



Operation and Maintenance Manual

777F Off-Highway Truck

JRP 1-UP (777F)

Language: Original Instructions

Important Safety Information

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

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

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

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

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



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

▲ WARNING

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

Failure to follow this warning may lead to premature failures, product damage, personal injury or death.

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

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:

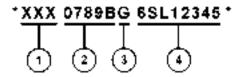


Illustration 1 g03891925

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

i03647229

Safety Messages

SMCS Code: 7000; 7405

There are several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please 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 the words or the images become unreadable. When you clean the safety messages, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety messages. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety message. Loose adhesive will allow the safety message to separate from the machine.

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

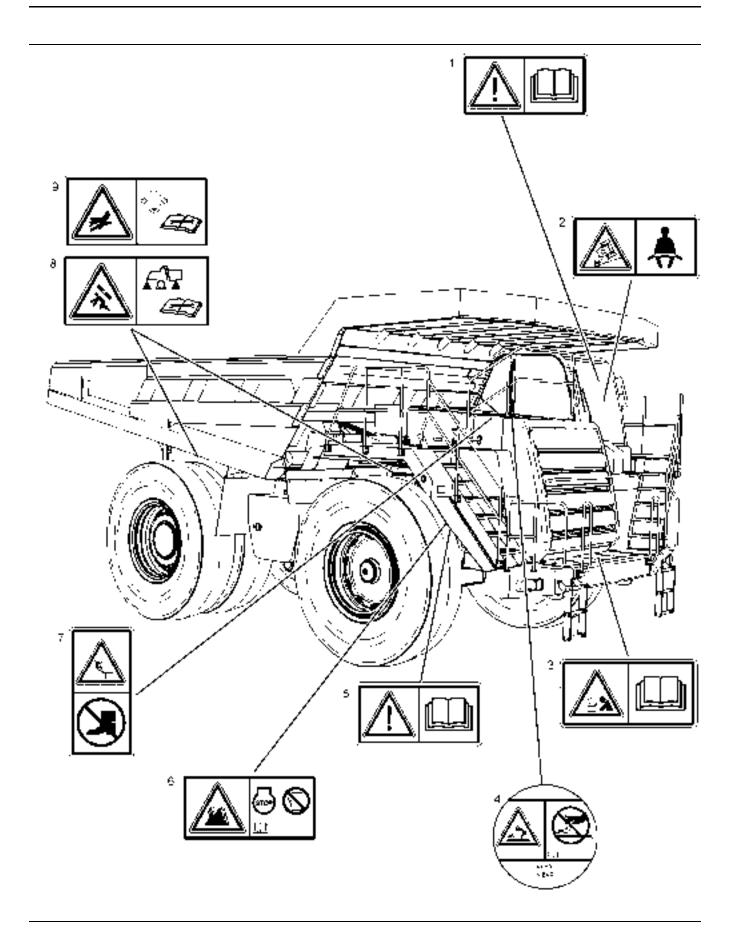


Illustration 2 g01957688

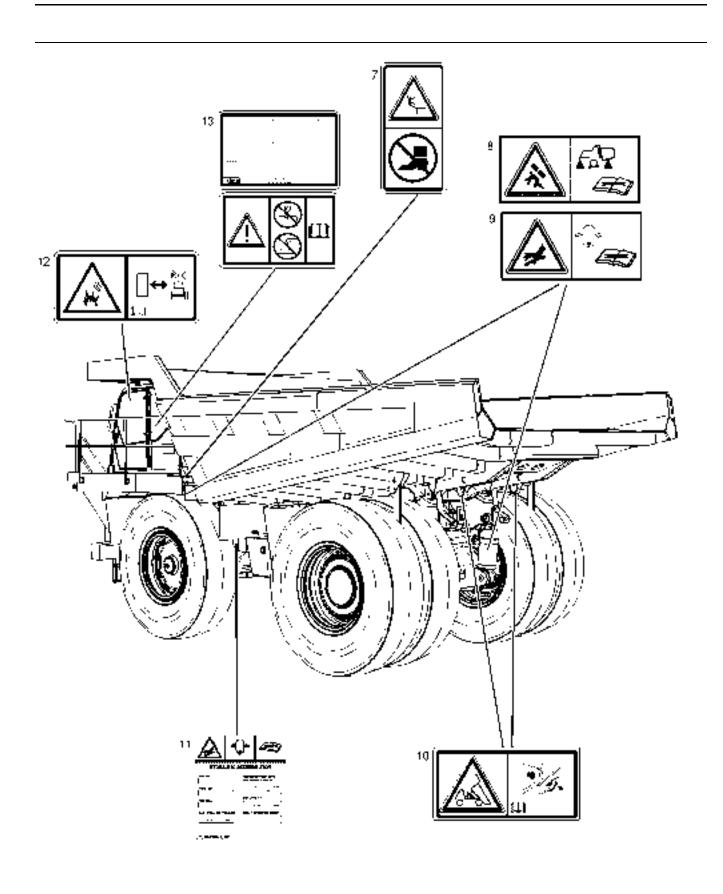


Illustration 3 g01957689

Do Not Operate (1)

This safety message is located inside the cab.

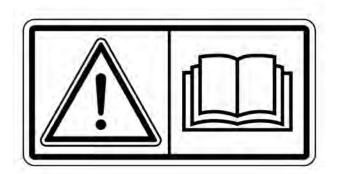


Illustration 4 g01370904



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 any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

Seat Belt (2)

This safety message is located inside the cab.



Illustration 5 g01370908

A 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.

Explosion Hazard (3)

This safety message is located on the battery access

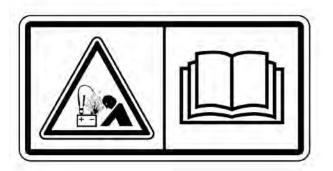


Illustration 6 g01370909



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.

Hot Coolant Under Pressure (4)

This safety message is located on the radiator cap.



Illustration 7 g01407380

A WARNING

The coolant is hot and the coolant is under pressure. Do not touch the hot surfaces. Refer to the Operation and Maintenance Manual for the procedure to follow when you check the radiator.

Do Not Operate (5)

This safety message is located on the valve cover and on the Electronic Control Module (ECM).

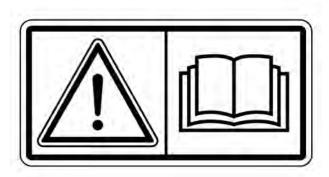


Illustration 8 g01370904

A WARNING

Do not operate or work on this engine unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death.

The ECM sends a high voltage signal to the unit injectors. To help prevent personal injury, disconnect the unit injector connector. Do not come in contact with the harness connector for the unit injector while the engine is operating.

Fire Hazard (6)

This safety message is located on the engine valve cover.



Illustration 9 g01185292

A WARNING

Flash fire may result in personal injury if crankcase covers are removed within fifteen minutes of emergency shutdown.

Do not restart engine until cause for shutdown has been corrected.

Fall Hazard (7)

This safety message is located on the right hand radiator cowling and this safety message is located on the main beam behind the cab.



Illustration 10 g01370910

A WARNING

Do not use this surface as a step or platform. This surface may not support additional weight or may be slippery. Serious injury or death could occur from a fall.

Crushing Hazard (8)

This safety message is located on each of the four suspension cylinders.

13







HIGH PRESSURE CYLINDER

Do not remove any valve, hydraulic fitting, or valve core, nor disassemble any parts until pressure has been relieved.

To relieve pressure, truck frame must be properly supported. Failure to comply with this warning will cause unexpected machine movement resulting in serious injury or death.

Refer to your Service Manual for correct procedures for relieving pressure and/or correct charging procedures.

See your Caterpillar dealer who has tools and detailed information for servicing and charging cylinders.

For information on servicing the suspension cylinders, refer to Systems Operation, Testing and Adjusting, RENR8316.

High Pressure Cylinder (9)

This safety message is located on each of the four suspension cylinders.

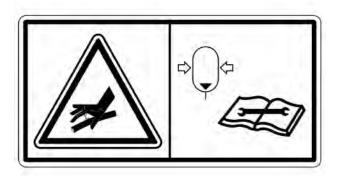


Illustration 12 g01370912

▲ WARNING

High Pressure Cylinder.

Do not remove any valve, hydraulic fitting, or valve core nor disassemble any cylinder parts until pressure is relieved. Personally injury or death may occur.

See service manual for correct procedure to relieve pressure and to charge cylinders.

For information on servicing the suspension cylinders, refer to Systems Operation, Testing and Adjusting, RENR8316.

Body Up Pin (10)

This safety message is located on the rear of the dump body near the points that are used to retain the body in the UP position.

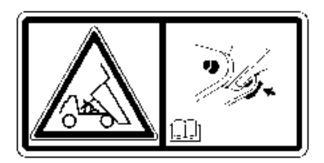


Illustration 13 g01955512

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

Gas Under Pressure (11)

This safety message is located on the brake accumulators. The brake accumulators are located on the left outside frame rail below the cab.



Illustration 14 g01123184

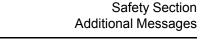
A WARNING

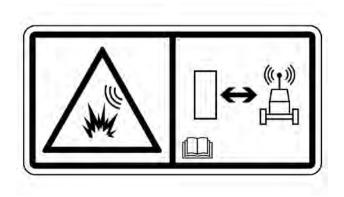
Gas under pressure. Rapid discharge from disconnecting or disassembly could cause personal injury or death. See service manual before relieving pressure or charging.

Product Link (12)

This safety message is located inside the cab.

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Safety Section









This machine is equipped with a Caterpillar Product Link communication device. When electric/ electronic detonators are used, this communication device should be deactivated within 12 m (40 ft) of a blast site, 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.

Do Not Weld or Drill the ROPS (13)

On **Earlier Machines**, this safety message is located outside on the lower rear left side of the cab. On **Later Machines**, this safety message is located inside the cab on the left front ROPS post.

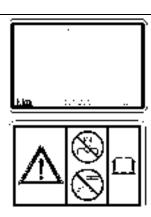


Illustration 16 g01953246

A 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 a Caterpillar dealer to determine this structure's limitations without voiding its certification.

i04371625

Additional Messages

SMCS Code: 1000; 7000; 7405

There are several specific messages on these machines. The exact location of the messages and the description of the messages are reviewed in this section. Please become familiarized with all messages.

Make sure that all of the messages are legible. Clean the messages or replace the messages if the words or images are unreadable. 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 separate from the machine.

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

Retarding Guidelines

This message is located inside the cab.

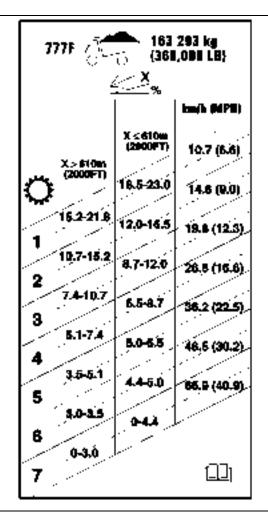


Illustration 17 g01242377

For more information on retarding, refer to Operation and Maintenance Manual, "Retarding".

Information for Air Conditioner System Service

This message is located inside the cab.

Do not work on the air conditioning system until you have read the service manual and you understand the service manual.

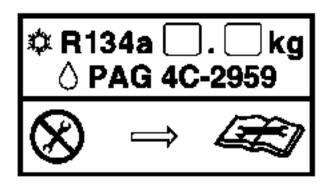


Illustration 18 g00983944

24 Volt Electrical System

This message is located above the auxiliary start receptacle.

This machine is equipped with a 24 volt electrical system.



Illustration 19 g01126478

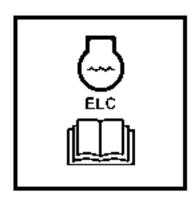
ELC (Extended Life Coolant) Cooling System

This message is located next to the access door for the radiator cap.

This machine is shipped from the factory with ELC.

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Safety Section

Safety Section Additional Messages





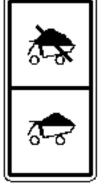


Illustration 22 g01147071

Do Not Lift

This message is located on any shipping eyes that are not lifting points.



Illustration 21 g01126496

Do Not Load Material on the Canopy

This message is located inside the cab.

Do not load any material on the canopy of the truck.

Product Link

If your machine is equipped with the Product Link System, this additional message is located in the cab

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

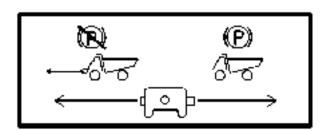


Illustration 23 g01418953

Diverter Valve (Tow Valve)

This message is located below the diverter valve on the left hoist support assembly.

Move the diverter valve in order to tow a disabled machine. Refer to Operation and Maintenance Manual, "Towing with Inoperable Engine" for more information.





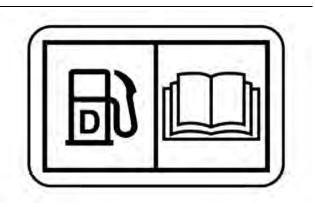


Illustration 26 g02379417

Weight of the Wheel Chock (If Equipped)

This message is located on each wheel chock. Use proper lift and carry techniques when the wheel chocks are handled.

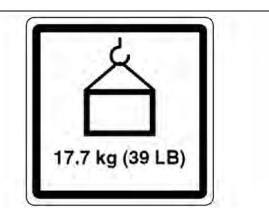


Illustration 25 g01955768

Diesel Fuel Recommendations

This message is located near any diesel fuel fill points.

Refer to Operation and Maintenance Manual, "Lubricant Viscosities (Fluids Recommendations)" for information on diesel fuel recommendations.

Engine Idle Shutdown (EIS) (If Equipped)

This message is located next to the engine start switch. Refer to Operation and Maintenance Manual, "Operator Controls" for more information.



Illustration 27

g02535436

i07746355

General Hazard Information

SMCS Code: 7000

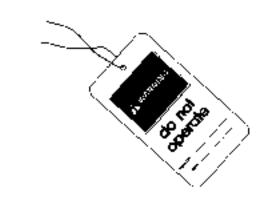


Illustration 28

g00104545

Typical example

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

🕰 WARNING

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

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

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

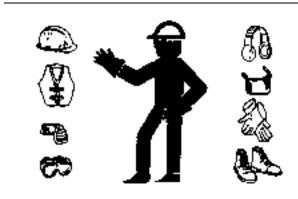


Illustration 29

g00702020

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

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

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

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

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

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

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

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

Obey all local regulations for the disposal of liquids.

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

Do not allow unauthorized personnel on the equipment.

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

Safety Section
General Hazard Information

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

Pressurized Air and Water

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

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

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

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

Trapped Pressure

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

Fluid Penetration

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

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

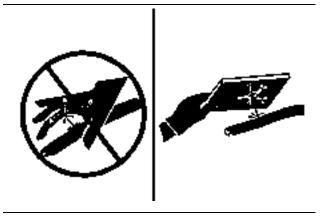


Illustration 30 g00687600

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, "Cat dealer Service Tool Catalog" for the following items:

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

Obey all local regulations for the disposal of liquids.

Inhalation

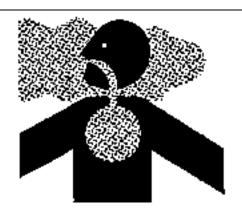


Illustration 31 g02159053

Exhaust

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

Asbestos Information

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

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

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

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

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

Dispose of Waste Properly

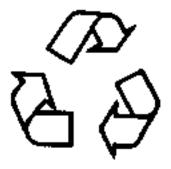


Illustration 32

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.

i07746334

Burn Prevention

SMCS Code: 7000

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

Coolant

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

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

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

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

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

Oils

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

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

Batteries

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

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

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

i07746336

Fire Prevention and Explosion Prevention

SMCS Code: 7000



Illustration 33 g00704000

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 case of 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 well 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 jumpstart 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.

A 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

SEBU7790-12

- 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 highpressure 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.

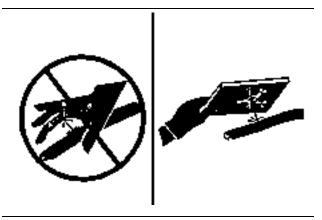


Illustration 36 g00687600

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".

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.

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Fire Extinguisher Location

SMCS Code: 7000; 7419

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instruction plate.

The fire extinguisher needs to be at least a 4.5 kg (10 lb) fire extinguisher unless the machine has a permanent, built in extinguishing system. The mounting location must not damage any safety features. The mounting location must not obstruct the operator compartment, or the operator from accessing or exiting the cab.

The fire extinguisher may be mounted to the handhold on the left catwalk platform near the cab. Also, the fire extinguisher may be mounted to the handhold on the right platform at the front of the platform near the access ladder. The fire extinguisher should be mounted so that the path of the operator is not blocked.

Do not weld a bracket on the ROPS and do not drill a hole in the ROPS in order to install a fire extinguisher.

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.

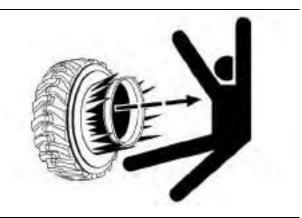


Illustration 37

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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.

A 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.

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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.

i02016010

Before Starting Engine

SMCS Code: 1000; 7000

Note: Start the engine only from the operator's 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.

Before you mount the machine, perform a walk around inspection. Look for any damaged components or leaks. Report discrepancies and make any necessary repairs before operating the machine. See the operation section in this Operation and Maintenance Manual, "Daily Inspection" for more information.

Once you mount the machine, inspect the platform for any loose items or debris. Remove obstructions from the screen on the air filter housing. Check levels in the coolant tanks. Look for any other signs of damage or wear.

When you enter the cab, inspect the condition of the seat belt and the condition of mounting hardware. Replace any damaged parts and any worn parts. Regardless of appearance, replace the seat belt after three years of use. Do not use a seat belt extension on a retractable seat belt.

Adjust the seat in order to achieve full pedal travel when the operator's back is against the back of the seat.

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

Before you start the engine or before you move the machine, make sure that no one is on the machine, underneath the machine, or around the machine. Make sure that there are no personnel in the area.

i02445790

27

Engine Starting

SMCS Code: 1000; 7000

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

Make sure that the transmission control is in the PARK position.

Make sure that the dump body is down. Put the hoist control in the FLOAT position.

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

i01372365

Before Operation

SMCS Code: 7000

Clear all personnel from the machine and from the area.

Clear all obstacles from the path of the machine. Beware of hazards such as electrical wires, ditches, etc.

Make sure that all of the windows are clean. Secure the doors in the closed position.

For the best visibility of the area that is close to the machine, adjust the mirrors.

Make sure that the machine has the following components: horn, backup alarm, action alarm, dash indicator lights and all other warning devices. Make sure that all of the devices are working properly.

Fasten the seat belt securely.

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Visibility Information

SMCS Code: 7000

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

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

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

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

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

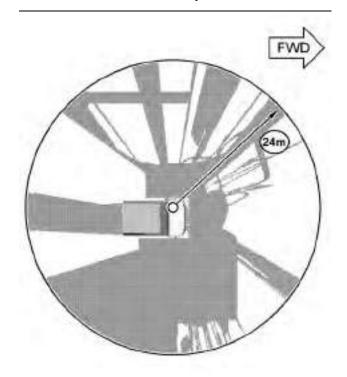
Modifications of the machine configuration by the user that result in a restriction of visibility shall be evaluated.

Restricted Visibility

SMCS Code: 7000

The size and the configuration of this machine may result in areas that can not be seen when the operator is seated. Illustration 38 and Illustration 39 provide an approximate visual indication of the areas of significant restricted visibility. Illustration 38 and Illustration 39 indicate restricted visibility areas at ground level inside a radius of 24 m (78 ft) from the operator on a machine. The illustrations do not provide areas of restricted visibility for distances outside a radius of 24 m (78 ft).

This machine may be equipped with optional visual aids that may provide visibility to some of the restricted visibility areas. For areas that are not covered by the optional visual aids, job site organization must be utilized to minimize hazards of this restricted visibility. For more information regarding job site organization refer to Operation and Maintenance Manual, "Visibility Information".



ustration 38

g06040884

Top view of the machine, ground level visibility Standard Machine

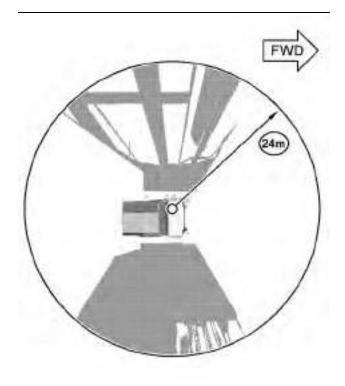


Illustration 39

g06040886

Top view of the machine, ground level visibility

Machine with optional mirrors, Front and Rear view
camera

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

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Operation

SMCS Code: 7000

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature of -40 °C (-40 °F) to 50 °C (122 °F). Special configurations for different ambient temperatures may be available. Consult your Caterpillar dealer for additional information on special configurations of your machine.

Limiting Conditions and Criteria

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

The Safety Section of the Operation and Maintenance Manual 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.

Operation

The Maintenance Interval Schedule in the Operation and Maintenance Manual 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 Monitoring System (if equipped) described in the Operation Section of the Operation and Maintenance Manual provides information on limiting condition criteria, including a warning level that requires immediate shutdown of the machine.

Machine Operation

A WARNING

Do not allow a companion to ride on the machine unless the companion is seated within the Rollover Protective Structure (ROPS) or Falling Object Protection Structure (FOPS) with the seat belt fastened. The companion must have the seat belt fastened while the machine is in operation. The operator of the machine is responsible for the safety of the companion. Personal injury or death may occur if the companion is not restrained and protected.

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

If equipped with dry brakes, do not release the parking brake or attempt to move the machine before normal brake air pressure has been reached. Refer to Operation and Maintenance Manual, Engine and Machine Warm-Up for additional information.

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

During warm-up, operate the machine slowly in an open area while you check for the proper operation of all controls and all protective devices.

Do not allow riders on the machine unless the machine has the following equipment:

- Additional seat
- · Additional seat belt
- Roll over Protective Structure (ROPS)

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

When the truck is on an upward slope, avoid dumping the truck. The truck could tip backward.

Avoid any conditions that can lead to the machine tipping. One or more of the tires not contacting the ground can lead to tipping. The machine can tip when you work on hills, on banks and on slopes. Also, the machine can tip or the tires can leave the ground when you cross ditches, ridges, or other unexpected obstacles at excessive speeds. Operating the machine in the conditions stated is considered abuse and can lead to severe frame damage.

Improper tire size or type can lead to reduced performance. Check with your local Cat dealer to ensure the tires being used are appropriate for the machine.

Avoid operating the machine across the slope. When possible, operate the machine up the slopes and down the slopes.

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

Know the maximum dimensions of your machine.

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

Always anticipate the grade and select the proper gear range for the grade.

Lower the truck bed completely before travel. Keep the hoist control in the FLOAT position during travel.

When the machine is being operated or loaded, stay in the cab of the machine.

Obey all road signs.

Excessive speeds in poor conditions can cause loss of machine control and accelerate machine and component wear. Road Analysis Control is an available machine option to aid in haul road maintenance.

A signalman should be present when you move the machine in reverse, and when you move the machine in a building or out of a building.

Aftermarket attachments welded to the frame in certain areas can reduce frame life. Contact your local Cat dealer for specific welding procedures related to your equipment.

Operation of the machine with non-OEM bodies that do not use the Caterpillar designed body pad guidelines will dramatically reduce frame life. Contact you Cat dealer for more information.

Operating the machine with improperly charged struts will affect payload accuracy which may lead to inadvertently overloading the machine. Improperly charged struts can also increase the stress levels experienced in the frame and reduce frame life.

NOTICE

Caterpillar recommends stopping the truck immediately if a flat tire is discovered. Driving on a flat tire may cause damage to the tire and rim.

i03725127

Parking

SMCS Code: 7000

Park the machine on a level surface and install wheel chocks. Refer to Operation and Maintenance Manual, "Use of Wheel Chocks" for more information on wheel chocks. If it is not possible to use wheel chocks place the wheels in a suitable ditch. When the machine is parked on a grade, turn the wheels into a suitable bank, when possible.

Apply the service brakes in order to stop the machine. Move the transmission control to the P position. When the transmission control is in the P position, the parking brakes are automatically engaged and the transmission is in neutral.

Turn the engine start switch to the OFF position in order to stop the engine. Remove the engine start switch key.

Place the battery disconnect switch in the OFF position and place a padlock on the switch in order to secure (lockout) the switch in the OFF position if the machine will not be in operation for an extended period of time. This will prevent current discharge of the battery. Any of the following conditions can cause a current discharge of the battery: a battery short circuit and any current draw from certain components.

i07746366

Slope Operation

SMCS Code: 7000

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

i03647291

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

The operator Equivalent Sound Pressure Level (Leq) is 76 dB(A) when "ANSI/SAE J1166 OCT 98" is used to measure the value for an enclosed cab. This is a work cycle sound exposure level. The cab was properly installed and maintained. The measurement was conducted with the cab doors and the cab windows closed.

The average exterior sound pressure level is 84 dB (A) when the "SAE J88Apr95 - Constant Speed Moving Test" procedure is used to measure the value for the standard machine. The measurement was conducted under the following conditions: distance of 15 m (49.2 ft) and "the machine moving forward in an intermediate gear ratio".

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

The information below applies to only the machine configurations that have the "CE" mark on the Product Identification Plate.

The dynamic operator sound pressure level is 75 dB (A) when "ISO 6396:2008" is used to measure the value for an enclosed cab. The measurement was conducted at 100% of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The cab was properly installed and maintained. The measurement was conducted with the cab doors and the cab windows closed.

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

Vibration Data for Off-Highway Trucks

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 off-highway trucks.

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 1 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 1

"ISO Reference Table A - Equivalent vibration levels of whole body vibration emission for earthmoving equipment."									
Machine	e Typical Operating Activity	Vibration Levels			Scenario Factors				
Туре		X axis	Y axis	Z axis	X axis	Y axis	Z axis		
Off-Highway Trucks	loading process	0,20	0,22	0,21	0,19	0,17	0,19		
	travel loaded	0,61	0,63	0,82	0,21	0,24	0,34		
	travel unloaded	0,73	0,73	0,87	0,20	0,25	0,33		
	unloading	0,37	0,37	0,33	0,14	0,13	0,08		

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 EM1". The seat has a transmissibility factor of "SEAT<1.1".

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 1.02 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.
- Maintain machines according to the manufacturer's recommendations.
 - a. Tire pressures
 - b. Brake and steering systems
 - c. Controls, hydraulic system and linkages
 - d. Suspension components
- 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.
 - Inspect and maintain the seat suspension and adjustment mechanisms.
- **5.** Perform the following operations smoothly:
 - a. Steer
 - b. Brake
 - c. Accelerate
 - d. Shift the gears
- 6. Move the attachments smoothly.
- 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 it is necessary to go over rough terrain.
- 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 off-highway trucks.

- 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:
 - 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, SEBU8257, "The European Union Physical Agents (Vibration) Directive 2002/44/EC" for more information about vibration.

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

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

Caterpillar, Inc. www.cat.com

i07746362

Operator Station

SMCS Code: 7000; 7301; 7325

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

i07746359

Guards

(Operator Protection)

SMCS Code: 7000; 7150; 7325

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

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

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

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

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

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

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

Other Guards (If Equipped)

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

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

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

- · Demolition applications
- Rock quarries

· Forestry products

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

Product Information Section

General Information

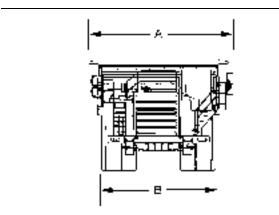
i03647302

Specifications

SMCS Code: 7000

777F

Dimensions



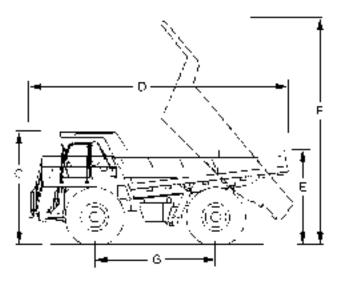


Illustration 40

a01957803

Approximate dimensions are shown. Dimensions are shown with a dual slope body. Dimensions will vary depending on the configuration and the options.

- (A) Overall Width 650 cm (21 ft 4 inch)
- (B) Overall Tire Width 523 cm (17 ft 2inch)
- (C) Overall Height (body down and empty) 517 cm (17 ft 0 inch)
- (D) Overall Length 1054 cm (34 ft 7inch)
- (E) Loading Height (body empty) 438 cm (14 ft 4inch)

(F) Overall Height (body raised) 1033 cm (33 ft 11inch) (G) Wheel Base 456 cm (15 ft 0 inch)

Weights

The target gross machine operating weight is listed under "Application/Configuration Restrictions" (see below).

The empty machine weight of the 777F will depend on the configuration of the machine. Weigh the empty machine in order to get an accurate weight. If a suitable scale is not available, contact your local Caterpillar dealer for an approximate weight of the machine, as equipped when shipped from the factory. This weight will not include additional equipment or options that have been installed on the machine after leaving the factory.

The target payload depends on the machine configuration. In order to calculate the target payload, subtract empty machine weight from the target gross machine operating weight.

The Caterpillar payload overload policy, referred to as the 10/10/20 Overload Policy, states that no more than 10% of payloads may exceed 110% of the target payload, and no single payload shall ever exceed 120% of the maximum target payload.

If this machine has a "CE" plate that is required for the European Union, the weight on the "CE" plate is based on the following:

- Empty machine weight with a dual slope body and medium impact liner
- Full tank of fuel
- 75 kg (165 lb) operator

Intended Use

The 777F Off-Highway Truck is an earthmoving machine. The 777F is classified as a dumper as described in ISO 6165:2001. This is a self-propelled wheeled machine with a rigid frame and wheel steering. This dumper has an open body that is intended for the following applications: transporting loose material and dumping loose material

Application/Configuration Restrictions

The Target Gross Machine Operating Weight (including payload) for the 777F Off-Highway Truck is 163293 kg (360000 lb). The braking systems and the steering systems in the 777F Off-Highway Truck are in compliance with ISO standards when tested to Caterpillar Global Mining Division's 10/10/20 Overload policy.

Cab structure is ROPS certified to ISO 3471:1994 up to 56063 kg (123598 lb) as a rigid frame dumper ROPS only option. This number excludes dumper body weight. This number also excludes carryback debris weight.

General Operating Restrictions

Use only in a non-explosive gas environment.

Table 2

777F Operating Restrictions	Grade
Parking Brake Holding Capability ⁽¹⁾	15%
Maximum Side Grade Operation (Except Dumping/Spreading) ⁽²⁾	15%
	0%
Maximum Negative Grade (uphill) for Dumping/Spreading ⁽⁴⁾	0%

- (1) The listed restriction assumes that the brake components are within working specifications, the machine mass is at maximum allowable, a graded ground surface, and a dry, firm underfoot. The machine operator is responsible for evaluating the condition of the machine, the environment, and use appropriate judgment to maintain control of the machine.
- (2) Operating on a side grade is not recommended. The listed restriction assumes a machine operating perpendicular to a side grade, graded ground surface, nominal payload, homogeneous payload distribution in the bowl, and operating on dry, firm underfoot. Refer to Operation and Maintenance Manual, "Slope Operation" for more information.
- (3) Dumping on a side grade is not recommended. The center of gravity of the machine changes very rapidly during dumping on a side grade.
- (4) Trucks are designed to dump on level ground with some variation in underfoot surface conditions. Dumping while machine is on a negative grade is not recommended because under some conditions, variations in payload densities and payload discharge characteristics could result in the front wheels lifting off the ground.

Identification Information

i04384264

Plate Locations and Film Locations

SMCS Code: 1000; 7000

The Product Identification Number (PIN) will be used to identify a powered machine.

Caterpillar products such as engines, transmissions, and major components or attachments are identified by Serial Numbers (S/N).

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

Product Identification Number (PIN)

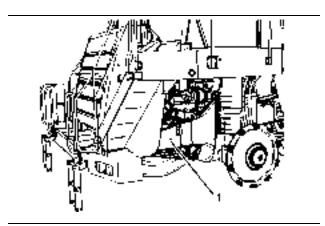


Illustration 41

g01220627

The tire and the wheel are removed for ease of viewing.

The Product Identification Number (PIN) is located on the front left side of the frame. PIN plate (1) may have the following information:

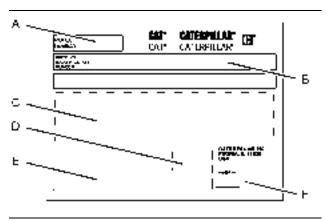


Illustration 42

g02436556

Model number (A)

Product Identification Number (B)_

Service Information Plate (C)_

Year of Manufacture Plate (D) (If Required) ___

CE Plate (E) (If Required) Refer to "European Union" below

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

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

European Union

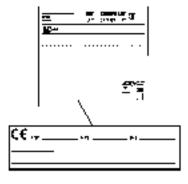


Illustration 43

g01880193

This plate is positioned on the bottom left side of PIN plate (1).

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

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

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

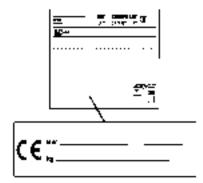


Illustration 44

g01120192

This plate is positioned on the bottom left side of PIN plate (1).

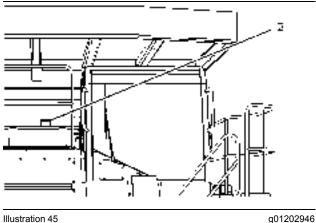
Note: The CE plate is on machines that are certified to the European Union requirements that were effective at that time.

For machines compliant to 1998/37/EC and 1989/392/EEC, the following information is stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

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

For the name and address of the manufacturer, and the country of origin of the machine, refer to the PIN plate.

Serial Number Plate (SN)



IIIUSII alion 45 gu 1202940

(2) Dump Body Serial Number _

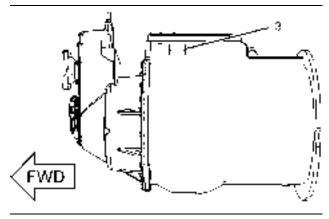


Illustration 46 g01202948

(3) Transmission Serial Number_____

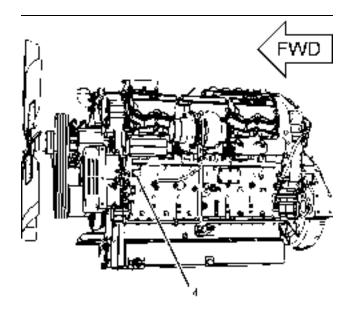


Illustration 47 g01220873

(4) Engine Serial Number_____

The following information is stamped on the component.

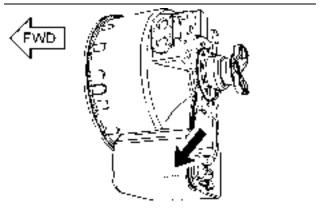


Illustration 48 g01196364

Torque Converter Serial Number_____

Differential Serial Number_____

Left Wheel Station Serial Number_____

Right Wheel Station Serial Number_____

Certification

ROPS/FOPS Plate

A WARNING

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

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 body or a payload, should not exceed the mass on the certification plate.

Earlier Machines

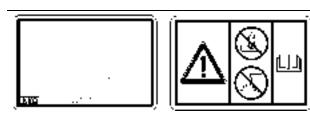


Illustration 49 g01953244

This certification plate is located outside on the lower rear left side of the cab.

Later Machines

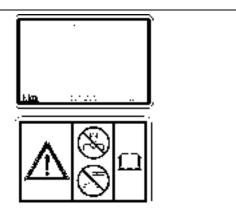


Illustration 50 g01953246

This certification plate is located inside the cab on the left front ROPS post.

i07709181

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

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

Consult your Cat dealer for an Emission Control Warranty Statement.

This label is located on the engine.

Declaration of Conformity

Declaration of Conformity

SMCS Code: 1000; 7000

Table 3

Date:

An EC 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 Declaration of Conformity provided with the machine. The extract shown below from an EC 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.

EC DECLARATION OF CONFORMITY OF MACHINERY				
Manufacturer: C	aterpillar Inc., 100 N.E. Adams S	Street, Peoria, Illinois 61629, USA		
	ed to compile the Technical File	and to communicate relevant part (s) of the	Technical File to the Authorities of Euro-	
		Standards & Regulations Manager, Caterpillar France S.A.S 40, Avenue Leon-Blum, B.P. 55, 38041 Grenoble Cedex 9, France		
I, the undersign	ed,, hereby certify th	at the construction equipment specified her	eunder	
Description:	Generic Denomination:	Earth-moving Equipment		
	Function:	Dumper		
	Model/Type:	777F		
	Serial Number:			
	Commercial Name:	Caterpillar		
Fulfils all the rele	vant provisions of the following Dir	rectives		
	Directives	Notified Body	Document No.	
2006/42/E	EC	N/A		
2004/108/	/EC	N/A		

Note: The above information was correct as of **August 2009**, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Name/Position

SEBU7790-12 43
Operation Section

Operation Section

Before Operation

i04027420

Mounting and Dismounting

SMCS Code: 7000



Illustration 51 g00037860

Use steps and handholds whenever you mount the machine. Use steps and handholds whenever you dismount the machine. Before you mount the machine, clean the step and the handholds. Inspect the step and handholds. Make all necessary repairs.

Face the machine whenever you mount the machine and whenever you dismount the machine. Maintain a three-point contact with the step and with handholds.

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

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

Machine Access System Specifications

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

i02631117

Before Operation

Daily Inspection

SMCS Code: 1000; 7000

A WARNING

Diesel engine exhaust contains products of combustion which may be harmful to your health

Always start and operate the engine in a well-ventilated area and, if in an enclosed area, vent the exhaust to the outside.

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

For maximum service life of the machine, make a thorough walk-around inspection before you mount the machine.

Look around the machine and under the machine. Inspect the condition of all major components. Look for the following discrepancies:

- loose bolts
- trash buildup
- oil, coolant, or fuel leaks
- broken parts or worn parts
- cracks in the frame or crack in the truck body

Note: Rust behind a bolt may indicate that the bolt is loose. Shiny metal areas around a bolt may indicate that the bolt is loose.

Remove any trash and any debris. Report any condition that requires service to the shop. Make sure that any necessary repairs are completed before you operate the machine.

Engine Exhaust (Diverter)

Note: If the machine is equipped with an engine block heater, first connect the one end of the power cable to the engine block heater. Next, connect the other end of the power cable to the power outlet. Before starting the machine or moving the machine, disconnect the end of the power cable from the power outlet. Then, disconnect the other end of the power cable from the engine block heater.

Perform all daily service requirements at the begining of each shift. Refer to the Operation and Maintenance Manual for the procedures.

Inspection Before Engine Starting

- Inspect the steering cylinders and tie rods for wear and inspect the steering cylinders and tie rods for damage.
- Visually inspect the tires for damage, excessive wear and indications of low tire pressure.
- Check all grease fittings for leaks or damage.
- Inspect hoses, tubes, lines, and hydraulic cylinders.
- Check the oil level in the hoist, torque converter, and brake tank.
- Check the oil level in the transmission tank.
- Drain water and sediment from the fuel tank.
- Drain water from the fuel system water separator.
- Check the suspension cylinders for leaks and for damage. Make sure that the suspension cylinders are not collapsed. Make sure that the suspension cylinder rods are properly extended.
- Inspect the hoist cylinders for leaks or damage.
- Check the coolant level in the radiator.
- Make sure that the ladders and hand rails are secure.
- Check the oil level in the steering tank.
- Check the level of the engine oil.
- Adjust the mirrors and clean the mirrors for proper vision.
- · Make sure that the windows are clean.
- Inspect the seat belt for damage and inspect the seat belt for proper operation.
- Test the backup alarm.
- Check the lights for proper operation and inspect the lights for damage.

· Check the fuel level in the fuel tank.

Inspection After Engine Starting

- · Test the indicators and gauges.
- Test the service brakes and test the secondary brakes.
- Test the primary steering and test the secondary steering.
- Check the engine air filter service indicator (if equipped).

i02756803

Engine Exhaust (Diverter)

(If Equipped)

SMCS Code: 1061; 1062



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.

The exhaust diverter can be set to allow the engine exhaust to flow through either the dump body or the side discharge port.

SEBU7790-12

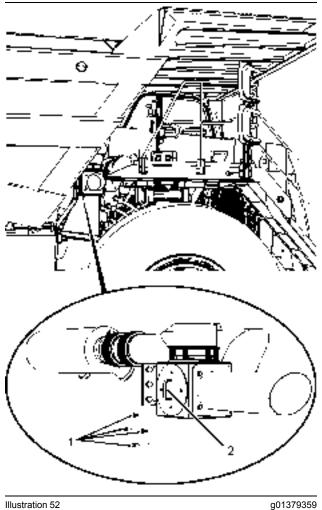


Illustration 52

In order to change the path of the engine exhaust, perform the following steps:

- 1. Remove four bolts (1) and four washers.
- 2. Rotate the handle (2) on the exhaust diverter.
 - a. When the handle on the exhaust diverter is HORIZONTAL, the exhaust will flow through the side discharge port.
 - b. When the handle on the exhaust diverter is VERTICAL, the exhaust will flow through the dump body.
- 3. Install the bolts and the washers.

Machine Operation

i03940269

Radio Mount

SMCS Code: 7338-MT; 733T-MT

A 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 a Caterpillar dealer to determine this structure's limitations without voiding its certification.

Any modifications to the inside of the operator station should not project into the operator space.

Entertainment Radio

The mounting location (1) for the entertainment radio is prewired with a radio system harness (12V) and coaxial cable. The cab is also factory installed with a speaker system and an antenna. Consult your Caterpillar dealer for a selection of Caterpillar entertainment radios that are available for your machine.

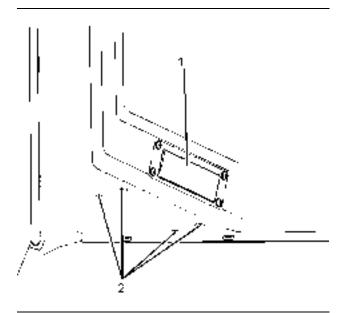


Illustration 53
Right front inside of cab

g02156098

Two-way Communication Radio

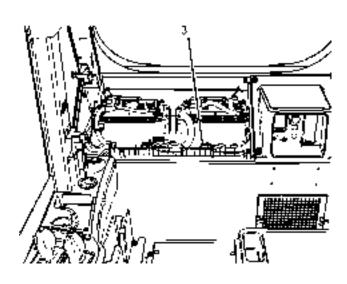


Illustration 54

g01390433

Rear inside of cab

47

Mounting location (2) and 12V power supply (3) are suitable for a two-way radio. The threaded bosses that are used for the mounting location are located behind the headliner. The power supply is protected by the "Communications Radio" fuse. Refer to Operation and Maintenance Manual, "Fuses - Replace" for additional fuse information. Consult your Caterpillar dealer for mounting instructions and wiring instructions for your specific application.

i03776413

Alternate Exit

SMCS Code: 7308

S/N: JRP2185-Up

The cab on this machine is equipped with a right side window assembly that will swing open. If the cab door becomes disabled, the window can be used as an alternate exit.

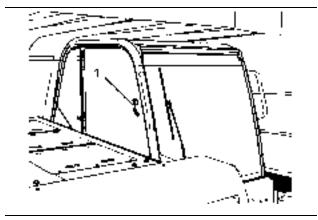


Illustration 55 g02038422

Release window latch (1). Open the window and exit the cab.

Removal of the Glass

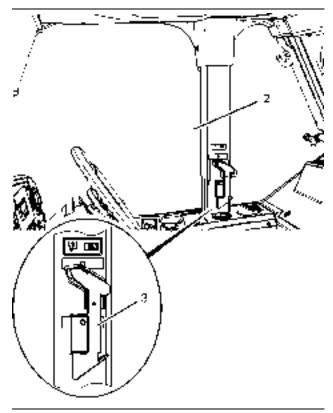


Illustration 56 g02045715

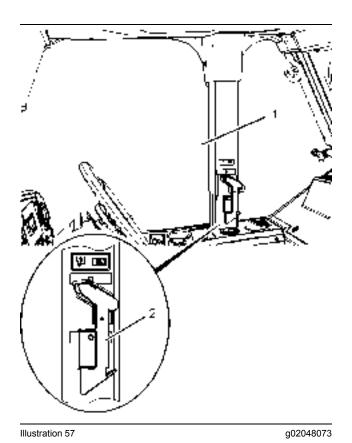
If the window is unable to be opened, remove the glass. Strike right side cab glass (1) with hammer (3). Strike near the edge of the glass in order to break the glass. Push out the glass and exit the cab.

i03790369

Alternate Exit

SMCS Code: 7308

S/N: JRP1-2184



Window (1) is unable to be opened and the glass must be removed in order to provide an alternate exit.

Strike the right side cab glass with hammer (2). Strike near the edge of the glass in order to break the glass. Push out the glass and exit the cab.

i02525833

Seat

SMCS Code: 7312

In order to reduce fatigue, periodically adjust the seat cushion and the backrest for additional comfort.

Air Suspension Seat with Three-Point Operator Restraint

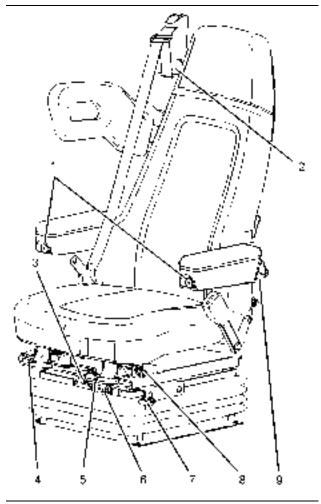


Illustration 58 g01211373

Armrest Adjustment Knob (1) – Rotate knob (1) clockwise in order to raise the front of the armrest. Rotate the knob counterclockwise in order to lower the front of the armrest. The armrest can be adjusted to the VERTICAL position.

Shoulder Belt Adjustment (2) – Pull the spring pin behind the vertical post for the shoulder belt and adjust the height of the shoulder belt. Release pin into a LOCKING position. For more information on the seat belt adjustment and shoulder belt adjustment, refer to Operation and Maintenance Manual, "Seat Belt".

Ride Indicator (3) – Ride indicator (3) will indicate optimum quality of the ride. With your weight on the seat, the white bar should be in the green zone.

49



Back Cushion Angle Lever (4) - Lift handle (4) in order to adjust the angle of the back cushion. Release the handle in order to lock the back cushion in the desired position.



Fore/Aft Adjustment (5) – Lift handle (5) in order to move the seat forward or move the seat rearward. Release the handle in order to lock the seat in place.



Height Adjustment (6) - In order to move the seat downward, pull out knob (6). In order to move the seat upward, push in the knob.



Ride Adjustment Lever (7) - Push down on lever (7) in order to increase the stiffness of the ride . Pull up on the lever in order to decrease the stiffness of the ride.



Seat Cushion Tilt (8) - The front of the seat cushion is pinned in a groove. Grasp the seat cushion and position the groove for the desired angle over the pin.



Lumbar Support Knob (9) - Turn knob (9) counterclockwise in order to increase the lumbar support. Turn the knob clockwise in order to decrease the lumbar support.

i02424554

Seat Belt

SMCS Code: 7327

Note: This machine was equipped with a seat belt when the machine was shipped from Caterpillar. See your Caterpillar dealer for all replacement parts.

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

Seat Belt Adjustment for Three-Point Operator Restraint

At the time of installation, the three-point operator restraint and the instructions for installation of the three-point operator restraint meet the SAE J386 standards and the SAE J2292 standards.

Shoulder Belt Adjustment

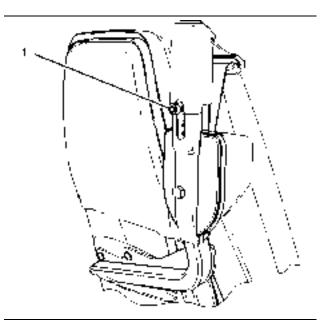


Illustration 59 g01211787

Pull spring pin (1) in order to release the vertical post.

Move the shoulder belt to the desired height.

Release the pin for the vertical post into the LOCKED position.

Fastening The Seat Belt

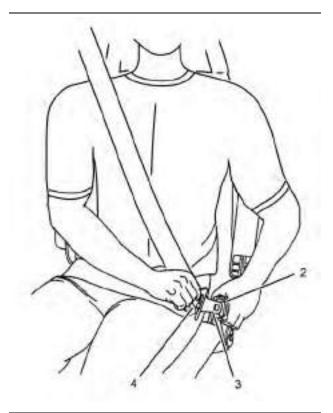


Illustration 60 g01211788

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

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

The retractors will adjust the length of the seat belt. The lap belt retractor will lock in position. The shoulder belt retractor will remain free until certain conditions cause the shoulder belt retractor to lock. The buckle and retractor assemblies will allow the operator to have some unrestricted movement for comfort.

Releasing The Seat Belt

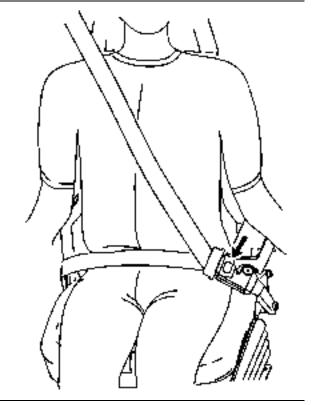


Illustration 61 g01211795

Grasp the seat belt near the latch.

Push the release button on the buckle in order to release the seat belt.

Guide the seat belt into the automatic retractors.

Seat Belt Adjustment for Retractable Seat Belts

At the time of installation, the retractable seat belt and the instructions for installation of the retractable seat belt meet the SAE J386 standards.

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Operation Section

Fastening The Seat Belt

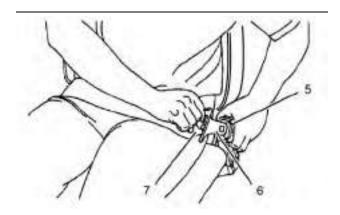


Illustration 62 g01211801

Pull seat belt (7) out of the retractor in a continuous motion.

Fasten seat belt catch (6) into buckle (5). Make sure that the seat belt is placed low across the lap of the operator.

The retractor will adjust the length of the seat belt and the retractor will lock in position. The buckle and retractor assemblies will allow the operator to have some unrestricted movement for comfort.

Releasing The Seat Belt

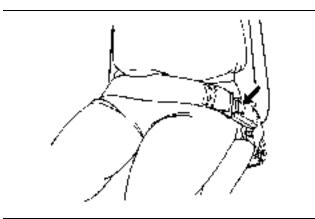


Illustration 63 q01211804

Grasp the seat belt near the latch.

Push the release button on the buckle in order to release the seat belt.

Guide the seat belt into the automatic retractor.

Seat Belt Adjustment for nonretractable seat belts

At the time of installation, the non-retractable seat belt and the instructions for installation of the nonretractable seat belt meet the SAE J386 standards. **Note:** Adjust both ends of the seat belt. The seat belt should be snug but comfortable.

Seat Belt

Lengthening the Seat Belt



Illustration 64 g01211809

1. Unfasten the seat belt.

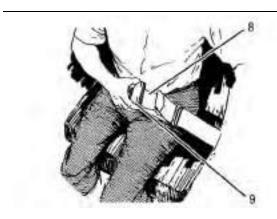


Illustration 65 g01211811

- 2. To remove the slack in outer loop (8), rotate buckle (9). This will free the lock bar. This permits the seat belt to move through the buckle.
- **3.** Remove the slack from the outer belt loop by pulling on the buckle.
- **4.** Loosen the other half of the seat belt in the same manner. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Shortening the Seat Belt



Illustration 66 g01211812

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

Fastening The Seat Belt



Illustration 67 g01211815

Fasten seat belt catch (10) into buckle (9). Make sure that the seat belt is placed low across the lap of the operator.

