SEBU7821-08 (en-us)
January 2021

Operation and Maintenance Manual

416D, 420D, 424D, 428D, 430D, 432D, 442D Backhoe Loaders

BFP 12900-UP (416D)
BGJ 1050-UP (416D)
B2D 1-UP (416D)
MBH 1-UP (420D)
FDP 18400-UP (420D)
BKC 920-UP (420D)
BLN 10300-UP (420D)
BMC 1060-UP (420D)
RXA 1-UP (424D)
CJZ 1-UP (424D)
DSX 1-UP (428D)
BXC 1-UP (428D)
MBM 1-UP (428D)
BNK 5900-UP (430D)
BML 4800-UP (430D)
TDR 1-UP (432D)
WEP 1-UP (432D)
SMJ 1-UP (442D)
TBD 1-UP (442D)

Language: Original Instructions

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

Important Safety Information

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

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

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

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

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

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

NOTICE

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

Other parts may not meet certain original equipment specifications.

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

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

Table of Contents

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:

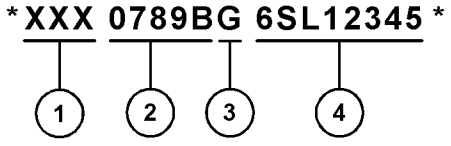

Illustration 1 g03891925

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

i03150003

Safety Messages

SMCS Code: 7000; 7405

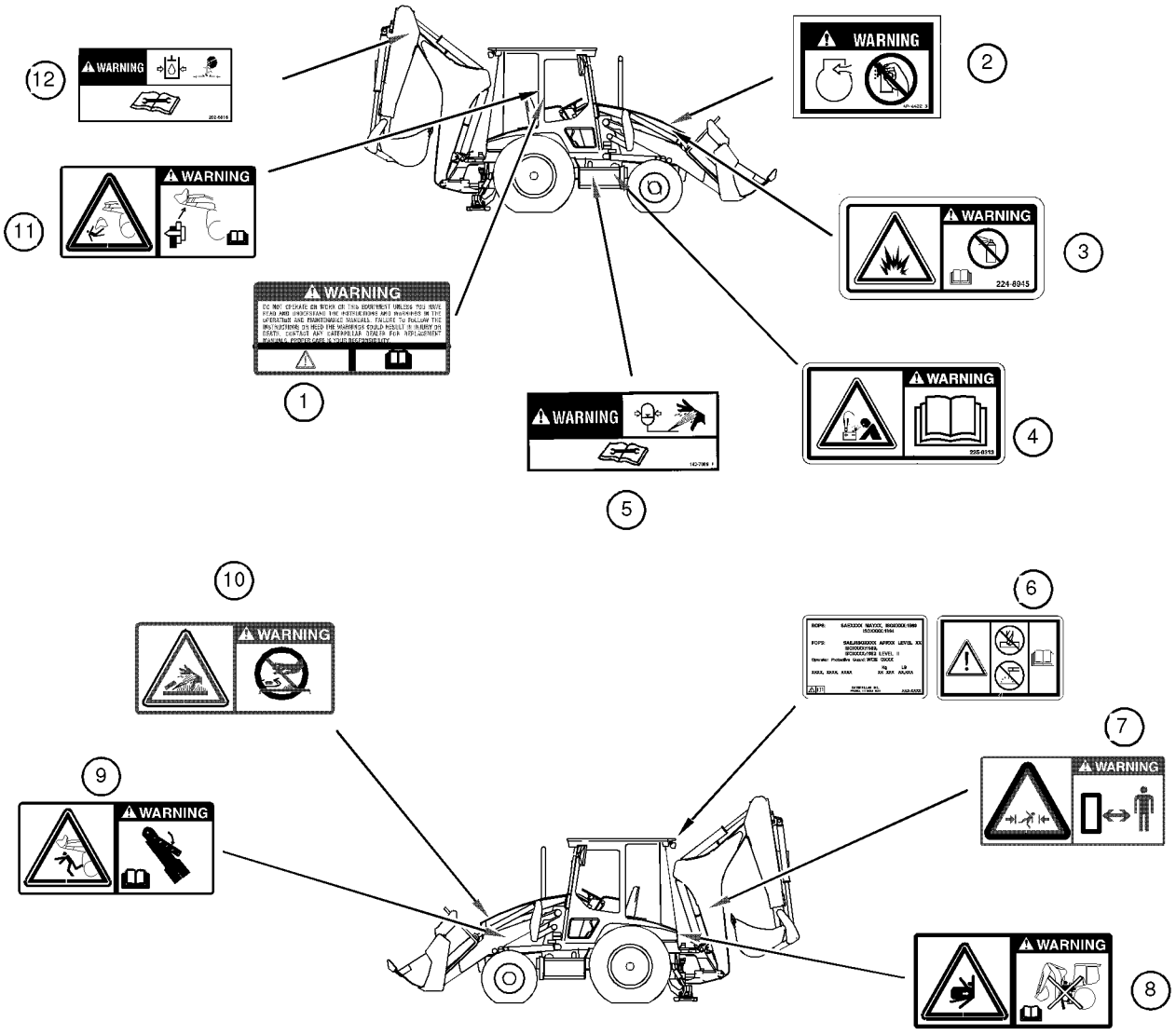

Illustration 2 g01032969

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

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

Do Not Operate (1)

Illustration 3 g00930652

This safety message is located above the right side console.

WARNING

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

No Ether In Air Inlet (2)

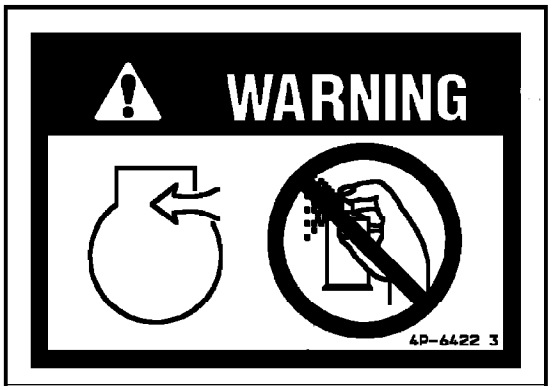

Illustration 4 g00924889

This safety message is located on the valve cover.

WARNING

If equipped with an air inlet heater (AIH) for cold weather starting, do not use aerosal types of starting aids such as ether. Such use could result in an explosion and personal injury.

Ether (3)

Illustration 5 g00931562

This safety message is located under the hood for the engine compartment.

⚠ WARNING

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

Batteries (4)

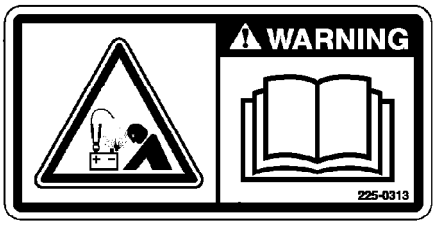

Illustration 6 g00931020

This safety message is located on the inside of the door for the battery compartment.

⚠ WARNING

Explosion Hazard! Improper jumper cable connections can cause an explosion resulting in serious injury or death. Batteries may be located in separate compartments. When using jump start cables, always connect the positive (+) cable from the source to the positive (+) terminal of the battery that is connected to the starter solenoid. Connect the negative (−) cable from the source to the negative (−) terminal of the starter. If the machine is not equipped with a starter negative terminal, connect the negative (−) cable to the engine block. Follow the procedure in the Operation and Maintenance Manual.

High Pressure Accumulator (5)

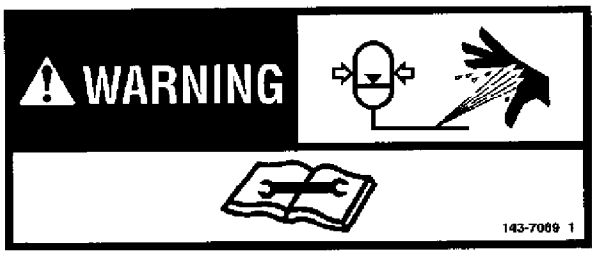

Illustration 7 g00901177

This safety message is located on the accumulator for the loader. This accumulator is located behind the battery compartment.

⚠ WARNING

Hydraulic accumulator contains gas and oil under high pressure. Improper removal or repair procedures could cause severe injury. To remove or repair, instructions in the service manual must be followed. Special equipment is required for testing and charging.

ROPS (6)

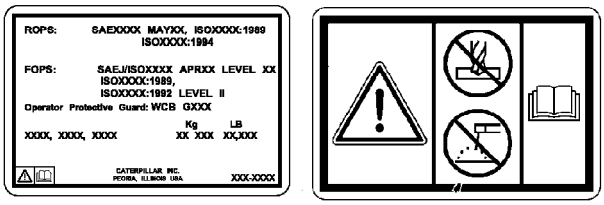

Illustration 8 g01033008

This safety message is located on the back of the cab.

⚠ 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.

Crush Hazard (7)

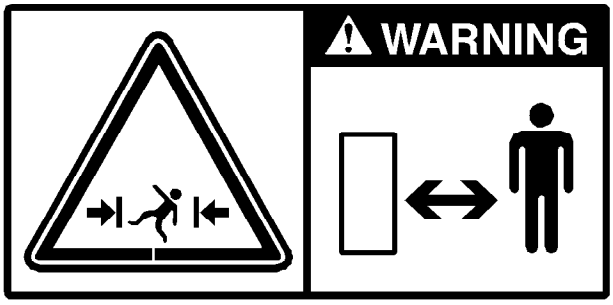

Illustration 9 g00930663

This safety message is located on the boom above the boom foot pin and sideways from the bottom wrapper plate.

⚠ WARNING

Crushing Hazard! Stay back a safe distance. There is no clearance for a person in this area when the machine turns. Failure to follow these instructions could cause serious injury or death.

Keep Clear (8)

Illustration 10 g01032992

This safety message is located on the back of the cab.

⚠ WARNING

Crush hazard; This is not an entrance or exit. Stay clear of this area when the machine is operating. Start and operate the backhoe from the operator seat only. Failure to follow these warnings could result in injury or death.

Brace The Lift Cylinder (9)

Illustration 11 g01032999

This safety message (if equipped) is located on the loader lift arm by the brace for the loader lift arm.

⚠ WARNING

When performing any work underneath a raised loader lift arm, the loader lift arm brace must be in place. Install the loader lift arm brace as follows.

1. **Empty loader bucket. Remove pin that secures loader lift arm brace to left loader arm. Raise loader arms to maximum height with the bucket in the dump position.**
2. **Position service brace over left lift cylinder with flat end against cylinder end.**
3. **Push pin through holes of loader lift arm brace and install cotter pin.**
4. **Slowly lower loader arms until brace contacts the top of the lift cylinder and bosses on loader arm.**
5. **To remove loader lift arm brace, reverse procedure.**

Failure to follow this procedure can result in death or serious injury if the loader arms are accidentally lowered.

Pressurized System (10)

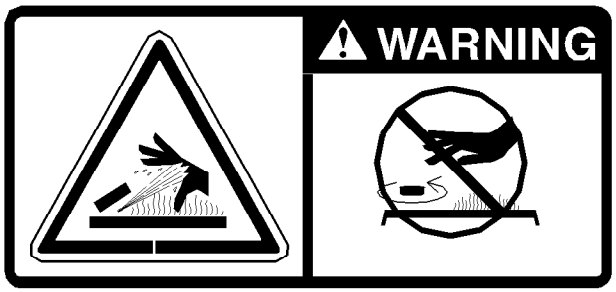

Illustration 12 g00930639

This safety message is located in two locations by the cooling system filler cap.

⚠ 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.

Improper Attachment of Work Tools (11)

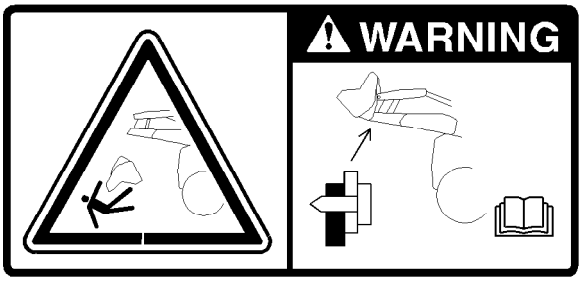

Illustration 13 g01032986

This safety message is located above the right side console.

⚠ WARNING

Improper attachment of implements could result in injury or death.

Do not operate this machine until you have positive indication that the coupler pins are fully engaged. Follow recommended procedure in Operation and Maintenance Manual.

High Cylinder Pressure (12)

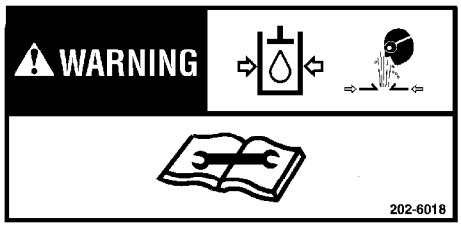

Illustration 14 g00997730

This safety message is located on the right side of the boom near the connection with the stick.

⚠ WARNING

High Pressure Cylinder. Failure to read and follow these instructions can cause rapidly discharging gas and/or hydraulic fluid which can result in death, personal injury and property damage.

i03150004

Additional Messages

SMCS Code: 7000; 7405

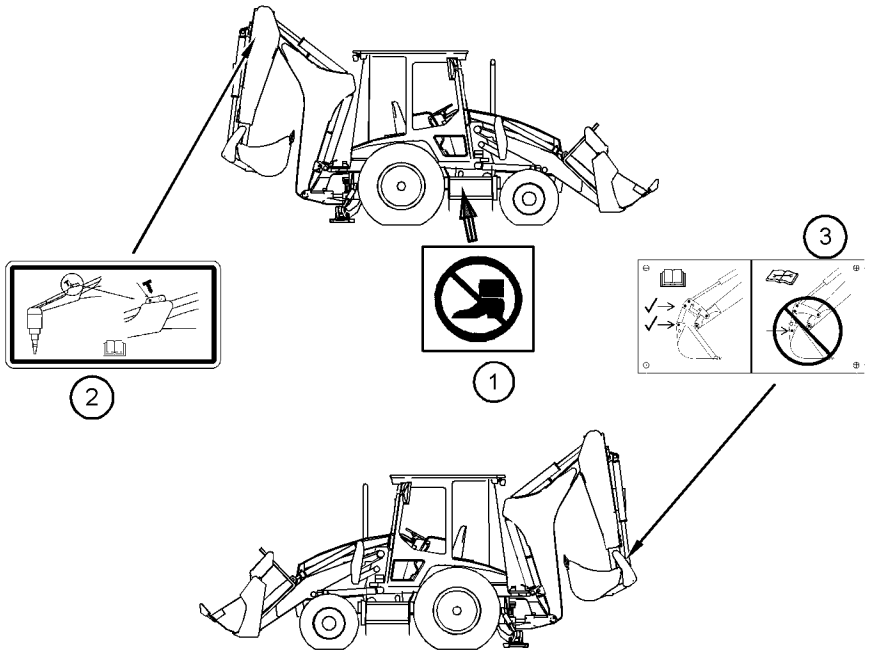

Illustration 15 g01190217

No Step (1)

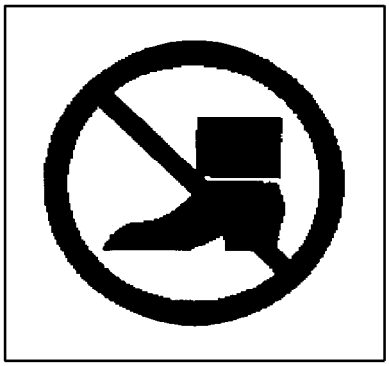

Illustration 16 g00936182

This message is located inside the battery box.

⚠ CAUTION

Do not step here. Stepping here could cause damage to the work tool and personal injury.

Pin the Extendable Stick (2)

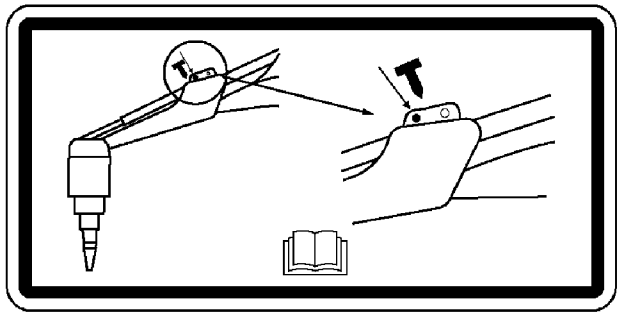

Illustration 17 g01187333

This message is located on the stick.

⚠ CAUTION

The E-Stick must be pinned before using attachments, to prevent movement which could cause personal injury.

