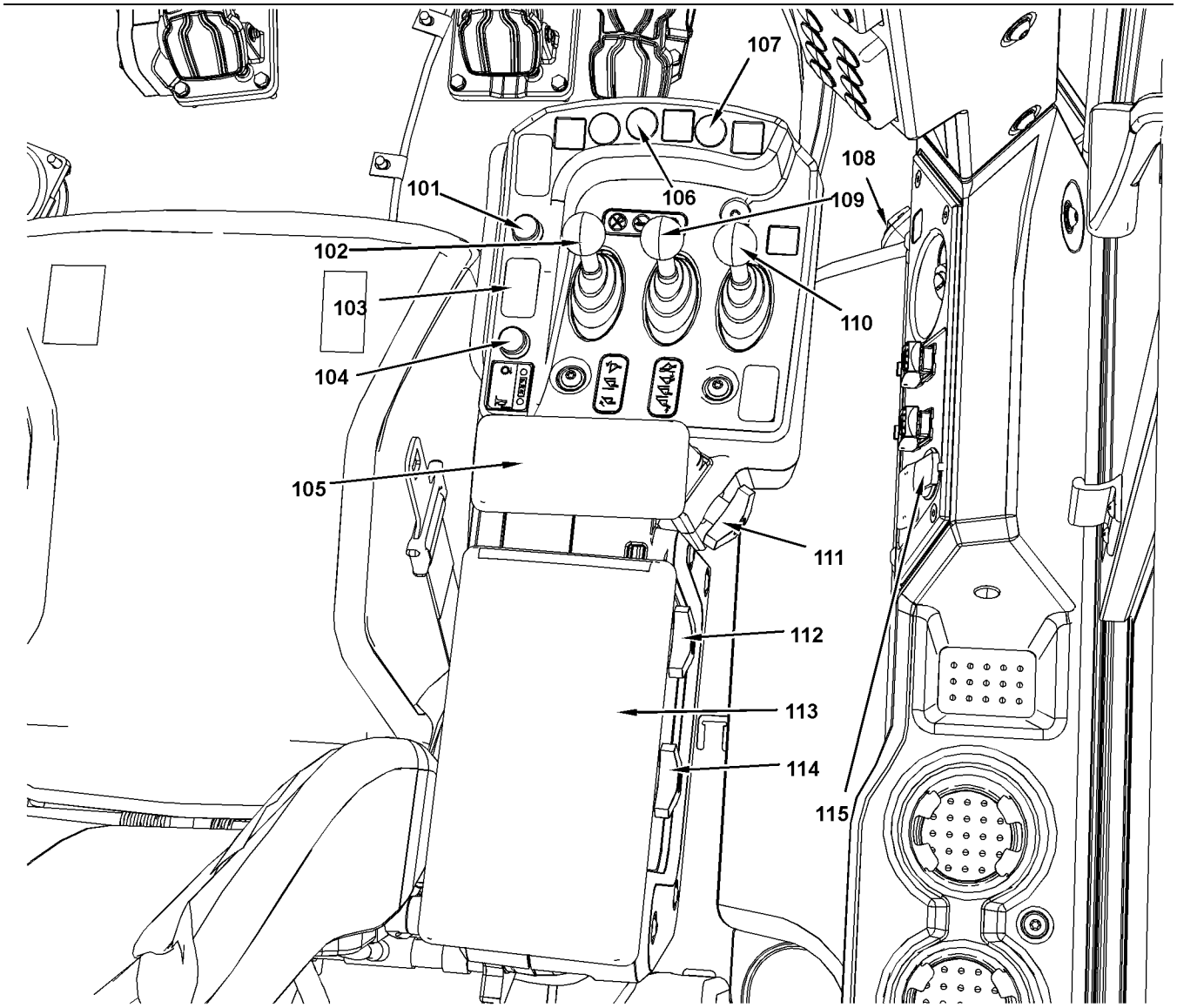

Illustration 87 g02560396

(101) Transmission Downshift
(102) Tilt Control
(103) Direction Control (If Equipped)
(104) Horn
(105) Wrist Support
(106) Autodig Trigger Switch (If Equipped)
(107) PCS Store Switch (If Equipped)
(108) 12 Volt Socket
(109) Lift control
(110) Auxiliary 3rd Function Control (If Equipped)
(111) Wrist Support Adjustment
(112) Armrest Support Adjustment
(113) Right Arm Support
(114) Armrest Support Adjustment
(115) 12 Volt Socket

Joystick Controls (If Equipped)

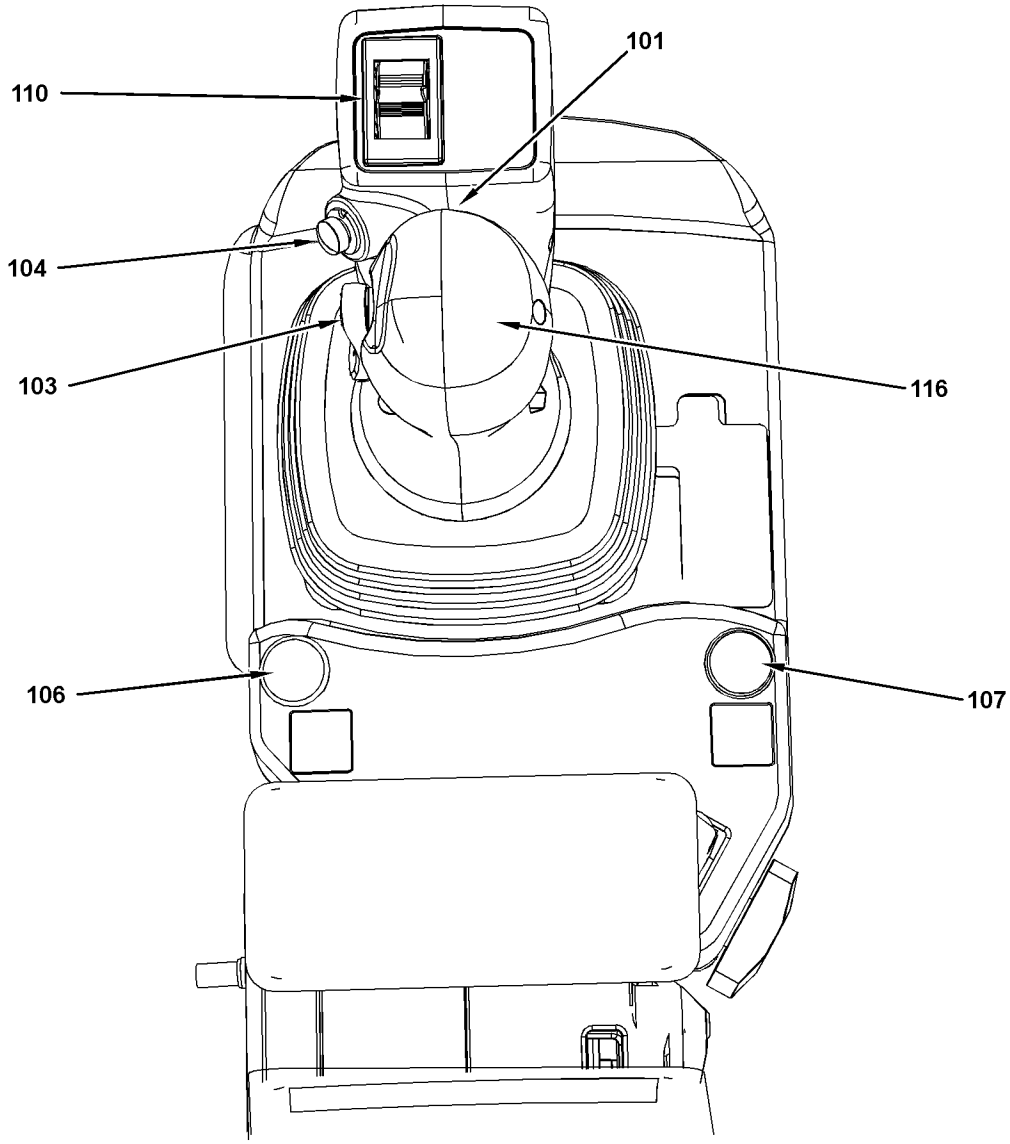

Illustration 88 g02560416

Joystick Work Tool Controls (If Equipped)

(101) Transmission Downshift
(103) Direction Control (If Equipped)
(104) Horn
(106) Autodig Trigger Switch (If Equipped)
(107) PCS Store Switch (If Equipped)
(110) Auxiliary 3rd Function Control (If Equipped)
(116) Joystick

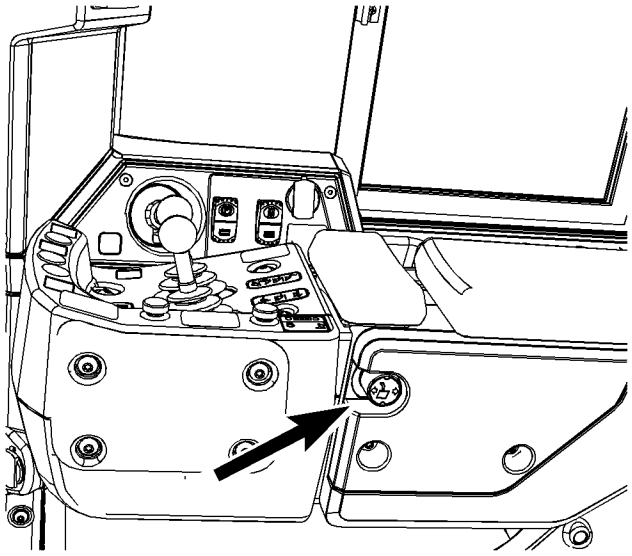

Illustration 89 g02153827

Right-hand console fore/aft adjustment. Push the knob in order to slide the console.

Lift and Tilt Control

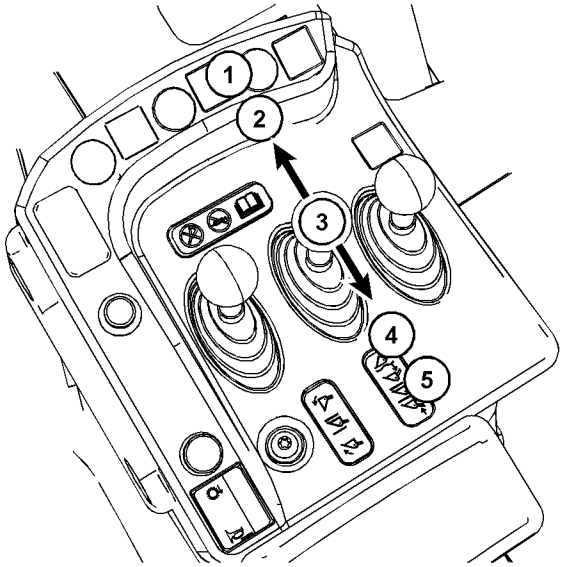

Illustration 90 g02103198

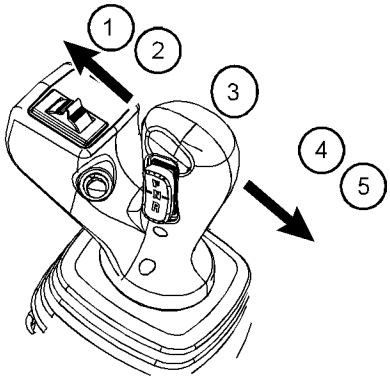

Illustration 91 g02103157

Joystick Control

LOWER DETENT (1) – Push the lever forward into the detent in order to activate either lower kickout or float. When the lever is moved into the detent, the operator will feel an increased resistance from the lever. Once in the DETENT position, the lever should be released to the HOLD position in order to activate the lower kickout. The attachment will continue to lower until the attachment reaches the kickout height that was preset by the implement lift kickout button. In order to override the kickout manually, the lever must be moved at least 6 degrees from the HOLD position. The kickout will not be activated if the lever is held in the DETENT position for more than 1 second. The kickout will not be activated if the lever is not returned to the HOLD position.

Note: If the attachment is greater than 200 mm (8 inch) from the lower KICKOUT position, a lower kickout will occur when the lift control lever is placed in the LOWER DETENT position. If the attachment is less than 200 mm (8 inch) from the lower KICKOUT position, then placing the lift control lever in the LOWER DETENT will cause the attachment to float to the ground.

Note: If the lower kickout is disabled, the attachment will float to the ground only when the control lever is held in the lower detent position.

When the float is activated, the attachment will follow along the contour of the ground. The lever will return to the HOLD position when the lever is released. The attachment will remain in the FLOAT position until the lever is moved at least 6 degrees from the HOLD position.

Note: If the linkage stops moving while the lower kickout is active, the linkage will be placed into FLOAT. Move the lift control lever at least 6 degrees from the HOLD position in order to cancel the float function.

NOTICE
Never use the LOWER DETENT/FLOAT position to lower a loaded bucket.

Machine damage can result from a bucket that falls too fast.

LOWER (2) – Push the lever forward in order to lower the attachment. The lever will return to the HOLD position when the lever is released.

HOLD (3) – The lever will return to the HOLD position when the lever is released from the RAISE position or from the LOWER position. The attachment will remain in the selected position.

RAISE (4) – Pull the lever backward in order to raise the attachment. The lever will return to the HOLD position when the lever is released.

RAISE DETENT (5) – Pull the lever rearward into the detent in order to activate the RAISE KICKOUT. When the lever is moved into the raise detent, the operator will feel an increased resistance from the lever. Once in the detent, release the lever to the HOLD position in order to activate the RAISE KICKOUT. The attachment will continue until the attachment reaches the raise kickout height that was preset by the implement lift kickout button. In order to override the kickout manually, the lever must be moved at least 6 degrees from the HOLD position. The kickout will not be activated if the lever is held in the detent position for more than 1 second. The kickout will not be activated if the lever is not returned to the HOLD position.

Tilt Control

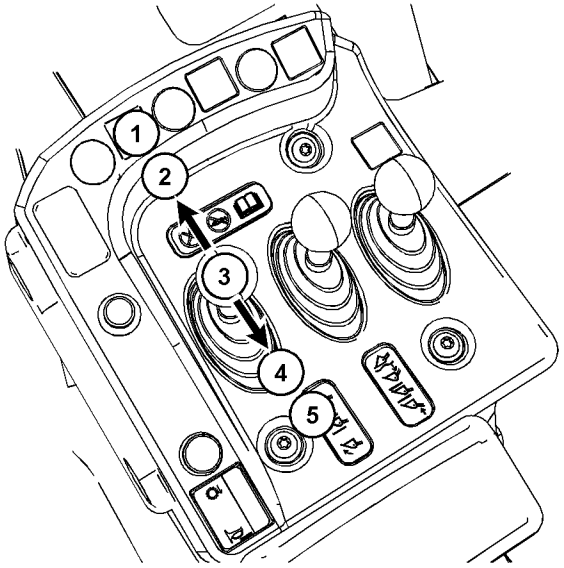

Illustration 92 g02103196

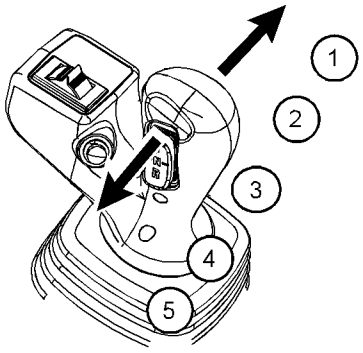

Illustration 93 g02103160

Joystick Control

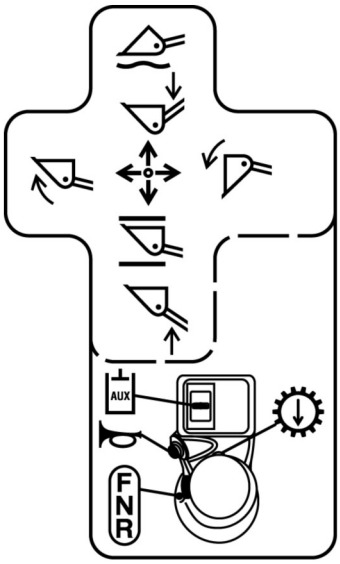

Illustration 94 g02131268

These instructions are located next to the joystick.

DUMP DETENT (1) – Push the lever forward into the detent in order to activate the dump kickout. When the lever is moved into the detent, the operator will feel an increased resistance from the lever. Once in the DETENT position, the lever should be released to the HOLD position in order to activate the dump kickout. The attachment will continue until the attachment reaches the digging angle that is preset by the implement tilt kickout button. In order to override the kickout manually, the lever must be moved at least 6 degrees from the HOLD position. The kickout will not be activated if the lever is held in the DETENT position for more than 1 second. The kickout will not be activated if the lever is not returned to the HOLD position.

DUMP (2) – Push the lever forward in order to dump a load from the bucket.

HOLD (3) – When you release the lever, the lever will return the HOLD position. The bucket will remain in the selected position.

RACKBACK (4) – Pull the lever backward in order to tilt the bucket backward.

RACKBACK DETENT (5) – Pull the lever rearward into the detent in order to activate the RACKBACK KICKOUT. When the lever is moved into the detent, the operator will feel an increased resistance from the lever. Once in the detent, the lever should be released to the HOLD position in order to activate the RACKBACK KICKOUT. The attachment will continue until the attachment reaches the digging angle that is preset by the implement tilt kickout button. In order to override the kickout manually, the lever must be moved at least 6 degrees from the HOLD position. The detent will not be activated if the lever is held in the detent position for more than 1 second. The kickout will not be activated if the lever is not returned to the HOLD position.

Note: A machine with ride control may experience partial lowering of the lift arms when the lever is held in the DUMP position with the bucket against the bucket stops and the lift arms are fully raised. To avoid partial lowering of the lift arms, return the lever to the HOLD position. An optional feature can be enabled to help prevent this situation. Enable Dump Stop Snubbing by using the Monitoring System Display. Refer to the Operation and Maintenance Manual, “Monitoring System” “Settings” section for details about the Dump Stop Snubbing control.

Linkage and Cylinder Snubbing

Note: Snubbing occurs with the lift and the tilt functions.

As the lift linkage is moved to the full raise or full lower position, the control system will cushion the end of travel. This control may be overridden by moving the lift lever to the HOLD position. Then move the lever back to the same direction from which the lever was released. If desired, raise and lower snubbing may be disabled through the Monitoring Display System.

As the bucket is moved to the full rackback or full dump position, the control system will cushion the cylinder at the end of travel. The control system will also cushion the linkage at the rackback stops and at the dump stops. This control may be overridden by moving the lift lever to the HOLD position and then moving the lever back to the same direction. This procedure allows for bucket cleanout or banging on the dump stops. The bucket must be racked back to approximately 10 degrees in order to reenable dump stop cushioning. If desired, rack and dump snubbing may be disabled through the Monitoring Display System.

Reference: Refer to the Operation and Maintenance Manual, “Monitoring System” for more details about snubbing.

Auxiliary Control (If Equipped)

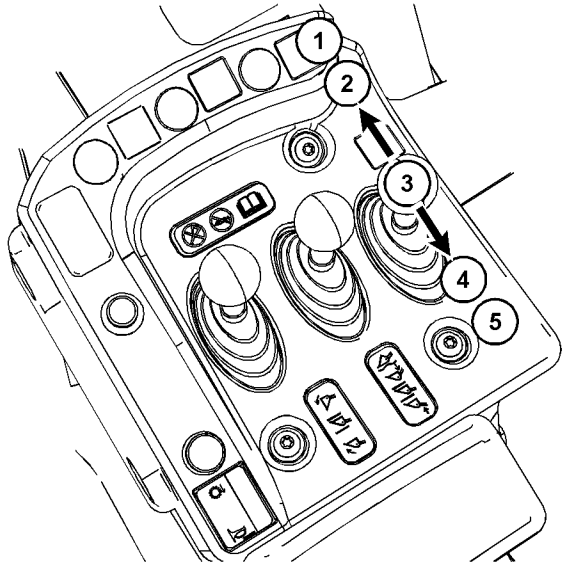

Illustration 95 g02139627

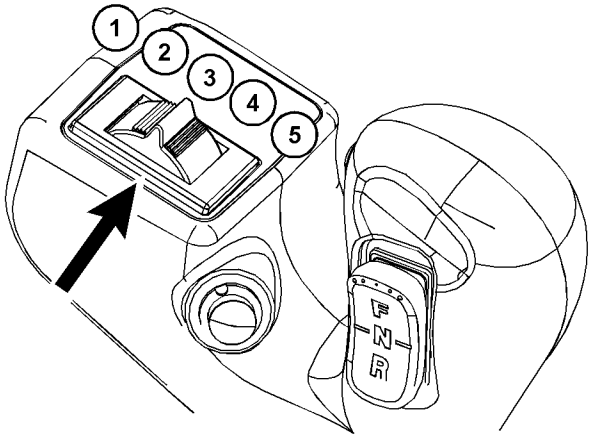

Illustration 96 g02103156

Joystick Auxiliary Control

If your machine is equipped with auxiliary hydraulics, this control is used for the following implements:

- Hydraulic Broom
- Multipurpose bucket
- Side dump bucket
- Auxiliary hydraulics
- Logging fork clamp

Hydraulic Broom Control

FORWARD DETENT (1) – Push the lever/roller into detent and release the lever/roller to the HOLD position in order to activate continuous flow in this direction. Move the control lever/roller out of the HOLD position in order to deactivate continuous flow.

FORWARD (2) – Broom will push material toward the machine.

HOLD (3) – The lever/roller will return to this position when the lever/roller is released. The attachment will remain in the selected position. If Continuous Flow has been activated, then the hydraulic circuit will remain active even though the lever/roller is in the HOLD position.

REARWARD (4) – Broom will push material away from the machine.

REARWARD DETENT (5) – Push the lever/roller into detent and release the lever/roller to the HOLD position in order to activate continuous flow in this direction. Move the control lever/roller out of the HOLD position in order to deactivate continuous flow.

Note: Continuous Flow operation for the detents must be enabled for the active work tool selection. See the “Work Tool Control System” section for mode details.

Note: Broom speed may be adjusted through the display. Refer to the “Work Tool Control System” section or to the “Display Settings” section for more information on the 3rd Function Modulation Scale Factor.

Multipurpose Bucket Control

CLOSE – Move the lever/roller to position 2 in order to close the bucket.

HOLD – The lever/roller will return to position 3 when the lever/roller is released from position 2 or from position 4. The attachment will remain in the selected position.

OPEN – Move the lever/roller to position 4 in order to open the bucket.

Side Dump Bucket Control

DUMP – Move the lever/roller to position 2 in order to dump the bucket.

HOLD – The lever/roller will return to position 3 when the lever/roller is released from position 2 or from

position 4. The attachment will remain in the selected position.

RETURN – Move the lever/roller to position 4 in order to lower the bucket.

Auxiliary Control

Right auxiliary hydraulic line – Move the lever/roller to position 2 in order to pressurize the right supply line.

HOLD – The lever/roller will return to position 3 when the lever/roller is released from position 2 or from position 4. The left supply line and the right supply line will not be pressurized when the lever/roller is in position 3.

Left auxiliary hydraulic line – Move the lever/roller to position 4 in order to pressurize the left supply line.

Note: Operating instructions for specific attachments are not provided. The function of the control lever/roller is dependent upon the installation of an attachment from an Auxiliary Equipment Manufacturer.

Note: Maximum speed of the hydraulic flow to the attachment may be adjusted through the display. Refer to the “Work Tool Control System” section or to the “Display Settings” section for more information on the 3rd Function Modulation Scale Factor.

Logging Fork Clamp Control

CLOSE – Move the lever/roller to position 2 in order to close the logging fork clamp.

HOLD – The lever/roller will return to position 3 when the lever/roller is released from position 2 or from position 4. The attachment will remain in the selected position.

OPEN – Move the lever/roller to position 4 in order to open the logging fork clamp.

Machine Security System (If Equipped)

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 Cat Machine Security System (MSS) can be identified by a decal in the operator station. MSS is designed to prevent theft of the machine or unauthorized operation.

Basic Operation

MSS may be programmed to read a standard Cat 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 can have programmed settings to require an electronic key or a standard Cat key for starting during certain periods of time.

When the key start switch of the machine is turned to the ON position, the ECM will read the unique ID. The ECM will then compare this ID to the list of authorized keys. The following table tells the operator the status for starting the machine. The status light is located near the key start switch.

Table 14

Green light	The machine will start.
Red light	The key is not authorized.

Note: MSS will not shut down the machine after the machine has started.

Security Management

The 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 30 seconds in order to restart the machine with an unauthorized key. 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 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. Consult your Cat dealer for information on additional features of the MSS.

Engine Idle Shutdown (If Enabled)

This function shuts down the engine after the operator is not operating the machine for a time. Engine idle shutdown will turn off the engine and after a short time will power down the remaining systems as if a key off was performed. This function does not shut down low beams, hazards, or parking lights, which can run down the battery after idle shutdown. This function can be enabled or disabled and programmed in the monitoring system display. Engine Idle Shutdown may be required for local regulations.

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

- The left service brake pedal is released.
- The throttle pedal is released.
- The transmission is in neutral.
- The implement controls are not active.

Engine Idle Shut down – The control limits the engine speed to 1000 rpm at 20 seconds before shutdown and turns on the action lamp. An alarm sounds for 20 seconds before the engine shuts down.

An operator can move one of the controls in order to cancel a shutdown. Using the left brake pedal to cancel a shutdown is the recommended option for the operator.

i06204660

Radio
(Entertainment If Equipped)

SMCS Code: 7338

⚠ CAUTION

When driving, always keep your eyes on the road and hands on the steering wheel, paying careful attention to normal driving tasks. As always, the driver is responsible for safe vehicle operation. Not keeping your eyes on the road and hands on the wheel while driving could result in injury to you or others.

Stereo Receivers

Illustration 97 g03566500

MP3/USB/iPod/Aux/Bluetooth Receiver

Illustration 98 g03566527

MP3/USB/iPod/Aux/Bluetooth/CD Receiver

Illustration 99 g03566571

MP3/USB/iPod/Aux/Bluetooth/CD/SAT Receiver

Radio Pin out

Radio pinout is shown below

Cavity	Pin#	Function	I/O
A1	1	CAN-High	I/O
A2	2	CAN-Low	I/O
A3	3	Park Lights	I
A4	4	Ignition	I
A5	5	PWR_ANT/PA_MIC_PWR	O
A6	6	Dim PWM/ANALOG	I
A7	7	Battery	I
A8	8	Power Ground	I
B1	9	RR + (Speaker)	O
B2	10	RR - (Speaker)	O
B3	11	RF + (Speaker)	O
B4	12	RF - (Speaker)	O
B5	13	LF + (Speaker)	O
B6	14	LF - (Speaker)	O
B7	15	LR + (Speaker)	O
B8	16	LR - (Speaker)	O
C1	17	Power Ground	I/O
C2	18	Amp Sense	I
C3	19	Not connected	
C4	20	Cell_Tel_Mute	I
C5	21	ASWC (Analog Steering Wheel Control)	I
C6	22	Not connected	
C7	23	L_AUX_N 1	I
C8	24	AUX_SHIELD_GND	I
C9	25	AUX 1_COM	I
C10	26	R_AUX_N 1	I
C11	27	AUX 1_ON_OFF	I
C12	28	Not connected	
C13	29	Not connected	
C14	30	Not connected	
C15	31	MIC + (BAT)	I
C16	32	MIC - (BAT)	I
C17	33	Not connected	
C18	34	Not connected	
C19	35	Not connected	
C20	36	Not connected	

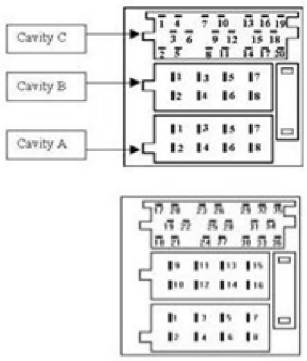

Illustration 100 g03566584

General Radio Receiver Functions

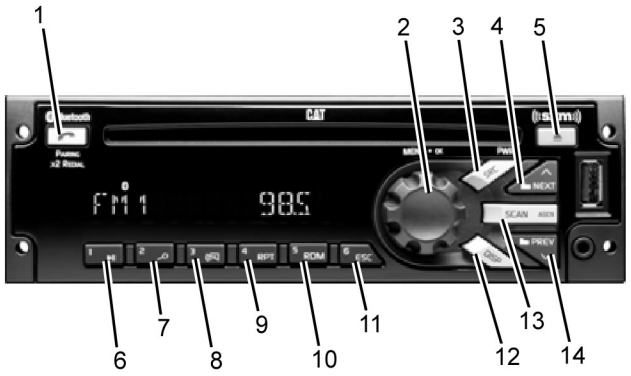

Illustration 101 g03566592

(1) Phone
(2) Knob
(3) SRC/PWR (Source/Power)
(4) Next
(5) Eject
(6) Play/Pause
(7) Browse
(8) Clock/Alarm
(9) RPT (Repeat)
(10) RDM (Random)
(11) ESC (Escape)
(12) DISP (Display)
(13) SCAN/ASCN (Scan/Autoscan)
(14) PREV (Previous)

Options

- An AM band with 6 AM presets
- Three FM bands with a total of 18 FM presets
- One weather band with six WX presets

Phone (if equipped)

Press the Phone button for more than 3 seconds to show the Bluetooth Menu. When Bluetooth is enabled, press the button to display the Dial Menu or to accept an Incoming Call (if a Phone is paired). During a call press the button for more than 3 seconds to transfer the call from the radio to the Phone.

VOLUME KNOB/OK

Press for less than 3 seconds to display Audio Control Menu. Press for more than 3 seconds to show the user menu. Rotate to increase/decrease volume or during a menu for navigation. Press while in a menu to confirm the selected action.

SRC/PWR (Source/Power)

Press to switch to FM -> AM -> WX -> SXM -> CD -> USB/iPod ->AUX -> Bluetooth Audio (if equipped) and to turn Radio ON. Press and hold to turn radio OFF.

NEXT (Next/Forward)

Press to select next track or station. Press and hold for FF or Tune Up

EJECT

Press to eject the CD

PLAY/PAUSE

Press to pause / unpause current Media.

BROWSE

Press to navigate on the device and select a specific song or play context (Applicable to USB sticks, CD MP3 discs and iPod).

CLOCK/ALARM

Press during Alarm activation to cancel the Alarm.

RPT (Repeat)

Press to repeat current track. Press again to stop repeat. Look for the RPT icon in the radio display to turn this feature ON or OFF.

RDM (Random)

Press to play the tracks randomly. Press again to stop random mode. Look for the RDM icon to turn on in the radio display.

ESC (ESCAPE)

Press to exit one Menu Level.

DISP (DISPLAY)

If vehicle ignition is ON: Press to change source display

SCAN/ASCAN

Scans stations/CD tracks/MP3/WMA files and folder and in tuner, stores stations to presets

PREV (Previous/Reverse)

Press to select previous track or station. Press and hold for FR or Tune Down

Change the Frequency Band

The following instruction provides information on how to correctly set the frequency band on the radios installed on Caterpillar machines. Once in the frequency then you will have the correct increments.

NOTICE
If the radio is set to the Saudi Arabia frequency band, the radio **CANNOT** be reset to any other country.

Illustration 102 g03812356

1. Radio OFF, ignition on

2. Press preset 5 (RDM 10) and volume knob (2) at the same time for 6 seconds.

3. Display will show USA number 1/6

4. Turn knob clockwise to select Frequency:

Table 15

USA	1/6
EUROPE	2/6
JAPAN	3/6
LAT AM (Latin America)	4/6
CHINA	5/6
SAUDI	6/6

5. Push knob to select zone.

6. Turn on radio to verify frequency.

To return to USA, follow same procedure.

Setting the Presets

The six numbered pushbuttons allow you to preset 6 of your favorite stations per band and easily return with the touch of a button. To set the presets:

(1) Turn on the receiver.

(2) Select the band.

(3) Tune to the desired station.

(4) Press and hold one of the six numbered buttons for more than 2 seconds to store the selected station. When the station has been set to the preset number you chose, you will hear a beep and the preset number will be visible.

(5) Repeat steps 1-4 for each pushbutton.

Note: Pressing a preset button in the future will tune the radio to the station you set on the band to which you are listening.

CD Receiver

Illustration 103 g03566527

Compact Disc Player (If Equipped)

Your integral CD player plays full size compact discs.

NOTICE
Never insert anything other than a CD into your CD player. Doing so could damage your CD player, result in unnecessary repairs and/or void the unit's warrant.

Playing a Compact Disc

(1) Turn on the ignition and receiver.

(2) Insert a disc partway into the slot, label-side up. The player will automatically pull the disc in once disc has been partially inserted. The CD icon and LOADING will appear on the display followed by the track number and elapsed time. Then, the disc will begin to play.

(3) If you are listening to AM/FM/WX radio, press the AUX (2) button to play a CD that has been loaded into the player. If no CD has been loaded, the display will show "NO CD" for 5 seconds and return to the default display. If a CD has been loaded, the track number and the elapsed time will be displayed.

Note: If a CD is ejected and not removed within 16 seconds, the CD will reload but will not start playing until the AUX (2) button is pressed.

DSPL/TIME

Press DSPL/TIME to toggle between the track number/elapsed time and time of day. To change the display, see the Display section of this manual.

Note: On newer machines there is an internal battery backup in the radio to retain time when using the machine battery disconnect switch.

TUNE/SEEK

Press (5) button to forward to the next track. The track number and elapsed time will appear.

TUNE/SEEK

Press (6) button to go to the beginning of the track being played. Press this button within the first 8 seconds of the track to go to the beginning of the previous track. The track number and elapsed time will appear.

PAUSE

Press the (9) button to pause a CD. PAU will appear on the display and the audio will be muted. Press the button again to resume play of the CD.

RDM

Press the RDM (10) button to activate random track selection. RDM will appear on the display and the tracks on the loaded disc will play in random order. Press the RDM (10) button to turn off random play.

RPT

Press the RPT (11) button to repeat the track you are playing. RPT will appear on the display and the track you are playing will be repeated until you press the RPT (11) button again.

FF

Press and hold the FF (13) button to fast-forward through a track. When you release the button, play will resume at normal speed. The track number and elapsed time will appear for 5 seconds before the default display reappears.

REV

Press and hold the REV (11) button to fast REVERSE. When you release the button, play will resume at normal speed. The track number and elapsed time will appear for 5 seconds before the default display reappears.

TRACK SCAN

Press SCAN/PSCAN (17) to scan all tracks on the CD. After playing 10 seconds of the current track, the player will automatically go to the next track. To end track scan, press SCAN/PSCAN (17) again.

EJECT

Press the Eject (18) button to eject a CD.

MP3/USB/iPod/Aux/Bluetooth/CD/ SAT

Illustration 104 g03566571

Mode Display

When you are playing MP3 or WMA files, press the "i Title/Menu" button to toggle between different displays views

(1) Track Number

(2) Artist Name

(3) Song Name ("Song Title" for iPod)

(3) Album Name

(5) Folder/PLST Name (excluding iPod)

AUX Input Display

When you are using an external device connected through the auxiliary inputs, pressing the "i Title/ Menu" button will have no effect.

When a device is connected via the aux input, the radio will display FRONT AUX as long as radio is kept in this mode. AUX is selected by pressing the SRC button and no device is connected, the radio will select the rear auxiliary input, and display REAR AUX as long as REAR AUX is kept in this mode.

Hands Free Display (Bluetooth®)

Bluetooth Hands Free section) with the radio and an incoming call is received, the radio will pause/mute. The display will show the phone name on the first line and the phone number on the second line. The << characters indicate an incoming call. Note: If the phone is in normal mode, the radio will emit a ring tone. If the phone is in silent mode, there will not be a ring tone.

When a cell phone has been previously paired and connected (see Using the Bluetooth Hands Free section) with the radio. A call is placed from the radio or the cell phone, the radio will pause/mute and the display will show the phone name on the first line and the phone number on the second line. The characters >> indicate an outgoing call.

Phone Disconnection

If the cell phone ends the Bluetooth connection, the phone turns off or the phone signal weakens, the radio will terminate the connection, and the radio will display PHONE DISCONNECTED for 3 seconds.

Use the DISCONNECT (see Using the Bluetooth Hands Free section) option from the Hands Free menu and the radio will attempt to disconnect with the current cell phone device.

Phone Reconnection

If a previously connected cell phone reactivates the connection with the radio, the cell phone is turned on or the phone re-establishes signal, the radio will display PHONE CONNECTED for 3 seconds.

Use the CONNECT (see Using the Bluetooth Hands Free section) option from the Hands Free menu to reconnect with a previously paired cell phone device.

Using an iPod®

The radio is capable of controlling and playing music from an iPhone/iPod.

Playing an iPod

Insert the iPod USB cable connector into the radio USB connector (the other end connected to your iPod). iPod READING will appear on the display. After all the connections have been made and the radio has finished reading the iPod, the iPod will begin playing. The elapsed time and the track number will be displayed. Play begins from current track played on iPod and continues sequentially through all tracks from the iPod's last selected mode. After playing the last track of the iPod's last selected mode, play stops and the radio will display the iPod Menu.

Files supported on USB sticks: MP1, MP2, MP3 (VBR) and WMA (ver. 9 and VBR).

Your MP3 player is able to read and play a maximum of 50 folders and playlists. Long files, folders, or a combination can reduce the number of files and folders that can be played. If you want to play many files or folders, minimize the length of the files and folders. You can also play an MP3/WMA recorded without file folders. The system can support up to 11 levels of folder nesting. If a disc contains more than 50 folders or 11 folder levels, your player will only let you access and navigate the maximum number and will ignore additional items.

WX

The WX band is for the Governmental weather radio services frequencies; the radio can tune the seven weather channels following the steps in Tuning, Presets, and SCAN sections.

SXM (If Equipped)

Vehicles with a valid SiriusXM® satellite radio subscription can receive SiriusXM programming. SiriusXM satellite radio has a wide variety of programming and commercial-free music, coast to coast, and in digital-quality sound.

SiriusXM®

SXM Display

When SiriusXM is active, the channel number, channel name, artist name/content info, song title, or category name could be displayed on the screen. SiriusXM may update the information at any time.

To change the current display view, short press the DISP button.

When a new channel is selected, a song change occurs, SXM source is selected (from power up or source change) or the information is updated, all the elements will be displayed using paging; the paging can be stopped by short pressing the DISP button

Display labels

To recognize the displayed text the radio uses the following convention :

- Channel Number: CH
- Channel Name: CH
- Artist Name: ART
- Content Info: INFO
- Song Title: SONG
- Category name: CAT

SXM Categories

SiriusXM stations are organized in categories.

The category list for SXM is in the following webpage: “http://www.siriusxm.com/sxm/pdf/sirius/channelguide.pdf”

To change the current category long press the NEXT/PREV button and the radio will tune the first channel on next or previous category.

Category mode Enable/Disabled

Category Search Mode Enabled means that only channels in the current Category are searched. When enabled, the CATEGORY icon is turned on.

Category Search Mode Disabled means that all channels are searched. When disabled, the CATEGORY icon is turned off.

To enable/disable the category browse mode follow the steps in the User Menu section

The default after a power up is Category Disabled.

SXM Channel Selection

Presets and SCAN functions work the same as defined in the SCAN subsection of AM-FM-WX Radio.

NEXT button

While in SXM the radio will scroll to the next channel available in numerical order.

PREV button

While in SXM the radio will scroll to the previous channel available in numerical order

Note: If the SXM service is not activated, only the free-to-air channels will be present.

SXM Radio ID

If tuned to channel 0, "RADIO ID" label alternates with the SXM radio eight-digit code. This code is needed to activate the service.

DISP button does not work in channel 0. Channel 0 is not available in category mode enabled.

SXM Messages

SXM BUSY – The audio system is acquiring and/or processing audio and/or text data. No action is needed.

ART UNAVAIL – There is not Artist Name related with the current song.

SONG UNAVAIL – There is not Song Title related with the current song.

CHAN UNAVAIL – There is no Channel Name related with the current channel.

CHECK ANTENNA – SXM antenna or antenna cable is not connected to the radio or the antenna is shorted.

NO SIGNAL – SXM tuner module reports the No Signal condition. Under this condition only Channel 0 will work as stated in this manual.

CHAN UNSUB – Active channel has become unsubscribed or the requested channel is not unsubscribed.

SUBSCRIPTION UPDATED - PRESS OK TO CONTINUE – The subscription of the radio was updated. To remove the message and return to the previous state pres "OK" (Knob).

CH UNAVAIL – Requested channel is reported unavailable for a newly selected channel or the currently selected channel. Unavailable channels are those that are in the legal channel range but are not currently available for display or subscription as a broadcast service. After 3 seconds the previous channel (if available) or channel 1 will be tuned.

OPTIONAL EQUIPMENT

Infrared Remote Control

Your receiver is compatible with an optional handheld remote control available from your dealer. The remote control will:

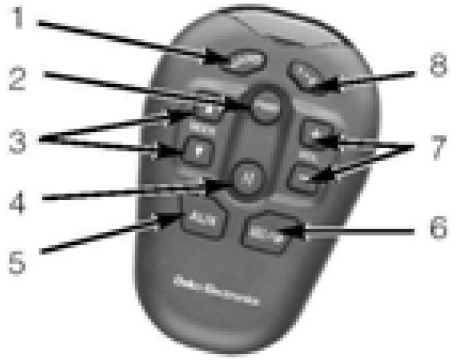

Illustration 105 g03566682

(1) Select a band
(2) Turn your receiver on and off
(3) Select the next or previous track/ Seek up and down
(4) Mute/Pause
(5) Select AUX inputs 1 or 2, iPod/USB
(6) Play a CD
(7) Adjust volume
(8) Select a preset station

Button Functions

BAND – Press this button to select FM1, FM2, AM or WX.

PWR – Press this button to turn the receiver on/off.

SEEK – Press these buttons to move to the next available radio station or to go to the next track.

II: – Press this button to reduce volume to a minimum. The radio display will read

MUTE – To deactivate mute, press this button again. The audio source will continue to play while the volume is at a minimum

AUX – Press this button to select Front Auxiliary, Rear Auxiliary, iPod/USB, or Bluetooth® Audio

CD – Press this button to turn on your integrated CD player.

VOL – Press this button to adjust the volume

1-6 – Press this button to advance through the presets in the selected band.

i05393569

Diesel Particulate Filter Regeneration

SMCS Code: 108F

NOTICE
Secure the hood in the fully closed position or the fully open position prior to starting the engine. Operating the machine with the hood partially open can cause the exhaust to damage hood components. Do not allow water to enter the DPF. Water will damage the DPF.

Regeneration

Regeneration is the removal of soot from the Diesel Particulate Filter (DPF). The Caterpillar Regeneration System (CRS) is used to regenerate the DPF. The DPF traps both soot and ash. The ash is removed through a cleaning process. Refer to Operation and Maintenance Manual, “Diesel Particulate Filter - Clean/Replace” 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 Button

Force Regeneration – Press in the button for 2 seconds in order to begin regeneration.

Disable Regeneration – Press in the button for 2 seconds in order to disable 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 button, press and hold the disable regeneration button for 2 seconds to reinitiate the disable regeneration.

Soot Level Monitoring

Illustration 106 g02228033

The soot level monitor indicates the level of soot that has accumulated within the DPF. The five marks on the monitor represent a percentage of soot within the DPF. The first mark indicates 0% soot level. The second mark indicates 25% soot level. The middle mark indicates 50% soot level. The fourth mark indicates 75% soot level. The last mark indicates 100% soot level. The soot level monitor can be used to optimize DPF regenerations based upon the work cycle of your machine. If machine conditions do not allow for an automatic regeneration, a manual regeneration should be performed before the soot level gauge indicates 100%.

Modes of Regeneration

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

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

Regeneration System Warning Indicators

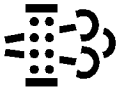

Illustration 107 g02117258

Indicator will illuminate when DPF soot load is greater than 90%

Regeneration should be performed as soon as possible. Machine operation may not allow an automatic regeneration to take place. A manual regeneration should be performed as soon as possible.

Indicator will turn off once DPF regeneration has started.

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

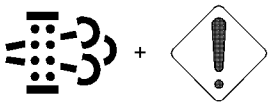

Illustration 108 g02117259

If the amount of soot collected in the DPF has reached a level that a regeneration is **required**, the DPF indicator and an action lamp will illuminate. Stop the machine and apply the parking brake. With the engine at low idle, initiate a manual regeneration. Engine power will be slightly derated if the machine continues to operate.

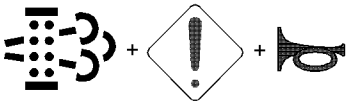

Illustration 109 g02117261

When DPF soot load percent reaches 116%, the application will use the timer from Core Engine. When the timer reaches the high soot load idle down time (compile-time config: default 5 minutes), the engine will limit engine speed to a compile time configurable parameter or low idle.

After a certain period, if no action is taken to regenerate an action alarm will activate. After 5 minutes with the action alarm active, the engine will automatically be taken to low idle.

A manual regeneration is required at this time. A complete regeneration will unlock the forced low idle speed. Cycling the engine start switch key will unlock the forced low idle speed.

When DPF soot load percent reaches 116% plus 10 mins, Core Engine will activate the Particulate Trap Active Regeneration Inhibited Due to Temporary System Lockout event E992-3 or SAE 3714-31. If the application is configured to do Hard Shutdown on Temporary System Lockout event, when the Temporary System Lockout event becomes active E992-3 or SAE 3714-31, a SINGLE HARD SHUTDOWN of the engine should be initiated, if the machine is NOT Working.

If an operator is present and restarts the machine, the existing lights and derate strategies apply. At the point of restart the operator will have a DPF Lamp, Check Engine Lamp, Audible Alarm, and a 100% Engine Derate. If the operator chooses to continue operation and not troubleshoot the system, he will eventually reach 140% soot loading at which point the below rolling shutdown strategy will be invoked. If the application is configured not to do Hard Shutdown, when the Temporary System Lockout event becomes active E992-3 or SAE 3714-31, depending on the service tool configuration on "High Soot Load Aftertreatment Protection Shutdown Configuration" following actions will take place.

If High Soot Load Aftertreatment Protection Shutdown Configuration is configured to Temporary System Lockout,invoke the below rolling shutdown strategy with the event E992-3 or SAE 3714-31.

If High Soot Load Aftertreatment Protection Shutdown Configuration is configured to Permanent System Lockout invoke the below rolling shutdown strategy ONLY with the event E991-3 or SAE 3715-31 otherwise, continue the idle down strategy and allow for service tool regen.

Once the engine has been in the forced low idle strategy for approximately 10 minutes, regeneration will be locked out. At this time, a regeneration can only be done through Caterpillar Electronic Technician (ET), by an authorized Cat dealer.

Rolling Shutdown Strategy

When DPF soot load percent reaches 140%, Core Engine will activate the ARD Permanent Disable event E991-3. When ARD Permanent Disable event becomes active, engine speed will be limited to low idle for the high soot load time (compile-time config: default 30 seconds) prior to the engine shutting down. The engine will be allowed to restart indefinitely for the high soot load time until the DPF is replaced and the event is cleared.

Engine speed will be limited to the high soot load speed limit (compile-time config: default 1500 rpm) during the restarts to encourage the operator to have the machine/engine serviced.

The initial idle down (low idle) is to ensure a safe machine/engine prior to the first shutdown. The restart speed limit is to allow the machine/engine to be moved yet not allow the machine/engine to reach an unsafe speed/condition. Latch for shutdown.

If high soot load shutdown feature is configured to latch shutdown, the shutdown will be latched until power-cycle. High Soot Load Shutdown cannot be programmed to OFF thru service tool. Requested high soot load idle engine speed Once High Soot Load Idle Down HSLID conditions are met, PID (4D01654) will be updated with the requested HSLID speed.

After a certain amount of time, the engine will automatically shut down. The engine can be restarted but will only run for 30 seconds before shutting down again.

Finally, if the engine is still allowed to run through multiple forced engine shutdowns, all types of regenerations are locked out. The DPF must be replaced. Consult your local Cat dealer if the DPF needs to be replaced.

Key Off Regeneration

The use of the Key Off Regeneration feature and the Delayed Engine Shutdown feature allows the engine to run for a time when the engine start switch is turned to the OFF position. The key may be removed.

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

⚠ WARNING

Leaving the machine unattended when the engine is running may result in personal injury or death. Before leaving the machine operator station, neutralize the transmission, apply the parking brake, lower work tools to the ground, and deactivate all work tools.

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

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

Key off regeneration allows for regeneration when the engine start switch key has been removed. To begin a key off regeneration, the soot level must be between 15% and 100% on the soot level monitor and/or a regeneration is in progress. The following steps outline the procedure of a key off regeneration:

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

2. The engine will continue to run for 15 seconds. During this 15 second interval, if a regeneration is desired, press and hold the force regeneration button for 2 seconds.

Note: If a regeneration is not desired, the machine will initiate the delayed engine shutdown.

3. The key off regeneration will activate and the key off regeneration will last for up to 15 minutes.

Note: If at anytime the regeneration needs to be stopped, press and hold the disable regeneration button.

4. Once the key off regeneration is complete, the machine will initiate the delayed engine shutdown.

5. The delayed engine shutdown will last for 5 minutes.

6. After the delayed engine shutdown has been completed, the engine will shut down.

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 transmission, apply the parking brake, lower work tools to the ground, and deactivate all work tools.

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.

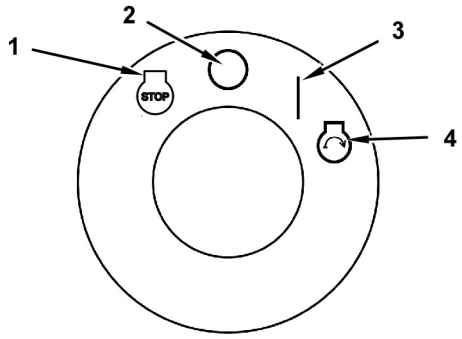

Illustration 110 g02110334

Ignition Keyswitch

(1) Engine Forced Shut down -Stop
(2) Off
(3) On
(4) Start

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.

i04770096

Service Brake Control

SMCS Code: 4251; 4265; 4269; 4800

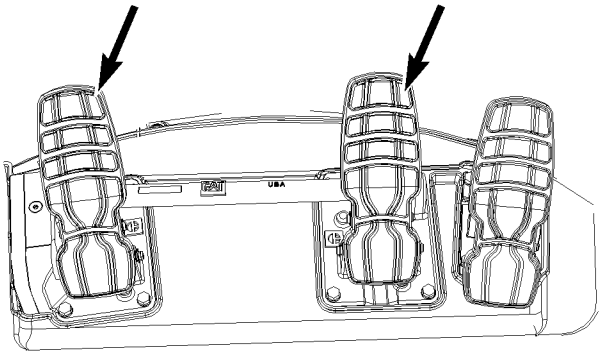

Illustration 111 g02193033

Right Service Brake Pedal

The right service brake pedal is used for conventional braking.

Left Brake Pedal

The left service brake pedal provides three braking functions:

- Automatic Downshifting of the Transmission
- Neutralization of the Transmission
- Braking

The left service brake pedal is used for automatic downshifting and neutralization of the transmission for all transmission shift modes. The automatic downshifting and the neutralizing of the transmission saves wear on the service brakes, axles, and components of the power train.

Use the left brake pedal for most conditions when adequate traction is available.