Releasing The Seat Belt



Illustration 68 g01211817

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

Extension of the Seat Belt

A WARNING

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

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

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

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

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

i03206361

Mirror

SMCS Code: 7319

A WARNING

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

A WARNING

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

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

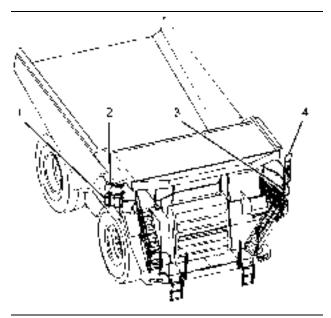


Illustration 69

g01625741

- (1) Lower right side rear view mirror
- (2) Upper right side rear view mirror
- (3) Front mirror
- (4) Single left side rear view mirror

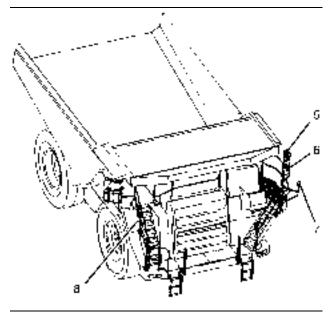


Illustration 70

g01604154

- (5) Upper left side mirror
- (6) Lower left side mirror
- (7) Left front corner mirror(8) Right front corner 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.

Modified machines or machines that have additional attachments may influence visibility in the mirrors. For more information refer to this Operation and Maintenance Manual, "Visibility Information" and "Restricted Visibility".

Mirror Adjustment

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

Note: Hand tools will be needed in order to adjust the mirrors. Refer to Specifications, SENR3130, "Torque Specifications" for the recommended torque.

Right Side Rear View Mirrors

Lower Right Side Rear View Mirror (1)

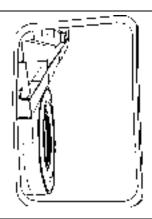


Illustration 71 g01604157

If equipped, adjust the lower right side rear view mirror in order to provide visibility to the following areas from the operator seat:

- the right side of the dump body and the rear tire as shown in illustration 71
- the point of contact between the right rear tire and the ground
- an obstacle on the ground 1 m (3.3 ft) from the right side of the dump body

There are two bolts on the back of the mirror and two bolts on the mirror bracket for the adjustment of the lower right side rear view mirror.

Upper Right Side Rear View Mirror (2)

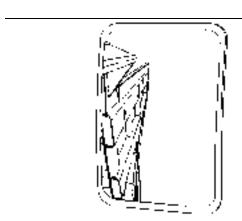


Illustration 72 g01604156

If equipped, adjust the upper right side rear view mirror in order to provide visibility to the following areas from the operator seat:

- the upper right edge of the dump body that will allow the truck to be positioned for loading by viewing the loader bucket pivot pin as shown in illustration 72
- an obstacle 1 m (3.3 ft) from the right side of the dump body

There are two bolts on the back of the mirror and two bolts on the mirror bracket for the adjustment of the upper right side rear view mirror.

Front Mirror

Front Mirror (3)

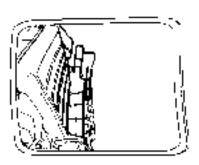


Illustration 73 g01622881

If equipped, adjust the front mirror in order to provide visibility to the following areas from the operator seat:

- the portion of the front bumper from the bottom of the stairs to the right front corner of the machine as shown in illustration 73
- an obstacle on the ground 1 m (3.3 ft) from the right front corner of the machine

There is one bolt on the back of the mirror and one bolt on the mirror bracket for the adjustment of the front mirror.

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Operation Section
Mirror

Left Side Rear View Mirrors

Single Left Side Rear View Mirror (4A) with Auxiliary Mirror (4B)

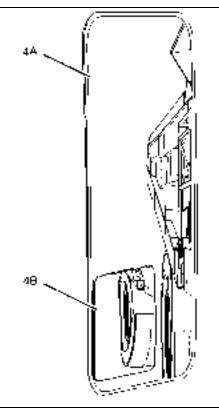


Illustration 74 g01604155

Single Left Side Rear View Mirror (4A)

If equipped, adjust the single left side rear view mirror in order to provide visibility to the following areas from the operator seat:

- the upper left edge of the dump body that will allow the truck to be positioned for loading by viewing the loader bucket pivot pin as shown in illustration
- an obstacle 1 m (3.3 ft) from the left side of the dump body

Auxiliary Mirror (4B)

If equipped, adjust the single left side rear view mirror in order to provide visibility in the auxiliary mirror to the following areas from the operator seat:

- the point of contact between the left rear tire and the ground as shown in illustration 74
- an obstacle on the ground 1 m (3.3 ft) from the left side of the dump body

There are three bolts on the back of the mirror and four bolts on the mirror bracket for the adjustment of the single left side rear view mirror.

Note: Auxiliary mirror (4B) does not have an adjustment that is separate from single left side rear view mirror (4A).

Upper Left Side Rear View Mirror (5)

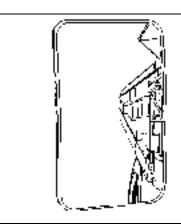


Illustration 75 g01625847

If equipped, adjust the upper left side rear view mirror in order to provide visibility to the following areas from the operator seat:

- the upper left edge of the dump body that will allow the truck to be positioned for loading by viewing the loader bucket pivot pin as shown in illustration 75
- an obstacle 1 m (3.3 ft) from the left side of the dump body

There are two bolts on the back of the mirror for the adjustment of the upper left side rear view mirror. There are four bolts on the mirror bracket for the adjustment of the upper and lower left side rear view mirrors.

Operation Section Operator Controls

Lower Left Side Rear View Mirror (6)

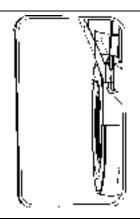


Illustration 76 g01625846

If equipped, adjust the lower left side rear view mirror in order to provide visibility to the following areas from the operator seat:

- the left side of the dump body and the rear tire as shown in illustration 76
- the point of contact between the left rear tire and the ground
- an obstacle on the ground 1 m (3.3 ft) from the left side of the dump body

There are two bolts on the back of the mirror for the adjustment of the lower left side rear view mirror. There are four bolts on the mirror bracket for the adjustment of the upper and lower left side rear view mirrors.

Corner Mirrors

Left Front Corner Mirror (7)

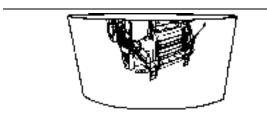


Illustration 77 g01625985

If equipped, adjust the left front corner mirror in order to provide visibility to the following areas from the operator seat:

- the full width of the front bumper as shown in illustration 77
- an obstacle on the ground 1 m (3.3 ft) from the left front corner of the machine

 an obstacle on the ground 1 m (3.3 ft) from the front of the machine

There are two screws on the back of the mirror for the adjustment of the left front corner mirror.

Right Front Corner Mirror (8)

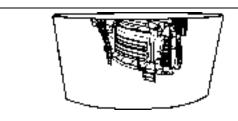


Illustration 78 g01625877

If equipped, adjust the right front corner mirror in order to provide visibility to the following areas from the operator seat:

- the full width of the front bumper as shown in illustration 78
- an obstacle on the ground 1 m (3.3 ft) from the right front corner of the machine
- an obstacle on the ground 1 m (3.3 ft) from the front of the machine

There are two screws on the back of the mirror for the adjustment of the right front corner mirror.

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Operator Controls

SMCS Code: 7300; 7451

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

Dash Panel Controls

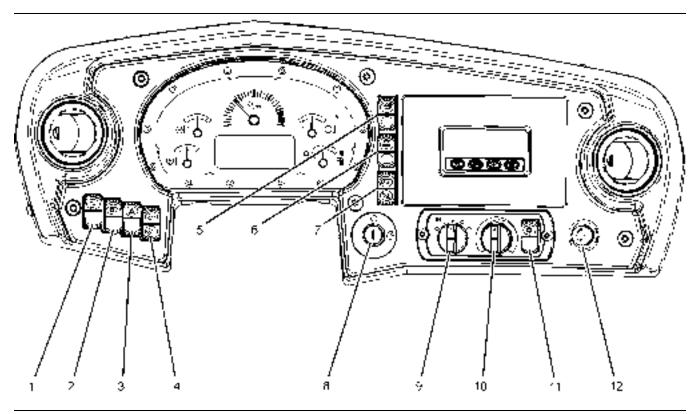


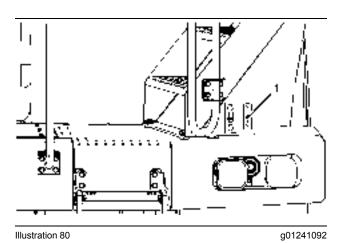
Illustration 79

(1) Dash panel switch for access lights and floodlights

- (2) Switch for headlights, parking lights, and taillights
- (3) Hazard flasher switch

- (4) Panel light switch
- (5) Switch for automatic retarder control (ARC)
- (6) Engine brake switch (if equipped)
- (7) Front brake disable switch (if equipped)
- g01379398
- (8) Engine start switch(9) Fan speed switch
- (10) Temperature variable control
- (11) Air conditioner switch
- (12) Cigar lighter (12 V)

Switch for Access Lights and Floodlights (1)



(1) Ground level switch for access lights and floodlights



Switches for Access Lights and Floodlights (1) – There are two separate two-way switches that activate the

access lights. One switch is on the front bumper and one switch is on the dash panel. Use either switch location in order to turn on or turn off the lighting.

On all machine configurations, the two-way switches will control the stairway access light. On machines that are equipped with optional mirrors, the two-way switches will also control floodlights that will illuminate the areas that can be viewed through the optional mirrors. These floodlights are positioned in order to illuminate the right and left side areas near the machine.

Switch for Headlights, Parking Lights, and Taillights (2)



Switch for Headlights, Parking Lights, and Taillights (2) - The switch for the headlights, parking lights, and taillights

is a three-position switch. Push the top half of the switch to the first detent in order to activate the parking lights and the taillights. Push the top half of the switch to the second detent in order to activate the headlights, the parking lights, and the taillights. Push the bottom half of the switch in order to turn off all the headlights, the parking lights, and the taillights.

Hazard Flasher Switch (3)



Hazard Flashers (3) - Push the top half of the switch in order to turn on the hazard flashers. Push the bottom half of the switch in order to turn off the hazard flashers.

Panel Light Switch (4)



Panel Light Switch (4) - Depress the top half of the switch and hold the switch in order to increase the intensity of the

panel lights. Depress the bottom half of the switch and hold the switch in order to decrease the intensity of the panel lights.

Automatic Retarder Control (5)



Automatic Retarder Control (ARC) (5) -Push the top half of the switch in order to select the ON position for the ARC

system. The ARC sustains the machine at a constant speed on a downgrade. If necessary, use manual retarder control (17) in order to apply more retarding force during the operation of the ARC system. Push the bottom half of the switch in order to select the OFF position for the ARC system.

The ARC should remain in the ON position during normal operation. For more information, refer to Operation and Maintenance Manual, "Retarding".

Engine Brake Switch (6) (If Equipped)



Engine Brake Switch (6) - Push the top half of the switch in order to select the ON position for the engine brake. The

engine brake provides engine compression braking on a downgrade. Push the bottom half of the switch in order to select the OFF position for the engine brake. The engine brake will provide engine compression braking automatically and the engine brake will only function when the switch for ARC is in the ON position.

Front Brake Disable Switch (7) (If Equipped)



ON Position – When the top half of the front brake disable switch is in the depressed position, only the rear brakes will be applied as the service brake pedal is depressed.

Note: When the top half of the front brake disable switch is depressed, the bottom symbol will illuminate in order to indicate the deactivation of the front brakes.



OFF Position - When the bottom half of the front brake disable switch is in the depressed position, the front and rear

brakes will be applied as the service brake pedal is depressed.

For more information on the front brake disable switch, refer to Operation and Maintenance Manual, "Braking".

Engine Start Switch (8)

Engine Start Switch (8) - The engine start switch starts the engine.



OFF position - The engine start switch must be in the OFF position in order to insert or remove the engine start switch

key. To disconnect the power to the electrical circuits in the cab, turn the engine start switch to the OFF position. Also, turn the engine start switch to the OFF position in order to stop the engine.

Note: When the engine start switch is placed in the OFF position, the parking brakes will engage and the brake accumulators will release the hydraulic pressure from the secondary braking system.



ON position - To activate the electrical circuits in the cab, turn the engine start switch key clockwise to the ON position.

Note: When the engine start switch is placed in the ON position the engine prelubrication system will activate and the monitoring system will perform a self test. Engine prelubrication is not available on later machines.

Engine Idle Shutdown (EIS) (if enabled) This function will shut down the engine after the operator is not operating the machine for a specified time. This function does not shut down accessories that operate with engine start switch in the ON position. These accessories can run down the battery after idle shutdown. EIS can be enabled/disabled and EIS delay time can be set through the Advisor/Messenger systems or Cat ET. Engine Idle Shutdown may be required for local regulations.

Note: EIS will be inactive during the operation of the machine, machine controls, or service tests.



START position - To start the engine, turn the engine start switch key clockwise to the START position. When

the engine start switch key is released, the engine start switch key will return to the ON position.

Note: The transmission control must be in the PARK position in order for the engine start switch to activate the starter.

Note: If the engine fails to start, return the engine start switch key to the OFF position. This must be done before attempting to start the engine again.

For more information on the Engine Start Switch, refer to Operation and Maintenance Manual, "Engine Starting".

Heating and Air Conditioning Controls

Fan Speed Switch (9)



Fan Speed Switch (9) - The fan speed switch controls the four-speed blower



OFF - Move the switch to this position in order to turn off the blower fan.



LOW - Move the switch to this position for a low fan speed.



MEDIUM - Move the switch to this position for a medium fan speed.



HIGH - Move the switch to this position for a high fan speed.



MAX - Move the switch to this position for the maximum fan speed.

Temperature Variable Control (10)



Temperature Variable Control (10) -Adjust the control anywhere between MINIMUM position (left) and MAXIMUM position (right). This will control the amount of heating and the amount of cooling.

Air Conditioner Switch (11)



Air Conditioner Switch (11) - Push the top of the switch in order to turn on the air conditioning system. Push the

bottom of the switch to turn off the air conditioning system.

Heating and Air Conditioning System Operation

The heating and air conditioning system can perform four functions:

Heating

Position fan switch (9) to desired speed. Adjust temperature variable control (10) for the desired temperature.

Air Conditioning

Place switch (11) in the ON position. Position fan switch (9) to desired speed. Adjust temperature variable control (10) for the desired temperature.

Pressurizing

When heating or cooling is not desired, pressurize the cab in order to prevent dust from entering.

Adjust temperature variable control (10) to a comfortable temperature. Position fan switch (9) to a speed that is needed to keep out the dust.

Note: Opening any cab window will eliminate the controlled air pressure in the cab.

Defogging

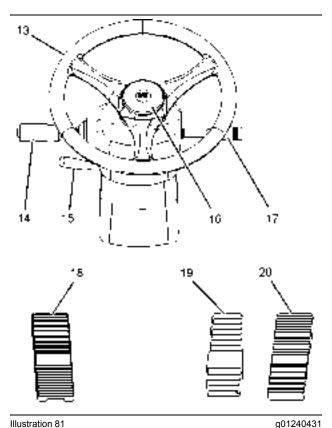
Place switch (11) in the ON position. Position fan switch (9) to a speed that is needed to remove moisture from the air in the cab. This prevents moisture from forming on the windows. Adjust temperature variable control (10) until the moisture level is lowered.

Cigar Lighter (12 V) (12)



Cigar Lighter (12) - Push the lighter inward and release the lighter. When the lighter is ready to use, the lighter will move outward. The lighter can also be used as a 12 volt power receptacle.

Steering Wheel Column Controls and Control Pedals



- (13) Steering wheel control
- (14) Multifunction switch
- (15) Steering column tilt and telescope control
- (17) Manual retarder control (lever)
- (18) Control pedal for the secondary brake system
- (19) Service brake control pedal
- (20) Accelerator pedal

Steering Wheel Control (13)



Steering Wheel Control (13) - This machine is equipped with a closed centered, hydraulic steering system.

There is no mechanical connection between the steering wheel and steering cylinders that move the front wheels. Under normal conditions, when the engine is running, movement of the steering wheel will turn the front wheels. When the steering wheel is turned clockwise, the front wheels will turn to the right. When the steering wheel is turned counterclockwise, the front wheels will turn to the left. When the steering wheel is released, the front wheels will remain in the selected position.

Secondary Steering System

A WARNING

Personal injury or death can occur if steering is lost completely during operation.

Do not continue to operate the machine using the secondary steering.

If the secondary steering activates during operation, immediately park the machine in a safe location. Inspect the machine and correct the condition which made the use of the secondary steering necessary.

A WARNING

Extended operation of the secondary steering motor could damage the motor and result in loss of emergency steering capability, which could cause injury or death. The Secondary Steering System should not be used for towing the machine or for other service procedures lasting longer than 5 minutes. The motor should be allowed to cool to ambient temperatures before reuse.



Secondary Steering System - This machine is equipped with a secondary steering system. If a failure of the

primary steering system occurs, a category 3 warning will be issued and the primary steering indicator will be illuminated. The secondary steering system will activate automatically and the secondary steering system will provide steering for a limited amount of time. The secondary steering indicator will illuminate when the secondary steering is active. The secondary steering system uses an electric driven steering pump to allow steering of the machine. The secondary steering system will provide steering for a minimum of one minute when a typical single component failure occurs. The secondary steering system operates when the machine is stationary or when the machine is traveling in forward or reverse direction.

Multifunction Switch (14)

Multifunction switch (14) controls the window wipers, the window washer, the brightness of the headlights, and the turn signals.

Window Wipers



Window Wipers - The rotary switch on the lever controls the window wipers. There are six different modes for the window wipers.



OFF Position



Intermittent Position 3 – The wipers will operate intermittently. This is the smallest interval of time between cycles.



Intermittent Position 2 - The wipers will operate intermittently.



Intermittent Position 1 - The wipers will operate intermittently. This is the largest interval of time between cycles.



Continuous Position 1 - The wipers will operate continuously at a slow speed.



Continuous Position 2 - The wipers will operate continuously at a high speed.

Window Washer



Window Washer - The button on the end of the lever activates the window washer.

Directional Turn Signals

Turn Signal LEFT – Pull rearward on the lever in order to activate the left turn signal. When the left turn signal is activated, an indicator will illuminate on the dash panel. The turn signal will remain on until the lever is manually returned to the MIDDLE position.

Turn Signal RIGHT - Push forward on the lever in order to activate the right turn signal. When the right turn signal is activated, an indicator will illuminate on the dash panel. The turn signal will remain on until the lever is manually returned to the MIDDLE position.

Dimmer Switch

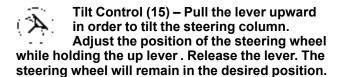




Dimmer Switch - The lever toggles up and down in order to adjust the headlights between

high beam and low beam.

Steering Column Tilt and Telescope Control (15)



Telescope Control (15) – Push the lever downward in order to telescope the steering column. Adjust the position of the steering wheel while holding down the lever. Release the lever. The steering wheel will remain in the desired position.

Horn (16)



Horn (16) – Depress the large button in the center of the steering wheel in order to sound the horn.

Manual Retarder Control (Lever) (17)

WARNING

Aggressive application of retarder capacity in slippery conditions may cause loss of operator control and/or power train damage. Apply the retarder gradually in slippery conditions. Serious injury or death may occur if the retarder is applied too aggressively in slippery conditions.

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NOTICE

Do not use the retarder control as a parking brake.

Do not use the retarder control to stop the machine.



Manual Retarder Control (Lever) (17) – The manual retarder control (lever) is used to manually regulate the machine

speed when traveling down a grade. Move the lever rearward in order to apply more retarding force and slow the machine. Move the lever forward in order to reduce retarding force and allow the machine speed to increase. When the lever is in the full forward position the manual retarder is off.

Refer to Operation and Maintenance Manual, "Retarding" for additional information.

Control Pedal for the Secondary Brake System (18)

A WARNING

To avoid the possibility of a unexpected machine movement when parking on a slope, always block the wheels securely before leaving the machine unattended.

If the secondary brake system is required in order to stop the machine, do not operate the machine until a complete check has been made of the entire braking system and until all necessary repairs have been made.

Control Pedal for the Secondary Brake System (18) – Use secondary brake control (18) in order to stop the machine if service brake control (19) does not stop the machine properly.

Refer to Operation and Maintenance Manual, "Braking" for additional information.

Service Brake Control Pedal (19)

Service Brake Control Pedal (19) – During normal operation, depress the service brake control pedal in order to stop the machine. Also, depress the service brake control pedal in order to slow the machine.

Refer to Operation and Maintenance Manual, "Braking" for additional information.

Accelerator Pedal (20)

Accelerator Pedal (20) – The accelerator pedal controls the fuel flow to the engine. As the accelerator pedal is depressed, the engine rpm will increase.

Console Controls

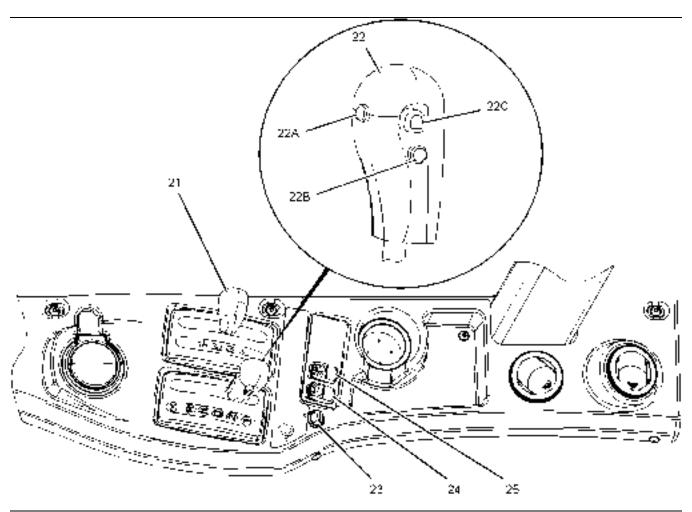


Illustration 82 g01516234

(21) Hoist control (22) Transmission control

(23) 12 V Power receptacle (24) Throttle backup and throttle lock switch (25) WAVS switch (if equipped)

Hoist Control (21)

NOTICE

The body must be lowered and in the FLOAT position when operating the machine. This will help prevent damage to the body, caused by vibrations from the haul road.

LOWER Position – Hold the hoist control lever completely forward in order to lower the dump body. When the lever is released, the lever will return to the FLOAT position.



FLOAT Position - When the hoist control lever is in the FLOAT position, the dump body will seek a level. The hoist control will stay in this position until the lever is manually moved.



HOLD Position – When the hoist control is in the HOLD position, the dump body will not move. The hoist control will stay in this position until the lever is manually moved.



RAISE Position – Hold the hoist control lever completely backward in order to raise the dump body and empty the load. When the lever is released, the lever will return to the HOLD position.

Transmission Control (22)

Transmission Control (22) – Use the transmission control to select FORWARD speed, NEUTRAL position, PARK position, and REVERSE direction. Depress button (22C) in order to unlock the transmission control and move the transmission control. Refer to Operation and Maintenance Manual, "Direction and Speed Control" for more information.

Shift Pattern



Park - When the transmission control is in the P position, the parking brakes are automatically engaged and the transmission is not in any gear (Neutral).



Reverse Position - When the transmission control is in the R position, the machine will move in



Neutral Position - When the transmission control is in the N position, the transmission is not in any

gear.

Note: When the transmission control is in the N position, the parking brake is not engaged and the wheels are able to roll freely.



Drive Position – When the transmission control is in the D position, the transmission will shift between first gear and any selected gear higher than second gear (third gear through seventh gear).

Use button (22A) in order to raise the selected high gear limit. Seventh gear is the maximum high gear limit.

Use button (22B) in order to lower the selected high gear limit. Third gear is the minimum high gear limit in the D position.



Second Position - When the transmission control is in the 2 position, the transmission will only shift between first gear and second gear.



First Position - When the transmission control is in the 1 position, the transmission will remain in first gear.

12 V Power Receptacle (23)



Power Receptacle (23) - This port provides 12 V power.

Throttle Backup and Throttle Lock Switch (24)



Throttle Backup and Throttle Lock Switch (24) - This switch will perform the function of throttle lock and the function of throttle backup.

Throttle Backup

If there is a malfunction in the throttle position sensor on the accelerator pedal, use switch (24) to raise the engine RPM above low idle in order to allow transportation to a service area. Place the transmission control lever in the desired gear. Hold the switch in the depressed position. While the switch is held in the depressed position, the engine low idle RPM will raise to 1300 RPM. When the switch is released, the engine RPM will return to low idle.

Throttle Lock

The throttle lock will maintain the engine speed at full throttle without depressing the accelerator pedal.

In order to activate the throttle lock, perform the following steps:

- Place the transmission control in the desired gear.
- If necessary, accelerate or decelerate in order to shift the transmission into the selected gear.
- Select a top gear limit with transmission control (22) or with the buttons (22A) and (22B).
- Place the accelerator pedal at full throttle and momentarily depress switch (24).

Note: The dash indicator light for the throttle lock will illuminate when the throttle lock is activated. Refer to Operation and Maintenance Manual, "Monitoring system" for more information.

The throttle lock feature will automatically deactivate if any of the following conditions occur:

- The application of the brakes
- The transmission control is moved.
- The transmission shifts to a gear above the selected gear
- Engine speed approaches overspeed.
- Any failure of a critical system component

When the throttle lock feature deactivates, the engine speed will be controlled by the accelerator pedal. The indicator on the dash will turn off when the throttle lock is deactivated.

65

Note: The throttle lock feature is set to allow use of the full gear range. Use the ET service tool to adjust the parameters of the throttle lock in order to program the gear range.

WAVS Switch (25) (If Equipped)



WAVS Switch (25) - For more information on the Work Area Vision System, refer to Operation and

Maintenance Manual, SEBU8157, "Work Area Vision System".

Overhead Controls

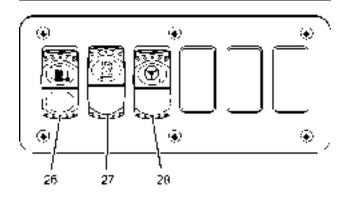


Illustration 83

g01290013

- (26) Heated mirror switch
- (27) Test switch for the Traction Control System (TCS) (if equipped)
- (28) Brake release/secondary steering switch

Heated Mirror Switch (26) (If Equipped)



Heated Mirror Switch (26) - Push in the top of the switch in order to apply heat to the exterior mirrors. The heated

mirrors can only be activated when the keyswitch is in the ON position. The switch for the heated mirrors is a momentary switch. When the switch is depressed, the switch will return to the original position and the heated mirrors will activate for a timed cycle. The timed cycle is approximately five minutes. During the timed cycle, push in the top of the switch in order to deactivate the heated mirrors.

Test Switch for the Traction Control System (TCS) (27) (If Equipped)



TCS.

TCS Test Switch (27) - Push the top half of the switch in order to test the TCS. Hold the switch in place during the test. Release the switch in order to end the test of the

See Operation and Maintenance Manual, "Traction Control System (TCS) - Test" for more information.

Brake Release/Secondary Steering Switch (28)



Brake Release/Secondary Steering Switch (28) – Push the top half of the switch and hold the switch in order to

manually activate the brake release and secondary steering pump. Release the switch in order to return the switch to the AUTO position.

The pump group for the brake release and secondary steering pump facilitates the following functions:

- Secondary steering system
- Parking brake release (manual disengagement)
- Prelubrication system (not available on later machines)
- QuickEvac system (not available on later machines)

Interior Lights (29) (30)

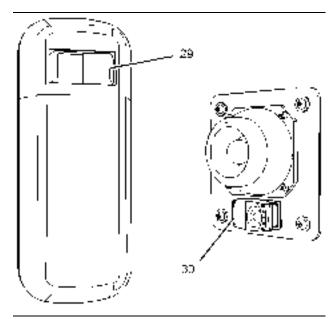


Illustration 84

g01290027

(29) Switch for the dome light (30) Switch for the map light



Dome Light (29) - Use the switch on the dome light in order to turn on or turn off the dome light. When the door is open, the dome light will turn on.



area.

Map Light (30) - Use the switch on the map light in order to turn on or turn off the map light. This light can be manually adjusted in order to direct the light to the desired

Cab Visor (31)

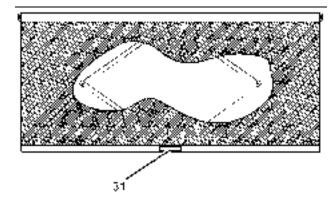


Illustration 85

g01290028

(31) Cab visor

Cab Visor (31) - Grasp the handle and pull downward in order to lower the cab visor for the front window. Grasp the handle and press upward in order to raise the cab visor for the front window.

i02761447

Battery Disconnect Switch

SMCS Code: 1411

NOTICE

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

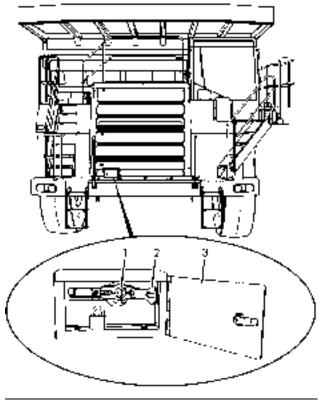


Illustration 86

The battery disconnect switch (1) is located on the lower right front side of the machine behind access cover (3). Remove the lock and open latch (2) in order to insert the key into the switch.



Battery Disconnect Switch – The battery disconnect switch can be used in order to disconnect the battery from the machine's electrical system. The key must be inserted into the battery disconnect switch before the battery disconnect switch can be



turned.

OFF – To disconnect the electrical system, turn the battery disconnect switch counterclockwise to the OFF

position.



ON - To activate the electrical system, turn the battery disconnect switch clockwise to the ON position. The battery disconnect switch must be turned to the ON position before you can start the engine.

If you remove the key from the battery disconnect switch, the latch can be locked over the switch in order to prevent the insertion of a key into the switch.

After you turn the battery disconnect switch ON or after you turn the battery disconnect switch OFF, close the access cover.

Note: The battery disconnect switch does not deplete the brake oil pressure from the brake accumulators. When the engine start switch is moved to the OFF position, solenoid valves will fully deplete the brake oil pressure from both brake accumulators.

i02414243

Backup Alarm

SMCS Code: 7406

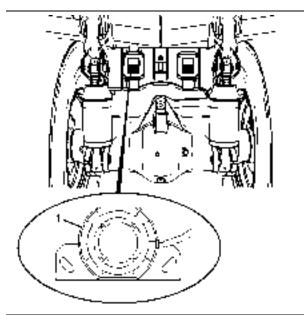


Illustration 87 g01206778



Backup Alarm (1) - The backup alarm will sound when the transmission control is in the REVERSE position. The backup alarm alerts people that the machine is backing up.

Note: The volume for the backup alarm is nonadjustable.

i02761543

Engine Shutdown Switch

SMCS Code: 7418-ZS

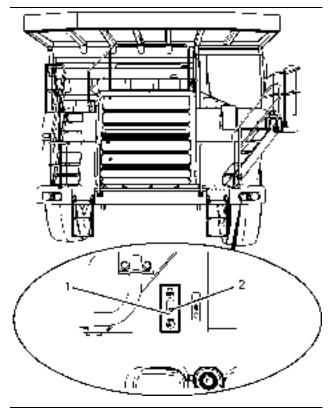


Illustration 88 g01202950



Engine Shutdown Switch - Use the engine shutdown switch to stop the engine from the ground level. In order to use the engine shutdown switch, raise guard (1). Move toggle switch (2) up to the STOP position. This will stop the engine. After the engine stops, lower the guard. Lowering the guard will turn the toggle switch to the RUN position.

During normal operation, use the engine start switch to stop the engine.

The engine shutdown switch does not deactivate the machine's electrical system. When the engine shutdown switch is in the STOP position, the engine starter is still enabled.

Note: The engine shutdown switch does not deplete the brake oil pressure from the brake accumulators. When the engine start switch is moved to the OFF position, solenoid valves will fully deplete the brake oil pressure from both brake accumulators.

i02998153

Braking

SMCS Code: 4250; 4251; 4265; 4267; 4278; 4284

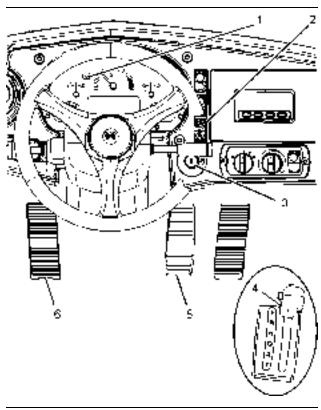


Illustration 89 g01520285

Parking Brake

Note: The parking brakes are spring-applied. The parking brakes are released by brake oil pressure that is stored in the secondary brake accumulator. The brake oil pressure in the secondary brake accumulator is developed when the engine is running.

The parking brakes will engage when any of the following conditions are met:

- Engine start switch (3) is in the OFF position.
- Transmission control (4) is in the PARK position.
- The brake oil pressure from the secondary brake accumulator is exhausted.



Parking Brake Indicator (1) – When the parking brakes are applied, the parking brake indicator will illuminate.

Note: When the transmission control is in the PARK position, the parking brakes are automatically engaged and the transmission is not in any gear (Neutral).

Service Brake

Note: The service brakes are applied by brake oil pressure that is stored in the service brake accumulator. The brake oil pressure in the service brake accumulator is developed when the engine is running. The service brakes are released by spring pressure.

Note: Allow the engine to run for 45 seconds before depressing the service brake pedal or moving the transmission control out of PARK. This will allow the brake accumulators to fully charge in order to provide full braking capacity.

During normal operation, depress service brake control pedal (5) in order to engage the service brakes. Use the service brakes for reducing ground speed or for stopping the machine.

The pedal is fully variable. The amount of force that is applied to the brakes is proportional to the amount of force that is applied to the pedal.

Note: Repeated engagement of the service brakes on downgrades may cause excessive wear and overheating of the service brakes. Refer to Operation and Maintenance Manual, "Retarding".

Front Brake Disable Switch (If Equipped)

The front brakes and the rear brakes are applied when the service brake pedal is depressed. Front brake disable switch (2) allows the front brakes to be deactivated. If the front brakes are used continuously for an extended period of time, the front brakes can overheat. Under normal circumstances, the front brake disable switch should be in the OFF position.



ON Position – When the top half of the front brake disable switch is in the depressed position, only the rear brakes

will be applied when the service brake pedal is depressed.

Note: When the top half of the front brake disable switch is depressed, the bottom symbol will illuminate in order to indicate the deactivation of the front brakes.



OFF Position – When the bottom half of the front brake disable switch is in the depressed position, the front and rear

brakes will be applied when the service brake pedal is depressed.

Note: When the bottom half of the front brake disable switch is depressed, the top symbol will illuminate in order to indicate the activation of the front brakes.

Secondary Brake

A WARNING

To avoid the possibility of a unexpected machine movement when parking on a slope, always block the wheels securely before leaving the machine unattended.

If the secondary brake system is required in order to stop the machine, do not operate the machine until a complete check has been made of the entire braking system and until all necessary repairs have been made.

Note: The secondary brake system utilizes the parking brake system to apply braking force to the rear wheels and the secondary brake system utilizes the front service brake system to apply braking force to the front wheels.

In case of failure of the service brakes, depress secondary brake control pedal (6) in order to engage the secondary brake system. The amount of force that is applied to the brakes is proportional to the amount of force that is applied to the pedal.

To obtain the maximum available braking force to the machine in an emergency stop condition, apply both the service and secondary brake control pedals simultaneously.

i03647217

Retarding

SMCS Code: 1000; 3121; 7000

The retarder system allows the machine to maintain a constant downhill speed.

Note: The engine brake (if equipped) will provide engine compression braking automatically and the engine brake will only function when the switch for ARC is in the ON position. For more information on the engine brake, refer to Operation and Maintenance Manual, "Operator Controls".

Manual Retarder Control (Lever)

NOTICE

Do not use the retarder control as a parking brake or to stop the machine.

NOTICE

When you quickly apply the entire retarder capacity on a slippery road, the wheels can lock and the transmission can downshift. This can cause serious damage to the power train.

Gradually apply the retarder control on slippery roads in order to prevent the wheels from locking and the transmission from downshifting.

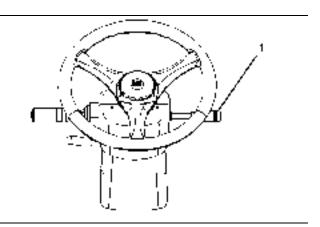


Illustration 90 g01242261



Manual Retarder Control (Lever) (1) – The manual retarder control (lever) is used to manually regulate the machine

speed when you travel down a grade. Move the lever rearward in order to apply more retarding force and slow the machine. Move the lever forward in order to reduce retarding force and allow the machine speed to increase. When the lever is in the full forward position the manual retarder is off.

Automatic Retarder Control (ARC)

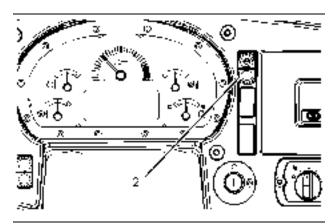


Illustration 91 g01449281



Automatic Retarder Control (ARC) (2) – Push the top half of the switch in order to select the ON position for the ARC

system. This allows the machine to maintain a constant downhill speed. Push the bottom half of the switch in order to select the OFF position for the ARC system.

When the proper gear is selected during ARC operation, vehicle speed and engine speed will be automatically regulated. If necessary, use the manual retarder control in order to apply more retarding force during the operation of ARC.

The ARC should remain in the ON position during normal operation. When you place switch (2) in the OFF position, the ARC will not control engine speed during normal operation. However, if the engine speed becomes too high, the ARC will perform overspeed protection.

Engine Overspeed Protection

This machine is equipped with automatic engine overspeed protection. If the engine speed reaches 2475 rpm, the ARC system will automatically engage, regardless of the position of the ARC switch. In order to prevent further engine overspeed, the transmission will upshift one gear if the engine speed reaches 2750 rpm and the transmission is in the same actual gear as the selected gear on the transmission control.

Retarding Guidelines (Film)

NOTICE

Retarding performance charts provide an indication of the energy absorption capability of a given truck powertrain on a specified continuous, and less than 610 m (2000 ft) decline. Retarding performance charts serve to indicate the correct transmission gear selection and ground speed that should be used on a given grade to avoid situations which may result in machine overspeed and damage to the machine. Retarding performance charts do not give an indication of the ability of the truck to stop or the ability of the truck to remain stationary on the grades that are listed on the chart.

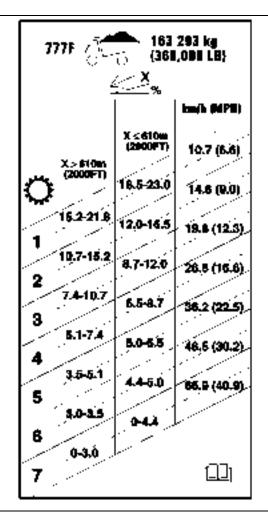


Illustration 92 g01242377

The film for retarding guidelines is located inside the cab.



Maximum Operating Weight – The maximum operating weight of a loaded Off-Highway Truck



Transmission Gear for the Downgrade – The selected gear for downhill travel



Downhill Slope Percentage – The percentage value of the slope for downhill travel



Distance of the Downgrade – The distance of the slope for downhill travel

The retarding capabilities that are listed on this film are based on an ambient temperature of 32 °C (90 °F).

The actual retarding capabilities for each gear will vary depending on the following conditions: outside temperatures, rolling resistance, load, the condition of the cooling system, tire size and altitude.

Retarding

Retarding Information and Conditions

Selection of the proper gear is essential for effective operation of the retarder system. Refer to the film for retarding guidelines in order to select the proper gear.

Select the proper gear on the transmission control before you start down the grade. The actual gear should also match the selected gear before you start down the grade. For more information on the transmission control, refer to Operation and Maintenance Manual, "Operator Controls".

When the film does not address the current conditions, use the following rule: The desired gear on a downgrade is the gear that is required to go up the grade when the machine is loaded.

The ground speed must be slow enough for the conditions and at a rate that will not cause the brakes to overheat. Braking should be steady. Slow down the machine for better brake cooling. Do not travel at high ground speeds and do not stop in a short distance.

Note: Engine speed must be at least 1700 rpm in order to circulate sufficient brake cooling through the oil cooler. This will keep the disc brakes cool.

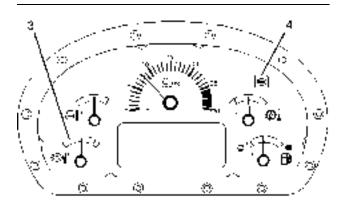


Illustration 93

g01449286

Frequently observe brake oil temperature gauge (3). If the needle enters the red range on the gauge, the capacity of the brake oil cooler has been exceeded. Reduce the load on the machine in order to slow the machine speed. For additional cooling, park the machine in a convenient location. Put the transmission in PARK. Run the engine at high idle.

Note: If the brake oil temperature is high after going down the grade, select a lower gear when you travel down the grade again.

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Indicator light (4) will illuminate when the ARC is engaged or retarding is manually applied with the retarder control lever.

Never coast down a grade in neutral. Always keep the transmission in gear. The chassis ECM will prevent shifting from a forward gear to NEUTRAL at ground speeds that are greater than 8 km/h (5 mph). Also, the Chassis Electronic Control System will prevent shifting from a forward gear to REVERSE gear at ground speeds that are greater than 5 km/h (3 mph).

Attempting to prevent upshifting on a downgrade that is long or steep by retarding can be unsuccessful. The transmission control should be in the desired gear before you start the downgrade. The actual gear should match the selected gear before you start the downgrade. If you rely on retarding, engine speed may reach the upshift point. The lower engine speed reduces brake cooling oil flow. This can cause overheating of the brakes.

When the service brake or the retarder is applied, the transmission upshift point is raised to a higher rpm than a normal shift point.

If you experience undesired shifting, move the transmission control to the proper gear.

If the machine builds up excessive speed during retarding, the engine can overspeed. Use the manual retarder lever in order to reduce the ground speed. Avoid repeated engaging and disengaging of the retarder control lever. Adjust the retarder control lever in order to maintain a proper rpm and a constant speed. If skidding is experienced, ease off the retarder control lever.

If additional braking is still needed, depress the service brake. Maintain a constant vehicle speed. Do not speed up and brake. Do not try to do all of the braking at the bottom of the hill. Keep braking steady and keep ground speed under control.

Note: The machine is equipped with automatic overspeed protection. If the engine speed reaches 2800 rpm and the transmission is in the same gear as the transmission control, the transmission will upshift one gear.

i07742538

Product Link

SMCS Code: 7490; 7606

Note: Your machine may be equipped with the Cat [®] Product Link[™] system.

The Cat Product Link communication device utilizes cellular and/or satellite technology to communicate equipment information. This information is communicated to Caterpillar, Cat dealers, and Caterpillar customers. The Cat Product Link communication device uses Global Positioning System (GPS) satellite receivers.

The capability of two-way communication between the equipment and a remote user is available with the Cat Product Link communication device. The remote user can be a dealer or a customer.

Data Broadcasts

Data concerning this machine, the condition of the machine, and the operation of the machine is being transmitted by Cat Product Link to Caterpillar and/or Cat dealers. The data is used to serve the customer better and to improve upon Cat products and services. The information transmitted may include: machine serial number, machine location, and operational data, including but not limited to: fault codes, emissions data, fuel usage, service meter hours, software, and hardware version numbers and installed attachments.

Caterpillar and/or Cat dealers may use this information for various purposes. Refer to the following list for possible uses:

- Providing services to the customer and/or the machine
- Checking or maintaining Cat Product Link equipment
- Monitoring the health of the machine or performance
- Helping maintain the machine and/or improve the efficiency of the machine
- Evaluating or improving Cat products and services
- Complying with legal requirements and valid court orders
- · Performing market research
- · Offering the customer new products and services

Caterpillar may share some or all the collected information with Caterpillar affiliated companies, dealers, and authorized representatives. Caterpillar will not sell or rent collected information to any other third party and will exercise reasonable efforts to keep the information secure. Caterpillar recognizes and respects customer privacy. For more information, please contact your local Cat dealer.

Operation in a Blast Site for Product Link Radios

A 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, PL141, PL131, PL161, 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"

i04348130

Monitoring System

SMCS Code: 7400; 7450; 7451; 7490

The Monitoring System is designed to alert the operator to an immediate problem with any of the machine systems that are monitored. The Monitoring System is also designed to alert the operator to an impending problem with any of the machine systems that are monitored.

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

Indicators and Gauges

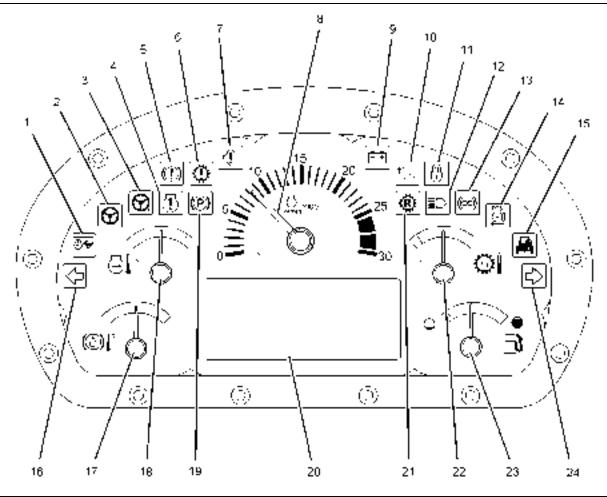


Illustration 94 g01379071

- (1) Throttle lock
- (2) Primary steering system
- (3) Secondary steering system
- (4) Engine Fault
- (5) Brake system fault
- (6) Transmission fault
- (7) Action light
- (8) Tachometer

- (9) Charging System
- (10) Body up
- (11) Lockout mode
- (12) High beam
- (13) Retarder
- (14) Traction Control System (TCS)
- (15) Machine Security System (MSS)
- (16) Left turn signal

- (17) Brake oil temperature
- (18) Coolant temperature
- (19) Parking brake
- (20) LCD display
- (21) Transmission reverse
- (22) Torque converter oil temperature
- (23) Fuel level
- (24) Right turn signal



Throttle Lock (1) - This indicator is illuminated when the throttle lock is activated.



Primary Steering System (2) - When this indicator is illuminated, the primary steering system pressure is low. Stop

the machine immediately. Stop the engine and investigate the cause. Do not operate the machine until the primary steering system pressure is normal.



Secondary Steering System (3) - When this indicator is illuminated, the secondary steering system is active.

The secondary steering system becomes active when the primary steering system has failed.



Engine Fault (4) – When this indicator is illuminated, there is a general fault in the engine.



Brake System Fault (5) - When this indicator is illuminated, there is a general fault in the brake system.



system.

Transmission Fault (6) - When this indicator is illuminated, there is a general fault in the transmission



Action Light (7) - When this indicator is illuminated, there is a malfunction in a machine system. This indicator is used in conjunction with the system indicators to convey the severity of the situation. Refer to "Warning Categories" for more information about the severity of various warnings.



Tachometer (8) - The tachometer will indicate the engine RPM. This also indicates engine overspeed. Engine overspeed is represented by the yellow zone and the red zone.



Charging System (9) - When this indicator is illuminated, there is a fault in the charging system.



Body Up (10) - When this indicator is illuminated, the truck body is in the raised position.



Lockout Mode (11) - This indicator will be illuminated when the engine lockout has been activated. The indicator will

also be illuminated when the machine lockout is activated. Refer to the following topics for more information:

- Operation and Maintenance Manual, "Engine Lockout Control"
- Operation and Maintenance Manual, "Machine Lockout Control"



High Beam (12) - When this indicator is illuminated, the high beam headlights are on.



Retarder (13) - This indicator will illuminate when the Automatic Retarder Control (ARC) is engaged or when the

manual retarder control is engaged. Refer to Operation and Maintenance Manual, "Retarding".



Traction Control System (14) - This indicator is illuminated when the Traction Control System (TCS) applies the rear brakes of a wheel that is losing traction. This also flashes during the TCS test.



Machine Security System (MSS) (15) - If the machine is equipped with MSS, this indicator will illuminate when MSS is activated.



Left Turn Signal (16) - This indicator illuminates when the left turn signal light is operating.



Brake Oil Temperature (17) - When the brake oil temperature is above the normal operating value, the brake oil temperature gauge will be in the red zone.



Coolant Temperature (18) - When the coolant temperature is above the normal operating value, the coolant temperature gauge will be in the red zone.



Parking Brake (19) - When this indicator is illuminated, the parking brake is engaged.



LCD Display (20) - This display is used to display the following information: service hour meter, machine ground speed, actual gear and direction.



Transmission Reverse (21) - The transmission lever is in the REVERSE position. This also indicates the possibility that the machine will shift into reverse when forward ground speed drops.



Torque Converter Oil Temperature (22) -When the oil for the torque converter is above normal operating temperature,

the torque converter oil temperature gauge will be in the red zone.



Fuel Level (23) - When the level of fuel in the fuel tank is low, the fuel level gauge will be in the red zone.



Right Turn Signal (24) - This indicator illuminates when the right turn signal light is operating.

Functional Test (Self Test)

A WARNING

If the action alarm does not sound during this test or machine monitoring displays are not functioning, do not operate the machine until the cause has been corrected. Machine operation with faulty action alarms or displays could result in injury or death as any Warning Category 3 notifications will not be relayed to the operator.

To ensure the proper operation of the monitoring system, check the system daily.

The battery disconnect switch must be in the ON position.

Operation Section Monitoring System

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When you turn the engine start switch key from the OFF position to the ON position, the monitoring system will perform an automatic self-diagnostic test.

The self-diagnostic test verifies that the outputs (gauges, indicators, and alarms) are operating correctly.

When you turn the engine start switch key to the ON position, the following systems are tested for approximately one second: indicators, gauges and LCD displays.

The gauges must go to the far right positions. All indicators must illuminate momentarily. All segments of the LCD displays must come on momentarily. The action alarm must sound.

Warning Categories

The Monitoring System provides three warning categories.

Warning Category 1

In this category, all of the following conditions will occur:

 An indicator will illuminate or a gauge will be in the red zone. The indicator that illuminates or the gauge that is in the red zone identifies the machine system that needs attention.

Warning category 1 requires operator awareness. Minor reductions in machine performance may occur.

Warning Category 2

In this category, all of the following conditions will occur:

- An indicator will illuminate or a gauge will indicate in the red zone.
- · The action light will flash.
- A popup screen appears on the Messenger/ Advisor display screen. Warning information appears on the display screen.

Note: Press the "OK" button in order to acknowledge any warning messages. This will snooze the action light and the message on the display screen.

Warning category 2 requires maintenance or a change in machine operation. Damage to components can occur.

Warning Category 2S

In this category, all of the following conditions will occur:

- An indicator will illuminate or a gauge will indicate in the red zone.
- The action light will flash.
- A steady action alarm will sound.
- A popup screen appears on the Messenger/ Advisor display screen. Warning information appears on the display screen.

Note: Press the "OK" button in order to acknowledge any warning messages. This will snooze the action light and the message on the display screen.

Warning category 2S requires maintenance or a change in machine operation. Severe damage to components can occur.

Warning Category 3

In this category, all of the following conditions will occur:

- An indicator will illuminate or a gauge will indicate in the red zone.
- The action light will flash.
- A sound from the action alarm will pulsate.
- A popup screen appears on the Messenger/ Advisor display screen. Warning information appears on the display screen.

Note: "Snooze" is not available for a warning category 3.