Improper Location of the Backhoe Bucket (3)

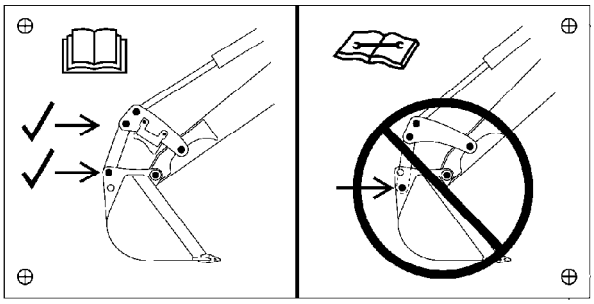

Illustration 18 g01034294

This message is located by the linkage for the backhoe bucket.

⚠ CAUTION

Improper bucket pin connection can cause machine damage. Make sure the bucket pins are connected properly.

i08313103

General Hazard Information

SMCS Code: 7000

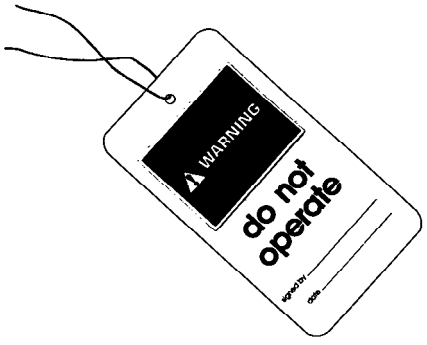

Illustration 19 g00104545

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.

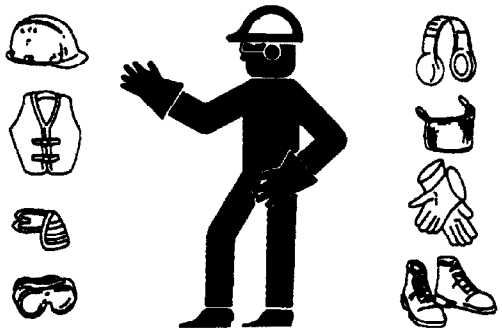

Illustration 20 g00702020

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

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

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

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

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

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

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

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

Obey all local regulations for the disposal of liquids.

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

Do not allow unauthorized personnel on the equipment.

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

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

Pressurized Air and Water

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

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

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

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

Trapped Pressure

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

Fluid Penetration

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

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

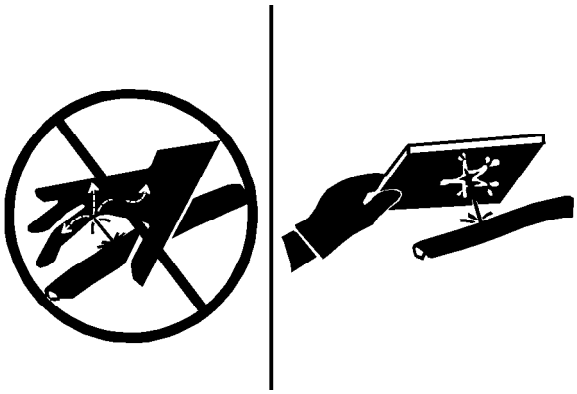

Illustration 21 g00687600

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 22 g02159053

Exhaust

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

Asbestos Information

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

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

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

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

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

Hexavalent Chromium Information

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

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

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

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

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

Dispose of Waste Properly

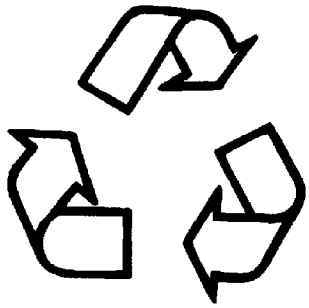

Illustration 23 g00706404

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 24 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 25 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 26 g03839133

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

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

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

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

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

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

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

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

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

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

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

⚠ WARNING

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

Wiring

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

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

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

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

Consult your Cat dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

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

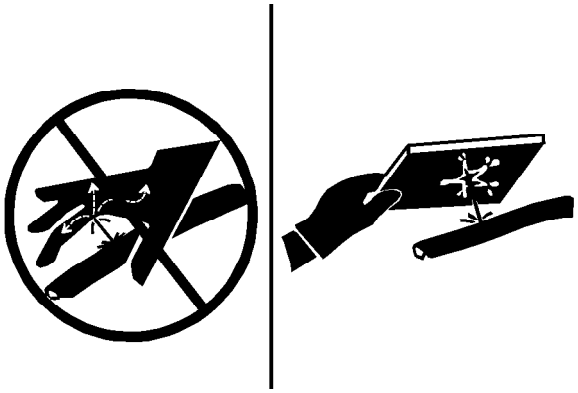

Illustration 27 g00687600

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.

i00980571

Fire Extinguisher Location

SMCS Code: 7000; 7419

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

Mount the fire extinguisher in the battery box. Do not weld the ROPS in order to install the fire extinguisher. Also, do not drill holes in the ROPS in order to mount the fire extinguisher on the ROPS.

i01943386

Tire Information

SMCS Code: 7000

S/N: RXA1–Up

S/N: BXC1–Up

S/N: B2D1–Up

S/N: TBD1–Up

S/N: MBH1–Up

S/N: BGJ1050–Up

S/N: SMJ1–Up

S/N: MBM1–Up

S/N: BFP12900–Up

S/N: WEP1–Up

S/N: TDR1–Up

S/N: DSX1–Up

S/N: CJZ1–Up

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 as far as 500 m (1500 ft) or more from the machine. Both the force of the explosion and the flying debris can cause property damage, personal injury, or death.

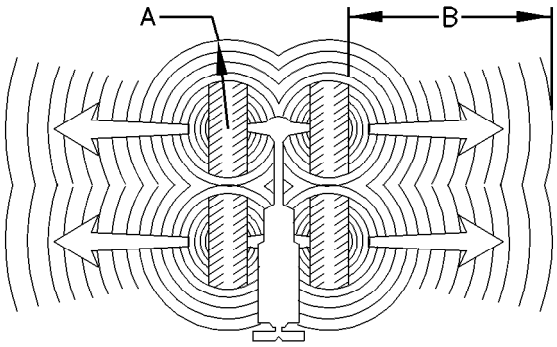

Illustration 28 g00337832

(A) At least 15 m (50 ft)
(B) At least 500 m (1500 ft)

Do not approach a warm tire. Maintain a minimum distance, as shown. Stay outside the shaded area in Illustration 28 .

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

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

i01122596

Electrical Storm Injury Prevention

SMCS Code: 7000

When lightning is striking in the vicinity of the machine, the operator should never attempt the following procedures:

- Mount the machine.
- Dismount the machine.

If you are in the operator's station during an electrical storm, stay in the operator's station. If you are on the ground during an electrical storm, stay away from the vicinity of the machine.

i00771840

Before Starting Engine

SMCS Code: 1000; 7000

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

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

Adjust the seat so that full pedal travel can be achieved with the operator's back against the back of the seat.

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

Before you start the engine and before you move the machine, make sure that no one is underneath the machine, around the machine, or on the machine. Make sure that the area is free of personnel.

i03571438

Engine Starting

SMCS Code: 1000; 7000

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

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

Move the transmission direction control lever to the NEUTRAL position.

Engage the parking brake.

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.

Briefly sound the horn before you start the engine.

i01388947

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.

The stabilizers must be in the correct position before you operate the machine. Completely raise the stabilizers for transporting the machine or for loader operation. Lower the stabilizers before you operate the backhoe. **DO NOT DIG UNDER THE STABILIZERS!**

Stand on the outside of the machine on the ground in order to reposition the flip-over stabilizer pads. **DO NOT REPOSITION THE STABILIZER PADS WHILE YOU ARE IN THE CAB!**

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

For the best visibility of the area that is close to the machine, adjust the rearview mirrors (if equipped).

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

Fasten the seat belt securely.

i01955170

Operation

SMCS Code: 7000

⚠ WARNING

Always engage the parking brake and transmission neutral lock before dismounting the machine, operating the backhoe or engaging the boom lock for the transport position. Failure to do so could allow unexpected machine movement, resulting in personal injury or death.

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature range of −26 °C to 43 °C (−15 °F to 110 °F). The temperature range is dependent upon several operating conditions: technique, environment and cooling system condition. Special configurations for different ambient temperatures may be available. Consult your Caterpillar dealer for additional information on special configurations of your machine.

Safety Information

When you operate the backhoe, engage the parking brake. Also, place the transmission in NEUTRAL and engage the transmission neutral lock.

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

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

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

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

- additional seat
- additional seat belt
- Rollover Protective Structure (ROPS)

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

Carry work tools approximately 40 cm (15 inches) above ground level. Do not go close to the edge of a cliff, an excavation, or an overhang.

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

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

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 overload the machine beyond the machine capacity.

Be sure that the hitches and the towing devices are adequate.

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

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

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

Know the maximum dimensions of your machine.

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

Observe any local government regulations when you use the backhoe loader to lift heavy objects.

i06299648

Engine Stopping

SMCS Code: 1000; 7000

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

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

i04159629

Work Tools

SMCS Code: 6700

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

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

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

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

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

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

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

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

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

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

Never use the work tool for a work platform.

i01439117

Parking

SMCS Code: 7000

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

Apply the service brake in order to stop the machine. Move the transmission control lever to the NEUTRAL position.

Move the speed control lever to the LOW IDLE position.

Engage the parking brake.

Engage the transmission neutral lock.

Lower all work tools to the ground.

Stop the engine.

Turn the engine start switch key to the OFF position for 4 seconds.

Turn the engine start switch key back to the ON position.

Press the hydraulic shutoff switch to the UNLOCKED position.

Move the hydraulic control levers back and forth in order to relieve hydraulic pressure.

Move the hydraulic control levers to the HOLD position.

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

i08229294

Equipment Lowering with Engine Stopped

SMCS Code: 7000

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

i01586743

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level for Enclosed Cab

The operator sound pressure level is measured at the recommended operating engine speed of 2200 rpm.

The measurement for operator sound pressure level was obtained by using procedures that are specified in “ANSI/SAE J1166Oct98”. The procedure specifies the requirements of the work cycle to use while the measurement is obtained. The operator sound pressure level is 81 dB(A) for the cab that is offered by Caterpillar. This reading is correct under the following conditions: proper installation of the cab, proper maintenance of the cab, closed cab doors and closed cab windows.

Hearing protection may be required when operating with an open operator station or when a cab is not properly maintained. Hearing protection may also be required when the cab doors and window are open or in a noisy environment.

The exterior sound pressure level for the standard machine is 73 dB(A). The measurement was obtained using the test procedures specified in “SAE J88Jun86”. The measurement was obtained under the following conditions: distance of 15 m (49.2 ft), machine in middle gear range and moving.

Sound Performance for Machines Offered in European Union Countries and in Countries that Adopt the EU Directives

Table 1

SOUND LEVELS	
Model	**Sound Level**
416D(1)	81 dB(A)
424D(1) with Utility Cab	81 dB(A)
424D(1) with Utility Plus Cab	81 dB(A)
416D(2), 420D(2), 430D(2), 428D(2), 432D(2), 438D(2), 442D(2)	78 dB(A)

(1) Naturally Aspirated
(2) Turbocharged

The operator sound pressure level is measured according to dynamic test procedures and conditions specified in “ISO 6396” or “2000/14/EC”. The operator sound pressure level is measured at the recommended operating engine speed of 2200 rpm.

As manufactured by Caterpillar, this machine's exterior sound power level meets the criteria specified in the European Directives noted on the certificate of conformance and the accompanying labels.

Vibration Level

The hands and arms are exposed to a weighted root mean square acceleration that is less than 2.5 m/sec^2.

The whole body is exposed to a weighted root mean square acceleration that is less than 0.5 m/s^2.

Measurements are obtained on a representative machine using the procedures in the following standards:

- “ISO 2631/1”
- “ISO 5349”
- “SAE J1166”

i07746362

Operator Station

SMCS Code: 7000; 7300

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.

Product Information Section

General Information

i01977949

Specifications

SMCS Code: 7000

Basic machine specifications are listed below. Actual machine specifications will vary with different work tools.

General Machine Specifications

Table 2

416D BACKHOE LOADER	
Approximate Weight	6920 kg (15257 lb)
Transport Length	6949 mm (22.8 ft)
Width across Stabilizers	2352 mm (7.7 ft)
Transport Height	3585 mm (11.8 ft)

Table 3

420D BACKHOE LOADER	
Approximate Weight	7154 kg (15772 lb)
Transport Length	7019 mm (23 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3585 mm (11.8 ft)

Table 4

424D BACKHOE LOADER	
Approximate Weight	7502 kg (16539 lb)
Transport Length	5730 mm (18.8 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3740 mm (12.3 ft)

Table 5

428D BACKHOE LOADER	
Approximate Weight	7738 kg (17059 lb)
Transport Length	5730 mm (18.8 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Table 6

430D BACKHOE LOADER	
Approximate Weight	7355 kg (16215 lb)
Transport Length	7334 mm (24 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3770 mm (12.4 ft)

Table 7

432D BACKHOE LOADER	
Approximate Weight	7809 kg (17216 lb)
Transport Length	5730 mm (18.8 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3740 mm (12.3 ft)

Table 8

442D BACKHOE LOADER	
Approximate Weight	7809 kg (17216 lb)
Transport Length	5730 mm (18.8 ft)
Width Across Stabilizers	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Backhoe Buckets

Table 9

STANDARD DUTY BUCKETS (HIGH ROTATION)			
Width	**Rated**	**Weight**	**Number of Teeth**
305 mm (12 inches)	78 L (2.75 ft^3)	100 kg (220.46 lb)	3
457 mm (18 inches)	118 L (4.167 ft^3)	114 kg (251 lb)	3
610 mm (24 inches)	175 L (6.18 ft^3)	134 kg (295 lb)	4
762 mm (30 inches)	233 L (8.228 ft^3)	153 kg (337 lb)	5
914 mm (36 inches)	292 L (10.31 ft^3)	172 kg (379 lb)	6

Table 10

HEAVY DUTY BUCKETS (HIGH ROTATION)			
Width	**Rated**	**Weight**	**Number of Teeth**
305 mm (12 inches)	78 L (2.75 ft^3)	108 kg (238 lb)	3
457 mm (18 inches)	118 L (4.167 ft^3)	126 kg (278 lb)	3
610 mm (24 inches)	175 L (6.18 ft^3)	150 kg (331 lb)	4
762 mm (30 inches)	233 L (8.228 ft^3)	169 kg (372 lb)	5
914 mm (36 inches)	292 L (11.31 ft^3)	193 kg (425 lb)	6

Table 11

HIGH CAPACITY BUCKETS (HIGH ROTATION)			
Width	**Rated**	**Weight**	**Number of Teeth**
457 mm (18 inches)	180 L (6.35 ft^3)	145 kg (320 lb)	3
610 mm (24 inches)	240 L (8.47 ft^3)	171 kg (377 lb)	4
762 mm (30 inches)	320 L (11.3 ft^3)	192 kg (423 lb)	5
914 mm (36 inches)	380 L (13.41 ft^3)	217 kg (478 lb)	6

Table 12

EXTREME SERVICE BUCKETS				
Width	**Struck**	**Rated**	**Weight**	**Number of Teeth**
600 mm (24 inches)	230 L (8.1 ft^3)	270 L (9.5 ft^3)	237 kg (521 lb)	4
760 mm (30 inches)	290 L (10.0 ft^3)	370 L (13.0 ft^3)	287 kg (631 lb)	4

Loader Buckets

Table 13

GENERAL PURPOSE CAPACITIES		
Rated	**Width**	**Weight**
1.14 m^3 (1.5 yd^3)	2434 mm (96 inches)	604 kg (1329 lb)

Travel Speeds

Table 14

TRAVEL SPEEDS FOR 416D WITH STANDARD TRANSMISSION				
	First Gear	**Second Gear**	**Third Gear**	**Fourth Gear**
Forward	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.2 km/h (11.9 mph)	32.5 km/h (20.2 mph)
Reverse	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.2 km/h (11.9 mph)	32.5 km/h (20.2 mph)

Table 15

TRAVEL SPEEDS FOR 420D AND 430D WITH STANDARD TRANSMISSION				
	First Gear	**Second Gear**	**Third Gear**	**Fourth Gear**
Forward	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.2 km/h (11.9 mph)	32.5 km/h (20.2 mph)
Reverse	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.2 km/h (11.9 mph)	32.5 km/h (20.2 mph)