Left Brake Pedal Operation

The functions of the left brake pedal depend on the position of the left brake pedal and on the position of the transmission shift mode.

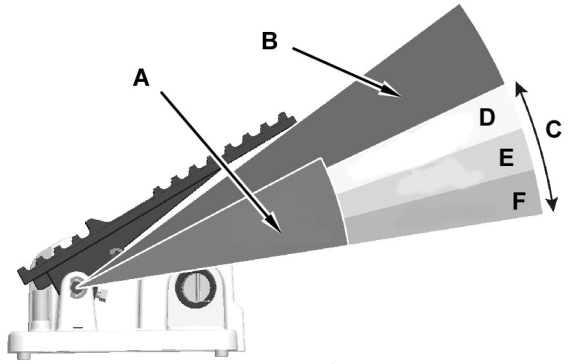

Illustration 112 g01443500

(A) Brake Application
(B) Logic for Downshift
(C) Transmission Neutralizer
(D) Level Operation Mode
(E) Moderate Operation Mode
(F) Aggressive Operation Mode

Initial travel of the left brake pedal will cause the transmission to downshift. The transmission will downshift until 2nd gear is reached. Each downshift of the transmission will reduce the speed of the machine. The transmission will downshift at higher speeds than the normal automatic downshift speeds. The transmission will only downshift if an engine overspeed will not occur. The transmission will not upshift until the left brake pedal is released.

The transmission will be neutralized when the pedal is depressed into Transmission Neutralizer (C) on Illustration 112 unless the transmission neutralizer is disabled. The start of neutralization will depend on the setting of the transmission Neutralizer Button. The transmission will be engaged again after the left brake pedal is released 4 degrees from the maximum pedal position. The transmission will engage only if the transmission was neutralized. The service brakes will still be applied when the transmission engages. This action will help prevent unwanted movement while the machine is on a slope.

Note: Wait at least one second after the left brake pedal is released for 4 degrees before the pedal is released. This action will allow the transmission to engage fully.

Depressing the left pedal will neutralize the transmission again.

When the left brake pedal is fully released, the transmission will return to normal operation. The transmission will remain in the current speed if the transmission mode is set in MANUAL.

Note: Refer to the Operation and Maintenance Manual, “Monitoring System” for more information. Consult your Cat dealer for more information about the operation of the left brake pedal.

i03863275

Battery Disconnect Switch

SMCS Code: 1411

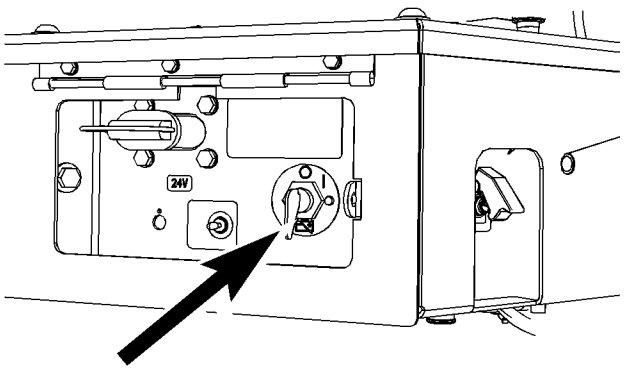

Illustration 113 g02131563

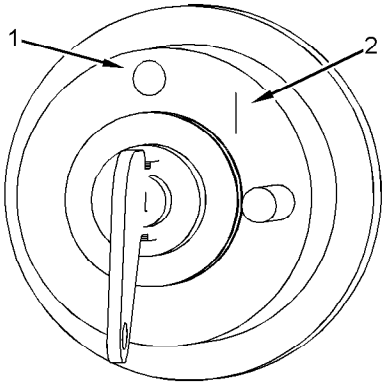

Illustration 114 g01099181

The battery disconnect switch is located on the left side of the machine.

Disconnect Switch OFF (1) – To deactivate the electrical system, turn the battery disconnect switch key counterclockwise to the OFF position.

Disconnect Switch ON (2) – To activate the electrical system, insert the battery disconnect switch key and turn the key clockwise. The key for the battery disconnect switch must be turned to the ON position before you start the engine.

The battery disconnect switch and the engine start switch perform different functions. The entire electrical system is disabled when you turn the battery disconnect switch to the OFF position. The battery remains connected to the electrical system when you turn the engine start switch to the OFF position.

Turn the battery disconnect switch to the OFF position and remove the key when you service the electrical system or any other machine components.

NOTICE
Never move the battery disconnect switch to the OFF position while the engine is operating. Serious damage to the electrical system could result.

To ensure that no damage to the engine occurs, verify that the engine is fully operational before cranking the engine. Do not crank an engine that is not fully operational.

Perform the following procedure in order to check the battery disconnect switch for proper operation:

1. With the battery disconnect switch in the ON position, verify that electrical components in the operator compartment are functioning. Verify that the hour meter is displaying information. Verify that the engine will crank.
2. Turn the battery disconnect switch to the OFF position.
3. Verify that the following items are not functioning: electrical components in the operator compartment, hour meter and engine cranking. If any of the items continue to function with the battery disconnect switch in the OFF position, consult your Caterpillar dealer.

i03886609

Backup Alarm

SMCS Code: 7406

Backup Alarm – The backup alarm is located on the rear of the machine next to the radiator.

The alarm will sound when the transmission direction control switch is in the REVERSE position. The backup alarm is used to alert people behind the machine when the machine is backing up.

i04923120

Monitoring System

SMCS Code: 7451; 7490

Monitoring System Display

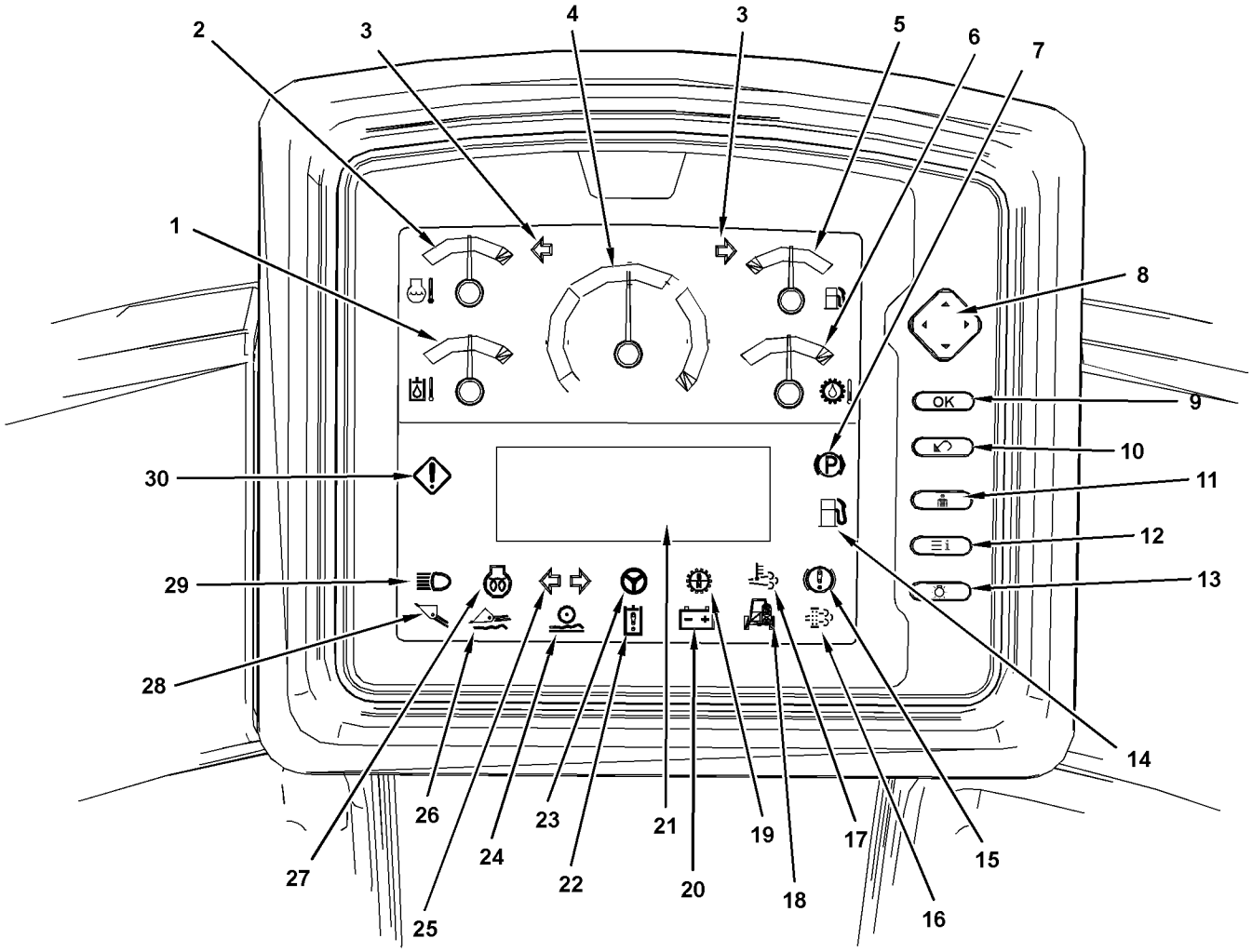

Illustration 115 g02096156

(1) Hydraulic Oil Temperature
(2) Engine Coolant Temperature
(3) Left and Right Turn Signals/Hazards (If Equipped)
(4) Engine RPM
(5) Fuel Level
(6) Transmission Oil Temperature
(7) Parking Brake
(8) Four Way Navigation
(9) OK/Select
(10) Back/Previous
(11) Operator Menu
(12) Main Menu
(13) Backlight
(14) Low Fuel Level
(15) Brake Warning
(16) Diesel Particulate Filter Regeneration Status
(17) High Exhaust System Temperature
(18) MSS Enabled (If Equipped)
(19) Transmission Neutralizer Disabled
(20) Charging System
(21) Display Screen (Refer to “Monitoring System Display”)
(22) Implement Lockout
(23) Secondary Steering
(24) Ride Control Status
(25) Bucket Turn Status/Hazard Lights (If Equipped)
(26) Lift Linkage Float
(27) Starting Aid Status (If Equipped)
(28) Autodig Status (If Equipped) (Refer to Aggregate Autodig)
(29) High Beam Lights
(30) Action Lamp (Refer to “Warning Categories”

Operation

The monitoring system displays the machine functions on the LCD screen of the monitoring system display. The monitoring system display receives information from many sources on the machine. The monitoring system display is located in the front operator console.

Power Up

The Caterpillar Monitoring System will perform a powerup sequence self test during engine start-up. The powerup sequence will include a functional test of the system. The alert indicators will come on for 3 seconds in order to verify the system. The action alarm will sound until the end of the self test or until the engine is started.

Functional Test

The Cat Monitoring System performs an automatic internal test when the machine is activated. Turning the engine start switch from the OFF position to the ON position will activate the test.

The test verifies proper operation of the outputs (displays, indicator lamps, and audible alarms).

The internal circuits are automatically checked.

The operator must observe the outputs in order to determine whether the displays are operating properly. The length of time for the test is approximately 3 seconds.

During this test, the alert indicators flash. The display window shows the CAT logo.

The tachometer needle and the needles on each gauge sweep to the right and to the left. The needles then go to the final position.

- The gear/direction readout shows an asterisk.
- The audible alarm sounds once.

At start-up, the system will display the fluid levels for the engine oil, coolant, and the fuel filter water separator.

The display starts the Normal Mode of operation. The display may scroll through the modes if the service input and the clear input are grounded or the operator switch input is grounded.

Gauges

Hydraulic Oil Temperature (1) – This gauge displays the hydraulic oil temperature.

Engine Coolant Temperature (2) – This gauge displays the engine coolant temperature.

Engine RPM (4) – This gauge displays the engine speed.

Fuel Level (5) – This gauge displays the fuel level.

Transmission Oil Temperature (6) – This gauge displays the transmission oil temperature.

Indicators

Left Turn Signal/Hazards (If Equipped) (3) – This indicator illuminates when the left turn signal is activated or the hazard lights are activated.

Right Turn Signal/Hazards (If Equipped) (3) – This indicator illuminates when the right turn signal is activated or the hazard lights are activated.

Parking Brake (7) – This indicator illuminates when the parking brake is engaged. The indicator should flash during start-up.

Low Fuel Level (14) – This indicator illuminates when the machine is low on fuel. Refuel the machine as soon as possible.

Brake Warning (15) – This indicator illuminates when there is a problem with the braking system.

Diesel Particulate Filter (DPF) Regeneration Status (16) – This indicator illuminates when the DPF is in a regeneration cycle.

High Exhaust System Temperature (17) – This indicator will illuminate when the ARD is active during a regeneration. The high exhaust temperature indicator will deactivate after regeneration is completed or the regeneration has been disabled.

Refer to the Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration System” for information about the emissions status.

Machine Security System Enable (If Equipped) (18) – This indicator illuminates when the machine security system is activated.

Transmission Neutralizer Disable (19) – This indicator illuminates when the transmission neutralizer is disabled.

Charging System (20) – This indicator illuminates when there is a problem with the battery charging system.

Implement Lockout (22) – This indicator illuminates when the implement lockout is set. When the lockout is set, the lift, tilt, and auxiliary functions, cannot be moved with the Implement Controls.

Secondary Steering (23) – This indicator illuminates amber when the secondary steering is functioning.

Ride Control (24) – This indicator illuminates green when the ride control is actively dampening the ride.

Bucket Turn Status/Hazard Lights (If Equipped) (25) – This indicator illuminates when the bucket turn signals are activated or when the hazard lights are activated.

Lift Linkage Float (26) – This indicator illuminates when the implement float is activated.

Engine Starting Aid Status (If Equipped) (27) – This indicator illuminates when an engine starting aid is activated. This indicator illuminates when the glow plugs activate or the ether solenoid is activated.

Autodig Status (If Equipped) (28) – This indicator illuminates when the autodig system is active.

Reference: Refer to Operation and Maintenance Manual, “Aggregate Autodig” for more detailed information.

High Beam Lights (29) – This indicator illuminates when the high beams are on.

Action Lamp (30) – This indicator illuminates when a fault has been detected by the monitoring system.

Warning Categories

The Caterpillar Monitoring System provides three warning categories. The first category requires only operator awareness. The second warning category requires an operator response. The third warning category requires immediate shutdown of the machine.

If the monitoring system detects an abnormal operating condition, the operator will be notified.

Refer to Table 16 for the status of the alarm and the action lamp indicator for each warning level.

The action lamp (30) will illuminate when a warning is active. The action lamp will flash red for warning level notifications.

Table 16

WARNING OPERATION				
	Warning Indications			
Warning Level	Red Action Indicator	Action Alarm	Required Operator Action	Possible Result (1)
1	OFF	OFF	No immediate action is required. The system needs attention soon.	No harmful or damaging effects.
2	ON	OFF	Change machine operation or perform maintenance to the system.	Damage to system components.
2s	Flash ON and OFF	ON (steady)		
3	Flash ON and OFF	Pulse ON and OFF	Immediately perform a safe engine shutdown.	Injury to the operator or severe damage to components.

(1) Result if no action is taken by the operator.

Recommended action to be taken by the machine operator in response to the different warning levels:

Level 1 – This warning level will cause the involved system alert indicator to illuminate. A level 1 warning will indicate that the operator should be aware of a condition of the machine systems.

Level 2 – This warning level will indicate that the operation of the machine should be changed or maintenance should be performed. Possible damage to components on the machine may occur.

Level 3 – This warning level will indicate that the machine needs to have an immediate, safe emergency shutdown. Possible injury to the operator or severe damage to components may occur.

When a level 3 warning is active, the action alarm will sound a pulsing tone. The action alarm will sound these tones in order to alert the machine operator that immediate action is required. If two warnings of a different level are active at the same time, the highest level warning will be displayed.

If a warning occurs, the message will override any screen that is displayed on the monitoring system display.

Monitoring System Display

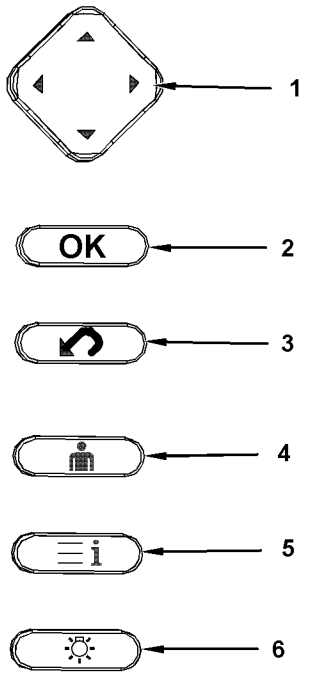

Illustration 116 g02109873

Control Buttons

(1) Four Way Navigation
(2) OK/Select
(3) Back/Previous
(4) Operator Menu
(5) Main Menu
(6) Backlight

(1) Four Way Navigation – This button is used for the following purposes: navigation, data information and a decrease in a setting value or an increase in a setting value.

(2) OK/Select – This button selects the currently highlighted menu option. The “OK/Select” button also acknowledges any Level 1, Level 2, or Level 3 diagnostic message on the display screen.

(3) Back/Previous – This button is used in order to return to the previous screen.

(4) Operator Menu – This button is used in order to return to the operator menu.

(5) Main Menu – This button is used in order to display the main menu. Press the Information button twice in order to return to the performance menu.

(6) Backlight – This button is used in order to adjust the light on the display area. Press the button and hold the button in order to adjust the backlight intensity with the left arrow key and the right arrow key. Press the back light button again while in backlight adjust mode in order to adjust the contrast.

The operator display and cab lights will change the backlight mode based on the external lighting status. When any of the headlights, marker lights, work lights, or long-distance lights are on, the display and cab lights will enter night mode. When all of these lights are off, the display and cab lights will change to day mode.

Key On

When the ignition key switch is turned to the ON position, the Cat Monitoring System will perform a power-up sequence self test. The power-up sequence will include a functional test of the system. The alert indicators will come on for 3 seconds in order to verify the system. The action alarm will sound until the end of the self test or until the engine is started.

The system will display the status for the engine oil, coolant, and the fuel filter water separator. The monitoring system display will show each compartment with either an “OK” or “CHECK” .

Note: Status is only available at key on, the check is disabled if the machine is immediately started.

Start Up

At machine start-up, the first preliminary screen will ask the operator to choose between a previously stored operator profile and the default settings. Press the “Four Way Navigation” button in order to move through the list of saved profiles. Press the “OK/Select” button within 15 seconds after start-up in order to accept the highlighted profile.

A second popup screen appears when active warnings are reported to the monitoring system. When warning information appears on the screen, the operator must acknowledge the warning message by pressing the “OK/Select” button. The monitoring system display will scroll through all of the warning messages that are generated by active warnings. The warning messages are not cleared from system memory by pressing the “OK/Select” button. The message may reoccur after a time according to the severity of the warning information.

After all of the screens with warning messages are acknowledged, the first performance monitor screen will appear. This screen will show a bar graph of the DPF soot level. This screen is the default screen.

Press the down arrow on the Four Way Navigation button in order to display other screens in the performance monitor. On the last screen, pressing the down arrow again will return the display to the first screen. Press the up arrow on the first screen, and the display will go to the last screen.

The following are topics displayed on the subsequent screens:

- Regeneration Status
- Total Operating Hours
- Engine Oil Pressure
- Battery Voltage
- Engine Coolant Temperature
- Hydraulic Oil Temperature
- Transmission Oil Temperature
- Fuel Remaining
- Average Fuel Rate
- Bucket Weight (If PCS Equipped)
- Truck Weight (Loaded or Remaining) (If PCS Equipped)

Refer to the Operation and Maintenance Manual, “Payload Control System (PCS)” for more information about Bucket Weight and Truck Weight.

Main Menu

The Main Menu can be displayed from any screen by pressing the “Main Menu” button. The Main Menu will display the following items:

- Settings
- Totals
- Service

- Machine Status
- Operator
- Configuration

The menu structure for Monitoring System Display is arranged in a stair step format. When the operator selects an option from a menu, the next screen is one level down from that selection. More selections or options may be available from that screen. There may be more information or options to be displayed from any level.

Use the “Four Way Navigation” button in order to highlight the desired selection. Navigate through the menus and submenus. Press the “OK/Select” button in order to select an option. Use the “Four Way Navigation” button in order to highlight a mode or parameter setting. Press the “OK/Select” button in order to select that option.

Settings Menu

The Settings menu allows the user to adjust the parameters for the following settings:

- Payload
- Work Tool
- Display
- Machine
- Engine
- Implement

Operating conditions, preferences of the operator, requirements for efficient operation inform the operator that adjustments to the parameters are needed. The setup of the machine determines the display of the available parameters. The attachments on the machine determine the available options.

The “Settings” menu option is entered by selecting “Settings” from the main menu. Press the “Four Way Navigation” button until “Settings” is highlighted. Press the “OK/Select” button.

Note: Press the main menu button in order to display the “Main Menu” .

In order to adjust the associated parameters, press the “Four Way Navigation” button until the desired category is highlighted. Press the “OK/Select” button in order to access the parameters in that category. Follow the screen prompts in order to adjust to the available parameters.

Payload Control System (PCS) (If Equipped)

The following is only a brief description of the menu items. Refer to the Operation and Maintenance Manual, “Payload Control System (PCS)” for more information about PCS.

Truck ID – This option allows the Operator to select a Truck ID from a list of predefined Truck IDs. For information about modifying the Truck ID list see the VIMSpc manual. VIMSpc must be used to modify the Truck ID list. The Truck ID list contains the following information about trucks: Truck Name, Truck Type, Truck Model and Truck Target weight. Only Truck Name and Truck Target Weight are displayed in the Monitoring System Display. The Truck ID is recorded in the system when the truck is loaded and the store button is pressed. The truck ID is also printed on the tickets if the optional printer is used.

Truck Target Weight – This option allows the operator to enter the target payload weight for the next truck to be loaded. The truck payload target weight feature displays the amount of material that should be loaded onto the current truck. Press the OK/Select button in order to change this value.

Material ID – This option allows the operator to select a Material ID from a previously defined list of Material IDs after a truck is loaded. VIMSpc must be used to modify the list of Material IDs. For information on modifying the Material ID list see the VIMSpc manual. The Material ID is recorded in the system when a truck is loaded and the store button is pressed. The identification of material is also printed on the tickets if the optional printer is used.

Loader ID – This option allows the operator to enter the loader identification number. The loader Identification number is an operator entered number used to stamp printer tickets and data saved for use in VIMSpc to track machine productivity.

Count Mode – This option allows the operator to select “Count Up” or “Count Down” mode in PCS. Count Up mode starts with the PCS truck weight at zero and adds each bucket weight to the total truck weight. With PCS set to Count Down mode the operator enters the desired truck target weight in the Monitoring System Display or uploaded with VIMSpc. PCS subtracts the weight of each bucket from the truck target weight. If the target weight of the truck is set to zero, the remaining weight will start at zero. The remaining weight will be more negative with each additional bucket weight.

Printer Tickets – This option allows the operator to turn the printer ticket feature ON or OFF. The operator defines the number of tickets to print from the PCS printer. An optional printer is required to print tickets. The printer tickets feature configures the number of tickets to print when the store button is pressed. When this feature is turned OFF, no printer tickets will be printed when the store button is pushed.

Start of Weigh – This option allows the operator to adjust starting point of the payload weigh range. The start of weigh, is the percent of lift arm position where PCS starts weighing the material. The lift arm % is the percentage with respect to the ground and maximum lift angle. The default setting for start of weigh is 50%. Adjusting the start of weigh allows customization of the weigh range for a particular application. Unless standard procedures for machine operation require raising or lowering the weigh range, the start of weigh value should be left unchanged. The start of weigh cannot be set lower than 20%. The start of weigh cannot be set higher than 75%.

Work Tool (If Equipped)

Active Tool – This option shows the number of the work tool that is currently activated.

3rd Fn Mod Factor – The 3rd Function Modulation Scale Factor allows the operator to reduce the maximum command to the 3rd function valve to provide better control to lower flow tools.

4th Fn Mod Factor – The 4th Function Modulation Scale Factor allows the operator to reduce the maximum command to the 4th function valve to provide better control to lower flow tools.

Imp Modulation – The Implement Modulation Mode allows the operator to select between “Normal” or “Fine” modulation mode. When Fine is selected, more precise and slower control of the work tool will occur.

3rd Fn Detent Mode – The 3rd Function Detent Mode allows the operator to set the operation of the 3rd function detent. The detent can be set to OFF or CONTINUOUS . When Continuous is selected, the valve will provide continuous oil flow to the work tool when in the detent position.

Display

Language – This option allows the operator to select the desired language for the Monitoring System Display.

Units – This option allows the operator to select the desired units for the Monitoring System Display. Select one of the following units: Metric and English.

Bklight Night – Select this option in order to adjust the backlighting of the display when the machine lights are ON. This setting drives the back lighting for the soft keys and the indicator brightness. Visibility of the information is improved. The display provides a bar graph for the adjustment.

Bklight Day – This option allows the operator to adjust the backlighting of the display when the machine lights are OFF. This setting drives the back lighting for the soft keys and the indicator brightness. Visibility of the information is improved. The display provides a bar graph for the adjustment.

Contrast – Select this option in order to adjust the contrast of the display. The display provides a bar graph for the adjustment.

Machine

Rd Ctrl Fwd Act Spd – The option allows the operator to view and change the forward activation speed for the ride control system.

Rd Ctrl Rev Act Spd – The option allows the operator to view and change the reverse activation speed for the ride control system.

Sec Steer Test – The option allows the operator to check the secondary steering system.

VSC – This option allows the operator to “ENABLE” or “DISABLE” the Variable Shift Control. The “ENABLE” setting is more fuel efficient and shifts at lower engine speeds. The “DISABLE” setting shifts at higher engine speeds, is less fuel efficient, and may improve performance/cycle times in certain applications.

FMS – The Fuel Management System (FMS) if, ON, provides lower fuel consumption rates. This function provides the same or better efficiency in normal applications. In more aggressive applications with short cycle times, tough digging, or climbing steep grades, running with FMS OFF may still provide the best performance.

Autolube Mode (If Equipped) – This option allows the operator to select the Light, Medium, or Heavy setting of the autolube system.

2nd Gear LUC Enable (If Equipped) – The 2nd Gear Lockup Clutch Enable allows the operator to turn the 2nd gear lockup clutch ON or OFF.

Beacon (If Equipped) – The Beacon Installation Status allows the operator to set the beacon as Installed or Not Installed.

LR Wrk Light (If Equipped) – The Long Range Work Lights #1 Installation Status allows the operator to set the long range work lights as Installed or Not Installed.

Engine

Reversing Fan Purge (If Equipped) – This option allows the operator to purge the cooling system manually.

Implement

Raise Snub – The Raise Snubbing Enable allows the operator to “ENABLE” or “DISABLE” the raise snubbing feature. When this feature is Enabled, the snubbing will cushion the cylinder at the end of travel.

Lower Snub – The Lower Snubbing Enable allows the operator to “ENABLE” or “DISABLE” the lower snubbing feature. When this feature is Enabled, the snubbing will cushion the cylinder at the end of travel.

Rack Snub (configuable on 966K and 972K only) – The Rack Snubbing Enable allows the operator to “ENABLE” or “DISABLE” the rack snubbing feature. When this feature is Enabled, the snubbing will cushion the cylinder at the end of travel.

Dump Snub – The Dump Snubbing Enable allows the operator to “ENABLE” or “DISABLE” the dump snubbing feature. When this feature is Enabled, the snubbing will cushion the cylinder at the end of travel.

Fine Modulation – The Fine Modulation Mode allows the operator to turn ON or turn OFF the fine modulation mode. When "ON" is selected, more precise and slower control of the work tool will occur.

Autodig Kickout (If Equipped) – The Autodig Kickout Position allows the operator to set the lift linkage height at the position the linkage will stop when Autodig finishes the loading cycle.

Dump Rate Ctrl – The Dump Rate Control allows the operator to “ENABLE” or “DISABLE” the dump rate control feature. When this feature is enabled, the speed of the bucket is modified to help maintain a constant speed of the bucket while dumping. This feature cannot be disabled on the 966 or 972 if equipped with a high lift linkage.

Dump Stop Snub – The Dump Stop Snubbing Enable allows the operator to “ENABLE” or “DISABLE” the dump stop snubbing feature. When this feature is enabled, the dump command will be disabled when the bucket is against the dump stops and the control lever is held in the dump position, which will reduce the amount the lift cylinder may be retracted because of the dumping motion.

Totals Menu

The “Totals” menu option allows the operator or the service technician to access lists of pertinent data about machine systems. This data is useful in order to determine when service work needs to be performed.

Use the “Four Way Navigation” button and highlight “Totals” from the “Main Menu” . Press the “OK/Select” button.

Use the “Four Way Navigation” button in order to highlight the desired category. Press the “OK/Select” button. The screen displays the first page of the “Totals” information for the selected category. Use the “Totals” information in order to view the totals in each of the following categories:

- Trip
- Material (If Equipped)
- Lifetime
- Print Totals (If Equipped)

Trip

The trip totals display the total information since the previous reset of the trip totals. The trip totals can be reset in the display by pressing the OK/Select button. When the OK/Select button is pressed, all the Trip Totals will be reset in the display.

Total Op Hrs – The Total Operating Hours displays the number of hours that the machine has been operating, since the last trip reset.

Mach Idle Time – The Machine Idle Time displays the number of hours that the machine has been operating under 1100 rpm, since the last trip reset.

Odometer – The Odometer displays the distance that the machine has driven in forward/reverse gear, since the last trip reset.

Fuel Consume – The Total Fuel Consumed display the total fuel used by the engine, since the last trip reset.

Avg Fuel Rate – The Average Fuel Consumption Rate display the average fuel used by the engine per hour, since the last trip reset.

Idle Fuel – The Total Idle Fuel displays the total fuel used by the engine when operating under 1100 RPM, since the last trip reset.

Tot Pyld Wt (If Equipped) – The Total Payload Weight displays the total of all the truck weights that have been stored by the operator since the last trip reset.

Load Count (If Equipped) – The PCS Total Load Count displays the total number of trucks loaded that have been stored by the operator since the last trip reset.

Pass Count (If Equipped) – The PCS Total Pass Count displays the number of buckets that were loaded based on the number of truck loads that have been stored, since the last trip reset.

Mc Ld Tr Hs (If Equipped) – The PCS Machine Loaded Travel Hrs records the time from the loading of the first bucket until the store button is pressed for each load. The machine loaded travel hours represents the total sum of this time for all loads, since the last trip reset.

Material (If Equipped)

The PCS material totals display the total information for each material that has been loaded. Use of the store button is required for material totals to accumulate. The total displayed for each material is the total value accumulated since the last reset. The material totals can be reset by pressing the OK/Select button. The operator must select a material from the material ID list in order for material totals to accumulate accurately.

Lifetime

The lifetime totals display the total information over the life of the machine.

Fuel Consumed – The Total Fuel Consumed displays the machine total fuel usage for the life of the machine.

Total Eng Fuel – The Total Engine Fuel displays the total fuel used by the engine for the life of the machine.

Idle Fuel – The Total Idle Fuel displays the machines consumption of fuel when running under 1100 RPM for the life of the machine.

Engine Idle Time – Displays the machine idle time, when running under 1100 rpm for the life of the machine.

Total Op Hrs – The Total Operating Hours displays the number of hours that the machine has been operating for the life of the machine.

Neut Gear Op Hrs – The Neutral Gear Operating Hours displays the number of hours that the machine has been operating in neutral for the life of the machine.

HydOilFltBypHrs – The Total Hydraulic Oil Filter Bypass Hours displays the number of hours that the hydraulic oil filter is bypassed for the life of the machine.

Odometer – Displays the distance that the machine has driven in forward/reverse gear for the life of the machine.

Tot Pyld Wt (if equipped) – The Total Payload Weight displays the total of all the truck weights that have been stored by the operator for the life of the machine.

Load Count (if equipped) – The PCS Total Load Count displays the total number of trucks loaded that have been stored by the operator for the life of the machine.

Pass Count (if equipped) – The PCS Total Pass Count displays the number of buckets that were loaded onto trucks that have been stored for the life of the machine.

Mc Ld Tr Hrs (if equipped) – The PCS Machine Loaded Travel Hrs records the time from the loading of the first bucket until the store button is pressed for each load. The machine loaded travel hours represents the total sum of this time for all loads, for the life of the machine.

Print Totals (If Equipped)

The print totals allows additional tickets to be printed with the optional PCS printer.

Print Additional Ticket – This option will print an additional ticket for the last truck that was loaded.

Print Truck Report – This option will print information about each truck load stored in memory. Refer to this Operation and Maintenance Manual, “Payload Control System (PCS)” section for more details.

Print Material Report – This option will print the material totals. Refer to this Operation and Maintenance Manual, “Payload Control System (PCS)” section for more details.

Service Menu

The “Service” menu option displays information about the systems and provides access to some service procedures. Some screens in the Service Menu are password protected for the service technician.

Consult your Cat dealer for information about the service menu options.

The Service Menu contains the following categories:

Diagnostics – Displays codes and events that have occurred on the machine.

Service Modes – The service modes available on the machine vary depending on installed systems.

Calibrations – The calibration procedures available on the machine vary depending on installed systems.

ECM Summary – Displays a list of all the electronic control modules along with the associated ECM and software part numbers that are on the machine.

Machine Status

The “Machine Status” menu option allows the operator or the technician to perform the real-time monitoring of electrical components in the major systems.

From the Main Menu use the “Four Way Navigation” button in order to highlight the “Machine Status” . Press the “OK/Select” button in order to access the menu for “Machine Status” . This menu organizes the systems into the following categories:

- Engine
- Transmission
- Implement
- Steering
- Brake/Axle
- Cab

- Payload (If Equipped)
- Autolube (If Equipped)

Engine

Eng Speed – Displays actual engine speed.

Desired Eng Speed – Displays the desired engine speed.

Fuel Rate – Displays the amount of fuel the engine is currently using.

Fuel Temperature – Displays the fuel temperature.

Eng Coolant Temp – Displays the engine coolant temperature.

Eng Charge Air Temp – Displays the engine charge air cooler #1 outlet temperature.

Eng Air Inlet Temp – Displays the engine air inlet temperature.

Eng Oil Press – Display the engine oil pressure.

Boost Press – Displays the boost pressure

Air Filter Restriction – Display the current air filter restriction value.

Peak Air Fltr Restriction – Display the current peak air filter restriction value.

Eng Load Factor – Displays the load factor on the engine.

Eng Power Derate – Displays the engine power derate percentage.

Eng Shutdown Sw Status – The ground level shutdown status displays if the engine shutdown switch is ON or OFF position.

MSS Immobilizer Status (If Equipped) – The security system immobilizer status displays if the Machine Security System (MSS) is Installed or Not Installed.

DPF 1 Soot – The Diesel Particulate Filter (DPF) 1 Soot Load displays the current soot load of the DPF.

Transmission

Actual Gear – Displays the current gear of the transmission.

Dir Selector #1 Pos (If Equipped) – Direction Selector #1 Position displays the position of the FNR switch on the left-hand steering device.

Shift Lever Pos (If Equipped) – Shift lever position displays the position of the FNR switch on the steering wheel shift lever.

Dir Selector #2 Pos (If Equipped) – Direction selector #2 position displays the position of the remote FNR switch.

Upshift Switch – Displays if the transmission upshift switch is Released or Depressed.

Downshift Switch – Displays if the transmission downshift switch is Released or Depressed.

Trans Switch – Displays the setting of the Auto/ Manual Transmission Select button.

L Brake Pedal – Displays the Left Brake Pedal position.

Trans Override (If Equipped) – Displays the Transmission Override status.

Ground Speed – Displays the ground speed of the machine.

Trans Out Speed #1 – Display the rpm of the Transmission Output Speed Sensor #1.

Trans Out Speed #2 – Displays the rpm of the Transmission Output Speed Sensor #2.

Var Shift Ctrl – Displays the current setting of the Variable Shift Control.

Torque Conv Temp – Displays the temperature of the transmission oil at the torque converter oil outlet.

Trans Oil Temp – Displays the temperature of the transmission oil at the transmission controls oil inlet.

TC Output Torque – Displays the calculated torque output of the torque converter.

Implement

Impl Lockout Switch – Displays the status Implement Hydraulic Lockout Switch position, showing Locked or Not Locked.

Impl Pilot Supply Sol – Displays status of the Implement Pilot Supply Solenoid.

Impl Lift Kickout Mode – Displays the Implement Raise and Lower Kickouts status as Enabled or Disabled

Impl Tilt Kickout Mode – Displays the Implement Rackback and Dump Kickouts status as Enabled or Disabled.

Lift Lever Position – Displays the position of the lift lever.

Tilt Lever Position – Displays the position of the tilt lever.

3rd Lever Position (If Equipped) – Displays the position of the third function lever.

4th Lever Position (If Equipped) – Displays the position of the fourth function lever.

Hydraulic Oil Temp – Displays the Hydraulic Oil Temperature.

Hyd Filter Bypass Status – Displays the Hydraulic Filter status as bypassing or filtering.

Ride Ctrl Sys Mode – Displays the Ride Control System status as OFF, in Automatic or in Service Mode.

Ride Control Status – Displays if the Ride Control System is currently Active or Inactive.

Ride Ctrl Head Sol – Displays if the Ride Control Head End Valve Solenoid is ON or OFF.

Ride Ctrl Balance Sol – Displays if the Ride Control Balance Spool Solenoid is ON or OFF.

Ride Ctrl Rod Sol – Displays if the Ride Control Rod End Check Valve Solenoid is ON or OFF.

Raise Solenoid – Displays the current sent to the Raise Solenoid.

Lower Solenoid – Displays the current sent to the Lower Solenoid.

Rackback Solenoid – Displays the current sent to the Rackback Solenoid.

Dump Solenoid – Displays the current sent to the Dump Solenoid.

3rd Fn Rearward Sol (If Equipped) – Displays the current sent to the Third Function Rearward Solenoid.

3rd Fn Forward Sol (If Equipped) – Displays the current sent to the Third Function Forward Solenoid.

4th Fn Rearward Sol (If Equipped) – Displays the current sent to the Fourth Function Rearward Solenoid.

4th Fn Forward Sol (If Equipped) – Displays the current sent to the Fourth Function Forward Solenoid.

Lift Cylinder Ext – Displays the extension of the lift cylinder.

Tilt Cylinder Ext – Displays the extension of the tilt cylinder.

Lift Cylinder Head Press – Displays the lift cylinder head end pressure.

Lift Cylinder Rod Press – Displays the lift cylinder rod end pressure.

Quick Cplr Engage Sol (If Equipped) – Displays the status of the quick coupler engage solenoid.

Quick Cplr Disengage Sol (If Equipped) – Displays the status of the quick coupler disengage solenoid.

Quick Cplr Enable Sol (If Equipped) – Displays the status of the quick coupler enable solenoid.

Quick Cplr Command (If Equipped) – Displays the status of the Quick Coupler button.

Lower Anti Drift Sol – Displays the status of the Lower Anti Drift Solenoid.

Dump Anti Drift Sol – Displays the status of the Dump Anti Drift Solenoid.

Impl Pump Press (If Equipped) – Displays the Implement Pump Pressure.

Impl Pump Torque Sol (If Equipped) – Displays the Implement Pump Torque Limit Solenoid Current.

Autodig Oper Mode (If Equipped) – Displays the Operating Mode of the Autodig system.

Autodig Dig Mode (If Equipped) – Displays which Autodig Digging Mode is currently set.

Autodig Trigger Sw (If Equipped) – Displays the status of the Autodig Trigger Switch.

Steering

Steer Angle – Displays the articulation angle of the machine.

Lvr/Whl Angle Alignment – Displays the status of the alignment of the steering control to the machine angle.

Rqstd Sec Steer Status – Displays the requested secondary steering status.

Sec Steer Syst Test Status – Displays the status of the secondary steering test.

Prim Steer Disable Sol – Displays the status for the primary steering disable solenoid.

Left Prim Steer Sol – Displays the percent command sent to the left primary steering solenoid.

Right Prim Steer Sol – Displays the percent command sent to the right primary steering solenoid.

Armrest Stowed Status – Displays the status of the Left Hand Armrest in the Stowed position.

Steer Ctrl Pos Snsr #1 – Displays the status of the Steering Control Position Sensor #1.

Steer Ctrl Pos Snsr #2 – Displays the status of the Steering Control Position Sensor #2.

Steer Ctrl Pos Snsr #3 – Displays the status of the Steering Control Position Sensor #3.

Steer Pump Press – Displays the steering pump pressure.

Brake/Axle

Parking Brake Switch – Displays the status of the parking brake switch.

Parking Brk Press – Displays the pressure of the parking brake sensor.

Parking Brake Status – Displays the status of the parking brake.

Parking Brake Sol – Displays the status of the parking brake solenoid.

Brake/Decel Pedal Pos – Displays the left brake pedal position.

Brake Chrg Press #1 – Displays the pressure in the brake accumulators.

Front Axle Oil Temp – Displays the front axle oil temperature.

Rear Axle Oil Temp – Displays the rear axle oil temperature.

Axle Oil Cooler Byp Sol (If Equipped) – Displays the status of the axle oil cooler bypass solenoid.

Cab

Rear Work Light – Displays the status of the rear work lights.

Front Work Light – Displays the status of the front work lights.

Turn Signals (If Equipped) – Displays the status of the turn signals.

High Beams (If Equipped) – Displays the status of the high beams.

Marker Light – Displays the status of the marker lights.

Beacon Status (If Equipped) – Displays the status of the beacon.

Heated Mirror Relay (If Equipped) – Displays the status of the defrost relay for the heated mirrors.

Heated Mirror Time Remain (If Equipped) – Displays the amount of time remaining on the Defroster Timer for the heated mirrors.

Front Wiper Dial Pos – Displays the position of the front wiper dial.

Rear Wiper Dial Pos – Displays the position of the rear wiper dial.

Payload (If Equipped)

Lift Linkage DC – Displays the Lift Linkage Position Sensor Duty Cycle.

Lift Cylinder Pos – Displays the position of the lift linkage in the calibrated range.

Lift Cylinder Head Press – Displays the pressure in the head end of the lift cylinder.

Lift Cylinder Rod Press – Displays the pressure in the rod end of the lift cylinder.

Store Sw Pos – Displays the status of the payload store switch.

Autolube (If Equipped)

Autolube Mode – Displays setting for the Autolube grease interval.

Operation Mode – Displays the current Operating Mode of the Autolube system.

Pump Status – Displays the status of the Autolube Pump.

Reservoir Level – Displays the status of the Autolube tank level.

Operator Menu

From the “Main” menu press the “Four Way Navigation” button until “Operator” is highlighted. Press the “OK/Select” button.

The “Operator” menu is used to set the “Operator Profile” . The “Operator Profile” is a private set of preferences that is identified by a name. Once the “Operator Profile” is created, the operator may associate various items to that profile such as the following components:

1. Display settings

a. Language

b. Units

c. Lights On Backlight (brightness of display with lights on)

d. Lights Off Backlight (brightness of display with lights off)

e. Contrast

2. Machine Settings

a. Variable Shift Control

b. Fuel Management System

After all of the parameters have been adjusted, the operator may then save the parameters for future usage.

At the next start-up the operator will be prompted to select a previously saved profile. Use the “Four Way Navigation” button in order to highlight the desired profile. Press the “OK/Select” button within 15 seconds in order to select that profile.

From the “Operator” menu press the “Four Way Navigation” button until the desired options for the “Operator Profile” are displayed. Press the “OK/Select” button. Select from one of the following menu options:

- Select the profile.
- Edit the profile.
- Create the profile.
- Delete the profile.

Note: Only the settings available in the operator profile will be stored with the profile.

Default

From the “Operator” menu use the “Four Way Navigation” button to highlight the “Default” option. Then press the “OK/Select” button in order to make the default settings active. The default settings are then the active settings and the machine operation will reflect the default settings.

Note: If default is selected, the machine operation and display will reflect the last active machine settings.

Factory

From the “Operator” menu use the “Four Way Navigation” button to highlight the “Factory” option. Then press the “OK/Select” button in order to make the factory settings active. The Factory settings are then the active settings and the machine operation will reflect the Factory settings.

Note: If Factory is selected, the machine operation and display will reflect the original machine settings.

Select Profile

From the “Operator” menu use the “Four Way Navigation” button in order to highlight the “Select Profile” option. Press the “OK/Select” button. Use the “Four Way Navigation” button in order to highlight the desired profile. Press the “OK/Select” button. This procedure activates the selected profile and the associated settings. The machine operation will reflect these settings.

Note: A maximum of 20 profiles may be used. If a profile is not selected, the machine operation will reflect the last machine settings.

Edit Profile

From the “Operator” menu use the “Four Way Navigation” button in order to highlight the “Edit” option. Press the “OK/Select” button. When all of the desired settings have been modified, select “EXIT” and press “OK/Select” in order to save the changes.

Create Profile

From the “Operator” menu use the “Four Way Navigation” button in order to highlight the “Create Profile” option. Press the “OK/Select” button. Follow the screen prompts in order to create a name. Save the new name to the existing list of profiles. Once a profile has been created, the operator can use the settings menu in order to set the operating parameters. The parameters that are changed will be automatically saved to the profile that is being used.

Note: A maximum of 20 profiles may be used. The name of the profile may be five characters long.

Delete Profile

From the “Operator” menu use the “Four Way Navigation” button in order to highlight the “Delete” option. Press the “OK/Select” button in order to display a list of existing profiles. Use the “Four Way Navigation” button in order to highlight the desired profile. Press the “OK/Select” button in order to delete that profile. This procedure deletes the selected profile from the list of stored profiles. This procedure also deletes the settings that are associated with that profile.

Note: The profile must be inactive in order to be deleted.

Configuration

The Configuration menu allows the user to adjust the parameters for the following settings:

- Machine
- Engine
- Implement
- Payload (If Equipped)

The Configuration Menus allow the operator to adjust the machine for operating conditions, user preferences, and requirements for efficient operation. The setup of the machine determines the display of the available parameters. The attachments on the machine determine the available options. The “Configurations” menu option is entered by selecting “Configuration” from the main menu. Press the Four Way Navigation button until Configuration is highlighted. Press the “OK/Select” button.

Note: Press the main menu button in order to display the Main Menu.

In order to adjust the associated parameters, press the Four Way Navigation button until the desired category is highlighted. Press the “OK/Select” button in order to access the parameters in that category.

Follow the screen prompts in order to adjust to the available parameters.

Machine

Auto Rear Wiper – This option allows the operator to ENABLE or DISABLE the automatic rear wiper function. When Enabled, the Automatic Rear Wiper will turn on when the Front Wiper is turned on and the machine is in reverse.

Engine

Idle Shtdn Enable – The Engine Idle Shutdown Enable allows the operator to enable the machine to shut down after idling for a predefined amount of time.

Idle Shtdn Time – Engine Idle Shutdown Delay Time allows the operator to define the amount of time the machine can run at engine idle conditions before shutting down. The Engine Idle Shutdown Enable must be configured as Enabled.

Implement

Raise Kickout – This option allows the operator to ENABLE or DISABLE the raise kickout.

Lower Kickout – This option allows the operator to ENABLE or DISABLE the lower kickout. If the lower kickout is disabled, when the lift lever is moved into the lower (forward) detent position, the float function will be activated and will remain active when the lever is moved back to the HOLD position.

Rack Kickout – This option allows the operator to ENABLE or DISABLE the rackback kickout.

Dump Kickout – This option allows the operator to ENABLE or DISABLE the dump kickout.

Payload (If Equipped)

Auto Truck ID – Allows the operator to Enable or Disable Automatic Truck ID. When Automatic Truck ID is enabled, the operator is automatically prompted to select the truck ID of the truck that is about to be loaded. This prompt occurs when the store button is pressed.

Auto Material ID – Allows the operator to Enable or Disable Automatic Material ID. When Automatic Material ID is enabled, the operator is automatically prompted to select the material type that was just loaded. This prompt occurs when the store button is pressed.

Weigh Range – The Payload Weigh Range Configuration allows the operator to enter the percentage of the lift range over which the PCS weight will be calculated. The minimum value is 15%. The default value is 15%. Cat does not recommend changing this value as there may be an adverse effect on accuracy.

Max Vel Cnf – The Maximum Velocity Configuration allows the operator to enter the maximum velocity for the Payload Control System (PCS). The velocity check set value sets the maximum percentage of the lift range that the lift arms travels in 20 milliseconds during a lift. If the lift arms have moved more than this value, a popup reweigh message will occur. The default setting is 1.5 percent. Unless standard procedures for machine operation require changing the velocity check set value, the value should be left unchanged.

Lft Spd Skw Lmt Cnf – The Lift Speed Skew Limit Configuration allows the operator to choose the skew limit (Off, Low, Medium, High) for PCS. The skew limit configuration value sets the sensitivity of the system to dramatic changes in the velocity of the lift. When the skew limit configuration threshold is exceeded, a popup reweigh message will occur. Unless standard procedures for machine operation require changing the skew limit configuration value, the value should be left unchanged. **Low** - The skew limit configuration value detects slight changes in velocity of the lift. **Medium** - The skew limit configuration value detects changes in the velocity of the lift. The changes include releasing the throttle while PCS is weighing material. The medium skew limit configuration value is the default value. **High** - The skew limit configuration value detects abnormal changes in the velocity of the lift. **Off** - The skew limit configuration value disables the popup reweigh event.

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Work Tool Control System (If Equipped)

SMCS Code: 7490; 7601

The Work Tool Control System is designed to make using work tools easier. The system allows hydraulic settings to be different for each work tool or application usage. The speed of the auxiliary hydraulics and the lever control characteristics can be modified for each work tool. Additionally, all of the kickout positions are stored for the active work tool selection and will be recalled when a work tool is selected.

Selecting the Work Tool

Work Tool Control – Push the Work Tool Control button in order to display the current work tool selection. Push the button again in order to cycle through the available work tools. Push the button and hold the button for 2 seconds in order to activate the selected work tool. The system will remember the position at the next start-up cycle. The middle light B next to the button will illuminate for 10 seconds after the selection is made.

The Work Tool Control System is available if the machine is equipped with a third function valve or a quick coupler. Implement system settings for each work tool are changed with the configuration menu for the implement system.

Note: Refer to the Operation and Maintenance Manual, “Monitoring System” for a description of the navigation buttons and settings for each work tool.

Monitoring System Display

The Monitoring System display is the main interface between the operator and the Work Tool Control System.

Display Buttons

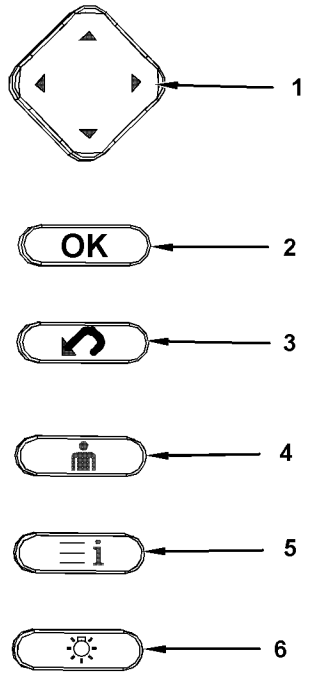

Illustration 117 g02109873

Control Buttons

(1) Four Way Navigation
(2) OK/Select
(3) Back/Previous
(4) Operator Menu
(5) Main Menu
(6) Backlight

Configuring a Work Tool

The “Work Tool” menu allows the operator to change the settings for the work tool. Five different work tools can be configured.