Warning category 3 requires the operator to immediately perform a safe machine shutdown. Injury to the operator or severe damage to components can occur.

Messenger System (If Equipped)

Note: Software parameters and specifications are subject to changes without notice. Refer to the latest revision of Systems Operation, Troubleshooting, Testing and Adjusting, RENR8344, "770, 772, 773F, 775F, and 777F Off-Highway Truck Monitoring System" for more information. For additional information on the payload monitoring system, refer to Systems Operation, Troubleshooting, Testing and Adjusting, RENR8284, "770, 772, 773F, 775F, and 777F Off-Highway Truck Payload Measurement System".

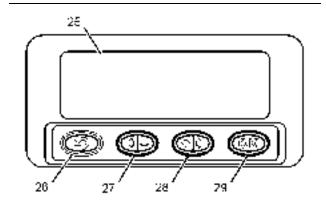


Illustration 95

g01323997

Digital display area (25) – This Messenger system shows information on digital display area (25).

Previous button (26) – Use this button to return to information that was previously shown on digital display area (25).

Scroll up/left button (27) – This button is used to scroll up through information that is shown on the display area. The button can also be used to scroll to the left through information that is shown on the display area.

Scroll down/right button (28) – This button is used to scroll down through information that is shown on the display area. The button can also be used to scroll to the right through information that is shown on the display area.

OK button (29) – After you have made selections with the scroll up/left button (27) and with the scroll down/right button (28), use this button in order to confirm those selections.

Default Screen

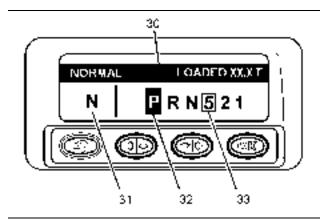


Illustration 96

q01389960

Typical transmission gear display

Note: When drive gears are changed, the gear range is displayed on the screen.

The default information that is displayed for the Messenger system is the transmission gear display. Refer to Operation and Maintenance Manual, "Transmission Control" for more information about selecting the drive gear.

Message area (30) – The message area will display the fuel consumption mode that is currently active. The modes are listed below:

- "Normal"
- "Economy"

If the machine is equipped with the Truck Payload Measurement System (TPMS), message area (30) will also display one of the following messages about the payload information:

"Loading" – The module senses the beginning of the load cycle.

"Last Pass" – One additional pass from the loading machine will fill the dump body to maximum capacity.

"Loaded" - The truck body is fully loaded.

"Payload" – This message appears when the TPMS has calculated the final payload weight and the machine has shifted past second gear. The final payload weight will also be displayed.

Actual gear (31) – This will display the actual gear and direction of the transmission. The display will show one of the following:

- "N" for the PARK position and the NEUTRAL position
- "1F" through "7F" for the FORWARD positions
- "1R" for the REVERSE position

Note: There is not a PARK position in the transmission. When the transmission control is in the PARK position, the transmission is in NEUTRAL and the parking brakes applied.

Selected gear (32) – If the transmission control lever is in any of the following positions, the gear that is highlighted indicates the position of the transmission control lever: PARK, REVERSE, NEUTRAL, SECOND and FIRST. If the transmission control lever is in DRIVE, the gear that is highlighted indicates the gear that has been selected as the top drive gear.

Top drive gear (33) – The single gear that is shown in the small outline is the top drive gear that has been selected with the transmission control.

"Monitor" Menu

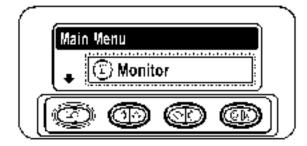


Illustration 97 g01380493

The "Monitor" menu option is accessed from the default screen. Press the up arrow button or the down arrow button until "Monitor" is highlighted. Then press the "OK" button.

The "Monitor" menu will display system data during machine operation. The following selections are available through the "Monitor" menu:

- Engine speed
- Ground speed
- · Engine coolant temperature
- Brake oil temperature
- Torque converter temperature
- · Fuel level
- · Actual gear
- · Shift lever
- · Air filter restriction pressure
- · Payload (if equipped)
- Payload state (if equipped)

"Totals" Menu

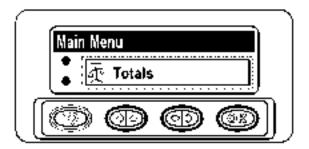


Illustration 98 g01311558

The "Totals" menu option is accessed from the default screen. Press the up arrow button or the down arrow button until "Totals" is highlighted. Then press the "OK" button.

The "Totals" menu will display accumulated values. The following selections are available through the "Totals" menu:

"Payload"

- · Total load count
- · Load count
- · Accumulated weight (if equipped)
- · Loaded time (if equipped)
- · Loaded distance (if equipped)
- · Reset load count ("Yes" or "No")

"Machine"

- Distance traveled
- · Machine hours
- · Total fuel

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Operation Section

"Settings" Menu

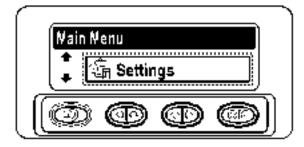


Illustration 99 g01311563

The "Settings" menu option is accessed from the default screen. Press the up arrow button or the down arrow button until "Settings" is highlighted. Then press the "OK" button.

Operating conditions, preferences of the operator and requirements for operating efficiency dictate the need to adjust the parameters.

The "Display setup", "Machine", "Transmission", "Brake", "Payload", "Engine" and Autolube selections that are available in the "Setttings" menu can be password protected with the "Service Mode" in order to limit access to programmable parameters. The programmed parameters in the password protected menu options are available for viewing only. Cat ET must be used in order to set the password.

The following selections are available through the "Settings" menu:

"Display Setup"

The following selections are available through the "Display Setup" submenu:

- Language
- Units ("English" or "Metric")
- Contrast
- Headlights ON
- · Headlights OFF

"Headlights On" will adjust the setting of the backlight for the display screen. This setting will determine the backlight intensity that will be used when the headlights are placed in the ON position.

"Headlights Off" will adjust the setting of the backlight for the display screen. This setting will determine the backlight intensity that will be used when the headlights are placed in the OFF position.

"Machine"

The following selections are available through the "Machine" submenu:

Monitoring System

- · Product identification
- Machine identification

"Transmission"

The following selections are available through the "Transmission" submenu:

- Top gear limit
- Body up gear limit
- · Machine speed limit
- Fuel economy mode
- Machine overload speed limit (if equipped)

"Brake"

The following selections are available through the "Brake" submenu:

Desired engine retarding speed

"Payload" (If Equipped)

The following selections are available through the "Payload" submenu:

- · Target payload
- Overload limit
- · Green TPMS indicator light configuration
- · Red TPMS indicator light configuration
- · Last pass indicator

"Engine"

The following selections are available through the "Engine" submenu:

- Ether solenoid "None" or "Continuous Flow"
- EIS Delay Time (select between 3 to 60 minutes)
- EIS Enable Status (enabled or disabled)

"Auto Lube" (if equipped)

The following selections are available through the "Auto Lube" submenu:

- Autolube interval
- AutoLube duration

"Service" Menu

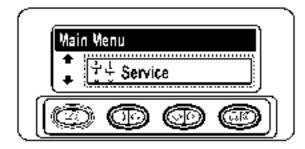


Illustration 100 g01311565

The "Service" menu option is accessed from the default screen. Press the up arrow button or the down arrow button until "Service" is highlighted. Then press the "OK" button.

The selections that are available in the "Service" menu can be password protected with the "Service Mode" password in order to limit access to programmable parameters. The programmed parameters in the password protected menu options are available for viewing only. Cat ET must be used in order to set the password.

"Diagnostics/Events"

The "Diagnostics/Events" submenu will display a complete list of all active event codes, inactive event codes, and diagnostic codes. Each line on the list will show the following information:

- SRC (source)
- Code number
- OCC (number of occurrences of the event or code)
- Active status or inactive status (code)

"System Parameters"

The "System Parameters" submenu will display the parameters for the system components that are monitored by the Electronic Control Modules (ECM). Some of the components may use multiple screens in order to display all of the parameters that are monitored. The "System Parameters" submenu will divide all parameters into the following categories:

- Monitoring system (parameters for the Messenger monitoring system)
- · Engine

- Transmission (parameters for the transmission and the chassis)
- Hoist (transmission/chassis ECM)
- Brake
- Payload

"Calibrations" (If Equipped)

Payload

The payload system must be recalibrated if a new TPMS software is installed. The payload system must also be recalibrated if the serial number of the machine is reprogrammed.

"System Tests"

The following selections are available through the "System Tests" submenu:

- Transmission stall test
- Manual lube mode (if equipped)
- · Self test (functional test)

Note: The "OK" button can be depressed for three seconds in order to initiate the self test.

"System Information"

The "System Information" submenu will display details about the software version and details about the ECM module for the following systems:

- · Monitoring system
- · Engine
- Chassis
- · Brake
- Payload (if equipped)

"Tattletale"

The tattletale feature allows the history of the machine to be recorded. The Tattletale submenu allows the viewing of extreme recorded values for each machine parameter that is active. When the "Active" submenu is selected, the following will be displayed:

- All the indicators that were activated will light.
- All the gauges will be set to the maximum value that was encountered during operation. This will be the minimum value for the fuel gauge.
- The maximum ground speed will be displayed on the LCD.

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For the following selections on the Tattletale submenu, the Messenger screen will display the values that correspond with the gauges:

- Brake oil temperature
- · Engine coolant temperature
- · Engine speed
- Torque converter temperature
- · Fuel level

The operator can step through the extreme recorded value of each gauge. The gauges that are selected will be set to the minimum value.

Service Mode Menu

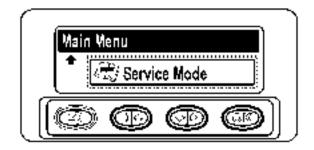


Illustration 101 g01380506

The "Service Mode" menu option is accessed from the default screen. Press the up arrow button or the down arrow button until "Service Mode" is highlighted. Then press the "OK" button.

The "Service Mode" menu is used in order to enter the "Service" menu on the display. The Service Mode protects certain features from access by the operator. Features that are protected from the operator can be enabled or disabled with a password.

Note: A password may be required or a password may not be required. This depends on the settings that have been made in Cat ET.

A Service Tool must be used to program the password into the display. The password cannot be changed within the Messenger.

Advisor System (If Equipped)

Note: Software parameters and specifications are subject to changes without notice. Refer to the latest revision of Systems Operation, Troubleshooting, Testing and Adjusting, KENR5955, "773F, 775F and 777F Off-Highway Truck Vital Information Management System (VIMS)" for more information. For additional information on the payload monitoring system, refer to Systems Operation, Troubleshooting, Testing and Adjusting, RENR8284, "770, 772, 773F, 775F, and 777F Off-Highway Truck Payload Measurement System".

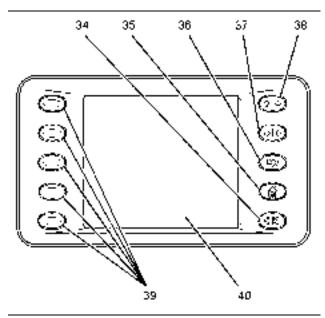


Illustration 102 g01320479

OK button (34) – After you have made selections with the scroll down/right button (37) and with the scroll up/left button (38), use this button in order to confirm those selections.

Home menu button (35) – Use this button to return to the main menu.

Previous button (36) – Use this button to return to information that was previously shown on digital display area (40).

Scroll down/right button (37) – This button is used to scroll down through information that is shown on the display area. The button can also be used to scroll to the right through information that is shown on the display area.

Scroll up/left button (38) – This button is used to scroll up through information that is shown on the display area. The button can also be used to scroll to

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the left through information that is shown on the display area.

Preset buttons (39) – The Advisor system allows you to program the locations of five menu items. In order to store a menu item into the memory, go to the desired screen display in the menu by using the navigation buttons. Assign a preset button by depressing the preset button until all preset buttons illuminate green (three to four seconds). The preset button is now assigned to the corresponding screen display in the menu. The preset button can be used to access the corresponding screen display from any location in the menu. If the profile is set to "Factory Set", any programmed preset buttons will revert to the default setting when the keyswitch is turned OFF. In order to save the preset programming, a profile must be selected or created. Refer to "Create Profile", and Create Profile in the "Operator" Menu, and Operator" information.

Digital display area (40) – The Advisor system shows information on this digital display area.

"Home" Menu

The structure of the Advisor menu is arranged in a layered list. When the operator or a technician selects an option from a menu, the next screen is one level below the previous screen. More selections may be available from the resulting screen. There may also be more than one page of information or options that can be displayed from a level. Only four options can be displayed at one time. This is indicated by the "More Options" icon. This icon is located on the left side of the screen.

The main menu can be displayed at any time by pressing the "Home" button.

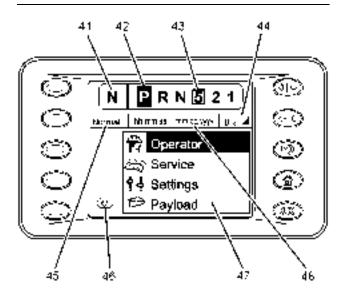


Illustration 103 g01320485

Actual gear (41) – This will display the actual gear and direction of the transmission. The display will show one of the following:

- "N" for the PARK position and the NEUTRAL position
- "1F" through "7F" for the FORWARD positions
- "1R" for the REVERSE position

Note: There is not a PARK position in the transmission. When the transmission control is in the PARK position, the transmission is in NEUTRAL and the parking brakes applied.

Selected gear (42) – If the transmission control lever is in any of the following positions, the gear that is highlighted indicates the position of the transmission control lever: PARK, REVERSE, NEUTRAL, SECOND and FIRST. If the transmission control lever is in DRIVE, the gear that is highlighted indicates the gear that has been selected as the top drive gear.

Top drive gear (43) – The single gear that is shown in the small outline is the top drive gear that has been selected with the transmission control. Any gear between 3 and 7 is able to be selected.

Note: When drive gears are changed, the gear range is displayed on the screen.

The default information that is displayed for the Advisor system is the transmission gear display. Refer to Operation and Maintenance Manual, "Transmission Control" for more information about selecting the drive gear.

Grade Percentage (44) – This screen will display a percentage value of the current grade (slope).

Fuel Consumption (45) – This screen will display the fuel consumption mode that is currently active. The modes are listed below:

- "Normal"
- "Economy"

More Options (46) – This icon shows the direction to scroll for more options.

Menu Items (47) – This screen will display the menu options that are available.

Date/Time Clock (48) – This screen will display the time and the date.

"Operator" Menu

The profile of an operator is a saved set of preferences that are identified by a name. Once the profile is created, the operator may associate various display settings and settings for the power train to that profile. When the preferences are adjusted, the preferences may be saved.

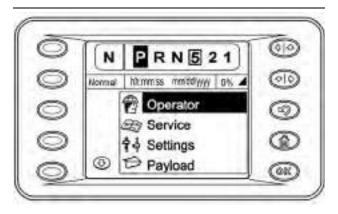


Illustration 104

g01320750

The profile of the operator is accessed from the "Home" menu. Press the up arrow button or the down arrow button until "Operator" is highlighted. Then press the "OK" button.

The following selections are available through the "Operator" menu:

"Select Profile"

From the "Operator" menu, use the appropriate arrow button to highlight the "Select Profile" option. Then press the "OK" button in order to display a list of existing profiles. Use the appropriate arrow button to highlight the desired profile. Then press the "OK" button in order to select that profile.

Note: A maximum of ten profiles may be used.

Note: A "None" profile will be automatically created when the last remaining profile is deleted and no profile exists. The programmed preferences are automatically saved when the keyswitch is turned OFF. "Factory Set" is not a profile.

"Edit/Save Current"

From the "Operator" menu, use the appropriate arrow button to highlight the "Edit/Save Current" option. Then press the "OK" button in order to view the settings that are associated with the current profile.

This procedure will cause the current settings of the selected profile to be displayed on the screen. The settings that are displayed are the current settings.

The operator may exit this display without saving by pressing the back button. The operator may save the settings by selecting "Save" and pressing the "OK" button.

"Create Profile"

From the "Operator" menu, use the appropriate arrow button to highlight the "Create Profile" option. Then press the "OK" button in order to display the "Create Profile" screen. Follow the screens in order to create a new name. The screen will give directions in order to save the name to the list of profiles. This procedure creates a profile.

Note: After a profile is created the selections in the "Settings" submenu can be saved to a specific profile.

Note: A maximum of ten profiles may be used.

"Delete Profile"

From the "Operator" menu, use the appropriate arrow button to highlight the "Delete Profile" option. Then press the "OK" button in order to display a list of existing profiles. Use the appropriate arrow button to highlight the profile for deleting. Then press the "OK" button in order to delete that profile. This procedure deletes the selected profile from the list of stored profiles.

"Factory Set"

From the "Operator" menu, use the appropriate arrow button to highlight the "Factory Set" option. Then press the "OK" button in order to make the default settings active.

This procedure recalls the default settings. The default settings are then the active settings and the Advisor display and the instrument cluster will reflect the default settings. Once the default settings have been activated, the settings may be viewed without saving using the "Edit/Save Current" option.

The default settings will not be saved with the current profile unless the operator saves the default settings to a profile by using the "Edit/Save Current" option.

"Monitor" Menu

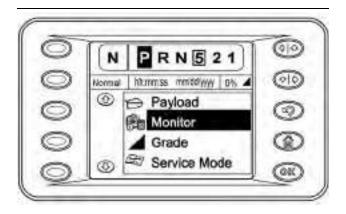


Illustration 105 g01320714

The "Monitor" menu option is accessed from the "Home" menu. Press the up button or the down button until the "Monitor" is highlighted. Then press the "OK" button.

The "Monitor" menu option allows the user to view the machine parameters that are being monitored. Four parameters are displayed on the screen at one time. Use the navigation buttons in order to scroll through the parameters. Press the "OK" button in order to attain a list of available parameters.

"Payload" Menu

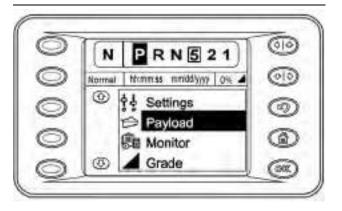


Illustration 106 g01320869

The "Payload" menu option is accessed from the "Home" menu. Press the up button or the down button until the "Payload" is highlighted. Then press the "OK" button.

The following information will be displayed in the "Payload" menu:

"Payload State" – The state of the payload (load cycle status) will be one of the following:

- "Loading": The module senses the beginning of the load cycle.
- "Last Pass": One additional pass from the loading machine will fill the dump body to maximum capacity.
- "Loaded": The dump body is fully loaded.

"Payload" - Calculated weight for the payload

"Target" - Target payload weight

See Systems Operation, RENR8284, "General Information" for more information about the payload.

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"Service" Menu

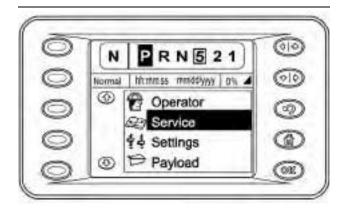


Illustration 107 g01320959

The "Service" menu option is accessed from the "Home" menu. Press the up arrow button or the down arrow button until "Service" is highlighted. Then press the "OK" button.

The selections that are available in the "Service" menu can be password protected with the "Service Mode" password in order to limit access to programmable parameters. The programmed parameters in the password protected menu options are available for viewing only. Cat ET must be used in order to set the password.

The following selections are available through the "Service" menu:

"Diagnostics"

The following selections are available through the "Diagnostics" submenu:

"Active Events"

The following selections are available through the "Active Events" submenu:

- Electronic Control Module
- Event Code
- Date of occurrence
- Time of occurrence
- · Warning Level
- Number of occurrences

"Logged Events"

The "Logged Events" menu option shows the list of events and diagnostic codes that have been recorded. Press the "OK" button in order to view the information of the event or code. Use the left arrow button or the right arrow button in order to move to the next logged event or the next code.

"Trigger Snapshot"

The "Trigger Snapshot" menu option allows the user to manually initiate a snapshot of the system. This snapshot will be in addition to the snapshots that are already programmed. The snapshot will remain active until the time has elapsed.

"Data Logger Start"

The "Data Logger Start" menu option allows the user to initiate the data logger. If the information for the data logger is being downloaded from the machine, the data logger cannot be started. The operator can initiate the data logger. Then, the operator can stop the data logger. This action can be performed numerous times until the total time for logging the data is thirty minutes. The status of the data logger is shown in the right portion of the screen on the Advisor. The menu item "Data Logger Stop" will change back to "Data Logger Start" when the data logger is no longer recording data. The menu items do not change when the service tool starts the data logger. The remaining storage time of the data logger is shown on the message area when the user highlights the "Data Logger Reset" menu item on the Advisor display. The format of the time is shown in "minutes:seconds" .

"Data Logger Reset"

The "Data Logger Reset" menu option allows the user to reset the data logger. This option clears all of the logged information. Select the "Data Logger Reset" menu item. The Advisor shows the time that is available for the data logger on the right side of the screen. Thirty minutes will be available after the data logger has been reset.

Note: The Data Logger is the only onboard file that can be reset through the Advisor display. The Advisor must be in the Service Mode or the Caterpillar Electronic Technician (ET) must be connected to the data link in order to reset the data logger. Also, this is true in order to perform other service functions. The VIMSpc software is not needed in order to reset the data logger.

"Service Parameters"

The "System Parameters" submenu will display the ECM status of the system components. Some of the components may use multiple screens in order to display all of the parameters that are monitored. The "System Parameters" submenu will sort all parameters into the following categories:

- "Sort By ECM" allows the user to view the parameters that are associated with separate system components.
- "Sort By Type" allows the user to view the parameters that are associated with separate units of measurement.

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All parameters

"Sort By ECM"

The "Sort By ECM" submenu will sort all parameters into the following categories:

- "Advisor": This selection will display the parameters for the Advisor monitoring system.
- "Engine": This will display the parameters that are monitored by the engine ECM.
- "Chassis": This will display the parameters that are monitored by the transmission/chassis ECM.
- "Brake": This will display the parameters that are monitored by the brake ECM.
- "VIMS": This will display the parameters that are monitored by the VIMS ECM (payload).

"Sort By Type"

The "Sort By Type" submenu will sort all parameters into the following categories:

- "Temperatures": This will display the parameters that are monitored under the category of temperature.
- "Pressures": This will display the parameters that are monitored under the category of pressure.
- "Speeds": This will display the parameters that are monitored under the category of speed.
- "Operator Inputs": This will display the parameters that are monitored under the category of operator input.
- "Sensor Duty Cycles": This will display the parameters that are monitored under the category of "sensor duty cycle".
- "Totals": This will display the parameters that are monitored under the category of totals.

"All Parameters"

The "All Parameters" menu option allows the user to view the entire list of parameters.

"Calibrations"

The following selections are available through the "Calibrations" submenu:

- · Truck Payload
- Inclinometer

Use the appropriate arrow button to highlight the desired calibration from the list. Then press the "OK" button. Follow the directions that are displayed on the screen in order to perform the calibration.

"System Tests"

The following selections are available through the "System Tests" submenu:

- Transmission stall test
- · Manual lube mode (if equipped)
- · Self test (functional test)

"System Information"

The "System Information" submenu will display details about the software version and details about the ECM module for the following systems:

- Advisor
- Engine
- Chassis
- Brake
- VIMS

"Tattletale"

The tattletale feature allows the history of the machine to be recorded. The Tattletale submenu allows the viewing of extreme recorded values for each machine parameter that is active. When the "Active" submenu is selected, the following will be displayed:

- · All the indicators that were activated will light.
- All the gauges will be set to the maximum value that was encountered during operation. This will be the minimum value for the fuel gauge.
- The maximum ground speed will be displayed on the LCD.

For the following selections on the Tattletale submenu, the Advisor screen will display the values that correspond with the indicators and gauges:

- Brake oil temperature
- Engine coolant temperature
- Engine speed
- Torque converter temperature
- Fuel level

The operator can step through the extreme recorded value of each parameter. The parameters that are inactive will be set to the minimum value.

"Settings" Menu

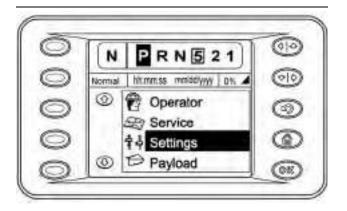


Illustration 108

g01320909

The "Settings" menu option is accessed from the "Home" menu. Press the up arrow button or the down arrow button until "Settings" is highlighted. Then press the "OK" button.

Operating conditions, preferences of the operator and requirements for operating efficiency dictate the need to adjust the parameters.

The "Display Setup", "Machine", "Chassis", "Brake", "VIMS", "Engine" and "Auto Lube" selections that are available in the "Setttings" menu can be password protected with the "Service Mode" password in order to limit access to programmable parameters. The programmed parameters in the password protected menu options are available for viewing only. Cat ET must be used in order to set the password.

The following selections are available through the "Settings" menu:

"Display Setup"

Individual preferences for the "Display Setup" need to be saved in the operator profile.

If the profile is set to "Factory Set", the preferences will revert to the default setting when the keyswitch is turned OFF. In order to save a preference, a profile must be selected or created. Refer to ""Create Profile", and Create Profile" in the ""Operator" Menu, and Operator" information.

The following selections are available through the "Display Setup" submenu:

- Language
- Units ("English" or "Metric")
- Contrast
- · Headlights on dimming
- · Headlights off dimming

- Date format
- · Time format

Headlights on dimming will adjust the setting of the backlight for the display screen. This setting will determine the backlight intensity that will be used when the headlights are placed in the ON position.

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Headlights off dimming will adjust the setting of the backlight for the display screen. This setting will determine the backlight intensity that will be used when the headlights are placed in the OFF position.

"Machine"

The following selections are available through the "Machine" submenu:

- · Product identification
- Machine identification

"Chassis"

The following selections are available through the "Chassis" submenu:

- · Top Gear Limit
- · Body Up Gear Limit
- · Machine Overload Speed Limit
- · Machine Speed Limit
- Fuel Economy Mode

"Brake"

The following selections are available through the "Brake" submenu:

· Desired engine retarding speed

"VIMS"

The following selections are available through the "VIMS" submenu:

- Load count
- Target payload
- Payload overload limit setting
- Green TPMS lamp
- Red TPMS lamp
- · Last pass indicator

"Engine"

The following selections are available through the "Engine" submenu: Operation Section Monitoring System

- · Ether solenoid "None" or "Continuous Flow"
- Engine Shutdown Delay Time (select between 3 to 60 minutes)
- EIS Enable Status (enabled or disabled)

"Auto Lube" (if equipped)

The following selections are available through the "Auto Lube" submenu:

- Autolube interval
- · AutoLube duration

"Grade" Menu

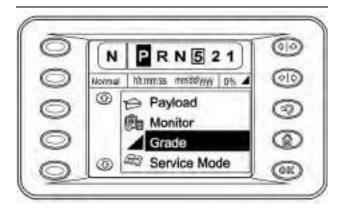


Illustration 109 g01320690

The "Grade" menu option is accessed from the "Home" menu. Press the up button or the down button until the "Grade" is highlighted. Then press the "OK" button.

The "Grade" menu option allows the user to view the grade of the hill. The user can view the following information:

- · Percentage of the grade value
- Image of the truck that represents the grade

Note: The information for the grade can also be found on the "Home Menu".

"Service Mode" Menu

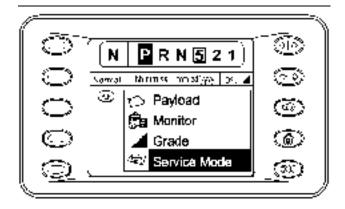


Illustration 110 g01324645

The "Service Mode" menu option is accessed from the "Home" menu. Press the up arrow button or the down arrow button until "Service Mode" is highlighted. Then press the "OK" button.

The "Service Mode" menu is used in order to access the password protected menu options. The "Service Mode" protects certain features from access by the operator. Features that are protected from the operator can be enabled or disabled with a password.

Note: A password may be required or a password may not be required. This depends on the settings that have been made in Cat ET.

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Operation Section

A Service Tool must be used to program the password into the display. The password cannot be changed within the Advisor.

i03642459

Camera

(If Equipped)

SMCS Code: 7347; 7348

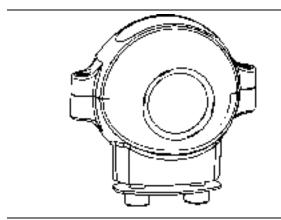


Illustration 111

g01223051

Camera for WAVS

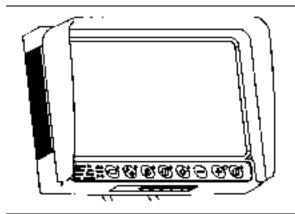


Illustration 112

g01223034

Display for WAVS

The Work Area Vision System (WAVS) is a closed circuit television system that is designed to supplement the view for the operator during machine operation. The WAVS on this machine has a rear mounted camera and a cab mounted monitor.

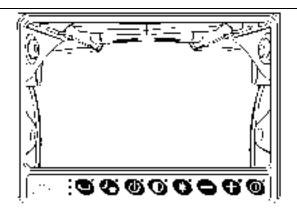


Illustration 113

q01954619

Camera

Typical example of the proper orientation of the image on the monitor

The dump body is shown in the lowered position.

Prior to operating the machine, ensure the proper orientation of the image on the monitor. The camera has been set up by the factory or by a Caterpillar dealer in order to provide the following view from the rear of the machine:

- · Partial view of the dump body
- · Partial view of the rear frame
- Partial view of the tires
- View of an object on the ground 25 m (82 ft) behind the rear tires

Consult your Caterpillar dealer before any adjustments are made to the camera.

Prior to operating the machine, ensure that the features of the display are properly adjusted. Ensure that the brightness and the contrast are adjusted prior to operating the machine. Ensure that the brightness and the contrast are adjusted after changes in the conditions for ambient light.

Prior to operating the machine, ensure that the display is positioned in order to provide clear visibility of the display from the operator seat. Do not position the display in a way that will cause the following conditions:

- Cover any safety messages or other important information.
- Impede the entry to the cab or impede the exit from the cab.
- Obstruct the visibility of the operator.
- Obstruct the view of any indicators, gauges, or monitoring system.
- Impair access to any operator controls or impair movement of any operator controls.

Operation Section
Cat Detect Object Detection

Prior to operating the machine, ensure that the camera lens and the display are clean.

Refer to Operation and Maintenance Manual, SEBU8157, "Work Area Vision System" for additional information about WAVS.

i05172337

Cat Detect Object Detection (If Equipped)

SMCS Code: 1408-ODS; 7347; 7348; 7490; 7620

Software updates will be released as changes become necessary. The following information was documented from the latest software version at the time this document was developed. Consult your Cat dealer for more information.

Refer to Operation and Maintenance Manual, SEBU8624, "Cat Detect Object Detection" for additional information about the object detection system.

System Information

The system is designed to enhance operator awareness of surroundings. Use of this system does not replace basic safety precautions and procedures for operating the machine. Proper functioning of the Cat Detect Object Detection system is not required for this machine to be operated safely. The operator can still use other means (for example, direct vision from the cab, direct vision the ground, mirrors, spotters, and warning horns) to verify that the area is clear, or to provide warning before the machine is moved.

Cat Detect Object Detection (Full System)

The Cat Detect Object Detection system uses radar (four sensors) and video (four cameras) in order to provide the operator with additional information about the work area around the machine. The video display interfaces with the radar sensors that are mounted around the machine. The radar sensors provide detection of objects that are normally in areas of restricted visibility around the machine. The system will detect large objects such as a light-duty vehicle that is near the machine and within the coverage map shown in illustration 115.

Cat Detect Object Detection (Vision Only System)

The Cat Detect Object Detection system is available as a four camera video only option **or** a rear camera video only option. The object detection (radar) functionality is not available with the vision only systems.

Coverage

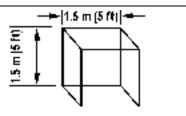


Illustration 114

g02183076

The minimum size of a detected object is 1.5 m (5 ft) by 1.5 m (5 ft).

Recognition of a target is dependent upon the material composition (hard and highly reflective verses soft) and the geometry (large, small, moving, not moving) of the target. Recognition of a target is also dependent upon the proximity of the object to the detection zone. The system may detect a target that is the size of a standing adult human. However, due to the limited number of areas for mounting the object detection sensors on the machine, there are areas around the machine that could allow an object to be undetected.

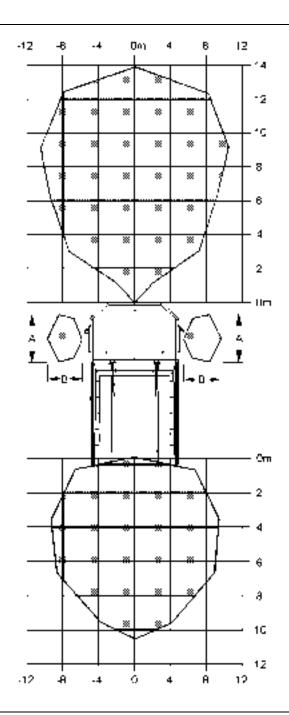


Illustration 115 g02465357

The shaded areas represent the coverage areas that are provided by the radar sensors

(A) 2.23 m (7.3ft)

(B) 2 m (6.6 ft)

Objects are most likely to enter a detection zone when the machine has been stopped. In order to help prevent objects from entering a detection zone unnoticed, the object detection system activates when the key switch is turned to the ON position and remains in the active state until the machine reaches a trigger speed or distance. The system operation can be configured for distance-based mode or speed-based mode. The distance-based mode or speed-based mode can be changed on the configuration screen. ET must be connected to the machine in order to change between distance-based or speed-based modes. The system operation is configured for distance-based mode as a default from factory.

If Equipped

The speed-based mode allows the system to remain active when the machine is traveling in the forward direction at speeds less than 8 km/h (5 mph). The system will transition to the standby state when the machine speed exceeds 8 km/h (5 mph). The system will become active whenever the machine speed falls below 5 km/h (3 mph) for the configured delay activation time. The system will always be active when the machine is traveling in reverse.

The distance-based mode allows the system to remain active until the machine transitions from a stopped state and has traveled for a minimum of 20 m (65 ft) in the forward direction. The system remains in the active state anytime the truck is traveling in reverse. The system will return to the active state automatically after the machine is brought to a complete stop and after the machine has remained stopped for the delay time that has been configured for the site. The reactivation delay is used to stop the system from transitioning from the standby state to the active state while making short stops. Cat ET is required to change the delay time.

Note: Caterpillar recommends that the settings for each site to be consistent across all machines in order to avoid operator confusion.

Prior to operating the machine, ensure the proper orientation of the images on the monitor. Consult your Cat dealer before any adjustments are made to any of the cameras and object detection sensors.

Prior to operating the machine, ensure that the brightness is properly adjusted. Ensure that the brightness is adjusted after changes in the conditions for ambient light.

Prior to operating the machine, ensure that the display is positioned in order to provide clear visibility of the display from the operator seat. Do not position the display in a way that will cause the following conditions:

- Cover any safety messages or other important information.
- Impede the entry to the operator station or impede the exit from the operator station.

Operation Section If Equipped

- Obstruct the visibility of the operator.
- Obstruct the view of any indicators, gauges, or monitoring system.
- Impair access to any operator controls or impair movement of any operator controls.

Prior to operating the machine, ensure that the camera lenses, object detection sensors, and the display are clean.

Note: In order to access the camera(s) and/or object detection sensors, it may be necessary to use a portable access system (ladder, stair assembly, man lift, or other portable access system) that is suitable and compliant to local regulations.

Components

Sensors

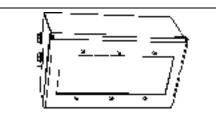


Illustration 116

g02466017

Object detection sensor

Medium range object detection sensors are located at the front, rear, left and right of the machine (if equipped with the full radar system).

Camera(s)

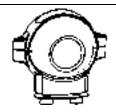


Illustration 117

g02180036

Object detection system camera

A camera is located on the front, rear, left side, and the right side of the machine (if equipped with the full radar system or the four camera vision only system).

A camera is located on the rear of the machine (if equipped with the single camera system).

Monitor

See "Monitor and Menu" in the following "Cat Detect Object Detection" information.

Work Lighting

During low light conditions, manually turn on the work lights in order to illuminate the camera view from the side cameras.

Variable Factors on System Operation

The operation of the system can be affected by any of the following factors.

🕰 WARNING

Personal injury or death could result without observing the following information.

Environmental conditions, installation, and topographical factors can affect the proper operation of the object detection system and must be considered during system operation.

Environmental – Poor environmental conditions may reduce the coverage distances. Weather conditions such as rain, snow, and sleet can create road conditions that may also cause debris to build up on the face of the object detection sensor. The moisture can reduce the effectiveness of the coverage of the radar by absorbing the RF energy that is emitted by the object detection sensors. If an accumulation of debris is observed on the object detection sensors, then clean the surface of the sensor. Use a damp cloth in order to clean the glass of the object detection sensors are not affected by a wash with high-pressure spray.

Note: The object detection sensors have blockage detection diagnostics that display a message on the display when debris blocks the object detection sensors. The event will remain active until the sensor has been cleaned or the blockage is removed.

Installation – Incorrect sensor bracket installation and or alignment may also cause the object detection sensors to give nuisance warnings to the operator. The system may sense false objects because the object detection sensors are not set to the correct angle.

Note: The brackets may become misaligned over time because of shock and vibration the machine is subjected to during normal operations. Visually inspect the condition of the radar brackets daily for damage.

Topographical – The system may sense objects even though no objects are present if the grade of a haul road, a loading area, or a ready line are significant enough to reflect RF energy in the same way as a vehicle or berm. One or more false targets

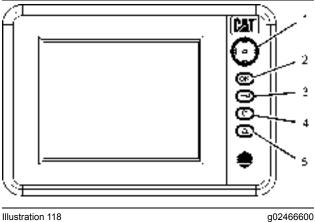
are possible when a V-ditch is utilized when parking the machine. The V-ditch can cause a false indication at the front or sides of the machine.

Monitor and Menu

Power On/Off

Power is supplied to the system when machine keyswitch is turned to the "ON" position. During the power up process, the display will perform a self test. During the self test, the display will ensure that all of the components are communicating and the alarm on the display will sound momentarily. When the self test is completed, the system status indicator will turn green, the cameras will be active, and the radar view screens will be active. If the self test fails, the System Status indicator will turn red. The camera screens will be active and the radar screen will be disabled (the vision capabilities can still be used if the radar detection is not functioning). If the self test fails, contact your Cat dealer.

Navigation





Arrow button (1) - The arrow button is used in order to perform the following functions:

- Toggle the display between the camera views (front, rear, left, and right)
- Highlight a selection (up/down and left/right)
- Manually adjust brightness level after the brightness button is depressed (right/ left)

OK button (2) - The "OK" button is used OK in order to edit settings. The operator must press the "OK" button to enter the settings. After pressing the "OK" button, the first parameter in the list that can be configured will be highlighted. The highlighted parameter can then be changed.

Tab button 3 - Use the tab button in order to change the active screen between the main screen, the configuration screen, and the diagnostic summary screen.

Brightness button (4) - Press the brightness button once in order to allow manual adjustment of the brightness for the display screen. Press and hold the brightness button for 2 seconds in order to enable/disable night mode for the display screen.

Note: The night mode will adjust the display to the 25 percent brightness setting in order to reduce the amount of light emitted during night time operation. The night mode brightness can be adjusted up or down and will be remembered the next time the night mode feature is enabled. When the display returns to the day mode the brightness setting will automatically adjust the 75 percent brightness. If necessary, adjust the brightness manually for personal view preferences.

Alarm check button (5) - The alarm check cancels any changes that were made in the configuration screen. The alarm check button also can be used to snooze the audible alarm. This snooze remains in effect until a directional change or the machine goes into standby mode. If any of these conditions are met the snooze is turned off. If the object is still present or a new object appears, the system will start beeping again.

Main Screen

Proximity and Direction Indicators

Note: Radar information will not be used to determine the exact position of the object. Only the general area of the object relative to the machine will be displayed. The operator must use the camera for the designated machine quadrant to determine if the object is in the path of the machine and evasive action is required.

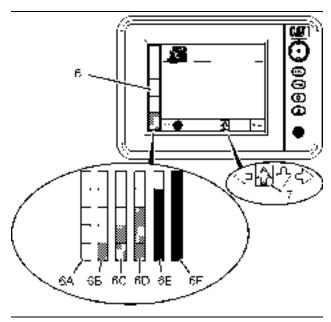


Illustration 119

g02466617

- (6) Proximity indicator
- (6A) No object detected
- (6B) Object detected in Caution Zone 1
- (6C) Object detected in Caution Zone 2
- (6D) Object detected in Caution Zone 3
- (6E) Object detected in Critical Zone
- (6F) Object detected in Stop Zone
- (7) Direction indicator

Proximity indicator (6) consists of a single bar with five segments on the left side of the display.

There are five levels of proximity indication. The number and color of the segments are based on the stopping distance and speed of the machine. The display will use the screen and the warning alarm to notify the operator of the highest warning level that is present.

Direction indication arrows (7) indicate which radar unit has detected an object. This gives the operator a general location of the object in relation to the truck. When object(s) are detected by multiple radar units, more than one direction indication arrow may be illuminated. A blue box around a direction indication arrow indicates which camera view is shown on the video display. Additionally the arrows will change color to warn the operator how close the object is to the machine.

Warning Indicators

No Object Detected

When there is no object detected, none of the segments on the left side of the display will be illuminated (refer to scenario (6A) in illustration 119).

Caution Zone 1

When Caution Zone 1 is active, a single yellow segment will illuminate on the left side of the display (refer to scenario (6B) in illustration 119). The audible alarm is not active.

When the machine is stationary, the object detected will be 10 m (33 ft) to 20 m (66 ft) from the front or rear of the machine. The system automatically compensates for the ground speed of the machine.

Note: This level will normally not be seen from the side due to the angles and coverage of the side radar units.

Caution Zone 2

When Caution Zone 2 is active, two yellow segments will illuminate on the left side of the display (refer to scenario (6C) in illustration 119). The audible alarm is not active.

When the machine is stationary, the object detected will be 8 m (26 ft) to 10 m (33 ft) from the front or rear of the machine. The system automatically compensates for the ground speed of the machine.

Note: This level will normally not be seen from the side due to the angles and coverage of the side radar units.

Caution Zone 3 with Variable Audible Alarm

When Caution Zone 3 is active, three yellow segments will illuminate on the left side of the display (refer to scenario (6D) in illustration 119). The audible alarm is active. The closer the object is, the frequency of the alarm will increase.

When the machine is stationary, the object detected will be 6 m (20 ft) to 8 m (26 ft) from the front or rear of the machine. The system automatically compensates for the ground speed of the machine.

Note: This level will normally not be seen from the side due to the angles and coverage of the side radar units.

Critical Zone with Variable Audible Alarm

When the Critical Zone is active, four red segments will illuminate on the left side of the display (refer to scenario (6E) in illustration 119). The audible alarm is active. The closer the object is, the frequency of the alarm will increase.

When the machine is stationary, the object detected will be 4 m (13 ft) to 6 m (20 ft) from the front, rear, or side of the machine. Alternatively the system automatically compensates for the ground speed of the machine.

Stop Zone with Continuous Audible Alarm

When the Stop Zone is active, five red segments will illuminate on the left side of the display (refer to scenario (6F) in illustration 119). The audible alarm is active. The alarm is sound continuously.

When the machine is stationary, the object detected will be 2 m (7 ft) to 4 m (13 ft) from the front, rear, or side of the machine. The system automatically compensates for the ground speed of the machine.

Multiple Camera Views (If Equipped with a Four Camera System)

The object detection system is available with a camera view for each of the four sides of machine as an aid to identifying the object that has been detected. The camera is enabled whenever the system is powered up. The camera views are available in all modes. The camera views can be toggled by using the arrow button.

After a detected object is clear, the camera view will remain in the same camera view until an object is detected in a different zone. The camera view will not automatically return to the camera view shown prior to the object detection.

The display will switch to a camera view based on the location of the detected objects. The rear camera view will only be displayed when the transmission control is in the REVERSE position or when the rear camera view is manually selected. The camera views will have the following priority: 1.) Right side, 2.) Front and 3.) Left side.

The display will select the camera view that is dependent on the following transmission control position and/or the status of the system:

Forward Camera Switching

When the transmission control is placed in a FORWARD position, the display will switch to the front camera view. If there are no objects detected at the time of transition, the display will remain on the front camera view.

Note: The proximity indicator and the direction indication arrows will provide a visual indication of objects that are detected at the rear of the machine. However, the display will not switch to the rear camera view while the transmission control is in a FORWARD position.

Reverse Camera Switching

When the transmission control is placed in the REVERSE position, the display will switch to the rear camera view. The display will remain in the rear camera view regardless of alarms in other zones. While the transmission control is in the REVERSE position and critical zone alarms are active, the proximity indicator and the direction indication arrows will be displayed and the audible alarm will sound. Manually select the appropriate camera view in order to display the display that corresponds with the alarm.

Note: Any camera view may be manually selected at any time, regardless of the position of the transmission control or status of the system.

The system remains in the active state anytime the transmission control is in the REVERSE position.

System Standby State

By default, the display will switch to the rear camera view when the system has gone into the standby state. If the rear camera view is not desired, the display will remember the last camera view that was physically selected during the last standby state and return to that view upon transition to the standby state until the system power has been cycled or a different camera view is selected while in the standby state.

Neutral Camera Switching

When the transmission control is placed in neutral, only manual camera switching is enabled.

System Status and System Fault

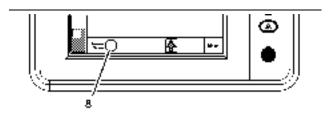


Illustration 120

g02468617

If Equipped

Active – In distance-based mode, the system is in the active state when the machine is stopped or the machine is within the first 20 m (66 ft) of travel from a stop. In speed-based mode, the system is in the active state when the machine is stopped or the machine is traveling in the forward direction at speeds less than 8 km/h (5 mph). The system will become active whenever the machine speed falls below 5 km/h (3 mph) for the configured delay activation time. Also, the system is in the active state anytime the transmission control is in the REVERSE position. While the system is active, the operator will be warned when objects are detected. When the system is active, system status field (8) will display a green indicator.

Standby – In distance-based mode, the system will transition to the standby state after the machine has moved more than 20 m (66 ft) and remains in standby until the machine has been stopped for the configured delay activation time. In speed-based mode, the system will transition to the standby state when the machine speed exceeds 8 km/h (5 mph) and remains in standby until the machine speed falls below 5 km/h (3 mph) for the configured delay activation time. When the system is in standby, system status field (8) will display a yellow indicator.

System Fault – The system is in system fault mode whenever a fault is present on one of the object detection sensors, if communication is lost with the machine controllers or if the battery voltage is out of the specified operating range. When a fault is

Operation Section If Equipped

detected, the system is in a disabled state. When a system fault is present, system status field (8) will flash a red indicator and a brief audible alarm will sound.

Configuration Screen

Note: When in the configuration screen, use the navigation buttons directly to the right of the menu options in order to select the corresponding menu option.

Press the tab button on the display to access the configuration screen. The operator will only be able to view the current system setting the first time that the configuration screen is accessed.

To edit the settings, the operator must first press the "OK" button. After entering the edit mode, the first parameter in the list that can be configured will be highlighted. The parameter must be highlighted in order to allow the parameter to be changed. Press the left arrow or the right arrow on the arrows button to change the highlighted parameter.

Navigation between parameters is accomplished by pressing the top and bottom parts of the arrows button. Any changes that are made to parameters will not become active until the operator has pressed the "OK" button to exit the configuration screen.

The following list of parameters can be configured when the Change View screen is accessed.

Language

The display supports the following list of languages:

- English
- French
- Indonesian
- Portuguese
- Spanish
- · Hindi (certain models only)

Object Detection System Enable Delay

Note: This parameter is only adjustable when Caterpillar Electronic Technician (Cat ET) is connected and communicating with the system.

This parameter configures the delay time that will be used by the object detection system to delay the activation of the object detection system after the machine comes to a stop.

When the machine stops for "X" seconds the system returns to active mode. This delay can be set from 0 to 30 seconds.

Once the operator has changed all the desired settings, pressing the "OK" button will make the view return to the first configuration screen. The operator will not be able to exit the configuration screen until the operator exits the edit mode.

Note: X represents a configurable value.

Object Detection Standby Mode

Note: This parameter is only adjustable when Caterpillar Electronic Technician (Cat ET) is connected and communicating with the system.

The system can be configured to run in one of two different modes:

Distance – In distance based standby, once the machine travels 20 m (65 ft) the system goes into standby mode. When the machine stops for "X" seconds the system returns to active mode. The "X" seconds are set in the "Object Detection System Enable Delay" dialog. This delay can be set from 0 to 30 seconds.

Speed – In speed based standby, once the machine travels above 11 km/h (7 mph) the system enters standby mode. When the machine slows down to below 4.8 km/h (3 mph) the system returns to active mode.

Note: "X" represents a configurable value.

Auto Dimming in Standby Mode

Auto dimming can be either Enabled or Disabled.

If enabled, the auto dimming feature will reduce the screen brightness by one third of the current brightness setting. The auto dimming will occur when the system goes into standby. If the system is in night mode prior to going into standby, the screen will be dimmed to a minimum brightness level.

Diagnostic Summary Screen

The diagnostic summary screen can be accessed by depressing the tab button twice. Press the tab button again to change the view back to the main screen.

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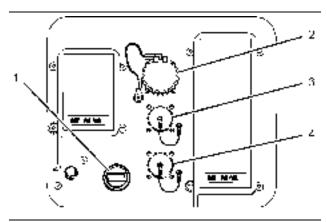
Operation Section Service Ports

For information on the diagnostic summary screen, refer to Operation and Maintenance Manual, SEBU8624, "Cat Detect Object Detection".

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Service Ports

SMCS Code: 0350



g01243936

The service ports are located on the panel behind the companion seat.



Power Receptacle (1) - This port provides 12 V power.



ET Service Port (2) - This service port allows service personnel to connect a laptop computer that is equipped with

the Electronic Technician (ET). This will allow service personnel to diagnose machine systems and the engine.



TPMS or VIMS Service Port (3) – This port allows service personnel to connect a laptop computer with the software for the Vital Information Management

System (VIMS).



Product Link Service Port (4) - This port allows service personnel to connect a laptop computer with the software for the product link system.

i03646132

Direction and Speed Control

SMCS Code: 3100; 7000

NOTICE

To avoid striking overpasses, electrical power lines and obstructions, always lower the body before moving the machine.

NOTICE

The machine must be stopped and engine at low idle before changing directions.

After moving the shift lever, do not accelerate until after hearing or feeling the transmission clutches engage.

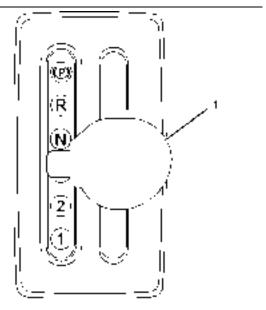


Illustration 122

g01519384

(1) Transmission control

Make sure that the machine is stopped and that the engine is at low idle when you move the transmission control to the PARK position. When the transmission control is in the PARK position, the transmission is in NEUTRAL and the parking brake will engage.

Make sure that the machine is stopped and that the engine is at low idle when you change direction between FORWARD and REVERSE, or between REVERSE and FORWARD.

When you move the transmission control lever from NEUTRAL to any forward speed, first gear is engaged. At low ground speeds, the machine will be in torque converter drive.