Table 16

TRAVEL SPEEDS FOR 420D AND 430D WITH AUTO-SHIFT TRANSMISSION					
	First Gear	Second Gear	Third Gear	Fourth Gear	Fifth Gear
Forward	5.7 km/h (3.5 mph)	9.2 km/h (5.7 mph)	12.3 km/h (7.6 mph)	19.0 km/h (11.8 mph)	32.0 km/h (19.8 mph)
Reverse	5.7 km/h (3.5 mph)	12.3 km/h (7.6 mph)	23.0 km/h (14.3 mph)		

Table 17

TRAVEL SPEEDS FOR 424D WITH STANDARD TRANSMISSION				
	First Gear	Second Gear	Third Gear	Fourth Gear
Forward	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.3 km/h (11.9 mph)	32.4 km/h (20.1 mph)
Reverse	5.8 km/h (3.6 mph)	9.3 km/h (5.8 mph)	19.3 km/h (11.9 mph)	32.4 km/h (20.1 mph)

Table 18

TRAVEL SPEEDS FOR 428D WITH STANDARD TRANSMISSION				
	First Gear	Second Gear	Third Gear	Fourth Gear
Forward	5.9 km/h (3.7 mph)	9.4 km/h (5.9 mph)	19.5 km/h (12.1 mph)	32.6 km/h (20.3 mph)
Reverse	5.9 km/h (3.7 mph)	9.4 km/h (5.9 mph)	19.5 km/h (12.1 mph)	32.6 km/h (20.3 mph)

Table 19

TRAVEL SPEEDS FOR 428D WITH AUTOSHIFT TRANSMISSION					
	First Gear	Second Gear	Third Gear	Fourth Gear	Fifth Gear
Forward	5.3 km/h (3.3 mph)	8.4 km/h (5.2 mph)	11.0 km/h (6.8 mph)	17.5 km/h (10.9 mph)	29.4 km/h (18.3 mph)
Reverse	5.3 km/h (3.3 mph)	11.0 km/h (6.8 mph)	21.4 km/h (13.3 mph)		

Table 20

TRAVEL SPEEDS FOR 432D WITH AUTOSHIFT TRANSMISSION					
	First Gear	Second Gear	Third Gear	Fourth Gear	Fifth Gear
Forward	5.3 km/h (3.3 mph)	8.4 km/h (5.2 mph)	11.0 km/h (6.8 mph)	17.5 km/h (10.9 mph)	29.4 km/h (18.3 mph)
Reverse	5.3 km/h (3.3 mph)	11.0 km/h (6.8 mph)	21.4 km/h (13.3 mph)		

Table 21

TRAVEL SPEEDS FOR 442D WITH AUTOSHIFT TRANSMISSION					
	First Gear	Second Gear	Third Gear	Fourth Gear	Fifth Gear
Forward	5.3 km/h (3.3 mph)	8.4 km/h (5.2 mph)	11.0 km/h (6.8 mph)	17.5 km/h (10.9 mph)	29.4 km/h (18.3 mph)
Reverse	5.3 km/h (3.3 mph)	11.0 km/h (6.8 mph)	21.4 km/h (13.3 mph)		

i04796947

Rated Load

SMCS Code: 7000

⚠ WARNING

Failure to comply with the rated load can cause personal injury or attachment damage.

Review the rated load of a particular attachment before performing any operation. Make adjustments to the rated load as necessary for non-standard configurations.

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

- lubricants
- full fuel tank
- enclosed ROPS
- 80 kg (176 lb) operator

Rated loads will vary with different attachments. Consult your Caterpillar dealer regarding the rated load for specific attachments.

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

Special hazards (toxic gases, ground conditions, etc) require special precautions. The operator must determine whether special hazards exist in each application. The operator shall perform the appropriate steps in order to eliminate the hazard. The operator shall perform the appropriate steps in order to reduce the hazard.

Rated Load for Loader Buckets

For North American applications, the rated operating load is defined by the SAE standard “J818 May 1987” and by “ISO 5998 1986”. For European applications, the rated operating load is defined by “EN 474-4 Feb. 1996”. The rated operating load is defined as the lesser value of 50% of the static tipping capacity and the hydraulic lift capacity.

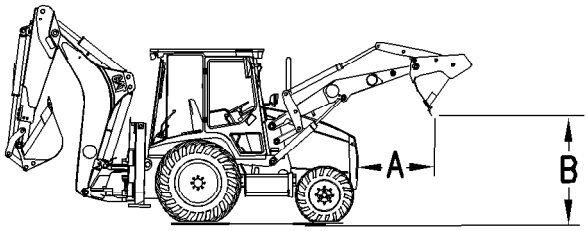

Illustration 29 g00285635

Dump Reach (A) and Dump Height (B)

Rated Load for Pallet Forks

For North American applications, the rated operating load is defined by the SAE standard “J1197 February 1991”. The rated operating load is defined as the lesser value of 50% of the static tipping capacity or the hydraulic lift capacity. The intended operating range of the pallet forks starts from the fully racked back position. The range ends at the top face of the pallet forks at 20° below the horizontal at any given lift height.

For European applications, the rated operating load is defined by “EN 474-4 Feb. 1996”. The rated operating load is defined as the lesser value of 80% of the static tipping capacity or the hydraulic lift capacity over firm and level ground. In rough terrain, the rated operating load is defined as the lesser value of 60% of the static tipping capacity or the hydraulic lift capacity. The intended operating range of the pallet forks starts from the fully racked back position. The range ends at the top face of the pallet forks at 20° below the horizontal at any given lift height.

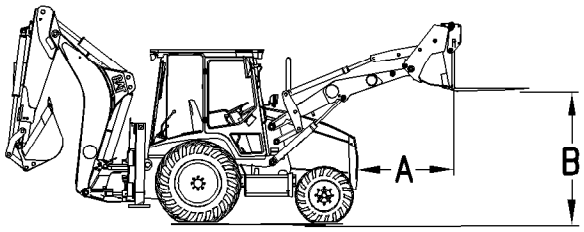

Illustration 30 g00285636

Reach (A) and Placement Height (B)

Rated Load for Material Handling Arm

The rated operating load is defined by “EN 474-4 Feb. 1996”. The rated operating load is defined as the lesser value of 50% of the static tipping capacity or the hydraulic lift capacity.

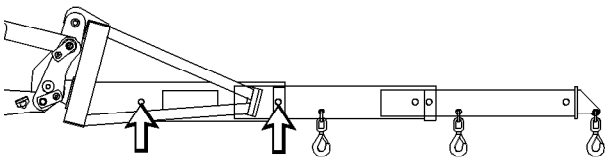

Illustration 31 g00285638

Remove the retainer pins from the arm in order to extend or retract the arm.

Replace the pins after the arm has been extended or retracted in order to lock the arm into position.

Lift the load close to the machine for best stability. Move the machine slowly in order to avoid excessive load swing.

Do not apply side loads on the hook and on the shackle. Check the condition of the hook, of the shackle and of any lifting chains. Replace the parts if any sign of unusual wear is indicated.

Rated Load for Backhoe Lifting and Object Handling

The rated load for the backhoe lifting applications is defined by “EN 474-4”. Rated operating loads are given according to this standard. Additional rated operating loads are given with “SAE J31 March 1986” and “ISO 10567 1992” as a reference.

The rated load for the backhoe lifting applications is defined by “EN 474-4 Feb. 1996”. The rated load for the backhoe lifting applications is defined as the lesser value of the following conditions at the specified lift point radius:

- 75% of the static tipping load
- the hydraulic lifting load
- 80% of the hydraulic holding load

The rated load for the backhoe lifting applications is defined by “SAE J31 March 1986” and “ISO 10567 1992” as a reference. The rated operating load for backhoe lifting applications is defined as the lesser value of the following conditions at the specified lift point radius:

- 75% of the static tipping load
- 87% of the hydraulic lifting load

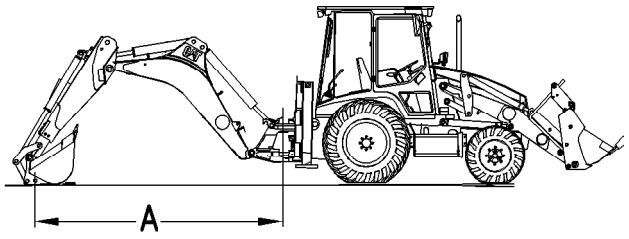

Illustration 32 g00286077

Lift Point Radius (A)

The lift point radius is defined as the distance from the swing pivot center to the bucket hinge pin for the backhoe. The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lift point radius (A). Rated loads include the weight of the attachment. The rated operating loads are for the standard machine configuration.

Note: In the European countries, regulations require a load sensing indicator and a boom lowering control device if more than 1000 kg (2204.6 lb) is lifted with the backhoe during object handling applications. Even though the hydraulic lift capacity exceeds 1000 kg (2204.6 lb) for the object handling application, the rated object handling capacity for the backhoe is 1000 kg (2204.6 lb) in European countries due to these regulations.

416D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

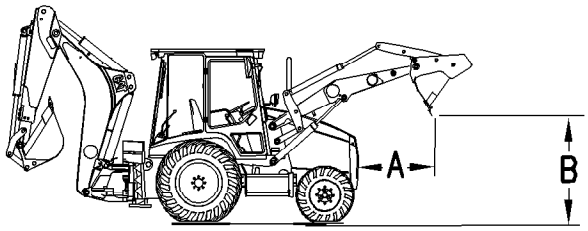

Illustration 33 g00741160

Dump Reach (A) and Dump Height (B)

Table 22

RATED BUCKET LOAD FOR A 416D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**“EN 474-4” Rated Operating Load**	**“SAE J818” Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5201	0.76 m^3 (1.0 yd^3)	2473 kg (5453 lb)	2473 kg (5453 lb)	2621 mm (103 inch)	753 mm (30 inch)
9R-5989	0.95 m^3 (1.25 yd^3)	2400 kg (5292 lb)	2400 kg (5292 lb)	2544 mm (100 inch)	835 mm (33 inch)
112-0940	0.95 m^3 (1.25 yd^3)	2240 kg (4938 lb)	2240 kg (4938 lb)	2609 mm (103 inch)	721 mm (28 inch)
112-0941	0.95 m^3 (1.25 yd^3)	2133 kg (4703 lb)	2133 kg (4703 lb)	2609 mm (103 inch)	721 mm (28 inch)

416D Pallet Forks

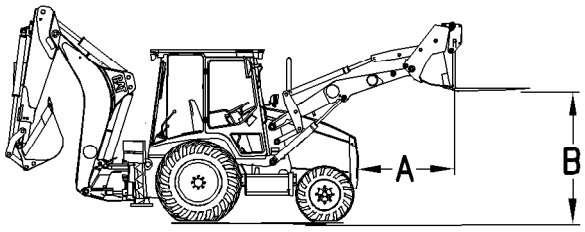

Illustration 34 g00741161

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with Single Tilt. The rated loads are provided for the following attachments:

- multipurpose buckets with flip over forks

Table 23

RATED LOAD FOR FLIP OVER FORK 416D SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**“EN 474-4” Rated Operating Load**	**“SAE J1197” Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-0941	0.95 m^3 (1.25 yd^3)	1024 kg (2257 lb)	994 kg (2192 lb)	2989 mm (118 inch)	1066 mm (42 inch)

416D Backhoe Lifting

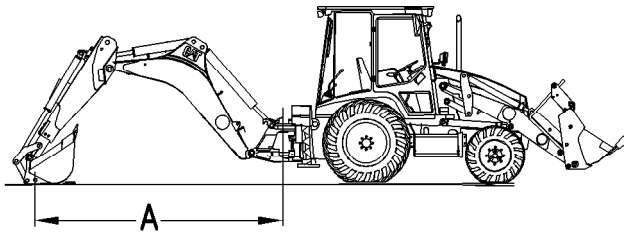

Illustration 35 g00741163

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 24

416D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.92 m (6.30 ft)	5981 kg (13174 lb)(1)
3.09 m (10.14 ft)	3493 kg (7693 lb)(1)
3.82 m (12.53 ft)	2723 kg (5997 lb)(1)
4.35 m (14.27 ft)	2319 kg (5109 lb)(1)
4.77 m (15.65 ft)	2012 kg (4432 lb)
Backhoe Center Pivot Swung to Side, Standard Stick	
1.91 m (6.28 ft)	7487 kg (16492 lb)
3.09 m (10.15 ft)	3655 kg (8051 lb)(1)
3.82 m (12.52 ft)	2464 kg (5428 lb)(1)
4.35 m (14.27 ft)	1946 kg (4286 lb)(1)
4.77 m (15.63 ft)	1648 kg (3631 lb)(1)

(continued)

(Table 24, contd)

416D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Retracted E-Stick	
1.84 m (6.03 ft)	6692 kg (14740 lb)(1)
3.07 m (10.06 ft)	3751 kg (8262 lb)(1)
3.82 m (12.54 ft)	2877 kg (6337 lb)(1)
4.38 m (14.37 ft)	2424 kg (5339 lb)(1)
4.82 m (15.81 ft)	1865 kg (4107 lb)
Backhoe Center Pivot Swung to Side, Retracted E-Stick	
1.84 m (6.03 ft)	7478 kg (16471 lb)
3.07 m (10.06 ft)	3775 kg (8314 lb)
3.82 m (12.54 ft)	2477 kg (5457 lb)(1)
4.38 m (14.37 ft)	1919 kg (4227 lb)(1)
4.82 m (15.81 ft)	1600 kg (3524 lb)(1)
Backhoe Straight Back, Extended E-Stick	
2.33 m (7.65 ft)	1622 kg (3573 lb)
3.47 m (11.07 ft)	2276 kg (5014 lb)
4.46 m (14.63 ft)	2217 kg (4883 lb)
5.19 m (17.04 ft)	1881 kg (4143 lb)
5.79 m (18.97 ft)	1032 kg (2274 lb)
Backhoe Center Pivot Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1540 kg (3392 lb)
3.47 m (11.37 ft)	2193 kg (4831 lb)
4.46 m (14.63 ft)	1977 kg (4355 lb)(1)
5.19 m (17.04 ft)	1469 kg (3235 lb)(1)
5.79 m (18.97 ft)	1033 kg (2275 lb)

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Table 25

416D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.92 m (6.30 ft)	3924 kg (8643 lb)	4510 kg (9935 lb)
3.09 m (10.14 ft)	2085 kg (4592 lb)	2397 kg (5279 lb)
3.82 m (12.53 ft)	1668 kg (3675 lb)	1918 kg (4224 lb)
4.35 m (14.27 ft)	1442 kg (3176 lb)	1658 kg (3651 lb)
4.77 m (15.65 ft)	1263 kg (2782 lb)	1452 kg (3198 lb)
Backhoe Center Pivot Swung to Side, Standard Stick		
1.91 m (6.28 ft)	3882 kg (8550 lb)	4462 kg (9828 lb)
3.09 m (10.15 ft)	2063 kg (4543 lb)	2371 kg (5222 lb)
3.82 m (12.52 ft)	1658 kg (3652 lb)	1839 kg (4045 lb)
4.35 m (14.27 ft)	1439 kg (3170 lb)	1504 kg (3308 lb)(1)
4.77 m (15.63 ft)	1267 kg (2790 lb)	1288 kg (2833 lb)(1)
Backhoe Straight Back, Retracted E-Stick		
1.84 m (6.03 ft)	3834 kg (8445 lb)	4407 kg (9707 lb)
3.07 m (10.06 ft)	1924 kg (4238 lb)	2211 kg (4871 lb)
3.82 m (12.54 ft)	1521 kg (3350 lb)	1748 kg (3851 lb)
4.38 m (14.37 ft)	1302 kg (2868 lb)	1497 kg (3297 lb)
4.82 m (15.81 ft)	1128 kg (2484 lb)	1296 kg (2855 lb)
Backhoe Center Pivot Swung to Side, Retracted E-Stick		
1.84 m (6.03 ft)	3783 kg (8333 lb)	4348 kg (9578 lb)
3.07 m (10.06 ft)	1899 kg (4183 lb)	2183 kg (4808 lb)
3.82 m (12.54 ft)	1509 kg (3324 lb)	1735 kg (3821 lb)
4.38 m (14.37 ft)	1298 kg (2860 lb)	1493 kg (3288 lb)
4.82 m (15.81 ft)	1131 kg (2491 lb)	1288 kg (2836 lb)(1)
Backhoe Straight Back, Extended E-Stick		
2.33 m (7.65 ft)	838 kg (1846 lb)	963 kg (2122 lb)
3.47 m (11.37 ft)	1157 kg (2548 lb)	1330 kg (2929 lb)
4.46 m (14.63 ft)	1115 kg (2455 lb)	1281 kg (2822 lb)
5.19 m (17.04 ft)	1017 kg (2241 lb)	1169 kg (2575 lb)
5.79 m (18.97 ft)	895 kg (1972 lb)	1029 kg (2267 lb)