1. Press the “Operator Menu” button.
2. Press the up arrow or the down arrow on the “Four Way Navigation” button in order to highlight the “Settings” menu. Press the “OK/Select” button.
3. Press the up arrow or the down arrow in order to highlight the “Work Tool” menu. Press the “OK/Select” button.
4. The “Work Tools” menu will be displayed with the current options for work tools. Press the up arrow or the down arrow in order to highlight the setting. Press the “OK/Select” button in order to change the highlighted setting.

Note: Only settings for the active tool can be changed. Use the Work Tool Control button to change the active tool if settings for a different tool need to be changed.

Note: Press the “Back/Previous” button in order to return to the default display.

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Payload Control System (PCS) (If Equipped)

SMCS Code: 7494

The following information is a brief overview of the basic functions of the system.

Note: Refer to the Operation and Maintenance Manual, “Monitoring System” for a description of the navigation buttons.

The Payload Control System (PCS) is an electronic system that will provide an accurate weight of the material that is loaded by a wheel loader.

Monitoring System Display

The Monitoring System display is the main interface between the operator and the PCS. The Monitoring System display is used for the following purposes:

- Display the bucket payload weight and display the truck payload weight.
- Display the system messages to the operator.
- Navigate through the menus.
- Adjust settings.
- Enter data.

Display Buttons

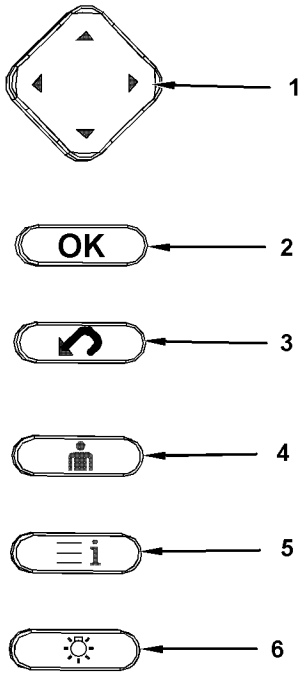

Illustration 118 g02109873

Control Buttons

(1) Four Way Navigation
(2) OK/Select
(3) Back/Previous
(4) Operator Menu
(5) Main Menu
(6) Backlight

Display Weights

Press the down arrow on the Four Way Navigation button in order to display other screens in the performance monitor. On the last screen, pressing the down arrow again will return the display to the first screen. Press the up arrow on the first screen, and the display will go to the last screen.

From the default screen, press the up arrow to display the truck weight. Press the up arrow again to display the bucket weight.

Bucket Weight – The total amount of material weighed in the currently loaded bucket.

Truck Weight – (Loaded or Remaining) Either the amount of material loaded in the current truck or the amount of material left to be loaded in the current truck. The number depends on the Count Mode selected.

PCS Menu Items

To access the PCS settings, totals, service, status, and configuation menus, refer to the Operation and Maintenance Manual, “Monitoring System Display” section. Use the Four Way Navigation arrows to navigate to the desired PCS menu.

Operating Modes for Payload

The PCS has the following two operating modes:

- Standby mode
- Weigh mode

Standby Mode

The following occurs in the standby mode:

- The function of weighing is suspended.
- The truck weights that were displayed are retained until the weigh mode is entered.

To enter PCS Standby mode from the Weigh mode, press the Reweigh button and Clear/Zero button simultaneously in order to enter the standby mode.

From the Standby mode to enter PCS Weigh mode, press the Reweigh button and Clear/Zero button simultaneously in order to enter the Weigh mode.

Weigh Mode

The weigh mode is the normal operating mode of the PCS. The PCS must be calibrated successfully before the weigh mode will function.

Weighing Materials

The steps that are used in order to obtain an accurate weight are listed below.

Perform the following before weighing the material:

1. Exercise the pins by raising the bucket at least three times.

2. Set the kickout at least 5% above the end of weigh point.

Note: The default end of weigh point is 65%.

3. Zero the system at the typical operating engine speed.

Avoid the following actions while the bucket is being lifted:

- Extreme changes in engine speed
- Directional shifts

- Harsh turning or jerky turning

Perform the following in order to weigh a bucket of material:

1. Load the bucket with material.

2. Fully tilt back the bucket.

3. Set the engine rpm to the normal operating speed.

4. Make sure that the bucket is below the start of weigh point.

Note: The default start of weigh point is 50% of the lift arm height.

5. Move the lift lever smoothly into the FULL DETENT position and raise the bucket.

The material will be weighed as the bucket travels through the weigh range. When weighing is complete, the right half of the display will show the weight of the material in the bucket. The left half of the display will show the accumulated weight of material in the truck.

Store Function

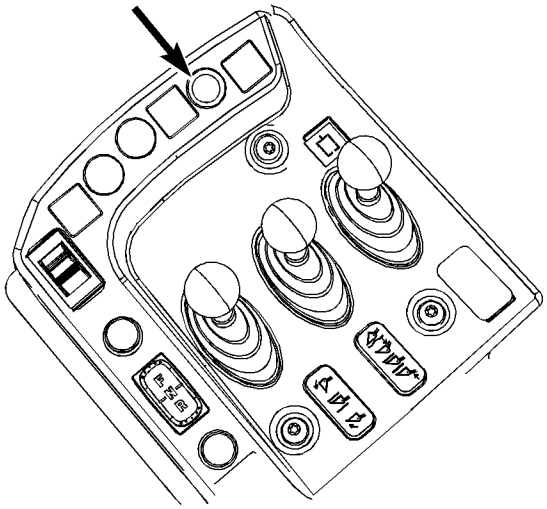

Illustration 119 g02727516

Store Button

The store button is a push button that is located on the implement console.

The store function allows the operator to clear the display and the store function allows the data to be stored in the ECM memory.

When the store button is momentarily pressed, the following will occur:

1. The following will be stored in the ECM memory:

- Weight of the truck
- ID of the truck
- ID of the material
- ID of the operator
- Time stamp
- Number of passes
- Number of the ticket

2. The bucket weight and the truck weight will show “0.00” on the display.

3. A new weigh cycle can be started.

PCS Reweigh Button

Press the Reweigh button (1) in illustration 120 in order to reweigh the material.

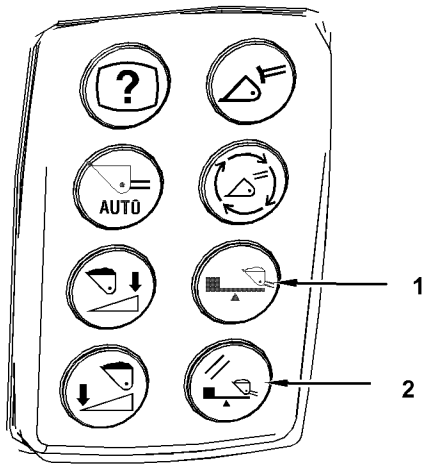

Illustration 120 g02150173

(1) PCS Reweigh Button
(2) PCS Clear/Zero Button

Reweigh Function

The reweigh function will allow the operator to subtract the previous bucket weight from the total truck weight. The reweigh function is used when the operator must add material from the last bucket. Also, the reweigh function is used when the operator must remove material from the last bucket in order to achieve the correct truck weight. The reweigh function allows the following:

- Erasing the previous bucket
- Reweighing the previous bucket after adding material to the bucket or after removing material from the bucket

Reweigh Messages

Reweigh messages will instruct the operator to reweigh the previous bucket. These messages will be displayed immediately after the bucket has been weighed. These messages are displayed when the system detects an error in the process of the lift. Details of each message are shown below:

Weigh Without Stopping - Lift Stopped During Weigh

This reweigh message will appear if the following occurs:

- The bucket stops moving while the bucket is in the weigh range.
- The operator does not place the lift lever in the FULL DETENT position.
- The operator releases the lift lever before the bucket has Traveled completely through the weigh range.

Weigh Without Shifting - Lift Pressure Change During Weigh

This reweigh message will appear when a substantial spike in the lift pressure is sensed in the hydraulic system. This event appears when the following occurs:

- The machine changes direction while the bucket is in the weigh range.

Weigh on Level Ground - Machine Pitched or Bucket Tilted

This reweigh message appears if the following occurs:

- The bucket was not in the FULLY TILTED BACK position while the bucket was in the weigh range.
- The machine was not on a flat surface.

Weigh at Higher RPM - Lift Too Slow to Weigh

This reweigh message appears if the following occurs:

- The lift was performed too slowly.

Keep Constant RPM - Excessive Lift Speed Change

This reweigh message appears if the following occurs:

- The motion or bounce of the machine causes pressure spikes.
- The throttle is released during the weighing process.

Reweigh Using Detent - Lift too Jerky During the Weigh

This reweigh message appears if the following occurs:

- The operator lowers the engine speed while the bucket is in the weigh range.
- The operator does not use the DETENT position of the lift lever.

If any of the messages that are shown above are displayed, perform a reweigh.

Reweighing A Bucket

In order to acknowledge the message, press the “OK/ Select” button.

1. Verify that the weigh screen is displayed.
2. Lower the bucket to the ground. If the material in the bucket needs to be adjusted, adjust the material.
3. Press the reweigh button.
4. Set the engine rpm at the normal operating speed.
5. Perform a smooth lift by correcting the condition that was displayed on the message screen. Perform a smooth lift in order to adjust the total truck weight.

PCS Clear/Zero Button

The Clear/Zero button (2) in illustration 120 is used to clear the display and zero the system. Press and hold the button in order to zero the system. Press and release the button in order to clear the displayed bucket weight and clear the displayed truck weight.

Zero Function

The zero function is used to adjust for changes in the empty bucket weight due to bucket wear or excess material stuck in the bucket. The operator should perform a zero in accordance with the following:

- A regular basis
- Prompt on the display

A zero of the system is performed in order to improve the accuracy of the PCS.

Zero Messages

Zero messages instruct the operator to perform a zero lift. The zero lift is performed in order to correct the following:

- Changes to the material that is in the bucket
- Changes in the hydraulic oil temperature

The zero messages are displayed only between trucks. Details for each message are shown below:

Perform Zero - Zero Timer Expired

This message is displayed when the following occurs:

- The machine has been running for more than 5 minutes and the PCS has not been zeroed.
- More than 4 hours passed since a zero was performed.

Perform Zero - Hydraulic Oil Temperature has Changed

This message is displayed when the following occurs:

- The PCS has detected a significant change in oil temperature.
- The change occurred since the previous zero was performed.

If any of the above two messages are displayed on the screen, perform the following in order to perform a zero lift:

Zeroing the Bucket

Press the “OK/Select” button in order to acknowledge the message.

1. Verify the weigh screen is displayed.

2. Empty the bucket.

3. Fully rack back the bucket to the stops.

4. Lower the bucket to the ground.

5. Hold the throttle steady at a normal operating engine speed.

6. Ease the lift lever into the DETENT position and allow the lift lever to kick out.

Note: When the bucket has reached the end of the weigh range, a small weight may be displayed on the screen. This value will vary depending on the oil temperature, the amount of material that is left in the bucket, and the condition of the linkage.

7. Press the clear/zero button and hold the clear/zero button. If the “Zero Accepted” message is shown on the display, proceed to the next step. If the “Zero Accepted” message is not shown on the display, then repeat Zeroing procedure.

8. Press the “OK/Select” button once in order to return to the default weigh screen.

Clear Function

The clear function allows the operator to clear the display without storing data into the ECM memory. Momentarily press the clear/zero button in order to achieve the following:

- Reset the bucket weight to zero.
- Reset the truck weight to zero.

When the clear/zero button is momentarily pressed, the following will occur:

1. The bucket weight and the truck weight will show “0.00” on the display.

2. A new weigh cycle can be started.

Note: If the clear/zero button is held for more than 2 seconds, a zero of the system will be attempted.

Note: If storing the truck weight data into memory is desired, the clear function should not be used. Once the display has been cleared, the data cannot be stored or recovered. The store button must be used to store data to memory.

Optional Printer

An optional printer may be used with the PCS. The kit for the printer contains all the necessary items that are required in order to install the optional printer. For more information about the installation, the operation, and the troubleshooting of the printer, refer to Special Instruction, REHS4453.

The printer gives PCS the capability to print the following:

Truck tickets – Detailed information about the truck that was loaded. The truck ticket contains some data that can be configured. Refer to Special Instruction, REHS4453 for more information.

Material reports – This report contains the totals of each material loaded since the last reset.

Truck reports – The truck report shows information about each truck load stored in memory.

The following information is printed about each truck:

- Time the truck was stored
- Date the truck was stored
- Amount of material loaded on the truck
- The number of buckets (passes) loaded onto the truck
- The index into the material ID list of the material loaded onto the truck
- The index into the truck ID list for the Truck ID that was associated with the truck

Messages For Downloading Data

The PCS stores data of the truck load cycles. The data can be transferred to a personal computer for analysis of the data using VIMSPC. 2200 truck loads can be stored in the control. Any additional loading cycles that occur before a download of the data will cause the oldest stored data to be deleted. The payload memory events will remain active until the data is downloaded to a PC. If the onboard memory is full, the latest data will be stored continuously. The oldest data will be permanently erased.

PCS will log events in order to instruct the operator to download the data. Details for each event are shown below. Events can be viewed in the Service/ Diagnostics menu.

Download Data Soon - Payload Memory Low

This message appears when the following occurs:

- The memory of the PCS that stores truck weights is more than 90% full.

Download Data Soon - Payload Memory Full

This message appears when the following occurs:

- The memory of the PCS that stores truck weights is more than 95% full. The memory can only store approximately 50 additional truck weights before the oldest truck weights will be permanently erased from memory.

Perform the following when the messages for the download of the data appear on the display.

If the data that is stored in memory is not needed, perform the following:

1. Press the “OK/Select” button in order to clear the event.
2. Continue with normal operation. If the data is not downloaded, the “Download Data Soon - Payload Memory Full” message will not be displayed again.

If the data that is stored in memory is not needed, perform the following:

- Download the data with a PC and VIMSpc Software.

Refer to the “VIMSpc Software” Section in this manual for a detailed description of downloading the data with VIMSpc.

Machine Considerations

In order for the PCS to provide accurate, reliable weights, the machine must be kept in good working order. Low hydraulic levels or poorly lubricated linkage pins will adversely affect the weighing accuracy of the PCS.

Lifting Techniques and Considerations

In order to achieve the proper operation of the PCS, the following steps are required:

1. If the machine is equipped with ride control, turn ride control to the AUTO or OFF position.
2. Set the lift kickout at least 5% above the weigh range.

Note: The default weigh range is 50% to 65%.

3. Fully rack back the bucket during weighing.
4. Maintain a constant and consistent engine speed. Above 1200 RPM
5. Move the lift lever smoothly into the FULL DETENT position during weighing.
6. Perform the operation of weighing on a flat surface.
7. When a zero is requested by the display, zero the system, or zero the system when material is sticking in the bucket.
8. Do not change the machine direction during a lift of material through the weigh range.
9. When you are prompted by the PCS, perform the reweighs.

In order to achieve the best accuracy, perform the following:

1. Exercise the lift linkage before zeroing or weighing.

2. Use consistent bucket loads when multipass loading is used to load a truck.

3. Minimize the amount of spilled material after the bucket has been weighed.

4. Perform a positioning of the material so the material is fully in the back of the bucket with partial bucket loads.

Considerations of the Site

The following issues related to the site and loading materials can adversely affect accuracy:

- Not performing a tare weight operation
- Material stuck in the truck from a previous load.
- Profile of load in the bucket

Simple CAL Update

The simple CAL update provides a method for fine-tuning the PCS. Fine-tuning the PCS accounts for a constant offset error between the weights of the PCS and the weights of the scale house. A constant offset error could be caused by the following events:

- Spillage of material during calibration before the calibration weight is weighed.
- Incorrect entry of the calibration weight into the display
- Spillage of the material during the loading of the material

Note: The machine cannot be turned OFF while a simple CAL update is being performed. If the machine is turned off, all information that was previously stored for the update will be lost. The lost information includes the history of trucks that were loaded.

The simple CAL update requires the actual weights of the scale house for ten truck loads that have been loaded with PCS. The tare weights of these ten loads must be accurate. If the tare weights are not accurate, performing the simple CAL update could have adverse effects on the accuracy of the system.

Note: The simple CAL update cannot be performed unless the operator presses the store button after each truck load.

In order to perform a simple calibration, record the weights on ten trucks at the scale house and the weight that is displayed by the PCS for the ten trucks. The scale house weights will be entered into the PCS during the simple process for calibration. Perform the following in order to access the simple CAL update:

1. Select the service menu.

2. Select the Calibrations menu.

3. Select the Payload menu.

4. Select the Simple Calibrations menu.

The display shows up to 15 truck loads. The trucks are listed in the order of loading.

Note: The first 15 truck loads that are shown on the display are the truck loads that were loaded immediately after powerup. If more than 15 trucks have been loaded after powerup, only the 15th truck on the display gets replaced with the most recently loaded truck.

When the simple calibration update has started, the most recently loaded truck will be displayed at the bottom of the list. When auto truck ID is enabled, the following will match:

- The Truck ID that is in the list
- The Truck ID that was assigned to the truck

Note: The assignment was made when the store switch was pressed. The following occurs when the auto truck ID feature is disabled:

- The truck ID will change to the next truck in the list after the store switch is pressed.

Following is an example of the operation:

- The first truck that is loaded after powerup will be “Truck 1” .
- The second truck will be automatically incremented to “Truck 2” .
- The most recent truck that was loaded will have the highest number.

To continue the simple calibration update, perform the following actions:

1. Select the truck that corresponds to the last weight that was reported.

Note: Verify that the truck loads match the proper weights.

2. Press the OK button.

Note: The last calculated weight by the PCS for that truck will be displayed.

3. Increment or decrement the last truck weight until the last truck weight matches the value from the scale house. Use the Four Way Navigation button in order to perform the operation.

4. Press the “OK” button in order to accept the weight.

5. Repeat Step 1 through Step 4 for ten trucks.

Note: When identifiers for the truck are not used, verify the proper truck for each weight. Remember that the trucks are listed in the order of loading. Accuracy could be adversely affected if the verification of the truck is not performed. After all ten trucks are entered, PCS will adjust the accuracy. The average truck weight should be closer to the actual truck weight after this procedure is performed.

i08001446

Product Link

SMCS Code: 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”

i04561593

Camera

SMCS Code: 7347; 7348

Rear View Camera

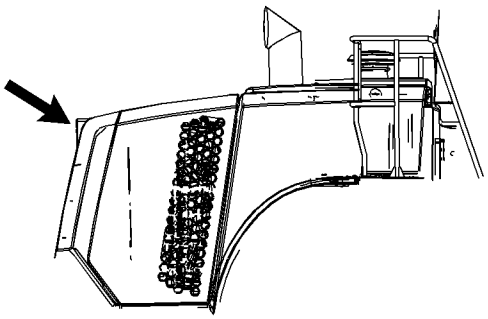

Illustration 121 g02727544

This machine is equipped with the Cat Work Area Vision System (WAVS). WAVS is a closed circuit video monitoring system. WAVS is made up of a video display and a camera. The rear view camera system is located on the rear top hood panel. A “VIDEO MODE SETTING” menu is available on the display in the cab.

Note: The rear view camera has been set up by the factory in order to provide views which comply with specified guidelines. Consult your Cat dealer before any adjustments are made to the system.

i04561598

Automatic Lubrication System (Autolube - If Equipped)

SMCS Code: 7540

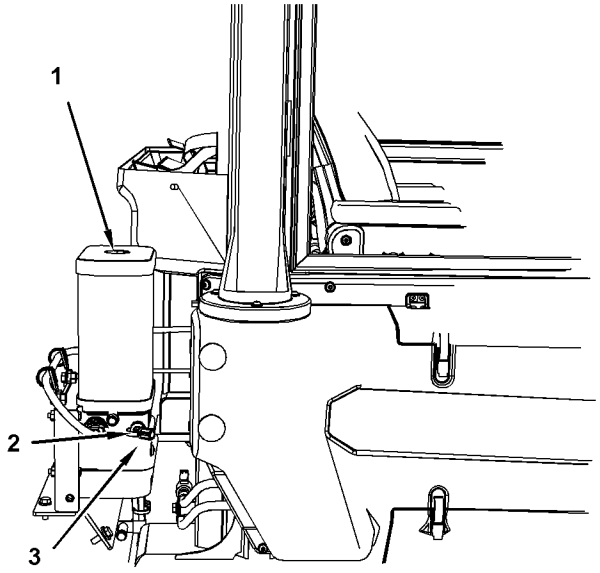

Illustration 122 g02727552

(1) Reservoir
(2) Dust Cap
(3) Fill Location

Grease reservoir (1) is located behind the cab on the right side of the machine.

The Caterpillar Automatic TWIN Greasing System

The automatic lubrication system consists of an electrical system and a lubrication system. These systems work together. The electrical system turns the automatic lubrication system on and off at periodic intervals.

Reference: Refer to System Operation, RENR 6331 for more information on the Automatic TWIN Greasing System.

The lubrication system consists of the following items:

- Grease pump with integrated control unit
- Distribution blocks with metering units

- Indicator fault display integrated in the system monitoring system

The lubrication system will automatically lubricate all of the points that are connected to the system. The system is on a timed cycle.

Operator Controls

On the display system, use the arrow buttons in order to navigate to the Autolube System. To navigate to the Autolube menu. Select Settings/Machine/ Autolube.

Select the required grease interval and press the “OK/Select” button.

The “Light” setting will provide grease every 45 minutes. The “Medium” setting will provide grease every 30 minutes. The “Heavy” setting will provide grease every 15 minutes.

Location of Grease Points

The lubrication system will automatically lubricate the following points:

- The linkage pins for the loader bucket
- Bearings for the lift cylinders
- Bearings for the tilt cylinders
- Upper sleeve bearing and middle sleeve bearing for the bucket tilt levers
- Upper sleeve bearing for the bucket lift arms
- The articulation hitch (upper and lower)
- The steering cylinder pins
- The axle oscillating bearings

Note: The Autolube System does not provide lubrication to the drive shaft support bearing, the drive shaft spline (center), the drive shaft universal joints and the hood tilt actuator.

i04365962

Aggregate Autodig
(If Equipped)

SMCS Code: 5741

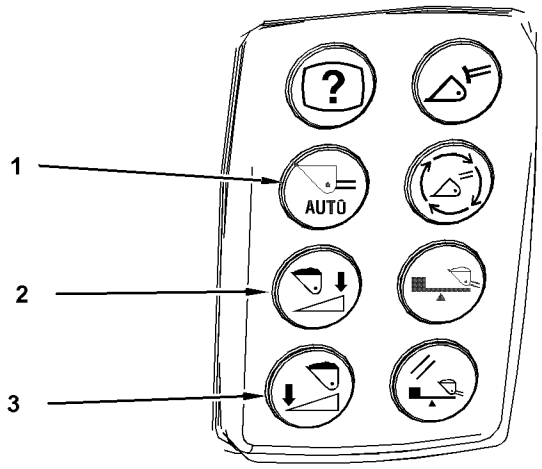

Illustration 123 g02126864

(1) Autodig Operation Mode
(2) Autodig Material Mode Increase
(3) Autodig Material Mode Decrease

Autodig System – The autodig system is designed to perform the operations of a loading cycle of an aggregate mix with minimal effort by the operator. Loading this type of material is repetitive. A high level of skill is required to maintain a consistent level of productivity during such loading cycles. This feature will fully load a bucket at consistent loading times.

Each Autodig material mode setting is programmed with the appropriate transmission speed for loading various types of material. The autodig system will only function up to the third gear, but the recommendation is to enter the pile in first or second gear. The autodig system will downshift the transmission to the proper gear. Autodig Material Modes 1 and 2 will allow the transmission to remain in second gear when loading. Autodig Material Modes 3 through 7 will downshift the transmission into first gear when bucket loading begins.

Note: If the transmission is in first gear and the dig mode switch is programmed for second gear, the autodig system will not upshift the transmission.

The lift kickout for the Autodig System is controlled in the Monitoring System. On the menu in the Monitoring System, navigate to Settings/Implement/ Autodig Kickout set. Move the lift arms to the desired height. Press the “OK/Select” button on the display.

Operating Modes of the Autodig System

The Autodig Material Mode Increase and Decrease buttons allow the operator to select different settings for different types of material for loading. In order to load light material, use the lower numbered material modes. In order to load heavy material, use the higher numbered material modes. Intermediate positions are available. Operator discretion is advised.

In order to turn off the autodig system, repeatedly press the Autodig Operation Mode button until no indicators are illuminated.

Automatic Pile Detection Mode

The autodig system will be set to the automatic pile detection mode upon initial activation. This means that the loading cycle will automatically begin when the bucket contacts the pile. The indicator will light when the autodig system is in the automatic pile detection mode.

The operator does not need to move the bucket controls during automatic loading. Lower the bucket to the ground. Drive the machine into the pile. Do not move any of the controls. The autodig system will automatically load the bucket. The machine can be driven to the hauling unit, when the bucket is fully tilted back.

Operator Triggered Mode

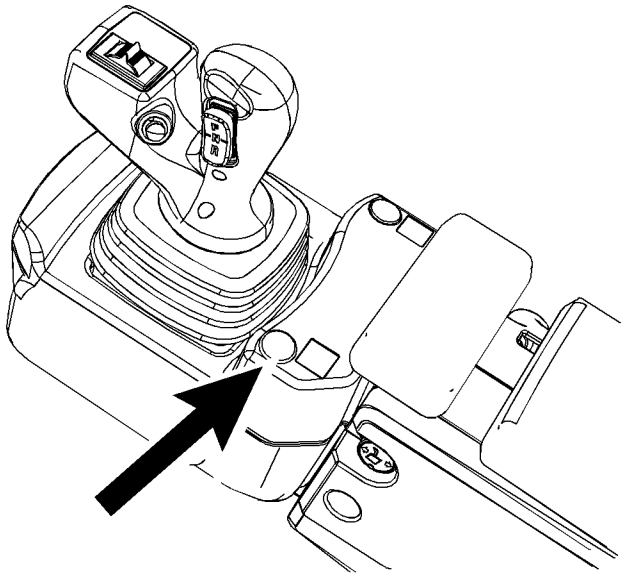

Illustration 124 g02131793

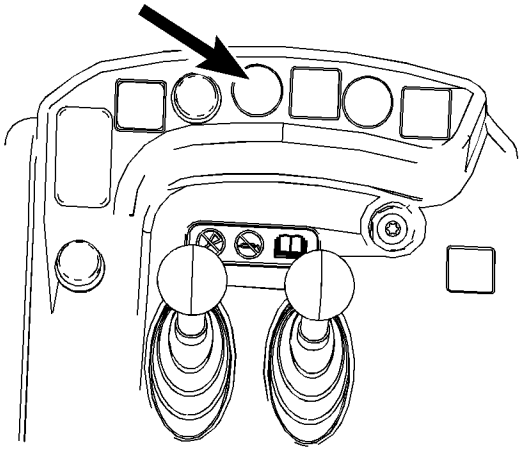

Illustration 125 g02126896

The operator may desire to start the autodig system manually.

1. Press the Autodig Material Mode Increase or Decrease switch in order to select the desired load setting.
2. Press the Autodig Operation Mode button in order to place the system in the Operator Triggered mode. Two indicators will light.

3. With the autodig system in the operator triggered mode, drive into the pile. Press the trigger switch in order to activate the loading cycle. The machine may be driven to the hauling unit when the lift cycle is completed.

Record Mode

The operator may record a load cycle that will be used in place of the preset load cycle. Position “8” is dedicated to the record mode. For Mode 8, the Autodig Material Mode Increase/Decrease A and G lights will be illuminated. See Keypad section for more information.

Record Steps

1. Place Autodig Material Mode into Mode 8.
2. Press the Autodig Operation Mode button until the Autodig Record Mode is entered. Three indicators will illuminate on the keypad. The system is in the record mode.
3. Position the machine in front of the pile with the bucket in the dig position.
4. In order to begin recording, press the trigger switch. The trigger switch is located near the work tool controls. A loading cycle must be performed within 20 seconds of pressing the trigger switch.
5. Enter the pile and load the bucket manually. While the bucket is being loaded, the indicator will flash slowly. The record mode will capture the lowest active transmission gear. This gear will be used during the loading cycle.
6. After loading the bucket, press the trigger switch to complete recording of the loading cycle. Loading the bucket plus pressing the switch must be done within 20 seconds. If the trigger switch is not pressed in this time, the loading cycle will go back to the previously recorded cycle or the default.
7. If the commands are recorded successfully, the autodig system will automatically return to the automatic pile detection mode.

Playback Steps

1. Press the Autodig Operation Mode button until the desired mode is selected (either Automatic triggered mode or Operator triggered mode).
2. Place Autodig Material Mode into Mode 8.
3. Keep the same parameters as you approach the pile. Do not touch the bucket levers, the neutralizer pedal, or the directional controls until the bucket is fully tilted back. Do not move any controls until the lift arms have reached the autodig system kickout height.
4. If the operator triggered mode has been selected, press the trigger switch as you enter the pile.
5. At any time, the operator may take control by moving the lift lever, the tilt lever, or the joystick.

Note: The initial setting for the eighth position is identical to the settings for the seventh position. The eighth position can no longer be set back to the default after the record mode has been utilized.

i04826275

Quick Coupler Operation

SMCS Code: 6129; 6522; 7000

To prevent injury, make sure that no people are working on the machine or near the machine. To prevent injury, keep the machine under control at all times.

Quick Coupler Function (if Equipped)

WARNING

Disengaging the coupler pins will release the work tool from control of the operator.

Serious injury or death may result from disengaging the work tool when it is in an unstable position or carrying a load.

Place the work tool in a safe position before disengaging the coupler pins.

WARNING

Inspect the quick coupler engagement before operating the machine.

Serious injury or death may result from improperly engaged coupler.

WARNING

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

If your machine is equipped with the Fusion coupler, refer to the Operation and Maintenance Manual for the “Fusion Quick Coupler” for detailed operation information.

Coupling the Work Tool

Front Work Tool Coupler for Tools That Do Not Require Hydraulics

1. Position the bucket or the work tool on a level surface.

2. Press the quick coupler button on the keypad.

a. A message will come up on the display to select “Engage” or “Disengage” for the coupler.

b. Select the disengage option by toggling the quick coupler button or use the Four Way Navigation arrows on the display to select “Disengage”.

c. Press and hold the quick coupler button for 2 seconds to activate cylinders or use the “OK” button on the display to activate the cylinders.

3. Tilt the coupler assembly forward.

Make sure that the coupler assembly is below the level of the hooks on the work tool that will be attached.

4. Slowly, drive the machine forward. Align the hooks on the work tool with the coupler assembly.

5. Pull back on the lift lever in order to raise the coupler slightly. Raise the coupler until the coupler assembly contacts the hooks on the work tool and the work tool is lifted slightly.

Make sure that the work tool is level from one side to the other side.

6. Tilt back the coupler assembly until the alignment bar of the work tool contacts the coupler.

7. Press the quick coupler button.

a. A message will come up on the display to select “Engage” or “Disengage” for the coupler.

b. Select the engage option by toggling the quick coupler button or use the Four Way Navigation arrows on the display to select “Engage”.

c. Press and hold the quick coupler button for 2 seconds to activate cylinders or use the “OK” button on the display to activate the cylinders.

Note: Visually ensure that both coupler pins are extending out of the holes in the work tool mounting bracket. Ensure that the tool is firmly attached and continue with steps 8 through 10.

8. Push the tilt lever in order to tilt the work tool downward.

9. Push the lift lever forward in order to put down pressure on the work tool.

10. Back up the machine and make sure that there is no movement between the work tool and the coupler.

Steps 8 through 10 indicate that the coupler pins have fully engaged into the retainer holes for the work tool.

Note: Operating instructions for specific work tools are not provided. The function of the control lever is dependent upon the installation of an Auxiliary Equipment Manufacturer work tool.

Work Tools That Require Hydraulics

Follow the procedure that is described in Operation and Maintenance Manual, “Front Work Tool Coupler for Tools That Do Not Require Hydraulics”.

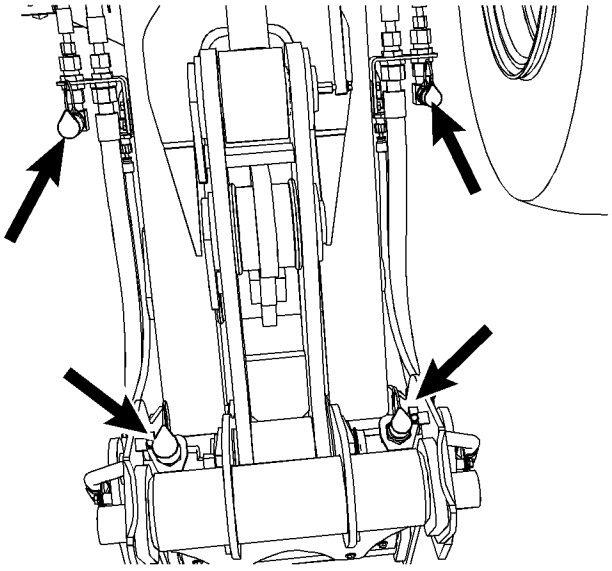

Illustration 126 g01413412

Quick disconnect fittings

Before you connect the quick disconnect plugs or before you disconnect the quick disconnect plugs, follow the steps below.

- Stop the engine.
- Move all of the control levers for the work tool in order to relieve the pressure in the hydraulic lines. Refer to “System Pressure Release” in the maintenance section of this Operation and Maintenance Manual
- Return all of the levers to the HOLD position.

- In order to connect the lines, push the fitting and push down on the external collar.

Disconnecting Lines

- In order to disconnect the hydraulic line, pull up on the external collar and pull on the line.
- Wipe off all foreign material.
- Install plugs on any unused connectors.

Uncoupling the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the quick coupler. Ensure that the work tool or bucket is not carrying a load.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

1. Position the bucket or the work tool on a level surface.

2. Press the quick coupler button on the keypad.

a. A message will come up on the display to select “Engage” or “Disengage” for the coupler.

b. Select the disengage option by toggling the quick coupler button or use the Four Way Navigation arrows on the display to select “Disengage”.

c. Press and hold the quick coupler button for 2 seconds to activate cylinders or use the “OK” button on the display to activate the cylinders.

3. If the coupler pins are stuck, perform one of the following procedures to release the coupler pins.

a. Raise the bucket or the work tool slightly above the ground. Shake the bucket or the work tool back and forth. Reposition the bucket or the work tool on a level surface. Repeat step 2.

b. Apply breakout force to the bucket or the work tool. Repeat step 2. Reposition the bucket or the work tool on a level surface.

4. After the coupler pins are DISENGAGED, tilt the coupler forward until the alignment bar on the work tool is away from the coupler.

5. Lower the coupler until the coupler is no longer in contact with the hooks on the work tool.

6. Tilt the coupler forward. Ensure that the coupler is below the hooks on the work tool that was attached.

7. Slowly drive the machine BACKWARD away from the work tool.

8. Press the quick coupler button.

a. A message will come up on the display to select “Engage” or “Disengage” for the coupler.

b. Select the engage option by toggling the quick coupler button or use the Four Way Navigation arrows on the display to select “Engage”.

c. Press and hold the quick coupler button for 2 seconds to activate cylinders or use the “OK” button on the display to activate the cylinders.

i04283343

Hood Tilt

SMCS Code: 7251-T2; 7275

Raise the Clamshell

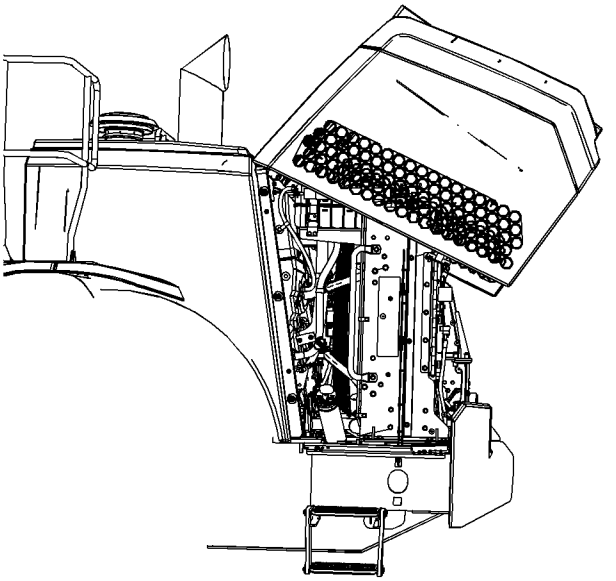

Illustration 127 g02468596

Ensure that the hood is in the fully LOWERED position. At the rear of the machine, release the latch on the clamshell. Pull out and raise the clamshell.

Lower the Clamshell

At the rear of the machine, reach up and pull down on the strap that is connected to the clamshell. Ensure that the clamshell latches in the LOWERED position.

Note: Ensure the sealing surface of the clamshell and rear platform is free of dirt, debris, or objects. Improper latching may occur or damage to the clamshell.

Raise the Hood

NOTICE
Secure the hood in the fully closed position or the fully open position prior to starting the engine. Operating the machine with the hood partially open can cause the exhaust to damage hood components. Do not allow water to enter the DPF. Water will damage the DPF.

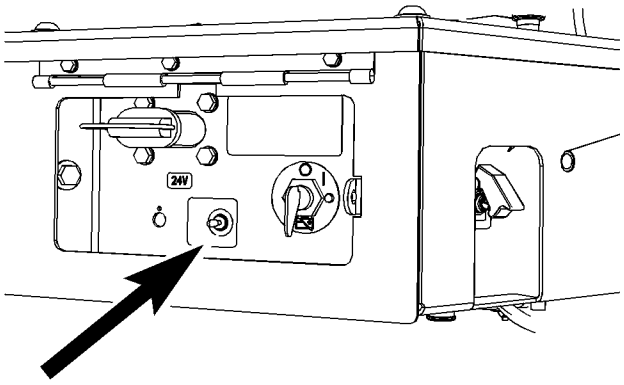

Illustration 128 g02131833

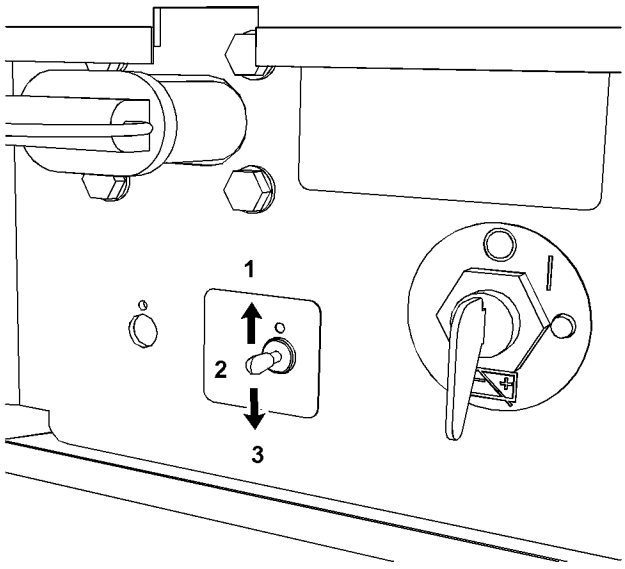

Illustration 129 g02468601

⚠ WARNING

Ensure the area behind the machine is clear before you tilt the engine hood. Failure to clear the area could result in serious injury. Maintain a clear area behind the machine while the hood is in the raised position.

⚠ WARNING

Do not perform any service work in the engine compartment unless the engine hood is in the fully raised position. Failure to do so could result in serious injury. Secure the engine hood in the fully raised position before performing any service work in the engine compartment.

The switch that controls the engine hood is located in a compartment on the left side of the machine.

Note: When opening the hood, the counter weight shelf must be clear of dirt, debris, or objects. The rear of the hood can be damaged if the hood is opened with objects on the shelf.

1. Ensure that the clamshell is closed securely.

2. Ensure that there are no personnel or equipment around the hood during operation.

3. Open the access door.

4. Move the toggle switch to the UP position (1) in order to raise the hood. Hold the switch in this position until the hood is fully open. Release the toggle switch. The toggle switch will return to the middle position (2).

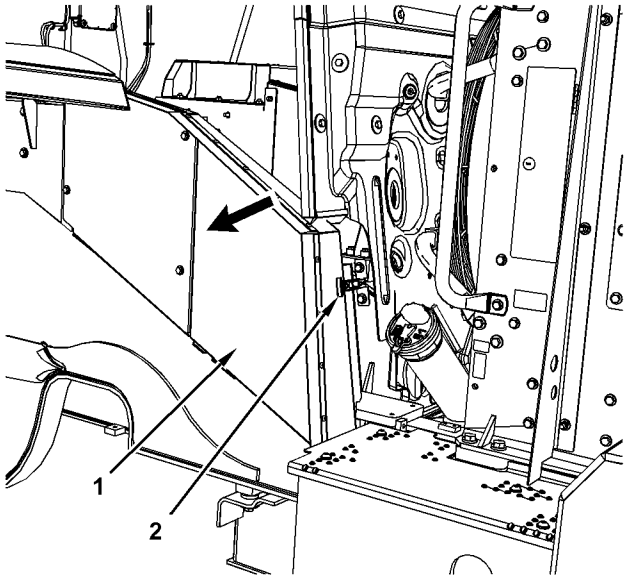

Illustration 130 g02468696

Some parts are removed for clarity.

(1) Side Panel
(2) Latch

Note: Do not continue to hold the toggle switch in the open or in the closed position after movement of the hood has stopped. When audible clicks are heard, release the toggle switch. Failure to release the toggle switch will result in damage to the actuator.

5. If further access is needed, either side panel can be opened. Hold the side panel in place, while unlatching the side panel. Lower the side panel to rest on the tire. The side panel can remain in the open position resting on the tire. For better access the side panel can be removed. Push the side panel forward along the hinge to remove the side panel fully.

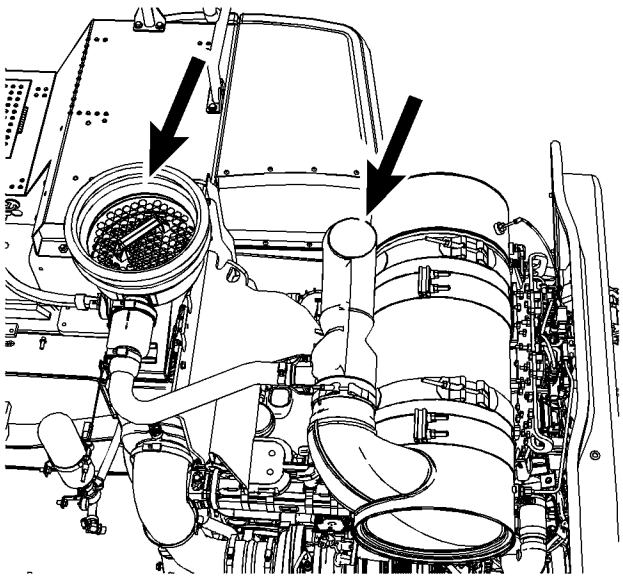

Illustration 131 g02469757

When hood is opened, cover the air intake and the DPF outlet to prevent any water entry.

The hood must be opened fully before accessing the rear platforms. The handrails for accessing the platform are located under the hood.

⚠ WARNING

Avoid contact with hot surfaces. Exhaust piping and engine components become hot during engine operation and cool slowly after engine shutdown. Any contact with hot surfaces can cause severe burns.

Lower the Hood

1. Ensure that there are no personnel or equipment around the hood during operation.

2. Ensure that the side panels are returned to the closed position and latched before the hood is closed.

3. Move the toggle switch to DOWN position (3) in order to lower the hood. Hold the switch in this position until the hood is fully closed. Release the toggle switch. The toggle switch will return to the middle position.

Note: Do not continue to hold the toggle switch in the open or in the closed position after movement of the hood has stopped. When audible clicks are heard, release the toggle switch. Failure to release the toggle switch will result in damage to the actuator.

NOTICE
Secure the hood in the fully closed position or the fully open position prior to starting the engine. Operating the machine with the hood partially open can cause the exhaust to damage hood components. Do not allow water to enter the DPF. Water will damage the DPF.

Manual Operation

The hood can be operated manually by using a socket head and an air wrench to turn the shaft of the lift motor. The manual control is located on the right rear side of the machine.

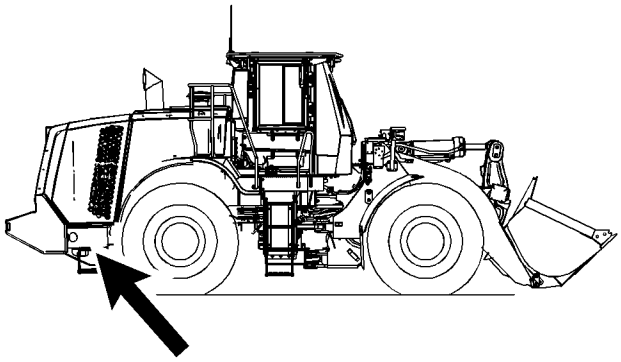

Illustration 132 g02131857

Note: If the hood is in the closed position, the clamshell will need to be raised in order to access the cover for the lift motor. Close the clamshell prior to raising the hood.

Insert a socket head through the hole and onto the shaft of the lift motor. Turn the shaft clockwise in order to raise the hood. Turn the shaft counterclockwise in order to lower the hood.

i03965169

Roading Fender Control (If Equipped)

SMCS Code: 7252

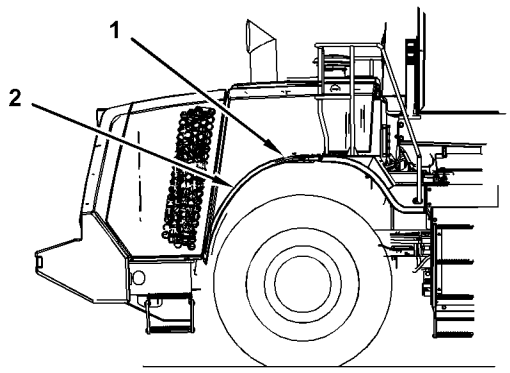

Illustration 133 g02161084

1. Push lever (1) in order to unlock roading fender (2).

2. Swing the roading fender away from the machine in order to access the engine compartment.

3. The roading fender has a lock in order to hold the fender in the OPEN position. The lock will prevent inadvertent movement of the roading fender. Release the lock in order to move the roading fender.

4. Move the roading fender back to the machine and lock the roading fender in the OPERATING position.

i05310013

Operation Information

SMCS Code: 7000

Basic Instructions

Follow these basic instructions whenever you are operating the machine:

- If equipped with the Left Hand Steering Control, lower the steering arm rest in order to enable steering. Steering must be enabled in order to release the parking brake.

- After the machine is started, allow the Left Hand Steering Control to move to the HOME position.
- At start-up, the system will display the fluid levels for the engine oil, coolant, hydraulic oil, and the fuel filter water separator.
- To prevent injury, make sure that no one is working on the machine or near the machine. Always maintain control of the machine.
- Raise the bucket or the work tool enough to negotiate any obstacles.
- Before you release the parking brake, depress the service brake pedal in order to keep the machine from moving.
- Drive the machine forward for best visibility and for best control.
- Reduce the engine speed when you maneuver in tight quarters and when you are going over a hill.

Fueling the Machine

⚠ WARNING

To avoid possible injury or death, do not smoke while in an area that contains flammable liquids.

All fuels, most lubricants, and some coolants are flammable.

Keep all fuels and lubricants stored in properly marked containers and away from unauthorized persons.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Store all oily rags or other flammable materials in a protective container in a safe place.

Remove all flammable materials such as fuel, oil, and other debris before they accumulate on the machine.

Do not expose the machine to flames, burning brush, etc., if at all possible.

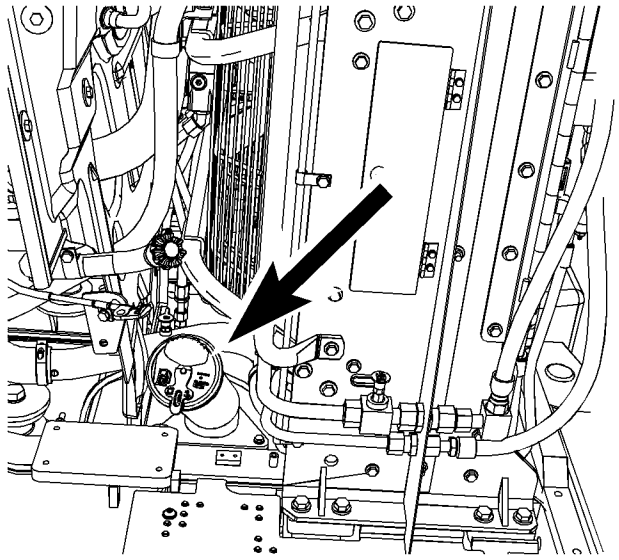

Illustration 134 g02492576

The fuel fill is located at the rear of the machine on the left side. Raise the clamshell. Refer to Operation and Maintenance Manual, “Hood Tilt” for information about the clamshell hood. Remove the fuel cap. Use care not to damage the fuel strainer. Replace the fuel cap and lock into place. Lower the clamshell.

Fuel cap may be hot. Use personal protective equipment in order to avoid a burn injury. Allow the cap to cool before fueling the machine.

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of −18 °C (−0 °F) to 43 °C (110 °F). Special configurations for different ambient temperatures may be available. The Cold Start Package helps starting the engine in cold weather. Refer to Operation and Maintenance Manual, “Engine Starting” for more information. If the machine is operated in high temperature conditions, the High Ambient Temperature Cooling Package is available. Consult your Cat dealer for additional information on special configurations of your machine.

Downhill Operation

Maintain a ground speed that is slow enough for the conditions. Before you operate down a hill, select the proper gear before you start down the grade. The proper gear should allow the machine to maintain the appropriate speed on the down grade. The throttle control should not be at high idle and the engine should not overspeed. In most situations, the proper gear will be the same gear that is required to drive up the grade.

If the machine builds up excessive speed, the engine can overspeed. This speed can damage the engine, the hydraulic pump and/or the power train. Use the right service brake pedal or the engine brake (if equipped) in order to slow the machine until a lower gear can be selected. Select the lower gear and proceed.

The brake oil can overheat in the following conditions:

- Use of the right service brake continuously in order to control travel speed
- Use of the right service brake pedal in order to stop at high speeds

Overheating can result in significant wear and/or damage to the right service brake pedal and final drive.

Note: The left service brake pedal may be used for downhill braking. The left service brake pedal will downshift the transmission to a lower gear. The left service brake pedal will not downshift the transmission to a lower gear if an engine overspeed would result.

Changing Direction and Speed

Speed changes at full engine speed and directional changes at full engine speed are possible. However, when you change directions, deceleration will maximize the comfort of the operator. In order to control the throttle, use the left brake pedal to decelerate. Deceleration will also maximize the service life of power train components.

Engine Idle Management System

The Engine Idle Management System (EIMS) is designed to help maximize fuel efficiency. EIMS allows flexibility to manage idle speeds. The EIMS engine software comes with two idle control settings: hibernate mode and work mode.