When the engine accelerates and the ground speed increases, the transmission automatically upshifts. During higher ground speeds of first gear and of other forward gears, the lockup clutch will be engaged. Then, the machine is in direct drive. When the engine speed slows and the ground speed decreases, the transmission automatically downshifts. During shifts, the machine will be in torque converter drive. Upshifting and downshifting are controlled automatically. The transmission will not shift until the proper ground speed is achieved. You can not force the transmission to shift by moving the transmission control lever.

For more information on the transmission control, refer to Operation and Maintenance Manual, "Operator Controls".

Shift Inhibiting

Use the Electronic Technician (ET) to program the gear limit. See Troubleshooting, Systems Operation, Testing and Adjusting, RENR8342, "Chassis Electronic Control system" for additional information.

Shifting is limited in the following situations: engine overspeed protection, coasting in neutral, management of directional shifts, limiting top gear, reverse neutralizer and limiting body up gear.

Engine Overspeed Protection

This machine is equipped with automatic engine overspeed protection. If the engine speed reaches 2475 rpm, the ARC system will automatically engage, regardless of the position of the ARC switch. In order to prevent further engine overspeed, the transmission will upshift one gear if the engine speed reaches 2750 rpm and the transmission is in the same actual gear as the selected gear on the transmission control.

NOTICE

Do not exceed 2750 rpm or engine damage can result.

Coasting in Neutral

The transmission will not shift into NEUTRAL if the machine speed is above 8 km/h (5 mph).

Management of Directional Shifts

If the transmission is in a forward gear and the transmission control is moved into the REVERSE position, the transmission will remain in forward gear until the machine speed is below 8 km/h (5 mph). Then, the transmission will shift into NEUTRAL. The transmission will not shift from NEUTRAL into REVERSE until the machine speed is below 5 km/h (3 mph).

Limiting Top Gear

The transmission will not shift to a gear above the selected top gear limit. The machine comes from the factory with the highest gear as the top gear limit. Use the Electronic Technician (ET) to change the top gear limit.

Reverse Neutralizer

If the body is raised and the transmission is in REVERSE, the transmission will shift into NEUTRAL. The transmission will not shift into REVERSE until the body is lowered completely and until the transmission control is moved into NEUTRAL. The hoist control must also be in the HOLD or FLOAT position.

Limiting Body Up Gear

The body up gear limit is programmed to first gear at the factory. The machine will not operate above the programmed gear limit until the body is completely down. The gear limit must remain set to first gear on machines with a "CE" mark (plate). The "CE" mark is on machines that are compliant with the requirements of the European Union. For machines without the "CE" mark, the body up gear limit can be changed to second or third gear by using the Electronic Technician (ET) that is available from your local Caterpillar dealer.

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Engine Lockout Control

SMCS Code: 1000; 7000

This machine is equipped with an Engine Lockout Control and a Machine Lockout Control. Do not activate both types of lockout controls at the same time.



Illustration 123

g01520019

The engine lockout control allows the engine to be disabled while service is performed. Use the engine lockout control to prevent accidental activation of the following:

- The engine starter
- The secondary steering
- The prelube function (if equipped)

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Operation Section

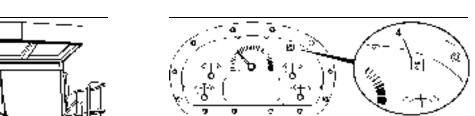


Illustration 125

g01513693

Machine Lockout Control

Indicator light (4) is located inside the cab on the dash panel.

- a. Indicator lights (1) and (4) will illuminate continuously. This will indicate that the machine is in the engine lockout mode.
- b. The indicator lights will flash in order to indicate that the engine lockout mode is not fully active.
 - If the indicator lights are flashing, confirm that the transmission control is in the PARK position and confirm that the engine start switch is in the OFF position. If the indicator lights continue to flash, consult your Cat dealer.
- **5.** Move the engine lockout switch downward in order to deactivate the engine lockout mode.

i04373651

Machine Lockout Control

SMCS Code: 7000

This machine is equipped with an Engine Lockout Control and a Machine Lockout Control. Do not activate both types of lockout controls at the same time.



Illustration 126

g01516030

The machine lockout control allows specific machine systems to be disabled while service is performed during engine operation. The machine lockout mode will allow the engine to be started and the machine lockout mode will allow the engine to run. Use the machine lockout control to prevent accidental activation of the following controls:

- · The transmission control
- The hoist control
- The steering control

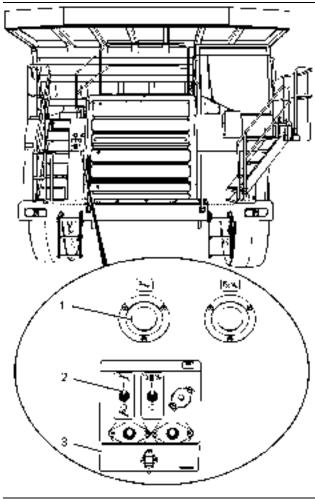


Illustration 124

g01520018

- **1.** Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- 2. Chock the wheels on the machine.
- **3.** Open door (3) in order to access the engine lockout switch.
- **4.** Move switch (2) upward in order to activate the engine lockout mode.

When the switch is activated, one of the following results will occur:

The brake release/secondary steering switch

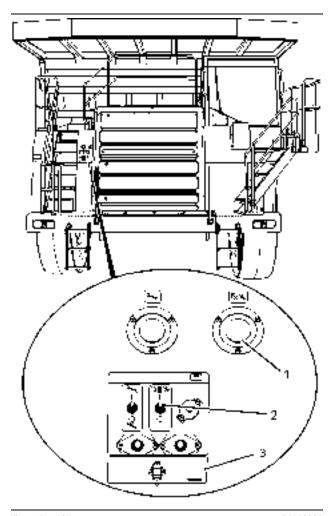
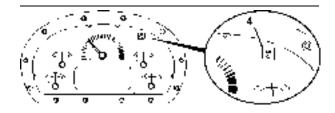


Illustration 127 g01516089

Note: The machine lockout can be activated during engine operation and the machine lockout can be activated before the engine is started. In order to activate the machine lockout before starting the engine, first place the engine start switch in the ON position, and then move the machine lockout switch. For more information on the engine start switch, refer to Operation and Maintenance Manual, "Operator Controls".

- Park the machine on a level surface and make sure that the transmission control is in the PARK position.
- 2. Chock the wheels on the machine.
- **3.** Open door (3) in order to access the machine lockout switch.
- Move switch (2) upward in order to activate the machine lockout mode.

When the switch is activated, one of the following results will occur:



Ilustration 128

g01513693

Indicator light (4) is located inside the cab on the dash panel.

- a. Indicator lights (1) and (4) will illuminate continuously. This will indicate that the machine is in the machine lockout mode.
- b. The indicator lights will flash in order to indicate that the machine lockout mode is not fully active in one or more of the systems.

If the indicator lights are flashing, confirm that the transmission control is in the PARK position. If the indicator lights continue to flash, consult your Cat dealer.

Note: The indicator light on the dash panel will correspond with the status of the machine lockout control and the status of the engine lockout control. The indicator light on the dash panel does not differentiate the status of the machine lockout control from the status of the engine lockout control.

Move the machine lockout switch downward in order to deactivate the machine lockout mode. i02707335

Fast Fill Service Center (If Equipped)

SMCS Code: 7513

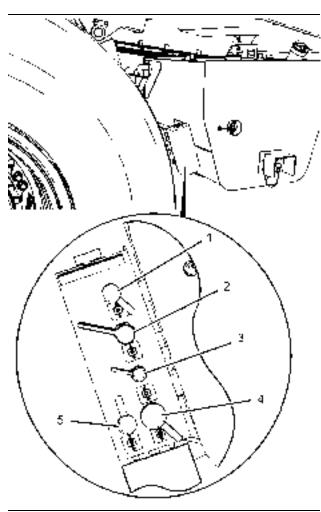


Illustration 129 g01358241



(1) Fast Fill Port for Steering Oil



(2) Fast Fill Port for Engine Oil



(3) Fast Fill Port for Engine Coolant



(4) Fast Fill Port for Transmission Oil



(5) Fast Fill Port for Hoist, Torque Converter, and Brake Oil

The control box for the Fast Fill Service Center is mounted on the right side of the machine at the rear of the fuel tank. The Fast Fill Service Center is designed in order to keep dirt and mud from contaminating your fluid systems. The system minimizes fluid loss during disconnection. The control box contains five fluid fill ports. The operator or the service personnel will connect the couplings to these ports. Each port corresponds to one of five fluids that are serviced by the system. The hoses for the fluids are connected to the back of the control box. The hoses then run to the designated reservoirs.

i03995734

Operation Information

SMCS Code: 7000

Loading

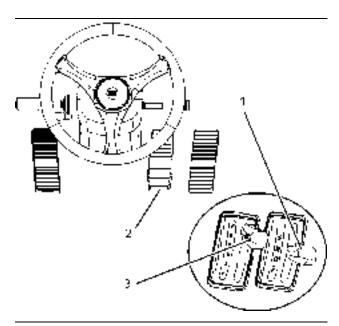


Illustration 130 g01520346

Positioning

Take care when you drive into the loading area. Maintain a safe distance from the machine in front of your machine.

Avoid hitting sharp rocks and overflow.

Park the machine on level ground. See Operation and Maintenance Manual, "Stopping the Machine" for the recommended procedure.

Loading

The operator of the machine should stay in the cab while the truck is being loaded.

Note: Keep hoist control (1) in the FLOAT position during the loading of the machine. Also, keep the hoist control in the FLOAT position when the machine travels.

NOTICE

DO NOT load material on the canopy. Loading material on the canopy can exceed the hoist capacity and can cause machine damage.

- Use service brake pedal (2) to stop the machine.
 See Operation and Maintenance Manual, "Stopping the Machine" for further information.
- **2.** Move transmission control (3) to the PARK position.

Truck Payload Measurement System (If Equipped)

Do not dump the first load into the truck before the truck has stopped and the transmission control is in the PARK position. Loading the truck too soon may affect the accuracy of the payload weight.

Do not put the machine in gear before the last load has been recorded on the display. This may affect the accuracy of the payload weight.

The truck can be repositioned during loading. If the truck moves more than 160 m (525 ft), the Truck Payload Measurement System (TPMS) will believe that the loading cycle is completed. Also, the additional loader passes will not be recorded.

The TPMS measures the load by using the pressures of the suspension cylinders.

The truck may bounce during loading which will delay the display of the payload.

The display will show no weight until the suspension cylinder pressures stabilize and the truck is full enough to get an accurate weight.

Payload Status Lamps

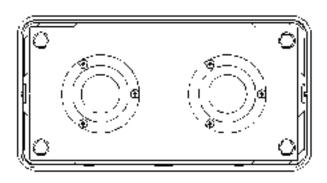


Illustration 131

g01242191

Payload status lamps

- As the truck is being loaded, the green payload status lamps will illuminate. The "LOADING" message and the payload weight will be displayed on the message center inside the cab.
- When the payload measurement system determines that 95 percent of the target weight will be achieved with another pass with the loading equipment, the red lamps will begin to flash. The message center will display "LAST PASS".
- When the payload weight reaches 95 percent or more of the target weight, the red lights will stay on continuously and the message center will display "FULLY LOADED".
- The payload measurement system measures the weight of the load again once the truck has exited the load site. The external red lights go off and the message center will display the "PAYLOAD" message and the final payload weight when the truck has moved more than 160 m (525 ft).
- The payload information automatically disappears from the message center after the load has been measured. The message center then returns to the default mode.

Accurate Payload Information

- Do not load the machine on a surface that has a slope of more than 5%.
- The information may not be accurate if the suspension cylinders are not properly charged.
- Do not allow the operator of the loader to press with the loader bucket on top of the last load.
- Do not move the truck more than 160 m (525 ft) while the truck is being loaded.

- Do not move the hoist control while the truck is being loaded.
- Calibrate the TPMS after components are replaced. Calibrate the TPMS after substantial changes are made to the empty weight of the truck. There is a substantial change in weight when wear plates are added to the body.
- The information will not be accurate if the truck is loaded with a conveyor. If the truck is loaded with a continuous feed system, the information will not be accurate. These systems do not provide an abrupt increase in the pressure of the suspension cylinders. The abrupt increase of the pressure of the suspension cylinders causes the TPMS to begin the loading cycle.
- Do not move away from the loading site before the pressures of the suspension cylinders have stabilized. Do not move away from the loading site before the message center displays the final weight.
- · Do not ignore fault codes.

Hauling

Pay attention to your surroundings. Keep a safe distance from any machines in front of your machine.

Do not drive over unprotected power cables. Do not drive under low height power cables.

Know the maximum height of the machine. Know the maximum width of the machine. Maintain proper clearances.

Always travel with the hoist control in the FLOAT position. Shift to the top speed that is anticipated. All further shifts will be automatic.

During normal operation, use the service brake for all normal braking.

Roads can be slick from ice or snow. Also, roads can be slick from being wet. Reduce the speed of the machine in order to compensate for poor ground conditions.

Traveling Down a Grade

Before you approach a downgrade that is long or steep, ensure that the parameters for the Automatic Retarder Control (ARC) are set properly. Refer to Operation and Maintenance Manual, "Monitoring System". Select the desired gear before you start the downgrade. The actual gear of the transmission should also match the selected gear before you start the downgrade.

Determine the proper gear for the conditions, the load, and the downgrade. Refer to Operation and Maintenance Manual, "Retarding". If you do not know the proper gear, use the common practice of selecting a gear that is required to go up the grade when the machine is loaded.

Preventing Overspeed

If the machine builds up excessive speed, use the service brake in order to reduce vehicle speed. This adds more brake force when the front brake control is in the ON position.

NOTICE

Do not shift into the NEUTRAL position and do not freewheel down a grade.

If the brake oil temperature gauge enters the red range, reduce the travel speed or stop the machine until the oil cools. This will prevent damage to the brake components.

This machine is equipped with automatic engine overspeed protection. If the engine speed reaches 2475 rpm, the ARC system will automatically engage, regardless of the position of the ARC switch. In order to prevent further engine overspeed, the lockup clutch will be disengaged and the transmission will upshift one gear if the engine speed reaches 2750 rpm and the transmission is in the same actual gear as the selected gear on the transmission control.

NOTICE

Do not exceed 2750 rpm or engine damage can result.

Dumping and Spreading

Positioning

A WARNING

Personal injury or death can occur when backing the machine over soft edges. Use care when backing into the dump area. Stay clear of soft edges that could collapse under the machine.

If the load is frozen in the machine bed and dumping is attempted on a slope, the machine can tip over causing personal injury or death.

Inspect the dump area before you bring in a loaded truck.

Take care when you drive into the dump area. Maintain a safe distance from other machines.

Avoid hitting sharp rocks.

Be sure that no personnel are near the dump area.

Be sure that the area is free of power lines or overhead obstructions.

Only raise the dump body when the machine is on level ground.

Dumping

NOTICE

DO NOT use the momentum of the moving truck to assist in dumping an improperly loaded truck. This can result in major structural damage to the truck. This could also result in damage to the hydraulic system.

Make sure that the machine is at the location to dump and move the transmission control to the PARK position.

Note: If the transmission control in not in the PARK position, the machine may roll.

Move the hoist control to the RAISE position and increase the engine speed. As the hoist cylinders approach full extension, reduce engine speed. Leave the hoist control in the RAISE position until the body is completely raised.

If necessary, move the transmission control to the 1 position and slowly drive the machine forward until the machine is clear of the load.

Completely lower the body before you pull out for the return trip.

Spreading

Only travel with the dump body raised during the spreading of material.

Only spread material in a forward direction of travel.

Do not exceed 10 km/h (6 mph) with a raised dump body during the spreading of material.

Lowering

Move the hoist control to the FLOAT position in order to lower the body. Leave the hoist control in the FLOAT position until the body is completely lowered.

Note: This machine is equipped with an automatic SNUB feature that activates just before the body is completely lowered. This reduces the FLOAT speed in order to prevent the body from contacting the frame too hard. Leave the hoist control in the FLOAT position until the body is completely lowered in order to allow the SNUB feature to soften the impact of the body.

Reverse Neutralizer

The machine will not shift into the REVERSE position while the body (bed) is being raised or the hoist control is in the RAISE position or in the LOWER position.

When the transmission control is in the REVERSE position and the hoist control is moved to the RAISE position or to the LOWER position, the transmission will promptly shift into the NEUTRAL position. If the machine is on a slope, apply the brakes in order to prevent the machine from moving. If the reverse neutralizer must be bypassed, see "Shifting into REVERSE with the Body Raised, and REVERSE" for the procedure.

The reverse neutralizer has no effect on the forward gears. If the situation is required, the forward gears can be engaged from the NEUTRAL position or the REVERSE position.

Shifting into REVERSE with the Body Raised

When the body (bed) is raised, perform the following steps in order to return the transmission control to the REVERSE position:

- 1. Move the hoist control to the HOLD position.
- Move the transmission control to the NEUTRAL position.
- 3. Pause for 3 seconds.
- **4.** Move the transmission control to the REVERSE position.

Engine Starting

i04380347

Engine Starting

SMCS Code: 1000; 7000

A WARNING

Diesel engine exhaust contains products of combustion which may cause personal injury.

Always start and operate the engine in a well ventilated area, and, if in an enclosed area, vent the exhaust to the outside.

The machine will not start unless the following conditions exist:

- The transmission control is in the PARK position.
- The engine speed is 0 rpm.

A WARNING

Do not allow a companion to ride on the machine unless the companion is seated within the Rollover Protective Structure (ROPS) or Falling Object Protection Structure (FOPS) with the seat belt fastened. The companion must have the seat belt fastened while the machine is in operation. The operator of the machine is responsible for the safety of the companion. Personal injury or death may occur if the companion is not restrained and protected.

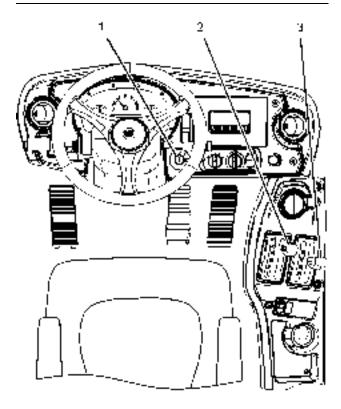


Illustration 132 g01520386

1. Move transmission control (2) to the PARK position.

- 2. The dump body should be down and hoist control (3) should be in FLOAT position.
- 3. Make sure that no one is on the machine, underneath the machine or around the machine. Make sure that there are no personnel in the area.
- **4.** Sound the horn and allow adequate time for bystanders to clear the area. Follow local practices for your machine application.
- 5. Turn engine start switch (1) to the ON position. The engine prelubrication system (if equipped) will activate for 3 seconds. The monitoring system will perform a self test. Refer to the "Functional Test" topic in Operation and Maintenance Manual, "Monitoring System".
- **6.** Turn the engine start switch to the START position in order to start the engine.

Note: If the key is turned to the START position before 3 seconds, the prelubrication system (if equipped) will terminate.

Note: For starting below -18 °C (0 °F), use of additional cold weather starting aids is recommended. A coolant heater, a fuel heater, or an extra battery capacity may be required. At temperatures below -23 °C (-10 °F), consult your Caterpillar dealer or refer to the Special Publication, SEBU5898, "Cold Weather Recommendations".

Engine Starting with Ether Starting Aid (If Equipped)

When the starting motor is engaged and the temperatures of the engine coolant and of the oil are below 10 °C (50 °F), the ether will be automatically injected into the engine. You can use Electronic Technician (ET) to turn off the automatic injections.

The Electronic Control Module (ECM) for the engine determines the need for the ether injection system. Four parameters determine the amount of ether that is injected and the duration of the injection.

- Size of the engine
- Engine coolant temperature
- Engine RPM
- Position of engine start switch

Engine Block Heater (If Equipped)

A WARNING

To avoid shocks or other injuries, never use an ungrounded or inadequate extension cord. Use a three-wire extension cord with a three-wire plug which is rated for at least a 15 amp load and is protected by a suitable fuse or circuit breaker.

Always inspect the heater electrical cord for worn or frayed insulation before plugging into current.

The engine block heater for this machine is available as either a 120V electrical unit or a 240V electrical unit.

An engine block heater warms the engine coolant in order to aid starting. The power cable for the engine block heater is available from your Caterpillar dealer.

The power cable connects to the engine block heater at the power receptacle. The power receptacle is located on the right side of the engine. First connect the one end of the power cable to the engine block heater. Next, connect the other end of the power cable to a power outlet with the appropriate voltage. Before starting the machine or moving the machine, disconnect the end of the power cable from the power outlet. Then, disconnect the other end of the power cable from the engine block heater.

Engine Cold Mode

The engine ECM will set the cold start strategy when the coolant temperature is below 20 °C (68 °F).

When the cold start strategy is activated, low idle rpm will be increased and engine power will be limited.

Cold mode operation adjusts the fuel injection timing and the injection duration for white smoke cleanup. The engine will usually exit the cold mode operation before the walk-around inspection is completed. During cold mode operation, the engine will remain at the elevated rpm that has been specified for the engine.

After the cold mode is completed, the engine should be operated at low rpm until normal operating temperature is reached.

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Engine and Machine Warm-Up

SMCS Code: 1000; 7000

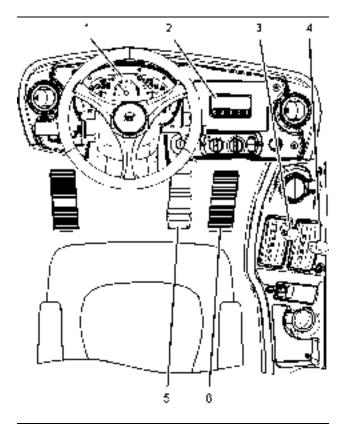


Illustration 133 g01519433

 Before operating the machine, check monitoring system (2). Take action on any events that are displayed.

Note: In order to provide maximum sound suppression, keep all doors closed and keep all windows closed.

- 2. Check the oil levels of the following systems and/or compartments: engine, transmission/torque converter, hoist/brake tank, rear axle and steering tank. Refer to the Maintenance Section for information on checking the oil levels.
- **3.** Check the horn. Check the backup alarm. Check any other warning devices on the machine.

- 4. Check the operation of the steering and the brakes. Check the secondary brakes and check the secondary steering. Do not operate the machine if any discrepancies are found. Refer to Operation and Maintenance Manual, "Braking System - Test". Also refer to Operation and Maintenance Manual, "Secondary Steering - Test".
- **5.** Frequently observe all messages, indicators, and gauges (1). All gauges should be at normal operating range. The system indicators, the action light, and the action alarm should be off.
- 6. Adjust the operator's seat. Adjust the mirrors.

♠ WARNING

Do not allow a companion to ride on the machine unless the companion is seated within the Rollover Protective Structure (ROPS) or Falling Object Protection Structure (FOPS) with the seat belt fastened. The companion must have the seat belt fastened while the machine is in operation. The operator of the machine is responsible for the safety of the companion. Personal injury or death may occur if the companion is not restrained and protected.

- 7. Fasten the seat belt.
- **8.** Lower the body. Place hoist control (4) in the FLOAT position.
- 9. Depress service brake control pedal (5).

Note: Allow the engine to run for 45 seconds before depressing the service brake pedal or moving the transmission control out of PARK. This will allow the brake accumulators to fully charge in order to provide full braking capacity.

10. Move transmission control lever (3) from the PARK position to the desired direction and the desired gear.

Note: Only operate the controls if the engine is running.

11. Release the service brake pedal and depress accelerator pedal (6).

Preparing to Operate the Machine

- In order to prevent injury, make sure that no one is working on the machine or near the machine.
 Keep the machine under control at all times in order to prevent injury.
- **2.** Know the maximum height of the machine. Know the maximum width of the machine. Maintain proper clearance.

- 3. Only operate the machine if the engine is running.
- 4. Before the machine operates at a high speed, check the operation of the brake system and of the steering system. These systems should be checked while the machine maintains a low speed.
- 5. Make sure that the Automatic Retarder Control (ARC) and the manual retarder operate properly before you travel down a grade with a loaded machine. Test the retarder on a short grade before the machine is loaded.
- Reduce engine speed when you are maneuvering in tight quarters or when you are driving over a rise.

Reference: For further operating information, See Operation and Maintenance Manual, "Operation Information".

Elevated Engine Idle

Low Temperature Warm-up

The low temperature warm-up feature will temporarily increase the low idle speed when the engine coolant is below normal operating temperature. Engine temperatures below normal operating temperature can decrease the engine life. This can become excessive in colder climates.

During initial start-up, the low temperature warm-up feature will accelerate engine warm-up and white smoke cleanup. The engine idle speed will automatically increase if the engine coolant does not come up to operating temperature within ten minutes after initial start-up. The engine will continue to run at the increased idle speed in order to bring the engine coolant up to operating temperature.

Extended periods of low engine idle can also result in lower coolant temperatures. During extended periods of low engine idle, the engine idle speed will automatically increase if the engine coolant drops below the operating temperature. This will maintain the engine coolant within the optimal operating temperature range.

The following conditions must be met in order for the low temperature warm-up feature to activate:

- The parking brake must be engaged.
- The transmission (actual gear) must be in NEUTRAL.
- The throttle position must be less than 25 percent.
- The coolant is below operating temperature.

Low Voltage

A low voltage condition will temporarily elevate the low idle speed in order to increase the output of the alternator.

The following conditions must be met in order for the low voltage condition to elevate the engine idle:

- The parking brake must be engaged.
- The transmission (actual gear) must be in NEUTRAL.
- The throttle position must be less than 25 percent.
- The battery voltage must be less than 24.5 volts for five minutes.

Warm-Up and Break-In of the Differential

Note: Correct oil levels are critical in the rear axle housing. Check the oil level prior to operation. Allow sufficient time for the oil to fill all of the compartments in the final drive housing. Allow sufficient time for the oil to fill all of the compartments in the differential housing.

Warm-Up

When the oil is allowed to warm-up gradually, the bearing components maintain optimum operating positions. High speeds during a cold start-up will cause the temperatures of the rotating components to be very different from the temperatures of the stationary components. High temperature differences within the bearing may result in less durability of the bearing component.

At start-up, operate the machine in fourth gear or in a lower gear until the oil is at 38°C (100°F). Allowing the oil to warm-up gradually permits bearing components to maintain optimum operating positions. High speeds during a cold start-up will cause the temperatures of the rotating components to be very different from the temperatures of the stationary components. High temperature differences within the bearing may result in less durability of the bearing component.

Break-In

Follow the break-in procedure for one cycle when any of the following conditions exist:

- The machine is new.
- The differential is replaced.
- · The differential is rebuilt.

The running surfaces of gears and of bearings are conditioned during break-in. Break-in brings bearing components to optimum operating positions.

- **1.** For 15 to 20 minutes, load the machine with 60% to 75% of the capacity.
- **2.** Limit the top speed to fourth gear for approximately 15 to 20 minutes.

Parking

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Stopping the Machine

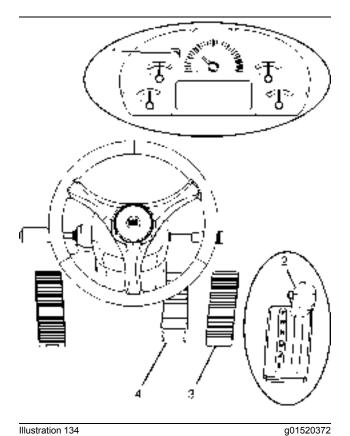
SMCS Code: 7000

A WARNING

Personal injury or death can result from unexpected motion after the machine is stopped.

Always place the transmission control lever in the PARK position in order to engage the parking brake before leaving the machine.

Stop the machine on level ground.



- **1.** Release accelerator pedal (3). Depress service brake control (pedal) (4).
- **2.** Move transmission control (2) to the PARK position. This will engage the parking brake.

Note: When the parking brake is engaged, parking brake indicator (1) will illuminate.

3. If the machine will remain parked, chock the wheels when it is appropriate. Refer to Operation and Maintenance Manual, "Use of Wheel Chocks" for information on the appropriate use of wheel chocks.

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Stopping the Engine

SMCS Code: 1000; 7000

 Park the machine on level ground and make sure that the transmission control is in the PARK position. See Operation and Maintenance Manual, "Stopping the Machine" for the recommended procedure.

NOTICE

Stopping the engine immediately after it has been working under load can result in overheating and accelerated wear of the engine components.

If the engine has been operating at high rpm and/or high loads, run at low idle for at least three minutes to reduce and stabilize internal engine temperature before stopping the engine.

Avoiding hot engine shutdowns will maximize turbocharger shaft and bearing life.

2. In order to allow the engine to cool gradually, operate the engine at low idle for three minutes.

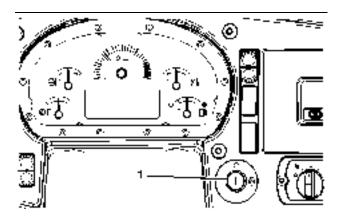


Illustration 135

g01242759

3. Turn engine start switch key (1) to the OFF position in order to stop the engine.

Note: If Engine Idle Shutdown (EIS) is enabled, the engine will shut down after the operator is not operating the machine for a specified time. EIS can be enabled/disabled and EIS delay time can be set through the Advisor/Messenger systems or Cat ET. Engine Idle Shutdown may be required for local regulations. For more information on EIS, refer to Operation and Maintenance Manual, "Operator Controls" "Engine Start Switch".

NOTICE

Never turn the battery disconnect switch key to OFF with the engine running. Electrical system damage could result.

- **4.** Turn the battery disconnect switch to the OFF position. Remove the disconnect key, and secure the lock on the cover plate.
- 5. If the machine will remain parked, chock the wheels when appropriate. Refer to Operation and Maintenance Manual, "Use of Wheel Chocks" for information on the appropriate use of wheel chocks.

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Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

If the engine off/on/start switch fails to stop the engine, perform the following procedure:

1. Make sure that the machine is at a complete stop. Make sure that the transmission control lever is in the PARK position.

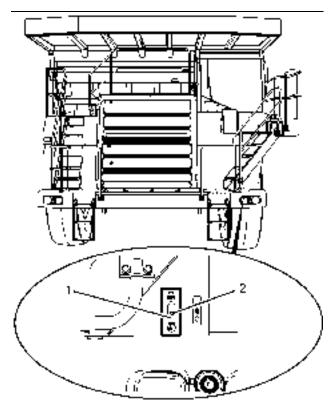


Illustration 136

g01202950

- 2. Raise cover (1).
- **3.** Move engine shutdown switch (2) upward to the STOP position.

Note: Do not operate the machine again until the malfunction has been corrected. When the malfunction has been corrected, place the engine shutdown switch in the RUN position. Lowering the guard will turn the toggle switch to the RUN position.

i02532796

Body Retaining Pin

SMCS Code: 7424

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

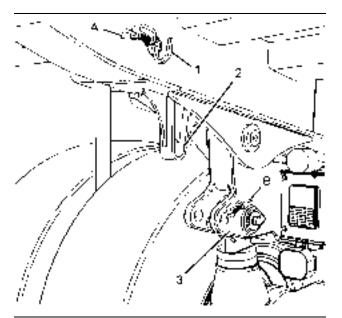


Illustration 137 g01267129

Spring rod (A)

Spring rod (B)

- (1) Body retaining pin
- (2) Body retaining bracket
- (3) Frame support

Installation

1. Raise the dump body to the fully raised position. Stop the engine and make sure that the transmission control is in the PARK position.

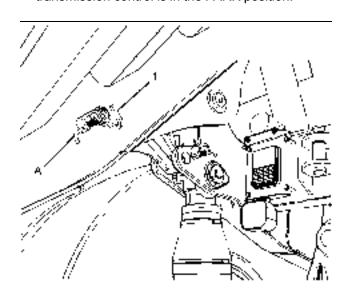


Illustration 138 q01267132

2. Pull spring rod (A) and remove body retaining pin (1) from the stored position on the left side.

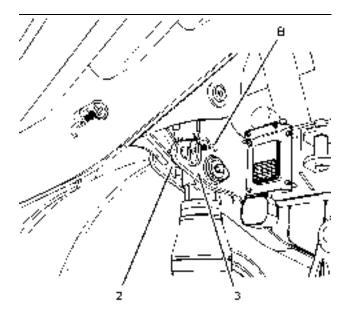


Illustration 139 g01267134

3. Pull spring rod (B) and install body retaining pin (1) through the pin bore in frame support (3) and body retaining bracket (2).

Note: In order to secure the body retaining pin, make sure that the body retaining pin is fully seated before releasing spring rod (B).

4. Perform Step 2 and Step 3 on the right side.

Removal

- Raise the dump body to the fully raised position in order to relieve any pressure from the body retaining pins. Stop the engine and make sure that the transmission control is in the PARK position.
- **2.** Pull spring rod (B) and remove the body retaining pins from the frame support on the left side.
- **3.** Pull spring rod (A) and install the body retaining pin in the stored position.

Note: In order to secure the body retaining pin, make sure that the body retaining pin is fully seated before releasing spring rod (A).

4. Perform Step 2 and Step 3 on the right side.

5. Lower the dump body.

i06026243

i02380923

Leaving the Machine

SMCS Code: 7000

 Use the steps and the handholds when you get off the machine. Make sure that the steps are clear of debris before you dismount.



Illustration 140

g00037860

2. Face the machine and maintain a three-point contact with the steps and with the handholds.

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

- **3.** Inspect the engine compartment for debris. Clean out any debris in order to avoid a fire.
- 4. Turn the battery disconnect switch to the OFF position. Remove the disconnect key, and secure the lock on the cover plate. This will help to prevent a battery short circuit. Removing the key will also help to protect the battery from vandalism and from any possible current draw by components over extended time periods.
- **5.** Install all the covers and install all the vandalism protection locks.

Use of Wheel Chocks

SMCS Code: 7000

A WARNING

Incorrect installation of the wheel chocks may not limit machine movement resulting in serious injury or death. The machine must be parked on a suitable level surface with the park brake engaged. Use wheel chocks in pairs.

The Caterpillar offered wheel chocks, if equipped, are for use on level grade only. If machine is to be chocked on a grade other than level, a field assessment is required to evaluate variables that can affect chock performance. It is the decision of each individual user to determine the best chock and chocking method for their particular application. Work site techniques need to be developed and tested to determine the acceptability of using the wheel chocks in those applications. Alternatively the machine front wheels can be turned into a suitable berm or placed in a parking ditch.

Limiting Factors for Wheel Chocks

Many factors must be considered with the use of wheel chocks. These factors include, but are not limited to, the following:

- Tire pressure
- Tire size
- · Tire type and design
- Gross machine weight
- Grade
- Condition of operating surface
- Load capacity of ground surface under the machine
- · Condition of the wheel chocks
- Ability to position the wheel chocks correctly
- · Environmental conditions

General Guidelines

Improper use of wheel chocks may result in failure.

The following are general guidelines for the use of wheel chocks:

- Select the wheel chocks according to the machine type and size.
- Always use wheel chocks in pairs.
- Always use wheel chocks on firm surfaces.
- Use wheel chocks only after the parking brake is applied and tested.
- Always chock the wheels in the direction of the grade.
- Chock both sides of one wheel if the direction of the grade is undetermined.
- Position the wheel chocks at the center of the tire tread.
- Position the wheel chocks firmly against the tire.
- Position the wheel chocks square against the tire.
- · Do not drive over the wheel chocks.
- Always test the wheel chocks in order to ensure that the site-specific conditions and machine requirements are met.

Various combinations of conditions exist. All conditions must be considered in order to select the most appropriate application for each wheel chock. Thorough testing must be completed at each customer site in order to ensure that the selected wheel chocks will meet all requirements.

Installation of Wheel Chocks (If Equipped) on a Level Surface

Note: Only select wheel chocks that are designed for use with this machine. When using wheel chocks that are not original equipment for this machine, follow the instructions for safe use from the manufacturer of the wheel chocks.

- **1.** Park the machine on a dry, level, solid surface that is free of any debris.
- 2. Inspect the ground conditions around both front wheels in order to ensure that the wheel chock will work in the required position. Consider the limitations, guidelines, and conditions in order to select the best placement of the wheel chocks. If the ground conditions are not suitable the machine will need to be repositioned elsewhere.

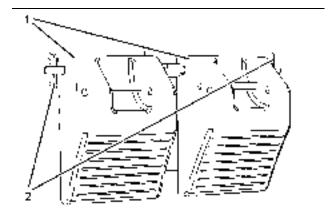


Illustration 141

q02150603

Typical example

- Inspect wheel chocks (1) for signs of damage such as distortion, chips, and cracks. Replace any damaged wheel chocks.
- 4. Remove locking pins (2) from the storage bracket.

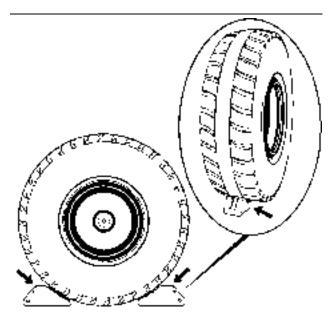


Illustration 142

g01955424

Typical example

5. Remove each wheel chock from the storage bracket and install each wheel chock on the tire, as shown in illustration 142. Place one wheel chock on the front of the tire and install one wheel chock on the back of the tire. Position each wheel chock firmly against the tire and position each wheel chock square against the tire. Position the wheel chocks at the center of the tire tread.

Note: Before handling a wheel chock, review the posted weight of the wheel chock. Use proper lift and carry techniques when each wheel chock is handled. Consider using two persons to lift and maneuver each wheel chock.

Removal of Wheel Chocks

- 1. Ensure that the parking brakes are engaged.
- 2. Inspect each wheel chock in order to ensure that the tires are not pressing against the wheel chock. If a tire is pressing against a wheel chock, the machine must be moved slightly in order to allow removal.
- 3. Remove each wheel chock and inspect each wheel chock for damage. Discard wheel chocks if distortion, cracks, or chips can be seen. Discard wheel chocks if the machine has rolled onto a wheel chock.
- **4.** Place each wheel chock onto the storage bracket and install the locking pins.

Transportation Information

i03646863

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

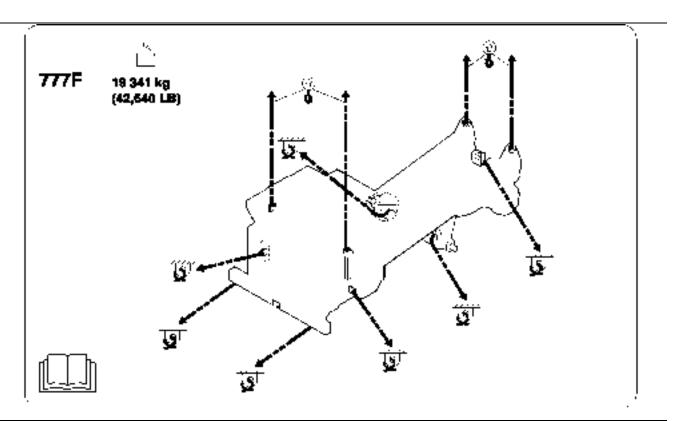


Illustration 143 g01957325

Only use this chart in order to lift and tie down a machine that is disassembled as the original shipment from the factory.

The machine shipping weight of the 777F will depend on the configuration and the options.

A WARNING

A machine may shift if improper procedures or equipment are used for lifting and tying down for transport. Ensure that proper equipment and procedures are used for lifting and tying machines down for transport. If a machine shifts it could cause personal injury or death.

NOTICE

Improper lifting or tie-downs can allow the machine to shift. This can cause damage to the machine.

This machine is not intended to be lifted after assembly. This machine is not intended to be tied down after assembly.

- For instructions on the assembly of this machine, refer to Special Instruction, REHS2594, "777F Off-Highway Truck Assembly Procedure".
- Weight and instructions are listed herein. This information is applicable to units that are manufactured by Caterpillar.
- For lifting objects, use properly rated cables and properly rated slings. Position the crane for a level machine lift.
- Spreader bar widths should be sufficient for preventing contact with the machine.
- Use the two rear holes and two front holes that are provided for tie-downs.

- Place suitable blocking under the machine and in front of the machine in order to stabilize the machine in the tie-down position. Install the tiedowns at the designated locations.
- Check the appropriate laws that govern the weight of the load. Check the appropriate laws that govern the width of the load and the length of the load.
- Consult your Caterpillar dealer for shipping instructions for your machine.

Lift and Tie Down Messages



Lifting Point – This message is located on points that are used to attach lifting devices.



Tie Down Point – This message is located on points that are used to attach tie-downs.

i00704122

Shipping the Machine

SMCS Code: 7000; 7500

Consult your Caterpillar dealer for shipping instructions for your machine.

Investigate the travel route for overpass clearances. Make sure that there is adequate clearance for the machine that is being transported.

In order to prevent the machine from slipping during loading or shifting in transit, remove ice, snow or other slippery material. Remove these materials from the loading dock and the area of the transport.

NOTICE

Obey all state and local laws governing the weight, width and length of a load.

Remove the starting aid (ether) cylinder, if equipped.

Make sure the cooling system has proper antifreeze if moving machine to a colder climate.

Observe all regulations governing wide loads.

- **1.** Block the trailer wheels or rail car wheels before loading.
- 2. Secure the machine with tie-downs when you transport the machine on a rail car or on a tractor-trailer.
- Cover the exhaust opening. If the machine is equipped with a turbocharger, damage can result to the turbocharger. Damage can occur if the turbocharger rotates and the engine is not running.

i03630216

Roading the Machine

SMCS Code: 7000: 7500

Before you road a machine, consult the following:

- Your Caterpillar dealer
- Your tire dealer
- The proper officials for your area

Obtain the required licenses and other similar items.

Obey all the laws that govern the weight and the size of a machine.

Perform a walk-around Inspection.

Measure the fluid levels in each of the compartments. If necessary, bring the fluid levels up to the correct levels.

Inflate the tires to the correct pressure. Consult your tire dealer for operating pressures. Refer to the Operation And Maintenance Manual, "Tire Information" and Operation And Maintenance Manual, "Tire Inflation Information" for information on tires.

Travel at a moderate speed. Observe all speed limitations when you road the machine.

The service brakes can be used for stopping the machine whenever it is necessary. Using the service brakes for controlling travel speed or stopping from high travel speeds can cause the brake oil to overheat. This will cause damage to the power train and excessive wear of the service brakes.

Limitations for TON-kilometer per hour (TON-mile per hour) must be obeyed. Consult your tire dealer for the speed limit of the tires that are used.

When you travel for long distances, schedule stops in order to allow the tires and the components to cool. Stop for 30 minutes after every 40 km (25 miles) or after every hour.

Jacking Location Information

i02649038

Jacking Locations

SMCS Code: 7000

Position the machine on a level surface that is free of overhead obstructions. Engage the parking brake. Shut off the engine.

Note: The body should be empty and lowered before lifting the machine.

Note: Any tooling that is used for lifting the machine or for securing the machine in the raised position should only be used on a concrete surface that is capable of supporting the weight of the machine.

Front of the Machine

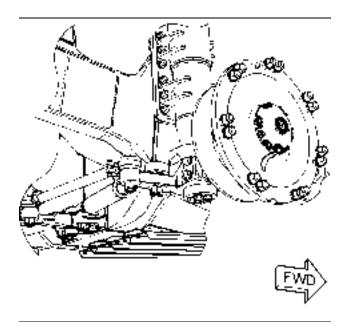


Illustration 144

g01329517

Typical example of right front

In order to lift the front of each side of the machine, use suitable tooling that can be mechanically secured in the raised position (25 ton minimum capacity). Place this tooling under the flat surface on the bottom of the casting which is used to mount the front suspension cylinder. The tooling should be placed near the welded joint between the casting and the front frame crossmember that is under the engine.

In order to secure the front suspension cylinder on each side of the machine, use suitable tooling that can be mechanically secured in the raised position (10 ton minimum capacity). Place this tooling under the front suspension cylinder in order to prevent the extension of the cylinder.

Rear of the Machine

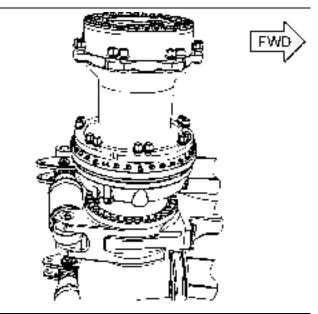


Illustration 145

g01329619

Typical example of right rear (bottom view)

In order to lift the rear of each side of the machine, use suitable tooling that can be mechanically secured in the raised position (25 ton minimum capacity). Place this tooling under a flat surface on the bottom of the differential housing.

Note: Do not attempt to lift the rear of the machine between the two rear suspension cylinders.

Towing Information

i02979103

Towing the Machine

SMCS Code: 7000

A 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.

Note: Empty the body and lower the body before towing a disabled machine. Do not tow a machine with material in the body and do not tow a machine with the body in the raised position. Failure to dump the load will result in damage to the frame and other components.

The towing machine must be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade and for the distance that is involved.

The towing force on the rear or on the front of an Off-Highway Truck must not exceed either of the following structural limits:

- 40 percent of the gross machine weight
- 1110000 N (249540 lb)

Maintain sufficient control and sufficient braking of the disabled machine when the disabled machine is being moved downhill. This may require a larger towing machine or additional machines that are connected to the rear of the machine that is being towed. This will prevent the machine from rolling away out of control.

These towing instructions are for moving a disabled machine for a short distance at low speed. Move the machine at a speed of 2 km/h (1.2 mph) or less to a convenient location for repair. These instructions are only for moving machines.

This machine is equipped with spring-applied parking brakes. These brakes are released with hydraulic pressure. If the engine is inoperable, activate the brake release/secondary steering switch. This will operate the motor for the electric powered parking and secondary brake release pump. Refer to Operation and Maintenance Manual, "Towing With Inoperable Engine" for additional information.

Shields must be provided on both machines. This will protect the operator if either the tow line or the tow bar breaks.

DO NOT allow anyone except the operator to be on the machine that is being towed by a cable.

DO NOT use a chain for pulling a disabled machine. A chain link can break. This may cause possible personal injury. Use a wire cable with ends that have loops or rings. Put an observer in a safe position in order to watch the pulling procedure. The observer must be able to stop the procedure, if necessary. Stop the procedure if the cable starts to break or if the cable starts to unravel. Stop pulling whenever the towing machine moves without moving the towed machine.

Before towing, make sure that the tow line or the tow bar is in good condition. Make sure that the tow line or the tow bar has enough strength for the towing procedure that is involved. The capacity of the tow line or of the tow bar must be at least 150 percent of the gross weight of the disabled machine. Under certain conditions, failure of the tow line or the tow bar will occur if the tow line or the tow bar is less than 150 percent capacity. A machine that is retrieved from the mud or a machine that is being towed up a grade are examples of these conditions.

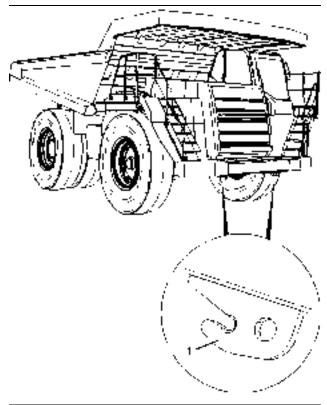


Illustration 146 g0120712

When the machine is towed from the front, use both tow points (1). When the machine is towed from the front, configure the tow bar or the tow line in a Y configuration. Failure to configure the front towing device in a Y configuration will cause damage to the disabled machine.

When the machine is towed from the front, pull in line with the disabled machine. Pulling the disabled machine at an angle will cause one of the legs of the Y configuration to break . Keep the tow line angle to a minimum. DO NOT exceed a 15 degree angle from the straight ahead position. Pulling the disabled machine at an angle will cause the frame or the rear axle housing to bend. Steer the tires of the towed truck in the direction of the pull.

Quick machine movement could overload the tow line or the tow bar. This could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.

Note: Do not apply more lifting force to the front of the machine than the lifting force that would be required to raise an empty machine with a hydraulic jack.

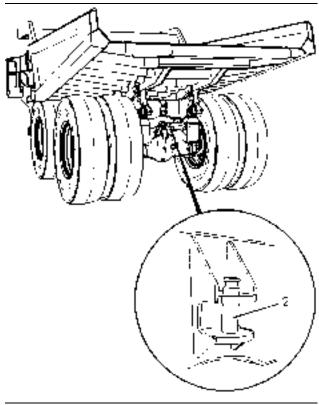


Illustration 147 g01207206

Whenever it is possible, tow the machine from the front. Certain conditions may require the machine to be towed from the rear. Tow the machine from the rear in order to reposition the machine and enable the machine to be safely towed from the front. When the machine is towed from the rear, only attach the tow line to rear tow point pin (2). Only tow a machine from the rear, if all of the following additional conditions are true:

- The machine will be towed across a smooth, level surface.
- The engine of the towed machine is operable.
- The steering system of the towed machine is operable.
- The braking system of the towed machine is operable.
- The machine will be towed slowly for a short distance.
- The body of the towed machine is empty and lowered.
- The towed machine has an operator in control of the steering and braking.

Consult your Caterpillar dealer for additional details about towing a disabled machine.

i07511585

Dumping with Engine Stopped

SMCS Code: 1000; 7000

If the engine is inoperable, use an Auxiliary Power Unit (APU) as a separate hydraulic source. An APU that is designed to use with this machine is available through your Cat dealer. Consult your Cat dealer for further information on the selection and the proper operation of an APU.

i03646483

Lowering the Body with Engine Stopped

SMCS Code: 7000

Lowering with Electrical Power

A WARNING

Extended operation of the secondary steering motor could damage the motor and result in loss of emergency steering capability, which could cause injury or death. The Secondary Steering System should not be used for towing the machine or for other service procedures lasting longer than 5 minutes. The motor should be allowed to cool to ambient temperatures before reuse.

When the engine is stopped, the hoist must be supplied with pilot oil pressure in order to lower the body. The brake release and secondary steering pump can be used in order to provide pilot oil to the hoist.

Refer to Operation and Maintenance Manual, "Operator Controls" for the location of the controls that are used to lower the body with the engine stopped.

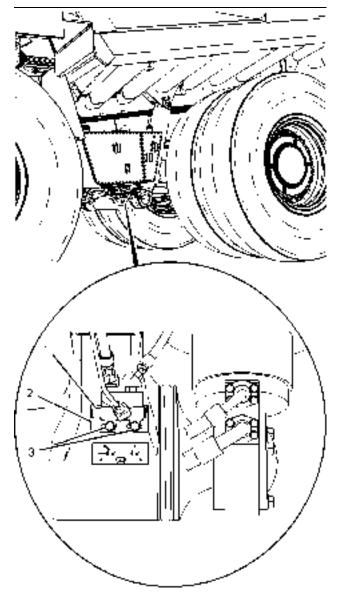


Illustration 148 g01280540

- The diverter valve must be shifted in order to supply brake oil to the parking brake release valve.
 - Loosen clamp bolts (3) on the diverter valve. Slide plate (2) and spool (1) to the left. After the spool is shifted, tighten the clamp bolts.
- **2.** Turn the engine start switch to the ON position.
- Move the hoist lever to the RAISE position for 15 seconds. Then, move the hoist lever to the FLOAT position.

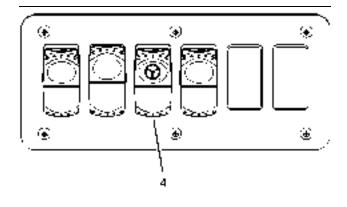


Illustration 149 g01419529

4. Depress the switch (4) for the brake release and the secondary steering pump in order to begin lowering the body. Hold the switch until the body is completely lowered.