(continued)

(Table 25, contd)

416D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Center Pivot Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	790 kg (1740 lb)	908 kg (2000 lb)
3.47 m (11.37 ft)	1112 kg (2449 lb)	1278 kg (2815 lb)
4.46 m (14.63 ft)	1094 kg (2409 lb)	1257 kg (2769 lb)
5.19 m (17.04 ft)	1009 kg (2222 lb)	1160 kg (2554 lb)
5.79 m (18.97 ft)	896 kg (1973 lb)	975 kg (2147 lb)

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416D Less Backhoe Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

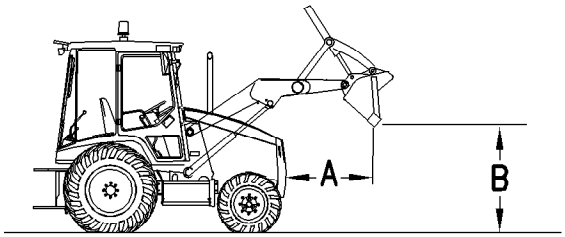

Illustration 36 g00851244

Dump Reach (A) and Dump Height (B)

Table 26

RATED BUCKET LOAD FOR A 416D LESS BACKHOE WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5201	0.76 m^3 (1.0 yd^3)	1404 kg (3095 lb)	1404 kg (3095 lb)	2621 mm (103 inch)	753 mm (30 inch)

416D Less Backhoe Pallet Forks

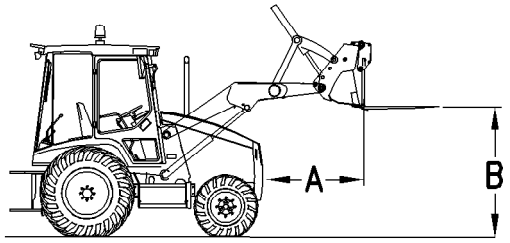

Illustration 37 g00851357

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with Single Tilt. The rated loads are provided for the following attachments:

- multipurpose buckets with flip over forks

Table 27

RATED LOAD FOR FLIP OVER FORKS on a 416D LESS BACKHOE SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-0941	0.95 m^3 (1.25 yd^3)	795 kg (1752 lb)	654 kg (1442 lb)	2989 mm (118 inch)	1066 mm (42 inch)

420D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

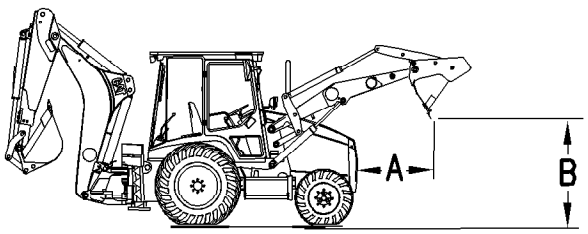

Illustration 38 g00741160

Dump Reach (A) and Dump Height (B)

Table 28

RATED BUCKET LOAD FOR A 420D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5989	0.95 m^3 (1.25 yd^3)	2833 kg (6245 lb)(1)	2833 kg (6245 lb)(1)	2544 mm (100 inch)	835 mm (33 inch)
9R-5202	1.0 m^3 (1.31 yd^3)	2843 kg (6269 lb)(1)	2843 kg (6269 lb)(1)	2575 mm (101 inch)	802 mm (32 inch)
9R-5988	1.05 m^3 (1.40 yd^3)	2782 kg (6133 lb)(1)	2782 kg (6133 lb)(1)	2521 mm (99 inch)	801 mm (32 inch)
112-0940	0.95 m^3 (1.25 yd^3)	2747 kg (6056 lb)	2747 kg (6056 lb)	2609 mm (103 inch)	721 mm (28 inch)
112-0941	0.95 m^3 (1.25 yd^3)	2641 kg (5823 lb)	2641 kg (5823 lb)	2609 mm (103 inch)	721 mm (28 inch)
111-8636	1.03 m^3 (1.35 yd^3)	2708 kg (5970 lb)	2708 kg (5970 lb)	2609 mm (103 inch)	721 mm (28 inch)
111-8637	1.03 m^3 (1.35 yd^3)	2601 kg (5735 lb)	2601 kg (5735 lb)	2609 mm (103 inch)	721 mm (28 inch)

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Table 29

RATED BUCKET LOAD FOR A 420D PARALLEL LIFT LOADER WITH QUICK COUPLER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
118-1972	0.95 m^3 (1.25 yd^3)	2649 kg (5839 lb)(1)	2649 kg (5839 lb)(1)	2462 mm (97 inch)	862 mm (34 inch)
118-1984	1.00 m^3 (1.31 yd^3)	2649 kg (5859 lb)(1)	2658 kg (5859 lb)(1)	2494 mm (98 inch)	830 mm (33 inch)
119-8142	0.95 m^3 (1.25 yd^3)	2610 kg (5755 lb)(1)	2610 kg (5755 lb)(1)	2531 mm (1010 inch)	751 mm (30 inch)
119-8144	1.03 m^3 (1.35 yd^3)	2591 kg (5712 lb)(1)	2591 kg (5712 lb)(1)	2531 mm (100 inch)	751 mm (30 inch)

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420D Pallet Forks

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over fork and for quick coupler type pallet forks that are associated with the quick coupler carriage.

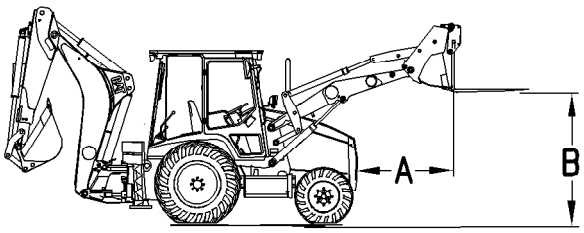

Illustration 39 g00741161

Reach (A) and Placement Height (B)

Table 30

RATED LOAD FOR FLIP OVER FORK 420D SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-0941	0.95 m^3 (1.25 yd^3)	1238 kg (2729 lb)	1202 kg (2650 lb)	2989 mm (118 inch)	2989 mm (42 inch)
111-8637	1.03 m^3 (1.35 yd^3)	1228 kg (2707 lb)	1193 kg (2629 lb)	3085 mm (118 inch)	2989 mm (42 inch)

Table 31

RATED LOAD FOR PALLET FORKS 420D PARALLEL LIFT WITH QUICK COUPLER					
Part Number	**Fork Tine Length**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
6W-8933	1050 mm (3 ft 5 inch)	2290 kg (5049 lb)(1)	1885 kg (4155 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)
6W-8900	1200 mm (3 ft 11 inch)	2279 kg (5025 lb)(1)	1808 kg (3985 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)
6W-9739	1350 mm (4 ft 5 inch)	2270 kg (5003 lb)(1)	1737 kg (3829 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)

(1) Tipping Limited

420D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

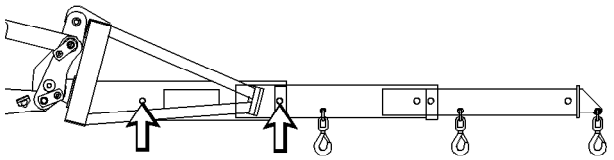

Illustration 40 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 32

420D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	967 kg (2131 lb)	612 kg (1349 lb)	448 kg (988 lb)
Placement Height at Lowest Position	−1996 mm (−6 ft 7 inch)	−2995 mm (9 ft 10 inch)	−3995 mm (13 ft 1 inch)
Reach at Lowest Position	548 mm (1 ft 9 inch)	544 mm (1 ft 9 inch)	546 mm (1 ft 9 inch)

(continued)

(Table 32, contd)

420D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Placement Height at Highest Position	4965 mm (16 ft 3 inch)	5805 mm (19 ft 1 inch)	6645 mm (21 ft 10 inch)
Reach at Highest Position	1458 mm (4 ft 9 inch)	1999 mm (6 ft 7 inch)	2541 mm (8 ft 4 inch)

420D Backhoe Lifting

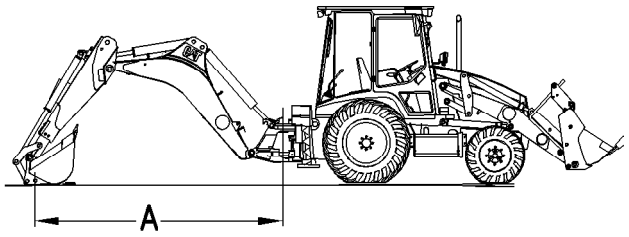

Illustration 41 g00741163

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 33

420D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.92 m (6.28 ft)	6134 kg (13512 lb)(1)
3.09 m (10.15 ft)	3580 kg (7886 lb)(1)
3.82 m (12.53 ft)	2790 kg (6148 lb)(1)
4.35 m (14.27 ft)	2376 kg (5233 lb)(1)
4.77 m (15.63 ft)	2115 kg (4659 lb)(1)

(continued)

(Table 33, contd)

420D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Center Pivot Swung to Side, Standard Stick	
1.91 m (6.28 ft)	8753 kg (19280 lb)
3.09 m (10.15 ft)	3662 kg (8066 lb)(1)
3.82 m (12.52 ft)	2464 kg (5427 lb)(1)
4.35 m (14.27 ft)	1942 kg (4278 lb)(1)
4.77 m (15.63 ft)	1643 kg (3618 lb)(1)
Backhoe Straight Back, Retracted E-Stick	
1.84 m (6.03 ft)	6855 kg (15100 lb)(1)
3.07 m (10.06 ft)	3843 kg (8464 lb)(1)
3.82 m (12.54 ft)	2947 kg (6491 lb)(1)
4.38 m (14.37 ft)	2483 kg (5469 lb)(1)
4.82 m (15.81 ft)	2073 kg (4567 lb)
Backhoe Center Pivot Swung to Side, Retracted E-Stick	
1.84 m (6.03 ft)	8786 kg (19353 lb)
3.07 m (10.06 ft)	37955 kg (7156 lb)(1)
3.82 m (12.54 ft)	2481 kg (5464 lb)(1)
4.38 m (14.37 ft)	1919 kg (4226 lb)(1)
4.82 m (15.81 ft)	1597 kg (3518 lb)(1)
Backhoe Straight Back, Extended E-Stick	
2.33 m (7.65 ft)	1929 kg (4249 lb)
3.47 m (11.37 ft)	2603 kg (5734 lb)
4.46 m (14.63 ft)	2501 kg (5509 lb)
5.19 m (17.04 ft)	2050 kg (4516 lb)(1)
5.79 m (18.97 ft)	1298 kg (2858 lb)
Backhoe Center Pivot Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1835 kg (4042 lb)
3.47 m (11.37 ft)	2604 kg (5735 lb)
4.46 m (14.63 ft)	1984 kg (4369 lb)(1)
5.19 m (17.04 ft)	1470 kg (3237 lb)(1)
5.79 m (18.97 ft)	1177 kg (2592 lb)(1)

(1) Tipping Limited

Table 34

420D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.92 m (6.28 ft)	4689 kg (10328 lb) (1)	4689 kg (10328 lb) (1)
3.09 m (10.15 ft)	2731 kg (6015 lb)	2771 kg (6103 lb)(1)
3.82 m (12.53 ft)	2179 kg (4800 lb)(1)	2179 kg (4800 lb)(1)
4.35 m (14.27 ft)	1870 kg (4120 lb)(1)	1870 kg (4120 lb)(1)
4.77 m (15.63 ft)	1677 kg (3694 lb)(1)	1677 kg (3694 lb)(1)
Backhoe Center Pivot Swung to Side, Standard Stick		
1.91 m (6.28 ft)	5058 kg (11142 lb)	5814 kg (12807 lb)
3.09 m (10.15 ft)	2703 kg (5953 lb)	2823 kg (6217 lb)(1)
3.82 m (12.52 ft)	1929 kg (4249 lb)(1)	1929 kg (4249 lb)(1)
4.35 m (14.27 ft)	1541 kg (3394 lb)(1)	1541 kg (3394 lb)(1)
4.77 m (15.63 ft)	1319 kg (2906 lb)(1)	1319 kg (2906 lb)(1)
Backhoe Straight Back, Retracted E-Stick		
1.84 m (6.03 ft)	5064 kg (11155 lb)	5228 kg (10362 lb) (1)
3.07 m (10.06 ft)	2568 kg (5656 lb)	2951 kg (5585 lb)
3.82 m (12.54 ft)	2046 kg (4507 lb)	2297 kg (4499 lb)(1)
4.38 m (14.37 ft)	1765 kg (3887 lb)	1951 kg (3808 lb)(1)
4.82 m (15.81 ft)	1541 kg (3395 lb)	1734 kg (3377 lb)(1)
Backhoe Center Pivot Swung to Side, Retracted E-Stick		
1.84 m (6.03 ft)	5000 kg (11013 lb)	5747 kg (12659 lb)
3.07 m (10.06 ft)	2536 kg (5585 lb)	2915 kg (6420 lb)
3.82 m (12.54 ft)	1942 kg (4277 lb)(1)	1942 kg (4277 lb)(1)
4.38 m (14.37 ft)	1524 kg (3356 lb)(1)	1524 kg (3356 lb)(1)
4.82 m (15.81 ft)	1286 kg (2832 lb)(1)	1286 kg (2832 lb)(1)
Backhoe Straight Back, Extended E-Stick		
2.33 m (7.65 ft)	1123 kg (2474 lb)	1291 kg (2844 lb)
3.47 m (11.37 ft)	1554 kg (3422 lb)	1786 kg (3934 lb)
4.46 m (14.63 ft)	1508 kg (3321 lb)	1733 kg (3817 lb)
5.19 m (17.04 ft)	1388 kg (3057 lb)	1595 kg (3514 lb)
5.79 m (18.97 ft)	1112 kg (2450 lb)	1336 kg (2943 lb)

(continued)

(Table 34, contd)

420D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Center Pivot Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	1065 kg (2345 lb)	1224 kg (2695 lb)
3.47 m (11.37 ft)	1496 kg (3296 lb)	1720 kg (3789 lb)
4.46 m (14.63 ft)	1481 kg (3263 lb)	1573 kg (3464 lb)(1)
5.19 m (17.04 ft)	1190 kg (2622 lb)(1)	1190 kg (2622 lb)(1)
5.79 m (18.97 ft)	973 kg (2144 lb)(1)	973 kg (2144 lb)(1)

(1) Tipping Limited

424D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

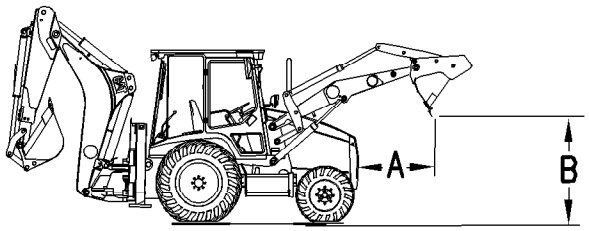

Illustration 42 g00285635

Dump Reach (A) and Dump Height (B)

Table 35

RATED BUCKET LOAD FOR A 424D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5202	1.0 m^3 (1.31 yd^3)	2416 kg (5326 lb)	2416 kg (5326 lb)	2633 mm (104 inch)	794 mm (31 inch)
112-0940	0.95 m^3 (1.25 yd^3)	2256 kg (4974 lb)	2256 kg (4974 lb)	2666 mm (105 inch)	714 mm (28 inch)
112-0941	0.95 m^3 (1.25 yd^3)	2150 kg (4741 lb)	2150 kg (4741 lb)	2666 mm (105 inch)	714 mm (28 inch)

424D Pallet Forks

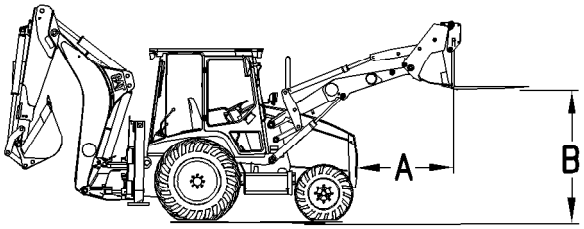

Illustration 43 g00285636

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over forks and for quick coupler type pallet forks that are associated with the quick coupler carriage.