Before the first Work Mode after machine starting, the machine will set the idle speed so a transmission oil level check can be completed. The idle speed will be held for 5 minutes with the low idle set to 950 rpm. The following conditions must be met:

- The throttle pedal is released
- The parking brake is engaged
- The transmission is in NEUTRAL
- The implements are not active
- There are no active diagnostic codes

If any of the above conditions are not met, the transmission oil level check will not occur again until the next power cycle.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

Hibernate Mode

If your machine has higher idle time, hibernate mode will provide lower fuel consumption, reduced sound level, and reduced emissions levels. Fuel consumption savings will vary by the model of the machine and work cycle. The hibernate mode is engaged after 10 seconds and the following conditions are met:

- The parking brake is engaged
- The implements are not active
- There are no active diagnostic codes
- The coolant temperature is greater than 50C
- The DPF outlet temperature is less than 200C
- The engine fan must be greater than 77% bypass
- The transmission is in neutral.
- The throttle pedal is released.

Note: The EIMS hibernate engine idle speed can be adjusted by your dealer. The programmable range for the hibernate mode is 650 rpm to 800 rpm.

The machine will return to the engine idle speed for work mode if any of the following occurs:

- Release of the parking brake
- Directional shift of the machine
- Activation of the implements
- Push of the throttle pedal
- The engine fan is at full speed

Work Mode

The work mode is the low idle speed of the machine during normal operation. The engine idle speed for work mode may be set in order to meet the requirements of the application.

Note: EIMS work mode engine idle speed can be adjusted by your dealer. The programmable range for the work mode is 650 rpm to 1100 rpm. The default work mode speed is 800 RPM.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

Low Voltage Mode

High electrical loads from attachments may cause a high electrical current drain on the battery. The low voltage mode is designed to reduce the risk of fully discharging the batteries. This feature is standard on all machines. The low voltage mode is engaged after 5 minutes when the following conditions are met:

- The transmission is in neutral.
- The parking brake is set.
- The throttle pedal is released.

When the battery voltage drops below 24.5 volts, the engine speed will increase to 1000 rpm in order to charge the battery.

The machine will return to the engine idle speed for work mode if any of the following occurs:

- release of the parking brake
- directional shift of the machine
- push of the governor pedal

Warm Up Mode

Note: If the machine is unable to regenerate during extended idling in extremely cold ambient conditions, engine derate and shutdown may occur.

The warm-up mode is designed to keep the engine and the machine warmer in cold-weather operations. The warm-up mode is engaged after 10 minutes and the following conditions are met:

- The feature is enabled in the software.
- The transmission is in neutral.
- The parking brake is set.
- The throttle pedal is released.

When the coolant temperature drops below 70 °C (158 °F) and the charge air cooler temperature drops below 5 °C (41 °F), the engine idle speed will increase to 1000 rpm. The machine will disengage warm-up mode when the coolant temperature reaches 80 °C (176 °F).

The machine will return to the engine idle speed for work mode if any of the following occurs:

- release of the parking brake
- directional shift of the machine
- push of the governor pedal

After the first time warm-up mode has been engaged, the following conditions will activate warm-up mode:

- 1 minute elapsed time
- The coolant temperature goes below 70 °C (158 °F).

The engine speed will increase to 1000 rpm.

The default setting for the warm-up mode is enabled.

Note: Consult your Cat dealer in order to enable/ disable the warm-up mode.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

i04531569

Parking Brake

SMCS Code: 7000

⚠ WARNING

Personal injury could result from the sudden stop of the machine. The parking brake is automatically engaged when brake oil pressure drops below an adequate operating pressure.

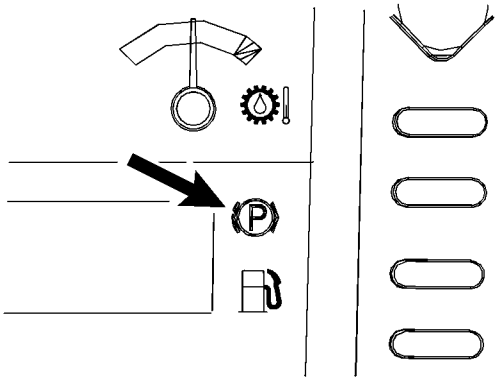

Illustration 135 g02145438

The alert indicator for the brakes is on the dash panel.

If the brakes lose oil pressure, an alert indicator for the brakes will flash and an action alarm will sound.

Anticipate a sudden stop. Correct the cause of the loss of oil pressure. Do not operate the machine without normal brake oil pressure.

The action light will also flash when the lights on the monitoring system flash.

NOTICE
Moving the machine with the parking brake engaged can cause excessive wear or damage to the brake.

If necessary, have the brake repaired before operating the machine.

If the parking brake is engaged, the light will be illuminated. If the parking brake switch is not in the ENGAGED position when the machine is started, you must cycle the parking brake switch. This procedure releases the parking brake.

Note: Always engage the parking brake when you shut down the machine.

Note: Do not engage the parking brake while the machine is in motion. The machine will stop suddenly.

Incline Ladder (If Equipped)

When the parking brake is engaged, the ladder will incline. Ensure that no personnel are on the ladder when the parking brake is engaged.

⚠ WARNING

Crush Hazard! Stay back a safe distance from the powered stairway when it is being raised or lowered. Failure to stay back may result in injury or death.

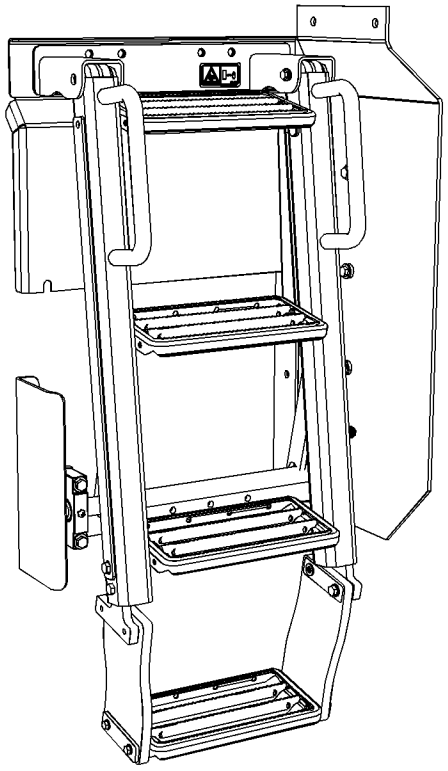

Illustration 136 g02711683

For shipping the ladder should be stored in the locked position. Use the cable and hook to secure the ladder.

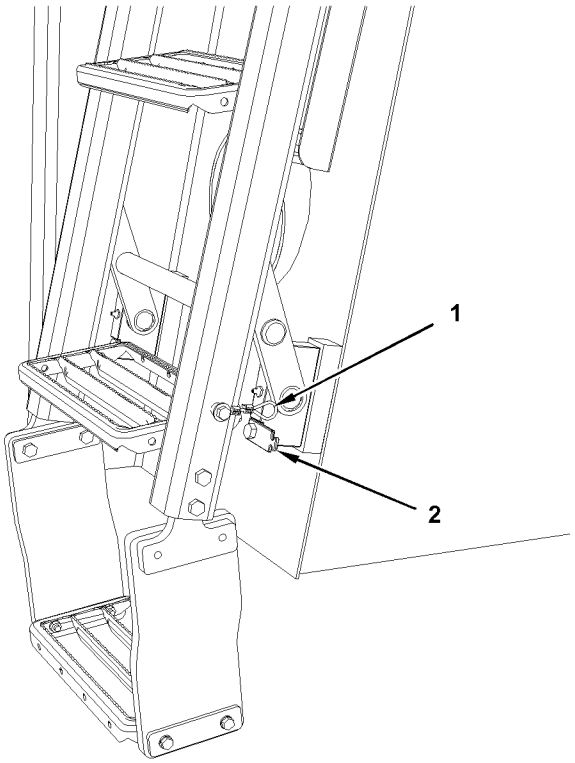

Illustration 137 g02711685

Note that some parts are not shown for clarity.

(1) Locking Cable
(2) Locking Hook

Put the loop of the cable around the hook to lock the ladder in the shipping position.

i04614139

Secondary Steering

SMCS Code: 7000

The secondary steering system provides a backup steering system if the primary steering system fails. The secondary steering system consists of redundant control valves which are standard and an optional electric secondary steering pump is available. If equipped, the system will perform a secondary steering pump test during engine startup. The Monitor Display is used in order to test the secondary steering system manually. The secondary steering indicator will illuminate, the action alarm will not sound during the test.

An alert indicator indicates a failure of the primary steering. When the alert indicator flashes, the secondary steering system is active. When the alert indicators come on and the action alarm sounds, steer the machine immediately to a convenient location and stop the machine. Stop the engine and investigate the cause of the failure. Do not operate the machine until the cause of the failure has been corrected.

⚠ WARNING

If the secondary steering activates during operation, immediately park the machine in a safe location. Inspect the machine and correct the condition which caused the secondary steering to activate.

Do not continue to operate the machine when the secondary steering is active.

Personal injury or death can occur if steering is lost completely during operation.

The batteries must have a normal charge. The secondary steering electrical system must be in proper working condition. A low battery, or any defect in the battery, battery cells, or electrical circuit can cause loss of secondary steering. Personal injury and/or damage to the machine can occur.

NOTICE
Once the secondary steering pump has been activated, the system should remain ON no more than 1 minute. Safely steer the machine to a stop immediately. Turn the key start switch to the OFF position in order to turn OFF the secondary steering pump. Prolonged use of the secondary steering pump will overheat the electric motor and damage the components.

Secondary Steering System – This machine is equipped with a secondary steering system.

All machines are equipped with the standard configuration of a secondary steering left solenoid valve and a right solenoid valve.

The attachment configuration adds two system pressure sensors, a secondary steering relay, and the electric secondary steering pump.

The optional secondary steering pump will activate automatically when the main pump loses pressure, such as a steering pump failure or engine failure. The redundant steering control will activate automatically when the primary steering control system fails. The transition from the primary steering to the secondary steering will occur in less than 2 seconds. The transition will vary depending on the speed of the machine. As the machine speed increases, the transition time decreases. When the secondary steering system is activated, the wheels automatically align to the angle of the steering device. Maintain deliberate and controlled movement of the steering inputs to maintain the desired direction of travel.

Note: If the secondary steering system is activated for more than 1 minute, replace the pump, the motor, and the solenoid. Inspect the wiring for any damage.

Once the secondary steering pump motor has been activated, the motor will remain active until one of the following occurs:

- the machine is turned off
- the machine speed is zero and engine is not running

Secondary Steering Indicator – This alert indicator will be amber in color when the secondary steering system is active or the secondary steering system is being tested.

The Monitoring Display System is used to test the secondary steering manually. Refer to the Operation and Maintenance Manual, “Secondary Steering - Test” for the procedure.

Engine Starting

i05293513

Engine Starting

SMCS Code: 1000; 7000

NOTICE
The start will be automatically disengage after 45 seconds of cranking. Allow the starter to cool for 2 minutes before cranking again. Turbocharger damage can result if the engine rpm is not kept low until the oil gauge display verifies that the oil pressure is sufficient.

1. All forward/neutral/reverse switches must be in the NEUTRAL position in order to start the machine. If either switch is not in NEUTRAL position, the machine will not start.

2. Engage the parking brake.

3. Fasten the seat belt.

4. Ensure that the control levers are in the HOLD position.

5. Before the engine is started, 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.

6. Turn the engine start switch to the START position in order to start the engine.

Note: Do not depress the accelerator pedal during engine starting.

Note: When engine start switch is in the ON position and indicator lamp for Starting Aid turns on, the glow plugs activate. Pause until the indicator lamp for the Starting Aid turns off. Once the indicator light for the Starting Aid goes off, you may start to crank the engine. If the indicator lamp for Starting Aid comes on while cranking the engine, the ether (if equipped) is being activated. The selection of the type of cold weather Starting Aid is based on temperature and altitude.

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

Engine Starting with Ether Starting Aid (If Equipped)

NOTICE
Use ether for cold starting purposes only.

The start will be automatically disengage after 45 seconds of cranking. Allow 2 minutes for starting motor to cool before cranking again.

Turbocharger damage can result, if the engine rpm is not kept low until the engine oil light/gauge verifies the oil pressure is sufficient.

1. Follow Step 1 through Step 6 of the Engine Starting Procedure.

A premeasured amount of ether will be automatically injected if the ambient conditions call for starting aid. The starting aid indicator will be illuminated on the Monitoring System Display.

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

Engine Starting with Cold Start Package (If Equipped)

For starting below −18°C (0°F), the use of a coolant heater is recommended:

Dependent on the ambient air temperature, a transmission pump bypass, and fan/brake pump bypass may be activated, to reduce the parasitic load on the engine.

Reference: At temperatures below −23°C (−10°F), consult your Cat dealer for additional information or refer to Special Publication, SEBU5898, “Cold Weather Recommendations”.

Engine Idle Management System

The Engine Idle Management System (EIMS) is designed to help maximize fuel efficiency. EIMS allows flexibility to manage idle speeds. The EIMS engine software comes with two idle control settings: hibernate mode and work mode.

Before the first Work Mode after machine starting, the machine will set the idle speed so a transmission oil level check can be completed. The idle speed will be held for 5 minutes with the low idle set to 800 rpm. The following conditions must be met:

- The throttle pedal is released
- The parking brake is engaged
- The transmission is in NEUTRAL
- The implements are not active

- There are no active diagnostic codes

If any of the above conditions are not met, the transmission oil level check will not occur again until the next power cycle.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

Hibernate Mode

If your machine has higher idle time, hibernate mode will provide lower fuel consumption, reduced sound level, and reduced emissions levels. Fuel consumption savings will vary by the model of the machine and work cycle. The hibernate mode is engaged after 10 seconds and the following conditions are met:

- The parking brake is engaged
- The implements are not active
- There are no active diagnostic codes
- The coolant temperature is greater than 50C
- The DPF outlet temperature is less than 200C
- The engine fan must be greater than 77% bypass
- The transmission is in neutral.
- The throttle pedal is released.

Note: The EIMS hibernate engine idle speed can be adjusted by your dealer. The programmable range for the hibernate mode is 650 rpm to 800 rpm.

The machine will return to the engine idle speed for work mode if any of the following occurs:

- Release of the parking brake
- Directional shift of the machine
- Activation of the implements
- Push of the throttle pedal
- The engine fan is at full speed

Work Mode

The work mode is the low idle speed of the machine during normal operation. The engine idle speed for work mode may be set in order to meet the requirements of the application.

Note: EIMS work mode engine idle speed can be adjusted by your dealer. The programmable range for the work mode is 650 rpm to 1100 rpm. The default work mode speed is 800 RPM.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

Low Voltage Mode

High electrical loads from attachments may cause a high electrical current drain on the battery. The low voltage mode is designed to reduce the risk of fully discharging the batteries. This feature is standard on all machines. The low voltage mode is engaged after 5 minutes when the following conditions are met:

- The transmission is in neutral.
- The parking brake is set.
- The throttle pedal is released.

When the battery voltage drops below 24.5 volts, the engine speed will increase to 1000 rpm in order to charge the battery.

The machine will return to the engine idle speed for work mode if any of the following occurs:

- release of the parking brake
- directional shift of the machine
- push of the governor pedal

Warm Up Mode

Note: If the machine is unable to regenerate during extended idling in extremely cold ambient conditions, engine derate and shutdown may occur.

The warm-up mode is designed to keep the engine and the machine warmer in cold-weather operations. The warm-up mode is engaged after 10 minutes and the following conditions are met:

- The feature is enabled in the software.
- The transmission is in neutral.
- The parking brake is set.
- The throttle pedal is released.

When the coolant temperature drops below 70 °C (158 °F) and the charge air cooler temperature drops below 5 °C (41 °F), the engine idle speed will increase 20rpm/sec until target rpm is reached. RPM will stay raised until coolant temperature rises above 70° C (158° F). The machine will disengage warm-up mode when the coolant temperature reaches 80 °C (176 °F).

The machine will return to the engine idle speed for work mode if any of the following occurs:

Note: Engine speed drops a 1000 rpm/sec.

- release of the parking brake
- directional shift of the machine
- push of the governor pedal

After the first time warm-up mode has been engaged, the following conditions will activate warm-up mode:

- 1 minute elapsed time
- The coolant temperature goes below 70 °C (158 °F).

The engine speed will increase to 20 rpm/sec till target speed is met.

The default setting for the warm-up mode is enabled.

Note: Consult your Cat dealer in order to enable/ disable the warm-up mode.

Note: If there is an active diagnostic code on the machine, the machine may operate at the programmed idle speed.

i04104194

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

After the engine has been started, allow the monitoring system to complete the self test.

NOTICE
Keep engine speed low until the engine oil pressure registers on the gauge or the engine oil pressure indicator light goes out. If it does not register or the light does not go out within ten 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 to protect your engine and to protect your transmission.

NOTICE
When you operate the machine in ambient temperatures below 4° C (40° F), cooler covers are recommended to maintain normal hydraulic operating temperatures. When the ambient temperature is above 4° C (40° F), the cooler covers are not required.

The engine may automatically change speeds when the machine is stationary and idling in cold ambient temperature for an extended time. The following conditions will be maintained:

- Desired coolant temperature.
- Desired operation of engine systems.
- Desired operation of the regeneration system.

During extended idling in cold ambient conditions, engine speed may operate between 1000 rpm and 1600 rpm. Operation at 1600 rpm is minimal and will only last for up to 20 minutes. The high exhaust system temperature indicator may also illuminate during extended idling conditions to signal that a low speed regeneration is in progress. A regeneration done in cold ambient extended idling conditions may activate below 30% soot level. A regeneration done in cold ambient extended idling conditions will typically last for 5-10 minutes.

Look at the indicators and the gauges frequently during operation.

Cycle all controls in order to allow warm hydraulic oil to circulate through all hydraulic cylinders and through all hydraulic lines.

When the engine idles during warm-up, observe the following recommendations:

- Allow the engine to warm up for approximately 15 minutes when the temperature is higher than 0°C (32°F).
- Allow the engine to warm up for approximately 30 minutes or more when the temperature is below 0°C (32°F).
- More time may be required if the temperature is less than −18°C (0°F). More time may also be required if the hydraulic functions are sluggish.

In order to help the hydraulic components warm up faster, engage the implement controls and disengage the implement controls.

Parking

i05468689

Stopping the Machine

SMCS Code: 7000

NOTICE
Do not engage the parking brake while the machine is moving unless the primary service brake fails.

The use of the parking brake as a service brake in regular operation will cause severe damage to the brake system.

1. Park the machine on a level surface. If necessary to park on a grade, block the wheels.

2. Apply the service brakes in order to stop the machine.

3. Move the transmission control to the NEUTRAL position.

4. Engage the parking brake.

5. Lower the work tool to the ground and apply slight downward pressure.

6. Allow the engine to run for 2 minutes before shutting down.

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

8. DO NOT turn off the battery power disconnect switch until the "Wait to Disconnect Lamp" has turned off. If the switch is turned off when the light is illuminated, then the DEF system will not purge. DEF could freeze and damage the pump and lines.

9. If the machine will not be operated for a month or more, remove the battery disconnect switch key.

i04688469

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 the engine components.

See the following stopping procedure, to allow the engine to cool, and to prevent excessive temperatures in the turbocharger center housing, which could cause oil coking problems.

1. While the machine is stopped, run the engine for 5 minutes at low idle. The engine idle allows hot areas of the engine to cool gradually.

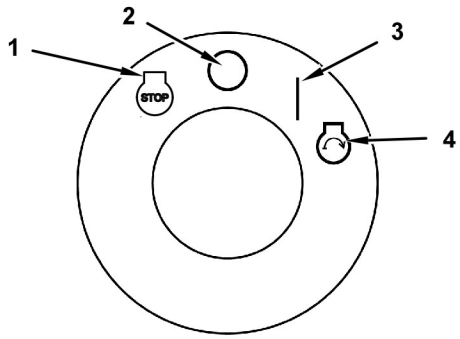

Illustration 138 g02110334

Ignition Keyswitch

(1) Engine Forced Shut down -Stop
(2) Off
(3) On
(4) Start

2. Turn the engine start switch to the OFF position and remove the key. There are several machine features that can occur when stopping the engine.

Engine Idle Shutdown (If Enabled)

The engine can shut down if all of the following conditions exist:

- The machine was warm when started
- The engine is left idling with the transmission in neutral
- No implement control movement
- No throttle movement
- Engine idle shutdown is enabled in the monitoring system.

The control limits the engine speed to 1000 rpm at 20 seconds before shutdown and turns on the action lamp. An alarm sounds for 20 seconds before the engine shuts down.

An operator can move one of the controls in order to cancel a shutdown. Using the left brake pedal to cancel a shutdown is the recommended option for the operator.

Reference: Refer to the Operation and Maintenance Manual, “Operator Controls”, “Engine Idle Shut Down” section for more information.

In order to restart the engine after an engine idle shut down, the keyswitch must be moved into the OFF position. Then turn the keyswitch back to the ON or START position

Key Off Regeneration Cycle (If Enabled)

When the ignition key switch is turned to the OFF position, the system will determine if a regeneration is possible. If the soot level is above 15 percent, the operator will be prompted to initiate a regeneration, if desired. If initiated, the cycle will run for 15 minutes. The cycle may be stopped by pressing the “Disable Regeneration” button. The normal delayed engine shutdown will continue.

Delayed Engine Shut Down

Turn the ignition key switch to the OFF position. If a regeneration is not required or not allowed, the engine may delay shutdown for 5 minutes for the engine to cool down.

Force Shut Down

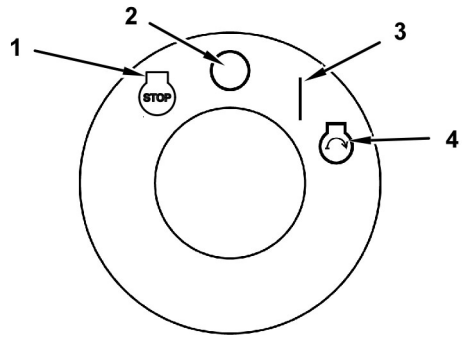

Illustration 139 g02110334

Ignition Keyswitch

(1) Engine Forced Shut down -Stop
(2) Off
(3) On
(4) Start

When the operator determines that an immediate shutdown is necessary, turn the key switch to the STOP position (2). Then turn the key switch in the counter clockwise direction and hold in that position (1) for 2 seconds.

Note: Damage could occur to the machine if the engine is not allowed to cool down before shutdown. Use the forced shutdown only if necessary.

i08067562

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

NOTICE
Perform a walk around inspection after actuation of a shutdown device.

Take necessary corrective action to resolve the cause of the shutdown.

Ensure that no additional damage has been done or could occur before returning to operation.

Turn the engine start switch into the STOP position and hold for 2 seconds. If the engine does not stop, an electrical malfunction exists.

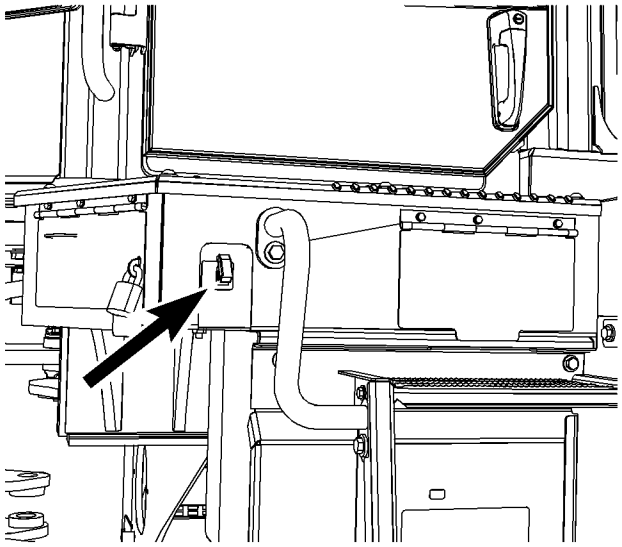

Illustration 140 g02131913

An emergency shutdown switch is located on the left side of the machine near the battery box. Move the switch upward to stop the engine.

i03886978

Equipment Lowering with Engine Stopped

SMCS Code: 7000

1. Turn the engine start switch to the ON position.

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

3. Push the lift control to the LOWER position in order to lower the bucket or the work tool to the ground. The lift control will return to the HOLD position when the control lever is released.

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

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

Note: If the work tools will not lower, the pilot supply on/off solenoid may be inoperable. In this case, proceed to Step 6.

⚠ WARNING

Personal injury or death may occur from failure to adhere to the following warnings.

Keep all personnel away from the boom drop area when lowering the boom with the engine stopped.

Keep all personnel away from the front linkage when lowering the boom.

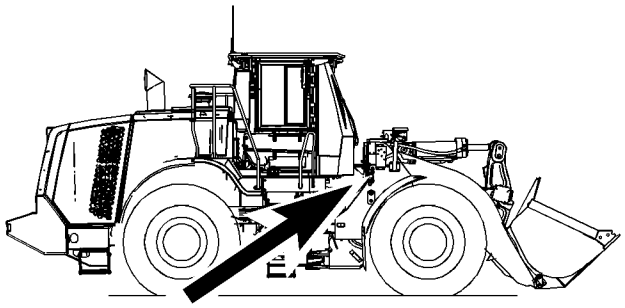

Illustration 141 g02131936

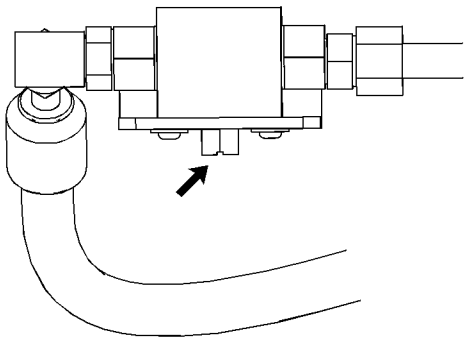

Illustration 142 g01105280

6. A ball valve is located near the right rear of the main control valve. This ball valve is used for manually lowering the work tool. **Slowly turn the square stem in the clockwise direction.** The square stem should be rotated 90 degrees. After the work tool is resting on the ground, rotate the square stem counterclockwise.

i04366934

Leaving the Machine

SMCS Code: 7000

1. Engage the parking brake.

2. Ensure that the engine is shut down and all lights are OFF before leaving the cab. Marker lights, hazard lights, and head lights will remain ON when the ignition switch is turned OFF.

3. Raise the left-hand steering arm rest.

4. Use the steps and the handholds when you get off the machine. Face the machine and use both hands. Make sure that the steps are clear of debris before you dismount.

5. Inspect the engine compartment for debris. Clean out any debris and paper in order to avoid a fire.

6. Remove all flammable debris in order to reduce a fire hazard. Dispose of all debris properly.

7. Always turn the battery disconnect switch to the OFF position before leaving the machine.

8. If the machine will not be operated for a month or more, remove the battery disconnect switch key.

9. Install all covers and all vandalism protection locks.

Transportation Information

i01671778

Shipping the Machine

SMCS Code: 7000; 7500

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance if the machine that is transported has a ROPS, a cab, or a canopy.

Remove ice, snow, or other slippery material from the loading dock and from the transport machine before you load the machine. This will help to prevent slippage of the machine. This will also help to prevent a shift while the machine is moving in transit.

Obey the appropriate laws that govern the parameters of the load (weight, width, and length).

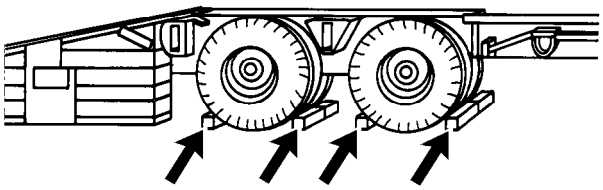

Illustration 143 g00863991

Properly chocked trailer wheels

1. Chock the trailer wheels or the rail car wheels before you load the machine.
2. After the machine is positioned, connect the steering frame lock in order to hold the front frame and the rear frame in place.
3. Lower the bucket or the work tool to the floor of the transport vehicle. Move the transmission control to the NEUTRAL position.
4. Engage the parking brake.
5. Turn the engine start switch to the OFF position. Remove the engine start switch key.
6. Move all of the control levers in order to relieve any trapped pressure.
7. Turn the battery disconnect switch to the OFF position. Remove the battery disconnect switch key.
8. Lock the door and the access covers. Attach any vandalism protection.
9. Secure the machine, any equipment, and any tools with adequate tie-downs in order to prevent movement during shipping.
10. Cover the exhaust opening. The turbocharger (if equipped) should not rotate when the engine is not operating. Damage to the turbocharger can result.

i07487087

Roading the Machine

SMCS Code: 7000

Check with the proper officials to obtain the required licenses and other similar items before roading the machine.

Complete a thorough daily inspection before you mount the machine and before you start the engine.

Reference: For more information, refer to Operation and Maintenance Manual, “Daily Inspection”.

Carry the work tool as low to the ground as possible with the bucket in full rack back. Disable the controls for the work tool when the machine is roaded.

Limitations for TON-kilometer per hour (TON-mile per hour) must be obeyed. Before roading, consult your tire dealer for recommended tire pressures and for speed limitations of the tires.

Inflate the tires to the correct pressure. Use a self-attaching inflation chuck to inflate the tire. Stand behind the tire tread while you inflate the tires.

Reference: For more information, refer to the Operation and Maintenance Manual, “Tire Inflation Information”.

When you road for long distances, schedule stops to allow the tires and the components to cool. Stop for 30 minutes after every 40 km (25 miles) or after every hour.

i03942489

Implement Restraint (Roading)

SMCS Code: 6001; 6107; 7000

The United Kingdom requires all machines that have a height that is greater than 3 m (9.8 ft) or machines that have elevating equipment that can exceed 3 m (9.8 ft) in height to be equipped with a locking device that cannot be operated from the cab.

The restraint is provided with the machine in order to restrain the lift arm in the travel position. Install the restraint between the lift arm and the work tool when you are traveling on public roads. Use the restraint only in accordance with the following instructions:

- The restraint does not replace any existing form of restraint that is provided with this machine.
- The restraint does not supersede any existing form of restraint that is provided with this machine.
- The restraint does not replace any existing feature that will disable the machine.
- All existing restraining devices must continue to be used in accordance with the Operation and Maintenance Manual.
- Keep the restraint with the machine at all times. Inspect the restraint regularly for damage. Any damaged components should be replaced immediately.
- Do not operate the lift arm while the restraint is installed. Activate the hydraulic lockout control after the restraint is installed. Activating the hydraulic lever lock will neutralize the pilot system operation.
- Use the restraint only when you are roading the machine. The restraint must not be used for any other function or operation.
- After you reach your destination, remove the restraint before you operate the lift arm.

Installation of the Implement Restraint

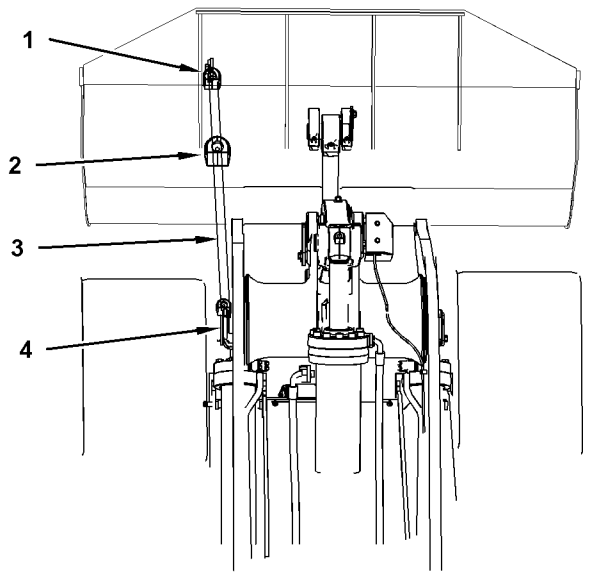

Illustration 144 g02156440

(1) Block on Work Tool
(2) Restraint Ratchet
(3) Restraint
(4) Lifting Eye on Loader Frame

1. Position the lift arm in position for machine roading.
2. Attach one end of the restraint (3) to the block (1) that is located on the work tool.
3. Attach the opposite end of the restraint (3) to the lifting eye (4) on the left side of the loader frame.
4. Secure the restraint with the ratchet (2). Tighten the ratchet in order to remove excess slack. Do not overtighten the restraint.
5. Release the ratchet by pulling the locking plate toward the handle.

i05202342

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

⚠ WARNING

Improper lifting and improper tie-downs can allow the load to shift or fail and cause injury or damage. Use only properly rated cables and slings with lift and tie down points provided.

Follow the instructions in Operation and Maintenance Manual, “Lifting and Tying Down the Machine” for the proper technique for securing the machine. Refer to Operation and Maintenance Manual, “Specifications” for specific weight information.

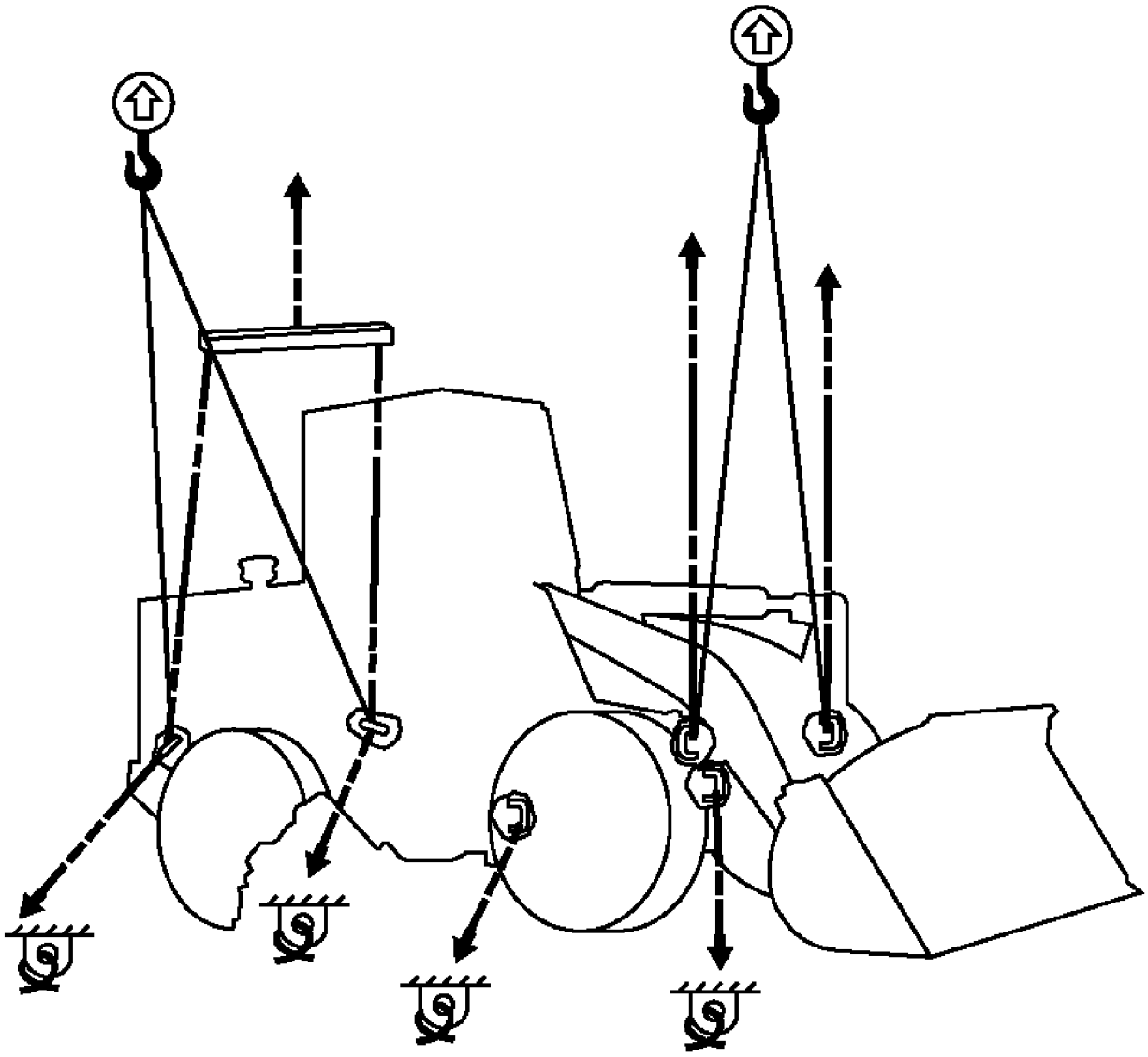

Illustration 145 g02537822

NOTICE
Improper lifting or tie-downs can allow the load to shift and cause injury or damage. Install the steering frame lock link before lifting.

Ensure that the lift arms are in fully lowered position before lifting the machine.

Check all of the laws that govern the load characteristics (height, weight, width, and length).

Reference: For shipping instructions, refer to Operation and Maintenance Manual, “Shipping the Machine”.

Lifting the Machine

Note: Do not use handles or steps in order to lift the machine. Do not use the work tool for a lifting point.

Note: The machine shipping weight that is listed is the weight of the most common configuration of the machine. If attachments have been installed on your machine, the weight of your machine and the center of gravity of your machine may vary.

Reference: Refer to Operation and Maintenance Manual, “Specifications” for the dimensions and weight of the machine.

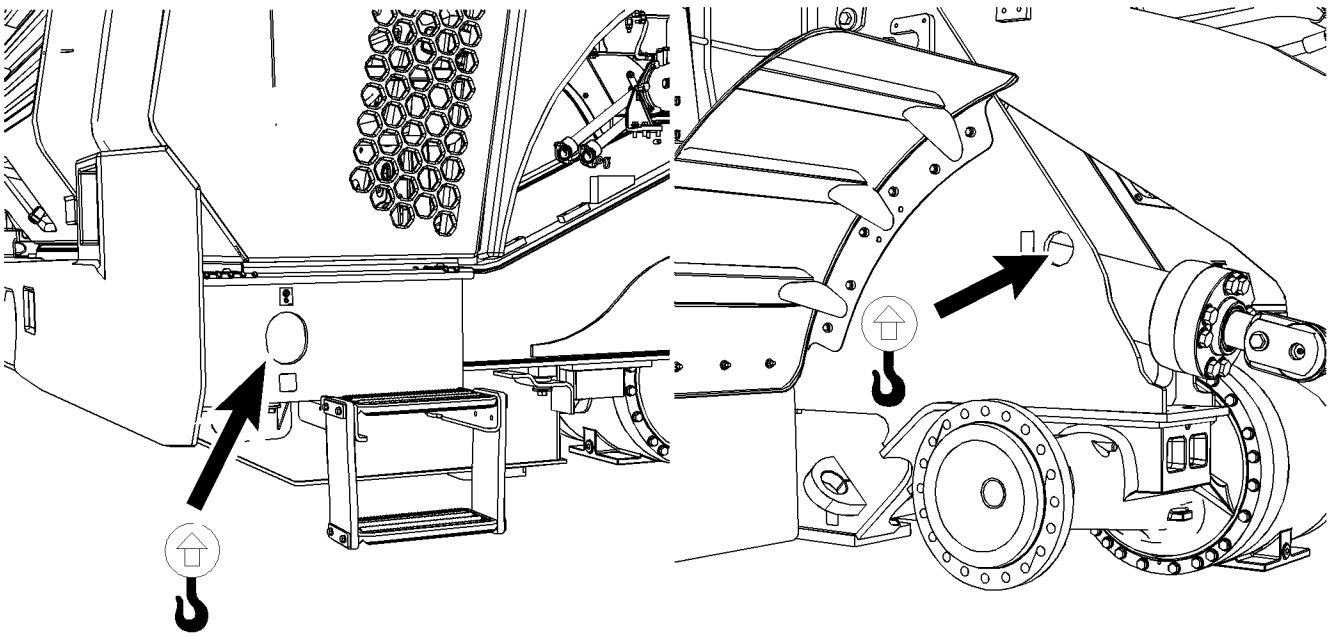

Illustration 146 g02889805

The lifting eyes are identified by a label that shows a hook.

Lifting Point – In order to lift the machine, attach the lifting devices to the lifting points.

Use properly rated cables and properly rated slings to lift the machine.

Remove the tread plate above the rear lifting hole on each side of the machine. Raise the hood to access all of the bolts.

Position the crane or the lifting device in order to lift the machine in a level position.

The width of the spreader bar must be sufficient to prevent the lifting cables or the lifting straps from contacting the machine.

Do not allow any personnel in the area around the machine.

1. Engage the parking brake before you sling the machine and before you secure the machine with tie-downs.
2. Install the frame lock pin prior to lifting the machine.
3. Attach two lifting cables to the rear of the machine. There is one lifting eye on each side of the rear of the machine.
4. Attach two lifting cables to the front of the machine. There is one eye on each side of the front of the machine.
5. Connect the four lifting cables to the spreader bars. The spreader bars must be centered over the machine.
6. If equipped, secure any attachments.
7. Lift the machine. Move the machine to the desired position.
8. When the machine is positioned, place the blocks behind the tires.

Tying Down the Machine

Note: Do not use handles or steps in order to tie down the machine. Do not use the work tool to tie down the machine. Do not wrap chains around the rear axle to tie down the machine. Avoid using the front axle as a tie down location whenever possible

There may be more than one way to tie down the machine. Local regulations should be used to determine the best method. Obey all local and regional governmental regulations.

Note: The machine shipping weight that is listed is the weight of the most common configuration of the machine. If attachments have been installed on your machine, the weight of your machine and the center of gravity of your machine may vary.

Reference: Refer to Operation and Maintenance Manual, “Specifications” for the dimensions and weight of the machine.

Note: Use only the specified locations for tying down the machine. Use the rear retrieval hitch and the bottom of the butterfly plate as optional tie down locations. Do not use any other locations in order to tie down the machine.

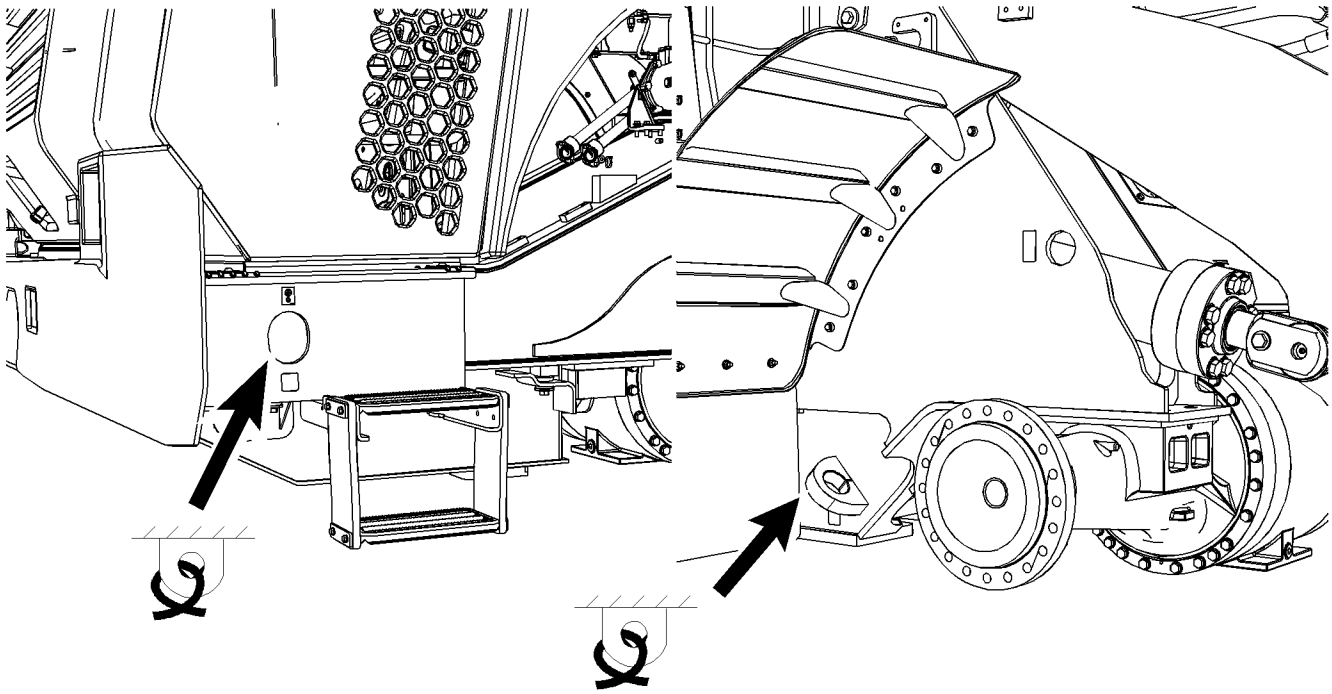

Illustration 147 g02889807

Tie Down Point – In order to tie down the machine, attach the tie-downs to the tie down points.

Use properly rated cables and shackles for tying down the machine.

Secure the machine at the tie-down positions. The positions are identified on the machine by a label.

Use the front eyes and the rear eyes that are provided on the lower frame of your machine. Use corner protection when necessary. Avoid routing cables over the tires, and the rear axle. Avoid contact with the work tool to prevent false tension. If necessary, remove the steps at the rear of the machine for proper access to the tie down point.

Install tie-downs at all four locations. Place wheel chocks in front of the machine and behind the machine.

Consult your Cat dealer for shipping instructions for your machine.

Towing Information

i04346322

Machine Retrieval

SMCS Code: 7000

⚠ WARNING

Personal injury or death could result when towing a disabled machine incorrectly.

Block the machine to prevent movement before releasing the brakes. The machine can roll free if it is not blocked.

⚠ WARNING

Personal injury or death can result from brake malfunction.

Make sure all necessary repairs and adjustments have been made before a machine that has been towed to a service area, is put back into operation.

NOTICE
This machine is not designed to allow for towing of attachments. The hitch is for machine retrieval only.

To perform the towing procedure properly, use the following recommendations.

This machine is equipped with spring-applied, oil pressure released parking brakes. If the engine or the brake oil system is inoperable, the parking brakes are applied and the machine cannot be moved.

Use these towing instructions for moving a disabled machine over a short distance of 8 kilometers (5 miles) or less. Do not move the machine faster than 3 km/h (2 mph). Move the machine to a convenient location for repair. Always haul the machine if long distance moving is required.

Shielding must be provided on the towing machine in order to protect the operator in case the tow line or the tow bar breaks.

Do not allow riders on a machine that is being towed unless the operator can control the steering and/or the braking.

Before you tow the machine, inspect the tow line or the tow bar. Make sure that the tow line or the tow bar is sturdy enough for towing the disabled machine. The tow line or the tow bar must have a strength that is equal to 1.5 times the gross weight of the machine that is being towed.

Do not use a chain for pulling. A chain link may break causing personal injury. Use a wire rope that has cable loops or end rings. Position an observer at a safe location. The observer should stop the pulling procedure if the cable starts to break or the cable starts to unravel. If the towing machine moves without the pulled machine, stop the pulling procedure.

Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

Quick machine movement could overload and break the tow line or the tow bar. Gradual, smooth machine movement works better.

Normally, the towing machine should be as large as the disabled machine. The towing machine must have enough brake capacity, enough weight, and enough power for the grade and distance that is involved.

Connect a larger machine or additional machines to the disabled machine in order to provide sufficient control and sufficient braking. Control of the disabled machine must be maintained at all times.

The requirements for all different situations cannot be specified. Minimal towing machine capacity is required on smooth, level surfaces. Maximum towing machine capacity is required on inclines or on poor surface conditions.

Any towed machine with a load must be equipped with a braking system that can be operated from the operator compartment.

Consult your Cat dealer for more information about towing a disabled machine.

Towing with a Running Engine

If the engine is running, the machine can be towed for a short distance under certain conditions. The power train and the steering system must be operable. **Tow the machine for a short distance only.** For example, pull the machine out of mud or to the side of the road.

The operator on the towed machine must steer the machine in the direction of the tow line.

Carefully obey all of the instructions that are outlined in this topic.

Towing with a Stopped Engine

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.

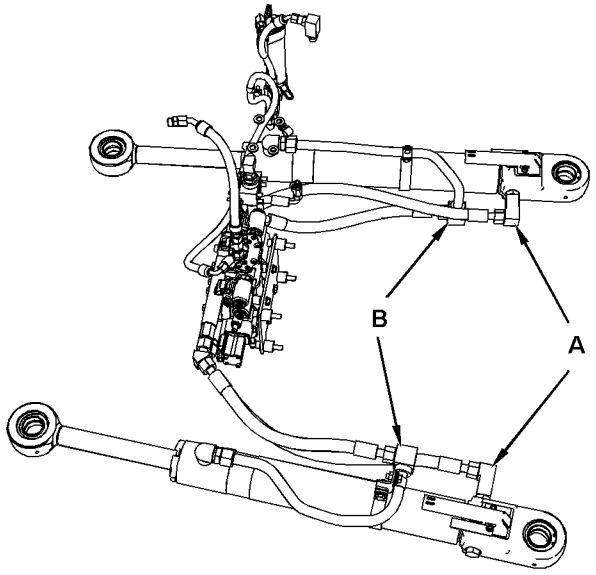

Illustration 148 g02501316
(A) Rod end. (B) Head end.

Perform the following steps before you tow the machine.

1. Reverse the hydraulic steering hose connections on one cylinder only allowing the steering cylinders to move freely.

Note: Make sure that the cylinder hoses are connected correctly before you operate the machine again. The steering system will not function if the hose connections are reversed.

2. If failure of the internal transmission or of the drive train is suspected, remove the center drive shaft and remove the rear drive shaft.

Reference: For the removal procedure for the drive shafts, refer to the Disassembly and Assembly manual for the power train or consult your Cat dealer.

3. Release the parking brake in order to prevent excessive wear and damage to the parking brake system while the machine is being towed.

Reference: For information about the manual release of the parking brake, refer to Operation and Maintenance Manual, “Parking Brake Manual Release”.

4. Fasten the tow bar or the tow line between the disabled machine and the towing machine.

5. Tow the machine slowly. Do not exceed 3 km/h (2 mph).

i04555320

Parking Brake Manual Release

SMCS Code: 4267; 7000

⚠ WARNING

Personal injury or death can result from a brake malfunction. Do not operate the machine if the brake was applied due to a malfunction of the oil system or the brake.

Correct any problem before attempting to operate the machine.

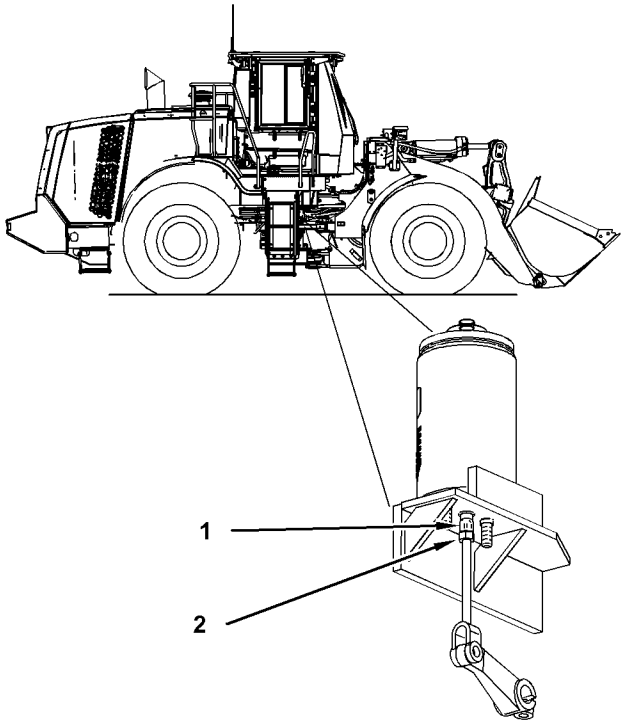

Illustration 149 g02131957

The parking brake actuator is mounted inside the front loader frame on the right side of the machine.