Lowering without Electrical Power

If the engine is inoperable and the machine is without electrical power, use an auxiliary power unit (APU) as a separate hydraulic source. An APU that is designed to use with this machine is available through your Caterpillar dealer. Consult your Caterpillar dealer for further information on the selection and the proper operation of an APU.

i03211371

Towing With Inoperable Engine

SMCS Code: 7000

A 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

Extended operation of the secondary steering motor could damage the motor and result in loss of emergency steering capability, which could cause injury or death. The Secondary Steering System should not be used for towing the machine or for other service procedures lasting longer than 5 minutes. The motor should be allowed to cool to ambient temperatures before reuse.

The parking brakes are spring-applied. The parking brakes are released by brake oil pressure.

Under normal conditions, the parking brakes are released by brake oil pressure that is stored in the secondary brake accumulator. The brake oil pressure in both brake accumulators is developed when the engine is running. Without adequate brake oil pressure in the secondary brake accumulator, the parking brakes are engaged and the machine cannot be moved.

When the engine is inoperable and the brake oil pressure from the service brake accumulator is depleted, the service brakes will not function and the secondary brake pedal will only apply braking force to the rear wheels.

Note: When the engine start switch is moved to the OFF position, solenoid valves will fully deplete the brake oil pressure from both brake accumulators.

Note: If the engine start switch remains in the ON position, and the transmission control is in the PARK position, a solenoid valve will only deplete the brake oil pressure from the secondary brake accumulator.

When the engine is inoperable and the brake oil pressure from the secondary brake accumulator is depleted, the parking brakes can be released by brake oil pressure that is developed by the brake release/secondary steering pump and then routed through the diverter valve.

When the parking brake is released by brake oil pressure through the diverter valve, only the secondary brake pedal can be used to stop the machine.

For more information on the braking system, refer to Operation and Maintenance Manual, "Braking".

In order to tow the machine with an inoperable engine, perform the following steps:

- Place the transmission control in the PARK
 position and place the engine start switch in the
 ON position. Refer to Operation and Maintenance
 Manual, "Operator Controls" for more information.
- 2. Chock the wheels.

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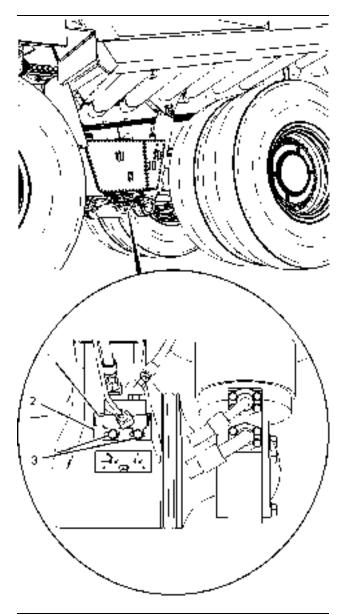


Illustration 150 g01280540

3. The diverter valve must be shifted in order to supply brake oil to the parking brake release valve.

Loosen clamp bolts (3) on the diverter valve. Slide plate (2) and spool (1) to the left. After the spool is shifted, tighten the clamp bolts.

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.

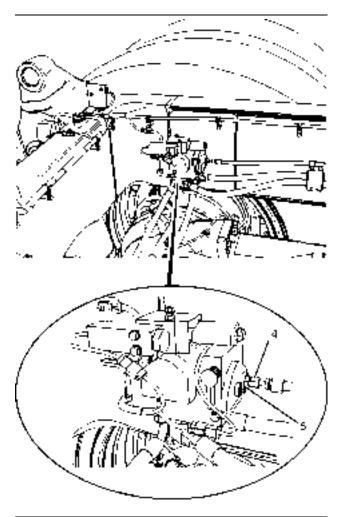


Illustration 151

g01389500

View of the inside left frame rail at the rear of the machine

The truck body is removed for ease of viewing.

4. If the machine is equipped with the Traction Control System (TCS), the pilot supply line from the traction control valve must be capped. This will minimize the bleeding down of the parking brake release oil pressure.

Remove pilot supply line (4) from fitting (5). Install 6V-9829 Cap As on the fitting and install 6V-9508 Plug in the pilot supply line.

5. Use a coupler and a hose to connect a 8T - 0857 Pressure Gauge to one of the following pressure taps:

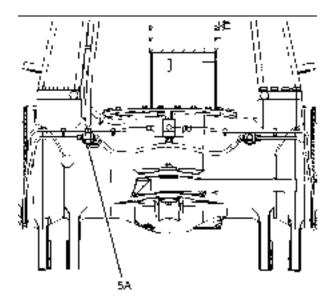


Illustration 152 g01280712

Top view of differential

a. If the machine is not equipped with the Traction Control System (TCS), use pressure tap (6A).

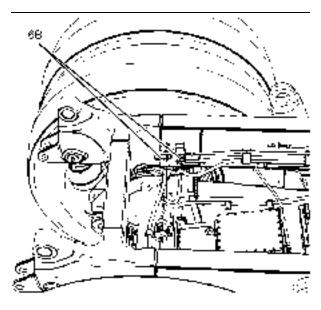


Illustration 153 g01280616

Two pressure taps are located on the TCS valve that is mounted to the left inside rear frame rail.

Note: Either one of the pressure taps is suitable for a pressure gauge connection.

- b. If the machine is equipped with TCS, use pressure tap (6B).
- 6. Hook up the towing machine and tighten the tow line or tow bar. Refer to Operation and Maintenance Manual, "Towing the Machine" for guidelines.
- Move the transmission control to the NEUTRAL position.

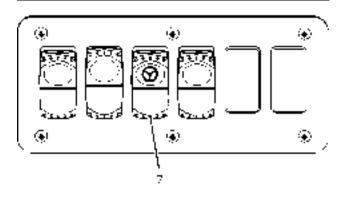


Illustration 154 g01637474

8. Press the brake release/secondary steering switch (7) in order to activate the pump. Hold the switch until the pressure stops rising on the pressure gauge that was installed in Step 5.

Note: An electric pump supplies brake oil pressure in order to disengage the parking brakes. This pump also supplies oil to the secondary steering system.

- **9.** While you depress the brake release/secondary steering switch, rotate the steering wheel to each side in order to check the steering.
- **10.** Apply the secondary brake pedal on the disabled machine in order to check the braking.
- 11. Remove the wheel chocks.
- **12.** Pull the disabled machine with the towing machine.
 - a. Whenever you steer the disabled machine, depress the brake release/secondary steering switch.
 - b. During towing, continue to watch the pressure gauge that was installed in Step 5. As the parking brake release oil pressure decreases, depress the brake release/secondary steering switch. Momentarily hold the brake release/ secondary steering switch in order to provide

adequate brake oil pressure and prevent the engagement of the parking brake. The pressure will decrease after approximately 30 to 45 seconds.

NOTICE

Do not allow oil pressure to drop below 2760 kPa (400 psi) while towing.

Partial brake engagement could occur and can result in brake damage. Brakes must be fully released when towed machine is moving.

i02445705

Towing With Power Train Failure

SMCS Code: 7000

Note: If the engine is inoperable refer to Operation and Maintenance Manual, "Towing With Inoperable Engine".

A 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.

Perform the following procedure on the disabled machine.

- **1.** Make sure that the transmission control is in the PARK position.
- 2. Block the wheels.

NOTICE

When towing the machine, attach tow line to the front tow hooks or rear tow pin only.

Hook up the towing machine. Refer to Operation and Maintenance Manual, "Towing the Machine" for the guidelines.

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.

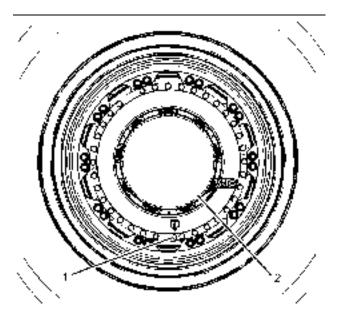


Illustration 155

g01221988

4. Remove drain plug (1) from the final drives. Drain the differential/final drive oil into a suitable container.

Note: When possible, position the final drive drain plugs at the lowest point.

- 5. Remove covers (2) from each rear wheel.
- **6.** Remove the axle shafts. Refer to the Power Train Disassembly and Assembly, "Axle Shaft Remove" for the procedure.
- **7.** Remove any damaged power train components that may rotate when the machine is towed.

Note: When there is failure of the final drive, clean the system before you tow the machine. Debris in the wheel can cause extensive damage to the machine when you tow the machine.

8. Replace the cover for each rear wheel.

- 9. Install the drain plug in each of the final drives.
- 10. Remove the blocks from the wheels.
- **11.** Check the steering by turning the steering wheel to the right and to the left.
- **12.** Check the braking by applying the service brake pedal.
- **13.** Move the transmission control to the NEUTRAL position.
- **14.** Tow the disabled machine while the engine of the disabled machine is running. Pull the disabled machine with the towing machine.

Note: The wheel bearings are not in oil when the final drives are drained. The maximum distance for towing is 30.5 m (100 ft) when the final drives are drained.

- **15.** Make sure that none of the power train components are causing additional damage.
- **16.** After the repairs are completed, install the axle shafts. Refer to the Power Train Disassembly and Assembly, "Axle Shaft Install " for the procedure.
- 17. Fill the differential and final drives. See Operation and Maintenance Manual, "Capacities (Refill)". Before you operate the machine, check the oil level in the final drives. See Operation and Maintenance Manual, "Differential and Final Drive Oil Check".

SEBU7790-12

Engine Starting (Alternate Methods)

02408887

Engine Starting with Auxiliary Start Receptacle

SMCS Code: 1450; 1463

This machine is equipped with a 24 volt starting system. Use only the same voltage for jump starting. Use of a higher voltage can damage the electrical system.

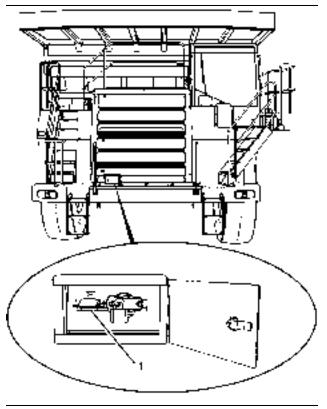


Illustration 156

g01203636

The auxiliary start receptacle (1) is on the front bumper of the machine.

Some Caterpillar products may be equipped with auxiliary start receptacles. All other machines can be equipped with a receptacle from parts service. Then, a permanent receptacle is always available for jump starting.

There are two cable assemblies that can be used to jump the stalled machine. You can jump the machine from another machine that is equipped with this receptacle or an auxiliary power pack. Your Caterpillar dealer can provide the correct cable lengths for your application.

- Determine the cause for the failure of the machine to start. Refer to Special Instruction, REHS0354, "Charging System Troubleshooting" for further information.
- Place the transmission direction and speed control lever in the PARK position on the stalled machine. This will engage the parking brake. Move all controls to the HOLD position.
- **3.** On the stalled machine, turn the start switch key to the OFF position. Turn off all of the accessories.
- **4.** Turn on the battery disconnect switch.
- Move the machine that is used for the electrical source close to the stalled machine. The cables must reach. DO NOT ALLOW THE MACHINES TO CONTACT EACH OTHER.
- 6. Stop the engine on the machine that is used for the electrical source. When you use an auxiliary power source, turn the charging system to the OFF position.
- On the stalled machine, connect the appropriate jump start cable to the auxiliary start receptacle (1).
- **8.** Connect the other end of this cable to the electrical source. You must connect the cable to the auxiliary start receptacle.
- 9. Start the engine on the machine that is used for the electrical source. Also, you can energize the charging system on the auxiliary power source.
- **10.** Allow the electrical source to charge the batteries for two minutes.
- Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, "Engine Starting".
- **12.** Immediately after the stalled engine starts, disconnect the jump start cable from the electrical source.
- **13.** Disconnect the other end of this cable from the stalled machine.
- 14. Conclude with a failure analysis on the starting charging system. Check the stalled machine, as required. Check the machine when the engine is running and the charging system is in operation.

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.

A 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.

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

i05752368

Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 1000; 7000; 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.

NOTICE

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

Engine Oil

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

Cat DEO-ULS or oils that meet the Cat ECF-2 specification and the API CI-4 are required for use in the applications listed below. Cat DEO-ULS or oils that meet the Cat ECF-3 specification and the API CJ-4 are recommended if available.

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

Note: C175 Series diesel engines require the use of **multigrade** SAE 40 oil. For example: SAE 0W-40, SAE 5W-40, SAE 10W-40, or SAE 15W-40. In ambient temperatures of −9.5° C (15° F) or above, SAE 15W-40 is the preferred oil viscosity grade

Table 4

Lubricant Viscosities for Ambient Temperatures							
Compartment or System	Oil Type and Performance		Type and Performance °C		٥	F	
Compartment of System	Requirements	Oil Viscosities	Min	Max	Min	Max	
Cat DEO-ULS Cold Weather		SAE 0W-40	-40	40	-40	104	
Engine Crankcase	Cat DEO-ULS SYN Cat DEO SYN	SAE 5W-40	-30	50	-22	122	
	Cat DEO-ULS Cat DEO	SAE 10W-30	-18	40	0	104	
	Cat DEO-ULS Cat DEO	SAE 15W-40	-9.5	50	15	122	

When fuels of sulfur level of 0.1 percent (1000 ppm) or higher are used, Cat DEO-ULS may be used if S·O·S oil analysis program is followed. Base the oil change interval on the oil analysis.

Off Highway Trucks

Cat FDAO SYN, Cat FDAO SAE 60 or commercial oil that meets Cat FD-1 SAE 60 is preferred in most Differential, Front Wheels, and Final Drives, particularly continuous operation.

Cat TDTO or a commercial TO-4 oil may be used as a third choice in place of the recommended Cat FDAO, Cat FDAO SYN or commercial FD-1 oil in the Differential, Front Wheels, and Final Drives.

If the ambient temperature is below -10° C (14°F), warm up the oil prior to operation. The oil must be maintained to a temperature above -10° C (14°F) during operation. If the ambient temperature is below -10° C (14°F), prior to operation, perform the differential warm-up procedure. Refer to Operation and Maintenance Manual, "Differential Warm-up and Break-in".

If the ambient temperature is below -25° C (-13° F) (below -35° C (-31° F) for Cat FDAO SYN), consult your Cat dealer for instructions. Failure to warm up the oil prior to operation will damage the machine.

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold Weather TDTO is recommended.

Table 5

Lubricant Viscosities for Ambient Temperatures							
Compartment or System	Oil Type and Performance	Oil Type and Performance Oil Viscosities					
Compartment of System	Requirements	Oil viscosities	Min	Max	Min	Max	
	Cat TDTO	SAE 0W-20	-40	10	-40	50	
Powershift Transmission	Cat TDTO-TMS Cat Cold Weather TDTO	SAE 10W	-20	10	-4	50	
	Cat TO-4	SAE 30	0	50	32	122	

(Table 5, contd)

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance	Oil Viscosities	°C		°F	
Compartment of System	Requirements	On viscosities	Min	Max	Min	Max
		Cat TDTO-TMS	-10	50	14	122
	SAE 0W-20	-40	40	-40	104	
	Cat HYDO Advanced 10	SAE 0W-40	-40	40	-40	104
	Cat HYDO Advanced 30 Cat BIO HYDO Advanced	SAE 0W-30	-40	40	-40	104
	Cat MTO	SAE 5W-30	-30	40	-22	104
Cat DEO Cat DEO-ULS	SAE 5W-40	-30	40	-22	104	
Staaring System	Cat TDTO	SAE 10W	-20	40	-4	104
Cat ECF-1-a, Cat ECF-2, Cat EC		SAE 30	10	50	50	122
	Cat DEO SYN Cat Cold Weather DEO-ULS	BIO HYDO Advanced	-20	40	-4	104
		SAE 10W-30	-20	40	-4	104
	Cat ECF-1-a, Cat ECF-2, Cat ECF-3, Cat BF-2	SAE 15W-40	-15	50	5	122
	Cat TO-4, Cat TO-4M	Cat MTO	-20	40	-4	104
		Cat TDTO-TMS	-15	50	5	122
Hoist, Brake, and Torque Converter	Cat TDTO	SAE 0W-20	-40	40	-40	104
System	Cat Cold Weather TDTO Cat TO-4	SAE 10W	-20	50	-4	122
	0.45040	SAE 50	-10	32	14	90
Differential, Front Wheels, and Final Drives	Cat FDAO Cat FDAO SYN	SAE 60	-10	50	14	122
Drives	Cat FD-1	Cat FDAO SYN	-10	50	14	122
Electric Lubrication (Auto Lube) Pump	API CH-4	SAE 10W-30	-40	50	-40	122

Grease Recommendations

Table 6

	Type of	Cat Greas	se for Of	f Highw	ay Truc	ks		
	Typical		Ambient Temperature Range			Range		
Application Point	Load and Speed	Load Factor	°C		°F		NLGI Grade	Grease Type
	Эреец		Min	Max	Min	Max		
	High	40-50%	-35	40	-31	104	1	Liltra EMaly Crassa
Belt Tightener, Drive Shaft Slip Spline, Fan Drive Pulley, Hoist Control Bell-	High	load factor.	-30	50	-22	122	2	Ultra 5Moly Grease
crank, Hoist Cylinder Bearing, Front and Rear Axle A-Frame Bearing, Steering Cylinder End, Steering Linkage, Steering	Medium	30-40% load factor.	-20	40	-4	104	2	Advanced 3Moly Grease
Tie Rod and Pin Bearings, Swaybar, Tachometer Drive ⁽¹⁾	Low	20-30% load factor.	-30	40	-22	104	2	Multipurpose Grease
Fan Drive Bearings			-20	40	-4	104	2	High Speed Ball Bearing Grease

⁽¹⁾ Typical Examples

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.

Table 7

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I	Recommended Grease for the A	Autolube System		
Compartment or System	GreaseType	NLGI Grade	°C	°F
Compartment of System	Greaserype	NLGI Grade	Min	Min
Cat Autolube System	Cat 3Moly Grease	NLGI Grade 2	-18	0
	Cat Ultra 5Moly ⁽¹⁾	NLGI Grade 2	-7	20
		NLGI Grade 1	-18	0
		NLGI Grade 0	-29	-20
	Cat Arctic Platinum	NLGI Grade 0	-43	-45
	Cat Desert Gold	NLGI Grade 2	2	35

⁽¹⁾ Preferred grease for most Off-highway Truck applications.

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.

Diesel Fuel Recommendations

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.

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

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

- Reduce engine efficiency and durability
- Increase the wear
- · Increase the corrosion
- Increase the deposits
- · Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals)
- Increase overall operating costs

· Negatively impact engine emissions

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

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

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

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.

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.

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

Coolant Information

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.

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

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Capacities (Refill)

SMCS Code: 7560

Due to fluid retention in the systems and/or compartments, refill capacities will be less than factory fill capacities. 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.

The following table states factory fill capacities:

Table 8

Compartment or System	Liters	US Gallons	Imperial Gallon
Engine Oil with Filter	117	31	25.7
Transmission System	91	24	20
Hoist, Torque Converter, and Brake Hydraulic Tank (Proper Cold Level)	219	58	48
Hoist, Torque Converter, and Brake Hydraulic Sys- tem (Including Tank)	534	141	117
Steering Hydraulic System	57	15	12.5
Each Front Wheel	7.5	2	1.6
Differential ⁽¹⁾	222	59	48.8
Each Final Drive(1)	42	11	9.2
Cooling System	232	61	51
Fuel Tank (standard)	1136	300	250
Fuel Tank (option)	1325	350	290
Each Front Strut	29	8	6.4
Each Rear Strut	16.5	4	3.6
Window Washer	9.5	2.5	2.1
ORS Tank ⁽²⁾	116	31	25.5

- (1) The differential and final drives share common oil.
- (2) The ORS tank is part of the Oil Renewal System (if equipped).

Table 9

Compartment or System	Milliliters	Ounce	Imperial Ounce
Electric Lubrication (Auto Lube) Pump	444	15	16

Refer to the Operation and Maintenance Manual, "Lubricant Viscosities" for information regarding the correct lubricant.

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S-O-S Information

SMCS Code: 1000; 7000; 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 $S \cdot O \cdot S$ 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; 5612-553-PX; 5615-553-PX; 6700-553-PX; 7540-553-PX

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, move the engine start switch to the OFF position. Allow the cooling system pressure cap to cool. The cap must be cool enough to touch with a bare hand. Remove the cooling system pressure cap slowly to relieve pressure.

Fuel System

To relieve the pressure from the fuel system, move the engine start switch to the OFF position.

High Pressure Fuel Lines

A WARNING

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

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

The fuel lines are different from fuel lines on other fuel systems because of the following differences:

- The high-pressure fuel lines are constantly charged with high pressure.
- The internal pressures of the high-pressure fuel lines are higher than other types of fuel system.

Before any service or repair is performed on the engine fuel lines, perform the following tasks:

- 1. Move the engine start switch to the OFF position.
- Wait for 10 minutes.

Note: Fuel pressure can be monitored by Caterpillar Electronic Technician (ET).

Do not loosen the high-pressure fuel lines in order to purge trapped air from the fuel system.

Hydraulic System

A WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered, oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

Hoist

To relieve the pressure from the hoist circuit, lower completely the truck body and move the hoist control to the FLOAT position. Then move the engine start switch to the OFF position.

Steering

To relieve the pressure from the steering system, move the engine start switch to the OFF position and rotate the steering wheel several times in both directions.

Brake

To relieve the pressure from the brake circuit, move the engine start switch to the OFF position. This will activate a solenoid valve in order to release the hydraulic brake pressure from the brake accumulators. 136 SEBU7790-12

Brake Accumulators

i07746333

A 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.

Relieving the pressure in the brake circuit will not release the nitrogen precharge pressure in the brake accumulators.

Engine Oil System

To relieve the pressure from the engine oil system, move the engine start switch to the OFF position.

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Match Tire Size (Dual Tire Configuration)

SMCS Code: 4203

The tires in a dual tire configuration should be the same brand, the same type, and the same construction. The tires should also be the same size. This includes tires of the same size with even wear. Match the tire size in dual tire configurations for increased service life of the lower power train.

The following conditions may result from tire sizes that are not closely matched: unequal loading of the tire, unequal tire wear, elevated stresses on the wheel bearings and elevated stresses on the structures for the lower power train.

For the correct methods of checking the variation in tire size, refer to Service Magazine, SEPD0766, 10 January 2005, "Match Tire Size in Dual Tire Configurations for Increased Service Life".

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

NOTICE

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

- 3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure to reduce the possibility of damage to the following components:
 - Bearings of the drive train
 - · Hydraulic components
 - Electrical components
 - Other components of the machine
- 4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.
- **5.** Use standard welding procedures to weld the materials together.

"Ether Starting Aid Cylinder - Replace" 179

Maintenance Interval Schedule	"Fuel System - Fill"				
SMCS Code: 1000; 7000	" Fuel System - Prime"				
Ensure that all safety information, warnings, and	" Fuses - Replace"				
instructions are read and understood before any operation or any maintenance procedures are performed.	" High Intensity Discharge Lamp (HID) - Replace"				
The user is responsible for the performance of	" Oil Filter - Inspect"				
maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of	"Rear Axle Housing End Play - Adjust" 211				
components due to normal wear and aging are included. Failure to adhere to proper maintenance	" Rim - Inspect"				
intervals and procedures may result in diminished performance of the product and/or accelerated wear	"Screen (Torque Converter Sump) - Clean" 215				
of components. Use mileage, fuel consumption, service hours, or	" Screen (Torque Converter, Hoist, and Brake Oil Cooler) - Clean"				
calendar time, WHICH EVER OCCURS FIRST, to determine the maintenance intervals. Products that operate in severe operating conditions may require	"Suction Screen (Hoist, Torque Converter, and Brake Tank) - Inspect/Clean/Replace"225				
more frequent maintenance. Refer to the maintenance procedure for any other exceptions that	"Suction Screen (Transmission Tank) - Clean" 227				
may change the maintenance intervals.	"Traction Control System (TCS) - Test" 23				
Note: The aftertreatment system can be expected to function properly for the useful life of the engine	" Window Washer Bottle - Fill"				
(emissions durability period), as defined by	" Window Wiper - Inspect/Replace" 235				
regulation. All prescribed maintenance requirements must be followed.	" Windows - Clean"				
Note: Before each consecutive interval is performed, all maintenance from the previous interval must be	Daily				
performed.	"Suspension Cylinder - Check" 229				
Use the service hour meter for the machine or machine system to determine when maintenance should be performed.	Initial 8 Service Hours				
·	"Oil Filter (Parking Brake Release) - Replace" 203				
When Required	" Oil Filter (Steering Pump Case Drain) - Replace"				
" Air Conditioner Filter - Clean"	" Oil Filter (Steering) - Replace"				
"Automatic Lubrication Reservoir - Fill" 141	"Oil Filter (Torque Converter) - Replace" 206				
"Battery - Recycle"	"Oil Filter (Torque Converter) - Replace" 207				
"Battery or Battery Cable - Inspect/Replace" 142	"Oil Filter (Transmission) - Replace" 208				
"Cab Air Filter - Clean/Replace"148	, , ,				
" Circuit Breakers - Reset"	Every 10 Service Hours or Daily				
"Cooling System Coolant (ELC) - Change" 149	" Backup Alarm - Test"				
"Display and Camera - Clean"	"Brakes, Indicators and Gauges - Test" 145				
" Engine Air Filter Primary Element - Clean/ Replace"	" Braking System - Test"				
" Engine Air Filter Secondary Element -	" Cooling System Coolant Level - Check" 153				
Replace"	" Differential and Final Drive Oil Level - Check" 160				
" Engine Air Precleaner - Clean"	"Engine Air Filter Service Indicator - Inspect" 165				

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"Engine Oil Level (Oil Renewal System) - Check"	"Frame and Body Support Pads - Clean/ Inspect"
"Engine Oil Level (Oil Renewal System) - Check"	Initial 500 Hours (for New Systems,
"Engine Oil Level - Check"	Refilled Systems, and Converted Systems)
"Engine Oil Level - Log Additions" 172	,
"Fuel System Primary Filter (Water Separator) - Drain"	"Cooling System Coolant Sample (Level 2) - Obtain"
"Fuel Tank Water and Sediment - Drain" 191	Every 500 Service Hours
"Hoist, Torque Converter and Brake Tank Oil Level - Check"	"Cooling System Coolant Sample (Level 1) - Obtain"
"Seat Belt - Inspect"	" Differential and Final Drive Oil Sample -
"Secondary Steering - Test"	Obtain"
"Steering System Oil Level - Check"	"Engine Oil Sample - Obtain"
"Transmission Tank Oil Level - Check" 234	"Front Wheel Oil Sample - Obtain" 185
Every 50 Service Hours or Weekly	" Hoist, Torque Converter and Brake Oil Sample - Obtain"
"Belt - Inspect/Replace"	"Steering System Oil Sample - Obtain" 224
"Body Pivot Bearings - Lubricate"	"Transmission Oil Sample - Obtain" 232
"Front Suspension Cylinder - Lubricate" 183	Every 500 Service Hours or 3
"Hoist Cylinder Bearings - Lubricate" 195	Months
"Magnetic Plug (Wheels) - Check" 201	"Automatic Lubrication Reservoir - Fill" 141
"Rear Axle A-Frame Bearing - Lubricate" 210	"Breather (Fuel Tank) - Replace" 147
"Rear Axle Housing Lateral Control Rod Bearings -	"Breather (Torque Converter) - Replace" 148
Lubricate"	" Differential and Final Drive Oil - Inspect" 160
"Rear Suspension Cylinder Bearings - Lubricate"	" Engine Crankcase Breather - Clean" 168
"Steering Cylinder Bearings - Lubricate" 220	" Engine Crankcase Breather - Clean" 167
" Steering Tie Rod and Pin Bearings - Lubricate"	" Engine Oil Filter (Oil Renewal System) - Change"
"Tire Inflation - Check"	" Engine Oil and Filter - Change"
Initial 500 Service Hours	" Fan Drive Bearing and Belt Tightener Pulley - Lubricate"
"Electronic Unit Injector - Inspect/Adjust" 162	"Frame - Clean/Inspect"
" Engine Brake Slave Piston Lash - Inspect/ Adjust"	"Front Wheel Oil - Change"
"Engine Valve Lash - Check/Adjust"	"Front Wheel Oil - Inspect"
"Engine Valve Rotators - Inspect"	"Front Wheel Oil Level - Check" 185
	" Fuel System Primary Filter (Water Separator) - Replace"
	"Fuel System Secondary Filter - Replace" 190

"Fuel Tank Cap and Strainer - Clean" 191	"Suspension Cylinder - Check" 229
" Magnetic Screen (Transmission) - Clean" 202	Every 2 Years
"Oil Filter (Parking Brake Release) - Replace" 203	" Receiver Dryer (Refrigerant) - Replace" 213
"Oil Filter (Steering Pump Case Drain) - Replace"	
"Oil Filter (Steering) - Replace"	Every 3 Years
"Oil Filter (Torque Converter) - Replace" 206	"Seat Belt - Replace"218
"Oil Filter (Torque Converter) - Replace" 207	Every 3000 Service Hours or 2
"Oil Filter (Transmission) - Replace" 208	Years
"Suspension Cylinder - Check"	" Cooling System Pressure Cap - Clean/ Replace"
Every 750 Service Hours or	"Electronic Unit Injector - Inspect/Adjust" 162
Monthly	" Engine Brake Slave Piston Lash - Inspect/ Adjust"166
"Lubrication Pump Oil Level - Check" 201	" Engine Valve Lash - Check/Adjust"
Every 1000 Service Hours or 6	" Engine Valve Rotators - Inspect"
Months	"Radiator Core and Aftercooler - Clean" 210
"Frame and Body - Inspect"	Every 4000 Service Hours or 1 Year
"Frame and Body Support Pads - Clean/ Inspect"	" Differential and Final Drive Oil - Change" 159
"Hoist, Torque Converter and Brake Tank Oil - Change"	Every 6000 Service Hours or 3
"Rollover Protective Structure (ROPS) -	Years
"Seat Suspension - Inspect/Lubricate"	" Cooling System Coolant Extender (ELC) - Add"
"Service Brakes - Inspect"	Every 6000 Service Hours or 4
"Steering Linkage - Inspect"	Years
"Steering System Oil - Change"	" Cooling System Water Temperature Regulator -
"Transmission Tank Oil - Change"	Replace"
Every 2000 Service Hours or 1 Year	Every 7500 Hours or 568 500 L (150 000 US gal) of Fuel
"Breather (Differential and Final Drive) - Replace"	" Engine Components - Rebuild/Install Reman" 167
"Differential Thrust Pin Clearance - Check" 159	
"Lubrication Pump Oil - Change" 200	
"Rear Axle Housing End Play - Adjust" 211	
Every Year	
"Cooling System Coolant Sample (Level 2) -	

"Engine Water Pump - Inspect"
Every 10 000 Service Hours
"Steering Ball Stud - Replace" 219
Every 12 000 Service Hours or 6 Years
" Cooling System Coolant (ELC) - Change" 149
Every 15 000 Service Hours
" Rim - Inspect"
Every 15 000 Hours or 1 137 000 L (300 000 US gal) of Fuel
"Engine Components - Clean/Inspect, Rebuild/Install Reman, Install New"167

i02531877

Air Conditioner Filter - Clean

SMCS Code: 7320-070-FI

If a reduction in air circulation is noticed, clean the radial seal air filter for the air conditioner.

The air filter element for the air conditioner is located behind the access door on the left rear of the cab.

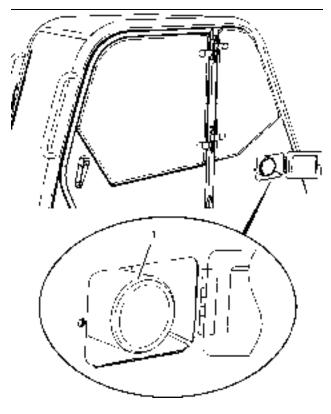


Illustration 157 g01266569

- **1.** Open the access door and remove air filter element (1).
- 2. Visually inspect the air filter element before cleaning. Inspect the air filter element for damage to the seal, the pleats, and the outer cover. Replace a damaged air filter element with a new air filter element.
- 3. Use low pressure compressed air in order to remove the dust from the dirty air 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.
- **4.** Install the clean air filter element and close the access door.

i02979740

Automatic Lubrication Reservoir - Fill

(If Equipped)

SMCS Code: 7540-544-TNK

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

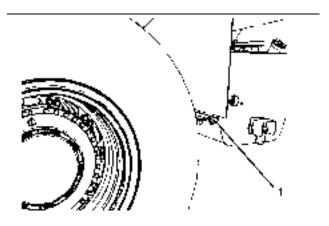


Illustration 158 q01507674

2. Fill the autolube reservoir through remote fill port (1).

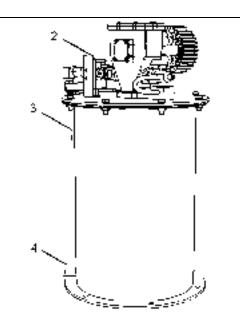


Illustration 159

q01211915

The autolube reservoir and the autolube pump are located between the frame rails above the transmission.

- (2) Level indicator
- (3) Vent port
- (4) Inlet for the remote grease line

3. Fill the reservoir until grease appears at the outlet for vent port (3).

Note: Level indicator (2) can also be used in order to determine when the reservoir is full.

Note: The bulk capacity of the grease reservoir is 27 kg (60 lb).

Note: If the reservoir is not properly vented, pressure will cause the wiper seal on the follower assembly inside the reservoir to fail when the reservoir is filled. Grease on the top side of the follower assembly may prevent the autolube system from functioning properly. Also, grease on the top side of the follower assembly may cause damage to the autolube system.

The automatic lubrication reservoir provides lubrication for many components. There are fittings at the following locations: rear of machine, left side of machine and right side of machine.

If any of the remote lines become damaged, install a fitting in place of the remote line. Lubricate the item at the fittings until the remote line can be replaced.

For more information on the autolube system, refer to Specifications, Systems Operation, Testing and Adjusting, RENR8396, "777F Off-Highway Truck Automatic Lubrication System".

i03448882

Backup Alarm - Test

SMCS Code: 7406-081

The backup alarm alerts the personnel behind the machine that the machine is backing up. The backup alarm is located at the rear of the machine.

- **1.** Park the machine on a level surface and stop the engine.
- **2.** Make sure that the area behind the machine is clear of personnel and clear of obstacles.
- **3.** Turn the engine start switch to the ON position.

Note: Do not start the engine.

- 4. Turn the fan speed switch to the OFF position and turn off the entertainment radio (if equipped). Open a door or a window.
- 5. Apply the service brakes.
- 6. Move the transmission control to the REVERSE position and listen for the backup alarm. The backup alarm should sound immediately. The backup alarm should continue to sound until the transmission control is moved out of the REVERSE position.

- Move the transmission control to the PARK position and release the service brake.
- **8.** If the backup alarm did not function, or if the backup alarm did not function properly, contact your Caterpillar dealer.

i07746330

Battery - Recycle

SMCS Code: 1401-561

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- · A battery supplier
- An authorized battery collection facility
- Recycling facility

i02424041

Battery or Battery Cable - Inspect/Replace

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

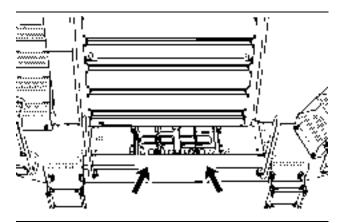


Illustration 160

g01203762

Location of the batteries

Note: When you replace the batteries, always use the same type of battery. This machine requires Maintenance Free batteries or Low Maintenance High Output batteries.

- **1.** Turn the engine start switch to the OFF position. Turn all of the switches to the OFF position.
- **2.** Turn the battery disconnect switch to the OFF position. Remove the key.
- 3. Remove the battery access covers.

4. Disconnect the negative end "–" of the battery cable from the frame near the battery disconnect switch.

Note: Do not allow the disconnected battery cable to contact the battery disconnect switch.

- **5.** Disconnect the negative end "-" of the battery cable from the battery.
- **6.** Disconnect the positive end "+" of the battery cable from the battery.
- **7.** Replace the battery or make all necessary repairs to the battery.
- **8.** Connect the positive end "+" of the battery cable to the battery.
- **9.** Connect the negative end "-" of the battery cable to the battery.
- **10.** Connect the negative end "-" of the battery cable to the frame near the battery disconnect switch.
- 11. Install the battery access covers.
- **12.** Install the key. Turn the battery disconnect switch to the ON position.

i03646557

Belt - Inspect/Replace

SMCS Code: 1357-510; 1357-040; 1397-510; 1397-040

Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

Inspection

Fan Drive Belts

This machine is equipped with a V-belt set that drives the radiator fan.

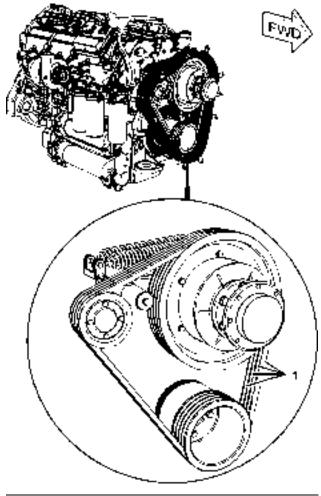


Illustration 161

g01956987

The belt guard is removed for reference.

Inspect the belts through the areas that are not obstructed by the belt guard. Do not remove the belt guard for inspection.

Inspect V-belts (1) for the following conditions: cracks, wear, stretch, frayed areas and missing pieces.

Refrigerant Compressor and Alternator Belt

This machine is equipped with a serpentine belt that drives the alternator and the refrigerant compressor.

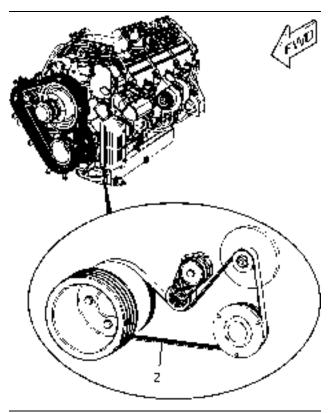


Illustration 162

g01956988

The belt guard is removed for reference.

Inspect the belt through the areas that are not obstructed by the belt guard. Do not remove the belt guard for inspection.

Inspect serpentine belt (2) for the following conditions: cracks, wear, stretch, frayed areas and missing pieces.

Replacement

Refer to Disassembly and Assembly, RENR8300, "777F Off-Highway Truck Engine Supplement" for information on replacing the fan drive belts and the refrigerant compressor and the alternator belt.

i02410978

Body Pivot Bearings - Lubricate

SMCS Code: 7258-086-BD

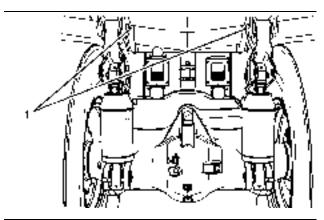


Illustration 163

g01205012

Lubricate two fittings (1) that are located at the rear of the machine under the body.

SEBU7790-12 145

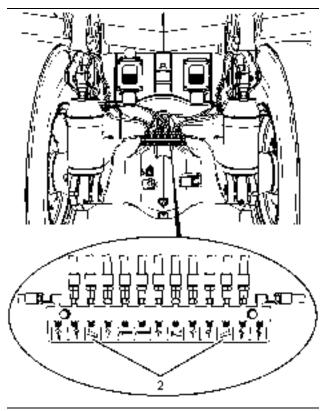


Illustration 164

g01205077

If your machine is equipped with remote lubrication fittings, lubricate fittings (2).

i02445772

Brakes, Indicators and Gauges - Test

SMCS Code: 4251-081; 4267-081; 4269-081; 7000-081; 7450-081; 7490-081

Before you operate the machine, perform the following checks.

- Inspect the brake indicator lights in the cab. Look for broken lenses on the gauges. Check for broken indicator lights, broken switches, and other broken components in the cab. Look for any inoperative gauges.
- **2.** Start the engine. Check the brake system for oil leaks and for damaged brake lines.
- **3.** Turn on all machine lights. Check for proper operation.
- **4.** Sound the horn. Listen for proper operation.
- **5.** Test the parking brake. For the proper test procedure, refer to Operation and Maintenance Manual, "Braking System Test".

- 6. Test the service brakes. For the proper test procedure, refer to Operation and Maintenance Manual, "Braking System - Test".
- **7.** Move the transmission control to the PARK position. Stop the engine.

Make any necessary repairs before machine operation. Consult your Caterpillar dealer for more information.

i07177416

Braking System - Test

SMCS Code: 4251-081; 4267-081

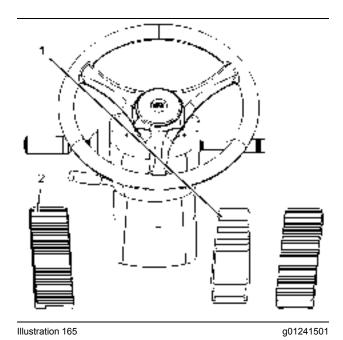
▲ WARNING

Personal injury can result if the machine moves during testing. If the machine begins to move during testing, reduce the engine speed immediately and place the transmission control in the PARK position in order to engage the parking brake.

Note: These tests should be conducted when the truck is empty.

The following tests are used to determine if the service brake system and the secondary brake system are functional. These tests are not intended to measure the maximum brake holding effort. The brake holding effort that is required to sustain a machine at a specific engine rpm varies depending on the machine. The variations are the differences in the engine setting, in the power train efficiency, and in the brake holding ability, etc.

During the test of the brakes, compare the previous engine rpm and the recent engine rpm. This will determine the system deterioration.



Service Brake Holding Ability Test

- 1. Fasten the seat belt before you test the brakes.
- Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- 3. Test the brakes on a dry, level surface.
- 4. Start the engine.
- **5.** Depress service brake control (1) in order to apply the service brakes.
- **6.** Move the transmission control lever to the D position.
- **7.** Gradually increase the engine speed to 1200 rpm. The machine should not move.
- 8. Reduce the engine speed to low idle. Move the transmission control lever to the PARK position. Stop the engine.

NOTICE

If the machine moved while testing the brakes, contact your Caterpillar dealer.

Have the dealer inspect and, if necessary, repair the service brake before returning the machine to operation.

Secondary Brake Holding Ability Test

1. Fasten the seat belt before you test the brakes.

- 2. Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- 3. Test the brakes on a dry, level surface.
- 4. Start the engine.
- **5.** Depress secondary brake control (2) in order to apply the secondary brakes.
- **6.** Move the transmission control lever to the D position.
- **7.** Gradually increase the engine speed to 1200 rpm. The machine should not move.
- **8.** Reduce the engine speed to low idle. Move the transmission control lever to the PARK position. Stop the engine.

NOTICE

If the machine moved while testing the brakes, contact your Cat dealer.

Have the Cat dealer inspect and, if necessary, repair the parking/secondary brakes before returning the machine to operation.

Parking Brake Holding Ability Test

- 1. Fasten the seat belt before you test the brakes.
- 2. Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- 3. Test the brakes on a dry, level surface.
- 4. Start the engine.

SEBU7790-12 147
Maintenance Section

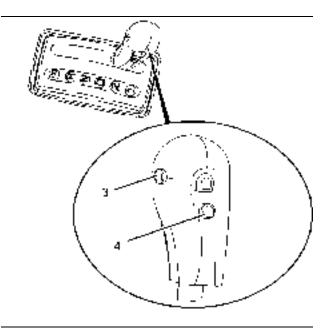


Illustration 166 g01519336

- **5.** Depress button (3) for the high gear limit RAISE and depress button (4) for the high gear limit LOWER at the same time.
- **6.** While both buttons are depressed, Move the transmission control lever to the D position.

Note: The buttons can now be released and the parking brake will remain on.

- **7.** Gradually increase the engine speed to 1200 rpm. The machine should not move.
- 8. Reduce the engine speed to low idle. Move the transmission control lever to the PARK position. Stop the engine.

NOTICE

If the machine moved while testing the brakes, contact your Cat dealer.

Have the Cat dealer inspect and, if necessary, repair the parking/secondary brakes before returning the machine to operation.

i02409474

Breather (Differential and Final Drive) - Replace

SMCS Code: 3258-510-BRE; 4050-510-BRE

 Park the machine on a level surface and make sure that the transmission control is in the PARK position.

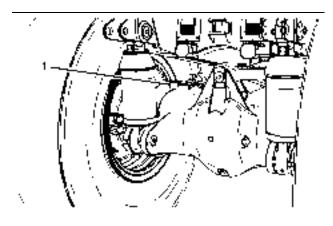


Illustration 167

g01204029

- **2.** Remove old breather (1) and properly discard the old breather.
- 3. Install a new breather.

i02409872

Breather (Fuel Tank) - Replace

SMCS Code: 1273-510-BRE

 Park the machine on a level surface and make sure that the transmission control is in the PARK position.

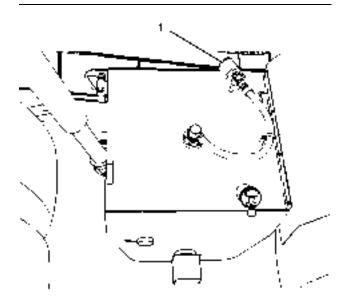


Illustration 168

g01204241

Top view of fuel tank

- 2. Remove fuel tank breather (1).
- **3.** Properly discard the used breather.
- 4. Install a new breather.

Breather (Torque Converter) - Replace

SMCS Code: 5057-510-BRE; 5095-510-BRE

Note: The breather for the torque converter vents the following components:

- Torque converter sump
- · Hoist, torque converter, and brake tank
- Transmission tank
- Transmission case
- Park the machine on a level surface and make sure that the transmission control is in the PARK position.

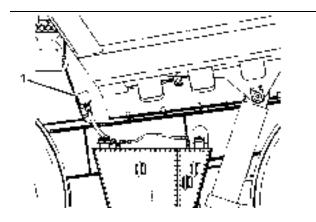


Illustration 169 g01203855

- Remove old breather (1) and properly discard the old breather.
- 3. Install a new breather.

i02482424

Cab Air Filter - Clean/Replace

SMCS Code: 7311-070-FI; 7311-510-FI; 7342-510; 7342-070

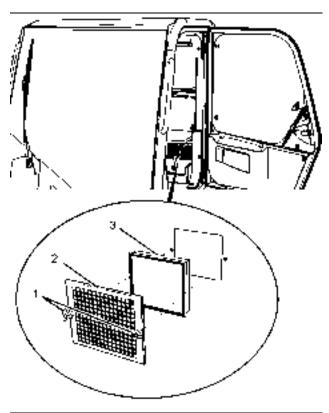


Illustration 170 g01239991

The filter element for the cab is located inside the operator's compartment.

- **1.** Loosen retaining screws (1). Remove cover (2) and filter element (3).
- 2. Wash the filter element in a nonsudsing detergent.
- **3.** Rinse the filter element in clean water. Allow the filter element to air dry.
- **4.** Install the clean filter element and the cover. Tighten the retaining screws.

Note: When rips or tears are noticed in the filter element, install a new filter element. When a reduction of air circulation is noticed in the cab after cleaning the filter element, install a new filter element.

Circuit Breakers - Reset

SMCS Code: 1420-529

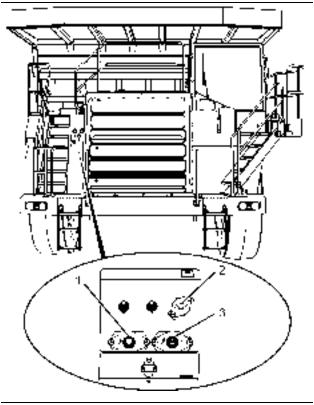


Illustration 171

g01520410



Circuit Breaker/Reset - Push in the button in order to reset the circuit breaker. If the electrical system is working properly, the button will remain depressed. If the button does not remain depressed, check the appropriate electrical circuit. Repair the electrical circuit, if necessary.



Alternator (1) – 90 Amp



Engine ECM (2) - 15 Amp



Starter Solenoid (3) - 80 Amp

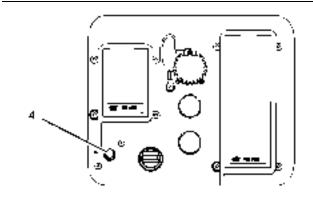


Illustration 172

g01243636

Circuit breaker (4) for the heater/air conditioner fan is located on the panel behind the companion seat.



Heater/Air Conditioner Fan (4) - 20 Amp

i02589862

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL; 1395-044-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

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 change the coolant until you read and understand the material in the Cooling System Specifications section.

NOTICE Mixing Cat Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or concentrate coolants. Use only Cat Extender with Cat ELC. Failure to follow these recommendations could result in damage to the cooling systems components.

If ELC cooling system contamination occurs, refer to Operation and Maintenance, "Extended Life Coolant (ELC)" under the topic ELC Cooling System Contamination.

This machine was factory filled with Cat Extended Life Coolant.

Whenever the coolant is dirty or whenever foaming is observed, change the coolant before the recommended interval.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

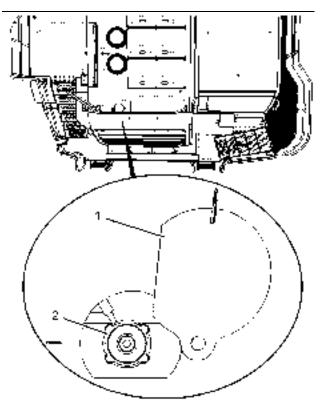


Illustration 173

g01215576

Top view

2. Slide open radiator cap access cover (1). Remove radiator cap (2) slowly in order to gradually relieve any system pressure.

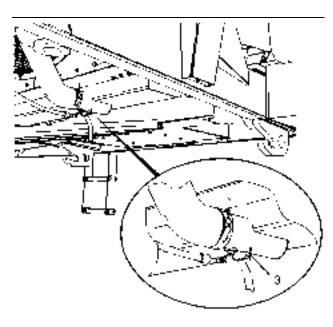


Illustration 174 g01215776

3. Open drain valve (3) and drain the coolant into a suitable container.

- **4.** Close the drain valve. Fill the system with clean water and a 6 to 10% concentration of cooling system cleaner.
- 5. Start the engine and operate the engine for 90 minutes. Stop the engine and drain the cleaning solution into a suitable container.
- 6. With the engine stopped, flush the system with water until the draining water is clear. Drain the water into a suitable container.
- 7. Close the drain valve.
- Add the coolant solution. Refer to Special Publication, SEBU6250, "Cooling System Specifications" and Operation and Maintenance Manual, "Capacities (Refill)" for further information.
- 9. Start the engine. Run the engine without the radiator cap. Run the engine until the thermostat opens and the coolant level stabilizes. This should purge the air from the system. Check the coolant level. Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check" for further information.
- **10.** Install the radiator cap.

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-538-NL

A 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

Adding coolant to an overheated engine could result in damage to the engine. Allow the engine to cool before adding coolant.

If the machine is to be stored in, or shipped to, an area with freezing temperatures, the cooling system must be protected to the lowest outside (ambient) temperature.

The engine cooling system is normally protected to a minimum of -29° C (-20° F) with Caterpillar Antifreeze, when shipped from the factory unless special requirements are defined.

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

Excessive additive (greater than the recommended 6% initial fill) together with concentrations of antifreeze greater than 60% cause deposits to form and can result in radiator tube blockage and overheating.

NOTICE

Mixing Extended Life Coolant (ELC) with other products reduces the effectiveness of the coolant and shortens coolant life. Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specifications for premixed or for concentrate coolants. Use only Caterpillar Extender with Caterpillar ELC. Failure to follow these recommendations could result in the damage to cooling system components.

If ELC cooling system contamination occurs, refer to Operation and Maintenance Manual, SEBU6250, "Caterpillar Machine Fluids Recommendations" under the topic of ELC Cooling System Contamination.

This machine was factory filled with Extended Life Coolant.