Table 36

RATED LOAD FOR 424D WITH FLIP OVER FORKS AND SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-0941	0.95 m^3 (1.25 yd^3)	1017 kg (2242 lb)	987 kg (2177 lb)	3045 mm (120 inch)	1055 mm (42 inch)

424D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

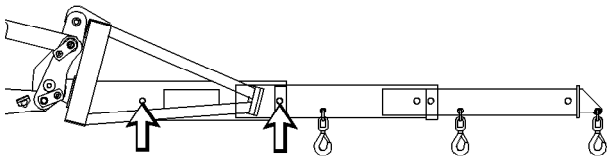

Illustration 44 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 37

424D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	967 kg (2131 lb)	612 kg (1349 lb)	448 kg (988 lb)
Placement Height at Lowest Position	−1996 mm (6 ft 7inches)	−2995 mm (9 ft 10 inch)	−3995 mm (13 ft 1 inch)
Reach at Lowest Position	548 mm (1 ft 9 inch)	544 mm (1 ft 9 inch)	546 mm (1 ft 9 inch)
Placement Height at Highest Position	4965 mm (16 ft 3 inch)	5805 mm (19 ft 1 inch)	6645 mm (21 ft 10 inch)
Reach at Highest Position	1458 mm (4 ft 9 inch)	1999 mm (6 ft 7 inch)	2541 mm (8 ft 4 inch)

424D Backhoe Lifting

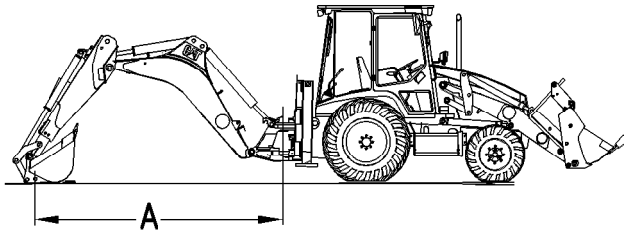

Illustration 45 g00286077

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 38

RATED LOAD FOR 424D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.86 m (6.11 ft)	4748 kg (10468 lb)
3.07 m (10.08 ft)	2928 kg (6455 lb)
3.81 m (12.49 ft)	2322 kg (5119 lb)
4.35 m (14.26 ft)	1996 kg (4400 lb)
4.76 m (15.63 ft)	1787 kg (3940 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick	
1.87 m (6.13 ft)	4160 kg (9171 lb)
3.07 m (10.07 ft)	2119 kg (4672 lb)
3.81 m (12.50 ft)	1563 kg (3446 lb)
4.35 m (14.27 ft)	1282 kg (2826 lb)
4.77 m (15.65 ft)	1108 kg (2443 lb)
Backhoe Straight Back, Retracted E-Stick	
1.79 m (5.85 ft)	5145 kg (11343 lb)
3.05 m (9.99 ft)	3057 kg (6740 lb)
3.81 m (12.51 ft)	2384 kg (5256 lb)
4.38 m (14.36 ft)	2025 kg (4464 lb)
4.82 m (15.81 ft)	1795 kg (3957 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick	
1.79 m (5.85 ft)	4384 kg (9665 lb)
3.05 m (9.99 ft)	2096 kg (4621 lb)
3.81 m (12.51 ft)	1500 kg (3307 lb)
4.38 m (14.36 ft)	1203 kg (2652 lb)
4.82 m (15.81 ft)	1018 kg (2244 lb)

(continued)

(Table 38, contd)

RATED LOAD FOR 424D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Extended E-Stick	
2.34 m (7.66 ft)	1618 kg (3567 lb)
3.44 m (11.28 ft)	2269 kg (5002 lb)
4.45 m (14.58 ft)	2067 kg (4557 lb)
5.19 m (17.02 ft)	1691 kg (3728 lb)
5.78 m (18.97 ft)	1032 kg (2275 lb)
Backhoe Side Shifted and Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1540 kg (3395 lb)
3.44 m (11.29 ft)	1926 kg (4246 lb)
4.45 m (14.59 ft)	1266 kg (2791 lb)
5.19 m (17.02 ft)	959 kg (2114 lb)
5.79 m (18.97 ft)	772 kg (1702 lb)

Table 39

RATED LOAD FOR 424D OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.86 m (6.11 ft)	3651 kg (8049 lb)	3651 kg (8049 lb)
3.07 m (10.08 ft)	2097 kg (4623 lb)	2283 kg (5033 lb)
3.81 m (12.49 ft)	1672 kg (3686 lb)	1830 kg (4034 lb)
4.35 m (14.26 ft)	1443 kg (3181 lb)	1587 kg (3499 lb)
4.76 m (15.63 ft)	1263 kg (2784 lb)	1431 kg (3155 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick		
1.87 m (6.13 ft)	3206 kg (7068 lb)	3206 kg (7068 lb)
3.07 m (10.07 ft)	1673 kg (3688 lb)	1673 kg (3688 lb)
3.81 m (12.50 ft)	1258 kg (2773 lb)	1258 kg (2773 lb)
4.35 m (14.27 ft)	1049 kg (2313 lb)	1049 kg (2313 lb)
4.77 m (15.65 ft)	921 kg (2030 lb)	921 kg (2030 lb)

(continued)

(Table 39, contd)

RATED LOAD FOR 424D OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Retracted E-Stick		
1.79 m (5.85 ft)	3948 kg (8704 lb)	3948 kg (8704 lb)
3.05 m (9.99 ft)	1936 kg (4268 lb)	2226 kg (4907 lb)
3.81 m (12.51 ft)	1524 kg (3360 lb)	1752 kg (3862 lb)
4.38 m (14.36 ft)	1303 kg (2873 lb)	1498 kg (3303 lb)
4.82 m (15.81 ft)	1128 kg (2487 lb)	1296 kg (2857 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick		
1.79 m (5.85 ft)	3372 kg (7434 lb)	3372 kg (7434 lb)
3.05 m (9.99 ft)	1655 kg (3649 lb)	1655 kg (3649 lb)
3.81 m (12.51 ft)	1211 kg (2670 lb)	1211 kg (2670 lb)
4.38 m (14.36 ft)	990 kg (2183 lb)	990 kg (2183 lb)
4.82 m (15.81 ft)	854 kg (1883 lb)	854 kg (1883 lb)
Backhoe Straight Back, Extended E-Stick		
2.34 m (7.66 ft)	835 kg (1841 lb)	960 kg (2116 lb)
3.44 m (11.28 ft)	1153 kg (2542 lb)	1326 kg (2923 lb)
4.45 m (14.58 ft)	1115 kg (2458 lb)	1281 kg (2824 lb)
5.19 m (17.02 ft)	1017 kg (2242 lb)	1170 kg (2579 lb)
5.78 m (18.97 ft)	895 kg (1973 lb)	1029 kg (2269 lb)
Backhoe Side Shifted and Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	790 kg (1742 lb)	908 kg (2002 lb)
3.44 m (11.29 ft)	1110 kg (2447 lb)	1276 kg (2813 lb)
4.45 m (14.59 ft)	1038 kg (2288 lb)	1038 kg (2288 lb)
5.19 m (17.02 ft)	809 kg (1784 lb)	809 kg (1784 lb)
5.79 m (18.97 ft)	671 kg (1479 lb)	671 kg (1479 lb)

428D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

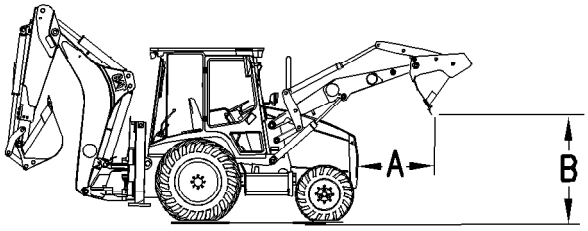

Illustration 46 g00285635

Dump Reach (A) and Dump Height (B)

Table 40

RATED BUCKET LOAD FOR A 428D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5202	1.00 m^3 (1.31 yd^3)	2917 kg (6431 lb)	2917 kg (6431 lb)	2633 mm (104 inch)	802 mm (32 inch)
111-8636	1.03 m^3 (1.35 yd^3)	2726 kg (6010 lb)	2726 kg (6010 lb)	2666 mm (105 inch)	714 mm (28 inch)
111-8637	1.03 m^3 (1.35 yd^3)	2620 kg (5776 lb)	2620 kg (5776 lb)	2666 mm (105 inch)	714 mm (28 inch)

Table 41

RATED BUCKET LOAD FOR A 428D PARALLEL LIFT LOADER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
112-1931	1.00 m^3 (1.31 yd^3)	3117 kg (6872 lb)	3117 kg (6872 lb)	2613 mm (103 inch)	764 mm (30 inch)
112-1940	1.35 m^3 (1.03 yd^3)	3061 kg (6748 lb)	3061 kg (6748 lb)	2650 mm (104 inch)	685 mm (27 inch)
112-1941	1.35 m^3 (1.03 yd^3)	2996 kg (6605 lb)	2996 kg (6605 lb)	2650 mm (104 inch)	685 mm (27 inch)

428D Pallet Forks

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over forks and for quick coupler type pallet forks that are associated with the quick coupler carriage.

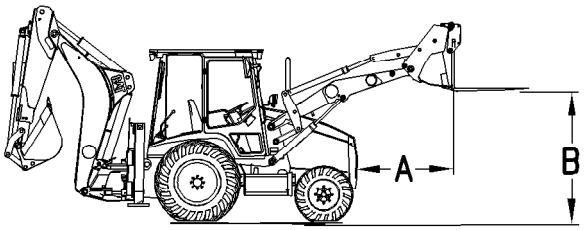

Illustration 47 g00285636

Reach (A) and Placement Height (B)

Table 42

RATED LOAD FOR 428D WITH FLIP OVER FORKS AND SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
111-8637	1.03 m^3 (1.35 yd^3)	1220 kg (2690 lb)	1185 kg (2612 lb)	3045 mm (120 inch)	1055 mm (42 inch)

Table 43

RATED LOAD FOR 428D WITH FLIP OVER FORKS AND PARALLEL LIFT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-1941	1.03 m^3 (1.35 yd^3)	1378 kg (3038 lb)	1339 kg (2952 lb)	3045 mm (120 inch)	1055 mm (42 inch)

428D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

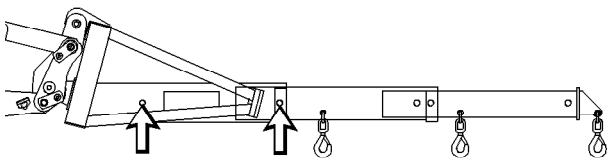

Illustration 48 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 44

428D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	967 kg (2131 lb)	612 kg (1349 lb)	448 kg (988 lb)
Placement Height at Lowest Position	−1996 mm (6 ft 7 inch)	−2995 mm (9 ft 10 inch)	−3995 mm (13 ft 1 inch)
Reach at Lowest Position	548 mm (1 ft 10 inch)	544 mm (1 ft 9 inch)	546 mm (1 ft 9 inch)

(continued)

(Table 44, contd)

428D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Placement Height at Highest Position	4965 mm (16 ft 3 inch)	5805 mm (19 ft 1 inch)	6645 mm (21 ft 10 inch)
Reach at Highest Position	1458 mm (4 ft 9 inch)	1999 mm (6 ft 7 inch)	2541 mm (8 ft 4 inch)

428D Backhoe Lifting

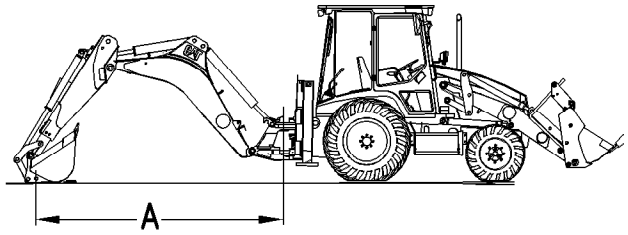

Illustration 49 g00286077

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 45

RATED LOAD FOR 428D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.86 m (6.11 ft)	4819 kg (10624 lb)
3.07 m (10.08 ft)	2993 kg (6598 lb)
3.81 m (12.49 ft)	2380 kg (5247 lb)
4.35 m (14.26 ft)	2050 kg (4519 lb)
4.76 m (15.63 ft)	1838 kg (4052 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick	
1.87 m (6.13 ft)	4202 kg (9264 lb)
3.07 m (10.07 ft)	2167 kg (4777 lb)
3.81 m (12.50 ft)	1606 kg (3541 lb)
4.35 m (14.27 ft)	1323 kg (2917 lb)
4.77 m (15.65 ft)	1146 kg (2526 lb)
Backhoe Straight Back, Retracted E-Stick	
1.79 m (5.85 ft)	5241 kg (11554 lb)
3.05 m (9.99 ft)	3114 kg (6865 lb)
3.81 m (12.51 ft)	2428 kg (5353 lb)
4.38 m (14.36 ft)	2061 kg (4544 lb)
4.82 m (15.81 ft)	1826 kg (4026 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick	
1.79 m (5.85 ft)	4461 kg (9835 lb)
3.05 m (9.99 ft)	2133 kg (4702 lb)
3.81 m (12.51 ft)	1525 kg (3362 lb)
4.38 m (14.36 ft)	1222 kg (2694 lb)
4.82 m (15.81 ft)	1034 kg (2280 lb)
Backhoe Straight Back, Extended E-Stick	
2.34 m (7.66 ft)	1924 kg (4242 lb)
3.44 m (11.28 ft)	2601 kg (5734 lb)
4.45 m (14.58 ft)	2107 kg (4645 lb)
5.19 m (17.02 ft)	1722 kg (3796 lb)
5.78 m (18.97 ft)	1298 kg (2862 lb)

(continued)

(Table 45, contd)

RATED LOAD FOR 428D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Side Shifted and Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1835 kg (4045 lb)
3.44 m (11.29 ft)	1966 kg (4334 lb)
4.45 m (14.59 ft)	1291 kg (2846 lb)
5.19 m (17.02 ft)	977 kg (2154 lb)
5.79 m (18.97 ft)	785 kg (1731 lb)

Table 46

RATED LOAD FOR 428D OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.86 m (6.11 ft)	3704 kg (8166 lb)	3704 kg (8166 lb)
3.07 m (10.08 ft)	2332 kg (5141 lb)	2332 kg (5141 lb)
3.81 m (12.49 ft)	1874 kg (4131 lb)	1874 kg (4131 lb)
4.35 m (14.26 ft)	1627 kg (3587 lb)	1627 kg (3587 lb)
4.76 m (15.63 ft)	1470 kg (3241 lb)	1470 kg (3241 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick		
1.87 m (6.13 ft)	3237 kg (7136 lb)	3237 kg (7136 lb)
3.07 m (10.07 ft)	1709 kg (3768 lb)	1709 kg (3768 lb)
3.81 m (12.50 ft)	1291 kg (2846 lb)	1291 kg (2846 lb)
4.35 m (14.27 ft)	1080 kg (2381 lb)	1080 kg (2381 lb)
4.77 m (15.65 ft)	949 kg (2092 lb)	949 kg (2092 lb)
Backhoe Straight Back, Retracted E-Stick		
1.79 m (5.85 ft)	4020 kg (8863 lb)	4020 kg (8863 lb)
3.05 m (9.99 ft)	2423 kg (5342 lb)	2423 kg (5342 lb)
3.81 m (12.51 ft)	1909 kg (4209 lb)	1909 kg (4209 lb)
4.38 m (14.36 ft)	1636 kg (3607 lb)	1636 kg (3607 lb)
4.82 m (15.81 ft)	1461 kg (3221 lb)	1461 kg (3221 lb)

(continued)

(Table 46, contd)

RATED LOAD FOR 428D OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Side Shifted and Swung to Side, Retracted E-Stick		
1.79 m (5.85 ft)	3430 kg (7562 lb)	3430 kg (7562 lb)
3.05 m (9.99 ft)	1683 kg (3710 lb)	1683 kg (3710 lb)
3.81 m (12.51 ft)	1230 kg (2712 lb)	1230 kg (2712 lb)
4.38 m (14.36 ft)	1004 kg (2213 lb)	1004 kg (2213 lb)
4.82 m (15.81 ft)	866 kg (1909 lb)	866 kg (1909 lb)
Backhoe Straight Back, Extended E-Stick		
2.34 m (7.66 ft)	1120 kg (2469 lb)	1287 kg (2837 lb)
3.44 m (11.28 ft)	1549 kg (3415 lb)	1780 kg (3924 lb)
4.45 m (14.58 ft)	1508 kg (3325 lb)	1670 kg (3682 lb)
5.19 m (17.02 ft)	1383 kg (3049 lb)	1383 kg (3049 lb)
5.78 m (18.97 ft)	1112 kg (2452 lb)	1203 kg (2652 lb)
Backhoe Side Shifted and Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	1065 kg (2348 lb)	1224 kg (2698 lb)
3.44 m (11.29 ft)	1494 kg (3294 lb)	1559 kg (3437 lb)
4.45 m (14.59 ft)	1056 kg (2328 lb)	1056 kg (2328 lb)
5.19 m (17.02 ft)	823 kg (1814 lb)	823 kg (1814 lb)
5.79 m (18.97 ft)	681 kg (1501 lb)	681 kg (1501 lb)