1. Chock the wheels in order to keep the machine from rolling when the parking brake is released.

2. Connect the steering frame lock.

3. Loosen locknut (2) by 18 mm (3/4 inch). Turn rod (1) until the rod moves out enough to release the parking brake totally.

Note: Before you park the machine, the parking brake must be engaged again.

Engine Starting (Alternate Methods)

i04284010

Engine Starting with Auxiliary Start Receptacle

SMCS Code: 1463

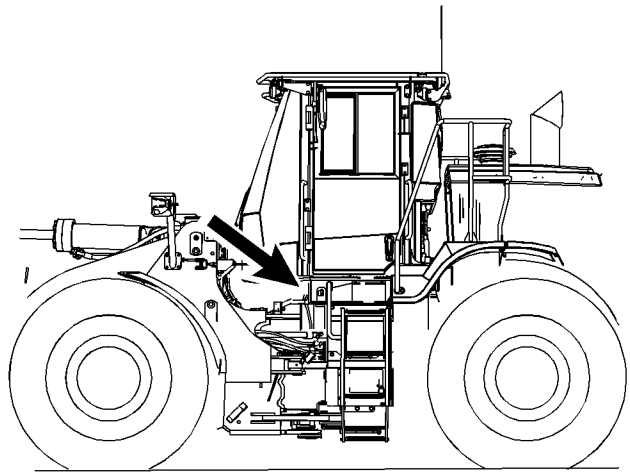

Illustration 150 g02132036

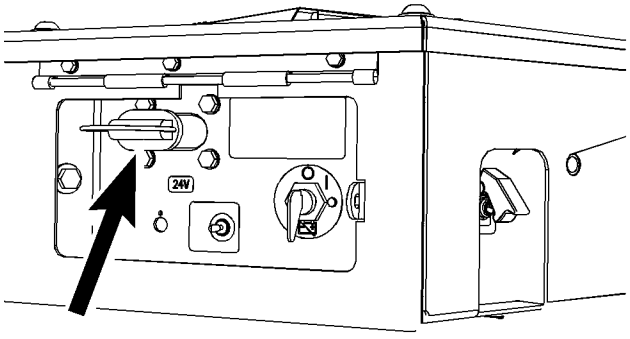

Illustration 151 g02131994

There are two cable assemblies that can be used to jump-start the stalled machine. You can jump-start the stalled machine from another machine that is equipped with an auxiliary start receptacle or with an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

1. Determine the reason that the engine will not start.

Reference: Refer to Special Instruction, SEHS7633, “Battery Test Procedure” for more information.

2. Move the transmission direction control lever on the stalled machine to NEUTRAL. Engage the hydraulic lockout control. Engage the parking brake. Lower all work tools to the ground. Move all controls to HOLD.

3. Turn the engine start switch key on the stalled machine to the OFF position. Turn off all accessories.

4. Turn the battery disconnect switch on the stalled machine to ON.

5. Move the machine that is being used as a power source close to the stalled machine. The jump-start cables should reach the batteries on both machines. **DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.**

6. Stop the engine on the machine that is being used as a power source. If you use an auxiliary power source, turn off the charging system.

7. Connect the appropriate jump-start cable to the auxiliary start receptacle on the stalled machine.

8. Connect the other end of the jump-start cable to the auxiliary start receptacle of the machine that is being used as a power source.

9. Start the engine on the machine that is being used as a power source or energize the charging system on the auxiliary power source.

10. Allow the machine that is being used as a power source to charge the batteries for 2 minutes.

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.

i04555352

Engine Starting with Jump Start Cables

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 the 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.

When using jumper cables, always connect the positive (+) jumper cable to the positive (+) battery terminal first. Next, connect the negative (-) jumper cable to the frame away from the batteries. Follow the procedure in the Operation and Maintenance Manual.

Jump start only with an energy source of 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.

⚠ WARNING

Do not attempt to charge a battery that has ice in any of the cells.

Charging a battery in this condition can cause an explosion that may result in personal injury or death.

Always let the ice melt before attempting to charge.

NOTICE
When starting from another machine, make sure that the machines do not touch. This can prevent damage to engine bearings and electrical circuits.

Turn on (close) the battery disconnect switch prior to the boost connection to prevent damage to electrical components on the stalled machine.

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.

This machine has a 24 volt starting system. Use only the same voltage for jump starting. Use of a higher voltage damages the electrical system.

Use of Jump Start Cables

1. Place the transmission control on the stalled machine in the NEUTRAL position. Engage the parking brake. Lower all attachments to the ground. Move all controls to the HOLD position.
2. On the stalled machine, turn the engine start switch to the OFF position. Turn off the accessories.
3. On the stalled machine, turn the battery disconnect switch to the ON position.
4. Move the machine or the auxiliary power source close to the stalled machine so that the cables can reach. **DO NOT ALLOW THE MACHINE OR THE AUXILIARY POWER SOURCE TO CONTACT THE STALLED MACHINE.**
5. Stop the engine on the machine that is the electrical source. (If you are using an auxiliary power source, turn off the charging system.)

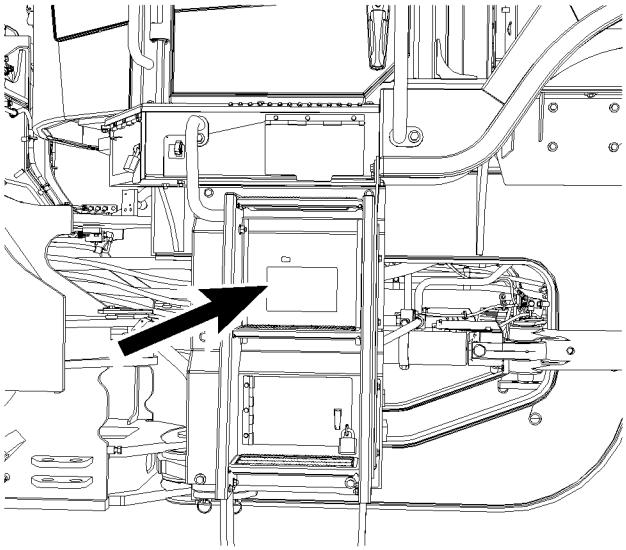

Illustration 152 g02132055

6. The batteries are located on the left side of the machine. Remove the bolts that secure the access panel for the batteries. Remove the access panel.

7. Check the battery caps for correct placement and for correct tightness. Make these checks on both machines. Make sure that the batteries in the stalled machine are not frozen. Check the batteries for low electrolyte.

8. Route the jump-start cables around the steps and away from the mounting and dismounting paths. Connect the positive jump-start cable to the positive cable terminal of the discharged battery.

Do not allow positive cable clamps to contact any metal except for battery terminals.

Note: Batteries in series may be in separate compartments. Use the terminal that is connected to the starter solenoid. This battery is normally on the same side of the machine as the starter.

9. Connect the positive jump-start cable to the positive terminal of the electrical source. Use the procedure from Step 8 in order to determine the correct terminal.

10. Connect one end of the negative jump-start cable to the negative terminal of the electrical source.

11. Make the final connection. Connect the negative cable to the frame of the stalled machine. Make this connection away from the battery, away from the fuel, away from the hydraulic lines, and away from all moving parts.

12. Start the engine of the machine that is the electrical source. (If you are using an auxiliary power source, energize the charging system on the auxiliary power source.)

13. Allow the electrical source to charge the batteries for 2 minutes.

14. Attempt to start the stalled engine.

Reference: For more information, refer to Operation and Maintenance Manual, “Engine Starting”.

15. Immediately after the stalled engine starts, disconnect the jump-start cables in reverse order.

Maintenance Section

Tire Inflation Information

i02096880

Tire Inflation with Nitrogen

SMCS Code: 4203

Caterpillar recommends the use of dry nitrogen gas for tire inflation and for tire pressure adjustments. This includes all machines with rubber tires. Nitrogen is an inert gas that will not aid combustion inside the tire.

⚠ WARNING

Proper nitrogen inflation equipment, and training in using the equipment, are necessary to avoid over inflation. A tire blowout or rim failure can result from improper or misused equipment and personal injury or death can occur.

A tire blowout and/or rim failure can occur if the inflation equipment is not used correctly, due to the fact that a fully charged nitrogen cylinder's pressure is approximately 15000 kPa (2200 psi).

There are other benefits to using nitrogen in addition to reducing the risk of an explosion. The use of nitrogen for tire inflation lessens the slow oxidation of the rubber. Use of nitrogen also slows gradual tire deterioration. This is especially important for tires that are expected to have a long service life of at least four years. Nitrogen reduces the corrosion of rim components. Nitrogen also reduces problems that result from disassembly.

⚠ WARNING

A tire blowout or a rim failure can cause personal injury.

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire, to prevent personal injury.

Note: Do not set the tire inflation equipment regulator higher than 140 kPa (20 psi) over the recommended tire pressure.

Use 6V-4040 Inflation Group or an equivalent inflation group to inflate tires with a nitrogen gas cylinder.

Reference: For tire inflation instructions, refer to Special Instruction, SMHS7867, “Nitrogen Tire Inflation Group”.

For nitrogen inflation, use the same tire pressures that are used for air inflation. Consult your tire dealer for operating pressures.

i02284174

Tire Inflation Pressure

SMCS Code: 4203; 7500

The tire inflation pressure for machines that are shipped from the factory is suitable for shipping only. Always obtain the proper tire inflation pressures for your machine from the tire supplier before placing the machine into operation. The recommended tire inflation pressures for the front tires and for the rear tires will vary for each application.

Proper tire inflation pressure and maintenance of the tire inflation pressure is critical for optimum tire life. The tire inflation pressure should always be obtained from the tire supplier due to changes in the technology of tires, equipment, and job applications.

Reference: Refer to the latest edition of Special Publication, “Caterpillar Performance Handbook” for general information on tire inflation pressure.

i02610518

Tire Inflation Pressure Adjustment

SMCS Code: 4203

Always obtain the proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. The tire pressure in a warm shop area 18° to 21°C (65° to 70°F) will significantly change when you move the machine into freezing temperatures. If you inflate the tire to the correct pressure in a warm shop, the tire will be underinflated in freezing temperatures. Low pressure shortens the life of a tire.

Reference: When you operate the machine in freezing temperatures, refer to Special Publication, SEBU5898, “Cold Weather Recommendations for All Caterpillar Machines” in order to adjust tire inflation pressures.

Lubricant Viscosities and Refill Capacities

i05873497

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.

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold Weather TDTO is recommended.

Caterpillar has determined that Medium Wheel Loaders equipped with the High Ambient Cooling Attachment can operate with Cat HYDO Advanced 10 Hydraulic System Oil in ambient temperatures from −20° C (−4° F) to 50° C (122° F).

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

In order 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. In order 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 in order to provide the full performance and life that has been designed and built into Cat engines.

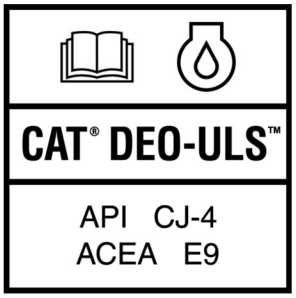

Illustration 153 g02448560

Cat DEO-ULS or oils that meet the Cat ECF-3 specification and the API CJ-4 are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification and the API CJ-4 and ACEA E9 oil categories have been developed with limited sulfated ash, phosphorus, and sulfur. These chemical limits are designed to maintain the expected aftertreatment devices life, performance, and service interval. If oils meeting the Cat ECF-3 specification and the API CJ-4 specifications are not available, oils meeting ACEA E9 may be used. ACEA E9 oils meet the chemical limits designed to maintain aftertreatment device life. ACEA E9 oils are validated using some but not all ECF-3 and API CJ-4 standard engine performance tests. Consult your oil supplier when considering use of an oil that is not Cat ECF-3 or API CJ-4 qualified.

Failure to meet the listed requirements will damage aftertreatment-equipped engines and can negatively impact the performance of the aftertreatment devices. The Diesel Particulate Filter (DPF) will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)
- Selective Catalytic Reduction (SCR)
- Lean NOx Traps (LNT)

Other systems may apply.

Table 17

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Engine Crankcase	**Cat DEO-ULS Cold Weather**	SAE 0W-40	−40	40	−40	104
	Cat DEO-ULS	SAE 10W-30	−18	40	0	104
	Cat DEO-ULS	SAE 15W-40	−9.5	50	15	122

Hydraulic Systems

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

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

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

Cat HYDO Advanced fluids have a 50% increase in the standard oil drain interval for machine hydraulic systems (3000 hours versus 2000 hours) over second and third choice oils when you 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. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. 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

If noise is a problem in the hydraulic system, 1U-9891 oil additive may be used in the hydraulic system. This additive is a friction modifier that helps reduce the noise level.

Table 18

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** (1) Cat TDTO	SAE 10W	−20	40	−4	104
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	0	50	32	122
	Cat BIO HYDO Advanced	“ISO 46” Multi-Grade	−30	45	−22	113
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	−20	40	−4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	−15	50	5	122
	Cat TDTO-TMS	Multi-Grade	−15	50	5	122
	Cat DEO-ULS Cold Weather	SAE0W-40	−40	40	−40	104
	Cat TDTO Cold Weather	SAE 0W-20	−40	40	−40	104

(1) Cat has determined that machines equipped with the High Ambient Cooling Attachment can operate with Cat HYDO Advanced 10 Hydraulic System Oil in ambient temperatures from −20° C (−4° F) to 50° C (122° F).

Transmission and Axles

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.

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.

Table 19

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Performance Requirements**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Power Shift Transmission	**Cat TDTO Cold Weather**	SAE 0W-20	−40	10	−40	50
	Cat TDTO	SAE 10W	−20	10	−4	50
		SAE 30	0	35	32	95
		SAE 50	10	50	50	122
	Cat TDTO-TMS	Multi-Grade	−20	43	4	110
CV Transmission	**Cat TDTO-TMS**	Multi-Grade	−20	43	4	110
Drive Axles	**Cat TDTO Cold Weather**	SAE 0W-20	−40	0	−40	32
	Cat TDTO	SAE 10W	−25	15	−13	59
		SAE 30	−20	43	−4	110
		SAE 50	10	50	50	122
	Cat TDTO-TMS	Multi-Grade	−30	43	−22	110

Special Lubricants

Grease

In order 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 20

Recommended Grease						
Compartment or System	**GreaseType**	**NLGI Grade**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
External Lubrication Points	**Cat Prime Application**	NLGI Grade 2	−20	40	−4	104
	Cat Extreme Application	NLGI Grade 2	−30	50	−22	122
		NLGI Grade 1	−35	40	−31	104
		NLGI Grade 0	−40	35	−40	95
	Cat Extreme Application-Arctic	NLGI Grade 0	−50	20	−58	68
	Cat Extreme Application-Desert	NLGI Grade 2	−20	60	−4	140
Steering Column(1) **Drive Shaft Universal Joints**(2) **Drive Shaft Support Bearing**	**Cat Utility**	NLGI Grade 2	−30	40	−22	104

(1) HMU Steering
(2) 980 Drive Shaft Universal Joints are maintenance free.

Grease for the Autolube System

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

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

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

Table 21

Recommended Grease for the Autolube System				
Compartment or System	**GreaseType**	**NLGI Grade**	**°C**	**°F**
			Min	**Min**
Cat Autolube System	**Cat Prime Application**	NLGI Grade 2	−18	0
	Cat Extreme Application	NLGI Grade 2	−7	20
		NLGI Grade 1	−18	0

(continued)

(Table 21, contd)

Recommended Grease for the Autolube System				
Compartment or System	GreaseType	NLGI Grade	°C	°F
			Min	Min
		NLGI Grade 0	−29	−20
	Cat Extreme Application-Arctic	NLGI Grade 0	−43	−45
	Cat Extreme Application-Desert	NLGI Grade 2	2	35

Diesel Fuel Recommendations

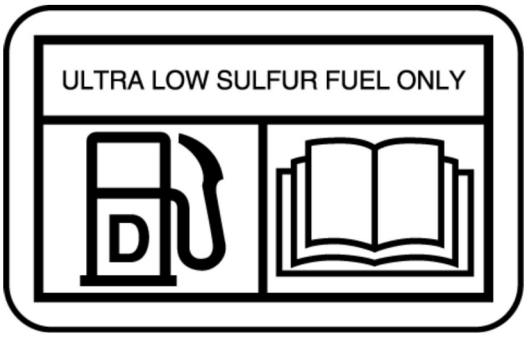

Illustration 154 g02157153
NACD Film

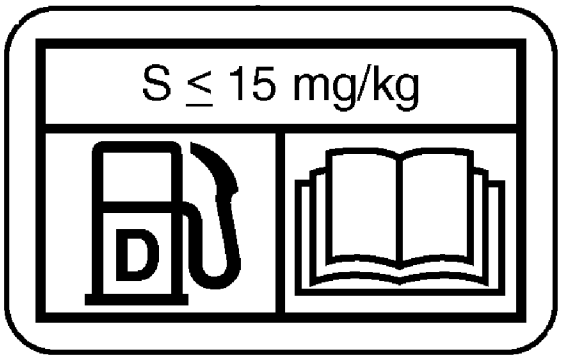

Illustration 155 g02052934
EAME Film

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

NOTICE
Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤10ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

Misfueling with fuels of higher sulfur level will invalidate the warranty and have the following negative effects:

- **Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)**
- **Adversely impact the performance and life of aftertreatment devices (cause loss of performance)**
- **Reduce regeneration intervals of aftertreatment devices**
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

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

Caterpillar does not require the use of ULSD in off road and machine applications that are not Tier 4/ Stage IIIB certified engines. ULSD is not required in engines that are not equipped with after treatment devices. For Tier 4/Stage IIIB/Stage IV certified engines always follow operating instructions. Fuel tank inlet labels are installed in order to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels, lubricants, and Tier 4 requirements. This manual may be found on the Web at Safety.Cat.com.

Fuel Additives

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

Biodiesel

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

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

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

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (15 ppm sulfur or less, per “ASTM D975”). In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel (10 ppm sulfur or less, per “EN 590”). The final blend must have 15 ppm sulfur or less.

Note: Up to B20 biodiesel blend level is acceptable for use in Medium Wheel Loader engines.

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

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

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

Coolant Information

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

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

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/ Coolant)

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

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Capacities (Refill)

SMCS Code: 7560

The refill capacities will vary depending on the service procedures and conditions.

Note: Observe all sight gauges and level indicators in order to ensure that the systems and/or compartments are refilled to the proper levels.

Table 22

Approximate Refill Capacities 966K and 972K			
Compartment or System	**Liters**	**US Gal**	**Imp Gal**
Cooling System	66	17.4	14.5
Fuel Tank	380	100	83.5
Engine Crankcase	24.5	6.5	5.4
Transmission	50	13.2	11.0
Hydraulic Tank(1)	144	38.0	31.7
Two-Valve Hydraulic System(2)	198	52.3	45.3
Three-Valve Hydraulic System(2)	203	53.6	44.6

(continued)

(Table 22, contd)

Approximate Refill Capacities 966K and 972K			
Compartment or System	**Liters**	**US Gal**	**Imp Gal**
Front Drive Axle(3)	64	16.9	14.1
Rear Drive Axle(3)	64	16.9	14.1
Automatic Lubrication System Tank	4	1	.88

(1) This capacity is only for the hydraulic tank.
(2) This capacity includes the hydraulic tank, the hydraulic lines, and all hydraulic components and attachments.
(3) The amount that is shown includes 1 L (0.3 US gal) of 1U-9891 Hydraulic Oil Additive.

Table 23

Component or System	kg	lbs	Recommended Type
Refrigerant(1)	1.8	4.0	R-134a

(1) Refer to Service Manual, UENR4125, “Air Conditioning and Heating R-134a for All Caterpillar Machines” for additional information

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for detailed information about fluids and lubricants. This manual may be found on the Web at Safety.Cat.com.

Reference: For refill capacities on the air conditioner system, refer to Service Manual, SENR5664, “Specifications” “System Capacities for Refrigerant”.

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S·O·S Information

SMCS Code: 1348; 1350; 3080; 4070; 4250; 4300; 5050; 7542

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

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

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

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

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

Maintenance Support

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System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 3000-553-PX; 4250-553-PX; 4300-553-PX; 5050-553-PX; 6700-553-PX; 7540-553-PX

⚠ WARNING

Personal injury or death can result from sudden machine movement.

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

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

Coolant System

⚠ WARNING

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

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

Hydraulic System

⚠ WARNING

Hydraulic oil pressure can remain in the hydraulic system on this machine after the engine and pump have been stopped. Serious injury can result if this pressure is not released before any service is done on the hydraulic system. In order to prevent possible injury, release the hydraulic system pressure before working on any fitting, hose, or hydraulic component.

Lower all work tools to the ground before service is started. If the hydraulic system must be serviced, tested, or adjusted with the work tool in the raised position, the work tool and lift cylinders must be supported properly.

Always move the machine to a location away from the travel of other machines. Be sure that other personnel are not near the machine when the engine is running and tests or adjustments are being made.

⚠ WARNING

Escaping fluid under pressure, even a pinhole size leak, can penetrate body tissue, causing serious injury, and possible death. If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury.

Always use a board or cardboard when checking for a leak.

⚠ WARNING

Pressurized System!

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

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

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

Note: Use this procedure to drain pressure from all accumulators and release trapped pressure in all systems.

1. Park the machine on a hard, smooth, level surface. The location should also be dry and free of debris.
2. Permit only one operator on the machine. All other personnel should be kept away from the machine.
3. If the machine is equipped with a ride control system, place the ride control system into “Service”.mode. Push the ride control button on the keypad and hold for 2 seconds to put the ride control in service mode.

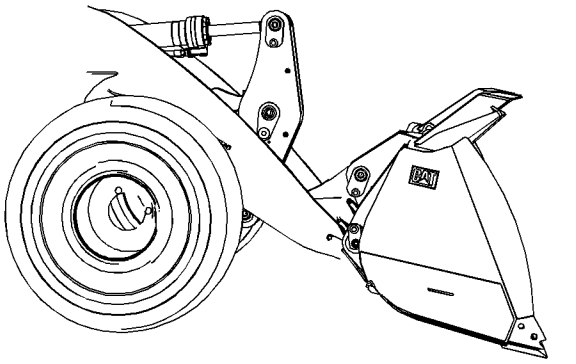

Illustration 156 g02727672

4. Position the bucket or the work tool just above the ground at a slight downward angle. This position will ensure that the head end of the lift cylinders is pressurized.

5. Engage the parking brake.

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

7. When the engine has stopped, turn the engine start switch back to the ON position so the pilot oil can reach the main valve.

8. Move the implement lockout switch to the UNLOCKED position.

9. Move the lift control lever to the FLOAT position and the tilt control lever to the TILT BACK position at the same time. This action allows the bucket or the work tool to tilt back while the boom is lowered.

The bottom of the bucket or the work tool should rest flat on the ground. The weight of the linkage should be supported by the ground. The pressure from the head end of the lift cylinders and from the ride control accumulator is now vented to the hydraulic tank.

10. When the bucket or the work tool has settled to the ground, move both control levers to the HOLD position. Cycle the control levers through all positions several times to purge any remaining pressure from the implement hydraulic system. This action will completely drain the pilot accumulator.

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

12. Slowly loosen the hydraulic tank filler cap to release the pressure from the hydraulic tank.

13. After all the pressure has been released, tighten the hydraulic tank filler cap. The hydraulic system pressure has now been released. Hydraulic lines and components can now be removed.

Release Procedure (Steering System and Braking 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.

⚠ WARNING

Escaping fluid under pressure, even a pinhole size leak, can penetrate body tissue, causing serious injury, and possible death. If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury.

Always use a board or cardboard when checking for a leak.

1. Park the machine on a hard, smooth, level surface. The location should also be dry and free of debris.

2. Straighten the machine and install the steering link.

3. Lower the bucket to the ground and stop the engine.

4. Engage the parking brake.

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

6. Move the left-hand steering control or turn the steering wheel (if equipped) fully to the left and fully to the right several times to relieve the pressure in the steering system.

7. Depress the brake pedal repeatedly to release any pressure in the braking system. When no more resistance is felt and no pressure release is heard, the braking system pressure is released.

Note: If the machine is equipped with the Steel Mill Override Controls, refer to "Machine Override Controls (Steel Mill If Equipped)" for more information. Pressure may be stored in the override accumulators. To release the accumulator pressure, perform steps 9 thought 12 below. Otherwise, proceed directly to step 14.

8. Ensure that the wheels are chocked to prevent possible movement.

9. Place the rear parking brake override switch in the upper position. If the pressure test lamp illuminates, there is pressure remaining in the override accumulators.

10. Place the rear parking brake override switch in the lower position. The parking brake will release and the parking brake status lamp will turn off.

11. Return the parking brake override switch to the upper position.

12. Repeat steps 10 and 11 until both of the following occur:

- The pressure test lamp does not illuminate when the switch is placed in the upper position.
- The parking brake status lamp does not turn off when the switch is placed in the lower position.

13. Place the rear parking brake override switch in the middle, neutral position.

Note: Failure to place the override switch in the middle, neutral position may cause the parking brake to remain off when the machine is restarted.

14. Slowly loosen the hydraulic tank filler cap to release the pressure from the hydraulic tank.

15. After all the pressure has been released, tighten the hydraulic tank filler cap. The hydraulic system pressure has now been released. Hydraulic lines and components can now be removed.

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Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

Do not weld on any protective structure. If repairs are needed to the protective structure, consult your Cat dealer.

Never weld on the machine while the machine electronics are still connected. Disconnect all electronic components to prevent damage to the components.

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

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

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

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

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

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

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

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Severe Service Application

SMCS Code: 1000; 7000

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

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

- Reliability
- Service life

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

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

Severe Environmental Factors

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

Severe Operating Conditions

- Frequent operation with inlet air which has a corrosive content
- Operation with inlet air which has a combustible content
- Operation which is outside of the intended application
- Operation with a plugged fuel filter
- Extended operation at low idle (more than 20% of hours)
- Frequent cold starts at temperatures below 0° C (32° F)
- Frequent dry starts (starting after more than 72 hours of shutdown)
- Frequent hot shutdowns (shutting down the engine without the minimum of 2 minutes to 5 minutes of cool down time)
- Operation above the engine rated speed
- Operation below the peak torque speed
- Operating with fuel which does not meet the standards for distillate diesel fuel as stated in Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “Distillate Diesel Fuel”
- Operating with a blend of distillate fuel which contains more than 20 percent biodiesel

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

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

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Prepare the Machine for Maintenance

SMCS Code: 1000; 7000

1. Move the machine to a dry, level, solid surface that is free of any debris.

Note: The surface must be solid enough to support the weight of the machine and any tooling that is used to support the machine.

2. Move the transmission control to the NEUTRAL position. Engage the parking brake. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

3. Lower the work tool to the ground.

4. Ensure that the pressure is released from any closed system that will be opened during the maintenance procedure. Refer to Operation and Maintenance Manual, “System Pressure Release” for more information.

This machine is equipped with lockout controls to suit the following types of machine maintenance.

Maintenance with the Engine Running

For maintenance that requires the engine to be running, perform the following:

1. Run the engine at an idle.

2. Deactivate the implements by using the implement lockout switch. Refer to Operation and Maintenance Manual, “Operator Controls” for more information.

Maintenance without the Engine Running

For maintenance that does not require the engine to be running, perform the following:

1. Move the engine start switch to the OFF position.

Maintenance with Electrical System Disabled

For maintenance that requires the electrical system to be disabled, perform the following:

1. Move the engine start switch to the OFF position.

2. Move the battery disconnect switch to the OFF position. Refer to Operation and Maintenance Manual, “Battery Disconnect Switch” for the proper procedure.

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Maintenance Interval Schedule

SMCS Code: 7000

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

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

Products that operate in severe operating conditions or that experience abnormally high fuel consumption, may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

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

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

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

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“ Window Wiper - Inspect/Replace” 225

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“ Open Crankcase Ventilation (OCV) Fumes Disposal Filter - Replace” 214
“ Service Brake Wear Indicator - Check” 220

Every 2500 Service Hours

“ Engine Valve Lash - Check” 196

Every 3000 Service Hours

“ Hydraulic System Oil - Change” 207

Every 3 Years

“ Seat Belt - Replace”. 218

Every 4000 Service Hours

“ Receiver Dryer (Refrigerant) - Replace”. 216

Every 5000 Service Hours

“ ARD Spark Plug - Clean”. 170
“ Diesel Particulate Filter - Clean” 185
“ Fuel Priming Pump - Replace” 198

Every 6000 Service Hours

“ Cooling System Coolant Extender (ELC) - Add” 182

Every 12 000 Service Hours

“ Cooling System Coolant (ELC) - Change” 181
“ Cooling System Water Temperature Regulator - Replace” 185

i05374672

ARD Spark Plug - Clean

SMCS Code: 1555-070

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.

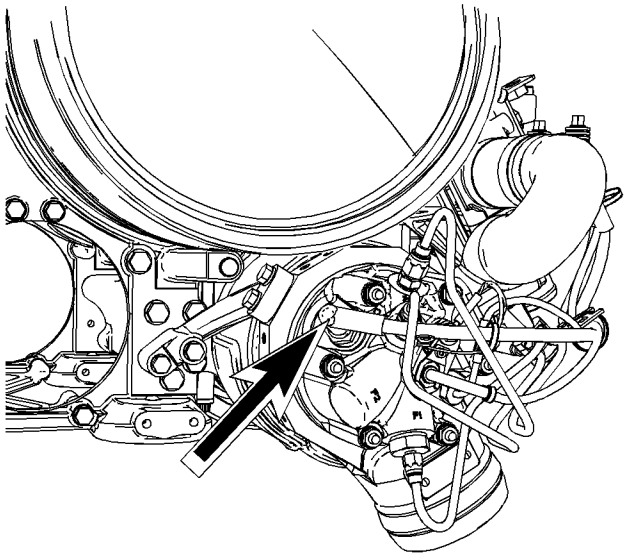

Illustration 157 g02140195

1. Remove the wire harness from the spark plug.

2. Use a deep well socket and a breaker bar to loosen the spark plug. If necessary, consult 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.

3. After removing spark plug, clean the ground probe inside the ARD combustion head by running a 305-2389 Plug Bore Brush through the hole in the ARD combustion head. Run the brush through the hole several times.

4. 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. Refer to the Specifications manual for the correct torque value.

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.

5. Install the spark plug by hand until the spark plug contacts the ARD. Torque the spark plug to the proper specification.

6. Connect the wiring harness.

i04538150

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD; 7065-086-BD; 7066-086-BD

⚠ WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Ensure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area.

Refer to Operation and Maintenance Manual, “Steering Frame Lock” before entering the articulation joint.

Wipe all fittings before applying grease.

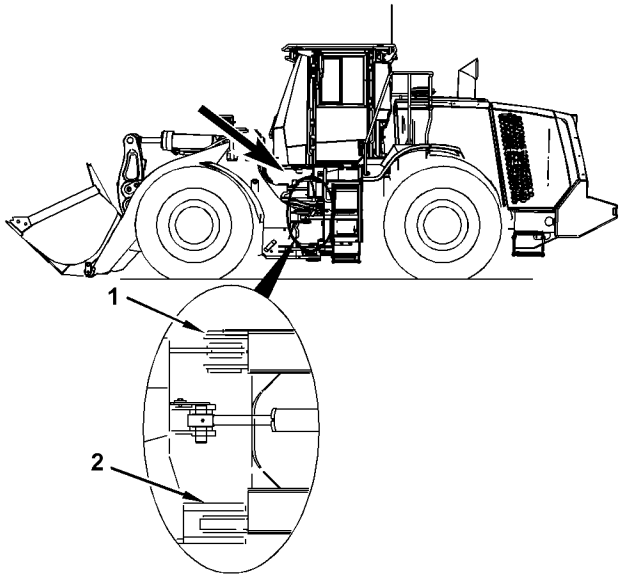

Illustration 158 g02109577

Apply grease to one fitting on the upper pivot bearing (1) and one fitting on the lower pivot bearing (2).

i04338311

Automatic Lubrication Filler Filter - Clean

(Autolube - If Equipped)

SMCS Code: 7540-070-HR

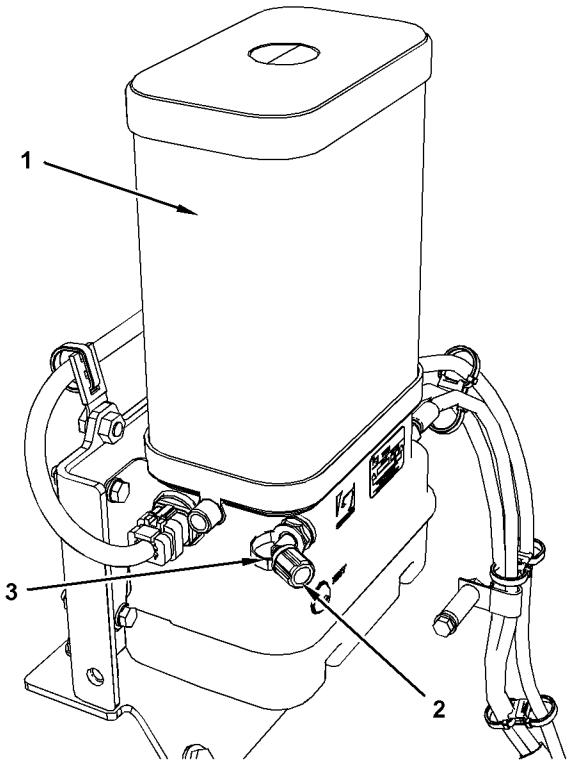

Illustration 159 g02494037

(1) Reservoir
(2) Dust Cap
(3) Filler Tube Assembly

1. Remove dust cap (2) from reservoir (1).

2. Clean filler tube assembly (3) and the coupling on the filler tube assembly.

3. Remove filler tube assembly (3) and the coupling.

4. Remove the grease fitting from the filter and clean the filter.

5. Clean the filter with solvent and compressed air. Check the filter for cracks. If any cracks exist, replace the filter.

6. Replace the grease fitting in the filter.

7. Fill the filter with grease.

8. Install the filter.

9. Install the filter assembly onto filler tube assembly (3).

10. Install filler tube assembly (3) and dust cap (2).

i04284393

Automatic Lubrication Grease Tank - Fill
(Autolube - If Equipped)

SMCS Code: 7540-544-TNK

The Automatic TWIN Greasing System

Reference: Refer to System Operation, RENR 6331 for more information on the Automatic TWIN Greasing System.

⚠ WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

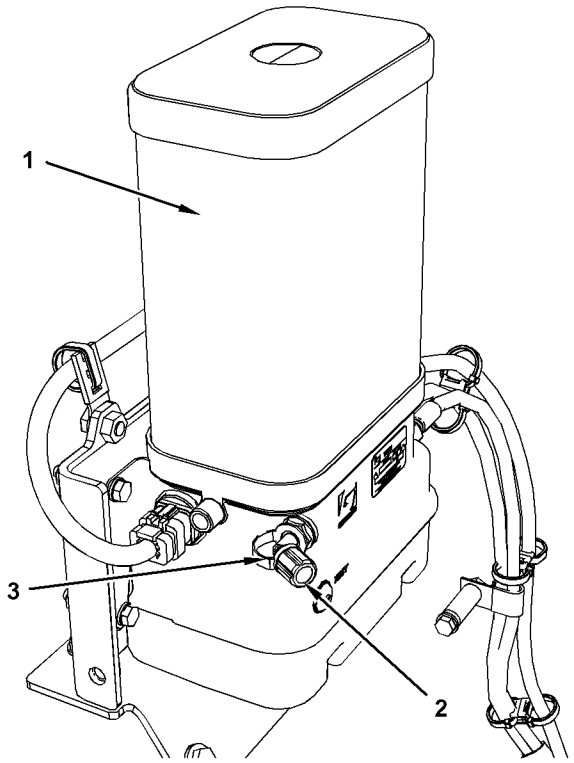

Illustration 160 g02494037

(1) Reservoir
(2) Dust Cap
(3) Filler Tube Assembly

Grease reservoir (1) is located near the rear fender on the right side of the machine.

Filling the Reservoir

1. Remove dust cap (2) from grease reservoir (1).

2. Clean the fitting before filling.

3. Fill grease reservoir (1) with grease to the maximum level which is indicated on the grease reservoir (1).

Note: Avoid fully emptying the reservoir causing air to enter the system. Air may be pumped into the reservoir. This air can accumulate under the piston. The air can be removed if the reservoir is refilled to a level slightly above the maximum level mark. Excess air and excess grease will be released from the pump at the overflow passage.

Reference: For the correct type of grease, refer to Operation and Maintenance Manual, “Lubricant Viscosities”.

Note: If a different brand of grease is used, check for compatibility. If the new grease is not compatible with the grease in the reservoir, the system must be purged. Refer to System Operation, RENR 6331 for more information about purging the system.

4. Install dust cap (2).

i05615077

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268-086-BD; 3278-086-BD

⚠ WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Ensure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area.

Refer to Operation and Maintenance Manual, “Steering Frame Lock” before entering the articulation joint.

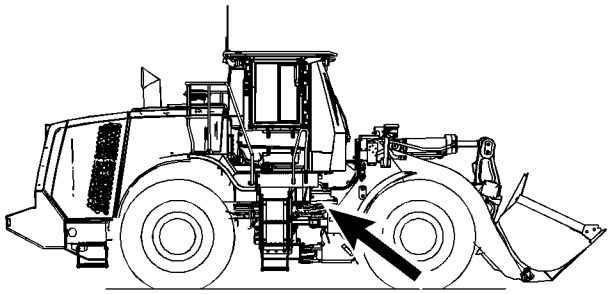

Illustration 161 g02109740

The remote grease fittings are on the right side of the machine in the articulation joint.

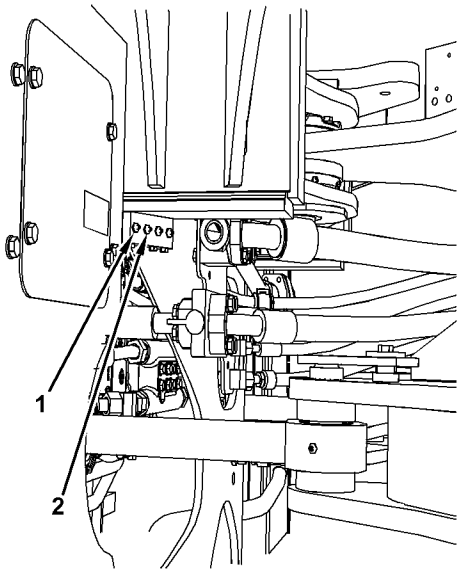

Illustration 162 g03565889

Wipe all fittings before lubricating.

Grease fitting (1) will lubricate the axle pivot bearing that is on the rear of the rear axle. Grease fitting (2) will lubricate the axle pivot bearing that is on the front of the rear axle.

Note: Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the proper grease.

i04404608

Backup Alarm - Test (If Equipped)

SMCS Code: 7406-081

The backup alarm is on the rear of the machine.

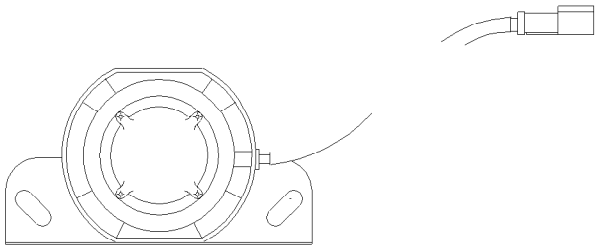

Illustration 163 g01043892

Turn the engine start switch to the ON position in order to perform the test.

Apply the service brake. Place the transmission into REVERSE.

The backup alarm should sound immediately. The backup alarm will continue to sound until the transmission is placed into NEUTRAL or into FORWARD.

i04555387

Battery - Clean

SMCS Code: 1401-070

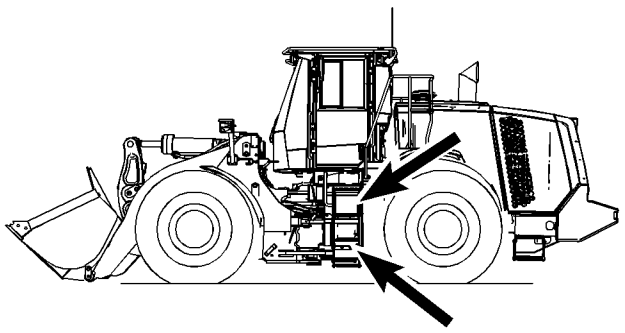

Illustration 164 g02494486

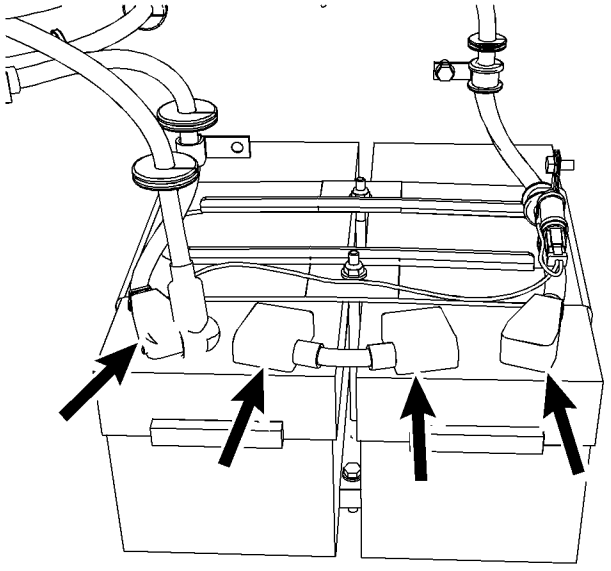

Illustration 165 g02161419

Open both battery compartments on the left side of the machine under the platform. Remove the battery hold-down.

Clean the battery terminals and the surfaces of the batteries with a clean cloth. Coat the battery terminals with petroleum jelly. Make sure that the battery cables are installed securely.

Replace the battery hold-down. Refer to Operation and Maintenance Manual, “Battery Hold-Down - Tighten” for the correct torque. Close the battery compartment.

i04284429

Battery Hold-Down - Tighten

SMCS Code: 7257-527

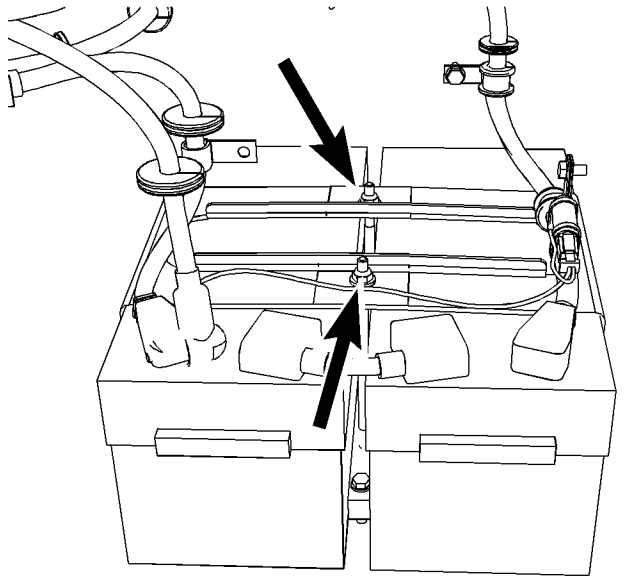

Illustration 166 g02161433

Open both battery compartments on the left side of the machine under the platform.

Over time, the vibration of an operating machine can cause the battery hold-down to loosen. To help to prevent loose batteries and the possibility of loose cable connections, tighten the locknut in the center of the hold-down to a torque of 14 ± 3 N·m (10 ± 2 lb ft).

i04552433

Battery or Battery Cable - Inspect/Replace

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

⚠ WARNING

Personal injury may occur from failure to properly service the batteries.

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 the engine start switch key OFF. Turn all of the switches OFF.
2. Turn the battery disconnect switch OFF. Remove the key.
3. Disconnect the negative battery cable from the disconnect switch.

Note: Do not allow the disconnected battery cable to contact the disconnect switch.

4. Disconnect the negative battery cable at the battery.
5. Disconnect the positive battery cable at the battery.
6. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
7. Make any necessary repairs. If necessary, replace the battery cables or the battery.
8. Connect the positive battery cable at the battery.
9. Connect the negative battery cable at the battery.
10. Connect the battery cable at the battery disconnect switch.
11. Install the key and turn the battery disconnect switch ON.

Recycle the Battery

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

i06954220

Belt - Inspect/Adjust/Replace

SMCS Code: 1397-040; 1397-510; 1397-025

Your machine is equipped with a single serpentine belt. Stop the engine. Open the rear hood. The belt is located on the front of the engine.

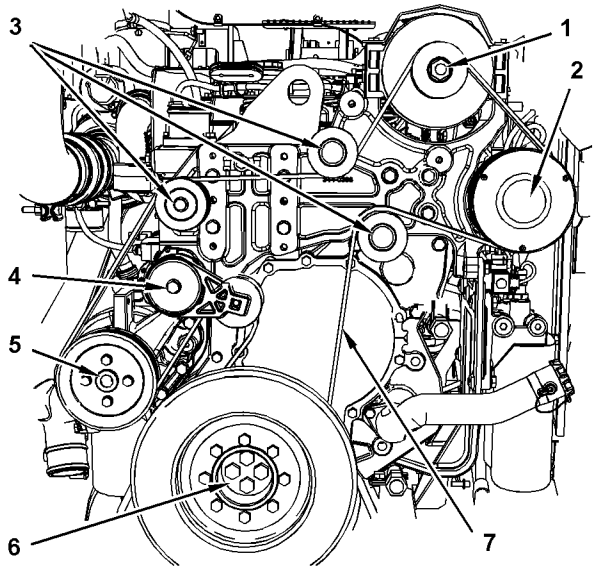

Illustration 167 g02156548

(1) Alternator
(2) Compressor
(3) Idler
(4) Tensioner
(5) Water Pump
(6) Crankshaft Pulley
(7) Serpentine Belt

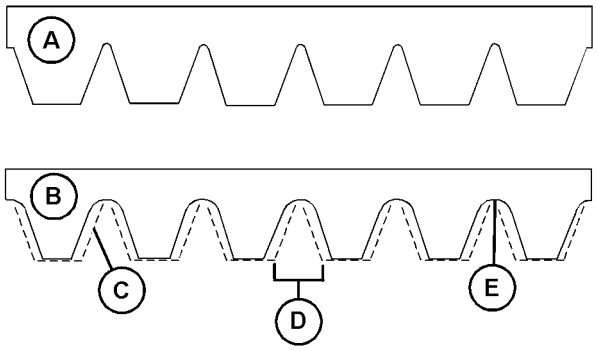

Illustration 168 g06114636

(A) New belt
(B) Worn belt

1. Inspect the condition of the serpentine belt. Over time the belt ribs will lose material (C). The space between the ribs will increase (D). The loss of material will cause the pulley sheave to contact the belt valley. This will lead to belt slippage and accelerated wear (E). Replace the belt if the belt is worn or frayed.

Tensioner keeps the correct tension on the belt. Insert a ratchet with a square drive into tensioner. Rotate the tensioner counterclockwise to relieve tension on the belt. Remove the belt.

Install the new belt. Be sure that the new belt is routed correctly, as shown. Rotate the tensioner counterclockwise to install the new belt. Release the tensioner when the new belt is installed. The correct tension will automatically be applied.

i05823698

Brake Accumulator - Check

SMCS Code: 4263-535

⚠ WARNING

Pressurized System!

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

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

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

1. Turn the engine start switch to the ON position. The alert indicator for the brake should come on if the braking system is not at normal operating pressure.

2. Start the engine. Run the engine at low idle speed until the engine is warm in order to increase the accumulator pressure. The alert indicator should go off.

3. At low idle engine speed, fully depress the brake pedal and release. Repeat this process until hearing the brake charging system recharge the accumulators. When charging, you will hear a slight dip in engine rpm.

4. When charging is completed, stop the engine and turn the key to the ON position without starting the engine. Fully apply the brake pedal and fully release off the brake pedal at a rate of 1 second on and 1 second off. Count the number of cycles until the alert indicator for brake oil pressure comes on. **A minimum of three applications of the brake pedal are required.**

5. If the alert indicator comes on before the number of cycles listed in step 4, measure the accumulator pre-charge pressures. Only an authorized Cat dealer can measure the nitrogen gas pressure in the accumulator. Use only dry nitrogen for recharging.

i06937306

Braking System - Test

SMCS Code: 4251-081; 4267-081

- Fasten the seat belt before you test the brakes.
- Park the machine on a dry, level surface.
- Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- Make sure that the steering frame lock is in the unlocked position.

The following tests are used to determine whether the braking system is functional. These tests are not intended to measure the maximum brake holding effort. The required brake holding effort for sustaining a machine at a specific engine rpm varies from one machine to another machine. The variations include differences in the engine setting, the power train efficiency, the brake holding ability, and others.

Service Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move during test, reduce the engine speed immediately and engage the parking brake.

1. Start the engine. Raise the implement slightly. Apply the service brake. Release the parking brake.
2. Make sure the Auto/Manual Transmission Select is in the MANUAL mode. Put the transmission control in SECOND GEAR REVERSE while the service brakes are applied.
3. Gradually increase the engine speed to high idle. The machine should not move.
4. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Engage the parking brake. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Cat dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Parking Brake Holding Ability Test

⚠ WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

This test is performed when the parking brake is engaged. If the machine begins to move, compare the engine rpm to the engine rpm of a prior test. This difference will indicate the amount of system deterioration.

1. Start the engine. Raise the implement slightly. Engage the parking brake.
2. Ensure that the transmission control is in the MANUAL position.
3. Move the transmission control to SECOND SPEED FORWARD.

   The parking brake indicator light should come on.
4. Gradually increase the engine speed to high idle. The machine should not move.
5. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Cat dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

i04366937

Bucket Linkage and Loader Cylinder Bearings - Lubricate

SMCS Code: 5102-086-BD; 5104-086-BD; 6107-086-BD

⚠ WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, “Steering Frame Lock” before entering the articulation joint.

Wipe off the fittings before any lubricant is applied.