Refer to Special Publications, SEBU6250, "Caterpillar Machine Fluids Recommendations" for the cooling system requirements. 1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

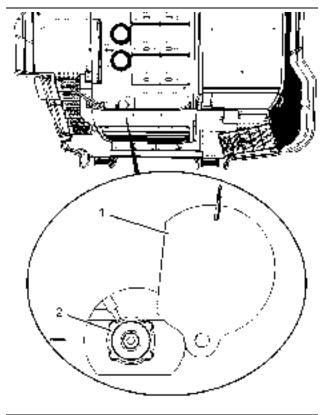


Illustration 175 g01215576

Top view

152

Slide open radiator cap access cover (1). Remove radiator cap (2) slowly in order to relieve the pressure.

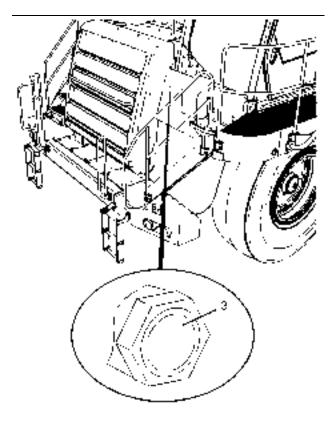


Illustration 176 g01215568

Observe the sight gauge (3) in order to check the coolant level. If necessary, drain enough coolant in order to allow the addition of the liquid coolant additive.

Note: Make sure that the coolant is drained into a suitable container.

- **4.** Add Cat cooling system coolant extender to the cooling system. Refer to Special Publication, SEBU6250, "Cooling System Specifications" and Operation and Maintenance Manual, "Capacities (Refill)" for the proper amount of Cat extender.
- **5.** Clean the radiator cap and inspect the radiator cap. Install the radiator cap.
- **6.** Start the engine and check the cooling system for leaks. Allow the coolant level to stabilize.
- **7.** If necessary, add premixed coolant in order to maintain the coolant level within the sight gauge.

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

🕰 WARNING

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

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

Remove the filler cap slowly to relieve pressure only when the engine is stopped and the filler cap for the heat exchanger is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

NOTICE

Adding coolant to an overheated engine could result in damage to the engine. Allow the engine to cool before adding coolant.

If the machine is to be stored in, or shipped to, an area with freezing temperatures, the cooling system must be protected to the lowest outside (ambient) temperature.

The engine cooling system is normally protected to a minimum of -29° C $(-20^{\circ}$ F) with Caterpillar Antifreeze, when shipped from the factory unless special requirements are defined.

Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for the cooling system requirements.

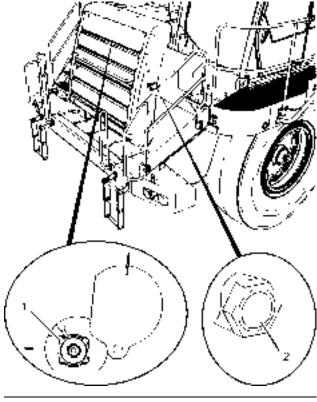


Illustration 177 g01296661

Note: If you must add coolant daily, check for leaks.

- **1.** Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- 2. When the coolant is cold (ambient temperature), observe sight gauge (2) in order to check the coolant level. Maintain the coolant level within the sight gauge.
- **3.** If necessary, remove radiator cap (1) slowly in order to relieve the pressure and add coolant.

Note: Always add the same coolant type that is in the machine. Do not mix coolant types. This can reduce the effectiveness of the coolant. Also, mixing coolant types can shorten the coolant life.

Cooling System Coolant Sample (Level 1) - 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.

Note: Level 1 results may indicate a need for Level 2 Analysis.

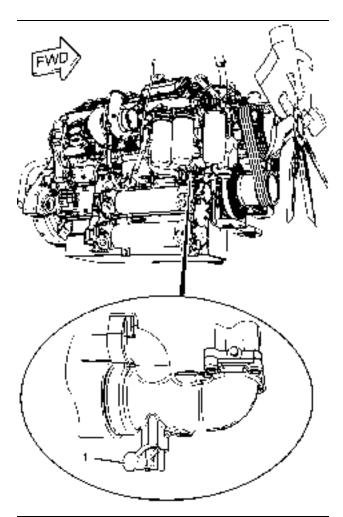


Illustration 178 q01215915

(1) Coolant sampling valve

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after you obtain the sample in order to avoid contamination of the sample.
- · Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

Refer to the following publications for S·O·S information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

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.

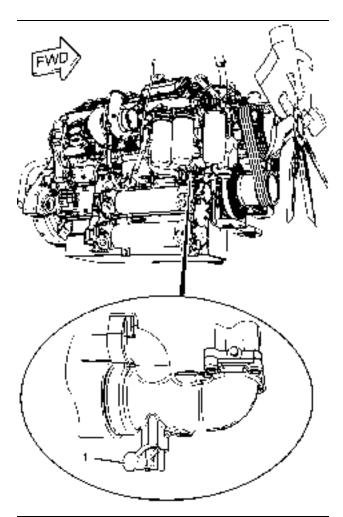


Illustration 179

g01215915

(1) Coolant sampling valve

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar 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.

Refer to the following publications for S·O·S information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

i02409998

Cooling System Pressure Cap - Clean/Replace

SMCS Code: 1382-510; 1382-070

♠ WARNING

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

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

Remove the filler cap slowly to relieve pressure only when the engine is stopped and the filler cap for the heat exchanger is cool enough to touch with your bare hand.

Cooling System Conditioner contains alkali. Avoid contact with skin and eyes.

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

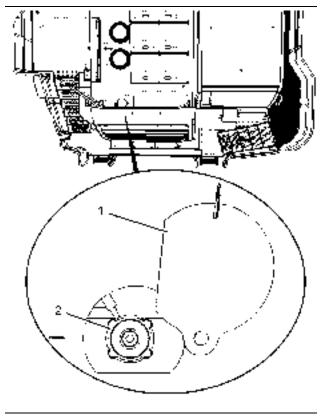


Illustration 180
Top view

g01215576

- Slide open radiator cap access cover (1). Remove radiator cap (2) slowly in order to relieve the pressure.
- **3.** Inspect the radiator cap for damage, for foreign material, and for deposits.
- **4.** Clean the radiator cap with a clean cloth or replace the radiator cap, if necessary.
- **5.** Install the radiator cap.

i02434194

Cooling System Water Temperature Regulator -Replace

SMCS Code: 1355-510; 1393-510

🕰 WARNING

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

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

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

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

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

Note: The thermostats should be replaced after the cooling system has been cleaned. Replace the thermostats while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

NOTICE

Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

Replace the two thermostats on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system.

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

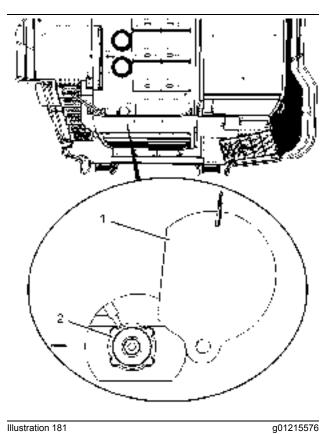


Illustration 181
Top view

2. Slide open radiator cap access cover (1). Remove radiator cap (2) slowly in order to relieve the pressure.

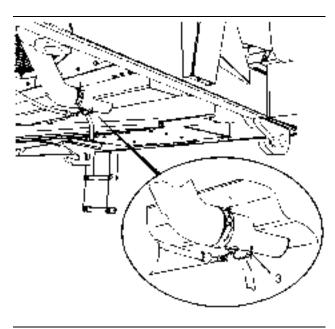


Illustration 182 g01215776

3. If the cooling system has not been drained, make sure that the coolant level is below the thermostat housing. If necessary, open drain valve (3) and drain the coolant into a suitable container until the coolant level is below the thermostat housing. Close the drain valve.

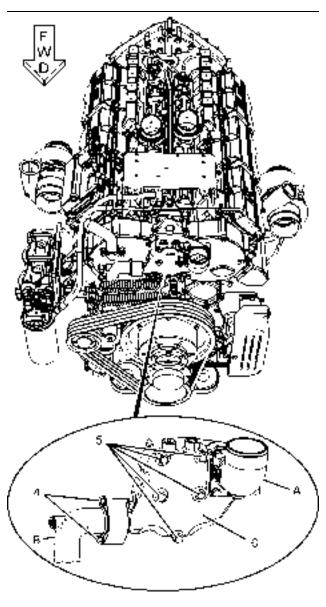


Illustration 183 g01216065

- 4. Disconnect the hose assembly from elbow (A). Remove bolts (4) from the elbow (B) and remove bolts (5) from the thermostat housing (6).
- **5.** Remove the thermostat housing assembly.
- 6. Remove the thermostats and the seals from the thermostat housing assembly.

NOTICE

Former thermostats may be used, if they meet test specifications and are not damaged or have excessive buildup or deposits.

NOTICE

Since Caterpillar engines incorporate a shunt design cooling system, it is mandatory to always operate the engine with a thermostat.

Depending on load, failure to operate with a thermostat could result in either an overheating or an overcooling condition.

NOTICE If the thermostat is installed incorrectly, it will cause the engine to overheat.

- 7. Install new seals and new thermostats in the housing.
- 8. Install the thermostat housing assembly. Install the bolts for the thermostat housing and install the bolts for the elbow (B).
- 9. Connect the hose assembly to elbow (A). Tighten the hose clamps.
- 10. Add the coolant solution. Refer to Special Publication, SEBU6250, "Cooling System Specifications" and Operation and Maintenance Manual, "Capacities (Refill)" for further information.
- 11. Start the engine. Run the engine without the radiator cap. Run the engine until the thermostat opens and the coolant level stabilizes. This should purge the air from the system. Check the coolant level. Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check" for further information.
- 12. Install the radiator cap.

Differential Thrust Pin Clearance - Check

SMCS Code: 3258-535-T9

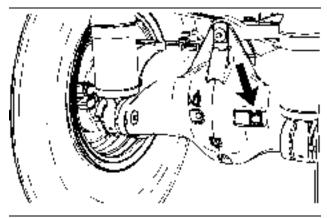


Illustration 184 g01204266

For the proper adjustment procedure for the thrust pin, refer to Testing and Adjusting, RENR8303, "777F Off Highway Truck Power Train" "Differential and Bevel Gear - Adjust".

i02520912

Differential and Final Drive Oil - Change

SMCS Code: 3258-044-OC; 4050-044-OC

The oil change interval for the differential and final drives can be monitored with a S·O·S (Scheduled Oil Sampling) program. For more information on S·O·S services, refer to Operation and Maintenance Manual, "S·O·S Information". When a S·O·S program is used, the oil change interval is based on the following:

- · The condition of the oil
- The S·O·S recommendation

When a S·O·S program is not used, the oil change interval is based on the following:

- 4000 service hours or 1 year if Caterpillar FDAO/ FD-1 oil is used.
- 2000 service hours or 1 year if Caterpillar TDTO/ TO-4 oil is used.

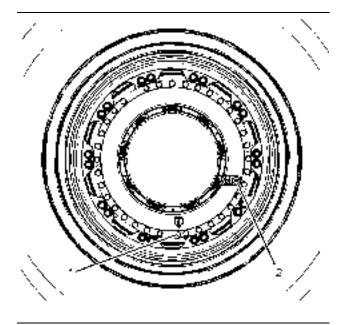


Illustration 185 g01204068

- 1. Rotate the wheels so that final drive drain plug (1) is in the lowest position on the rear wheel.
- 2. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

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.

3. Remove the final drive drain plug. Drain the oil into a suitable container.

Note: Inspect the magnetic drain plug and the oil. Refer to Operation and Maintenance Manual, "Differential and Final Drive Oil - Inspect" for further information.

- 4. Clean the drain plug. Install the drain plug.
- Repeat Step 1 through Step 4 for the other final drive.

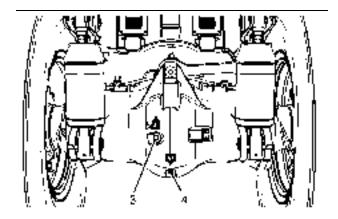


Illustration 186 g01204082

6. Remove differential drain plug (4) and allow the oil to drain into a suitable container.

Note: Inspect the magnetic drain plug and the oil. Refer to Operation and Maintenance Manual, "Differential and Final Drive Oil - Inspect" for further information.

- 7. Clean the drain plug. Install the drain plug.
- **8.** Remove differential filler plug (3) and wipe the surface around the filler plug opening .
- Fill the differential compartment to the bottom of the filler plug opening. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".

NOTICE

If the ambient temperature at engine start-up or during operation is below -10° C $(14^{\circ}$ F), perform the procedures in Operation and Maintenance Manual, "Differential Warm-up and Break-in". Check the differential compartment and the final drive compartment for the proper fluid level. Failure to warm up the oil or improper lubrication levels prior to operation will cause damage to the machine.

- 10. Clean the filler plug and install the filler plug.
- 11. Remove final drive filler plugs (2). Fill each final drive to the bottom of the filler plug opening. When the final drive drain plug is in the lowest position, the final drive filler plug will be at the correct oil level.

Note: The final drives may need to be repositioned in order to place the drain plug in the lowest position.

Note: Allow oil to fill all of the compartments. Correct oil levels are critical in the differential and final drives.

Operate the machine on level ground for a few minutes.

Note: The differential and final drive oil level needs to be checked and maintained at operating temperature. After the oil has been changed in the differential and final drives, adjustment of the oil level may be necessary when the truck reaches operating temperature.

13. Stop the machine. Check the oil level. If necessary, adjust the oil level to the bottom of the opening for the differential filler plug.

Note: Overfilling the differential and final drives will cause overheating and foaming of the oil in long hauling applications and high speed applications. A reduction of the life of components may be the result of overheating and foaming of the oil.

i02450436

Differential and Final Drive Oil - Inspect

SMCS Code: 3278-040-OC; 4050-040-OC

Inspect the differential and final drive oil for any of the following symptoms that may indicate a mechanical failure:

- A high amount of metal on the magnetic plug
- An increased level of nickel concentration in the S·O·S sample
- An increase in the size of the particle count in the S·O·S sample
- Oil leaks in the area around the drive wheel bearings

The rear wheel bearings do not need to be adjusted or inspected until the scheduled overhaul. Unless a symptom of an obvious failure appears, do not adjust or inspect the rear wheel bearings. If the differential and final drive oil has any of the above symptoms, the rear wheel bearings may need to be inspected.

Consult your Caterpillar dealer for more information.

i02582644

Differential and Final Drive Oil Level - Check

SMCS Code: 3258-535-FLV; 4050-535-FLV

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

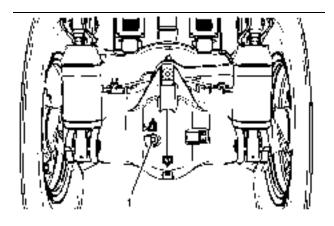


Illustration 187 g01217597

- 2. Remove differential filler plug (1) and clean the area around the opening.
- **3.** Check the oil level. Maintain the oil level to the bottom of the filler plug opening.
- 4. If necessary, add oil. Install the filler plug.

Note: The differential and final drives share a common oil compartment. When the machine is parked on a level surface and when the final drive drain plug is in the lowest position, the final drive filler plug will be at the same level as the differential filler plug. Allow the oil to fill all of the compartments before rechecking the oil level.

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4050-008; 4070-008; 7542

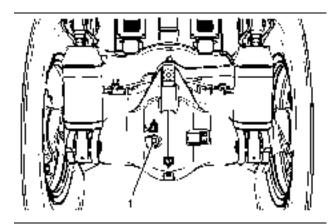


Illustration 188 g01217597

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.

The oil sample for the differential and for the final drives is obtained with a sampling gun through the filler plug (1).

Refer to the following publications for $S \cdot O \cdot S$ information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

Display and Camera - Clean (If Equipped with Work Area Vision System)

SMCS Code: 7347-070; 7348-070

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

Display

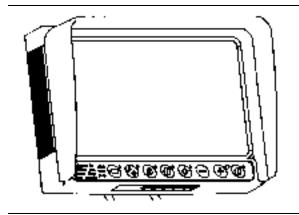


Illustration 189
WAVS display

q01223034

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.

Camera

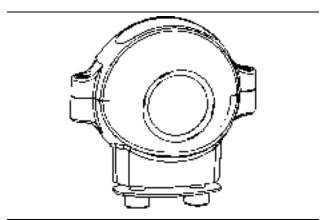


Illustration 190

g01223051

The WAVS camera is located on the rear of the machine near the taillights.

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.

Note: For more information on WAVS, refer to Operation and Maintenance Manual, SEBU8157, "Work Area Vision System".

i02549084

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1251-025; 1251-040; 1290-025; 1290-040

A WARNING

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting the unit injectors.

The electronic unit injectors use high voltage. Disconnect the unit injector enable circuit connector in order to prevent personal injury. Do not come in contact with the injector terminals while the engine is running.

This procedure is recommended by Caterpillar as part of a lubrication and preventive maintenance schedule in order to help provide maximum engine life. Only qualified personnel should perform this procedure.

For information on adjusting the electronic unit injector, refer to Systems Operation, Testing And Adjusting, SENR9937, "C27 and C32 Engines for Caterpillar Built Machines" or consult your Caterpillar dealer.

i02436954

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1051-510-PY; 1051-070-PY; 1054-510-PY; 1054-070-PY

NOTICE

Service the air cleaner only with the engine stopped. Engine damage could result. Service the air cleaner filter elements when the air filter service indicator detects an inlet air restriction. Refer to Operation and Maintenance Manual, "Engine Air Filter Service Indicator - Inspect" for more information.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

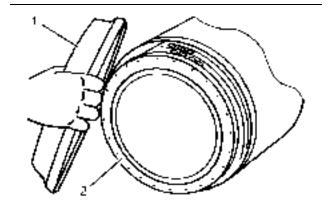


Illustration 191 g01217472

- 2. Remove covers (1) for the air filter housings.
- **3.** Remove primary filter elements (2) from the air filter housings.
- **4.** Clean the inside of the air filter housings.
- **5.** Clean the dust valves on the bottom for the air filter housings.
- **6.** Install clean primary air filter elements. Install the covers for the air filter housings.

Note: Refer to "Cleaning Primary Air Filter Elements".

Cleaning Primary Air Filter Elements

NOTICE

Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times if the element is properly cleaned and the element is properly 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. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

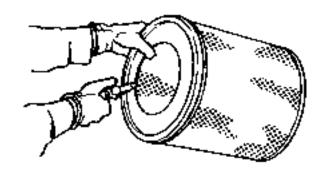


Illustration 192 g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) in order to force dirt particles toward the dirty side (outside).

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning primary air filter elements which require daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

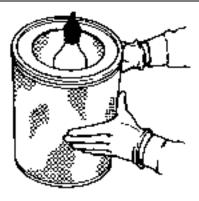


Illustration 193 g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, 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.

i02437040

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the engine air filter secondary elements when you service the engine air filter primary elements for the third time. Replace the secondary filter elements if the exhaust smoke remains black and the clean primary filter elements have been installed.

- Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- **2.** Remove the air filter covers and remove the primary filter elements from the air filter housings.

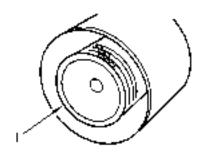


Illustration 194 g00644798

(1) Secondary filter element

- **3.** Remove secondary filter elements (1) and properly discard the secondary elements.
- **4.** Cover the air inlet openings. Clean the inside of the air cleaner housings.
- **5.** Uncover the air inlet openings. Install the new secondary filter elements.
- **6.** Install the primary filter elements and install the air filter covers.

i02432194

Engine Air Filter Service Indicator - Inspect

SMCS Code: 7452-040-DJ

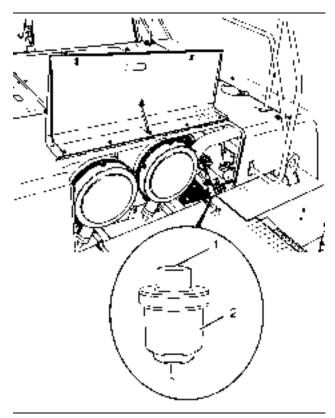


Illustration 195 g01215317

The air filter service indicator will detect an inlet air restriction. Examine the air filter service indicator. If the yellow piston in the indicator (2) enters the red zone, service the air cleaner.

Note: The yellow piston in the indicator will remain at the maximum position that was reached during the previous operation. Depress reset button (1) in order to reset the position of the yellow piston.

NOTICE

Service the engine air filters with the engine stopped. Engine damage could result.

In order to service the engine air filters, refer to Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace" and Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace".

Maintenance Section
Engine Air Precleaner - Clean

i04458890

Engine Air Precleaner - Clean

SMCS Code: 1055-070

NOTICE

Service the engine air precleaners only when the engine is stopped. Engine damage could result.

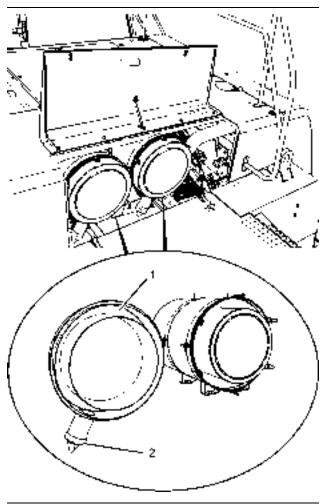


Illustration 196

g01215454

- Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- **2.** Unlatch the clips on each precleaner assembly (1). Remove the precleaner assemblies.
- **3.** Clean the precleaners and clean dust valves (2) with one of the following methods:
 - · Air pressure
 - · Water pressure

Detergent washing

If necessary, dry the precleaner assemblies completely.

- **4.** Inspect the precleaner assemblies after cleaning. Replace any missing or damaged parts.
- Install the precleaner assemblies. Ensure that the dust valve is properly seated over the retaining rib to prevent the dust valve from becoming dislodged.

Note: Operating the machine with missing or damaged dust valves will shorten the filter life and the maintenance interval for the air filters.

i02502656

Engine Brake Slave Piston Lash - Inspect/Adjust

(If Equipped)

SMCS Code: 1129-025; 1129-040

A WARNING

Be sure the engine cannot be started while this maintenance is being performed. To prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting engine valve lash clearance.

NOTICE

Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar Dealer for the complete engine valve lash adjustment procedure.

For proper adjustment, the engine valve lash must be adjusted before the engine brake is adjusted. For more information on engine valve lash adjustment, refer to Operation and Maintenance Manual, "Engine Valve Lash - Check/Adjust".

For the inspection procedure and the adjustment procedure for the engine brake slave piston lash, refer to the "Cat Compression Brake Valve Lash - Adjust" in Systems Operation, Testing and Adjusting, SENR9937, "C27 and C32 Engines For Caterpillar Built Machines".

Engine Components - Clean/ Inspect, Rebuild/Install Reman, Install New

SMCS Code: 1000-571-IC; 1000-012-IC; 1000-022-MC

Caterpillar recommends this additional maintenance for the following engine components. Consult your Cat dealer for further information.

The quantity of burned fuel that is shown with the service hours assumes a load factor of 40 percent. If the load factor is higher than 40 percent, the number of service hours for the overhaul interval will be lower. If the load factor is lower than 40 percent, the number of service hours for the overhaul interval will be higher. The quantity of consumed fuel is a better indicator for the overhaul interval than service hours.

Install New Components

- All seals, gaskets, and O-rings
- · Low-pressure fuel lines and nonmetallic fuel lines
- · Camshaft bearings
- · Crankshaft seals
- Gear train bushings, bearings, and thrust plates
- Main bearings, rod bearings, and crankshaft thrust plates
- Piston rings

Rebuild Components and/or Install Remanufactured Components

- Cylinder heads
- Direct Fan Drive Assembly (if equipped)
- Oil pump
- Scavenge oil pump
- Variable speed fan clutch (if equipped)

Clean Components and Inspect Components for Reusability

- Aftercooler core
- Camshaft
- Camshaft lifters
- Connecting rods

- Crankshaft
- · Cylinder block
- Cylinder liners
- Damper
- Gear train
- Oil coolers
- Piston crowns and piston skirts
- Piston pins
- Spacer plates

i02574644

Engine Components - Rebuild/ Install Reman

SMCS Code: 1000-022-MC

Caterpillar recommends this additional maintenance for the following engine components. Consult your Caterpillar dealer for further information.

The quantity of burned fuel that is shown with the service hours assumes a load factor of 40 percent. If the load factor is higher than 40 percent, the number of service hours for the mid-life service interval will be lower. If the load factor is lower than 40 percent, the number of service hours for the mid-life service interval will be higher. The quantity of consumed fuel is a better indicator for the mid-life service interval than service hours. The following list contains components that should be rebuilt or replaced with a remanufactured product.

- Alternator
- Electric Starter
- Turbochargers
- Injectors
- · Refrigerant Compressor
- Water Pump

i03130910

Engine Crankcase Breather - Clean

SMCS Code: 1317-070-ENG

S/N: JRP556-Up

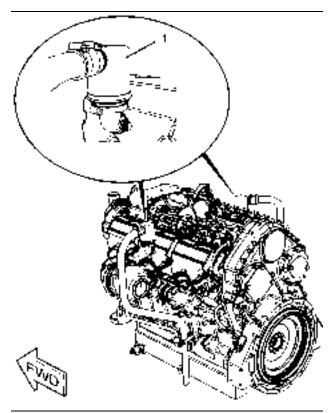


Illustration 197 g01517096

The engine in this machine is equipped with two engine crankcase breathers (1). One breather is on the valve cover on the right side and one breather is on the valve cover on the left side.

- Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- 2. Loosen the clamps.
- **3.** Remove the hoses from the breathers. Remove the breathers from the valve covers.
- **4.** Wash the breathers in clean nonflammable solvent.
- **5.** Install the breathers on the valve covers. Install the hoses and clamps on the breathers.
- 6. Tighten all of the clamps.

i03130918

Engine Crankcase Breather - Clean

SMCS Code: 1317-070-ENG

S/N: JRP1-555

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

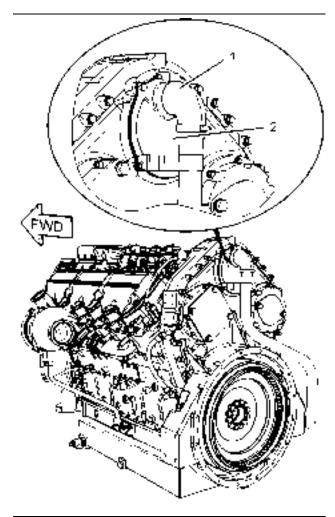


Illustration 198

g01222705

The crankcase breather is located on the back of the engine.

- 2. Remove hose (1) from the outlet of breather assembly (2).
- Remove the four bolts and remove the breather assembly from the engine.
- **4.** Remove the breather element. Wash the breather element and the breather in a clean nonflammable solvent. Allow the breather element to dry before installation.
- 5. Check the condition of the hose. Replace the hose if the hose is damaged. Check the condition of the breather assembly seal. Replace the seal if the seal is damaged.
- **6.** Install the breather element and install the breather assembly.

7. Install the hose onto the outlet of the breather assembly and tighten the clamp.

i02433498

Engine Oil Filter (Oil Renewal System) - Change

(If Equipped)

SMCS Code: 1308-510; 1349

🕰 WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

 Park the machine on a level surface. Make sure that the transmission control is in the PARK position. The oil must be warm and the engine stopped.

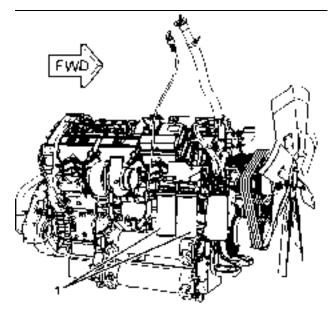


Illustration 199

q01215667

Remove used oil filters (1) and discard the used oil filters.

Note: The filters are accessed through the right front wheel well. Oil may be trapped in the filter housing bases. In order to avoid possible burns, remove the filters when the filters are cool enough to touch with your bare hand. Drain the oil into a suitable container.

- Clean the filter housing base. Make sure that the former gaskets are removed.
- **4.** Apply a thin film of clean engine oil to the seal of each new filter.
- **5.** Install the filters by hand. Tighten each filter until the sealing surface contacts the base. Note the position of the index marks on each filter in relation to a fixed point on the filter base.

Note: Caterpillar filters have rotation index marks that are spaced 90° or 1/4 of a turn away from each other. When you tighten the filters, use the rotation index marks as a guide.

6. Tighten each filter according to the instructions that are printed on the filter. Use the index marks as a guide.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filters to the amount that is required for final installation. Make sure that the installation tool does not damage the filters.

7. Start the engine and operate the engine at low idle for five minutes. Inspect the engine oil filters for oil leaks. Make any necessary repairs. Engine Oil Level (Oil Renewal System) - Check

8. Check the oil level in the engine. Refer to Operation and Maintenance Manual, "Engine Oil Level - Check" for the proper procedure. If necessary, add oil.

i02531218

Engine Oil Level (Oil Renewal System) - Check (If Equipped)

SMCS Code: 1348-535; 1349-535

S/N: JRP1-954

The Oil Renewal System (ORS) meters engine oil that is blended into the fuel supply of the machine. This oil will be consumed in the engine during the normal process of combustion.

The amount of oil that is metered is calculated by the engine's Electronic Control Module (ECM). This amount is based on the actual load factor or on the fuel that is consumed by the engine. The ratio of oil that is injected into the fuel can be adjusted with the Cat ET service tool. Typically, the amount of oil that is burned is approximately 19 L (5 US gal) of oil per 3790 L (1000 US gal) of fuel.

The 777F ORS is equipped with an ORS tank. The ORS tank is an oil reservoir that will replenish the oil that is removed from the engine crankcase by the valve for the oil renewal system.

For more information on the Oil Renewal System, refer to Systems Operation, RENR2223, "Oil Renewal System".

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

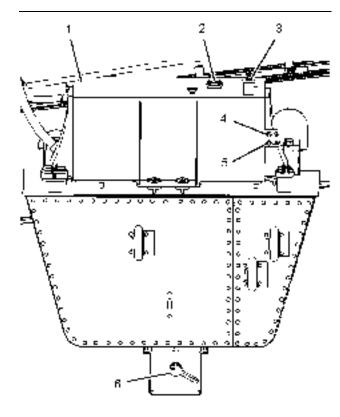


Illustration 200

g01266317

- Check the oil level of ORS tank (1) with gauge (2).
 The oil level can also be monitored with green level indicator (4) and red level indicator (5).
- **3.** If necessary, add oil at filler cap opening (3) or fast fill coupling (6).

Note: Keeping a daily maintenance log of all the additions of oil is necessary for determining whether the ORS is working properly. Refer to Operation and Maintenance Manual, "Engine Oil Level - Log Additions" for more information.

i02992677

Engine Oil Level (Oil Renewal System) - Check

(If Equipped)

SMCS Code: 1348-535; 1349-535

S/N: JRP955-Up

The Oil Renewal System (ORS) meters engine oil that is blended into the fuel supply of the machine. This oil will be consumed in the engine during the normal process of combustion.

The amount of oil that is metered is calculated by the engine's Electronic Control Module (ECM). This amount is based on the actual load factor or on the fuel that is consumed by the engine. The ratio of oil that is injected into the fuel can be adjusted with the Cat ET service tool. Typically, the amount of oil that is burned is approximately 19 L (5 US gal) of oil per 3790 L (1000 US gal) of fuel.

The 777F ORS is equipped with an ORS tank. The ORS tank is an oil reservoir that will replenish the oil that is removed from the engine crankcase by the valve for the oil renewal system.

For more information on the Oil Renewal System. refer to Systems Operation, RENR2223, "Oil Renewal System".

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

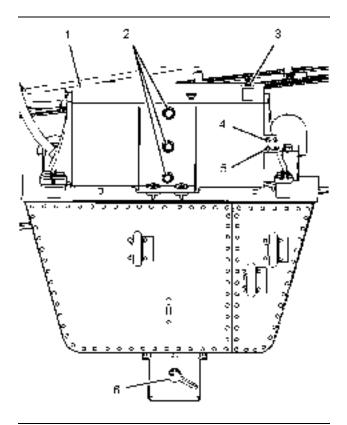


Illustration 201

- 2. Check the oil level of ORS tank (1) with sight gauges (2). The oil level can also be monitored with green level indicator (4) and red level indicator (5).
- 3. If necessary, add oil at filler cap opening (3) or fast fill coupling (6).

Note: Keeping a daily maintenance log of all the additions of oil is necessary for determining whether the ORS is working properly. Refer to Operation and Maintenance Manual, "Engine Oil Level - Log Additions" for more information.

i02857434

Engine Oil Level - Check

SMCS Code: 1348-535-FLV

NOTICE
Do not under fill or overfill engine crankcase with oil. Either condition can cause engine damage.

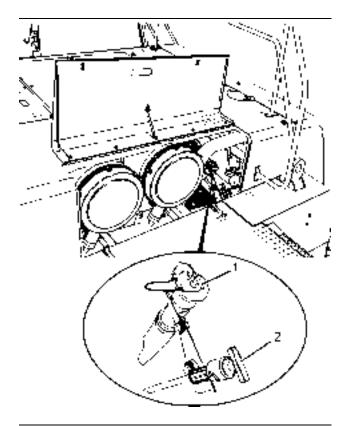


Illustration 202 q01214549

- 1. Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- 2. Remove engine oil level gauge (2). Inspect the oil level gauge in order to determine the engine oil level.

Engine Oil Level - Log Additions

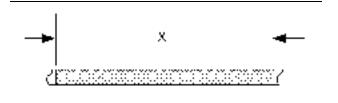


Illustration 203 g01423532

- Maintain the oil level within operating range (X), between the "ADD" mark and the "FULL" mark on the oil level gauge.
 - a. If the engine is stopped and the oil is cold, maintain the oil level on the "ENGINE STOPPED WITH COLD OIL" side of the dipstick.
 - b. If the engine is running and the oil is at operating temperature, maintain the oil level on the "ENGINE AT LOW IDLE WITH WARM OIL" side of the dipstick.
- **4.** If necessary, remove the oil filler cap (1) and add oil. Clean the filler cap and install the filler cap.

i02449978

Engine Oil Level - Log Additions

(If Equipped with the Oil Renewal System)

SMCS Code: 1348; 1349

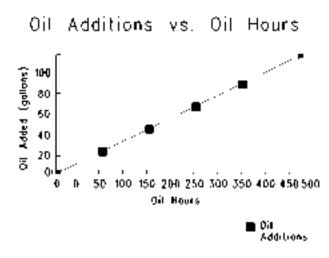


Illustration 204 g00408438

The Oil Renewal System (ORS) meters engine oil that is blended into the fuel supply. This oil will be consumed by the engine during the process of combustion. Normal operation will continually lower the oil level in the crankcase. Continually adding new engine oil will allow the life of the oil to be extended. An S·O·S analysis will determine if the oil needs to be changed.

The graph in Illustration 204 plots the quantity of added oil against the service hours during a 500 hour period. This data can be used to determine if the Oil Renewal System is working properly. Keeping a daily maintenance log of all of the additions of oil is necessary for the accuracy of this data. The daily maintenance log is also necessary for adjustment of the metering rate. The daily maintenance log will also indicate the total amount of oil that has been added since the last oil change. This information is needed at the time of each S·O·S analysis.

Note: Log the additions of engine oil to the crankcase and the additions of engine oil to the makeup oil tank.

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

🕰 WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

▲ WARNING

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

Obtain S·O·S samples as close as possible to the recommended sampling interval. To receive the full effect of S·O·S analysis, establish a consistent trend of data. To establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

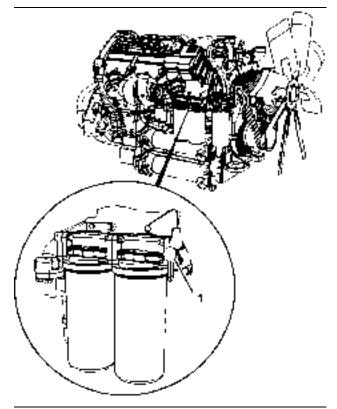


Illustration 205

g01214652

Sampling valve (1) for the engine oil is on the engine oil filter base.

Refer to the following publications for S·O·S information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

Note: If your machine is equipped with the Oil Renewal System (ORS), engine oil is blended into the fuel supply of the machine. This oil will be consumed in the engine during the process of combustion. Continually adding new oil will allow the life of the oil to be extended. An S·O·S Oil Analysis will determine if the oil needs to be changed. The recommended replacement interval for the engine oil filters remains at 500 hours. In order to change the engine oil filters only, refer to Operation and Maintenance Manual, "Engine Oil Filter (Oil Renewal System) - Change". For more information on the Oil Renewal System, refer to Operation and Maintenance Manual, "Engine Oil Level (Oil Renewal System) - Check" and Systems Operation, RENR2223, "Oil Renewal System".

A WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

♠ WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

Note: Some commercial oils that meet API specifications may require shorter oil change intervals. The oil change intervals are determined by close monitoring of the oil condition and engine wear metals. Caterpillar prefers the scheduled oil sampling as the proper method of checking engine wear metals.

Consult your Caterpillar dealer for the latest oil recommendations.

Oil Pan Drain and Engine Oil Filters

- Park the machine on a level surface. Make sure that the transmission control is in the PARK position. The oil must be warm and the engine stopped.
- 2. Move the engine lockout switch upward in order to activate the engine lockout mode. Refer to Operation and Maintenance Manual, "Engine Lockout Control" for more information.

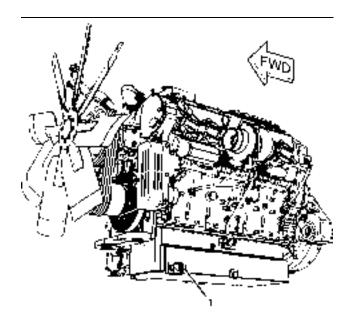


Illustration 206

g01214925

3. Open drain valve (1) and drain the oil into a suitable container. Close the drain valve.

SEBU7790-12 175

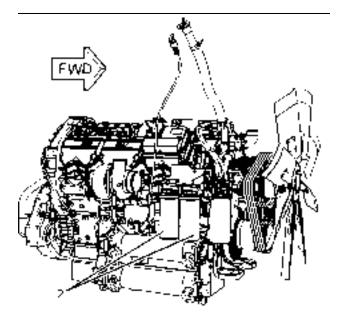


Illustration 207 g01214874

4. Remove used oil filters (2) and discard the used oil filters.

Note: The filters are accessed through the right front wheel well. Oil may be trapped in the filter housing bases. In order to avoid possible burns, remove the filters when the filters are cool enough to touch with your bare hand. Drain the oil into a suitable container.

- **5.** Clean the filter housing base. Make sure that the former gaskets are removed.
- **6.** Apply a thin film of clean engine oil to the seal of each new filter.
- 7. Install the filters by hand. Tighten each filter until the sealing surface contacts the base. Note the position of the index marks on each filter in relation to a fixed point on the filter base.

Note: Caterpillar filters have rotation index marks that are spaced 90° or 1/4 of a turn away from each other. When tightening the filters, use the rotation index marks as a guide.

8. Tighten each filter according to the instructions that are printed on the filter.

Note: A Caterpillar strap wrench, or another suitable tool may be needed in order to turn the filters to the amount that is required for final installation. Make sure that the installation tool does not damage the filters.

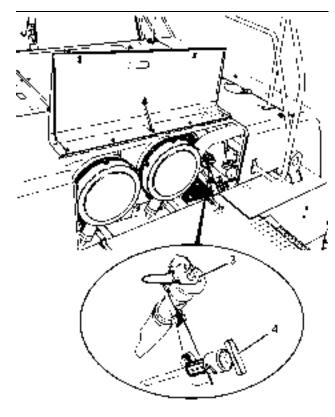


Illustration 208 g01214889

- 9. Remove the oil filler cap (3). Fill the crankcase with oil and install the filler cap. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the type of oil. Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the amount of oil.
- **10.** Start the engine and operate the engine at low idle for five minutes. Inspect the engine oil filters for leaks. Make any necessary repairs.

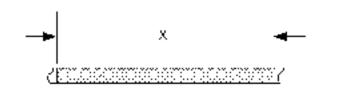


Illustration 209 g01423532

- **11.** Maintain the oil level within operating range (X), between the "ADD" mark and the "FULL" mark on the oil level gauge.
 - a. If the engine is stopped and the oil is cold, maintain the oil level on the "ENGINE STOPPED WITH COLD OIL" side of the dipstick.

b. If the engine is running and the oil is at

b. If the engine is running and the oil is at operating temperature, maintain the oil level on the "ENGINE AT LOW IDLE WITH WARM OIL" side of the dipstick.

QuickEvac

The QuickEvac/Prelubrication system is not available on later machines.

♠ WARNING

Extended operation of the QuickEvac motor could damage the motor and result in loss of emergency steering capability, which could cause injury or death. The QuickEvac motor should not be used longer than 5 minutes. The motor should be allowed to cool to ambient temperatures before reuse.

Table 10

Required Tools		
Item	Part Number	Description
Α	187-1458	QuickEvac Service Tool

- Park the machine on a level surface. Place the transmission control lever in the PARK position. The oil must be warm and the engine must be stopped.
- 2. Move the engine lockout switch upward in order to activate the engine lockout mode. Refer to Operation and Maintenance Manual, "Engine Lockout Control" for more information.

Note: The QuickEvac system will only evacuate the oil when the engine lockout mode is active.

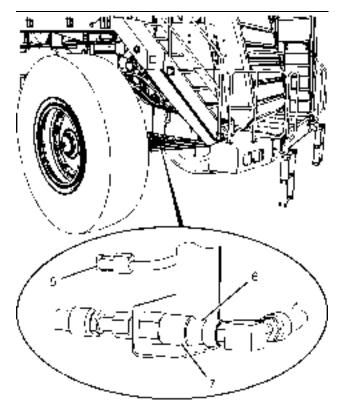


Illustration 210 g01234247

- 3. Detach the quick disconnect fittings. Attach QuickEvac Tool (A) to male quick disconnect fitting (6). Attach an air supply to the designated hose on the QuickEvac Tool. Purge the oil system of the engine and the oil filters for 10 seconds by using 620 kPa (90 psi) of air pressure. Detach the air supply.
- 4. Attach the designated hose from the QuickEvac Tool to female quick disconnect fitting (7) and attach the electrical connection for the QuickEvac Tool to electrical connection (5).
- **5.** Use the remote operator switch on the QuickEvac Tool to evacuate the oil from the engine.
- **6.** Detach the QuickEvac Tool after the oil is evacuated. Attach male quick disconnect fitting (6) to female quick disconnect fitting (7).
- **7.** Remove used oil filters (2) and discard the used oil filters. Refer to Illustration 207.

Note: The filters are accessed through the right front wheel well. Oil may be trapped in the filter housing bases. In order to avoid possible burns, remove the filters when the filters are cool enough to touch with your bare hand. Drain the oil into a suitable container.

8. Clean the filter housing base. Make sure that the former gaskets are removed.

SEBU7790-12

- Apply a thin film of clean engine oil to the seal of each new filter.
- 10. Install the filters by hand. Tighten each filter until the sealing surface contacts the base. Note the position of the index marks on each filter in relation to a fixed point on the filter base.

Note: Caterpillar filters have rotation index marks that are spaced 90° or 1/4 of a turn away from each other. When tightening the filters, use the rotation index marks as a guide.

11. Tighten each filter according to the instructions that are printed on the filter.

Note: A Caterpillar strap wrench, or another suitable tool may be needed in order to turn the filters to the amount that is required for final installation. Make sure that the installation tool does not damage the filters.

- 12. Remove the oil filler cap (3). Refer to Illustration 208 . Fill the crankcase with oil. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the type of oil. Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the amount of oil.
- **13.** Start the engine and operate the engine at low idle for five minutes. Inspect the engine oil filters for leaks. Make any necessary repairs.
- **14.** Maintain the oil level within operating range (X), between the "ADD" mark and the "FULL" mark on oil level gauge (4). Refer to Illustration 208 and Illustration 209.
 - a. If the engine is stopped and the oil is cold, maintain the oil level on the "ENGINE STOPPED WITH COLD OIL" side of the dipstick.
 - b. If the engine is running and the oil is at operating temperature, maintain the oil level on the "ENGINE AT LOW IDLE WITH WARM OIL" side of the dipstick.

Whenever a QuickEvac procedure is performed, an event will be recorded. The event will be recorded when the pump is activated by the switch on the QuickEvac Service Tool. The event will be recorded in the following manner:

- · The service hours of the first event
- · The service hours of the last event
- The total number of events

Only one event will be recorded during each power cycle to the ECM. This will prevent creating multiple events for one Quick Evac procedure.

For more information on the Quick Evac system, refer to Specifications, Systems Operation, Testing and Adjusting, RENR8395, "773F - 777F Off-Highway Truck Quick Evacuation, Prelubrication, and High Speed Oil Change".

Engine Oil Fill with High Speed Arrangement (If Equipped)

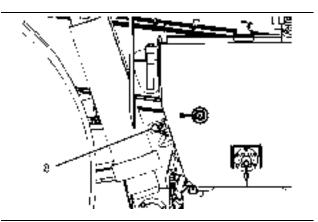


Illustration 211

g01508100

- **1.** Remove the dust cover and attach the oil fill hose to male fitting (8).
- Fill the crankcase with oil. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the correct type of oil. Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the correct amount of oil.
- 3. Remove the oil fill hose and install the dust cover.
- **4.** Start the engine and operate the engine at low idle for five minutes. Inspect the engine oil filters for leaks. Make any necessary repairs.
- Maintain the oil level within operating range (X), between the "ADD" mark and the "FULL" mark on oil level gauge (4). Refer to Illustration 208 and Illustration 209.
 - a. If the engine is stopped and the oil is cold, maintain the oil level on the "ENGINE STOPPED WITH COLD OIL" side of the dipstick.
 - b. If the engine is running and the oil is at operating temperature, maintain the oil level on

Engine Valve Lash - Check/Adjust

the "ENGINE AT LOW IDLE WITH WARM OIL" side of the dipstick.

Engine Oil Fill with Wiggins Fast Fill Service Center (If Equipped)

Refer to Operation and Maintenance Manual, "Fast Fill Service Center" for more information.

i02548994

Engine Valve Lash - Check/ Adjust

SMCS Code: 1102-025; 1102-535

A WARNING

Ensure that the engine can not be started while this maintenance is being performed. To help prevent possible injury, do not use the starting motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring/adjusting valve lash clearance.

A WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

NOTICE

Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar dealer for the complete valve lash adjustment procedure.

Operation of Caterpillar engines with improper valve adjustments can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

This procedure is recommended by Caterpillar as part of a lubrication and preventive maintenance schedule in order to help provide maximum engine life.

For information on checking the engine valve lash, refer to Systems Operation, Testing And Adjusting, SENR9937, "C27 and C32 Engines for Caterpillar Built Machines" or consult your Caterpillar dealer.

i01597115

Engine Valve Rotators - Inspect

SMCS Code: 1109-040-DJ

A WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn, to help prevent being burned by hot oil or spray.

Engine valve rotators rotate the valves when the engine runs. This helps to prevent deposits from building up on the valves and the valve seats.

Perform the following steps after the engine valve lash is set, but before the valve covers are installed:

- Start the engine according to Operation and Maintenance Manual, "Engine Starting" (Operation Section) for the procedure.
- 2. Operate the engine at low idle.
- Observe the top surface of each valve rotator. The valve rotators should turn slightly when the valves close.

NOTICE

A valve rotator which does not operate properly will accelerate valve face wear and valve seat wear and shorten valve life. If a damaged rotator is not replaced, valve face guttering could result and cause pieces of the valve to fall into the cylinder. This can cause piston and cylinder head damage.

If a valve fails to rotate, consult your Caterpillar dealer.

i04524424

Engine Water Pump - Inspect

SMCS Code: 1361-040

A water pump that has failed might cause severe engine overheating problems. The engine overheating problems could result in the following problems:

- Cracks in the cylinder head
- Piston seizure
- · Other potential engine damage



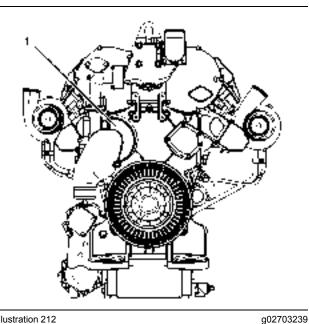


Illustration 212

Front of engine

Typical example

Visually inspect water pump (1) for leaks. If leaks are found, replace all the seals.

Note: For the replacement of the water pump seals, refer to Disassembly and Assembly, RENR9217, "C27 and C32 Engines For Caterpillar Built Machines".

Ether Starting Aid Cylinder -Replace

SMCS Code: 1456-510-CD

WARNING

Breathing ether vapors or repeated contact of ether with skin can cause personal injury. Personal injury may occur from failure to adhere to the following procedures.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

To avoid possible injury, be sure the brakes are applied and all controls are in HOLD or NEUTRAL when starting the engine.

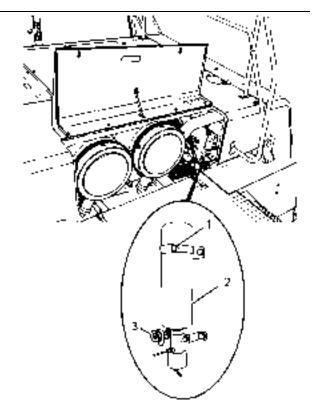


Illustration 213 g01214631

- **1.** Loosen clamp (1) and unscrew ether starting aid cylinder (2).
- 2. Remove the used gasket. Install the new gasket that is provided with the ether starting aid cylinder. Install the new ether starting aid cylinder. Tighten the clamp.

Note: Install protective cap (3) if an ether starting aid cylinder will not be in place.

i02489894

Fan Drive Bearing and Belt Tightener Pulley - Lubricate

SMCS Code: 1359-086-BD; 1359-086-PP

The fittings are located at the right front of the engine.

1. Park the machine on a level surface and move the transmission control to the PARK position. Stop the engine.

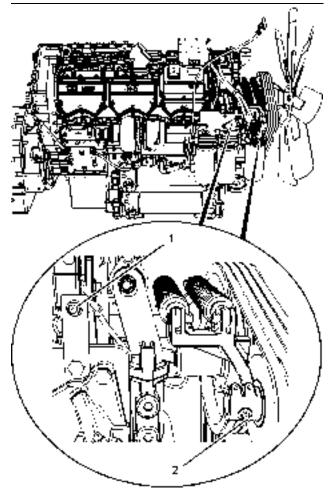


Illustration 214

g01243816

2. Apply grease to fitting (1) for the fan drive and apply grease to fitting (2) for the belt tensioner.

Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the recommended grease.

i02564542

Frame - Clean/Inspect

SMCS Code: 7050-571

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

- Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- 2. Raise the body to the fully raised position and install the body retaining pins. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".
- 3. Stop the engine.

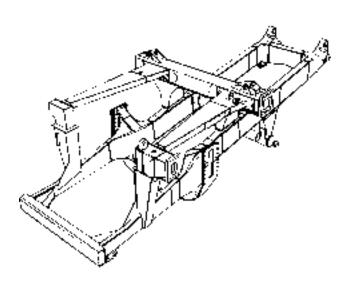


Illustration 215 g01207945

- **4.** Clean the frame with a high pressure washer.
- 5. Inspect the frame for damage and for cracks. If you find cracks or damage, consult your Caterpillar dealer for specific repair procedures. Do not operate the machine until the necessary repairs have been made.
- **6.** Remove the body retaining pins and lower the body. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".

i06538434

Frame and Body - Inspect

SMCS Code: 7050-040; 7258-040

🕰 WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

- **1.** Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- Raise the body to the fully raised position and install the body retaining pins. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".
- **3.** Stop the engine.