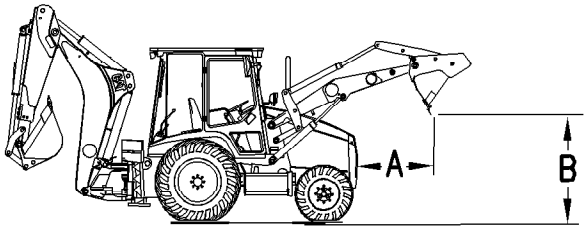

Illustration 50 g00741160

Dump Reach (A) and Dump Height (B)

430D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

Table 47

RATED BUCKET LOAD FOR A 430D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
9R-5202	1.00 m^3 (1.31 yd^3)	2899 kg (6391 lb)	2899 kg (6391 lb)	2575 mm (101 inch)	802 mm (32 inch)
9R-5988	1.07 m^3 (1.40 yd^3)	2837 kg (6255 lb)	2837 kg (6255 lb)	2521 mm (99 inch)	801 mm (32 inch)

(continued)

(Table 47, contd)

RATED BUCKET LOAD FOR A 430D WITH SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
112-1916	1.15 m^3 (1.50 yd^3)	2826 kg (6230 lb)	2826 kg (6230 lb)	2521 mm (99 inch)	801 mm (32 inch)
112-0940	0.95 m^3 (1.25 yd^3)	2747 kg (6056 lb)	2747 kg (6056 lb)	2609 mm (103 inch)	721 mm (28 inch)
112-0941	0.95 m^3 (1.25 yd^3)	2641 kg (5823 lb)	2641 kg (5823 lb)	2609 mm (103 inch)	721 mm (28 inch)
111-8636	1.03 m^3 (1.35 yd^3)	2708 kg (5970 lb)	2708 kg (5970 lb)	2609 mm (103 inch)	721 mm (28 inch)
111-8637	1.03 m^3 (1.35 yd^3)	2601 kg (5735 lb)	2601 kg (5735 lb)	2609 mm (103 inch)	721 mm (28 inch)

Table 48

RATED BUCKET LOAD FOR A 430D PARALLEL LIFT LOADER WITH QUICK COUPLER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
118-1984	1.00 m^3 (1.531 yd^3)	2776 kg (6121 lb)(1)	2776 (6121)(1)	2494 mm (98 inch)	830 mm (33 inch)
118-1971	1.15 m^3 (1.50 yd^3)	2701 kg (5954 lb)(1)	2701 kg (5954 lb)(1)	2440 mm (96 inch)	827 mm (33 inch)
119-8142	0.95 m^3 (1.25 yd^3)	2732 kg (6023 lb)(1)	2732 kg (6023 lb)(1)	2531 mm (100 inch)	751 mm (30 inch)
119-8144	1.03 m^3 (1.35 yd^3)	2712 kg (5979 lb)(1)	2712 kg (5979 lb)(1)	2531 mm (100 inch)	751 mm (30 inch)

(1) Tipping Limited

430D Pallet Forks

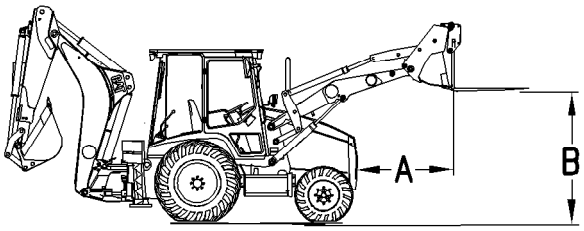

Illustration 51 g00741161

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over fork and for quick coupler type pallet forks that are associated with the quick coupler carriage.

Table 49

RATED LOAD FOR FLIP OVER FORK 430D SINGLE TILT					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-0941	0.95 m^3 (1.25 yd^3)	1238 kg (2729 lb)	1202 kg (2650 lb)	2989 mm (118 inch)	1066 mm (42 inch)
111-8637	1.03 m^3 (1.35 yd^3)	1228 kg (2707 lb)	1193 kg (2629 lb)	2989 mm (118 inch)	11066 mm (42 inch)

Table 50

RATED LOAD FOR PALLET FORKS 430D PARALLEL LIFT WITH QUICK COUPLER					
Part Number	**Fork Tine Length**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
6W-8933	1050 mm (3 ft 5 inch)	2394 kg (5277 lb)(1)	1961 kg (4322 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)
6W-8900	1200 mm (3 ft 11 inch)	2383 kg (5254 lb)(1)	1890 kg (4166 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)
6W-9739	1350 mm (4 ft 5 inch)	2373 kg (5232 lb)(1)	1816 kg (4004 lb)(1)	3124 mm (123 inch)	680 mm (27 inch)

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430D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

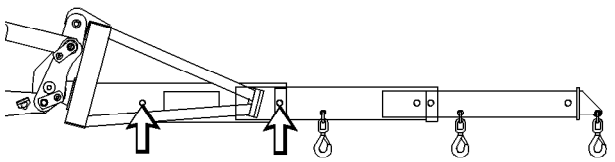

Illustration 52 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 51

430D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	967 kg (2131 lb)	612 kg (1349 lb)	448 kg (988 lb)
Placement Height at Lowest Position	−1996 mm (−6 ft 7 inch)	−2995 mm (9 ft 10 inch)	−3995 mm (13 ft 1 inch)
Reach at Lowest Position	548 mm (1 ft 10 inch)	544 mm (1 ft 9 inch)	546 mm (1 ft 9 inch)

(continued)

(Table 51, contd)

430D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Placement Height at Highest Position	4965 mm (16 ft 3 inch)	5805 mm (19 ft 1 inch)	6645 mm (21 ft 10 inch)
Reach at Highest Position	1458 mm (4 ft 9 inch)	1999 mm (6 ft 7 inch)	2541 mm (8 ft 4 inch)

430D Backhoe Lifting

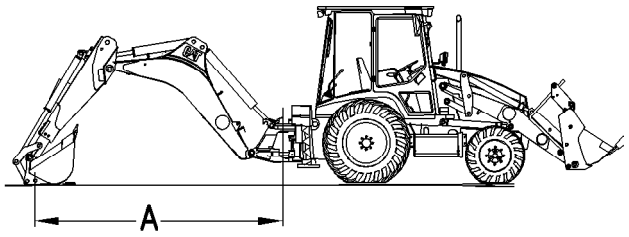

Illustration 53 g00741163

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 52

430D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
2.13 m (6.99 ft)	5807 kg (12791 lb)(1)
3.35 m (10.99 ft)	3490 kg (7687 lb)(1)
4.10 m (13.46 ft)	2739 kg (6033 lb)(1)
4.66 m (15.28 ft)	2340 kg (5155 lb)(1)
5.08 m (16.68 ft)	2089 kg (4601 lb)(1)

(continued)

(Table 52, contd)

430D RATED OPERATING LOAD FOR BACKHOE BUCKET APPLICATION	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Center Pivot Swung to Side, Standard Stick	
2.13 m (6.98 ft)	8831 kg (19452 lb)(1)
3.35 m (10.98 ft)	3282 kg (7228 lb)(1)
4.10 m (13.46 ft)	2259 kg (4975 lb)(1)
4.66 m (15.27 ft)	1795 kg (3953 lb)(1)
5.08 m (16.67 ft)	1524 kg (3357 lb)(1)
Backhoe Straight Back, Retracted E-Stick	
2.02 m (6.63 ft)	6132 kg (13507 lb)(1)
3.38 m (11.08 ft)	3369 kg (7420 lb)(1)
4.20 m (13.79 ft)	2554 kg (5625 lb)(1)
4.81 m (15.78 ft)	2131 kg (4694 lb)(1)
5.28 m (17.33 ft)	1865 kg (4109 lb)(1)
Backhoe Center Pivot Swung to Side, Retracted E-Stick	
2.02 m (6.63 ft)	10093 kg (22231 lb)
3.38 m (11.08 ft)	3122 kg (6876 lb)(1)
4.20 m (13.79 ft)	2034 kg (4480 lb)(1)
4.81 m (15.77 ft)	1554 kg (3424 lb)(1)
5.28 m (17.33 ft)	1277 kg (2812 lb)(1)
Backhoe Straight Back, Extended E-Stick	
2.86 m (9.17 ft)	1887 kg (4157 lb)
3.92 m (11.86 ft)	2458 kg (5415 lb)
4.99 m (16.36 ft)	2138 kg (4710 lb)(1)
5.78 m (18.96 ft)	1722 kg (3794 lb)(1)
6.41 m (21.02 ft)	1463 kg (3223 lb)(1)
Backhoe Center Pivot Swung to Side, Extended E-Stick	
2.86 m (9.38 ft)	1808 kg (3983 lb)
3.92 m (12.85 ft)	2459 kg (5416 lb)
4.99 m (16.36 ft)	1592 kg (3507 lb)(1)
5.78 m (18.95 ft)	1160 kg (2555 lb)(1)
6.41 m (21.02 ft)	909 kg (2002 lb)(1)

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Table 53

430D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
2.13 m (6.99 ft)	4456 kg (9816 lb)(1)	4456 kg (9816 lb)(1)
3.35 m (10.99 ft)	2717 kg (5984 lb)(1)	2717 kg (5984 lb)(1)
4.10 m (13.46 ft)	2155 kg (4747 lb)(1)	2155 kg (4747 lb)(1)
4.66 m (15.28 ft)	1858 kg (4092 lb)(1)	1858 kg (4092 lb)(1)
5.08 m (16.68 ft)	1671 kg (3680 lb)(1)	1671 kg (3680 lb)(1)
Backhoe Center Pivot Swung to Side, Standard Stick		
2.13 m (6.98 ft)	6111 kg (13461 lb)	6705 kg (14769 lb) (1)
3.35 m (10.98 ft)	2551 kg (5620 lb)(1)	2551 kg (5620 lb)(1)
4.10 m (13.46 ft)	1789 kg (3940 lb)(1)	1789 kg (3940 lb)(1)
4.66 m (15.27 ft)	1444 kg (3181 lb)(1)	1444 kg (3181 lb)(1)
5.08 m (16.67 ft)	1244 kg (2741 lb)(1)	1244 kg (2741 lb)(1)
Backhoe Straight Back, Retracted E-Stick		
2.02 m (6.63 ft)	4697 kg (10345 lb) (1)	4697 kg (10345 lb) (1)
3.38 m (11.08 ft)	2625 kg (5782 lb)(1)	2625 kg (5782 lb)(1)
4.20 m (13.79 ft)	2016 kg (4441 lb)(1)	2016 kg (4441 lb)(1)
4.81 m (15.78 ft)	1701 kg (3747 lb)(1)	1701 kg (3747 lb)(1)
5.28 m (17.33 ft)	1504 kg (3312 lb)(1)	1504 kg (3312 lb)(1)
Backhoe Center Pivot Swung to Side, Retracted E-Stick		
2.02 m (6.63 ft)	5783 kg (12738 lb)	6648 kg (14644 lb)
3.38 m (11.08 ft)	2431 kg (5355 lb)(1)	2431 kg (5355 lb)(1)
4.20 m (13.79 ft)	1621 kg (3570 lb)(1)	1621 kg (3570 lb)(1)
4.81 m (15.77 ft)	1265 kg (2786 lb)(1)	1265 kg (2786 lb)(1)
5.29 m (17.33 ft)	1059 kg (2333 lb)(1)	1059 kg (2333 lb)(1)
Backhoe Straight Back, Extended E-Stick		
2.80 m (9.17 ft)	1105 kg (2435 lb)	1271 kg (2799 lb)
3.92 m (12.86 ft)	1767 kg (3892 lb)	2031 kg (4474 lb)
4.99 m (16.36 ft)	1707 kg (3759 lb)(1)	1707 kg (3759 lb)(1)
5.78 m (18.96 ft)	1397 kg (3076 lb)(1)	1397 kg (3076 lb)(1)
6.41 m (21.02 ft)	1071 kg (2360 lb)	1204 kg (2652 lb)(1)

(continued)

(Table 53, contd)

430D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**Rated Operating Load "SAE J31"/ "ISO 10567"**	**Rated Operating Load "EN 474-4"**
Backhoe Center Pivot Swung to Side, Extended E-Stick		
2.86 m (9.38 ft)	1055 kg (2324 lb)	1213 kg (2672 lb)
3.92 m (13.84 ft)	1699 kg (3743 lb)	1953 kg (4302 lb)
4.99 m (16.36 ft)	1293 kg (2849 lb)(1)	1293 kg (2849 lb)(1)
5.78 m (18.95 ft)	973 kg (2143 lb)(1)	973 kg (2143 lb)(1)
6.41 m (21.02 ft)	787 kg (1733 lb)(1)	787 kg (1733 lb)(1)

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432D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

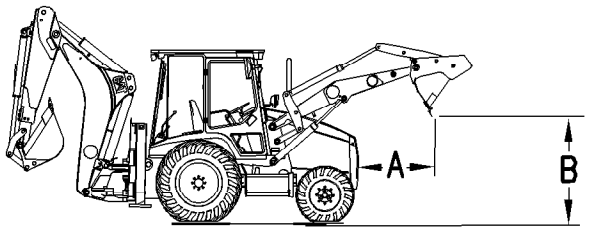

Illustration 54 g00285635

Dump Reach (A) and Dump Height (B)

Table 54

RATED BUCKET LOAD FOR A 432D PARALLEL LIFT LOADER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
112-1931	1.00 m^3 (1.31 yd^3)	3117 kg (6872 lb)	3117 kg (6872 lb)	2613 mm (103 inch)	764 mm (30 inch)
112-1940	1.35 m^3 (1.03 yd^3)	3061 kg (6748 lb)	3061 kg (6748 lb)	2650 mm (104 inch)	685 mm (27 inch)
112-1941	1.35 m^3 (1.03 yd^3)	2996 kg (6605 lb)	2996 kg (6605 lb)	2650 mm (104 inch)	685 mm (27 inch)

Table 55

RATED BUCKET LOAD FOR A 432D PARALLEL LIFT LOADER WITH QUICK COUPLER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
118-1984	1.00 m^3 (1.31 yd^3)	2931 kg (6462 lb)	2931 kg (6462 lb)	2552 mm (100 inch)	823 mm (32 inch)
119-8144	1.35 m^3 (1.03 yd^3)	2869 kg (6326 lb)	2869 kg (6326 lb)	2589 mm (102 inch)	744 mm (29 inch)

432D Pallet Forks

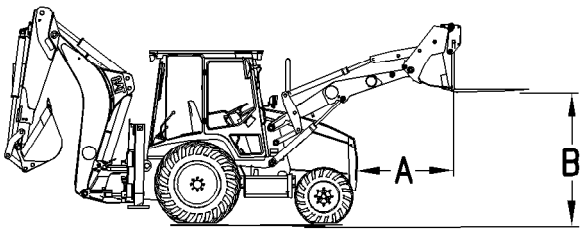

Illustration 55 g00285636

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over forks and for quick coupler type pallet forks that are associated with the quick coupler carriage.