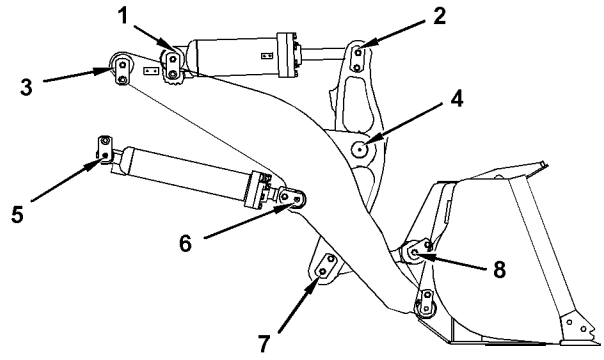

Illustration 169 g02160276

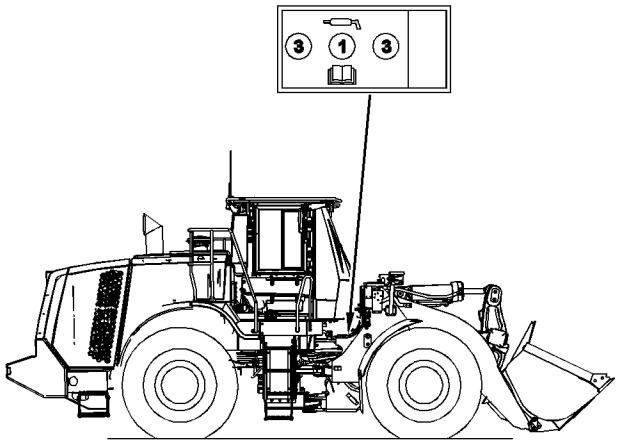

Illustration 170 g02520636

In order to lubricate pins (1) and (3), apply grease through the remote fittings. The remote fittings are located on the right side of the machine near the articulation joint.

In order to lubricate pins (2), (4), (5), (6), (7), and (8) apply grease through the standard grease fittings.

Note: If your machine is equipped with an automatic lubrication system, inspect the distribution blocks and all the lubrication lines for lubrication leaks.

i01924084

Bucket Lower Pivot Bearings - Lubricate

SMCS Code: 6101-086-BD; 6107-086-BD

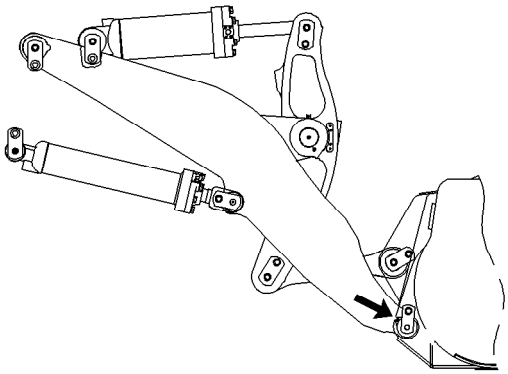

Illustration 171 g01001411

Wipe off all fittings before any lubricant is applied.

Apply lubricant through one fitting on each side of the machine.

i04284453

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

Note: Clean the cab air filters more often if the machine is being operated in dusty conditions.

Note: Less frequent cleaning of the cab air filters is possible if the machine is equipped with an HVAC precleaner attachment.

Locate the cab air filters on the right side of the machine.

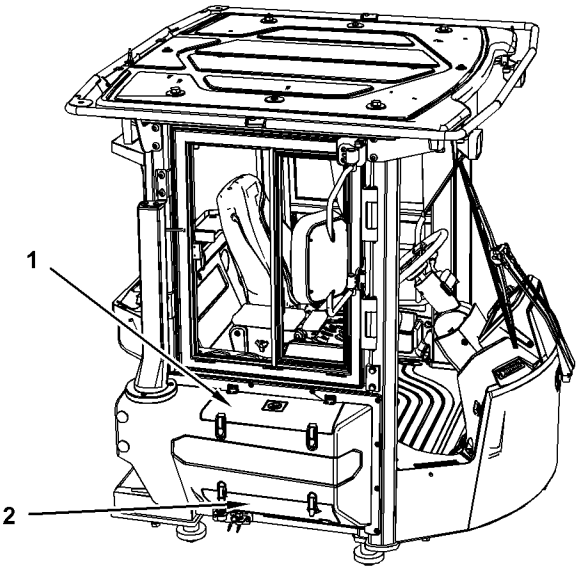

Illustration 172 g02351943

1. Open the top access door (1) on the right side of the cab. Remove the filter element that is used to recirculate the air in the cab.
2. Open the bottom access door (2) on the right side of the cab. Remove the fresh air filter element.
3. Clean the filter elements with reduced pressure air or wash the filter elements in warm water with a nonsudsing household detergent.
4. If water and detergent are used to clean the filter elements, rinse the filter elements in clean water. Allow the filter elements to air dry thoroughly.

Note: If either filter element is damaged, install a new filter element.

5. Install the filter elements and close the access doors.

i05374847

Camera - Clean

SMCS Code: 7348-070

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

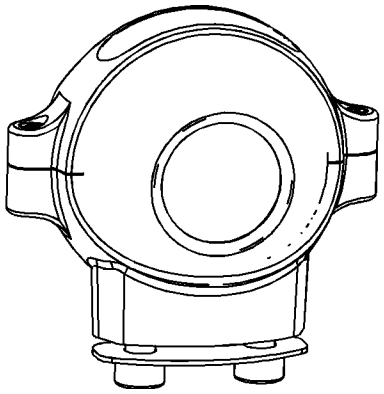

Illustration 173 g01223051

The WAVS camera is located on the rear of the machine in the center of the fan guard.

Camera

Use a damp cloth or water spray in order to clean the camera lens. The camera is a sealed unit. The camera is not affected by high-pressure spray.

The camera is equipped with an internal heater to help counteract the effects of condensation, snow, or ice.

Display (If Equipped)

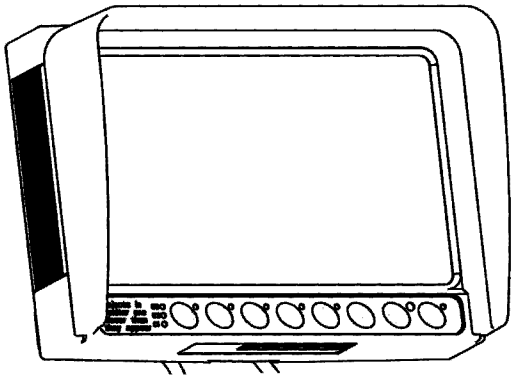

Illustration 174 g02520637

WAVS display

Use a soft, damp cloth in order to clean the display. The display has a soft plastic surface that can be easily damaged by an abrasive material. **The display is not sealed. Do not immerse the display with liquid.**

i04366942

Circuit Breakers - Reset

SMCS Code: 1420-529

The circuit breaker panel is located on the left side of the machine under the front of the cab above the battery box.

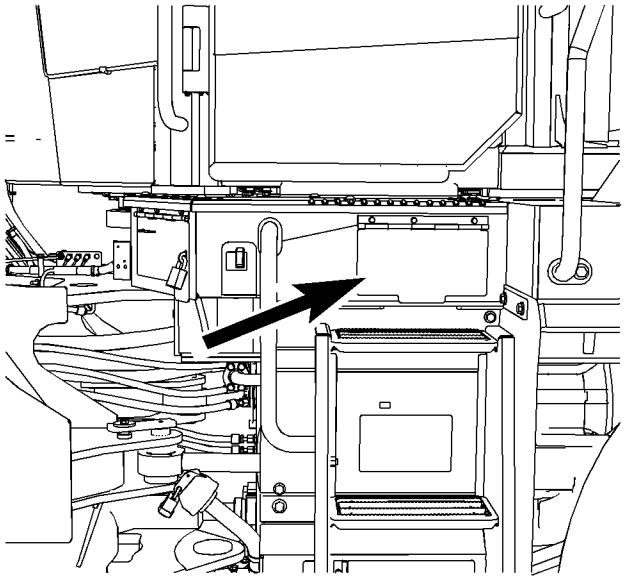

Illustration 175 g02111794

Depress the button in order to reset the circuit breakers. If the circuit is functioning properly, the button will remain depressed. If the button will not remain depressed, check the appropriate electrical circuit.

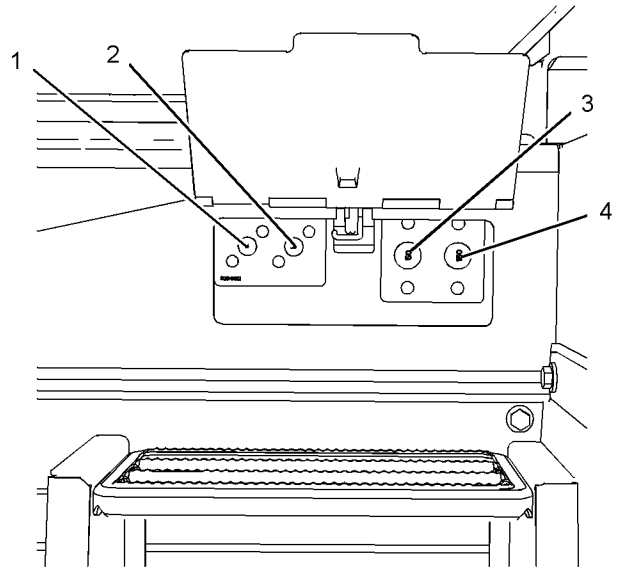

Illustration 176 g02111795

(1) 15 Amp Circuit Breaker Cab ECM
(2) 30 Amp Circuit Breaker Engine ECM
(3) 50 Amp Circuit Breaker Starter
(4) 150 Amp Circuit Breaker Main

i04931894

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL

⚠ 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.

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
Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant, shortens coolant service life, and may cause premature wear to components.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

If an Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required. Use the following procedure to change the Extended Life Coolant.

The cooling system pressure cap is located under the hood at the rear of the machine.

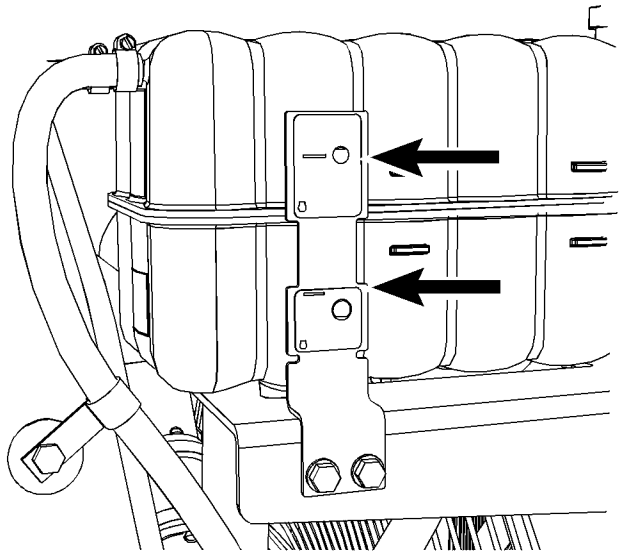

Illustration 177 g02158440

1. Slowly loosen the cooling system pressure cap in order to relieve system pressure. The coolant tank is located under the hood on the left side of the machine.

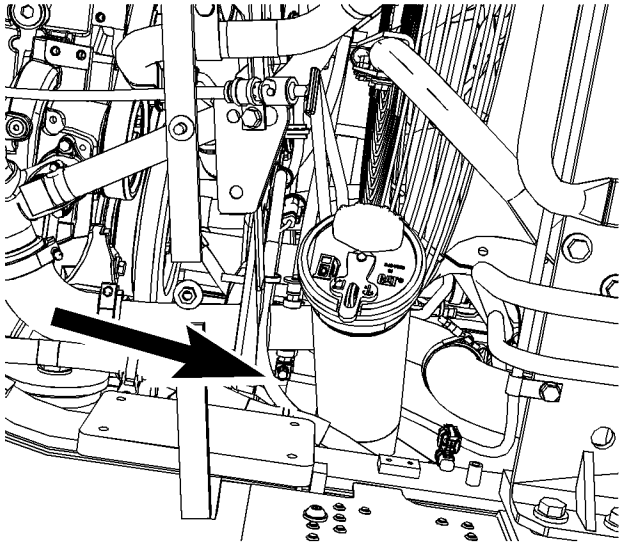

Illustration 178 g02498297

2. Open the drain valve on the bottom radiator tube. The drain is behind the fuel fill. The drain valve can be accessed from the left side of the machine. Allow the coolant to drain into a suitable container.

3. Flush the cooling system with clean water until the draining water is clean. Close the drain valve.

4. Replace the water temperature regulator.

Reference: Refer to Operation and Maintenance Manual, “Cooling System Water Temperature Regulator - Replace” for the correct procedure.

5. Add the Extended Life Coolant.

Reference: Refer to Operation and Maintenance Manual, “Capacities (Refill)” for the refill capacity of the cooling system.

6. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

7. Maintain the coolant level between the “MAX” and “MIN” lines on the coolant tank.

8. Install the cooling system pressure cap. Stop the engine.

i05916582

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

⚠ WARNING

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

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

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

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

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

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

This could result in damage to cooling system components.

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

Use Caterpillar Extended Life Coolant (ELC) when you add coolant to the cooling system.

Reference: Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for all cooling system requirements.

1. Stop the engine and allow the engine to cool.

2. Remove the cooling system pressure cap slowly in order to relieve the pressure.

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

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

Note: Discard drained fluids according to local regulations.

4. Add Caterpillar Extended Life Coolant (ELC) to the cooling system.

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.

i04401438

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

⚠ 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.

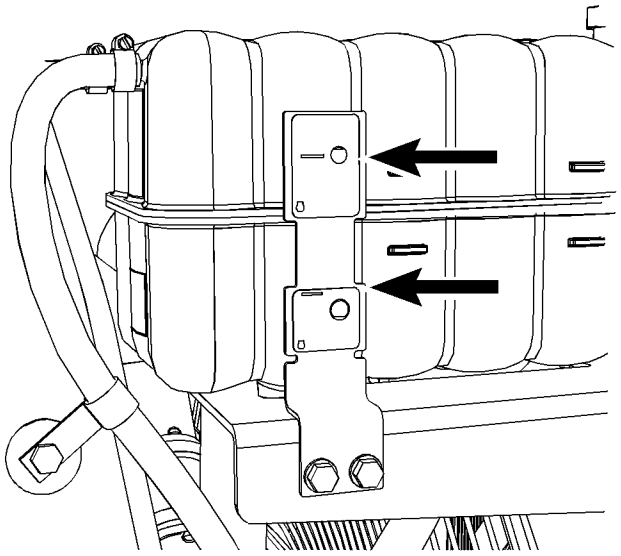

Illustration 179 g02158440

Coolant level gauge is located on the side of the tank. The coolant level can be checked through the left-hand side grill.

Maintain the coolant level between the maximum and minimum marks. Add coolant, if necessary.

Note: If you add coolant daily, inspect the cooling system for leaks.

Lower and secure the clamshell hood.

Note: If the key ON coolant level check is performed every 10 service hours or daily, a visual check should still be performed every 50 service hours or weekly.

At start-up, the system will display the fluid levels for the engine oil, coolant, and the fuel filter water separator. Turn the key to the ON position. Wait while the system does the check. The display screen will display the results of each compartment.

i04284473

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

Note: You do not need 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) obtained. Follow the 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. The following types of coolants need sampling.

- Commercial long life coolants that meet the Cat Engine Coolant Specification -1 (Cat “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.

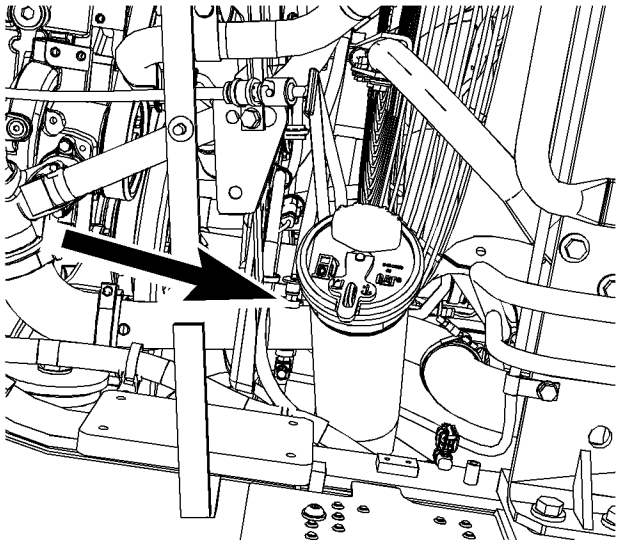

Illustration 180 g02498316

The sampling valve for the cooling system is located behind the fuel fill on the left side of the machine.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat 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 Cat dealer.

i04284476

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

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.

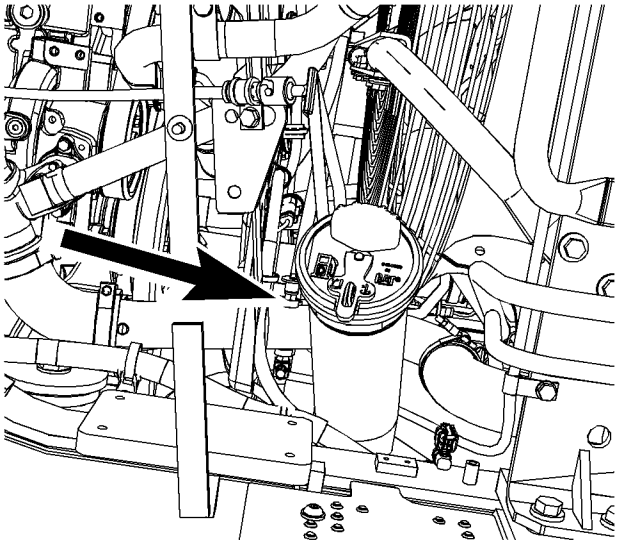

Illustration 181 g02498316

The sampling valve for the cooling system is located behind the fuel fill on the left side of the machine.

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.

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

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 Caterpillar dealer.

i04284478

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

⚠ 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.

NOTICE
Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

NOTICE
Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a thermostat installed.

If the thermostat is installed wrong, it will cause the engine to overheat. Inspect gaskets before assembly and replace if worn or damaged.

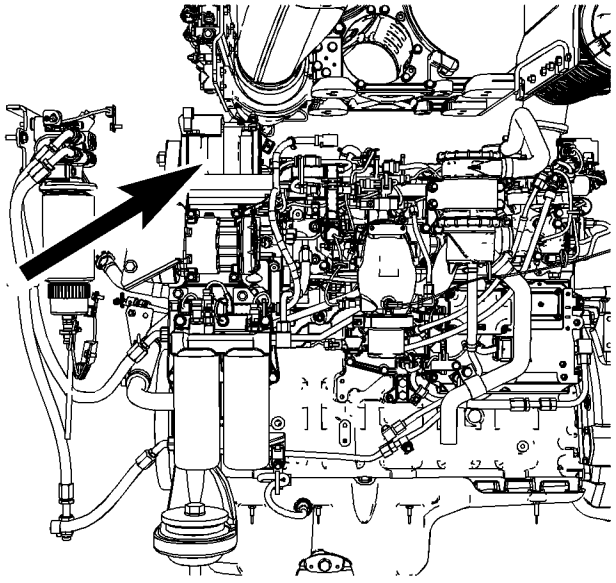

Illustration 182 g02498336

Replace the water temperature regulator in order to reduce the chance of problems with the cooling system.

Replace the water temperature regulator and the seals while the cooling system is drained below the water temperature regulator housing.

Note: If you are only replacing the water temperature regulator, drain the coolant to a level that is below the water temperature regulator housing.

Reference: Refer to Disassembly and Assembly, RENR9214, “C11 and C13 Engines for Caterpillar Built Machines” for the correct procedure for replacing the water temperature regulator.

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.

i02164355

Differential and Final Drive Oil - Change

SMCS Code: 3278-044; 4011-044

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.

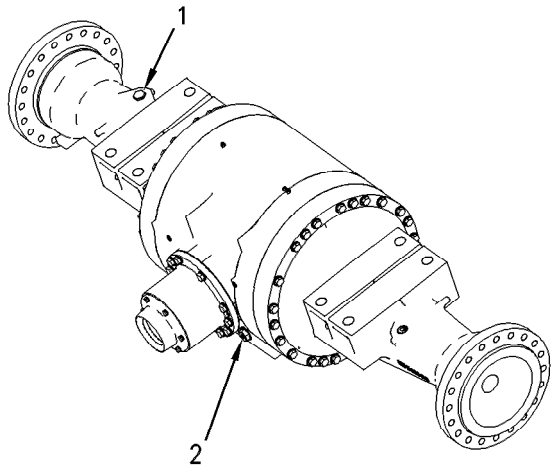

Illustration 183 g00287529
Front axle

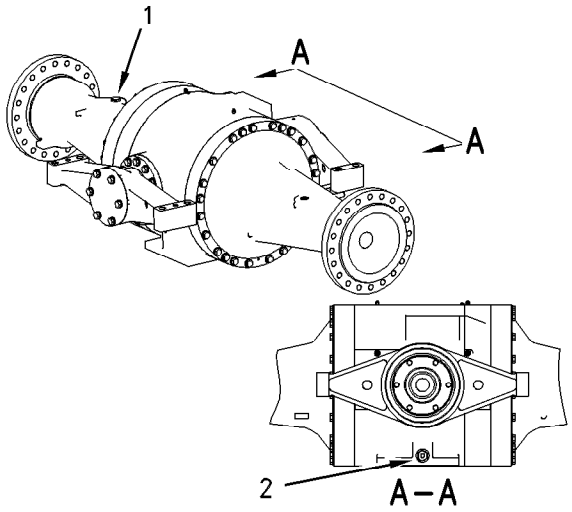

Illustration 184 g00287531
Rear axle

Note: The axle housings are equipped with ecology drain valves.

1. Remove drain plugs (2). Attach a hose to a suitable drain adapter. Install the adapter in the drain valve and allow the oil to drain into a suitable container.
2. Clean the drain plugs and install the drain plugs.
3. Wipe off dipstick/fill plugs (1) and the surfaces around dipstick/fill plugs (1).
4. Remove the dipstick/fill plugs. Fill each axle with 1.0 L (1.06 qt) of 1U-9891 Hydraulic Oil Additive. Fill the axles with oil.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities” for the type of lubricant and for the refill capacity.

5. Clean the dipstick/fill plugs and install the dipstick/fill plugs.
6. Run the machine on level ground for a few minutes in order to equalize the oil level in the axle. Check the oil level in the axle.

Reference: Refer to Operation and Maintenance Manual, “Differential and Final Drive Oil Level - Check” for the correct procedure.

i01102280

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4011-535-FLV

Note: Before you measure the oil level, operate the machine for a few minutes in order to equalize the oil level.

1. Park the machine on level ground. Lower the bucket and apply slight downward pressure. Engage the parking brake. Stop the engine.

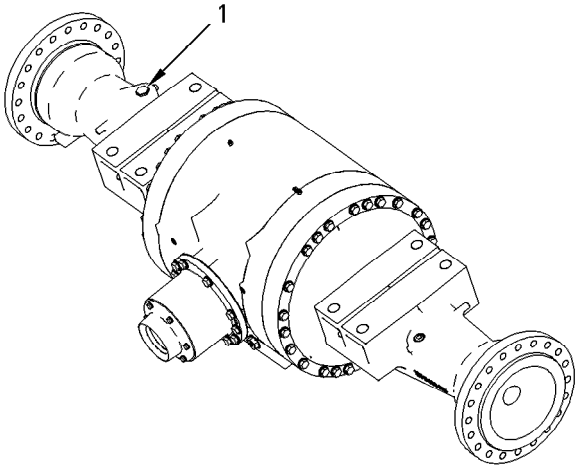

Illustration 185 g00285312

Front Axle

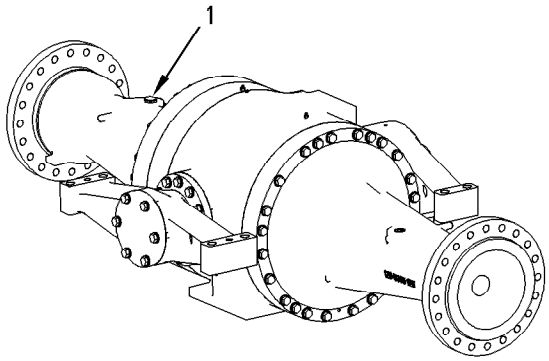

Illustration 186 g00287527

Rear Axle

2. Remove dipstick/fill plug (1) on the left side of the axle. Wipe off the level gauge with a clean cloth and reinsert the plug. This will ensure a more accurate measurement of the oil level.

Note: Make sure that the plug is installed completely before you check the oil level. If the plug is not installed completely, an incorrect oil level reading can occur.

3. Remove dipstick/fill plug (1) again and check the oil level. Maintain the oil level between the ADD mark and the FULL mark. Add oil, if necessary.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities” for the type of lubricant and for the refill capacity.

4. Clean the plug and install the plug.

i01921974

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4011-008; 4070-008; 7542

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. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the differential oil for a more accurate sample.

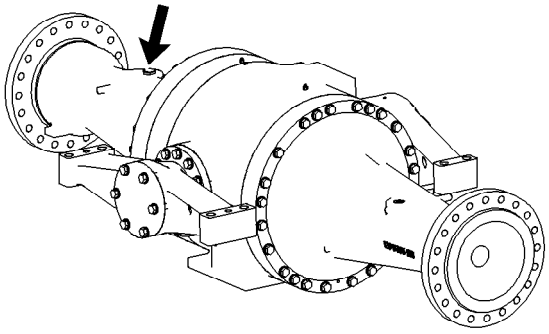

Illustration 187 g00884056

Rear axle

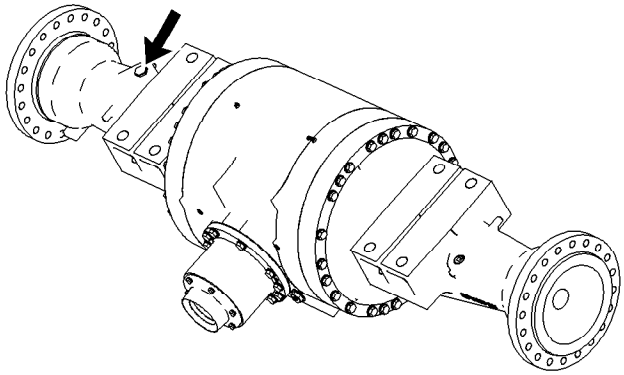

Illustration 188 g00884059

Front axle

2. The differential and final drives are not equipped with sampling valves. Obtaining an oil sample will require the use of a vacuum pump or equivalent in order to extract the oil from the component. Extract the oil through the filler openings on the differential and final drives.

3. Complete any additional required work. Fill the differential and final drives with oil, as required. Install the dipstick/fill plugs.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i06753269

Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

Wipe all the fittings before you apply grease to the fittings.

NOTICE
To prevent damage to the seal, articulate the machine full right or left, before lubricating the splines.

1. Start the engine. Raise the bucket. Release the parking brake. Articulate the machine to the right or to the left to properly lubricate the splined shaft.

2. Lower the bucket to the ground. Engage the parking brake. Stop the engine.

Note: Since the steering frame lock cannot be connected in this case, remove the engine start switch key and turn the battery disconnect switch to the OFF position.

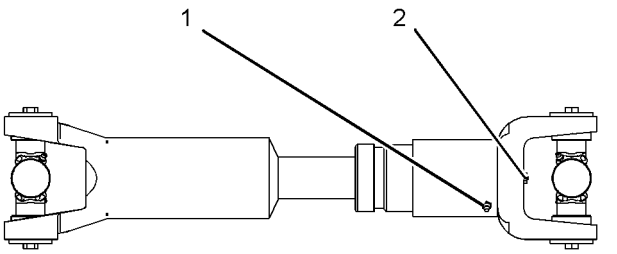

Illustration 189 g01106848

3. Apply grease to the fitting (1). Apply grease until the relief (2) overruns.

Note: Molybdenum Grease is preferred. Multipurpose Grease may be used. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the proper grease.

4. Start the engine. Raise the bucket. Release the parking brake. Reposition the machine in a straight direction without articulation.

5. Lower the bucket to the ground. Apply a slight down pressure. Engage the parking brake. Stop the engine.

i04284551

Drive Shaft Support Bearing - Lubricate

SMCS Code: 3267-086-BD

Note: Access the fitting from under the machine just in front of the parking brake.

Do not grease the drive shaft support bearing more than the recommended interval.

NOTICE
Do not over grease the drive shaft support bearing. The excess grease may get into the brake area. Damage to the brakes or the loss of the brakes may occur. Take precautions in order to avoid getting grease in the adjacent brake area.

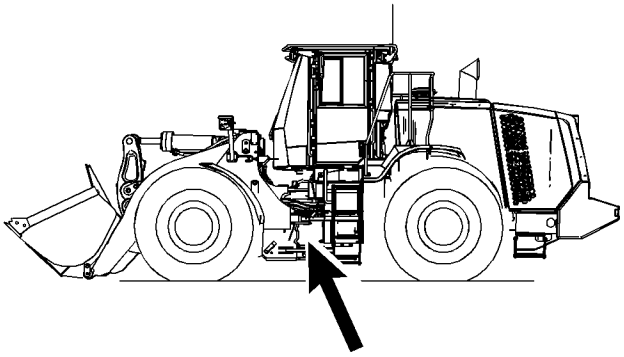

Illustration 190 g02112756

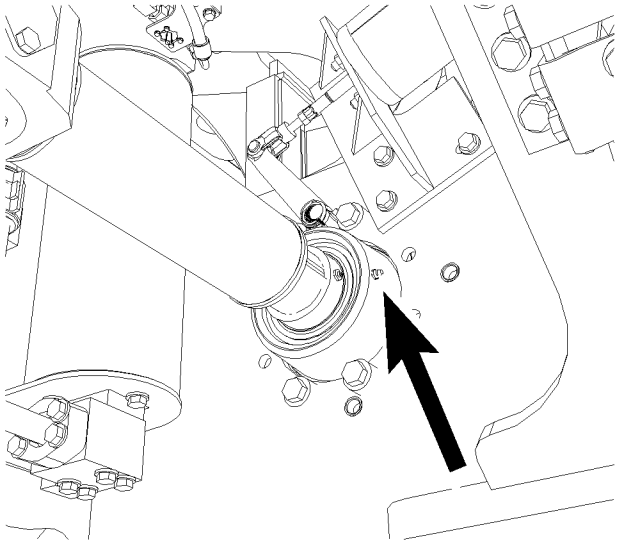

Illustration 191 g02154414

Wipe off the fitting before any lubricant is applied.

Apply lubricant through the fitting on the drive shaft support bearing. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the proper grease.

i02571972

Drive Shaft Universal Joints - Lubricate

SMCS Code: 3251-086

Note: Do not grease the universal joints more than the recommended interval.

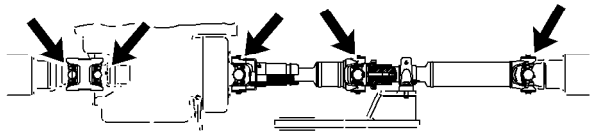

Illustration 192 g01069141

1. Wipe off the grease fittings before lubricating.

2. Lubricate all five grease fittings on the universal joints. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for the proper grease.

i04039379

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-510-PY; 1054-070-PY

Note: A warning for the air filter will be shown on the monitor display when the engine air filter primary element needs to be cleaned.

1. The rear hood should be opened in order to access the air filter. The air filter is located on the right side of the machine.

Note: The air filter housing may become hot during engine operation. Allow the housing to cool before attempting to access the filters.

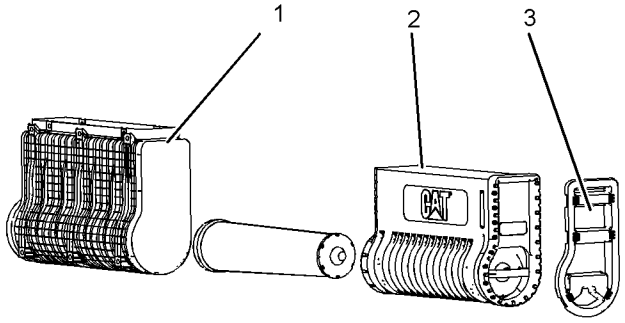

Illustration 193 g02128739

2. Remove the cover on air filter housings (3).

3. Remove primary element (2) from the air filter housing.

4. Clean the inside of air filter housing (1).

5. Inspect the primary element (2). If the pleats, the gaskets, or the seals are damaged, discard the element. Replace a damaged primary element with a clean primary element.

Cleaning Primary Air Filter Elements

NOTICE
Caterpillar recommends certified air filter cleaning services that are available at Cat dealers. The Cat cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be cleaned up to three times if the element is properly cleaned and the element is inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE
Do not clean the air filter elements by bumping or tapping. Damage to the seals could result. 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 the primary air filter element. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

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. 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 a primary air filter element in 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

Inspect the clean, dry primary air filter element. Inspect the primary air filter element for tears and/or holes. 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.

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:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i04284629

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE
Service the air filter only with the engine stopped. Engine damage could result.

NOTICE
Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

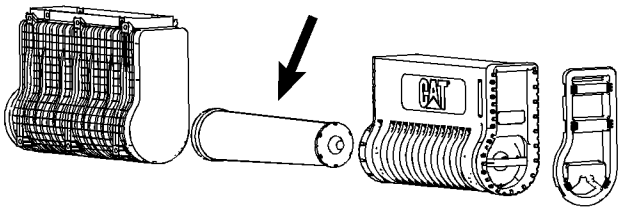

Illustration 194 g02129134

Replace the secondary element when you replace the primary element.

1. Remove the primary element.

Reference: Refer to Operation and Maintenance Manual, “Engine Air Filter Primary Element - Clean/ Replace” for the correct procedure.

2. Remove the secondary element.

3. Cover the air inlet opening. Clean the inside of the air cleaner housing.

4. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.

5. Uncover the air inlet opening. Install a new secondary element.

6. Install a clean primary element and the cover for the air cleaner housing.

7. Close the access door.

i04284611

Engine Air Precleaner - Clean

SMCS Code: 1055-070

1. Inspect the precleaner tray (3) for dirt and for trash.

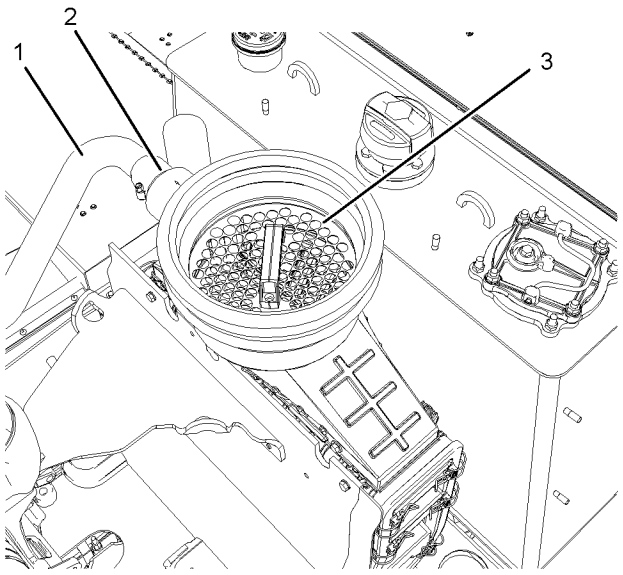

Illustration 195 g02495777

(1) Ejector Tube
(2) Check Valve
(3) Precleaner Tray

2. Loosen the clamp at the base of precleaner tray (3). Remove the rubber boot and remove the tray by pulling up on the handle. Remove the screen.

3. Inspect the precleaner tubes in the tray for dirt and for dust.

4. Use pressurized air to clean the tubes. Put the tubes on a flat surface. Direct the pressurized air into the tubes from the top in order to loosen the dirt.

5. Replace the precleaner tray and the rubber boot and secure with the clamp.

6. Loosen the camp for check valve (2).

7. Remove the check valve from the air cleaner housing.

8. Inspect the check valve for proper operation and debris build-up. The check valve hinges from the top. Inspect ejector tube (1) for debris build-up. Clean the check valve and the ejector tube if required.

9. Install the check valve and tighten the clamp.

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

i04284637

Engine Compartment - Clean

SMCS Code: 1000-070-CPA; 1000-070

Inspect the engine compartment for dirt buildup or debris. Remove any dirt or debris from the engine compartment.

Remove any debris or dirt from the engine compartment.

Note: Use care when you clean the engine compartment. Damage to the machine may occur.

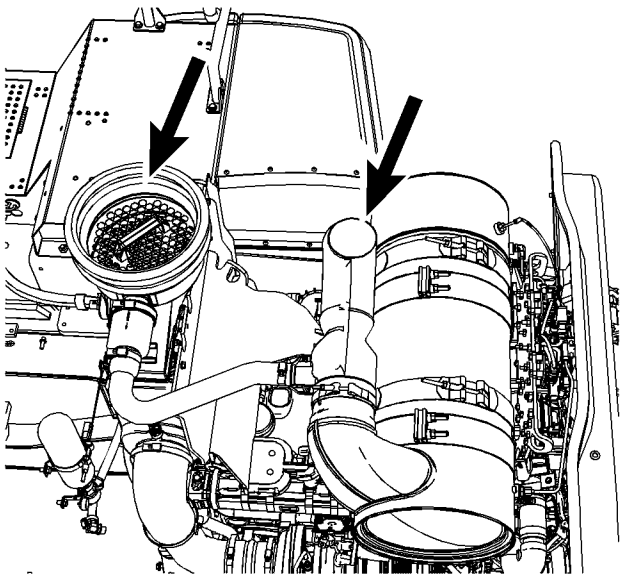

Illustration 196 g02469757

Note: Cover the DPF outlet and the engine air inlet in order to prevent debris entry.

i04284649

Engine Oil Level - Check

SMCS Code: 1000-535-FLV

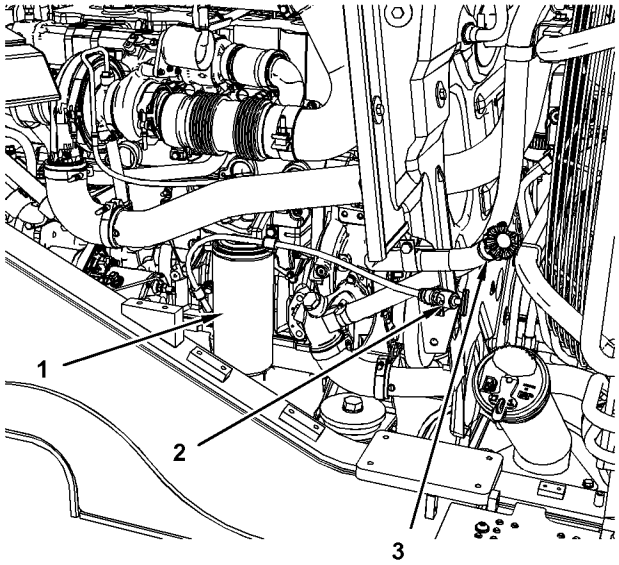

Illustration 197 g02497638

(1) Oil filter
(2) Dipstick
(3) Oil fill

Fully raise the clamshell. The oil level dipstick is located on the left side of the machine.

Note: If the key ON engine oil level check is performed every 10 service hours or daily, a visual check with the dipstick should still be done every 50 service hours or weekly.

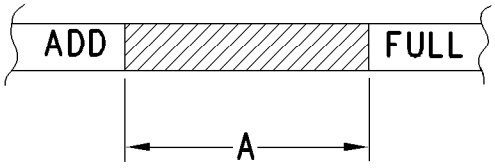

Illustration 198 g00746755

Maintain the oil level between the FULL mark and ADD mark on the dipstick. Check the level of the engine oil while the engine is shut off. Add oil, if necessary.

At start-up, the system will display the fluid levels for the engine oil, coolant, and the fuel filter water separator. Turn the key to the ON position. Wait while the system does the check. The display screen will display the results of each compartment.

i04555449

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

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. Operate the machine for a few minutes before obtaining the oil sample. Running the engine will thoroughly mix the engine oil for a more accurate sample.

2. Fully open the engine hood.

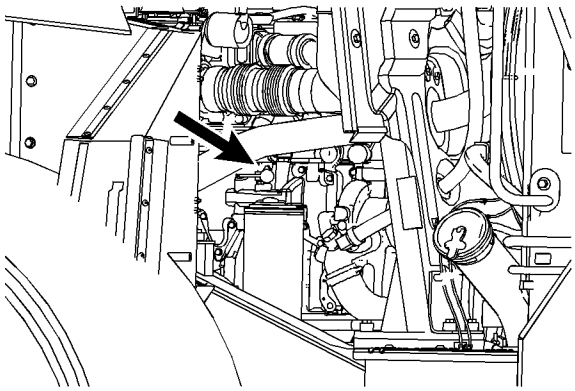

Illustration 199 g02131634

3. The sampling port is located on the base of the oil filter. Use the sampling valve in order to obtain a sample of engine oil.

4. Fully close the engine hood.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i04555468

Engine Oil and Filter - Change

SMCS Code: 1318-510

Selection of the Oil Change Interval

NOTICE
A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

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

Cat oil filters are recommended.

Refer to this Operation and Maintenance Manual, “Lubricant Viscosities” for further information about oils that may be used in Cat engines.

Refer to this Operation and Maintenance Manual, “Severe Service Application ” to determine if oil change interval should be reduced from the normal change interval. If operating in any of the conditions or environments outlined in the Severe Service Application, use S·O·S Services oil analysis to determine the best oil change interval. If S·O·S Services oil analysis S is not being used, oil change interval should be reduced to 250 hrs.

Table 24

Oil Change Interval (1)		
Multigrade Oil Type	**Operating Conditions**	
	Normal	**Severe Service Application**
Cat DEO-ULS	500 hr	250 hr
Oil meeting the requirements of the Cat ECF-3 Specification or the API CJ-4 classification 8 minimum TBN Preferred	500 hr	250 hr
Oil meeting the requirements of the ACEA C9/ E6 Specification TBN below 10.4	500 hr	250 hr

(1) The standard oil change interval in this engine is 500 hours, if the operating conditions and recommended oil types that are listed in this table are met. If the type of oil, the quality of the oil and the operating conditions fail to meet certain standards, the oil change intervals must be decreased to 250 hours. Refer to Special Publication, PEHJ0192, “Optimizing Oil Change Intervals” in order to determine whether the oil change interval should be reduced to 250 hours.

Procedure for Changing the Oil

⚠ WARNING

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

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

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

Dispose of all fluids according to local regulations and mandates.

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

Refer to the Operation and Maintenance Manual, “Hood Tilt” for the access to the engine.

Park the machine on a level surface and engage the parking brake. Stop the engine.

Note: Drain the crankcase while the oil is warm. Waste particles that are suspended in the oil will drain along with the oil. As the oil cools, the waste particles will settle to the bottom of the crankcase. The particles will not be removed by draining the oil and the particles will recirculate in the engine lubrication system with the new oil.

1. Open the engine hood to the fully open position.
2. The drain plug is located on the right side of the machine on the engine oil pan. Open the oil drain valve and allow the oil to drain into a suitable container. Close the drain valve.

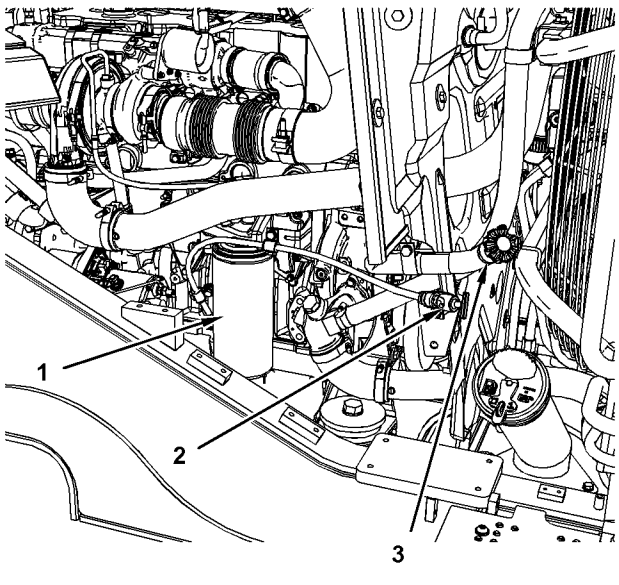

Illustration 200 g02497638

(1) Oil Filter
(2) Dipstick
(3) Oil Fill

3. Clean the area around engine oil filter (1) before you remove the engine oil filter. Use a strap type wrench to remove the engine oil filter. Inspect the oil filter. Refer to Operation and Maintenance Manual, “Oil Filter - Inspect”.
4. Clean the filter mounting base. Make sure that all of the used gasket has been removed.

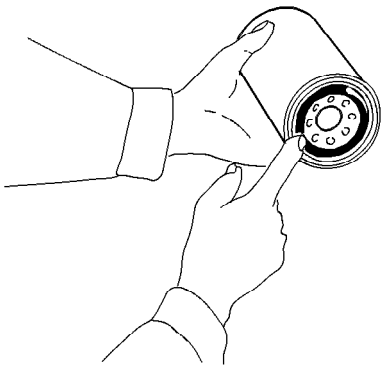

Illustration 201 g00101318

5. Apply a thin coat of oil to the seal on the new engine oil filter. Install a new engine oil filter hand tight until the seal of the engine oil filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the engine oil filter that are spaced 90 degrees or 1/4 or a turn away from each other. When you tighten the engine oil filter, use the rotation index marks as a guide.

6. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Cat filters, use the instructions that are provided with the filter.

Note: Use a Cat strap wrench in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

7. Clean the area around oil filler cap (3) before you remove the oil filler cap. Clean the area around oil level gauge (2) before you remove the oil level gauge. Remove oil filler cap (3) on the left side of the engine. Fill the crankcase with new oil. Refer to the following topics:

- Operation and Maintenance Manual, “Lubricant Viscosities”
- Operation and Maintenance Manual, “Capacities (Refill)”

8. Clean the oil filler cap and install the oil filler cap.

9. Start the engine and allow the oil to warm. Check for any oil leaks.

10. Check the oil level on dipstick (2).

Reference: Refer to Operation and Maintenance Manual, “Engine Oil Level - Check” for the correct procedure.

11. Stop the engine.

12. Close the hood to the fully closed position.

i04538255

Engine Valve Lash - Check

SMCS Code: 1105-535

In order to perform the valve lash adjustment, refer to Systems Operation, Testing and Adjusting, “Engine Valve Lash - Inspect/Adjust”.

Note: A qualified mechanic should adjust the engine valve lash because special tools and training are required.

i04538349

Ether Starting Aid Cylinder - Replace
(If Equipped)

SMCS Code: 1456-510-CD

Personal injury may occur from failure to adhere to the following procedures.

⚠ WARNING

Ether is poisonous and flammable.

Breathing ether vapors or repeated contact of ether with skin can cause personal injury.

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.

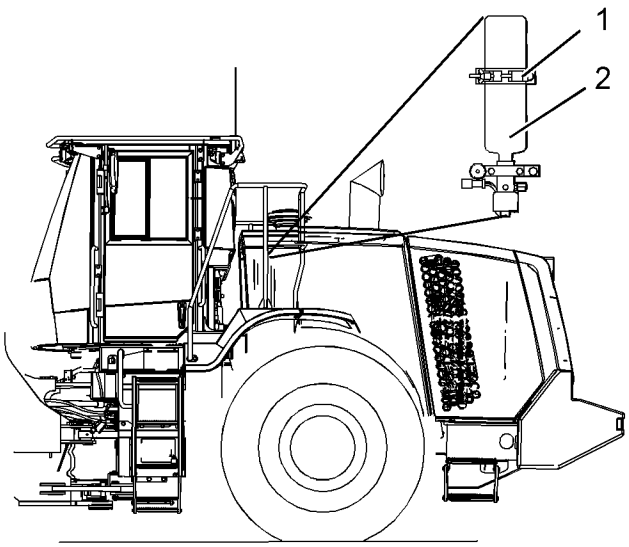

Illustration 202 g02765236

1. Fully open the engine hood. The ether starting aid cylinder is mounted on the left side of the machine next to the air cleaner.

2. Loosen retaining clamp (1) and unscrew ether starting aid cylinder (2).

3. Remove the gasket. Install the new gasket that is provided with each new ether starting aid cylinder.

4. Install new ether starting aid cylinder (2) hand tight. Tighten retaining clamp (1) securely.

5. Fully close the engine hood.

Note: If the temperature of the ether cylinder is different than ambient, allow 30 minutes to 1 hour for the cylinder to equalize temperature.

i07681009

Film (Product Identification) - Clean

SMCS Code: 7405-070; 7557-070

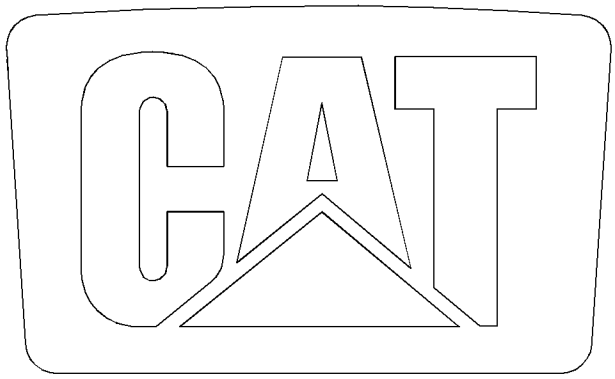

Illustration 203 g02174985

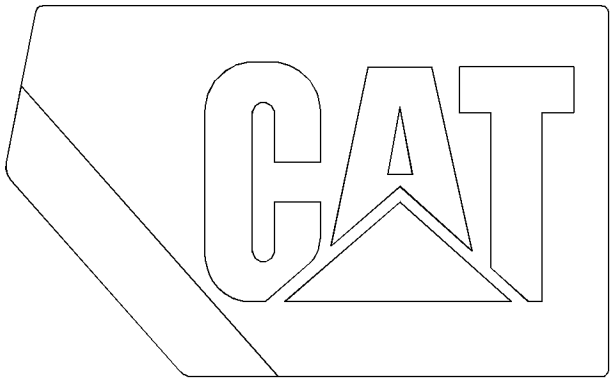

Illustration 204 g02175297

Illustration 205 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.

i08063019

Fuel Priming Pump - Replace (Emission Related Component)

SMCS Code: 1258-510

A replacement kit is available for the electronic fuel priming pump. Contact your Cat dealer for the correct part number and details for your application.

i04854911

Fuel System - Prime

SMCS Code: 1250-548

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

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

Dispose of all fluids according to local regulations and mandates.

Note: The volume of the air in the water separator is small. Usually, priming the fuel system is not necessary if only the water separator element was changed.

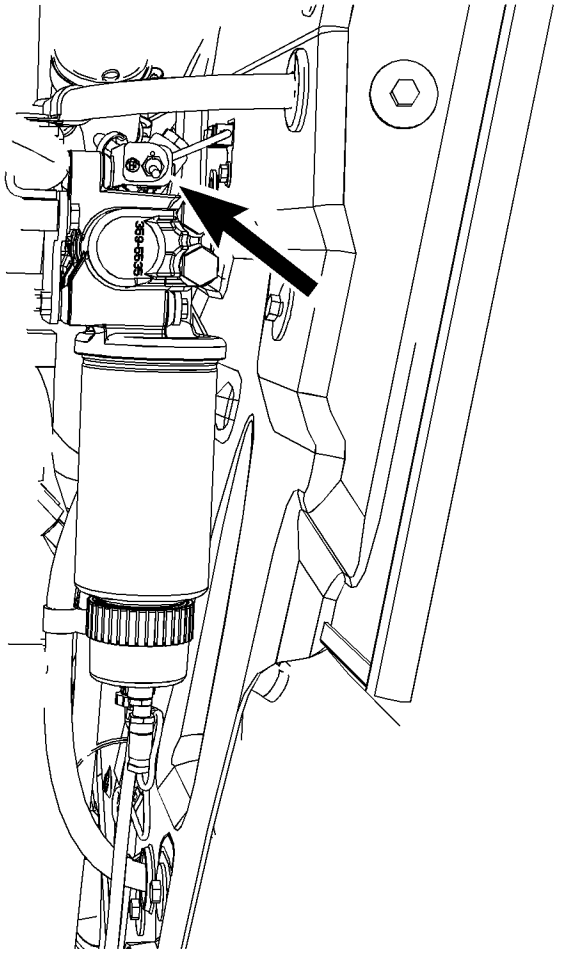

Illustration 206 g02985638

1. Stop the engine and place the key in the OFF position. Open the clamshell. The fuel priming pump is located above the primary fuel filter on the right side of the machine. This machine is equipped with an electric fuel priming pump. The toggle switch for the pump is located on the filter base. Operate the fuel pump for approximately 60 seconds.