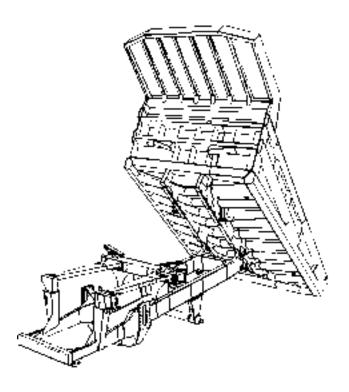


Illustration 216 g01207947

4. Clean the frame and the body with a high-pressure washer. If necessary, continue to clean the frame and the body with a wire brush or a scraper.

- 5. Inspect the frame and the body. If you find cracks, damage or excessive wear, consult your Caterpillar dealer for specific repair procedures. Do not operate the machine until the necessary repairs have been made.
- **6.** Remove the body retaining pins and lower the body. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".

Note: For more information, refer to Special Instruction, SEHS0039, "Procedure to Inspect the Frame" and Special Instruction, SEHS0041, "Procedure to Inspect the Body".

i03646604

Frame and Body Support Pads - Clean/Inspect

SMCS Code: 7050-571; 7258-571-S4

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

- Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- 2. Raise the body to the fully raised position and install the body retaining pins. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".
- 3. Stop the engine.

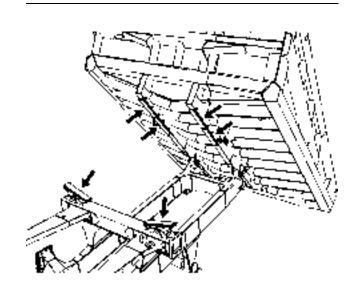


Illustration 217 g01207950

- 4. Clean the body support pads with high pressure water or steam. If damage is found, consult your Caterpillar dealer for specific repair procedures.
- 5. Visually inspect each of the body support pads. Compare all the body support pads. If the inspection indicates uneven wear of the body support pads, you may need to readjust the shims. Also, if the paint on the frame indicates uneven wear, you may need to readjust the shims. If the body support pads are shimmed correctly, review your loading operation.

Note: Proper installation of the body support pads will effectively balance the load weight. If the body support pads indicate uneven wear, readjusting the shims may correct the problem. Also, if the paint on the frame indicates uneven wear, readjusting the shims may correct the problem.

6. Remove the body retaining pins and lower the body. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".

Front Suspension Cylinder - Lubricate

SMCS Code: 7201-086

A WARNING

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 have read and understood the operation, lubrication, maintenance and repair information.

NOTICE Excessive grease could damage the seals.

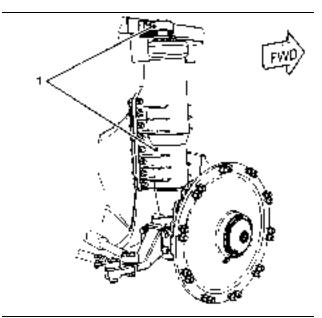


Illustration 218

g01209087

Right front suspension cylinder

Two fittings (1) are located on each front suspension cylinder. Lubricate the fittings on each front suspension cylinder.

Remote Lubrication Fittings (If Equipped)

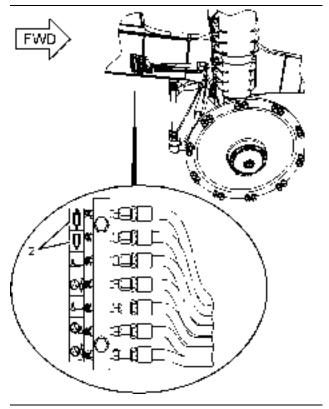


Illustration 219

g01208855

Right side remote lubrication fittings

Two remote lubrication fittings (2) for the front suspension cylinders are located on each side of the main frame. Lubricate the remote fittings on each side of the main frame.

i03041269

Front Wheel Oil - Change

SMCS Code: 4201-044-OC

Note: The oil change interval for the front wheel can be determined with the $S \cdot O \cdot S$ scheduled oil sampling program. The oil change interval is based on the condition of the oil. If the $S \cdot O \cdot S$ scheduled oil sampling program is not used, the oil change should be performed at 500 service hours.

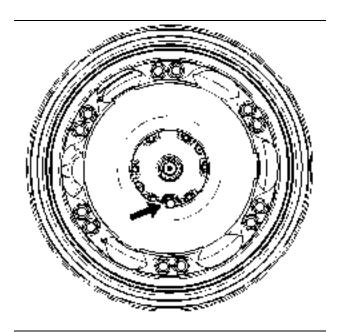


Illustration 220 g01250756

- **1.** Position the front wheel so that the drain plug is facing downward.
- 2. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

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.

- **3.** Remove the drain plug slowly in order to relieve any pressure.
- 4. Allow the oil to drain into a suitable container.
- 5. Clean the drain plug and install the drain plug.

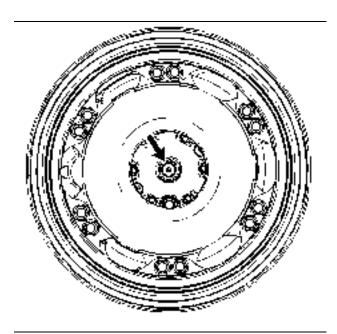


Illustration 221 g01250751

- 6. Remove the filler plug.
- 7. Fill the oil compartment to the bottom of the filler plug opening. Refer to Operation and Maintenance Manual, "Capacities (Refill)".
- **8.** Clean the filler plug and install the filler plug. Use the same procedure for the other front wheel bearing.

i05897874

Front Wheel Oil - Inspect

SMCS Code: 4201-040-OC

Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, "Prepare the Machine for Maintenance".

Inspect the front wheel oil for any of the following symptoms that may indicate a failure of the wheel bearings:

- A high amount of metal on the magnetic plug
- An increased level of nickel concentration in the S·O·S sample
- An increase in the size of the particle count in the S·O·S sample
- Oil leaks in the area around the front wheel spindle

The front wheel bearings do not need to be adjusted or inspected until the scheduled overhaul. Unless a symptom of an obvious failure appears, do not adjust or inspect the front wheel bearings. If the front wheel oil has any of the above symptoms, the front wheel bearings may need to be inspected. Consult your Cat dealer for more information.

i03041270

Front Wheel Oil Level - Check

SMCS Code: 4201-535-FLV

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

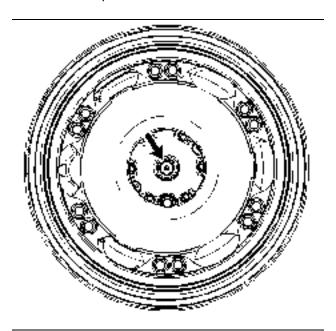


Illustration 222 g01250751

Note: In order to prevent dirt from entering the wheel bearing, use a clean cloth to wipe the area around the filler plug before you remove the filler plug.

- 2. Remove the filler plug slowly in order to relieve any pressure.
- **3.** Maintain the oil level to the bottom of the filler plug opening.
- 4. Clean the filler plug and install the filler plug.

i03646165

Front Wheel Oil Sample - Obtain

SMCS Code: 4201-008-OC; 7542

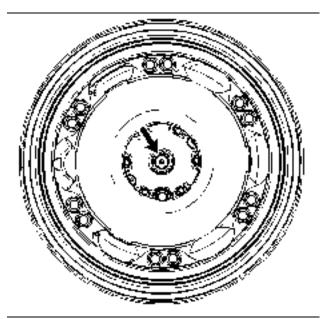


Illustration 223 q01250751

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.

Use a sampling gun in order to obtain an oil sample for the front wheel through the filler plug. Remove the filler plug slowly in order to relieve any pressure.

Refer to the following publications for S·O·S information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

Fuel System - Fill

SMCS Code: 1250-544

A WARNING

Personal injury or death may result from failure to adhere to the following procedures.

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

Clean up all leaked or spilled fuel. Do not smoke while working on the fuel system.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

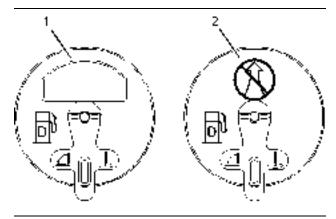


Illustration 224

g01329147

- (1) Vented Fuel Cap
- (2) Non-Vented Fuel Cap

Note: Machines that are not equipped with a fast fill fuel adapter group require a vented fuel cap. Machines that are equipped with the nonpressurized fast fill fuel adapter group require a vented fuel cap. Machines that are equipped with the pressurized fast fill fuel adapter group require a non-vented fuel cap.

NOTICE

Failure to install a vented fuel cap on a nonpressurized fuel tank could create a vacuum in the fuel system. This could cause damage to the fuel system components and/or inefficient engine operation.

Failure to install a non-vented fuel cap on a pressurized fast fill fuel adapter group could cause the fuel tank to be overfilled during refueling.

Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the fuel tank capacity of your machine.

Park the machine on a level surface. Make sure that the transmission control is in the PARK position.

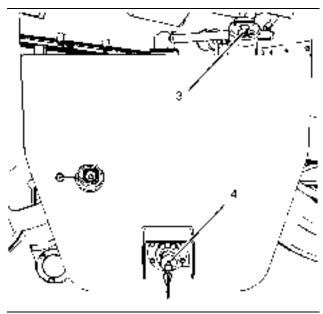


Illustration 225 g01329113

Fuel Tank Filler Neck

- 1. Clean fuel cap (3) and the filler neck. Remove the fuel cap.
- **2.** Fill the fuel tank with fuel through the filler neck and install the fuel cap.

Fast Fill Fuel Adapter

NOTICE

Use only a Caterpillar approved fast fill system to fuel machines. Over pressurization may cause tank deformation and fuel spillage.

Contact your Cat dealer for fast fill system availability.

1. Remove dust cover (4) and clean the fast fill fuel adapter.

Note: The maximum fuel flow rate for the fast fill fuel adapter group is 375 L/min (100 US gpm).

Fill the fuel tank through the fast fill fuel adapter and install the dust cover.

i02434474

Fuel System - Prime

SMCS Code: 1250-548

A WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire. Clean up fuel spills immediately.

Note: The engine start switch must be in the OFF position in order to prime the fuel system.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

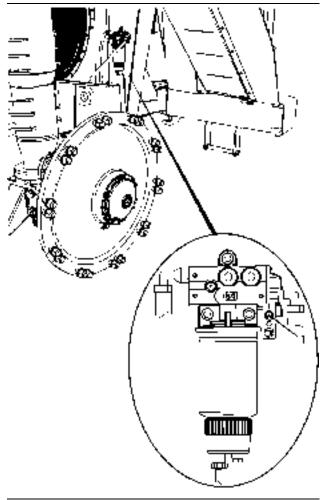


Illustration 226 g01216232

The tire and the wheel are removed for ease of viewing.



(1) Switch for the Electric Fuel Priming Pump

- 2. Hold switch (1) upward in order to activate the electric fuel priming pump. The priming pump will fill the engine fuel lines and the fuel filters with fuel.
- 3. As the air is purged from the fuel system, fuel pressure will increase. Listen for the electric fuel priming pump to come under load. Do not continue priming the fuel system after the priming pump is under load. Do not operate the priming pump for more than two minutes.
- 4. Start the engine.
- **5.** If the engine starts but the engine runs rough, continue to run the engine at low idle until the engine runs smoothly.
- **6.** If the engine does not start after several attempts, consult your Caterpillar dealer.

Fuel System Primary Filter (Water Separator) - Drain

i02612728

i02435841

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1261-543; 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.

Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

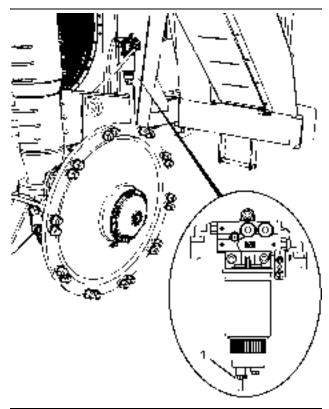


Illustration 227

g01216735

The tire and the wheel are removed for ease of viewing.

Open drain valve (1) on the bottom of the fuel/water separator element in order to drain the water into an approved container. Close the drain valve when all of the water has been drained.

Fuel System Primary Filter (Water Separator) - Replace

SMCS Code: 1261-510; 1263-070

Replace the fuel/water separator elements when the engine has a loss of power or when the exhaust smoke is black.

🕰 WARNING

Personal injury or death can result if spilled fuel ignites. Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

To help prevent possible injury, turn the battery disconnect switch to the OFF position when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not 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. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

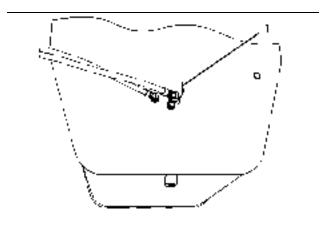


Illustration 228

g01216993

View of the back side of the fuel tank

2. Close fuel shutoff valve (1).

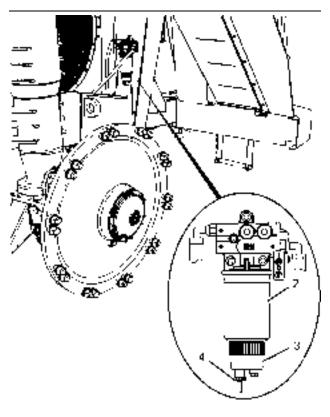


Illustration 229

g01216878

The tire and the wheel are removed for ease of viewing.

- 3. The water separator bowl (3) is located on the bottom of the primary fuel filter (2). Open the drain valve (4) on the water separator bowl. Allow the water and the fuel to drain into a suitable container.
- **4.** Use a strap type wrench to remove the filter from the filter mounting base.

5. Remove the water separator bowl from the filter element. Clean the water separator bowl and the O-ring groove.

Note: The water separator bowl is reusable. Do not discard the water separator bowl.

- **6.** Inspect the O-ring seal in the water separator bowl for damage. Replace the O-ring seal, if necessary.
- Lubricate the O-ring seal with clean diesel fuel or with engine oil. Place the O-ring seal in the water separator bowl.
- **8.** Install the water separator bowl onto the new filter element by hand. Do not use tools to tighten the water separator bowl.
- 9. Lubricate the gasket of the new filter element with clean diesel fuel. Install the new 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.

10. 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: You may need to use a Caterpillar strap wrench, or another suitable tool, 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.

Tighten the drain valve on the water separator bowl.

Note: The water separator element is under suction during normal engine operation. The drain valve must be tightened in order to prevent air leakage into the fuel system.

- 12. Open the fuel shutoff valve.
- **13.** Prime the fuel system.

For information on priming the fuel system, refer to the Operation and Maintenance Manual, "Fuel System - Prime".

14. Start the engine and inspect the filter for leaks. Make any necessary repairs. If the engine has a loss of power or the exhaust smoke is still black, replace the secondary filters.

Fuel System Secondary Filter -Replace

SMCS Code: 1261-510-SE

WARNING

Personal injury or death can result if spilled fuel ignites. Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

To help prevent possible injury, turn the battery disconnect switch to the OFF position when changing fuel filters or water separator elements. Clean up fuel spills immediately.

NOTICE Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not 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. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

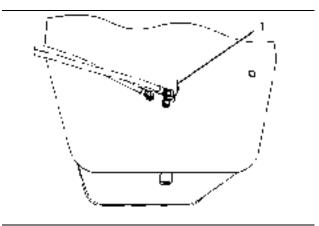


Illustration 230

g01216993

View of the back side of the fuel tank

2. Close fuel shutoff valve (1).

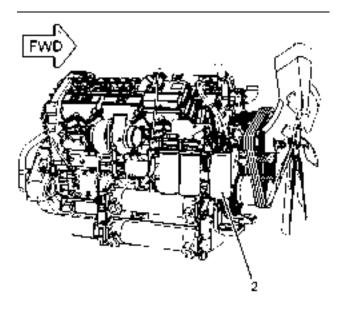


Illustration 231

q01215222

- 3. Secondary fuel filter (2) is located on the right side of the engine. Remove the filter element from the base. Discard the used element.
- 4. Clean the filter mounting base. Make sure that all of the former seal is removed.
- 5. Lubricate the sealing surface of the new filter element with clean diesel fuel.
- 6. Install the filter by hand. Tighten the filter element until the sealing surface contacts the base. Tighten the filter element for an additional 3/4 of a turn.

There are rotation index marks on the filter element. These marks are spaced 90° or 1/4 turn from each other. Use the marks as a guide when you tighten the filter element.

- 7. Open the fuel shutoff valve.
- **8.** Prime the fuel system. Refer to the Operation and Maintenance Manual, "Fuel System Prime".
- **9.** Start the engine and inspect the filter for leaks. Make any necessary repairs.

i02410359

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-Z2; 1273-070-STR

1. Make sure that the transmission control is in the PARK position.

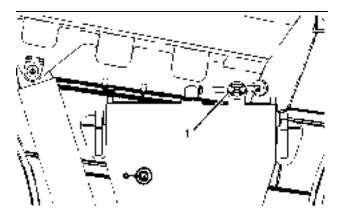


Illustration 232 g01204658

- 2. Remove fuel tank cap (1).
- Inspect the cap gasket. Replace the gasket if the gasket is damaged.
- 4. Remove the retaining snap ring.
- 5. Remove the screen.
- 6. Disassemble the cap.
- 7. Wash all the parts in clean, nonflammable solvent.
- 8. Lightly oil the element. Assemble the cap.
- **9.** Install the screen, the retaining snap ring and the cap.

i02520941

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-MAS

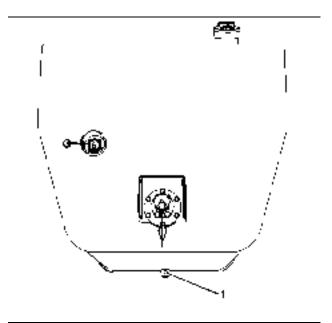


Illustration 233 g01204673

The fuel tank is located on the right side of the machine.

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.

- Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- Open fuel tank drain valve (1) and allow the moisture and the sediment to drain into a suitable container.
- 3. Close the drain valve.

Fuses - Replace

SMCS Code: 1417-510

NOTICE If it is necessary to replace fuses frequently, an electrical problem may exist.

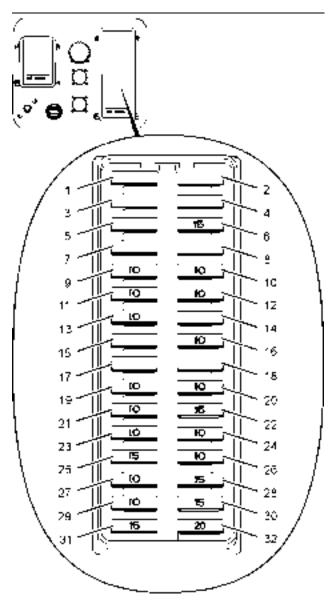
Contact your Caterpillar dealer.

Fuses protect the electrical system from damage that is caused by overloaded electrical circuits. Replace a fuse if the element separates. If the fuse of a particular electrical system requires frequent replacement, check the electrical circuit. Repair the electrical circuit, if necessary. The fuse panel is positioned in the operator's compartment behind the operator's seat.

NOTICE

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

24 Volt Fuses



g01250131 Illustration 234



Spare Fuse (1)



Spare Fuse (2)



Spare Fuse (3)



Spare Fuse (4)



Spare Fuse (5)



HVAC (6) - 15 Amp



Spare Fuse (7)



Spare Fuse (8)



Backup Alarm (9) - 10 Amp



MineStar (10) - 10 Amp



Autolube System (11) - 10 Amp



Accessories (12) - 10 Amp



WAVS (13) – 10 Amp



Spare Fuse (14)



Spare Fuse (15)



Secondary Steering, Prelube, and Oil Evac (16) – 10 Amp



Spare Fuse (17)



Spare Fuse (18)



Heated Mirror (Upper) (19) – 10 Amp



Heated Mirror (Lower) (20) - 10 Amp



Horn (21) - 10 Amp



Chassis ECM (22) - 15 Amp





Directional Signal/Hazard Light (23) – 10 Amp



Product Link (24) - 10 Amp



Windshield Washer and Wiper (25) – 15 Amp



Instrument Cluster (26) - 10 Amp



VIMS or TPMS (27) – 10 Amp



Brake ECM (28) - 15 Amp



Keyswitch (29) - 10 Amp



Stop Lamps (30) – 15 Amp



MineStar (31) - 15 Amp



24 Volt to 12 Volt Converter (32) – 20 Amp

12 Volt Fuses

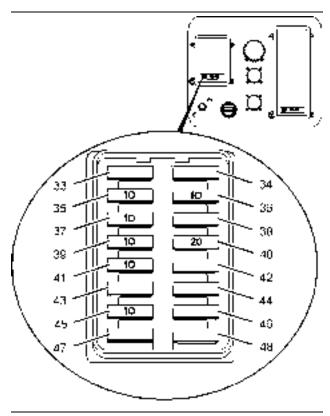


Illustration 235 g01250085



Spare Fuse (33)



Spare Fuse (34)



Entertainment Radio (35) – 10 Amp



12 Volt Power Port (Console Panel) (36) – 10 Amp



12 Volt Power Port (Rear Panel) (37) – 10 Amp



Spare Fuse (38)



Cigar Lighter (39) - 10 Amp



Communication Radio (40) - 20 Amp



HVAC Control (41) - 10 Amp



Spare Fuse (42)



Spare Fuse (43)



Spare Fuse (44)



Entertainment Radio (45) - 10 Amp



Spare Fuse (46)



Spare Fuse (47)



Spare Fuse (48)

i07349182

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.

A 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.

- Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.
- Disassemble the housing for the HID lamp in order to have access to the bulb.

Note: On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.

- 3. Remove the bulb from the HID lamp.
- 4. Install the replacement bulb in the HID lamp.

If the bulb is an integral part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: In order 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.

- 5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.
- **6.** Reattach the electrical power to the HID lamp.
- 7. Check the HID lamp for proper operation.

Note: Consult your Cat dealer for additional information on HID lamps.

i02411945

Hoist Cylinder Bearings - Lubricate

SMCS Code: 5102-086-BD

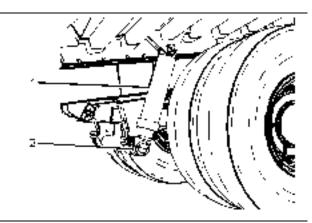


Illustration 236

g01205467

Lubricate the lower bearings with two fittings (1) that are located at the bottom of the cylinder and lubricate the upper bearings with two fittings (2) that are located on the cylinder housing.

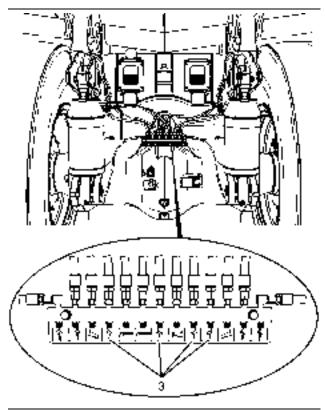


Illustration 237

q01205470

If your machine is equipped with remote lubrication fittings, lubricate fittings (3).

Hoist, Torque Converter and Brake Oil Sample - Obtain

SMCS Code: 5050-008; 7542

▲ WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

🕰 WARNING

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

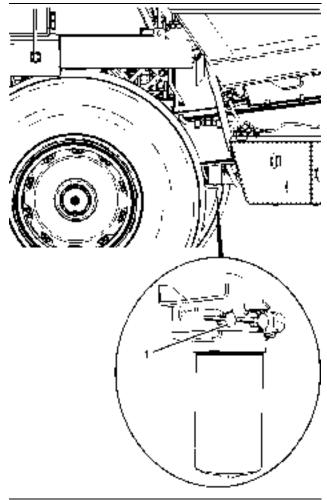


Illustration 238 g01280756

Sampling valve (1) for the hoist, torque converter, and brake oil is located on the filter assembly for the torque converter lockup clutch valve. This filter assembly is located on the left inside frame rail behind the front wheel.

Refer to the following publications for $S \cdot O \cdot S$ information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

Hoist, Torque Converter and Brake Tank Oil - Change

SMCS Code: 5056-044

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

 Park the machine on a level surface with the truck body in the DOWN position. Stop the engine and make sure that the transmission control is in the PARK position.

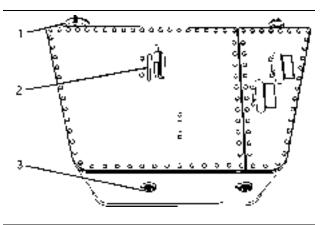


Illustration 239

g01204719

The hoist, torque converter, and brake tank is located on the left side of the machine.

2. Remove filler cap (1) in order to prevent a vacuum in the tank. Install the filler cap after the tank has been drained. This will prevent dirt from entering the system.

3. Remove tank drain valve plug (3). Install a 88.0 mm (3.50 inch) long NPT pipe nipple in order to open the internal drain valve. The outer diameter of the NPT pipe nipple should be 25 mm (1 inch). Drain the oil into a suitable container.

Note: Hand tighten the NPT pipe nipple. Do not use tools.

- **4.** Remove the pipe nipple. Clean the drain plug and install the drain plug.
- **5.** Remove the filler cap.
- **6.** Remove the retaining ring on the filler screen. Remove the screen.
- Wash the cap and the filler screen in clean, nonflammable solvent. Allow the cap and the filler screen to dry.
- **8.** Inspect the cap seal. Use a new seal if the used seal is damaged. Install the filler screen and the retaining ring.

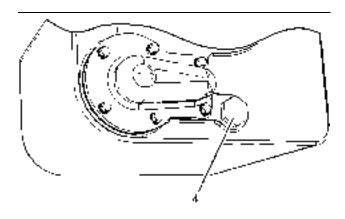


Illustration 240

g01384730

- Remove drain plug (4) from the torque converter sump and drain the oil into a suitable container. Clean the drain plug and install the drain plug.
- 10. Fill the hoist/brake tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".

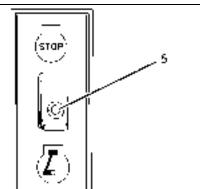


Illustration 241 g01210592

The engine shutdown switch is located above the left side of the front bumper.

- **11.** Use engine shutdown switch (5) to prevent the engine from starting. Crank the engine for approximately 15 seconds. The oil level will decrease as oil fills the system.
- **12.** Add oil to the tank in order to raise the oil to the proper level in upper sight gauge (2). Refer to Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil Level Check" for the proper oil level within the sight gauge.
- **13.** Repeat Step 11 and Step 12 until the proper oil level stabilizes in the upper sight gauge.
- **14.** Lower the guard on the engine shutdown switch. Start the engine and operate the engine at low idle. Check for leaks and make necessary repairs.
- 15. Raise the truck body until the hoist cylinders are extended halfway. Lower the truck body and add oil, if necessary.
- **16.** Raise the truck body until the hoist cylinders are fully extended. Lower the truck body and add oil, if necessary.
- **17.** Repeat Step 15 and Step 16 until the proper oil level stabilizes in the upper sight gauge.
- 18. Install the filler cap.

i03206136

Hoist, Torque Converter and Brake Tank Oil Level - Check

SMCS Code: 5056-535-OC

Type 1

The type 1 hoist, torque converter, and brake tank was factory installed on machines JRP1–1564. All type 1 tanks should be converted to a type 2 tank. Contact your Caterpillar dealer in order to update the hoist, torque converter, and brake tank.

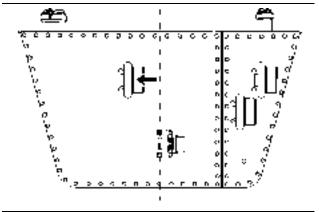


Illustration 242

g01636034

The type 1 tank can be identified by the alignment of the sight gauges. The upper sight gauge and the lower sight gauge are not aligned vertically on the type 1 tank.

1. Park the machine on a level surface with the truck body in the DOWN position. Stop the engine and allow the oil to cool. Make sure that the transmission control is in the PARK position.

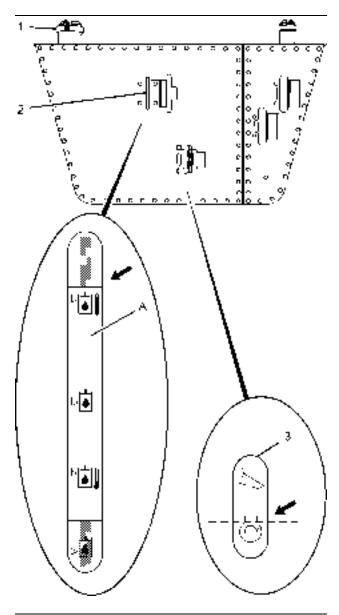


Illustration 243 g01636033

The hoist, torque converter, and brake tank is located on the left side of the machine.

2. Check the oil level in sight gauge (2). The oil level must be checked when the oil is cold (ambient temperature). Maintain the oil level within upper green range (A).

Note: As the oil approaches operating temperature, the oil level will rise above the top of the sight gauge.

NOTICE

Do not use the lower green range in order to check to oil level of the hoist, torque converter, and brake tank. The lower green range will not provide enough oil to the system and machine damage could result.

3. If necessary, remove filler cap (1) and add oil. If the system has been drained, see this Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil - Change" for the proper filling procedure.

Note: If the oil level must be checked with the truck body in the RAISED position, the minimum oil level must be within sight gauge (3) with the engine on.

Note: The type 1 tank and the type 2 tank have the same oil capacity. The upper sight gauge is raised on the type 2 tank in order to display the proper level within the sight gauge.

Type 2

The type 2 hoist, torque converter, and brake tank was factory installed on machines JRP1565–UP. All machines with a previous serial number should be converted to a type 2 tank.

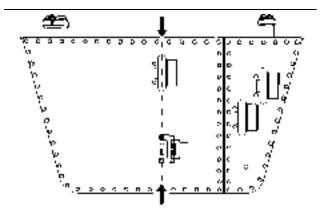
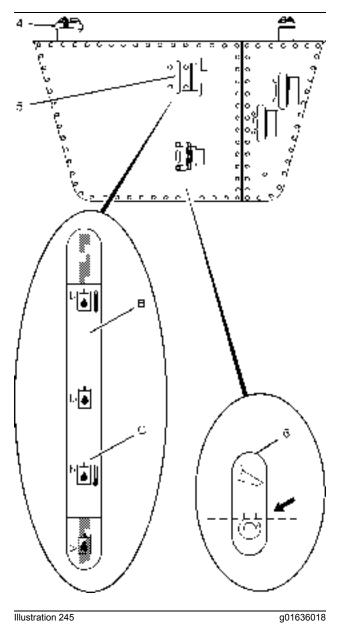


Illustration 244

g0163601

The type 2 tankcan be identified by the alignment of the sight gauges. The upper sight gauge and the lower sight gauge are aligned vertically on the type 2 tank.

 Park the machine on a level surface with the truck body in the DOWN position. Stop the engine and make sure that the transmission control is in the PARK position. 200



The hoist, torque converter, and brake tank is located on the left side of the machine.

- 2. Check the oil level in sight gauge (5).
 - a. When the oil is hot (operating temperature),
 maintain the oil level within upper green range
 (B).
 - b. When the oil is cold (ambient temperature), maintain the oil level within lower green range (C).
- 3. If necessary, remove filler cap (4) and add oil. If the system has been drained, see this Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil - Change" for the proper filling procedure.

Note: If the oil level must be checked with the truck body in the RAISED position, the minimum oil level must be within sight gauge (6) with the engine on.

i04382447

Lubrication Pump Oil - Change

SMCS Code: 7516-044-OC

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

- Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- 2. Raise the body to the fully raised position and install the body retaining pins. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".
- 3. Stop the engine.

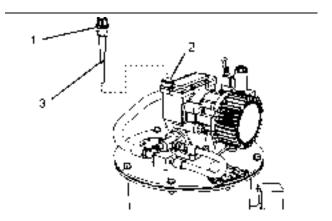


Illustration 246

g02547383

The autolube pump is located between the frame rails above the transmission.

- 4. Remove oil level gauge (dipstick) (1).
- **5.** Use a suction device in order to extract the oil through filler port (2).
- **6.** Fill the electric lubrication pump with oil through the filler port. Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".
- 7. Maintain the oil level at indicator (3) on the gauge.

Lubrication Pump Oil Level - Check

SMCS Code: 7516-535-FLV

A WARNING

A raised body (bed) may fall unexpectedly and without warning resulting in personal injury or death.

When it is necessary to work under the truck with the body (bed) raised, install the body (bed) retaining pins through the pin bores in the frame and the retaining brackets on the body.

- Park the machine on a level surface. Make sure that the transmission control is in the PARK position.
- 2. Raise the body to the fully raised position and install the body retaining pins. For the proper procedure, refer to Operation and Maintenance Manual, "Body Retaining Pin".
- 3. Stop the engine.

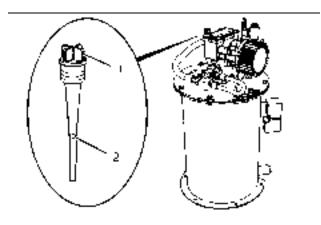


Illustration 247

g02546737

The autolube pump is located between the frame rails above the transmission.

- **4.** Remove oil level gauge (dipstick) (1). Inspect the gauge in order to determine the oil level.
- **5.** Maintain the oil level at indicator (2) on the gauge. If necessary, add oil.

i02518137

Magnetic Plug (Wheels) - Check

SMCS Code: 0663-535

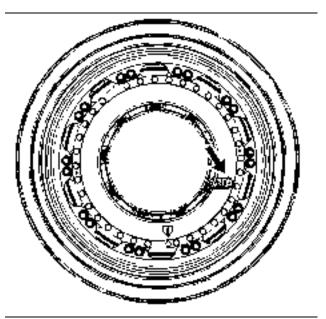


Illustration 248

q01259878

Magnetic plug on the rear wheel

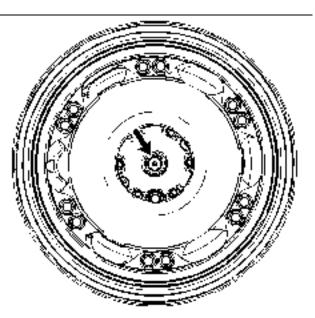


Illustration 249

g01250751

Magnetic plug on the front wheel

All of the wheels have a magnetic plug. The magnetic plugs will attract metal from the oil. A bearing failure is indicated by an increased amount of metal on the magnetic plug.

202

If any abnormal particles are found, consult your Caterpillar dealer.

After you correct a failure that produces debris, clean the compartments before you add any oil.

i04411154

Magnetic Screen (Transmission) - Clean

SMCS Code: 3030-070-MGS

A WARNING

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

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

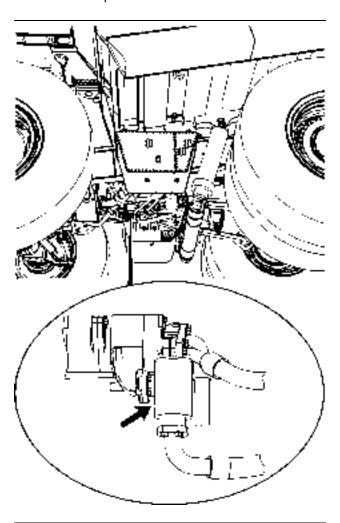


Illustration 250 g01251098

Location of the transmission magnetic screen

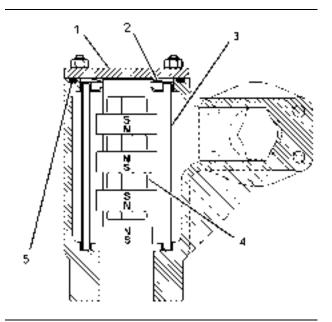


Illustration 251 g02234015

- 2. Remove cover (1), wave washer (2), screen (3) and magnetic tube assembly (4).
- 3. Inspect the screen and magnets for large particles of debris. An excessive amount of debris may be an indication of possible failure. Also, oil contamination may require you to change the transmission oil. If large particles are found, consult your Caterpillar dealer for further analysis and additional guidance.

NOTICE

Do not drop or rap the magnets against any hard objects. Replace any damaged magnets.

- 4. Remove the magnets from the tube assembly.
- 5. Wash the magnets, the screen, and the magnetic tube assembly in clean, nonflammable solvent. Clean the magnets with a cloth, a stiff bristle brush or air pressure.
- Install the clean magnets on the tube assembly. Refer to Illustration 251 for the arrangement of the magnets.
- **7.** Inspect seal (5) in the housing. If the seal is damaged, replace the seal.
- **8.** Assemble the screen and the magnetic tube assembly.

Note: Screen must be assembled with "Assemble This End In" facing inward.

Inspect the screen and the magnetic tube assembly to ensure both are installed properly into housing.

Note: Improper installation will cause the screen to seat too high in the housing and crush the screen when the cover is installed.

10. Install the wave washer and the cover.

Note: Before tightening the nuts, apply pressure to center of cover. If the cover will not seat evenly over each stud, the screen and the magnetic tube assembly are not properly installed. If necessary, remove the cover and adjust the screen and the magnetic tube assembly and reinstall the wave washer and the cover.

- **11.** Start the engine and operate the engine at low idle. Check for any leaks and make the necessary repairs.
- 12. Check the oil level in the transmission tank. If necessary, add oil. For the proper procedure, refer to Operation and Maintenance Manual, "Transmission Tank Oil Level - Check".

i02612683

Oil Filter (Parking Brake Release) - Replace

SMCS Code: 5068-510-BRK

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

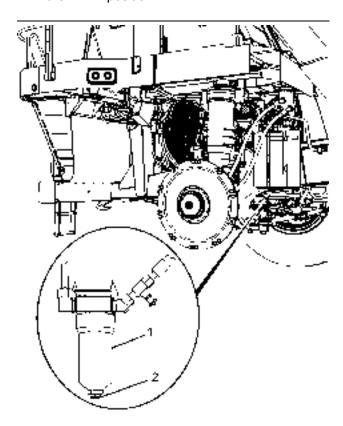


Illustration 252

g01249591

The parking brake release oil filter is located on the inside left frame rail near the front axle.

The tire and the wheel on the left front is removed for ease of viewing.

2. Remove drain plug (2) from filter housing (1). Drain the oil into a suitable container.

Note: Removing the drain plug from the bottom of the brake oil filter may not allow all of the oil to drain from the filter housings. When you remove the filter housing and the filter element, be careful to avoid contact with hot oil.

- **3.** Clean the drain plug and inspect the seal in the drain plug. If the seal is damaged, replace the seal with a new seal. Install the drain plug.
- **4.** Remove the filter housing and the filter element. Properly discard the used filter element.
- Wash the filter housing in clean nonflammable solvent.
- **6.** Inspect the seal in the filter base. If the seal is damaged, replace the seal with a new seal.
- **7.** Install the new filter element in the housing. Install the housing.
- **8.** Start the engine and operate the engine at low idle. Check for any leaks and make the necessary repairs.
- 9. Check the oil level in the hoist, torque converter, and brake tank. If necessary, add oil. For the proper procedure, refer to Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil Level - Check".

Oil Filter (Steering Pump Case Drain) - Replace

SMCS Code: 5068-510; 5091-510-ZH

Park the machine on level ground and stop the engine. Make sure that the transmission control is in the PARK position.

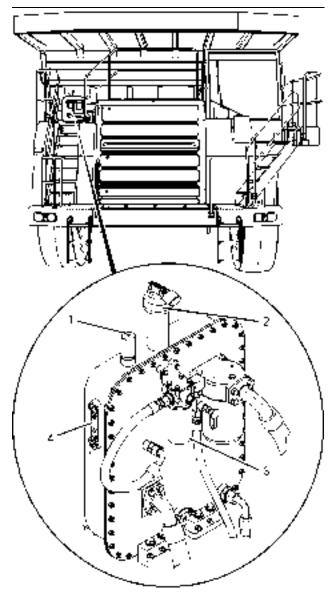


Illustration 253 g01212119

- 1. Push the button on breaker relief valve (1).
- **2.** Slowly, loosen filler cap (2) on the steering hydraulic tank in order to relieve the pressure.

A WARNING

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

- 3. Remove case drain oil filter (3).
- **4.** Clean the filter mounting base. Make sure that the old filter seal is removed.
- 5. Lubricate the seal of the new filter with clean oil.

6. Install the new filter by hand until the seal contacts the filter mounting base. Note the position of the index marks on the filter in relation to a fixed point on the mounting base.

Note: There are rotation index marks on each filter that is spaced 90 degrees (1/4 turn) away from each other. When you tighten the filter, use the rotation index marks as a guide.

7. Tighten all filters according to the instructions that are printed on the filter. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a strap type wrench or a suitable tool 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.

- **8.** Start the engine and operate the engine at low idle. Check the machine for leaks and make any necessary repairs. Install the filler cap.
- Check the oil level. Maintain the oil level within the green range of sight gauge (4). If necessary, add oil.

i02549938

Oil Filter (Steering) - Replace

SMCS Code: 5068-510-ZH

Park the machine on level ground and stop the engine. Make sure that the transmission control is in the PARK position.

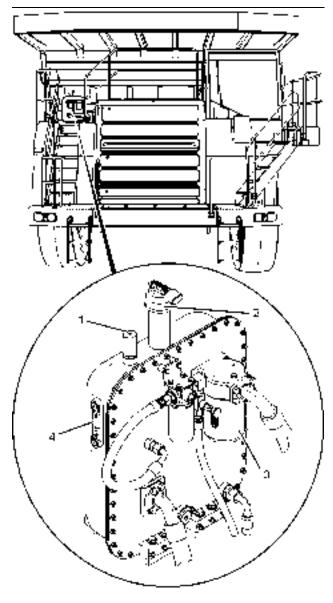


Illustration 254 g01212156

- 1. Push the button on breaker relief valve (1).
- **2.** Slowly, loosen filler cap (2) on the steering hydraulic tank in order to relieve the pressure.

A WARNING

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

- 3. Remove steering oil filter (3).
- **4.** Clean the filter mounting base. Make sure that the old filter seal is removed.
- 5. Lubricate the seal of the new filter with clean oil.

Oil Filter (Torque Converter) - Replace

6. Install the new filter by hand until the seal contacts the filter mounting base. Note the position of the index marks on the filter in relation to a fixed point on the mounting base.

Note: There are rotation index marks on each filter that is spaced 90 degrees (1/4 turn) away from each other. When you tighten the filter, use the rotation index marks as a guide.

7. Tighten all filters according to the instructions that are printed on the filter. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a strap type wrench or a suitable tool 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.

- **8.** Start the engine and operate the engine at low idle. Check the machine for leaks and make any necessary repairs. Install the filler cap.
- Check the oil level. Maintain the oil level within the green range of sight gauge (4). If necessary, add oil.

i03043043

Oil Filter (Torque Converter) - Replace (Inlet)

SMCS Code: 5068-510-VC

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

Note: Removing the drain plug from the bottom of the torque converter oil filter may not allow all of the oil to drain from the filter housing. When you remove the filter housing and the filter element, be careful to avoid contact with hot oil.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

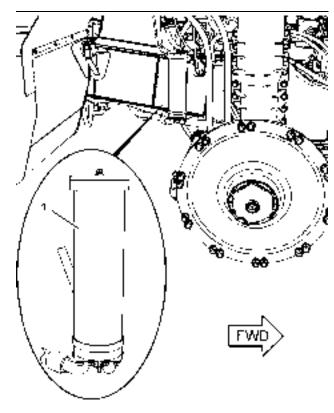


Illustration 255

q01217140

The tire and the wheel are removed for ease of viewing.

(1) Torque converter oil filter

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.

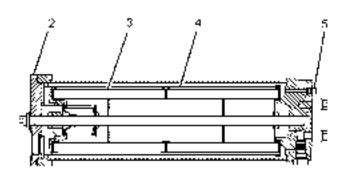


Illustration 256 g01217151

- 2. Remove drain plug (5) from the bottom of the filter housing and drain the oil into a suitable container.
- 3. Clean the drain plug and install the drain plug.
- **4.** Remove cover (2), filter element (3), and screen (4) as an assembly.
- **5.** Discard the filter element into a suitable container.
- 6. Remove the screen from the filter housing.
- **7.** Clean the filter housing in clean nonflammable solvent.
- **8.** Inspect the cover seal. If the seal is damaged, replace the cover seal with a new cover seal.
- 9. Install the screen and a new filter element.
- 10. Install the cover.
- **11.** Start the engine and operate the engine at low idle. Check for leaks and make any necessary repairs.
- **12.** Check the oil level in the hoist, torque converter, and brake tank. If necessary, add oil. For the proper procedure, refer to Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil Level Check".

Oil Filter (Torque Converter) - Replace

(Lockup Clutch Valve)

SMCS Code: 5068-510-VC

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact skin.

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

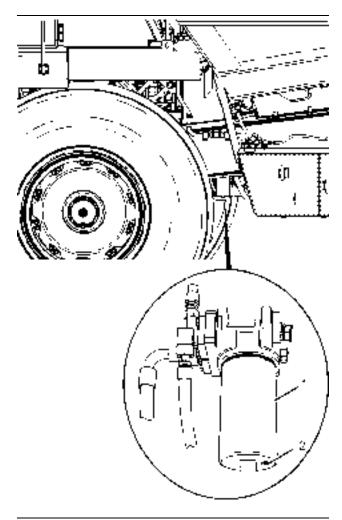


Illustration 257 g01218871

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.

2. Remove drain plug (2) from filter housing (1). Drain the oil into a suitable container. Clean the drain plug and install the drain plug.

Note: Removing the drain plug from the bottom of the transmission oil filter may not allow all of the oil to drain from the filter housings. When you remove the filter housing and the filter element, be careful to avoid contact with hot oil.

- **3.** Remove the filter housing and the filter element. Properly discard the used filter element.
- Wash the filter housing in clean nonflammable solvent.
- **5.** Inspect the seal in the filter housing. If the seal is damaged, replace the seal with a new seal.
- **6.** Install the new filter element in the housing. Install the housing.
- 7. Start the engine and operate the engine at low idle. Check for any leaks and make the necessary repairs.
- 8. Check the oil level in the hoist, torque converter, and brake tank. If necessary, add oil. For the proper procedure, refer to Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil Level Check".

i03043082

Oil Filter (Transmission) - Replace

SMCS Code: 3067-510

A WARNING

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

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position. SEBU7790-12 209
Maintenance Section

Maintenance Section
Oil Filter - Inspect

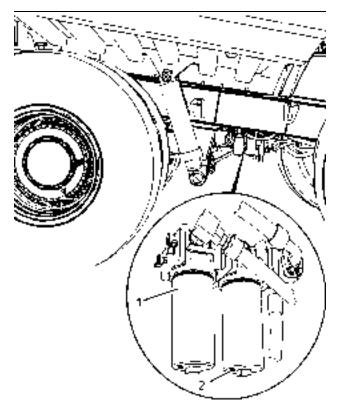


Illustration 258 g01217792

The transmission oil filter is located behind the fuel tank and under the center tube.

The fuel tank is removed for ease of viewing.

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.

2. Remove drain plug (2) from each filter housing (1). Drain the oil into a suitable container. Clean the drain plugs and install the drain plugs.

Note: Removing the drain plugs from the bottom of the transmission oil filter may not allow all of the oil to drain from the filter housings. When you remove the filter housings and the filter elements, be careful to avoid contact with hot oil.

3. Remove the filter housings and the filter elements. Properly discard the used filter elements.

- Wash the filter housings in clean nonflammable solvent.
- **5.** Inspect the seal in each filter housing. If the seal is damaged, replace the seal with a new seal.
- **6.** Install the new filter elements in the housings. Install the housings.
- 7. Start the engine and operate the engine at low idle. Check for any leaks and make the necessary repairs.
- Check the oil level in the transmission tank. If necessary, add oil. For the proper procedure, refer to Operation and Maintenance Manual, "Transmission Tank Oil Level - Check".

i02106227

Oil Filter - Inspect

SMCS Code: 5068-040

Inspect a Used Filter for Debris

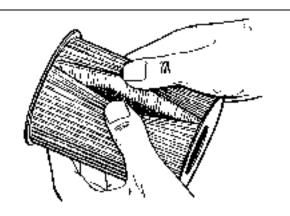


Illustration 259

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.

Radiator Core and Aftercooler - Clean

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.

i02612604

Radiator Core and Aftercooler - Clean

SMCS Code: 1064-070; 1353-070-KO

NOTICE

High water pressure water and high water volume can damage the radiator.

Use a water spray nozzle that will disperse the water.

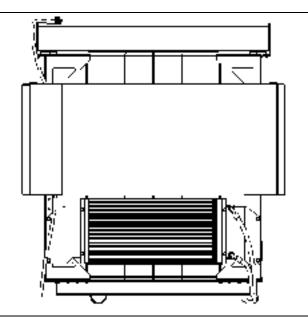


Illustration 260

g01262519

Typical example

- **1.** Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.
- 2. Remove the two-piece grill.
- 3. Clean the radiator core and clean the aftercooler.

Use compressed air, high pressure water, or steam to remove dust and other debris from the radiator core and the aftercooler. However, the use of compressed air is preferred.

4. install both pieces of the grill.

See Special Publication, SEBD0518, "Know Your Cooling System" for the complete procedure for cleaning the radiator core.

i02412098

Rear Axle A-Frame Bearing - Lubricate

SMCS Code: 7551-086-ZX

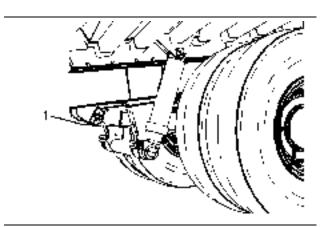


Illustration 261

g01205582

Lubricate fitting (1) that is located in front of the rear axle support.

SEBU7790-12 211



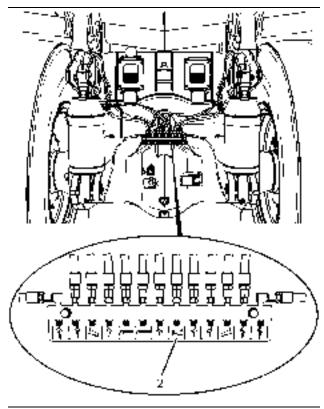


Illustration 262

g01205586

If your machine is equipped with remote lubrication fittings, lubricate fitting (2).

i02503639

Rear Axle Housing End Play - Adjust

SMCS Code: 3282-025-EP

The end play adjustment of the rear axle housing is recommended at the initial 2000 service hours. Yearly inspection and maintenance of the end play of the rear axle housing will maximize service life.

Note: The end play adjustment of the rear axle housing is recommended at every 6 months in severe applications.

To adjust the end play of the rear axle housing, refer to Testing and Adjusting, RENR8303, "777F Off-Highway Truck Power Train". Consult your Caterpillar dealer for any additional information.

Rear Axle Housing Lateral Control Rod Bearings -Lubricate

SMCS Code: 7551-086-RO

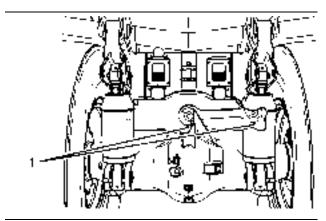


Illustration 263

g01205386

This rear view is cutaway in order to show the fittings for the lateral control rod.

Lubricate two fittings (1) that are located at the rear of the machine between the frame and the differential.