Table 56

RATED LOAD FOR 432D WITH FLIP OVER FORKS AND PARALLEL LIFT					
Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-1941	1.03 m^3 (1.35 yd^3)	1378 kg (3038 lb)	1339 kg (2952 lb)	3045 mm (120 inch)	1055 mm (42 inch)

Table 57

RATED LOAD FOR 432D WITH PALLET FORKS AND PARALLEL LIFT WITH QUICK COUPLER					
Part Number	**Fork Tine Length**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
6W-8933	1050 mm (3 ft 5 inch)	2443 kg (5386 lb)	1885 kg (4155 lb)	3124 mm (123 inch)	680 mm (27 inch)
6W-8900	1200 mm (3 ft 11 inch)	2423 kg (5342 lb)	1808 kg (3985 lb)	3124 mm (123 inch)	680 mm (27 inch)
6W-9739	1350 mm (4 ft 5 inch)	2402 kg (5295 lb)	1737 kg (3829 lb)	3124 mm (123 inch)	680 mm (27 inch)

432D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

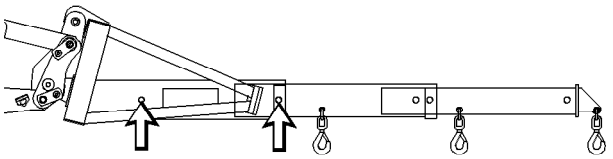

Illustration 56 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 58

432D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	965 kg (2127 lb)	611 kg (1347 lb)	447 kg (986 lb)
Placement Height at Lowest Position	−1939 mm (6 ft 4 inch)	−2938 mm (9 ft 8 inch)	−3938 mm (12 ft 11 inch)
Reach at Lowest Position	550 mm (1 ft 10 inch)	550 mm (1 ft 10 inch)	550 mm (1 ft 10 inch)

(continued)

(Table 58, contd)

432D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Placement Height at Highest Position	5026 mm (16 ft 6 inch)	5868 mm (19 ft 3 inch)	6711 mm (22 ft 0 inch)
Reach at Highest Position	1440 mm (4 ft 9 inch)	1977 mm (6 ft 6 inch)	2516 mm (8 ft 3 inch)

432D Backhoe Lifting

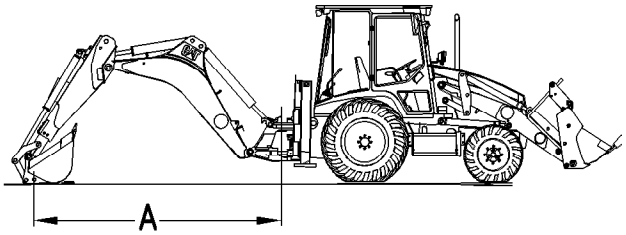

Illustration 57 g00286077

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 59

RATED OPERATING LOAD FOR 432D WITH BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.86 m (6.11 ft)	4838 kg (10666 lb)
3.07 m (10.08 ft)	2981 kg (6572 lb)
3.81 m (12.49 ft)	23632 kg (52100 lb)
4.35 m (14.26 ft)	2029 kg (4473 lb)
4.76 m (15.63 ft)	1816 kg (4004 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick	
1.87 m (6.13 ft)	4230 kg (9326 lb)
3.07 m (10.07 ft)	2152 kg (4744 lb)
3.81 m (12.50 ft)	1585 kg (3494 lb)
4.35 m (14.27 ft)	1298 kg (2862 lb)
4.77 m (15.65 ft)	1120 kg (2469 lb)
Backhoe Straight Back, Retracted E-Stick	
1.79 m (5.85 ft)	5241 kg (11554 lb)
3.05 m (9.99 ft)	3114 kg (6865 lb)
3.81 m (12.51 ft)	2428 kg (5353 lb)
4.38 m (14.36 ft)	2061 kg (4544 lb)
4.82 m (15.81 ft)	1826 kg (4026 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick	
1.79 m (5.85 ft)	4461 kg (9835 lb)
3.05 m (9.99 ft)	2133 kg (4702 lb)
3.81 m (12.51 ft)	1525 kg (3362 lb)
4.38 m (14.36 ft)	1222 kg (2694 lb)
4.82 m (15.81 ft)	1034 kg (2280 lb)
Backhoe Straight Back, Extended E-Stick	
2.34 m (7.66 ft)	1924 kg (4242 lb)
3.44 m (11.28 ft)	2601 kg (5734 lb)
4.45 m (14.58 ft)	2107 kg (4645 lb)
5.19 m (17.02 ft)	1722 kg (3796 lb)
5.78 m (18.97 ft)	1298 kg (2862 lb)

(continued)

(Table 59, contd)

RATED OPERATING LOAD FOR 432D WITH BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Side Shifted and Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1835 kg (4045 lb)
3.44 m (11.29 ft)	1966 kg (4334 lb)
4.45 m (14.59 ft)	1291 kg (2846 lb)
5.19 m (17.02 ft)	977 kg (2154 lb)
5.79 m (18.97 ft)	785 kg (1731 lb)

Table 60

432D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.86 m (6.11 ft)	3719 kg (8199 lb)	3719 kg (8199 lb)
3.07 m (10.08 ft)	2323 kg (5121 lb)	2323 kg (5121 lb)
3.81 m (12.49 ft)	1860 kg (4101 lb)	1860 kg (4101 lb)
4.35 m (14.26 ft)	1612 kg (3554 lb)	1612 kg (3554 lb)
4.76 m (15.63 ft)	1453 kg (3201 lb)	1453 kg (3201 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick		
1.87 m (6.13 ft)	3259 kg (7185 lb)	3259 kg (7185 lb)
3.07 m (10.07 ft)	1698 kg (3743 lb)	1698 kg (3743 lb)
3.81 m (12.50 ft)	1275 kg (2811 lb)	1275 kg (2811 lb)
4.35 m (14.27 ft)	1061 kg (2339 lb)	1061 kg (2339 lb)
4.77 m (15.65 ft)	930 kg (2050 lb)	930 kg (2050 lb)
Backhoe Straight Back, Retracted E-Stick		
1.79 m (5.85 ft)	4020 kg (8863 lb)	4020 kg (8863 lb)
3.05 m (9.99 ft)	2423 kg (5342 lb)	2423 kg (5342 lb)
3.81 m (12.51 ft)	1909 kg (4209 lb)	1909 kg (4209 lb)
4.38 m (14.36 ft)	1636 kg (3607 lb)	1636 kg (3607 lb)
4.82 m (15.81 ft)	1461 kg (3221 lb)	1461 kg (3221 lb)

(continued)

(Table 60, contd)

432D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Side Shifted and Swung to Side, Retracted E-Stick		
1.79 m (5.85 ft)	3430 kg (7562 lb)	3430 kg (7562 lb)
3.05 m (9.99 ft)	1683 kg (3710 lb)	1683 kg (3710 lb)
3.81 m (12.51 ft)	1230 kg (2712 lb)	1230 kg (2712 lb)
4.38 m (14.36 ft)	1004 kg (2213 lb)	1004 kg (2213 lb)
4.82 m (15.81 ft)	866 kg (1909 lb)	866 kg (1909 lb)
Backhoe Straight Back, Extended E-Stick		
2.34 m (7.66 ft)	1120 kg (2469 lb)	1120 kg (2469 lb)
3.44 m (11.28 ft)	1549 kg (3415 lb)	1549 kg (3415 lb)
4.45 m (14.58 ft)	1508 kg (3325 lb)	1508 kg (3325 lb)
5.19 m (17.02 ft)	1383 kg (3049 lb)	1383 kg (3049 lb)
5.78 m (18.97 ft)	1112 kg (2452 lb)	1112 kg (2452 lb)
Backhoe Side Shifted and Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	1065 kg (2348 lb)	1065 kg (2348 lb)
3.44 m (11.29 ft)	1494 kg (3294 lb)	1494 kg (3294 lb)
4.45 m (14.59 ft)	1056 kg (2328 lb)	1056 kg (2328 lb)
5.19 m (17.02 ft)	823 kg (1814 lb)	823 kg (1814 lb)
5.79 m (18.97 ft)	681 kg (1501 lb)	681 kg (1501 lb)

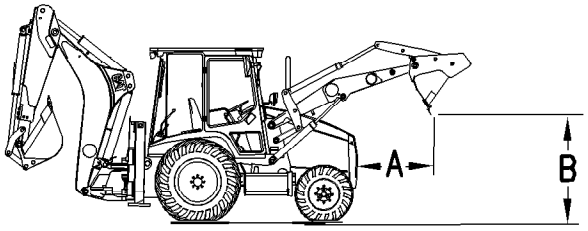

Illustration 58 g00285635

Dump Reach (A) and Dump Height (B)

442D Loader Buckets

The following tables provide the rated operating loads for the standard machine that is equipped with the given bucket. The corresponding dump clearance is given for each bucket at maximum lift height and at the full dump angle. The reach is given for each bucket at maximum lift height and at the full dump angle. Clearance is measured from the ground to the bucket edge in order to dump the load. The reach is measured from the front grill to the bucket edge.

Table 61

RATED BUCKET LOAD FOR A 442D PARALLEL LIFT LOADER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
112-1931	1.00 m^3 (1.31 yd^3)	3117 kg (6872 lb)	3117 kg (6872 lb)	2613 mm (103 inch)	764 mm (30 inch)
112-1940	1.35 m^3 (1.03 yd^3)	3061 kg (6748 lb)	3061 kg (6748 lb)	2650 mm (104 inch)	685 mm (27 inch)
112-1941	1.35 m^3 (1.03 yd^3)	2996 kg (6605 lb)	2996 kg (6605 lb)	2650 mm (104 inch)	685 mm (27 inch)

Table 62

RATED BUCKET LOAD FOR A 442D PARALLEL LIFT LOADER WITH QUICK COUPLER					
Bucket Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J818" Rated Operating Load**	**Dump Height (B)**	**Dump Reach (A)**
118-1984	1.00 m^3 (1.31 yd^3)	2931 kg (6462 lb)	2931 kg (6462 lb)	2552 mm (100 inch)	823 mm (32 inch)
119-8144	1.35 m^3 (1.03 yd^3)	2869 kg (6326 lb)	2869 kg (6326 lb)	2589 mm (102 inch)	744 mm (29 inch)

442D Pallet Forks

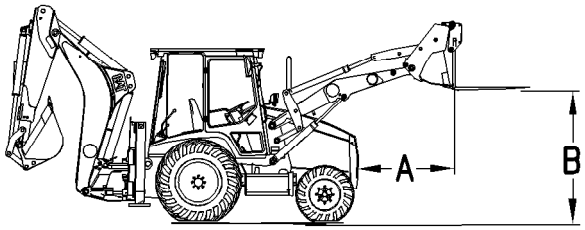

Illustration 59 g00285636

Reach (A) and Placement Height (B)

The following tables provide the rated operating loads for the standard machine configuration with the given loader type (Single Tilt, Parallel Lift, or Parallel Lift with Quick Coupler). The rated loads are provided for multipurpose buckets with flip over forks and for quick coupler type pallet forks that are associated with the quick coupler carriage.

Table 63

RATED LOAD FOR 442D WITH FLIP OVER FORKS AND PARALLEL LIFT					
Part Number	**Volumetric Rating**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
112-1941	1.03 m^3 (1.35 yd^3)	1378 kg (3038 lb)	1339 kg (2952 lb)	3045 mm (120 inch)	1055 mm (42 inch)

Table 64

RATED LOAD FOR 442D WITH PALLET FORKS AND PARALLEL LIFT WITH QUICK COUPLER					
Part Number	**Fork Tine Length**	**"EN 474-4" Rated Operating Load**	**"SAE J1197" Rated Operating Load**	**Placement Height (B)**	**Reach (A)**
6W-8933	1050 mm (3 ft 5 inch)	2443 kg (5386 lb)	1885 kg (4155 lb)	3124 mm (123 inch)	680 mm (27 inch)
6W-8900	1200 mm (3 ft 11 inch)	2423 kg (5342 lb)	1808 kg (3985 lb)	3124 mm (123 inch)	680 mm (27 inch)
6W-9739	1350 mm (4 ft 5 inch)	2402 kg (5295 lb)	1737 kg (3829 lb)	3124 mm (123 inch)	680 mm (27 inch)

442D Material Handling Arm

The placement height (ground line to the chain hook) and reach (front grill to the chain hook) are given for the highest position of the material handling arm and for the lowest position of the material handling arm.

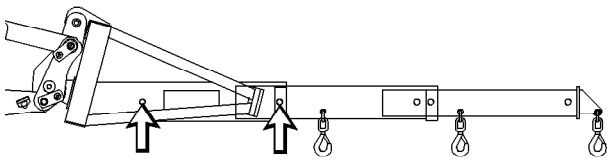

Illustration 60 g00285638

The following table provides the rated operating loads for the standard parallel lift machine configuration with a material handling arm and with a quick coupler.

Table 65

442D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Rated Operating Load	965 kg (2127 lb)	611 kg (1347 lb)	447 kg (986 lb)
Placement Height at Lowest Position	−1939 mm (6 ft 4 inch)	−2938 mm (9 ft 8 inch)	−3938 mm (12 ft 11 inch)
Reach at Lowest Position	550 mm (1 ft 10 inch)	550 mm (1 ft 10 inch)	550 mm (1 ft 10 inch)

(continued)

(Table 65, contd)

442D RATED LOAD FOR MATERIAL HANDLING ARM "EN 474-4"			
	Retracted	**Mid-Position**	**Extended**
Placement Height at Highest Position	5026 mm (16 ft 6 inch)	5868 mm (19 ft 3 inch)	6711 mm (22 ft 0 inch)
Reach at Highest Position	1440 mm (4 ft 9 inch)	1977 mm (6 ft 6 inch)	2516 mm (8 ft 3 inch)

442D Backhoe Lifting

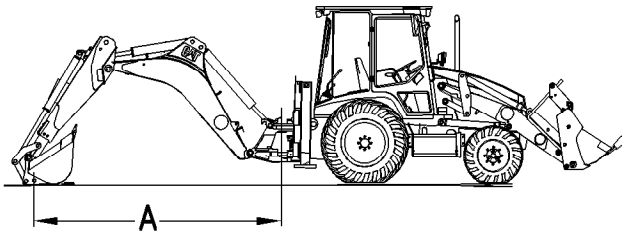

Illustration 61 g00286077

Lift Point Radius (A)

The bucket hinge pin for the backhoe is level with the lower boom hinge pin at each lifting point in the following tables. Rated loads include the weight of the attachment. The following tables provide the operating loads for the standard machine configuration.

Table 66

RATED OPERATING LOAD FOR 442D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick	
1.86 m (6.11 ft)	4838 kg (10666 lb)
3.07 m (10.08 ft)	2981 kg (6572 lb)
3.81 m (12.49 ft)	23632 kg (52100 lb)
4.35 m (14.26 ft)	2029 kg (4473 lb)
4.76 m (15.63 ft)	1816 kg (4004 lb)

(continued)

(Table 66, contd)

RATED OPERATING LOAD FOR 442D BACKHOE BUCKET	
Lift Point Radius	**Rated Operating Load "EN 474-4"**
Backhoe Side Shifted and Swung to Side, Standard Stick	
1.87 m (6.13 ft)	4230 kg (9326 lb)
3.07 m (10.07 ft)	2152 kg (4744 lb)
3.81 m (12.50 ft)	1585 kg (3494 lb)
4.35 m (14.27 ft)	1298 kg (2862 lb)
4.77 m (15.65 ft)	1120 kg (2469 lb)
Backhoe Straight Back, Retracted E-Stick	
1.79 m (5.85 ft)	5241 kg (11554 lb)
3.05 m (9.99 ft)	3114 kg (6865 lb)
3.81 m (12.51 ft)	2428 kg (5353 lb)
4.38 m (14.36 ft)	2061 kg (4544 lb)
4.82 m (15.81 ft)	1826 kg (4026 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick	
1.79 m (5.85 ft)	4461 kg (9835 lb)
3.05 m (9.99 ft)	2133 kg (4702 lb)
3.81 m (12.51 ft)	1525 kg (3362 lb)
4.38 m (14.36 ft)	1222 kg (2694 lb)
4.82 m (15.81 ft)	1034 kg (2280 lb)
Backhoe Straight Back, Extended E-Stick	
2.34 m (7.66 ft)	1924 kg (4242 lb)
3.44 m (11.28 ft)	2601 kg (5734 lb)
4.45 m (14.58 ft)	2107 kg (4645 lb)
5.19 m (17.02 ft)	1722 kg (3796 lb)
5.78 m (18.97 ft)	1298 kg (2862 lb)
Backhoe Side Shifted and Swung to Side, Extended E-Stick	
2.40 m (7.86 ft)	1835 kg (4045 lb)
3.44 m (11.29 ft)	1966 kg (4334 lb)
4.45 m (14.59 ft)	1291 kg (2846 lb)
5.19 m (17.02 ft)	977 kg (2154 lb)
5.79 m (18.97 ft)	785 kg (1731 lb)