2. Start the engine.

Note: Additional priming may be needed if you are priming because of the following circumstances:

- The engine will not start.
- The engine starts but the engine continues to misfire.
- The engine starts but the engine continues to emit smoke.
- The engine has run out of fuel.
- The fuel injectors have been removed from the engine.

Operate an electric fuel pump for approximately 30 seconds for this additional priming.

i04854913

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

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.

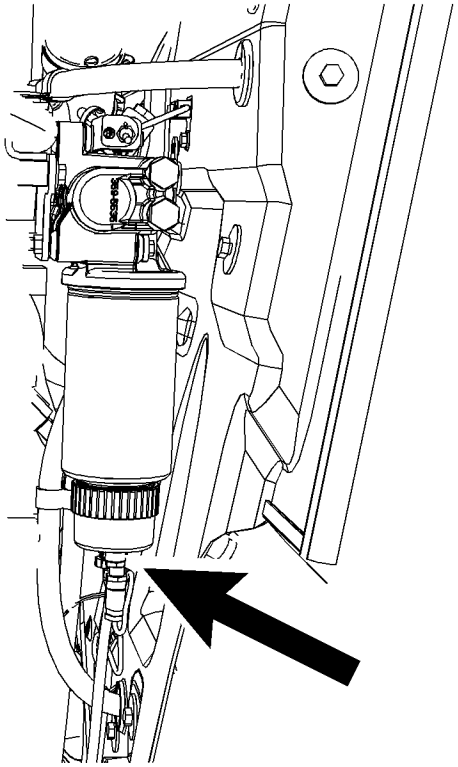

Illustration 207 g02985663

1. Open the clamshell hood. The water separator is located on the bottom of the primary fuel filter on the right side of the machine.

2. Open the drain valve on the bottom of the water separator bowl. Allow the water and the fuel to drain into a suitable container.

3. Close the drain valve.

Note: The water separator is under suction during normal engine operation. Tighten the drain valve securely in order to prevent air leakage into the fuel system.

4. Close the clamshell hood.

Note: At start-up, the system will display the fluid levels for the engine oil, coolant, and the fuel filter water separator. Turn the key to the ON position. Wait while the system does the check. The display screen will display the results of each compartment.

Note: If the key ON water separator check is performed every 10 service hours or daily, a water drain should still be done every 50 service hours or weekly.

i04854915

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510; 1263-510-FQ

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 fill fuel filters with fuel before installing them. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts. The fuel system should be primed prior to starting the engine.

1. Open the clamshell. The primary fuel filter is located on the right side of the machine.

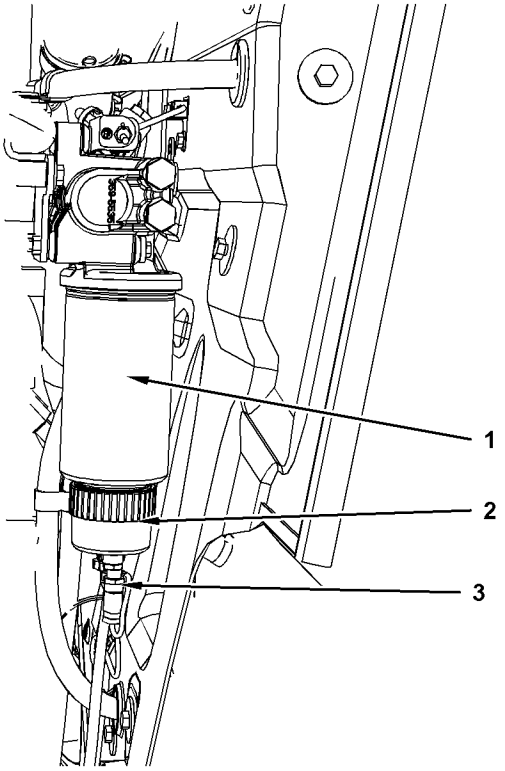

Illustration 208 g02985656

2. Open drain valve (3) on the bottom of water separator bowl (2). Allow the water and the fuel to drain into a suitable container.

3. Use a strap type wrench in order to remove the primary fuel filter (1). Unscrew the sediment bowl from the fuel filter.

4. Clean the water separator bowl and the O-ring groove.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

5. Inspect the O-ring seal on the water separator bowl. Replace the O-ring seal, if necessary.

6. Lubricate the O-ring seal with clean diesel fuel or with engine oil. Place the O-ring seal in the water separator bowl.

7. Install the water separator bowl onto the new filter element until the filter element is snug.

8. Apply a thin coat of clean diesel fuel to the seal on the new filter. Install the new fuel filter hand tight until the seal of the fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

9. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: Use a Caterpillar strap wrench in order to turn the filter. Ensure that the installation tool does not damage the filter.

10. Close drain valve (1).

Note: The water separator element is under suction during normal engine operation. Tighten the drain valve securely in order to prevent air leakage into the fuel system.

11. Prime the fuel system in order to fill the water separator element with fuel.

Reference: Refer to Operation and Maintenance Manual, “Fuel System - Prime” for the correct procedure.

12. Close the clamshell.

i04854916

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

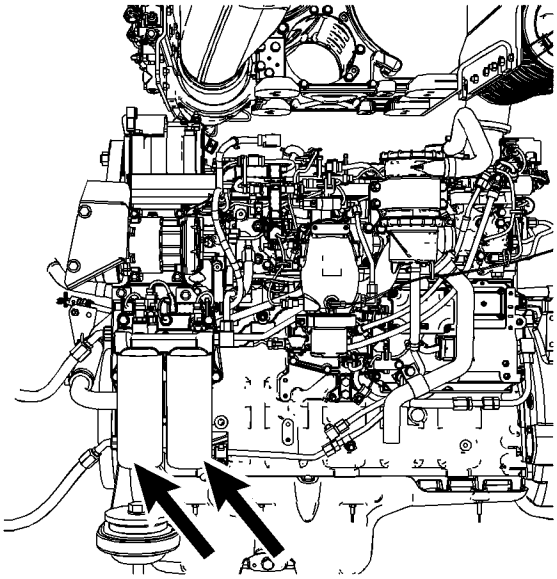

Illustration 209 g02985660

1. Fully open the engine hood. Secondary fuel filters are located on the right side of the machine.

2. Open drain valve in order to allow fuel to flow from the filter. The fuel will flow out of the hose. Catch the fuel in a suitable container and dispose of the fuel properly. Close the drain valve. Remove the fuel filters. Dispose of the used filters properly.

3. Clean the filter mounting base. Ensure that all of the used gasket is removed.

4. Lubricate the seal of the new fuel filters with clean diesel fuel. Install the new fuel filters hand tight until the seal of the fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

5. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: Use a Cat strap wrench in order to turn the filter. Ensure that the installation tool does not damage the filter.

NOTICE
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

6. Prime the fuel system.

Reference: Refer to Operation and Maintenance Manual, “Fuel System - Prime” for the correct procedure.

7. Fully close the engine hood.

i04546265

Fuel Tank Cap Filter - Replace

SMCS Code: 1273-510-FI; 1273-510-Z2

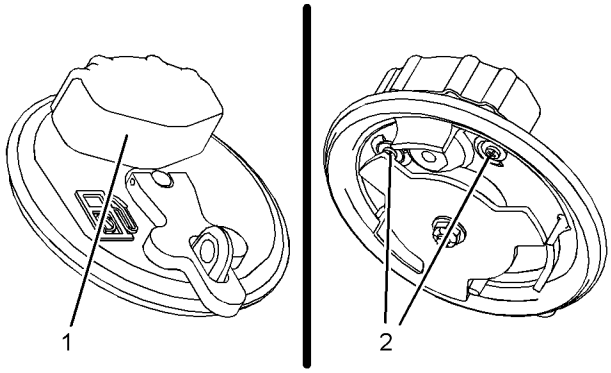

Illustration 210 g02612539

Note: The fuel tank cap may become hot during engine operation. Allow the cap to cool before proceeding.

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

i04538450

Fuel Tank Strainer - Clean

SMCS Code: 1273-070-STR

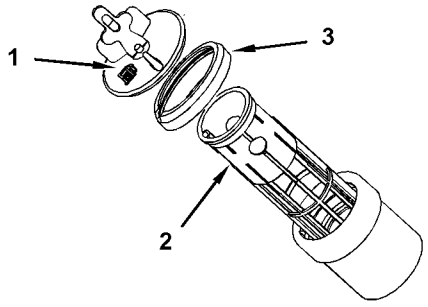

Illustration 211 g02716143

Note: The fuel tank cap may become hot during engine operation. Allow the cap to cool before proceeding.

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. Remove the fuel cap boot from the cap.

6. Inspect the fuel cap boot. If the fuel cap boot is damaged, replace the fuel cap boot.

7. Wash the fuel cap boot in a clean, nonflammable solvent.

8. Install the fuel cap boot and the fuel tank cap.

i05202456

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

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.

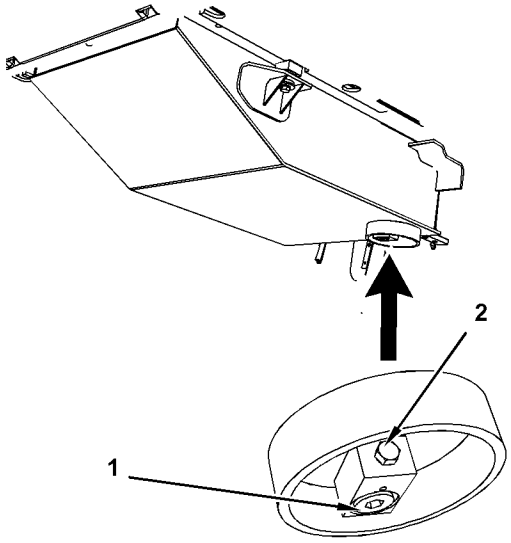

Illustration 212 g02161296

When the drain valve is under the fuel tank at the rear of the machine.

1. Remove plug (1).

2. Loosen the bolt (2) on the side of the drain.

3. Allow the water and the sediment to drain into a suitable container.

4. Tighten the bolt on the side of the drain.

5. Install plug (1).

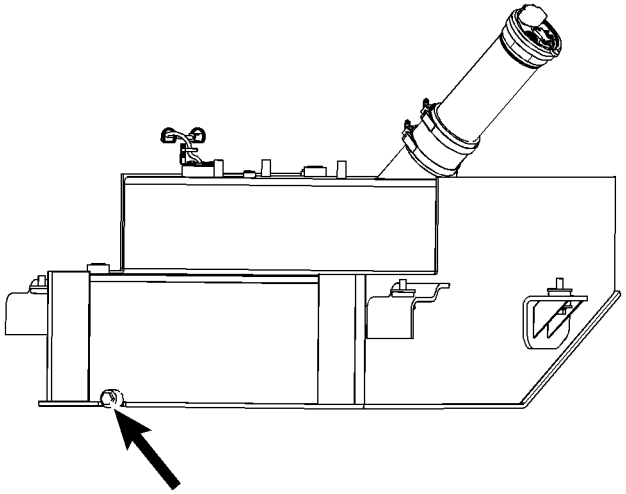

Illustration 213 g03338730

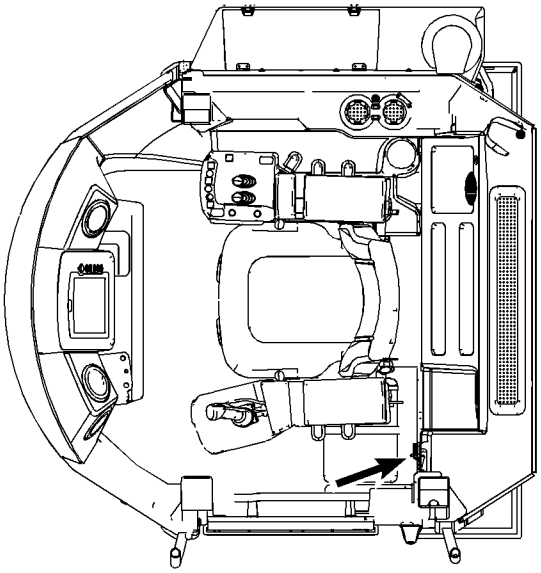

Illustration 214 g02137480

When the drain valve is located on the side of the fuel tank at the rear of the machine.

1. Loosen the plug on the side of the fuel tank.

Note: The engagement of the plug can be varied to allow metering of the water and sediment as it is drained.

2. Allow the water and the sediment to drain into a suitable container.

3. Tighten the plug.

i04555537

Fuses and Circuit Breakers - Replace/Reset

SMCS Code: 1417-510; 1420; 1420-529

NOTICE
Replace fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer.

Fuses – The fuses protect the electrical system from a circuit that has been overloaded. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

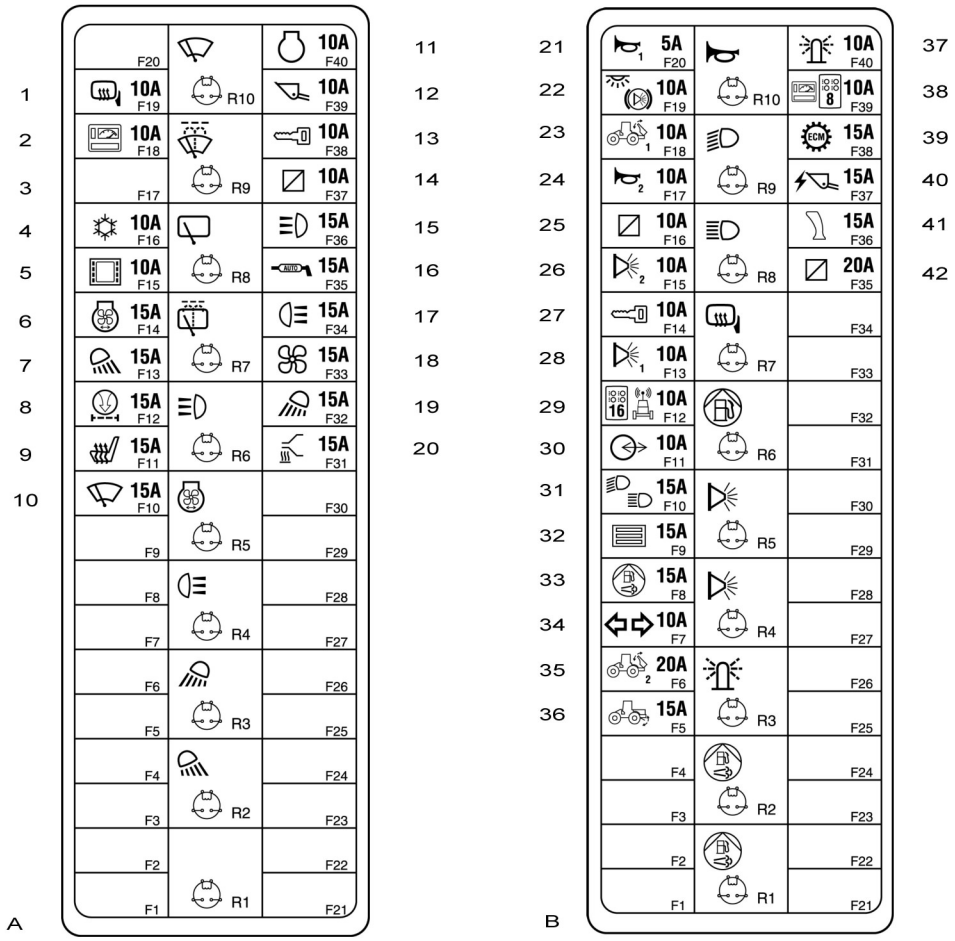

Illustration 215 g02497116

(A) Top Fuse Panel (B) Bottom Fuse Panel

The fuses are located in the cab on the left side of the operator seat.

(1) Exterior Rear View Mirror . . . . . 10 A

(2) Instrument Panel . . . . . 10 A

(3) Electronic Control Module . . . . . 10 A

(4) Air Conditioning . . . . . 10 A

(5) Monitor . . . . . 10 A

(6) Engine Reverse Fan . . . . . 15 A

(7) Work Light . . . . . 15 A

(8) Air Filter . . . . . 15 A

(9) Heated Seats . . . . . 15 A

(10) Window Wipers . . . . . 15 A

(11) Engine . . . . . 10 A

(12) Bucket Control . . . . . 10 A

(13) Key Switch . . . . . 10 A

(14) Open . . . . . 10 A

(15) Long Range Lights (Front) . . . . . 15 A

(16) Autolube . . . . . 15 A

(17) Long Range Lights (Rear) . . . . . 15 A

(18) Ventilation/Air Circulating Fan . . . . . 15 A

(19) Work Light . . . . . 15 A

(20) Nozzle Heating . . . . . 15 A

(21) Horn 1 . . . . . 5 A

(22) Brake Light/Dome Light . . . . . 10 A

(23) Hood Actuator 1 . . . . . 10 A

(24) Horn 2 . . . . . 10 A

(25) Open . . . . . 10 A

(26) Tail Light 2 . . . . . 10 A

(27) Key Switch . . . . . 10 A

(28) Tail Light 1 . . . . . 10 A

(29) Product Link/Touchpad . . . . . 10 A

(30) Input/Output . . . . . 10 A

(31) High/Low Headlights . . . . . 15 A

(32) Electronic Control Module . . . . . 15 A

(33) Engine Emission System-Fuel Pump . . . . . 15 A

(34) Turn Signals . . . . . 10 A

(35) Hood Actuator 2 . . . . . 20 A

(36) Crank Case Guard Actuator . . . . . 15 A

(37) Beacon Light . . . . . 10 A

(38) Instrument Panel/Touchpad . . . . . 10 A

(39) Transmission ECM . . . . . 15 A

(40) ECM Loader Bucket . . . . . 15 A

(41) Joystick . . . . . 15 A

(42) Open . . . . . 20 A

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.

i06303690

Hood Tilt Actuator - Lubricate

SMCS Code: 7275-086

Wipe all fittings before lubricating.

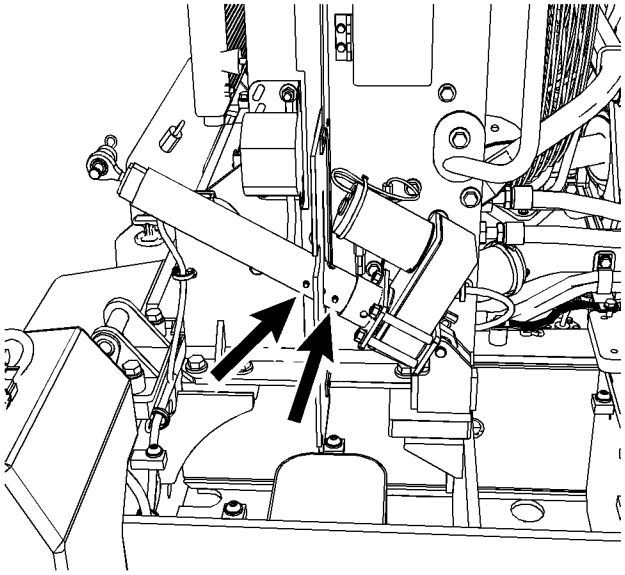

Illustration 216 g02148446
Hood tilt actuator (the hood is removed for clarity)

1. Fully raise the engine hood. The hood tilt actuator is located on the right side at the rear of the machine.

2. Fully extend the cylinder and wipe off the inner post with a clean cloth. Then, lubricate the entire length of the inner post.

3. Wipe off both fittings (if equipped) on the cylinder. Then, apply the lubricant through the two fittings (if equipped) until the lubricant escapes back through each fitting.

4. Fully close the engine hood.

i04829669

Hydraulic System Oil - Change

SMCS Code: 5056-044

Selection of the Oil Change Interval

Your machine may be able to use an extended interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is listed in the Operation and Maintenance Manual, “Maintenance Interval Schedule”. The oil should be monitored during intervals of 500 hours. The extended interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Cat machine hydraulic and hydrostatic transmission systems when ambient temperature is between −20 °C (−4 °F) and 40 °C (104 °F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Cat oil filters are recommended. The interval for changing the oil filter is listed in the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Note: A warning for the hydraulic filter bypass will be shown on the monitor display, if the hydraulic oil filter needs to be replaced prior to the service interval.

Oil

An extended 6000 hour interval for changing the oil is specific to HYDO Advanced 10.

An extended 4000 hour interval for changing the oil is for the following oil types.

- Cat Hydraulic Oil (HYDO)
- Cat Transmission and Drive Train Oil (TDTO)
- Cat TDTO-TMS
- Cat Diesel Engine Oil
- Cat Biodegradable Hydraulic Oils (HEES)
- Cat Multipurpose Tractor Oil (MTO)
- Heavy-duty diesel engine oils with a minimum zinc content of 900 ppm

If Cat oils cannot be used, use heavy-duty oils with the following classification: Cat ECF-1, API CG-4, API CF and TO-4. These oils must have a minimum zinc additive of 0.09 percent (900 ppm).

Note: Industrial hydraulic oils are not recommended in Cat hydraulic systems.

Other References

Reference: Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”

Reference: Special Publication, SEBU5898, “Cold Weather Recommendations for All Caterpillar Machines”

Reference: Special Publication, PEDP7035, “Optimizing Oil Change Intervals”

Reference: Special Publication, PEDP7036, “S·O·S Fluid Analysis”

Reference: Special Publication, PEDP7076, “Understanding the S·O·S Oil Analysis Tests”

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Cat standard SOS Fluids Analysis or an equivalent oil sampling program should be used.

The current guidelines for cleanliness of the oil should be observed. Refer to “Measured Data”.

If an oil sampling program is not available, the standard 3000 hour oil change interval should be used.

Measured Data

The following information should be monitored through sampling of the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- Significant changes in the following additives should be monitored: zinc, calcium, magnesium and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 ppm for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Cat machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed the normal by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.
- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity of 100 °C (212 °F) oil should not exceed a change of more than 2 cSt from new oil.

Procedure for Changing the Hydraulic Oil

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. Operate the machine in order to warm the hydraulic oil.

2. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

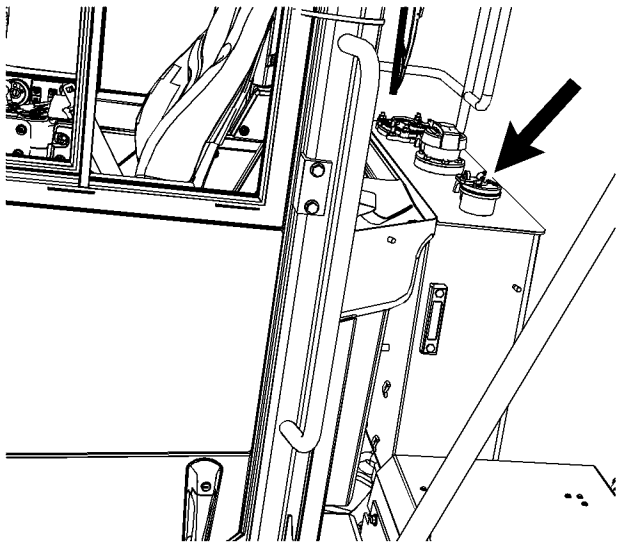

Illustration 217 g02140312
Hydraulic tank filler cap

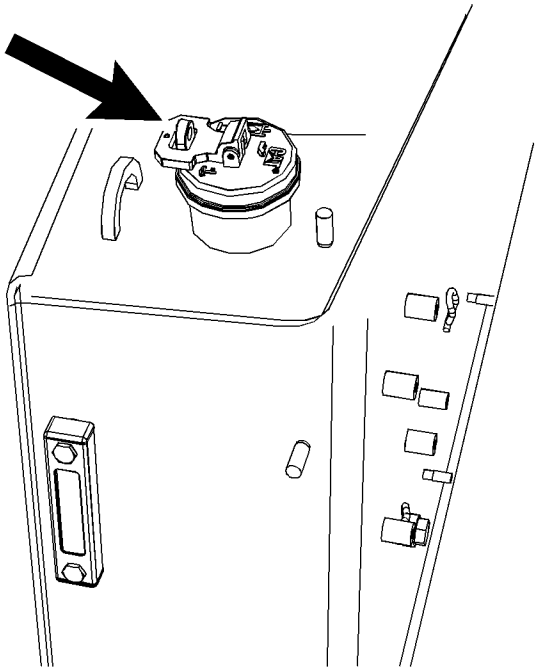

Illustration 218 g02960518
Hydraulic tank filler cap with full flow filter

3. The hydraulic tank is behind the cab of the machine. Relieve any pressure that is in the tank.

4. Remove hydraulic tank filler cap and the filler strainer. The filler strainer is located right beneath the hydraulic tank filler cap. Wash the filler cap and the strainer in a clean, nonflammable solvent. Install the strainer.

5. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.

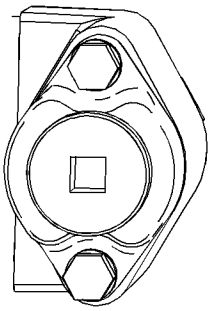

Illustration 219 g02715715

6. The hydraulic tank has a remote drain plug which is located on the right side of the machine in the lower part of the hydraulic service center. Remove drain plug. Wash the drain plug in a clean, nonflammable solvent.

Note: The hydraulic service center is located on the right side of the machine behind the ladder.

7. The hydraulic tank is equipped with an ecology drain valve. Attach a hose to a suitable drain adapter. Install the adapter in the drain valve and allow the oil to drain into a suitable container.

8. After you have drained the oil, remove the adapter from the drain opening.

NOTICE
Never start the engine while the hydraulic oil tank is being drained or while the hydraulic oil tank is empty. Excessive wear and damage to the hydraulic components can occur.

9. Close the drain valve. Install the drain plug.

10. Change the hydraulic oil filters.

Reference: Refer to Operation and Maintenance Manual, “Hydraulic System Oil Filter - Replace” for the correct procedure.

11. Fill the hydraulic tank with clean oil. Make sure that the oil level is at the “FULL” mark on the sight gauge on the left side of the hydraulic tank. Install the filler cap.

Reference: Refer to Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities” for the correct type of oil and for the correct amount of oil.

12. Start the engine and run the engine for at least 10 seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is at the “FULL” mark on the sight gauge. Install the filler cap.

13. Start the engine and run the engine at low idle. Cycle the implements slowly so that all hydraulic systems are filled with oil.

Note: If the alert indicator for a low oil level comes on, stop the engine and immediately add oil to the hydraulic tank. The oil level should not be below the suction ports in the hydraulic tank while the engine is running.

14. Add hydraulic oil to the tank until the oil level is at the “FULL” mark on the sight gauge.

15. Stop the engine. Top off the hydraulic tank so that the oil level is at the “FULL” mark on the sight gauge. Install the filler cap.

Note: The oil must be free of air bubbles. If air bubbles are present in the hydraulic oil, air is entering the hydraulic system. Inspect the hydraulic suction line and the hose clamps.

16. If necessary, tighten any loose clamps or any loose connections. Replace any damaged hoses.

i04814353

Hydraulic System Oil Filters - Replace

SMCS Code: 5068-510

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.

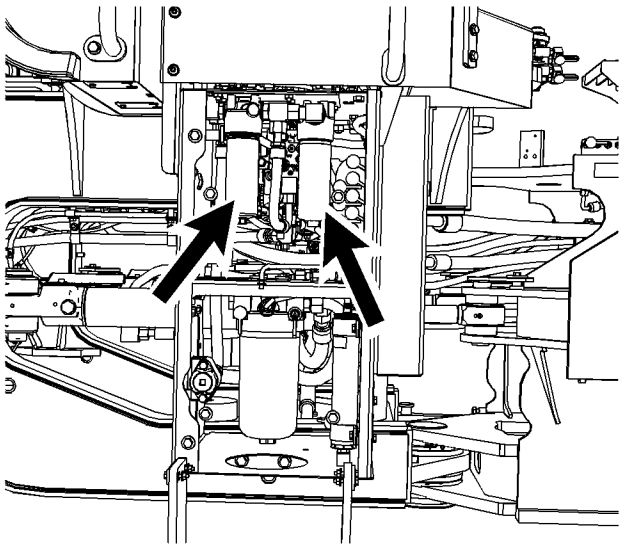

Illustration 220 g02499957
Dual Hydraulic Filter Service Center

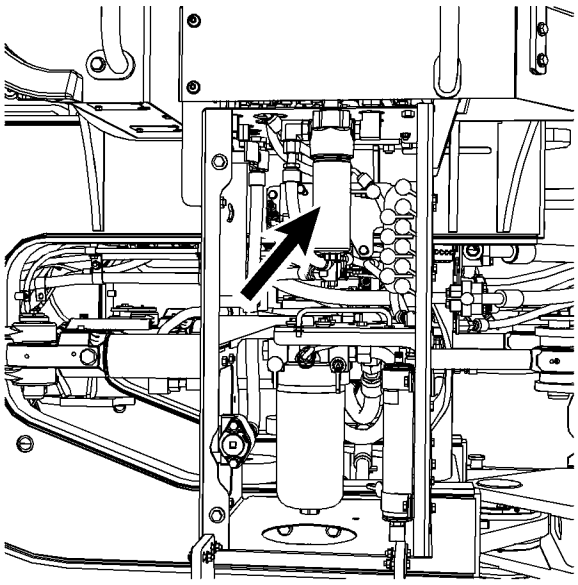

Illustration 221 g02943181
Single Hydraulic Filter Service Center

The Kidney Loop hydraulic filters are located on the right side of the machine in the hydraulic service center.

1. Open the access door to the hydraulic service center.

2. Remove the hydraulic tank filler cap.

3. Use a strap type wrench to remove the filter housing or remove the filter housing with the hex nut on the bottom of the housing. Drain the oil into a suitable container.
4. Remove the used filter element by pulling the element away from the canister. Dispose of the used filter element properly.
5. Clean the inside of the canister with a clean, nonflammable solvent.
6. Clean the mounting base with a clean, nonflammable solvent. Remove any part of the filter element gasket that remains on the filter mounting base.
7. Inspect the filter housing seal. Replace the housing seal and the retaining ring with the new parts provided with the service element. Apply a thin coat of oil to the seal.
8. Insert the new filter element into the canister.
9. Install the canister onto the base using the hex nut on the bottom of the housing. **Tighten the filter housing until the housing bottoms out in the base, then loosen 1/4 of a turn.**

Case Drain Filter (If Equipped)

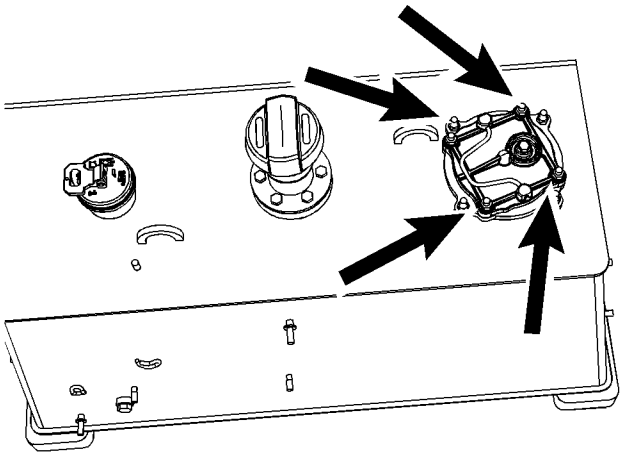

Illustration 222 g02197694
Case Drain Filter

1. The case drain filter is located on the top of the hydraulic tank. Raise the engine hood. Refer to the Operation and Maintenance Manual, “Hood Tilt”.
2. Remove the four bolts on the cover.
3. Loosen the nut. Remove the filter element from the tank. Remove the filter element. Discard the used filter element. Clean the cover in a clean, nonflammable solvent. Inspect the cover seal. If the seal is damaged, use a new seal.
4. Install a new filter element.
5. Install the filter in the tank and the cover with the four bolts. Tighten the cover bolts to a torque of 60 ± 5 N·m (44 ± 4 lb ft).

Full Return Flow Filtration Filter (If Equipped)

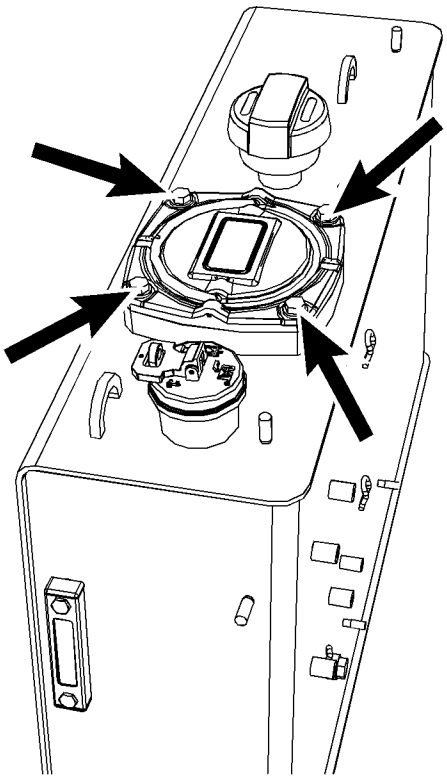

Illustration 223 g02943184
Full Return Flow Filtration Filter

1. The full return flow filtration filter is located on the top of the hydraulic tank. Raise the engine hood. Refer to the Operation and Maintenance Manual, “Hood Tilt”.
2. Remove the four bolts on the cover.
3. Lift out the filter from the tank by the handle on the cover. Use the handle on the filter element to remove the filter element. Discard the used filter element.

Note: The filter element may come out with the cover. Remove the filter element from the cover and discard the used filter element.

4. Clean the cover in a clean, nonflammable solvent. Inspect the cover seal. If the seal is damaged, use a new seal.
5. Install a new filter element.
6. Install the filter in the tank.
7. Tighten the four bolts on the cover bolts to a torque of 100 ± 20 N·m (74 ± 15 lb ft).

Finish Procedure

1. Maintain the hydraulic oil level between the top and the bottom mark on the sight gauge. Add oil, if necessary.
2. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.
3. Install the hydraulic tank filler cap.
4. Start the engine and run the engine at low idle. Inspect the hydraulic system for leaks.
5. Check the hydraulic oil site gauge on the left side of the machine on the hydraulic tank. Maintain the oil level above the “ADD COLD” mark on the sight gauge. Add hydraulic oil, if necessary. Refer to the Operation and Maintenance Manual, “Hydraulic System Oil Level - Check” for information about adding oil.

i04538762

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV

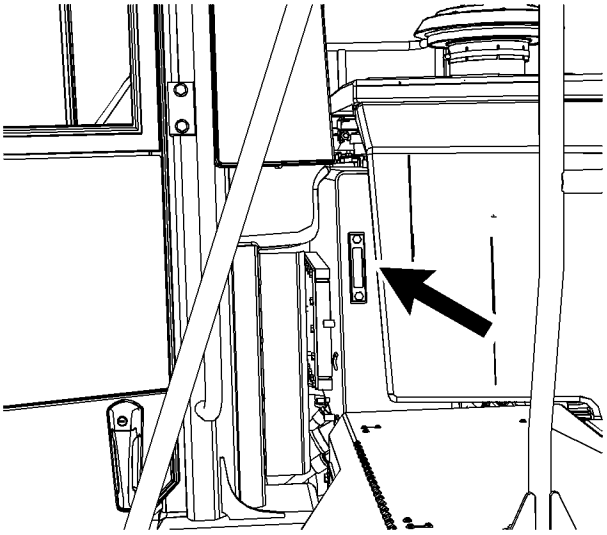

Illustration 224 g02496778

The hydraulic tank is located behind the cab. The sight gauge is located on the hydraulic tank on the left side of the machine.

The lift arms must be lowered with the bucket flat in order to check the hydraulic oil. Check the hydraulic oil level while the engine is stopped. Maintain the oil level above the “ADD COLD” mark on sight gauge. If necessary, remove filler cap slowly and add oil.

i04285430

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 5056-008; 7542

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. Operate the machine for a few minutes before obtaining the oil sample. Operate the hydraulic controls in order to mix the hydraulic oil thoroughly for a more accurate sample.

2. Open the clamshell hood.

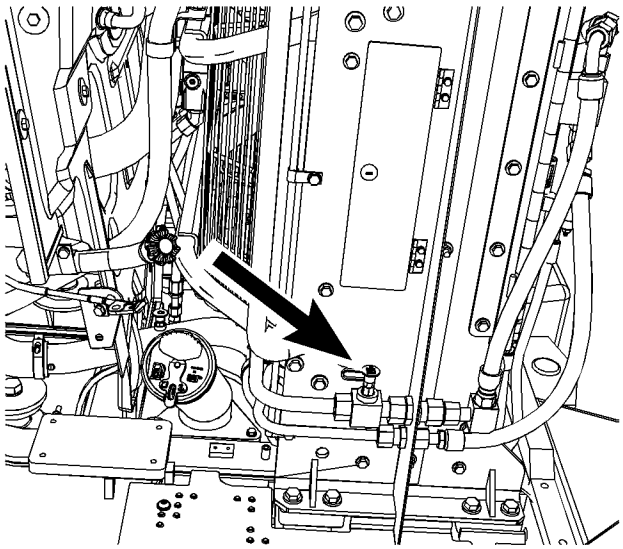

Illustration 225 g02496777

3. The S·O·S oil sample port is located on the left side in the machine next to the radiator. Use the in-line sampling valve in order to obtain a sample of hydraulic oil.

4. Close and secure the clamshell hood.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i04829691

Hydraulic Tank Breather - Replace

SMCS Code: 5050-510-BRE; 5056-510-BRE; 5118-510

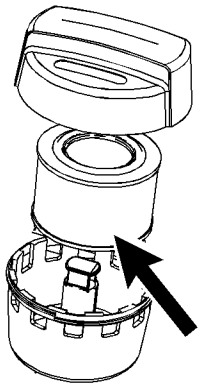

Illustration 226 g02960576

The hydraulic tank breather is located on the top of the hydraulic tank behind the cab of the machine.

1. Remove the top of the hydraulic tank breather.

2. Replace the breather element.

3. Install the top of the breather

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3004-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

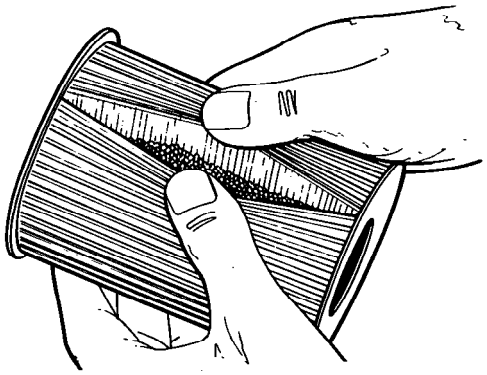

Illustration 227 g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i03883758

Open Crankcase Ventilation (OCV) Fumes Disposal Filter - Replace

SMCS Code: 1317-510-FI

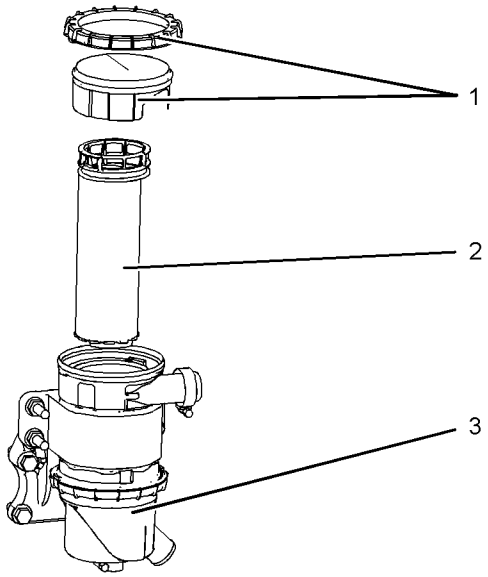

Illustration 228 g02129220

Open the hood on the rear of machine in order to access the engine compartment. The Open Crankcase Ventilation (OCV) is located on the right side of the engine.

1. Remove the OCV cover and cap(1) from the OCV housing (3).
2. Remove the OCV filter (2) from the OCV housing.
3. Replace the OCV filter.
4. Check the condition of the hose. Make sure that the inside of the hose is unobstructed. Replace the hose if the hose is damaged.
5. Install the cover onto the OCV housing.
6. Close the access door and the hood.

i04285432

Radiator Core - Clean

SMCS Code: 1353-070-KO

Ensure that the engine is off before you perform this procedure.

1. Open the clamshell hood at the rear of the machine.

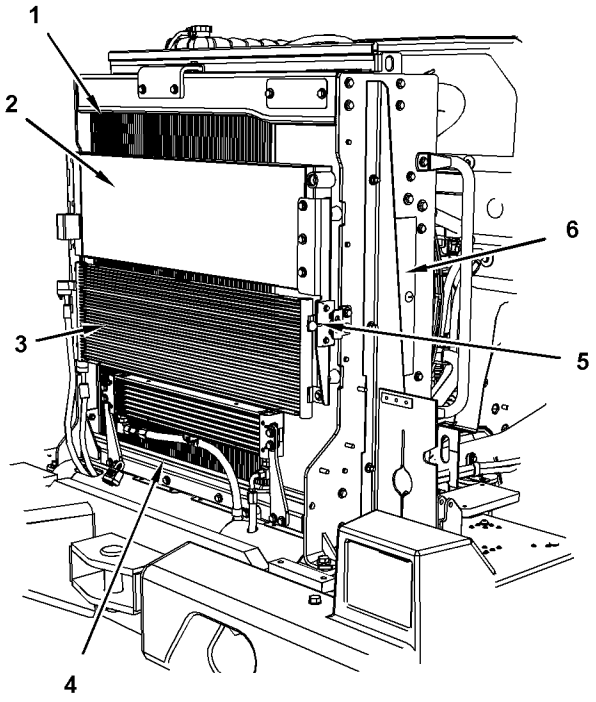

Illustration 229 g02496476

(1) Radiator
(2) Hydraulic Oil Cooler
(3) A/C Condenser
(4) Fuel Cooler
(5) Control Knob
(6) Access Panel

2. Use the control knob in order to release the hydraulic oil cooler and the A/C condenser. Swing hydraulic oil cooler and condenser away from the radiator.

3. Using the machine key open the left and right side access doors to clean the radiator and ATAAC cores.

4. Use compressed air, high-pressure water, or steam to remove dust and other debris from the radiator fins. The maximum air pressure for cleaning purposes must be reduced to 205 kPa (30 psi). The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi). However, the use of compressed air is preferred. Refer to Operation and Maintenance Manual, “General Hazard Information” for Safety information about using pressurized air and water.

5. Lock the access doors.

6. Swing the hydraulic oil cooler and the air conditioner condenser back into the operating position.

7. The fuel cooler does not swing out. The wand must be placed behind the fuel cooler between the fuel cooler and radiator cores to clean out the fuel cooler.

8. Close and fully latch the radiator grill.

i05873697

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510

⚠ 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.

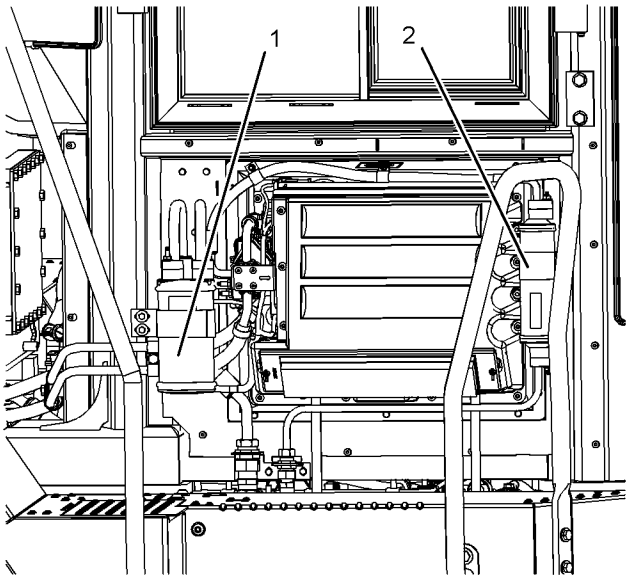

Illustration 230 g02496257

(1) Refrigerant Accumulator
(2) Refrigerant dryer receiver

Remove the cover of the air conditioning unit on the right side of the machine. The in-line refrigerant dryer receiver is on the right side.

Refer to Service Manual, UENR4125, “In-Line Refrigerant Dryer Receiver - Remove and Install” for the replacement procedure of refrigerant dryer receiver.

Note: When you operate the machine in a climate with high humidity, replace the in-line refrigerant dryer receiver after every 1000 service hours or 6 months.

i05873743

Ride Control Accumulator - Check

SMCS Code: 5077-535-R6

⚠ WARNING

Pressurized System!

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

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

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

Note: When the ride control accumulator is properly charged, the bouncing motion of the machine is reduced by the ride control accumulator.

1. Put a typical load in the bucket.
2. Press and hold the ride control button in order to activate the ride control service mode.
3. Drive the machine over a rough road surface.

   If the machine bounces too much or the accumulator piston striking the stop can be heard, consult your Caterpillar dealer or refer to Service Manual Testing and Adjusting, “Ride Control Accumulator - Test and Charge”.

i03657286

Roading Fender Hinges - Lubricate
(If Equipped)

SMCS Code: 7252-086-RNG

Wipe off the fitting before any lubricant is applied.

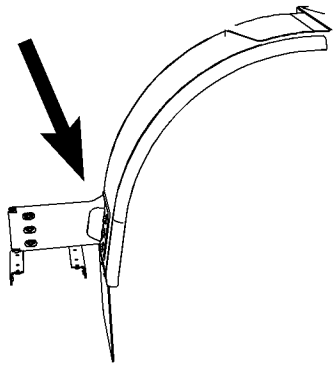

Illustration 231 g01963400

Open the roading fender. Apply lubricant through one fitting on the hinge. There is one hinge on each side of the machine.

i05259070

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

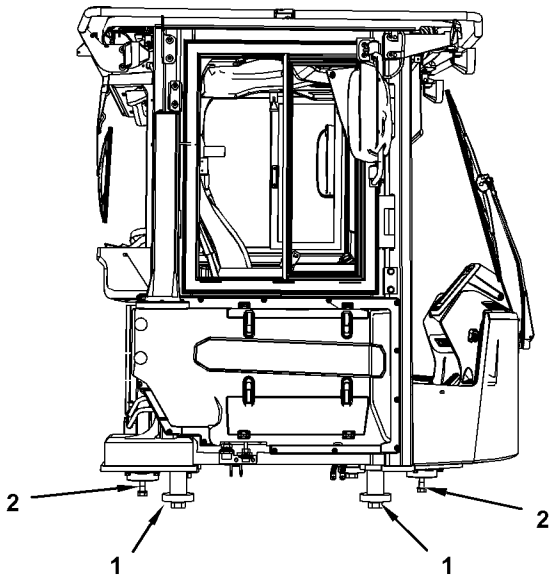

Illustration 232 g02496197

Inspect the ROPS for bolts that are loose or damaged. Use original equipment parts only to replace bolts that are damaged or missing. Tighten the four larger cab mounting bolts (1) to a torque of 850 ± 100 N·m (629 ± 74 lb ft). Tighten the four smaller cab mounting bolts (2) to a torque of 460 ± 60 N·m (339 ± 44 lb ft)

Note: Apply oil to all bolt threads before installation. Failure to apply oil can result in improper bolt torque.

Do not repair the ROPS by welding reinforcement plates to the ROPS. Consult your Caterpillar dealer for repair of cracks in any welds, in any castings, or in any metal section of the ROPS.

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”

i04423750

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 233 g02620156

Typical example

Inspect the buckle for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect the seat belt for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect the 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).

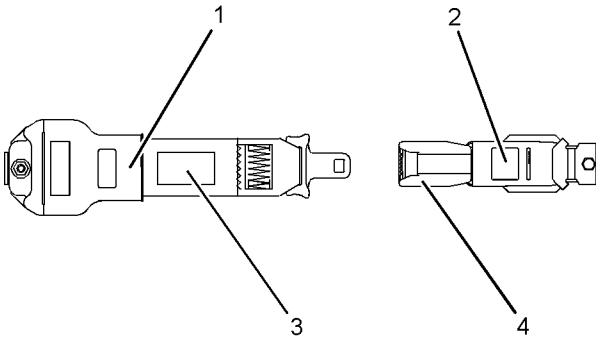

Illustration 234 g01152685

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.

i04555498

Secondary Steering - Test

SMCS Code: 4300-081-SE; 4300-081-SST; 4324-081; 4324

⚠ WARNING

The service brake must be checked in order to ensure proper operation before you test the supplemental steering system.

Personal injury, death, or property damage could occur if the supplemental steering system is tested and the service brake is not operational.

Test the service brake before you test the supplemental steering system.

Perform the following procedure in order to test the secondary steering pump (if equipped) and the secondary steering control valves. The procedure may be required by local regulations.

Ensure that there are no hazards in the test area. The test area must be unobstructed and level. Operate the machine in second gear.

Ensure that all air tanks and accumulators are properly charged. Ensure that there is no load in the work tool. Position the machine with the bucket or the work tool in the CARRY position with the machine in neutral.

The secondary steering pump is an electrical driven pump (if equipped). The pump should be tested by running the secondary steering test through the display. This test will test the secondary steering pump (if equipped) and the secondary steering control valves.

⚠ WARNING

If the secondary steering activates during operation, immediately park the machine in a safe location. Inspect the machine and correct the condition which caused the secondary steering to activate.

Do not continue to operate the machine when the secondary steering is active.

Personal injury or death can occur if steering is lost completely during operation.

The batteries must have a normal charge. The secondary steering electrical system must be in proper working condition. A low battery, or any defect in the battery, battery cells, or electrical circuit can cause loss of secondary steering. Personal injury and/or damage to the machine can occur.

Note: Before the test for the secondary steering is performed, the machine must meet the following conditions:

- If equipped with the Left Hand Steering Control, the left-hand armrest must be down and latched.
- The engine must be operating.
- The parking brake must be engaged.
- The transmission control must be in NEUTRAL.
- The area around the front wheels must be clear of obstacles and personnel.

Note: Verify that the secondary steering indicator is on and amber in color throughout the test. The light ensures that the test is actually being activated. If the secondary steering indicator does not turn on amber in color, verify that the initial conditions are met.

1. Locate the secondary steering test in the monitoring display. Select “Yes” in order to activate the test. The test will be active for 10 seconds.

2. While the test is running, provide the following steering inputs:

a. Steer left

b. Steer center

c. Steer right

d. Verify that the movement of the front wheel aligns with each steering input.