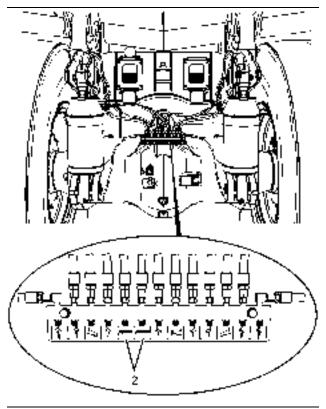


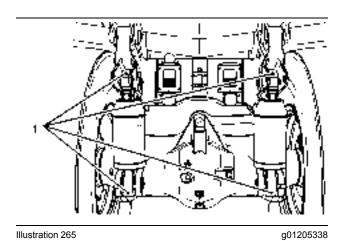
Illustration 264 g01205388

If your machine is equipped with remote lubrication fittings, lubricate fittings (2).

i02411301

Rear Suspension Cylinder Bearings - Lubricate

SMCS Code: 7213-086-BD



Lubricate four fittings (1) that are located at the rear of the machine between the frame and the differential.

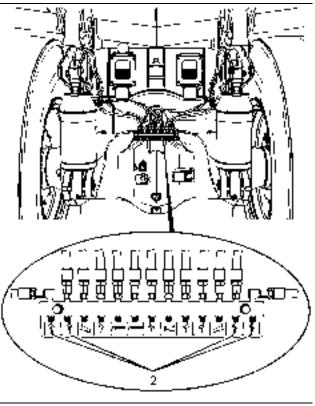


Illustration 266 g01205339

If your machine is equipped with remote lubrication fittings, lubricate fittings (2).

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.

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

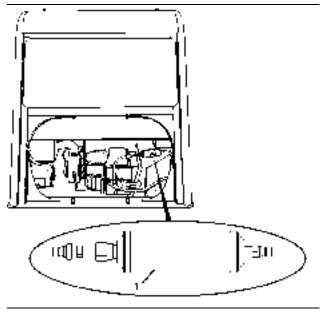


Illustration 267

g01217368

(1) Refrigerant dryer

Refer to Service Manual, SENR5664, "Air Conditioning and Heating R-134a for All Caterpillar Machines" for the proper procedure to change the refrigerant dryer and for the proper procedure to reclaim the refrigerant gas.

i02650056

Rim - Inspect

SMCS Code: 4209-040

Inspect the rim whenever a tire is dismounted.

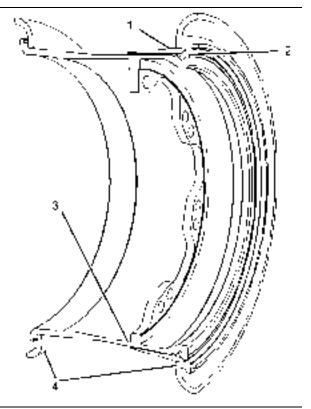


Illustration 268 g01329962

Typical example

Cutaway view of the rim assembly

Inspect the following components of the rim assembly:

Bead Seat Band (1) – Inspect the bead seat band for the following: wear, corrosion and cracks.

Lock Ring (2) – Inspect the lock ring for the following: wear, corrosion, cracks, flat spots and warping. When the lock ring is not assembled, the two ends of the lock ring must overlap each other.

Rim Base (3) – Inspect the rim base for the following: wear, corrosion, cracks and fretting.

Flanges (4) – Inspect the flanges for the following: wear, corrosion, cracks and fretting.

Do not reuse rim components that are cracked, worn, damaged, or pitted from corrosion. For more information on the reusability of the rim components, consult your Caterpillar dealer.

i02650089

Rim - Inspect

SMCS Code: 4209-040

The tires must be dismounted from the rim in order to perform a magnetic particle inspection.

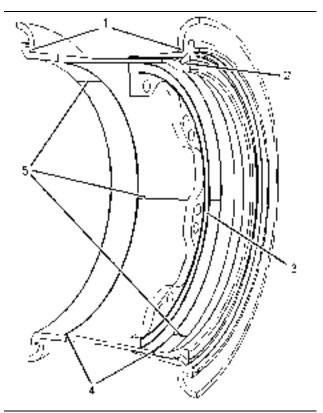


Illustration 269 g01330544

Typical example

Cutaway view of the rim assembly

The following high stress areas of the rim should be checked:

- (1) Areas of contact with flanges
- (2) Contact areas with the lock ring and the groove for the lock ring
- (3) Welds on the rim disc
- (4) Welds around the circumference of the rim base
- (5) Butt welds

For more information on magnetic particle inspection, refer to Guideline For Reusable Parts And Salvage Operations, SEBF8148, "General Salvage and Reconditioning Techniques" or consult your Caterpillar dealer.

Do not reuse rim components that are cracked, worn, damaged, or pitted from corrosion. For more information on the reusability of the rim components, consult your Caterpillar dealer.

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325-040

Inspect the Rollover Protective Structure (ROPS) for bolts that are loose or damaged. Replace any damaged bolts and any missing bolts with original replacement parts only. Refer to Specifications, SENR3130, "Torque Specifications" for the recommended torque.

Note: Apply oil to all bolt threads for the ROPS before you install the bolts. Improper bolt torque can result if you do not apply oil to the threads.

Do not weld reinforcement plates to the ROPS in order to straighten the ROPS. Do not weld reinforcement plates to the ROPS in order to repair the ROPS.

Inspect the ROPS for any cracks in the welds, cracks in the castings, or cracks in any metal section.

Refer to Special Instruction, SEHS6929, "Inspection, Maintenance, and Repair of ROPS and Attachment Installation Guidelines" or consult your Caterpillar dealer for more information.

i02768147

Screen (Torque Converter Sump) - Clean

SMCS Code: 3101-070-Z3

🛕 WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

 Park the machine on a level surface with the truck body in the DOWN position. Stop the engine and make sure that the transmission control is in the PARK position.

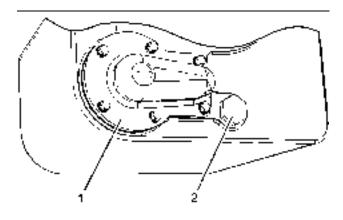
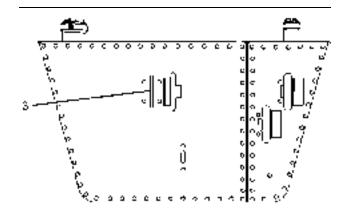


Illustration 270 g01206675

Bottom portion of the torque converter

- 2. Remove drain plug (2) for the torque converter sump and drain the oil into a suitable container. Clean the drain plug and install the drain plug.
- **3.** Remove screen cover (1) and the screen assembly.
- 4. Remove the screen and the baffle retaining nut.
- **5.** Remove the baffle and the screen from the screen cover.
- 6. Wash the screen, the baffle and the screen cover in a clean, nonflammable solvent. Do not crush the screen.
- **7.** Inspect the cover gasket for damage. If the cover gasket is damaged, use a new gasket.
- Install the screen and the baffle on the screen cover. Install the screen cover and the screen assembly.
- **9.** Start the engine and run the engine for approximately 15 seconds. The oil level will decrease as oil fills the system.
- 10. Stop the engine.

Screen (Torque Converter, Hoist, and Brake Oil Cooler) - Clean



- Illustration 271 g01206671 **11.** Add oil to the hoist, torque converter, and brake
- tank in order to raise the oil level to the FULL mark in upper sight gauge (3).

 12. Start the engine and operate the engine at low
- **12.** Start the engine and operate the engine at low idle. Inspect the area for leaks and make any necessary repairs.
- 13. Check the oil level. Maintain the oil level to the FULL mark in the upper sight gauge. If necessary, add oil.

i02489339

Screen (Torque Converter, Hoist, and Brake Oil Cooler) -Clean

SMCS Code: 1374-070-Z3

A 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.

After a failure in the hoist, the torque converter, or the brakes, clean the screens for the hoist, torque converter, and brake oil cooler. The oil cooler screens are located on the right side of the engine.

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

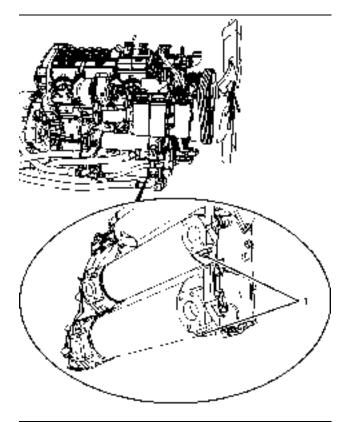


Illustration 272 g01243410

2. Remove drain plugs (1) and drain the oil from the oil cooler into a suitable container. Clean the drain plugs and install the drain plugs.

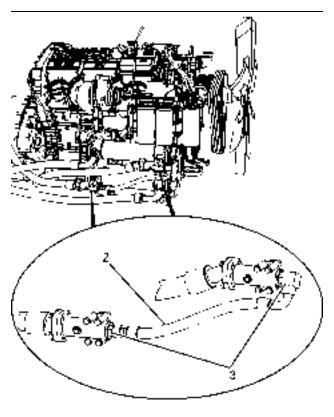


Illustration 273 g01243459

3. Remove both ends of hose (2) and remove fittings (3).

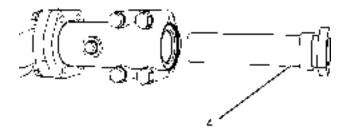


Illustration 274 g01243523

4. Remove oil cooler screens (4).

Note: The oil cooler screens are fragile.

- Wash the screens in a clean, nonflammable solvent.
- **6.** Install the screens. Orient each screen so that the end with the holes is closer to the plug.

- **7.** Inspect the seals. Replace any seals, if necessary. Install the hose and fittings.
- Start the engine and run the engine at low idle. Check for leaks and make any necessary repairs.
- 9. Check the oil level in the hoist, torque converter, and brake tank. If necessary, add oil. Refer to Operation and Maintenance Manual, "Hoist, Torque Converter, and Brake Tank Oil Level -Check" for more information.

i04423691

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 275

g02601458

Typical example

Inspect seat belt (1) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect buckle (2) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Caterpillar dealer for the replacement of the seat belt and the mounting hardware.

218 SEBU7790-12

Maintenance Section Seat Belt - Replace

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).

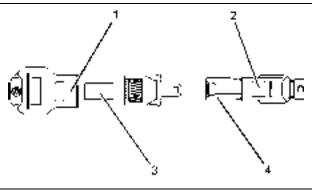


Illustration 276

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.

i04408029

Seat Suspension - Inspect/ Lubricate

SMCS Code: 7324-086; 7324-040

Inspect

Seat Suspension

Inspect the seat suspension for excessive looseness and wear. If excessive looseness or wear is detected, contact you Cat dealer or refer to Systems Operation/ Testing and Adjusting/Disassembly and Assembly, RENR2165, "Comfort Series Seat for Caterpillar Machines".

Lubricate

Seat Suspension

Adjust the seat fully rearward and apply a dry lubricant to the front of the seat slide mechanism. Adjust the seat fully forward and apply a dry lubricant to the rear of the seat slide mechanism. Move the seat rearward and forward several times in order to distribute the lubricant.

Armrest (Seat)

Pivot the armrest to the vertical position. Apply dry lubricant or silicone lubricant between the parts in the mechanism for the armrest assembly.

i05389442

Secondary Steering - Test

SMCS Code: 4300-081-SST

A WARNING

Personal injury or death can occur if steering is lost completely during operation.

Do not continue to operate the machine using the secondary steering.

If the secondary steering activates during operation, immediately park the machine in a safe location. Inspect the machine and correct the condition which made the use of the secondary steering necessary. SEBU7790-12 219

🛕 WARNING

Extended operation of the secondary steering motor could damage the motor and result in loss of emergency steering capability, which could cause injury or death. The Secondary Steering System should not be used for towing the machine or for other service procedures lasting longer than 5 minutes. The motor should be allowed to cool to ambient temperatures before reuse.

NOTICE

The secondary steering switch should always be in the AUTO position during normal operation. This will ensure that secondary steering capability is immediately available if the primary steering system fails.

NOTICE

To minimize battery drain, leave the switch in the MANUAL position only long enough to test the secondary steering. Return the switch to the AUTO position immediately after testing.

Note: This test should be conducted when the truck is empty.

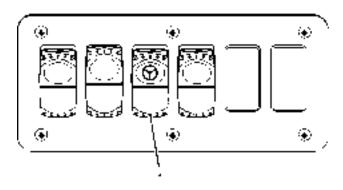


Illustration 277

g01242656

- **1.** Stop the machine on a level surface. Place the transmission control in the PARK position and stop the engine.
- 2. Push the top half of brake release and secondary steering switch (1) and hold the switch in order to manually activate the brake release and secondary steering pump. The switch is located on the overhead switch panel.
- Turn the steering wheel completely to the right. Then, turn the steering wheel completely to the left.
- **4.** Release the switch in order to return the switch to the AUTO position.

The secondary steering response should be similar to the primary steering response. If the secondary steering does not function properly, consult your Caterpillar dealer.

i02530833

Service Brakes - Inspect

SMCS Code: 4251-040

Record the initial measurement of the service brake disc thickness when the machine is new or when the brakes are rebuilt. Compare subsequent measurements to the initial measurement in order to determine the amount of wear.

Inspect the front brakes for wear and inspect the brake system for leakage.

Inspect the rear brakes for wear and inspect the rear brakes for system leakage.

For more information on the proper procedures, refer to Systems Operation, Testing and Adjusting, RENR8315, "777F Off-Highway Truck Hydraulic System" "Service Brake Discs - Check".

Note: Refer to Guideline for Reusable Parts and Salvage Operations, SEBF8095, "Service Brakes for Off-Highway Trucks and Tractors" when you rebuild the brakes.

i03646309

Steering Ball Stud - Replace

SMCS Code: 4305-510-SD

For instructions on replacement of the ball studs, refer to the Disassembly and Assembly, "Off-Highway Truck Machine Systems" manual for your machine or consult your Caterpillar dealer.

The replacement interval may vary and the replacement interval is heavily dependent on the conditions of the haul cycle. These conditions include the following considerations: haul road condition, length of hauls, number of turns per cycle, load and grade of the haul road.

Inspect the condition of the tapered steering bores in the steering assembly whenever the ball studs are replaced. Refer to Reuse and Salvage Guidelines, SEBF9054, "Reusability of Tapered Steering Bores" or consult your Caterpillar dealer in order to determine whether the tapered bore can be reused.

i02420058

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

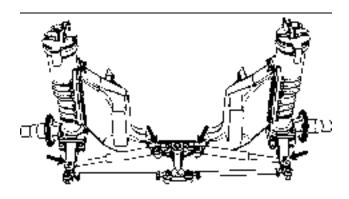


Illustration 278

Top view of steering cylinders

g01210227

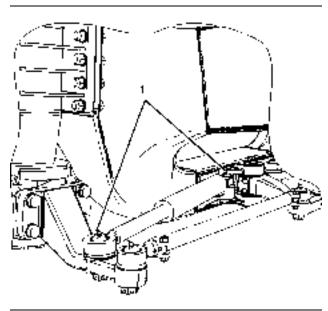


Illustration 279

g01209288

Left steering cylinder

Two fittings (1) are located on each steering cylinder. Lubricate the fittings on each steering cylinder.

Remote Lubrication Fittings (If Equipped)

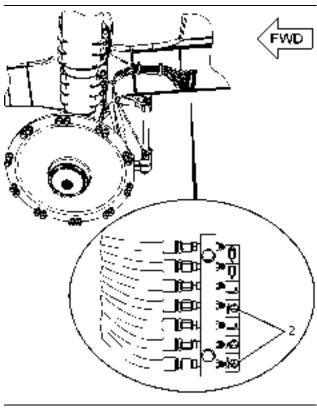


Illustration 280

g01209377

Left side remote lubrication fittings

Two remote lubrication fittings (2) for the steering cylinders are located on each side of the main frame. Lubricate the remote fittings on each side of the main frame.

i04557635

Steering Linkage - Inspect

SMCS Code: 4305-040

Inspect the horizontal wear limits for the ball studs in the steering linkage. At the same time, inspect the outer bearing race. Also, inspect the grease fittings and the seals.

1. Stop the machine on a level surface and place the transmission control in the PARK position.

SEBU7790-12 221

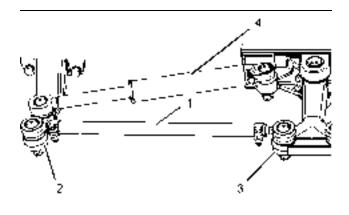


Illustration 281

q02648216

Typical example

- (1) Steering link
- (2) Steering arm
- (3) Center arm
- (4) Steering cylinder
- Attach the magnetic base of a dial indicator to the steering link. The dial indicator will allow the horizontal movement of the ball stud to be measured.
- Measure the horizontal wear of the ball studs and outer bearing races on the outside ends of the linkage by placing the dial indicator against the side of the steering arm.
- 4. Set the dial indicator to zero.
- 5. Steer the front wheels in both directions. Record the amount of horizontal play from the dial indicator. The dial indicator indicates the amount of wear in the ball studs and the outer bearing races.

Note: It is only necessary to move the steering wheel in each direction enough to absorb any slack that may have worn into the ball stud and outer race. When the front wheels have moved any amount each direction, the steering linkage has to moved enough to register the horizontal wear on the dial indicator.

- 6. Measure the horizontal wear of the ball studs and outer bearing races on the inside ends (center) of the linkage, by placing the dial indicator against the side of the center arm.
- 7. Set the dial indicator to zero.
- **8.** Steer the front wheels in both directions. Record the amount of horizontal play from the dial indicator.
- Repeat this procedure in order to measure the ball studs and outer bearing races for the other steering link.

- 10. Repeat this procedure in order to measure the ball studs and outer bearing races for both steering cylinders.
- 11. The maximum amount of horizontal wear is 1.02 mm (0.040 inch). If any of the measurements exceed this limit, replace the worn ball studs and the outer bearing races.
- **12.** Inspect all of the covers for the ball studs. Inspect all grease fittings and seals. Replace any worn components and any damaged components.

Note: Properly lubricate the steering linkage in order to ensure the durability of components. The steering linkage must be free of contaminants in order to ensure the durability of components.

i03648280

Steering System Oil - Change

SMCS Code: 4300-044-OC

A WARNING

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

Operate the engine in order to warm the steering system oil. Park the machine on a level surface and place the transmission control lever in the PARK position. Stop the engine.

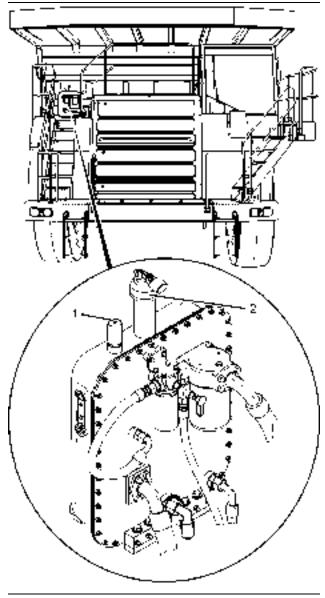


Illustration 282 g01281150

- 1. Push the button on the breaker relief valve (1). The breaker relief valve is located on top of the steering hydraulic tank.
- Slowly, remove filler cap (2) on the steering hydraulic tank in order to relieve the pressure. Install the filler cap after the tank has been drained. This will prevent dirt from entering the system.

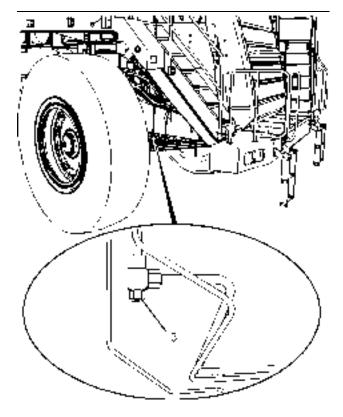


Illustration 283 g01281155

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.

- **3.** Remove cap plug (3) and drain the oil into a suitable container.
- 4. Clean the cap plug and install the cap plug.
- **5.** Remove the filler cap and the retaining ring on the screen.
- **6.** Remove the filler screen. Wash the cap and the screen in clean, nonflammable solvent. Allow the cap and the screen to dry.
- **7.** Inspect the cap seal. Use a new seal if the used seal is damaged.
- **8.** Install the screen and the retaining ring.

Steering System Oil Level - Check

SMCS Code: 4332-535-OC

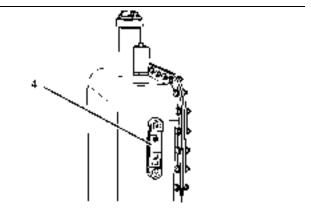


Illustration 284 g01281168

- 9. Fill the steering hydraulic tank and install the filler cap. The oil level must be within the green range of sight gauge (4). Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".
- **10.** Start the engine. Observe the oil level and inspect the machine for leaks. Stop the machine and make any necessary repairs.
- 11. Check the oil level in the steering hydraulic tank. When the engine is running and the oil is at operating temperature, maintain the oil level within the green range of the sight gauge. If necessary, add oil.

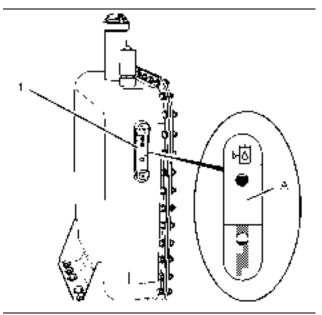


Illustration 285

q01604534

The steering hydraulic tank is mounted on the right hand platform.

Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

Check the oil level in the steering hydraulic tank. Maintain the oil level within green range (A) of sight gauge (1). If necessary, add oil in order to bring the oil level into the green range.

i03126943

224

i03646965

Steering System Oil Sample - Obtain

SMCS Code: 4300-008-OC; 7542

🕰 WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

🕰 WARNING

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

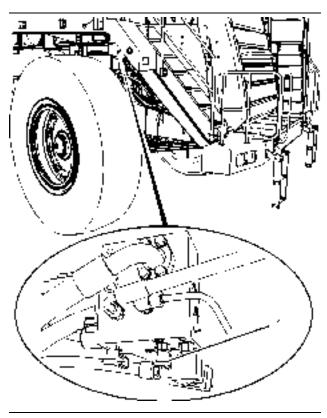


Illustration 286 g01280958

Sampling valve (1) for the steering hydraulic oil

Activate the machine lockout control. Make sure that the transmission control is in the PARK position. Refer to Operation and Maintenance Manual, "Machine Lockout Control" for more information.

Take the oil sample when the engine is operating at low idle.

Refer to the following publications for S·O·S information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

i02420568

Steering Tie Rod and Pin Bearings - Lubricate

SMCS Code: 4300-086-BD; 4318-086; 7551-086-PN

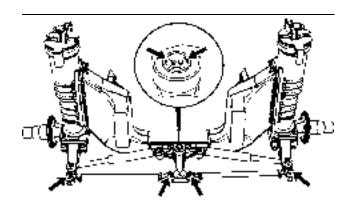
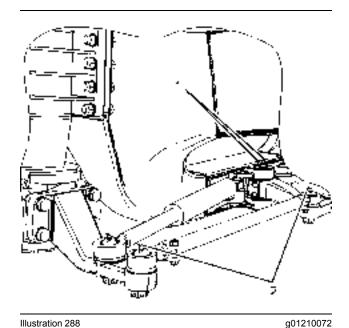


Illustration 287

g01209531

Top view of the steering linkage



Left side view of steering linkage

Two fittings (1) are located on the center arm pivot pin bearing. Lubricate the fittings on the center arm pivot pin bearing.

Two fittings (2) are located on each steering tie rod. Lubricate the fittings on each steering tie rod.

Remote Lubrication Fittings (If Equipped)

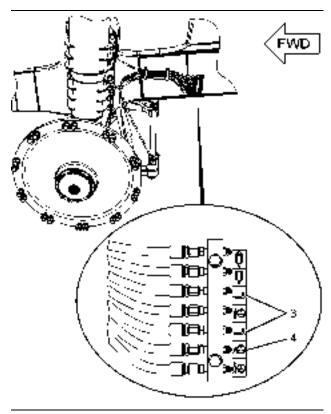


Illustration 289

g01210143

Left side remote lubrication fittings

Two remote lubrication fittings (3) for the steering tie rods are located on each side of the main frame. Lubricate the remote fittings on each side of the main frame.

One remote lubrication fitting (4) for the center arm pivot pin bearing is located on each side of the main frame. Lubricate the remote fitting on each side of the main frame.

i02913617

Suction Screen (Hoist, Torque Converter, and Brake Tank) - Inspect/Clean/Replace

SMCS Code: 5056-040-Z3



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

Suction Screen (Hoist, Torque Converter, and Brake Tank) - Inspect/Clean/Replace

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.

There are three suction screens inside the hoist, torque converter, and brake tank. Clean the screens whenever there is a failure of the following components:

- · Torque converter
- · Hoist cylinders
- Hoist pumps

Access the screens from the back side of the hoist, torque converter, and brake tank.

1. Park the machine on a level surface with the truck body in the DOWN position. Stop the engine and make sure that the transmission control is in the PARK position.

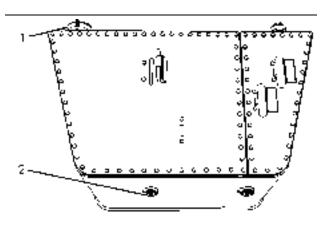


Illustration 290 g01210492

Remove filler cap (1) in order to prevent a vacuum in the tank. Install the cap after the tank has been drained. This will prevent dirt from entering the system.

Note: Hand tighten the NPT pipe nipple. Do not use tools.

3. Remove the tank drain plug (2). Install a 88 mm (3.50 inch) long NPT pipe nipple in order to open the internal drain valve. The outer diameter of the NPT pipe nipple should be 25.4 mm (1 inch). Drain the oil into a suitable container.

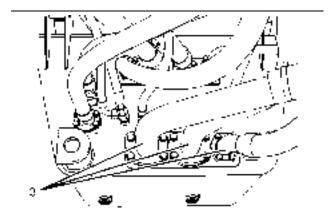


Illustration 291 g01210459

Remove tube assemblies (3) from the back of the tank.

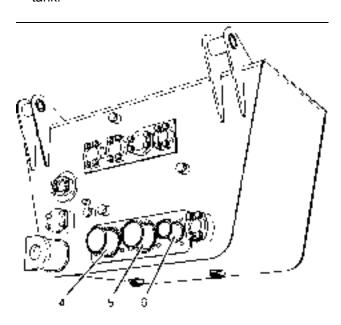


Illustration 292 g01210488

- **5.** Remove suction screen (4) for the hoist. Remove suction screen (5) for the torque converter. Remove suction screen (6) for the auxiliary brake cooling.
- Wash the suction screens and the bolts in clean, nonflammable solvent.
- Install the clean suction screens, the tube assemblies and the clean bolts.

8. Fill the hoist/brake tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".

SEBU7790-12

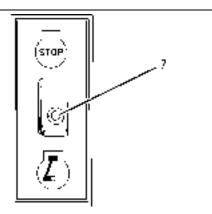


Illustration 293 g01210607

The engine shutdown switch is located above the left side of the front bumper.

9. Use engine shutdown switch (7) to prevent the engine from starting. Crank the engine for approximately 15 seconds. The oil level will decrease as oil fills the system.

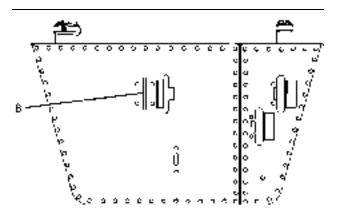


Illustration 294 g01210508

- 10. Add oil to the tank in order to raise the oil to the proper level in upper sight gauge (8). Refer to Operation and Maintenance Manual, "Hoist, Torque Converter and Brake Tank Oil Level Check" for the proper oil level within the sight gauge.
- **11.** Repeat Step 9 and Step 10 until the proper oil level stabilizes in the upper sight gauge.
- **12.** Lower the guard on the engine shutdown switch. Start the engine and operate the engine at low idle. Check for leaks and make necessary repairs.

- **13.** Raise the truck body until the hoist cylinders are extended halfway. Lower the truck body and add oil, if necessary.
- 14. Raise the truck body until the hoist cylinders are fully extended. Lower the truck body and add oil, if necessary.
- **15.** Repeat Step 13 and Step 14 until the proper oil level stabilizes in the upper sight gauge.
- **16.** Install the filler cap.

i02913766

Suction Screen (Transmission Tank) - Clean

SMCS Code: 5056-070-Z3

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

Clean the screen whenever there is a failure in the transmission.

Access the screen from the back side of the transmission tank.

 Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position. 228

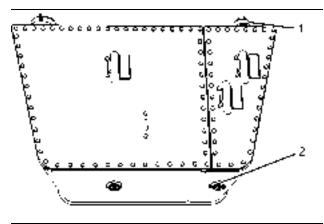


Illustration 295 g01210572

Remove filler cap (1) in order to prevent a vacuum in the tank. Install the cap after the tank has been drained. This will prevent dirt from entering the system.

Note: Hand tighten the NPT pipe nipple. Do not use tools.

3. Remove the tank drain plug (2). Install a 88 mm (3.50 inch) long NPT pipe nipple in order to open the internal drain valve. The outer diameter of the NPT pipe nipple should be 25.4 mm (1 inch). Drain the oil into a suitable container.

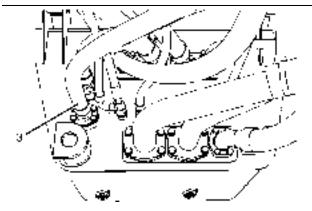


Illustration 296 g01210585

4. Disconnect tube assembly (3) from the back of the tank.

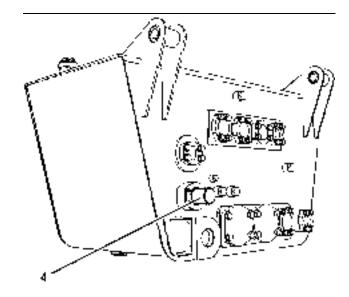


Illustration 297 g01210590

- **5.** Remove suction screen (4) for the transmission.
- **6.** Wash the suction screen and the bolts in clean, nonflammable solvent.
- **7.** Install the clean suction screen , the tube assembly and the clean bolts.
- 8. Fill the transmission tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".

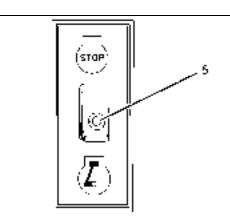


Illustration 298

g01210592

The engine shutdown switch is located above the left side of the front bumper.

9. Use engine shutdown switch (5) to prevent the engine from starting. Crank the engine for approximately 15 seconds. The oil level will decrease as oil fills the system.

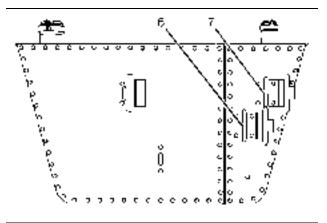


Illustration 299 g01210596

- **10.** Add more oil to the transmission tank in order to raise the oil level within the green range of lower sight gauge (6).
- **11.** Repeat Step 9 and Step 10 until the oil level stabilizes within the green range of the lower sight gauge.
- 12. Move the engine shutdown switch to the down position. Start the engine and operate the engine at low idle. Check for leaks and make necessary repairs.
- 13. Install the filler cap.
- **14.** Observe the oil level when the oil is warm and the transmission control is in the PARK position. Maintain the oil level within the green range of upper sight gauge (7).
- 15. Stop the engine. If necessary, add oil.

i07623116

Suspension Cylinder - Check

SMCS Code: 7201-535

🛕 WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

Daily

Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, "Prepare the Machine for Maintenance". Refer to step for maintenance that DOES NOT require the engine to be running. Ensure that pressure is purged from the steering accumulators prior to performing inspection. Refer to Steering and Steering Accumulators within Operation and Maintenance Manual, "System Pressure Release".

Visually inspect the front and rear suspension cylinders for leaking oil. If leaking oil is present, remove the cylinder and repair the leak. Repair the cylinder or replace the cylinder as soon as possible.

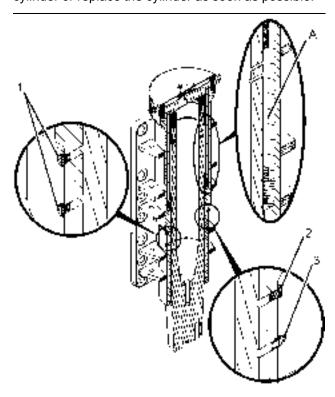


Illustration 300

g01219112

Suspension cylinder

- (1) Relief valve
- (2) Plug
- (3) Fitting

Visually inspect the front and rear suspension cylinders for any unusual conditions that might affect the operation of the cylinder or the ride of the truck. The following conditions can affect performance:

- · collapsed cylinder
- excessive rod extension
- damage to the chrome or Advanced Surface Technology (AST) on the entire cylinder rod

230

Visually inspect the wiper seal for a gap with the cylinder rod.

Visually inspect to ensure that all mounting hardware is present and in good condition.

Grease that is forced into the cavity that is inside the cylinder at Location (A) will limit the travel of the cylinder rod. If the travel of the cylinder rod is limited, the ride of the truck can become rough.

If reduced travel of the cylinder rod is found, repair the cylinder or replace the cylinder as soon as possible. Repair or replace for any damage and/or leaks regardless if the strut is riding low.

Failure to take prompt immediate action may/will create contingent damage within the cylinder and increase the repair cost.

Note: Do not attempt to remove the relief valves (1), plug (2), or fitting (3) when there is pressure in the cylinder.

Every 500 Service Hours or 3 months

Note: All the suspension cylinders that are shipped from the factory receive a preliminary charge of nitrogen and a preliminary charge of oil. During field assembly, the suspension cylinders must be charged with nitrogen.

- **1.** Check the suspension cylinders when the dump body is empty.
- **2.** Stop the machine gradually on a level surface without using the brakes.
- 3. Prepare the machine for maintenance. Refer to Operation and Maintenance Manual, "Prepare the Machine for Maintenance". Refer to step for maintenance that DOES NOT require the engine to be running. Ensure that pressure is purged from the steering accumulators prior to performing inspection. Refer to Steering and Steering Accumulators within Operation and Maintenance Manual, "System Pressure Release".

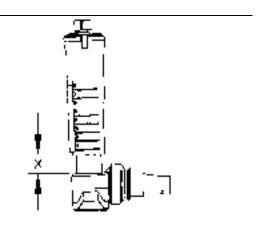


Illustration 301

q01583894

Front Suspension Cylinder

(X) Distance of exposed finished surface

4. Measure the distance of exposed finished surface (X) for the front suspension cylinders. Compare the present distance to the distance from the previous time. If those dimensions are not available, check the charge pressure.

Note: There are two relief valves for the grease on the forward side of the front suspension cylinder. These relief valves are located 180 degrees from the lubrication fitting. Do not plug the grease passage of the relief valves.

5. If necessary, perform the charging procedure on the front suspension cylinders.

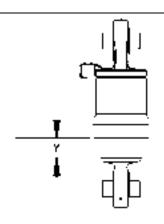


Illustration 302

g01964614

Rear Suspension Cylinder

(Y) Distance of exposed finished surface

6. Measure the distance of exposed finished surface (Y) for the rear suspension cylinders. Compare the present distance to the distance from the previous time. If those dimensions are not available, check the charge pressure. **Note:** When the rear suspension cylinders are properly charged, the left rear suspension cylinder will not show as much finished surface as the right rear suspension cylinder. This is due to the rigid frame and to the weight of the cab.

7. If necessary, perform the charging procedure on the rear suspension cylinders.

Refer to Special Instruction, SEHS9411, "Servicing the Suspension Cylinders for Off-Highway Trucks" for any information concerning suspension cylinders. The Special Instruction includes tooling, pressures, and the correct procedures for purging (oil and nitrogen) and charging (oil and nitrogen), that are used on all off-highway truck suspension cylinders.

Every Year

Purge the nitrogen and oil charge from the suspension cylinders. Refer to the procedure to purge suspension cylinders in Special Instruction, SEHS9411.

Replace the relief valves on the front suspension cylinder and make sure that all the grease ports are clear.

Recharge the suspension cylinders with nitrogen charge. Refer to the procedure to recharge the suspension cylinders in Special Instruction, SEHS9411.

i07746942

Tire Inflation - Check

SMCS Code: 4203-535-AI: 4203-535-PX

A WARNING

Personal injury or death can occur if personnel are trapped between the wheel and the frame.

The steering system is hydraulically controlled and wheels can crush personnel during movement.

Use caution when working between the wheels and the frame. If the wheels must be turned, ensure that all personnel are clear of the machine before any movement.

Measure the tire pressure on each tire. Adjust the tire pressure, if necessary. Consult your tire supplier for the correct tire operating pressures and load ratings.

See Operation and Maintenance Manual, "Tire Inflation Information" for more tire information.

i05389453

231

Traction Control System (TCS) - Test

SMCS Code: 3288-081; 4801-081

Note: This test should be conducted when the truck is empty.

Note: This procedure determines whether the Traction Control System (TCS) is functioning. This procedure also determines if the left rear brake and the right rear brake engage at the correct time.

- Find an area that is clear and level. Also, the area must be large enough in order to safely drive the machine in a complete circle. Start the machine and move the transmission control to the first gear forward (1 position).
- Position the machine for a counterclockwise circle. Turn the steering wheel all the way to the left. With the engine at low idle, drive the machine in a complete circle.

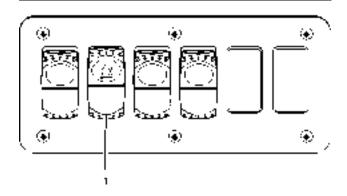


Illustration 303

q01242817

TCS test switch (1) is located on the overhead switch panel.

- **3.** During the turn, press TCS test switch (1) and hold the switch in the ON position.
- **4.** The TCS will engage off and on causing a pulsing action with the outside rear brake. This sequence will repeat as the machine drives in a circle.
- 5. Release the test switch.
- **6.** Position the machine for a clockwise circle. Turn the steering wheel all the way to the right. With the engine at low idle, drive the machine in a complete circle.
- **7.** During the turn, press the TCS test switch and hold the switch in the ON position.

Maintenance Section
Transmission Oil Sample - Obtain

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- **8.** The TCS will engage off and on causing a pulsing action with the outside rear brake. This sequence will repeat as the machine drives in a circle.
- 9. Release the test switch.
- 10. For information on the TCS, refer to Specifications, Systems Operation, Testing and Adjusting, SENR2986, "Off-Highway Trucks/ Tractors Automatic Electronic Traction Aid (AETA)/ Traction Control System (TCS)" or consult your Caterpillar dealer.

i03648281

Transmission Oil Sample - Obtain

SMCS Code: 3080-008; 7542-008

♠ WARNING

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

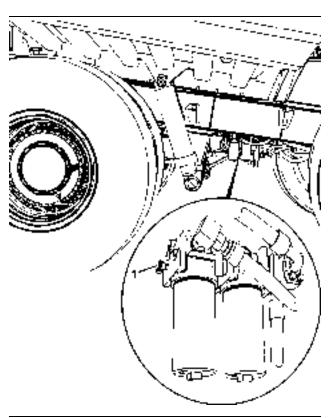


Illustration 304 g01218022

The transmission oil filter is located behind the fuel tank and under the center tube.

The fuel tank is removed for ease of viewing.

Sampling valve (1) for the transmission oil is located on the transmission oil filter. The transmission oil filter is located on the right side of the frame behind the front wheel.

Refer to the following publications for $S \cdot O \cdot S$ information:

- Operation and Maintenance Manual, "S·O·S Information"
- Special Publication, SEBU6250, "S·O·S Services Oil Analysis"
- Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"
- Special Publication, PEGJ0047, "How to Take a Good Oil Sample"
- Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

i02913761

Transmission Tank Oil - Change

SMCS Code: 3080-044-TNK

A WARNING

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the 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.

1. Park the machine on a level surface and stop the engine. Make sure that the transmission control is in the PARK position.

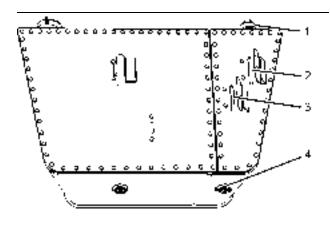


Illustration 305 g01208051

- 2. Remove the filler cap (1) in order to prevent a vacuum in the transmission tank. Install the filler cap after the transmission tank is drained. This will prevent dirt from entering the system.
- Remove the retaining ring of the transmission filler screen.
- **4.** Remove the screen. Wash the filler cap and the screen in clean, nonflammable solvent. Allow the cap and the screen to dry.
- **5.** Inspect the seal. Use a new seal if the used seal is damaged.
- **6.** Install the filler screen and the retaining ring.
- 7. Remove drain valve plug (4) in the transmission tank. Install a 100 mm (4.0 inch) long NPT pipe nipple in order to open the internal drain valve. The outer diameter of the NPT pipe nipple should be 25 mm (1.0 inch). Drain the oil into a suitable container.

Note: Hand tighten the NPT pipe nipple. Do not use tools.

8. Remove the pipe nipple and install the drain plug.

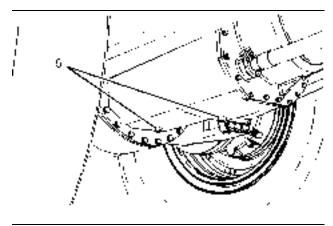


Illustration 306 q01208125

- Remove drain plugs (5) from the transmission housing. Drain the oil into a suitable container. Clean the drain plug and install drain plugs.
- 10. Fill the transmission tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities". Refer to Operation and Maintenance Manual, "Capacities (Refill)".

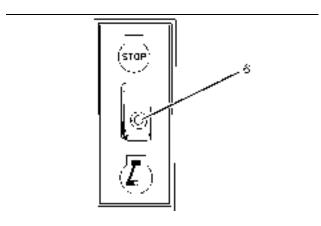


Illustration 307

g01208184

The engine shutdown switch is located above the left side of the front bumper.

- 11. Use engine shutdown switch (6) to prevent the engine from starting. Crank the engine for approximately 15 seconds. The oil level will decrease as oil fills the system.
- **12.** Add more oil to the transmission tank in order to raise the oil level within the green range of lower sight gauge (3).
- **13.** Repeat Step 11 and Step 12 until the oil level stabilizes within the green range of the lower sight gauge.

- 14. Move the engine shutdown switch to the down position. Start the engine and operate the engine at low idle. Check for leaks and make necessary repairs.
- 15. Install the filler cap.
- 16. Observe the oil level when the oil is warm and the transmission control is in the PARK position. Maintain the oil level within the green range of upper sight gauge (2).
- 17. Stop the engine. If necessary, add oil.

NOTICE

Failure to properly fill the transmission tank after an oil change may cause damage to the transmission clutches. Follow the procedure that is described above.

i03126725

Transmission Tank Oil Level - Check

SMCS Code: 3080-535-TNK

Park the machine on a level surface. Make sure that the transmission control is in the PARK position.

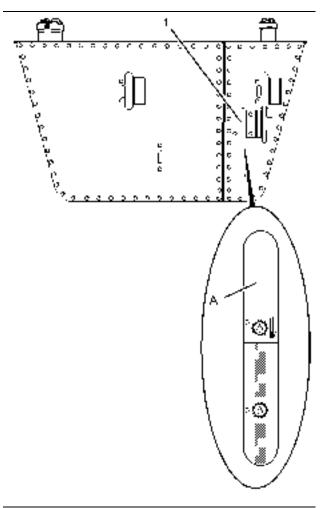


Illustration 308 g01603537

When the engine is stopped and the transmission oil is cold (ambient temperature), maintain the transmission oil level within green range (A) on lower sight gauge (1). If necessary, add oil in order to bring the oil level into the green range.

Note: If the system has been drained, see this Operation and Maintenance Manual, "Transmission Tank Oil - Change" for the proper filling procedure.

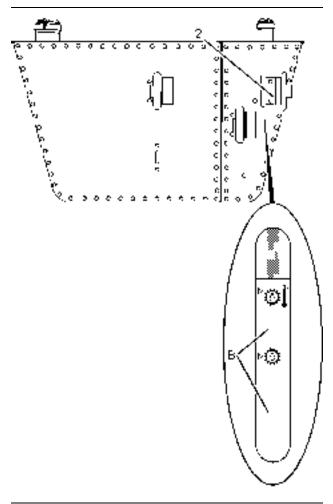


Illustration 309 g01603539

When the engine is running at low idle and the transmission oil is at normal operating temperature, maintain the transmission oil level within green range (B) on upper sight gauge (2). If necessary, add oil in order to bring the oil level into the green range.

i03041263

Window Washer Bottle - Fill

SMCS Code: 7306-544-KE

NOTICE

When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

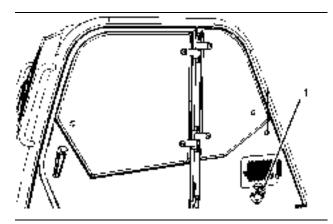


Illustration 310

g01383171

The filler spout for the washer fluid bottle is located on the left rear of the cab. Remove filler cap (1) in order to fill the bottle with window washer solvent.

i02422816

Window Wiper - Inspect/ Replace

SMCS Code: 7305-510; 7305-040

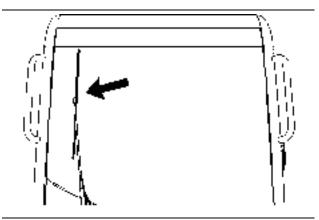


Illustration 311

g01210624

Inspect the windshield wiper blade. Replace the windshield wiper blade if the windshield wiper blade is worn or damaged. Replace any windshield wiper blade that streaks the windshield.

i02612597

Windows - Clean

SMCS Code: 7310-070; 7340-070

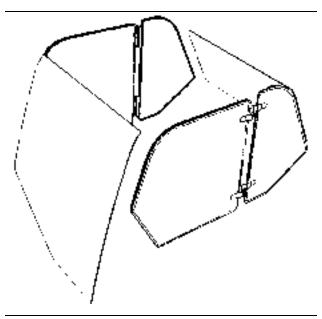


Illustration 312

Cab window group

g01207547

Use commercially available window cleaning solutions to clean the windows. Only clean the windows when handholds are available.

Reference Information Section

Reference Materials

i03648282

Reference Material

SMCS Code: 1000; 7000

Special Publication, PECP9067, "One Safe Source"

Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide"

Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"

Special Publication, SEBU5898, "Cold Weather Recommendations"

Special Publication, PEGJ0046, "S·O·S Services: Understanding Your Results"

Special Publication, PEGJ0047, "How to Take a Good Oil Sample"

Special Instruction, PEHJ0191, "S·O·S Fluid Analysis"

Special Publication, SEBD0518, "Know Your Cooling System"

Specifications, SENR3130, "Torque Specifications"

Systems Operation, Troubleshooting, Testing and Adjusting, RENR7911, "Product Link"

Specifications, Systems Operation, Testing and Adjusting, SENR2986, "Off-Highway Trucks/Tractors Automatic Electronic Traction Aid (AETA)/Traction Control System (TCS)"

Special Instruction, REHS4420, "Inspection Procedure for the Ball Stud"

Reuse and Salvage Guidelines, SEBF9054, "Reusability of Tapered Steering Bores"

Disassembly and Assembly, RENR8311, "777F Off-Highway Truck Machine Systems"

Specifications, Systems Operation, Testing and Adjusting, RENR8396, "777F Off-Highway Truck Automatic Lubrication System"

Specifications, Systems Operation, Testing and Adjusting, RENR8395, "773F - 777F Off-Highway Truck Prelubrication, and High Speed Oil (Quick Evac)"

Special Instruction, REHS2594, "Assembly Procedure for the 777F Off-Highway Truck"

Special Instruction, REHS2653, "Assembly Procedure for the 777F Dual Slope Truck Body"

Operation and Maintenance Manual (Supplement), SEBU8257, "The European Union Physical Agents (Directive) 2002/44/EC"

Operation and Maintenance Manual, SEBU8157, "Work Area Vision System (WAVS)"

Troubleshooting, Systems Operation, Testing and Adjusting, RENR8344, "Machine Monitoring System"

Systems Operation, Troubleshooting, Testing and Adjusting, RENR8284, "770, 772, 773F, 775F, and 777F Off-Highway Truck Payload Measurement System"

Systems Operation, Troubleshooting, Testing and Adjusting, KENR5955, "773F, 775F and 777F Off-Highway Truck Vital Information Management System (VIMS)"

Troubleshooting, Systems Operation, Testing and Adjusting, RENR8342, "Chassis Electronic Control System"

Special Instruction, SEHS7332, "Do Not Operate Warning Tag"

Parts Manual, SEBP4305, "777F Truck"

Service Manual, RENR8295, "777F Truck"

Disassembly and Assembly, RENR8304, "777F Off-Highway Truck Power Train"

Disassembly and Assembly, RENR9217, "C27 and C32 Engines For Caterpillar Built Machines"

Special Publication, SMBU6981, "Emissions Control Warranty Information"

Systems Operation, Testing and Adjusting, SENR9937, "C27 and C32 Engines For Caterpillar Built Machines"

Service Manual, SENR5664, "Air Conditioning and Heating with R134-A (All Caterpillar Machines)"

Systems Operation, Testing and Adjusting, RENR8316, "777F Suspension Cylinders"

Safety Manual, SEBU5935

Video Tape, AEVN3780, "The Human Element - Mine Safety & You"

Special Instructions, SEHS7633, "Battery Test Procedure"

Special Instruction, SEHS6929, "Inspection, Maintnenance and Repair of ROPS and Attachment Installation Guidelines"

Special Instructions, SMHS7867, "6V-4040 Nitrogen Tire Inflation Group"

Reference Information Section Decommissioning and Disposal

Special Instructions, SEHS9031, "Storage Procedure for Caterpillar Products"

Special Publication, SEBF8029, "Guideline for Reusablility of Parts"

Video Tape, SEVN4142, "Mining Trucks - Cleanliness and Component Life"

Systems Operation, Testing and Adjusting, Disassembly and Assembly, RENR8391, "Caterpillar Comfort Series Seat with three point operator restraint"

Guideline for Reusable Parts and Salvage Operations, SEBF8095, "Service Brakes for Off-Highway Trucks and Tractors"

Guideline For Reusable Parts And Salvage Operations, SEBF8148, "General Salvage and Reconditioning Techniques"

Systems Operation, RENR2223, "Oil Renewal System"

Testing and Adjusting, RENR8303, "777F Off-Highway Truck Power Train"

Systems Operation, Testing and Adjusting, RENR8315, "777F Off-Highway Truck Hydraulic System"

Special Instruction, REHS0354, "Charging System Troubleshooting"

Service Magazine, SEPD0766, 10 January 2005, "Match Tire Size in Dual Tire Configurations for Increased Service Life"

Additional Reference Material

ASTM D2896, "TBN Measurements" This can normally be obtained from your local technological society, from your local library, or from your local college.

SAE J313, "Diesel Fuels" This can be found in the SAE handbook. Also, this publication can be obtained from your local technological society, from your local library, or from your local college.

SAE J754, "Nomenclature" This can normally be found in the SAE handbook.

SAE J183, "Classification" This can normally be found in the SAE handbook.

"Engine Fluids Data Book"

Engine Manufacturers Association Two North LaSalle Street, Suite 2200 Chicago, IL USA 60602

E-mail: ema@enginemanufactureers.org

Phone: (312) 827-8700 Facsimile: (312) 827-8737

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

Delivery Date: _____

Note: For product identification plate locations, see the section "Product Identification Information" in the Operation and Maintenance Manual.

_			
Produc	t Information		
Model:			
Product Ider	ntification Number:		
Engine Seria	al Number:		
Transmissio	n Serial Number:		
Generator S	Serial Number:		
Attachment	Serial Numbers:		
Attachment	Information:		
Customer E	quipment Number:		
Dealer Equi	pment Number:		
Dealer	Information		
Name:		Branch:	
Address:			
	Dealer Centeet	Phone Number	Houre
	<u>Dealer Contact</u>	<u>Flione Number</u>	<u>Hours</u>
Sales: -			
Parts: _			
Service: -			