Note: If the wheels do not move according to the steering command, consult your local Cat dealer.

Note: In order to protect the secondary steering pump, the secondary steering test will shut off after 10 seconds. If the secondary steering test shuts off, the alert indicator will not be amber in color.

3. The secondary steering indicator will illuminate amber in color during the test. If the alert indicator is not illuminated after the test, the test was successful and the steering performance was normal.

Note: If the secondary steering indicator is amber in color, the test has failed. The warning level that is displayed will provide instructions that must be followed. Consult your local Cat dealer.

4. The secondary steering test in the display will continue to say “Yes” after the test is completed. Select “No” in the Monitor Display in order to continue other functions.

i01801632

Service Brake Wear Indicator - Check

SMCS Code: 4255-535-IND

Reference: For information about checking the service brake wear indicator, refer to Testing and Adjusting, “Braking System” for the machine that is being serviced or consult your Caterpillar dealer.

i04348910

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, “Steering Frame Lock” before entering the articulation joint.

WARNING

Crushing Hazard. Insure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area. Failure to do so could result in serious injury or death.

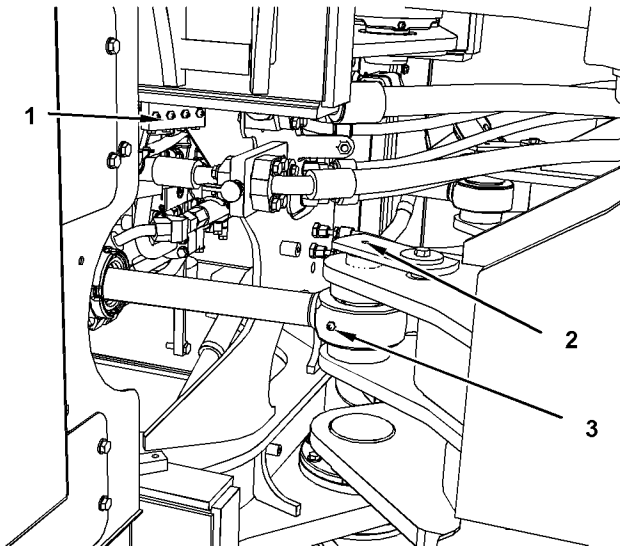

Illustration 235 g02495937

(1) Remote grease fittings for the head ends

(2) Location of the grease fittings for the rod ends

(3) Location of the grease fittings for the rod ends

Wipe off the fittings before any lubricant is applied. The steering cylinders are lubricated by using standard grease fittings.

The head ends of the steering cylinders are lubricated by using remote grease fittings. The fittings are located on the right side of the machine in front of the steps.

i02305841

Tire Inflation - Check

SMCS Code: 4203-535-AI

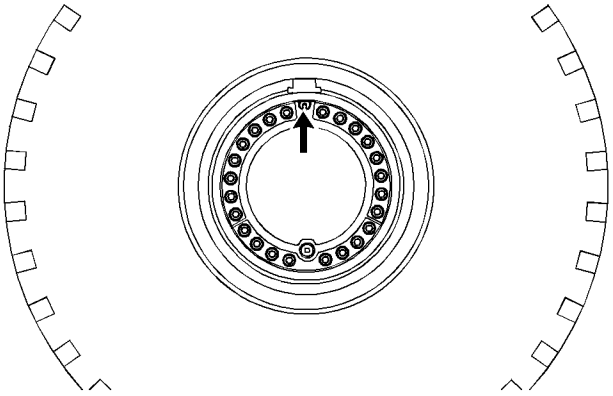

Illustration 236 g01160201

Always obtain proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. Measure the tire pressure on each tire.

Inflate the tires with nitrogen , if necessary.

Reference: Refer to the “Tire Inflation Information” section of the Operation and Maintenance Manual for more information.

i04285453

Transmission Oil - Change

SMCS Code: 3030-044

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. Operate the engine in order to warm the transmission oil. Park the machine on level ground. Lower the bucket and apply slight downward pressure.

2. Engage the parking brake. Stop the engine.

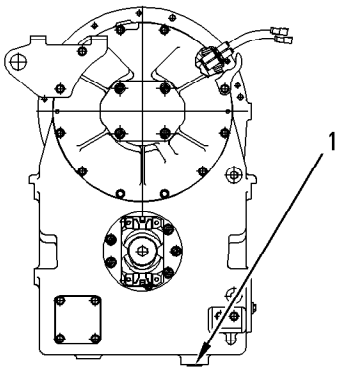

Illustration 237 g01002772

3. Remove drain plug (1) on the bottom of the transfer case.

4. Change the transmission oil filter.

Reference: Refer to Operation and Maintenance Manual, “Transmission Oil Filter - Replace” for the correct procedure.

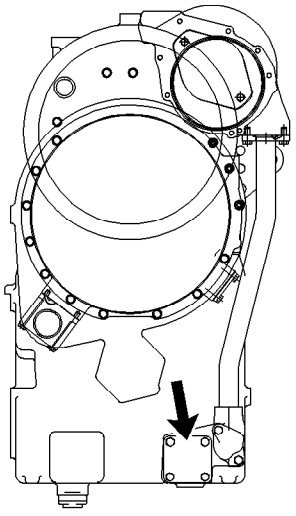

Illustration 238 g00884724

5. The magnetic strainer is on the right rear side of the transfer case. Remove the four bolts, the cover, and the seal that holds the magnets and the screen in place.

6. Remove the screen and the magnets from the transfer case housing.

7. Wash the screen in a clean, nonflammable solvent. Use a bristle brush or pressure air to clean the screen. Clean the magnets. Replace any damaged magnets.

8. Clean the cover. Inspect the cover seal. Replace the cover seal if the seal is damaged.

9. Insert the magnets and the screen into the transfer case housing. Install the seal, the cover, and the four bolts.

10. Clean the transmission oil drain plug and install the transmission oil drain plug.

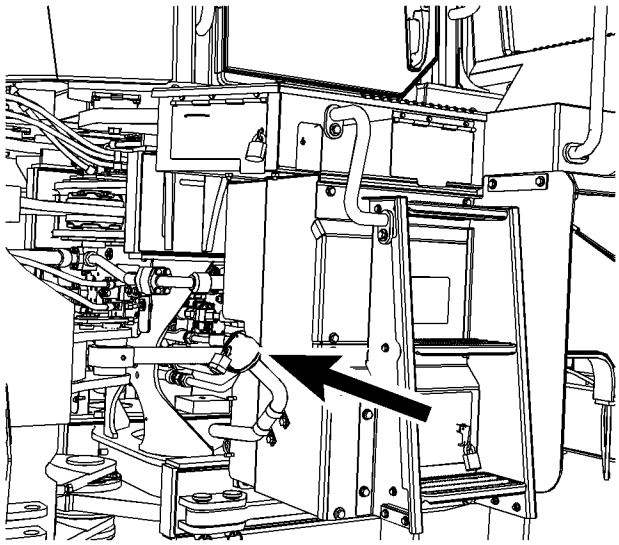

Illustration 239 g02161336

11. Remove the oil filler cap on the left side of the machine and fill the transmission with oil.

Reference: Refer to Operation and Maintenance Manual, “Lubricant Viscosities and Refill Capacities” for the type of lubricant and for the refill capacity.

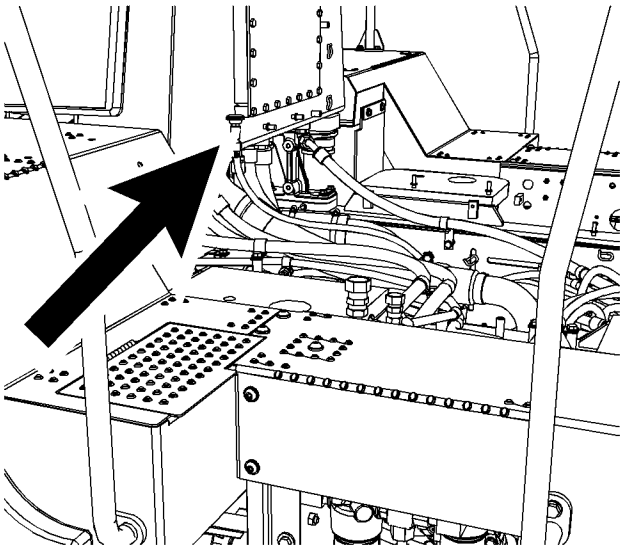

Illustration 240 g02495856

Transmission Breather. The cab is removed for clarity

12. The breather is located on the right side between the hydraulic tank and the cab. Remove the breather. Wash the breather in a clean, nonflammable solvent. Install the breather.

13. Start and run the engine at low idle. Inspect the machine for leaks. Slowly operate the transmission controls in order to circulate the transmission oil.

14. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, “Transmission Oil Level - Check” for the correct procedure.

i04818823

Transmission Oil Filter - Replace

SMCS Code: 3004-510; 3067-510

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.

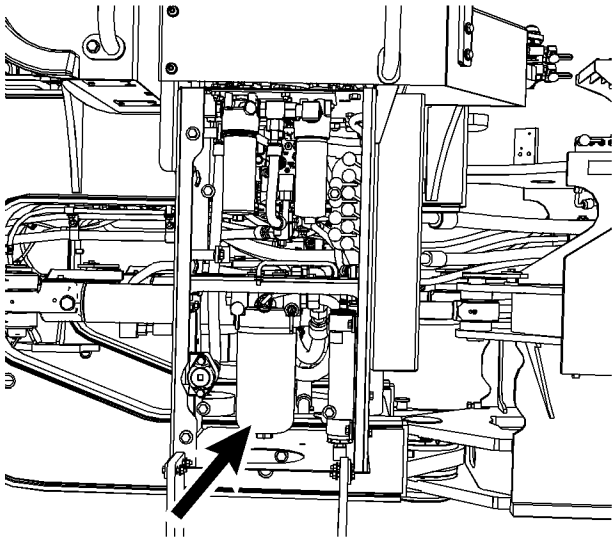

Illustration 241 g02495757
Dual Hydraulic Filter Service Center

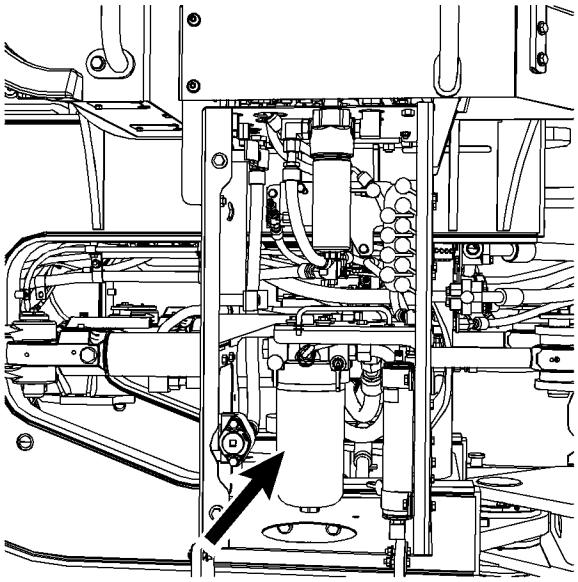

Illustration 242 g02941940
Single Hydraulic Filter Service Center

Note: A warning for the transmission filter bypass will be shown on the monitor display. The light will illuminate if the transmission oil filter needs to be replaced prior to the service interval.

The transmission oil filter is located on the right side of the machine under the platform in the hydraulic service center.

1. Operate the machine in order to warm the oil. Park the machine on level ground. Lower the bucket to the ground and apply slight downward pressure.
2. Engage the parking brake and stop the engine.
3. Open the access panel.
4. Remove the filter housing drain plug and allow the oil in the filter to drain into a suitable container.
5. Use a strap type wrench to remove the filter housing or remove the filter housing with the hex nut on the bottom of the housing.
6. Remove the used filter element by pulling the element away from the canister. Ensure that the reusable center tube is not removed during element service. Dispose of the used filter element properly.
7. Clean the filter housing and the filter housing base with a clean, nonflammable solvent.
8. Inspect the filter housing seal. Replace the housing seal with the new one provided with the service element.

9. Install the new filter element into the transmission filter housing over the fixed center support tube. Clean the filter housing drain plug and install the drain plug.

10. Install the filter housing to the filter housing base. The torque to use on the housing hex nut is 50 N·m (37 lb ft).

11. Start the engine. Slowly operate the transmission controls in order to circulate the transmission oil. Check the machine for oil leaks.

12. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, “Transmission Oil Level - Check” for the correct procedure.

i04366946

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

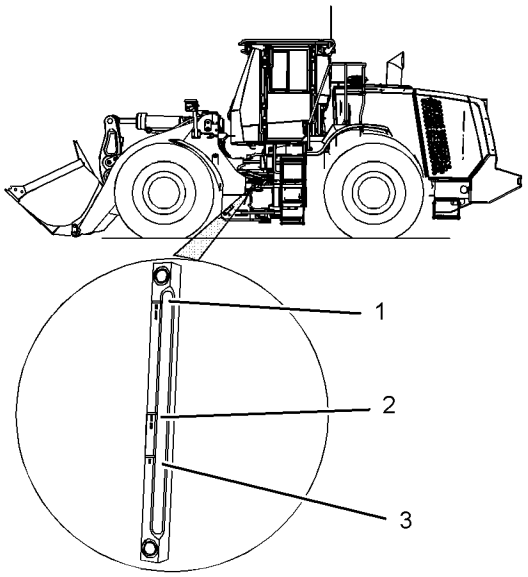

Illustration 243 g02495737

The sight gauge for the transmission oil level is located on the left side of the machine near the articulation joint.

Note: Before the machine is started, the transmission oil level should be above “MIN START” mark (1) on the upper end of the sight gauge.

1. Operate the machine for a few minutes in order to warm the transmission oil.

2. Park the machine on a hard, level surface. Put the transmission control into the NEUTRAL position. Lower the bucket to the ground with a slight downward pressure. Engage the parking brake.

3. Stop the engine and restart the engine. Ensure that throttle pedal is released, parking brake is engaged, transmission is in neutral, and the implements are not active. For 5 minutes after restart, the engine speed will be set to transmission oil level check speed of 950 rpm.

4. Check the oil level while the engine is running at transmission oil level check idle speed. Ensure that the machine is not running at hibernate idle.

While the engine is running at transmission oil level check idle speed, the transmission oil level should be between the “MIN” mark (3) and the “MAX” mark (2).

5. If necessary, remove the filler cap and add oil.

i04555512

Transmission Oil Sample - Obtain

SMCS Code: 3080-008; 7542

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. Operate the machine for a few minutes before obtaining the oil sample. Thoroughly mixing the transmission oil will provide a more accurate sample.

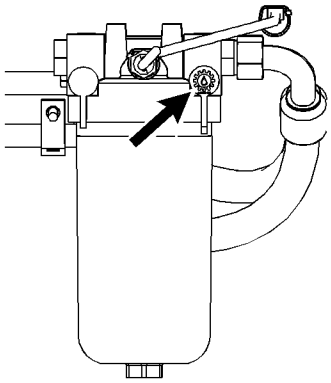

Illustration 244 g02138440

2. The sampling valve for the transmission oil is located on the transmission oil filter base. The filter is located on the right side of the machine in the hydraulic service center. Use the in-line sampling valve in order to obtain a sample of transmission oil.

Reference: For more information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” “S·O·S Oil Analysis” and Special Publication, PEHP6001, “How To Take A Good Oil Sample”.

i03894955

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

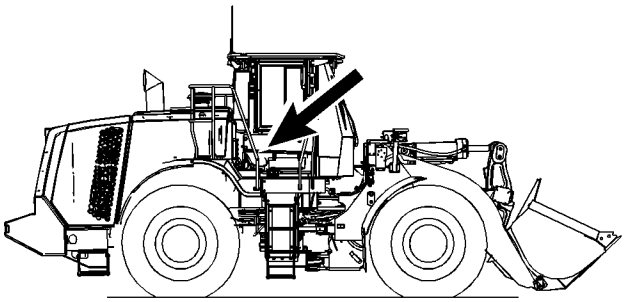

Illustration 245 g02138450

Window Washer Reservoir – The window washer reservoir is located under an access door on the platform on the right side of the machine. Fill the window washer reservoir through the filler opening.

Avoid getting dirt/debris in the window washer reservoir. Dirt may damage the washer pump and plug the check valve and washer nozzles.

i03894961

Window Wiper - Inspect/ Replace

SMCS Code: 7305-510; 7305-040

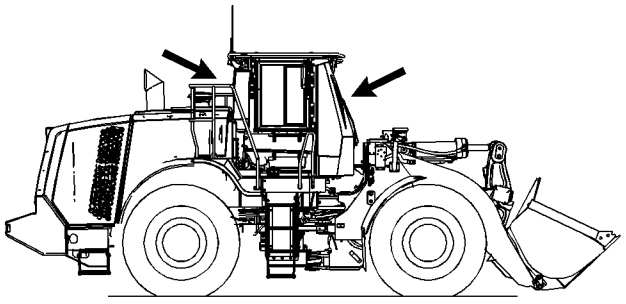

Illustration 246 g02138457

Inspect the condition of the wiper blades on the front window and on the rear window. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i04401808

Windows - Clean

SMCS Code: 7310-070

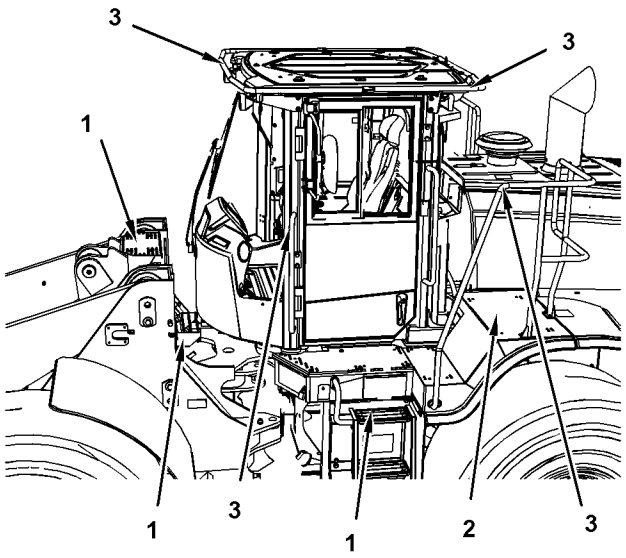

Illustration 247 g02193073

Note: Ensure that the machine is in the STRAIGHT position before accessing the windows. Rotate the left-hand mirror bracket out of the way by rotating towards the window to the detent position. Use the handrails to maintain three points of contact.

Use commercially available window cleaning solutions in order to clean the windows. Use the steps (1), platforms (2) and handholds (3) that are provided. Ensure that the steps and platforms are free of debris before climbing on the machine.

i06274452

Work Tool - Inspect

SMCS Code: 6700-040

Quick Coupler

If your machine is equipped with the Fusion coupler, refer to the Fusion Operation and Maintenance Manual, “Fusion Quick Coupler” for detailed operation and inspection information.

When you install a work tool on the quick coupler, inspect the engagement of the coupler pins. If there is play between the coupler pins and the corresponding bores, inspect the coupler pins and the bores for damage or wear.

If there is play between the quick coupler and the hooks of the work tool, inspect the quick coupler and the hooks for wear or for damage.

Make any necessary repairs before you operate the work tool.

Bucket Tips

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

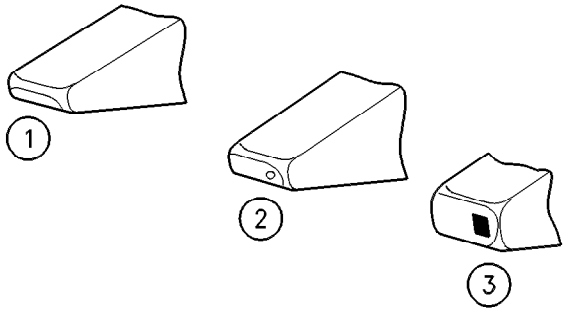

Illustration 248 g00101352

(1) Usable
(2) Replace the tip.
(3) Replace the 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.

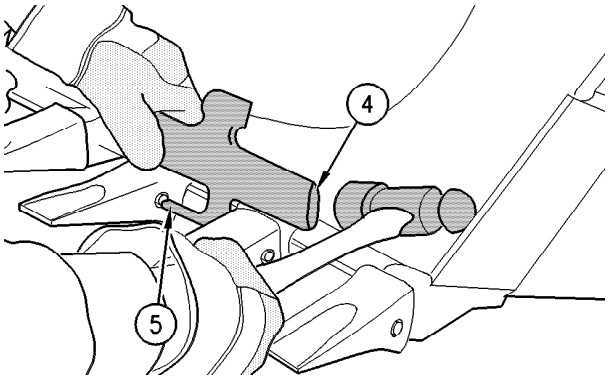

Illustration 249 g00590670

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

a. Place the Pin-Master on the bucket tooth.

b. Align extractor (5) with the pin.

c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

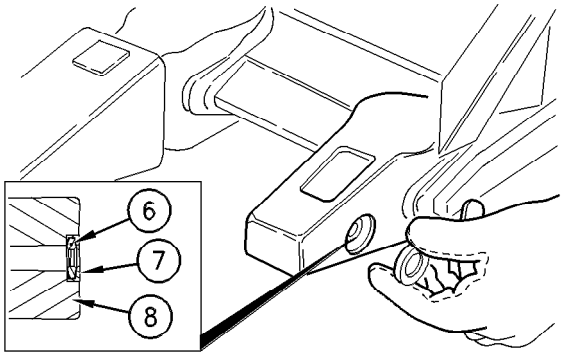

Illustration 250 g00590819

(6) Retainer
(7) Retaining washer
(8) Adapter

2. Clean the adapter and the pin.

3. Fit retainer (6) into retaining washer (7). Install this assembly into the groove that is in the side of adapter (8).

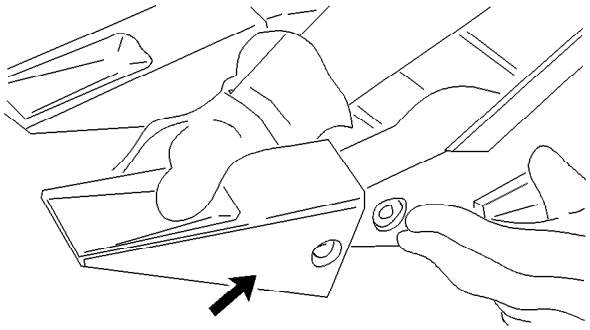

Illustration 251 g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

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

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

Note: To install the pin correctly into the retainer, the pin must be driven in from the right side of the tooth. Improper installation of the pin can result in the loss of the bucket tip.

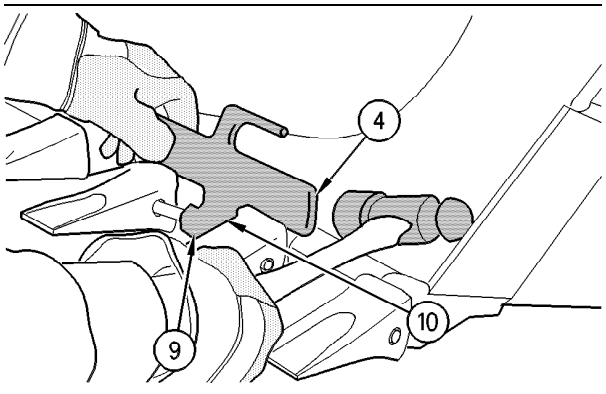

Illustration 252 g00590666

(4) Back of Pin-Master
(9) Pin setter
(10) Pin holder

a. Insert the pin through the bucket tooth.

b. Place the Pin-Master over the bucket tooth and locate the pin in the hole of holder (10).

c. Strike the tool with a hammer at the back of the tool (4) in order to start the pin.

d. Slide pin holder (10) away from the pin and rotate the tool slightly in order to align pin setter (9) with the pin.

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

6. After you drive the pin, make sure that the retainer fits snugly into the pin groove.

K-Series Tip

Removal

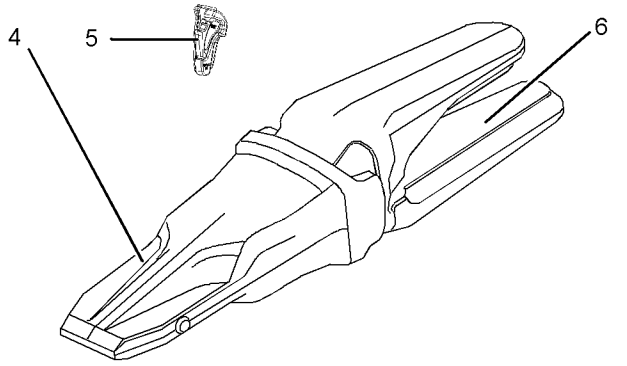

Illustration 253 g01389463

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

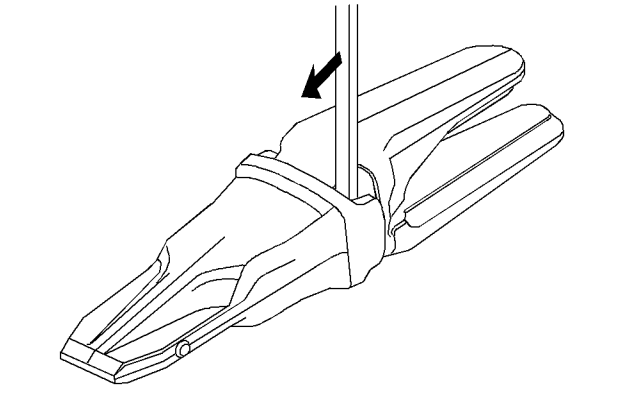

Illustration 254 g01175361

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.

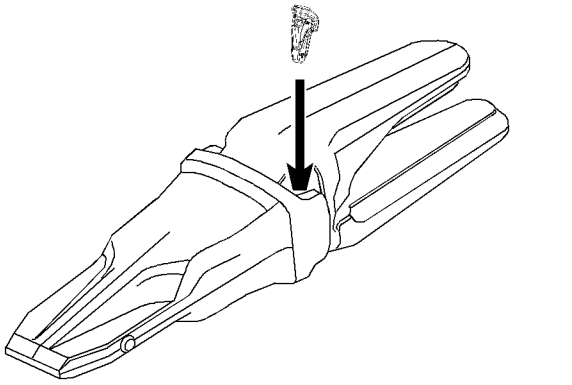

Illustration 255 g01124736

3. Install the retainer. Make sure that the retainer latch catches under the tip pocket.

4. Make sure that the latch is properly seated by trying to remove the bucket tip.

Bucket Hinge and Lift Arm Clearance Shims - Inspect/Adjust/ Replace

Inspect the Linkage

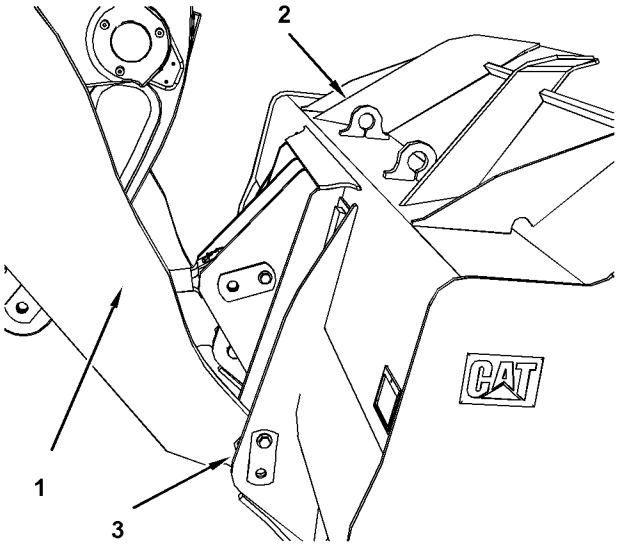

Illustration 256 g02495596

(1) Lift Arm
(2) Bucket
(3) Inspection Points for the Bucket Hinge.

Periodically inspect the bucket linkage. The gap between the bucket and the linkage should not exceed the thinnest shim that is available for the bucket assembly.

1. Lower the lift arm assembly (1) to suitable blocking. Rest the bucket (2) on the ground.

2. Use a gauge to measure the gap at the hinge.

3. If the measurement exceeds the required amount, new shims must be installed.

Installing Shims for the Hinge on the Bucket

Note: Refer to the Disassembly and Assembly Manual, “Bucket - Remove” for the correct procedure for removing the pins in the linkage.

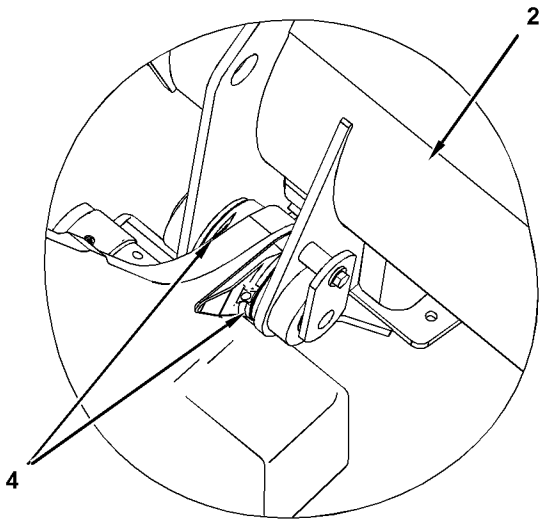

Illustration 257 g01345720

(2) Bucket
(4) Install washers on lift arm.

Install washers and pin assembly to the bucket in order to reduce the gap between the lift arm and the hinges on the bucket. When possible, use washers on both sides of the lift arm.

Note: Refer to the Disassembly and Assembly Manual, “Bucket - Install” for the correct procedure for installing the pins in the linkage.

Bucket Cutting Edges - Inspect/ Replace

⚠ WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

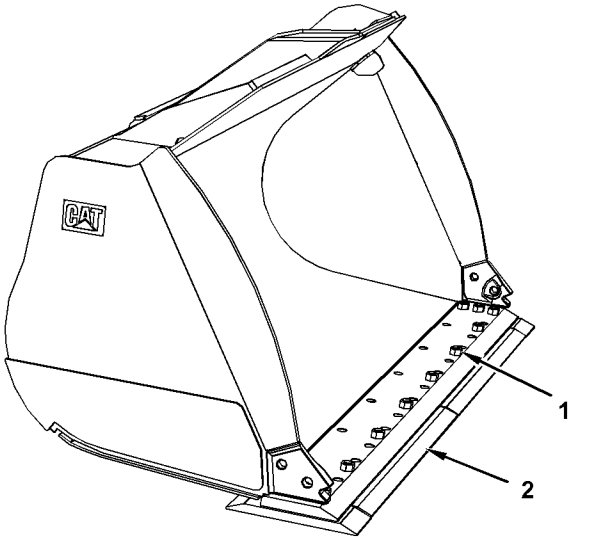

Illustration 258 g02495597

(1) Bolts for Cutting Edge
(2) Cutting Edge

Check the cutting edges and the end bits for wear and for damage. Use the following procedure to service the cutting edges and the end bits:

1. Raise the bucket and place blocking under the bucket.

2. Lower the bucket onto the blocking. Stop the engine.

3. Remove bolts (1), cutting edge (2) and the end bits.

4. Clean all contact surfaces.

5. If the opposite side of the cutting edge is not worn, use the opposite side of the cutting edge. The end bits are not reversible.

If both sides are worn, install a new cutting edge.

6. Install bolts (1). Tighten the bolts to the specified torque.

Reference: Refer to Specifications, SENR3130, “Ground Engaging Tool (G.E.T.) Fasteners”.

7. Start the engine. Raise the bucket and remove the blocking. Lower the bucket to the ground.

8. After a few hours of operation, check the bolts for proper torque.

Bucket Wear Plates

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket wear plates.

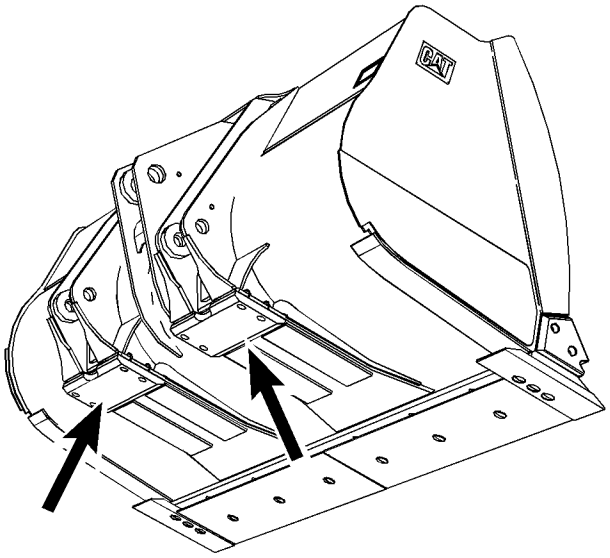

Illustration 259 g02495641

Inspect the wear plates. Replace the wear plates before damage to the bottom of the bucket occurs. Consult your Cat dealer for replacement of wear plates.

Pallet Forks

Descriptions of the Fork Tine

Parts

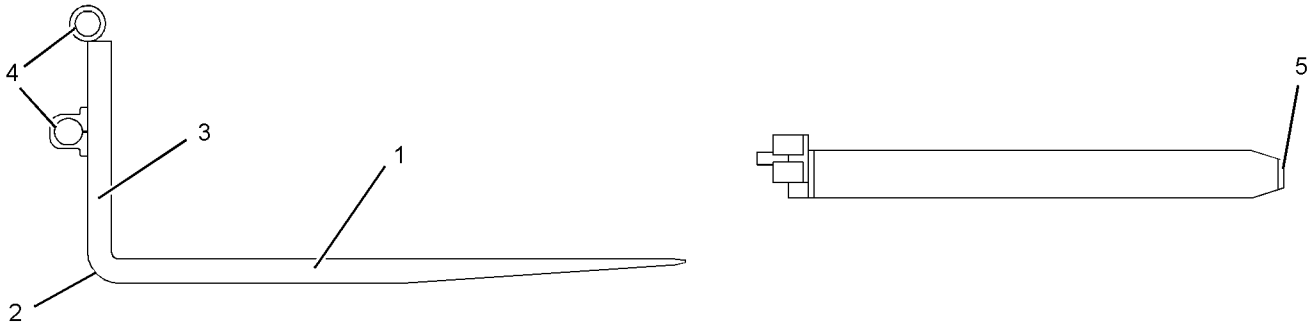

Illustration 260 g01598401

(1) Blade – The horizontal part of the fork tine that supports the load

(2) Heel – The curved transition between the blade and the shank

(3) Shank – The vertical part of the fork tine

(4) Hanger – Hangers mount the fork tine to the carriage

(5) Tip – The free end of the blade

Surfaces

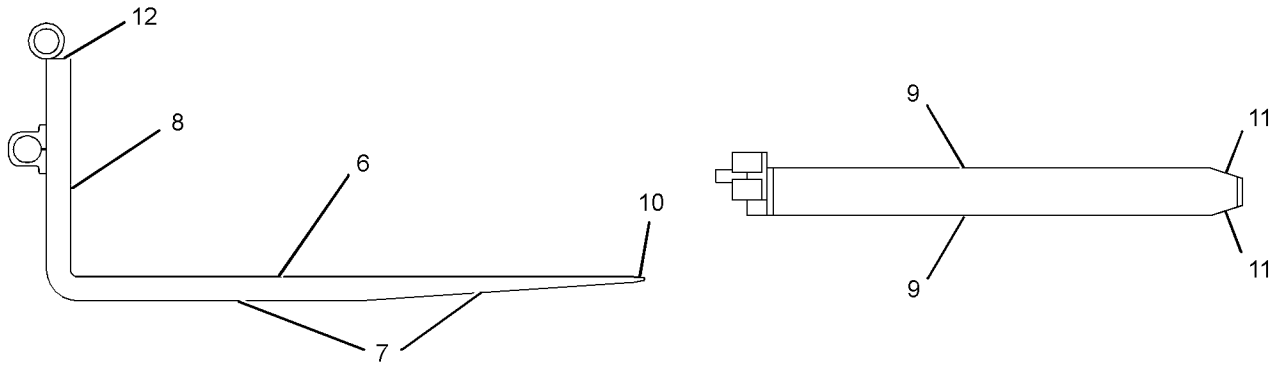

Illustration 261 g02142830

(6) Upper Face of the Blade – The upper surface of the blade that carries the load

(7) Bottom of Heel – The lower surface of the blade that includes the taper

(8) Front Face of Shank – The distance for the load center is measured from the front face of the shank. The face of the shank contacts the load.

(9) Flanks – The side faces of the blade and the shank

(10) Blade Bevel – The upper and lower surfaces of the blade tip that are tapered for easy insertion of the fork tines

(11) Tip Flanks – The side surfaces of the tip of the blade that are tapered for easy insertion of the fork tines

(12) Top of Shank – The top surface of the shank

Dimensions

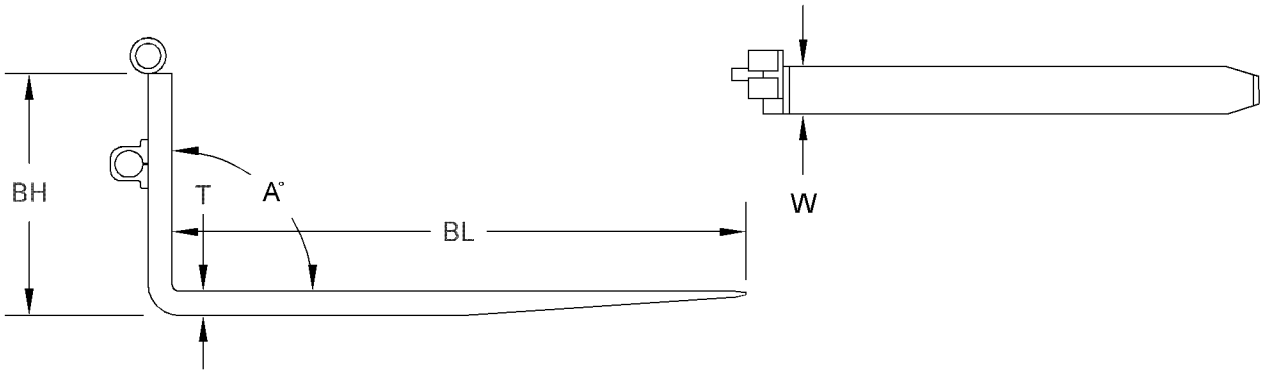

Illustration 262 g02142831

(T) Thickness – The thickness of the blade at the closest point to the heel

(W) Width – The width of the blade at the closest point to the heel

(BH) Back Height – The distance from the bottom of the blade to the top of the shank

(BL) Length – The length of the blade is measured from the front face on the shank to the tip on the blade.

(A) Angle – The angle from the upper surface of the blade to the front face of the shank.

Inspection of the Fork Tines

The fork tines must be inspected for the following conditions:

- permanent deformation
- stress cracks
- other defects

Check the fork tines daily for any twisting or bending of the fork tines. If any twisting or bending is observed, the fork tines should be changed prior to any lifting operation. If the fork tines are damaged, consult your Cat dealer.

Check the fork tines for wear or for damage. Inspect the welds, the locks, the shafts, and the fork tines for damage. If the components are damaged, consult your Cat dealer. Refer to Operation and Maintenance Manual, “Daily Inspection” for additional information.

Blade Thickness

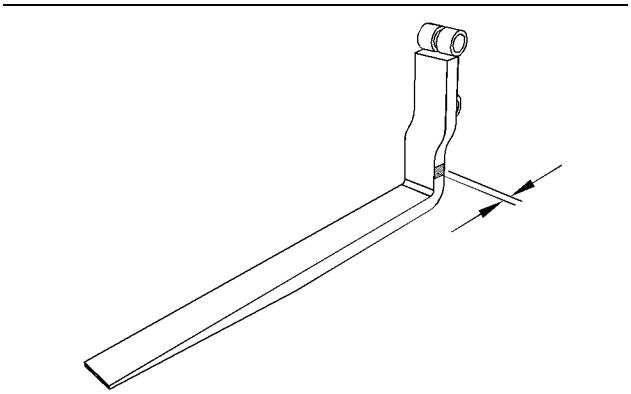

Illustration 263 g01600073

1. Measure the thickness of the shank. Ensure that the measuring device is held square across the shank in order to acquire an accurate measurement.

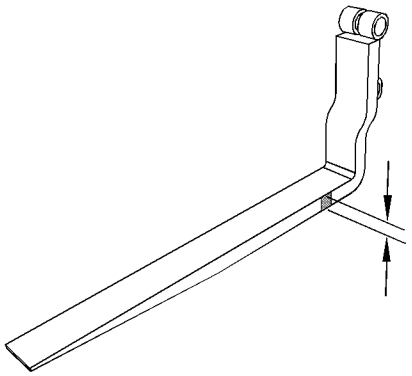

Illustration 264 g01600074

2. Measure the blade of the fork tine near the heel. Ensure that the measuring device is held square across the blade in order to acquire an accurate measurement.

3. Compare the measurement of the blade and the measurement of the shank.

4. If the difference in measurements is less than 10%, the fork tine can remain in service.

5. If the difference in measurements is greater than 10%, the fork tine must be taken out of service. Fork tine wear that is greater than 10%, represents a 20% reduction in the capacity of the fork tine.

Consult your Cat dealer for additional information.

Angle of the Heel

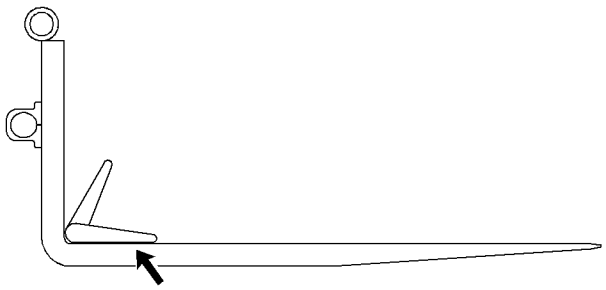

Illustration 265 g01600075

1. Place a measuring device in the top inside area of the heel on top of the blade. Ensure that the measuring device is held flat against the blade in order to acquire an accurate measurement.

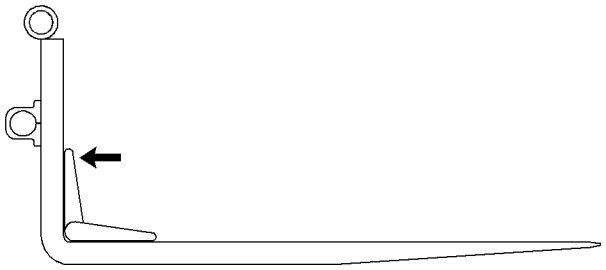

Illustration 266 g01600076

2. Move the upper arm of the measuring device toward the face of the shank. Ensure that the measuring device is held flat against the face of the shank in order to acquire an accurate measurement.

3. Check the angle that was measured with the device for the angle of the heel.

4. If the angle is between 87 degrees and 93 degrees, the fork tine can remain in service.

5. If the angle is less than 87 degrees or greater than 93 degrees, the fork tine must be taken out of service.

Consult your Cat dealer for additional information.

i04566428

Work Tool - Lubricate

SMCS Code: 6700-086

If your machine is equipped with the Fusion coupler, refer to Operation and Maintenance Manual, “Fusion Quick Coupler” for detailed lubrication information.

Apply lubricant to all the inside surfaces of both wedge pockets on the bucket or the work tool.

Quick Coupler - Lubricate

Note: Refer to Operation and Maintenance Manual, “Lubricant Viscosities” for more information on the types of grease to use. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more information on grease.

Note: Uncoupling the bucket or the work tool daily helps to prevent the coupler wedges from sticking.

1. Uncouple the bucket or the work tool in order to position the coupler so the fittings are accessible.

2. Wipe off the fittings before you lubricate the fittings.

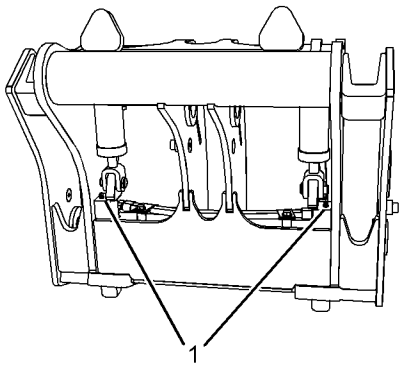

Illustration 267 g01526562

3. Lubricate both wedge assemblies on the quick coupler. Apply lubricant to grease fittings (1) on the wedge assemblies.

Logging Fork Clamp - Lubricate

Wipe off all fittings before any lubricant is applied.

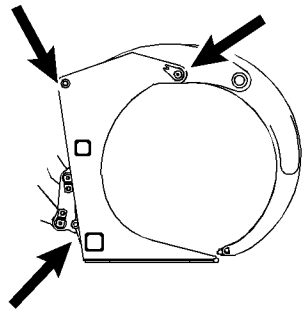

Illustration 268 g02352211

Apply lubricant through the indicated fittings on each side of the logging fork.

Pallet Fork - Lubricate

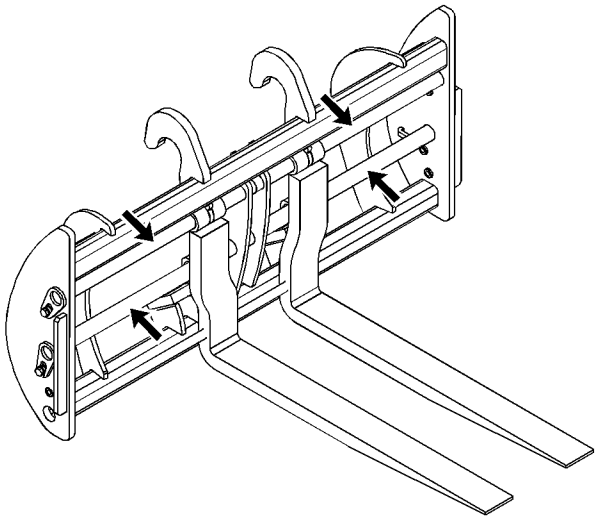

Illustration 269 g01563105

Typical example

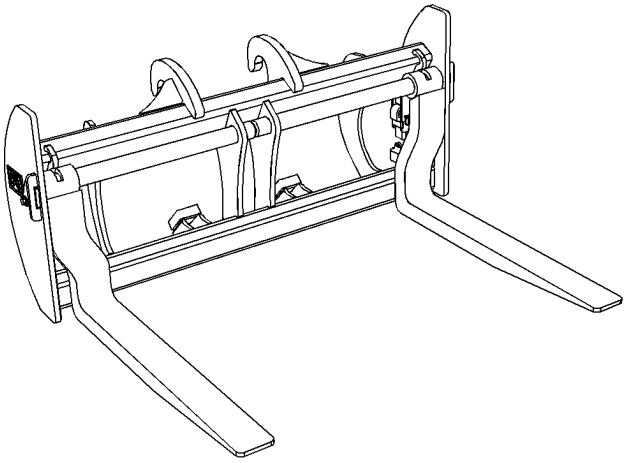

Illustration 270 g02730282

Typical forks on Fusion Coupler

1. Coat the shafts with grease.

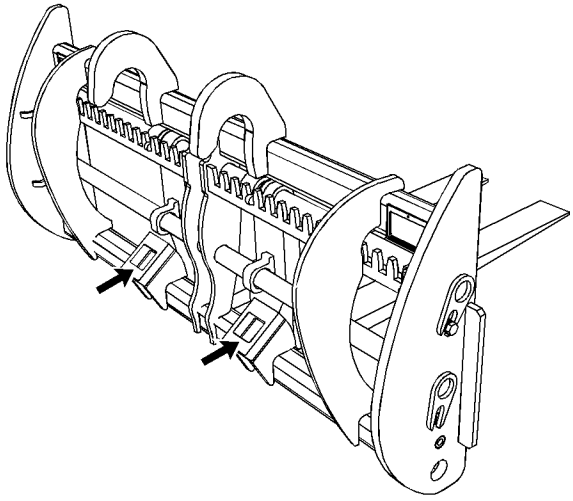

Illustration 271 g01563115

Typical example

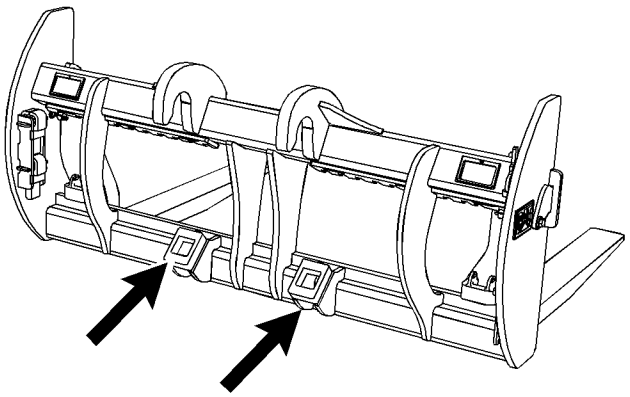

Illustration 272 g02730295

Typical forks on Fusion Coupler

2. Coat the mounting holes for the quick coupler with grease.

Reference: Refer to Operation and Maintenance Manual, SEBU6250, “Caterpillar Machine Lubricant Recommendations” for information on lubricants.

Grapple Fork

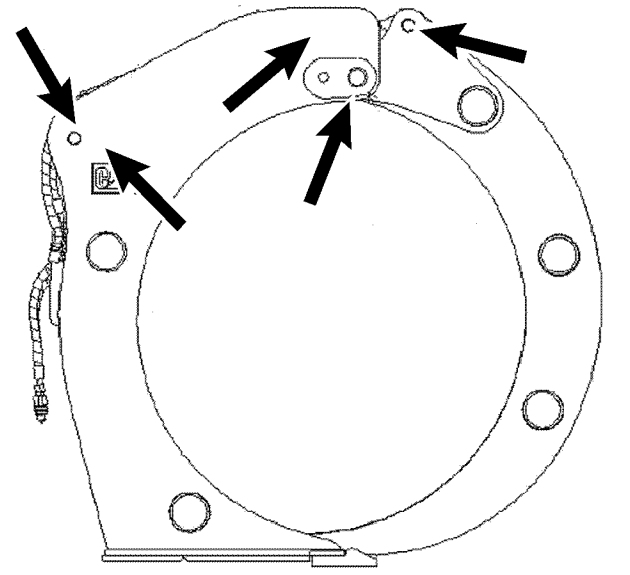

Illustration 273 g02143770

Apply lubricant through fittings that are indicated on each side of the grapple.

Note: Illustration 273 includes grease points for the optional kickout.

Material Handling Arm

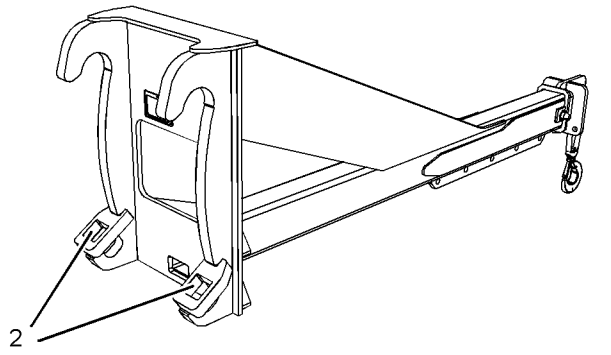

Illustration 274 g02196062

Apply lubricant to all the inside surfaces of both wedge pockets on the work tool.

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.

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____