Table 67

442D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**"SAE J31"/"ISO 10567" Rated Operating Load**	**Rated Operating Load "EN 474-4"**
Backhoe Straight Back, Standard Stick		
1.86 m (6.11 ft)	3719 kg (8199 lb)	3719 kg (8199 lb)
3.07 m (10.08 ft)	2323 kg (5121 lb)	2323 kg (5121 lb)
3.81 m (12.49 ft)	1860 kg (4101 lb)	1860 kg (4101 lb)
4.35 m (14.26 ft)	1612 kg (3554 lb)	1612 kg (3554 lb)
4.76 m (15.63 ft)	1453 kg (3201 lb)	1453 kg (3201 lb)
Backhoe Side Shifted and Swung to Side, Standard Stick		
1.87 m (6.13 ft)	3259 kg (7185 lb)	3259 kg (7185 lb)
3.07 m (10.07 ft)	1698 kg (3743 lb)	1698 kg (3743 lb)
3.81 m (12.50 ft)	1275 kg (2811 lb)	1275 kg (2811 lb)
4.35 m (14.27 ft)	1061 kg (2339 lb)	1061 kg (2339 lb)
4.77 m (15.65 ft)	930 kg (2050 lb)	930 kg (2050 lb)
Backhoe Straight Back, Retracted E-Stick		
1.79 m (5.85 ft)	4020 kg (8863 lb)	4020 kg (8863 lb)
3.05 m (9.99 ft)	2423 kg (5342 lb)	2423 kg (5342 lb)
3.81 m (12.51 ft)	1909 kg (4209 lb)	1909 kg (4209 lb)
4.38 m (14.36 ft)	1636 kg (3607 lb)	1636 kg (3607 lb)
4.82 m (15.81 ft)	1461 kg (3221 lb)	1461 kg (3221 lb)
Backhoe Side Shifted and Swung to Side, Retracted E-Stick		
1.79 m (5.85 ft)	3430 kg (7562 lb)	3430 kg (7562 lb)
3.05 m (9.99 ft)	1683 kg (3710 lb)	1683 kg (3710 lb)
3.81 m (12.51 ft)	1230 kg (2712 lb)	1230 kg (2712 lb)
4.38 m (14.36 ft)	1004 kg (2213 lb)	1004 kg (2213 lb)
4.82 m (15.81 ft)	866 kg (1909 lb)	866 kg (1909 lb)
Backhoe Straight Back, Extended E-Stick		
2.34 m (7.66 ft)	1120 kg (2469 lb)	1120 kg (2469 lb)
3.44 m (11.28 ft)	1549 kg (3415 lb)	1549 kg (3415 lb)
4.45 m (14.58 ft)	1508 kg (3325 lb)	1508 kg (3325 lb)
5.19 m (17.02 ft)	1383 kg (3049 lb)	1383 kg (3049 lb)
5.78 m (18.97 ft)	1112 kg (2452 lb)	1112 kg (2452 lb)

(continued)

(Table 67, contd)

442D RATED OPERATING LOAD FOR OBJECT HANDLING APPLICATION		
Lift Point Radius	**“SAE J31”/“ISO 10567” Rated Operating Load**	**Rated Operating Load “EN 474-4”**
Backhoe Side Shifted and Swung to Side, Extended E-Stick		
2.40 m (7.86 ft)	1065 kg (2348 lb)	1065 kg (2348 lb)
3.44 m (11.29 ft)	1494 kg (3294 lb)	1494 kg (3294 lb)
4.45 m (14.59 ft)	1056 kg (2328 lb)	1056 kg (2328 lb)
5.19 m (17.02 ft)	823 kg (1814 lb)	823 kg (1814 lb)
5.79 m (18.97 ft)	681 kg (1501 lb)	681 kg (1501 lb)

Identification Information

i01978146

Plate Locations and Film Locations

SMCS Code: 1000; 7000

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

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

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

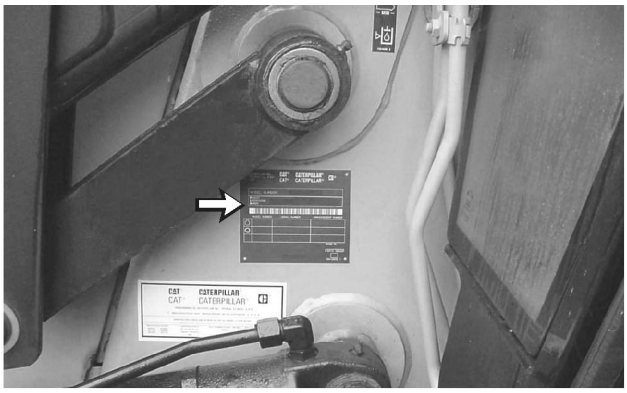

Illustration 62 g00767733

Note: The letter “Z” may be stamped in the block that is identified as “Parts Order” . This block is located on the plate for the Product Identification Number (PIN). This stamp indicates some customization to the machine which will require special handling when parts are ordered.

Machine PIN _____

Service Information Number Plate (SIN) _____

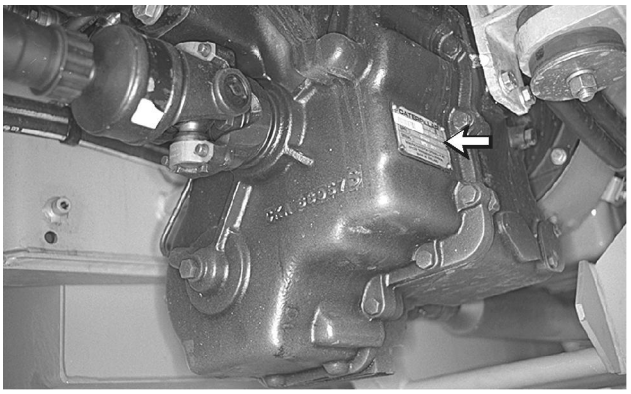

Illustration 63 g00293495

Standard Transmission

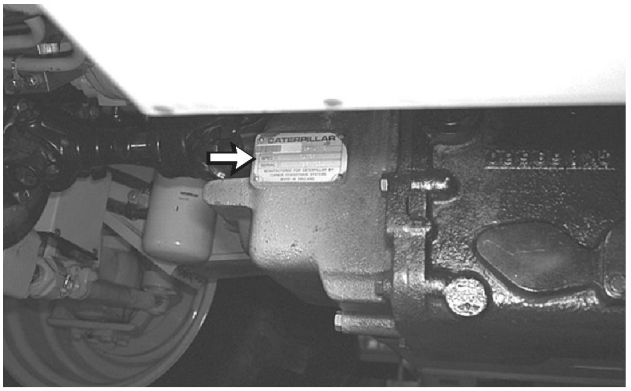

Illustration 64 g00293497

Power Shift Transmission

Transmission Serial Number _____

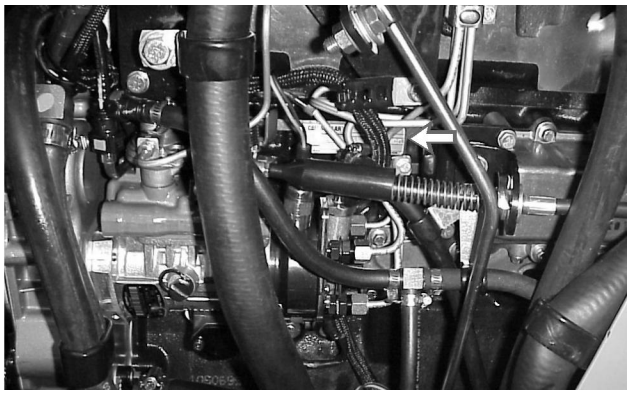

Illustration 65 g01032465

Engine Serial Number _____

i01831262

Emissions Certification Film

SMCS Code: 1000; 7000; 7405

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

A typical example is shown.

Perkins	IMPORTANT ENGINE INFORMATION			
ENGINE FAMILY	INITIAL INJECTION TIMING			
ENGINE TYPE	FUEL RATE AT ADVERTISED kW mm3/STROKE			
ENGINE NO.	DISPLACEMENT L	E11	96	
ADVERTISED kW AT RPM	IDLE RPM		24	
VALVE LASH COLD (INCHES) EXH. INLET				
EMISSION CONTROL SYSTEM	e11•97/68			
SETTINGS ARE TO BE MADE WITH ENGINE AT NORMAL OPERATING TEMPERATURE TRANSMISSION IN NEUTRAL				
THIS ENGINE CONFORMS TO U.S. EPA AND CALIFORNIA REGULATIONS LARGE NON-ROAD COMPRESSION-IGNITION ENGINES THIS ENGINE IS CERTIFIED TO OPERATE ON COMMERCIALLY AVAILABLE DIESEL FUEL 3181A007				

The EPA/EU Emissions Certification Film (if applicable) is located either on the side, the top, or the front of the engine.

Perkins	RENSEIGNEMENTS IMPORTANTS SUR LE MOTEUR			
FAMILLE DU MOTEUR	CALAGE D'INJECTION INITIAL			
TYPE DE MOTEUR	TAUX D'INJECTION AU kW ANNONCÉ MM3/COURSE			
NO DU MOTEUR	CYLINDRÉE L	E11	96	
kW ANNONCÉ À TR/MIN	RALENTI TR/MIN		24	
JEU DES SOUPAPES À FROID (POUCES)	ÉCHAP ADMISSION			
DISPOSITIF ANTIPOLLUTION	e11-97/68			
LES RÉGLAGES DOIVENT ÊTRE FAITS AVEC LE MOTEUR À LA TEMPÉRATURE DE FONCTIONNEMENT NORMALE BOÎTE DE VITESSES AU POINT MORT CE MOTEUR EST CONFORME AUX NORMES AMÉRICAINES EPA ET AUX RÉGLEMENTATIONS DE LA CALIFORNIE GROS MOTEURS HORS-ROUTE À COMPRESSION-ALLUMAGE CE MOTEUR EST HOMOLOGUÉ POUR FONCTIONNER AVEC DU CARBURANT DIESEL DU COMMERCE 3181A007				

L'AUTOCOLLANT D'HOMOLOGATION DU DISPOSITIF ANTIPOLLUTION EPA/UE (SELON ÉQUIPEMENT) EST SITUÉ SOIT SUR LE CÔTÉ, SOIT SUR LE DESSUS DU MOTEUR SOIT SUR LE DEVANT DU MOTEUR.

Illustration 66 g00937288

Operation Section

Before Operation

i04021647

Mounting and Dismounting

SMCS Code: 7000

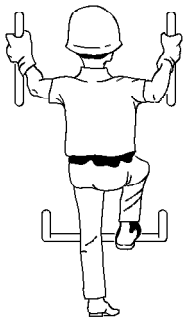

Illustration 67 g00037860

Typical example

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

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

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

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

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

Machine Access System Specifications

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

Alternate Exit

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

i04108390

Daily Inspection

SMCS Code: 7000

NOTICE
Accumulated grease and oil on a machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours or each time any significant quantity of oil is spilled on a machine.

Note: For maximum service life of the machine, make a thorough walk-around inspection before you operate the machine. Inspect the machine for leaks. Remove any debris from the engine compartment and the undercarriage. Remove any debris from the stabilizers and all working cylinders in order to prevent damage to the machine. Ensure that all guards, covers, and caps are secured. Inspect all hoses and belts for damage. Make the needed repairs before you operate the machine.

Perform the following procedures on a daily basis.

- Operation and Maintenance Manual, “Backhoe Boom, Stick, Bucket, and Cylinder Bearings - Lubricate”
- Operation and Maintenance Manual, “Backup Alarm - Test”
- Operation and Maintenance Manual, “Brake Reservoir Oil Level - Check”
- Operation and Maintenance Manual, “Braking System - Test”
- Operation and Maintenance Manual, “Cooling System Level - Check”
- Operation and Maintenance Manual, “Engine Air Filter Service Indicator - Inspect”

- Operation and Maintenance Manual, “Engine Oil Level - Check”
- Operation and Maintenance Manual, “Fuel System Water Separator - Drain”
- Operation and Maintenance Manual, “Hydraulic System Oil Level - Check”
- Operation and Maintenance Manual, “Loader Bucket, Cylinder, and Linkage Bearings - Lubricate”
- Operation and Maintenance Manual, “Seat Belt - Inspect”
- Operation and Maintenance Manual, “Stabilizer - Clean/Inspect”
- Operation and Maintenance Manual, “Stabilizer and Cylinder Bearings - Lubricate”
- Operation and Maintenance Manual, “Swing Frame and Cylinder Bearings - Lubricate”
- Operation and Maintenance Manual, “Tire Inflation - Check”
- Operation and Maintenance Manual, “Transmission Oil Level - Check”

Refer to the Maintenance Section for the detailed procedures. Refer to the Maintenance Interval Schedule for a complete list of scheduled maintenance.

Machine Operation

i01978195

Alternate Exit

SMCS Code: 7310

Illustration 68 g00732915

The cab door on the right side of the machine serves as an alternate exit. The cab door can be opened from the inside or from the outside. Pull the door latch on the outside of the cab door in order to open the cab door from the outside.

Illustration 69 g00733378

If the machine is not equipped with a cab door on the right side of the machine use the rear side window of the machine as an alternate exit. Move the levers for the window in order to open the rear side window.

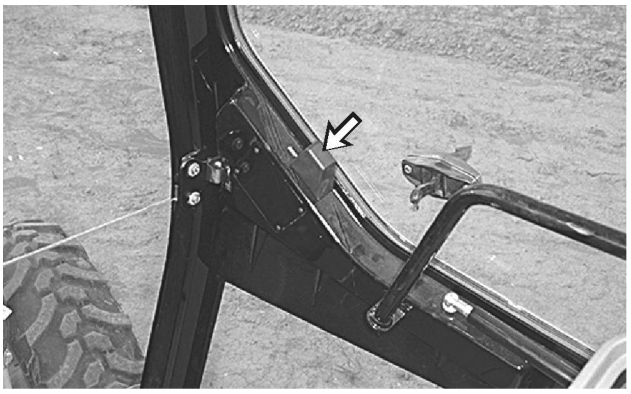

Illustration 70 g00287240

Move the lever on the inside of cab door in order to unlatch the cab door and open the cab door from the inside.

i01368015

Seat

SMCS Code: 7312

Adjust the seat at the beginning of each work period and adjust the seat when you change operators.

Lock the seat into position before you operate the machine. This will prevent movement of the seat.

Always use the seat belt when you operate the machine.

The seat should be adjusted so that full pedal travel is allowed with an operator that is seated against the back of the seat.

Static Seat

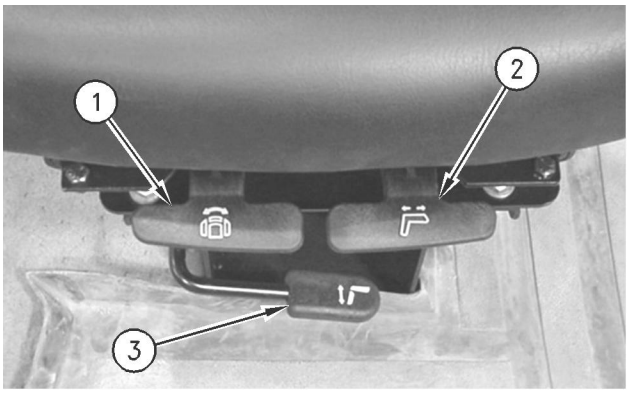

Illustration 71 g00740726

Pull up on the rotate lever (1). The seat will rotate to the rear of the machine in order to operate the backhoe.

Pull up on the fore/aft lever (2). Hold up the lever and slide the seat forward or backward to the desired position. Release the lever in order to lock the seat into position.

Pull up on the lever for the height adjuster (3) and push down on the seat cushion in order to lower the seat. Pull up on the lever for the height adjuster and pull up on the seat cushion in order to raise the seat.

Standard Air Seat

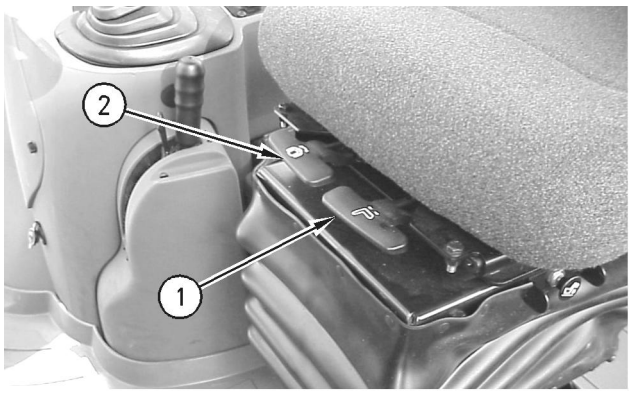

Illustration 72 g00738788

Pull up on the fore/aft lever (1). Hold up the lever and slide the seat forward or backward to the desired position. Release the lever in order to lock the seat into position.

Pull up on the rotate lever (2). The seat will rotate to the rear of the machine in order to operate the backhoe.

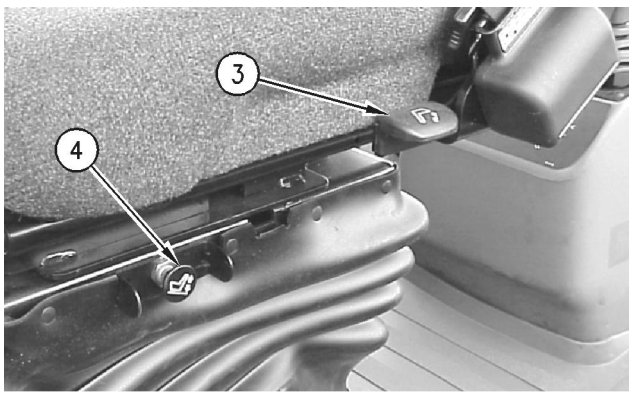

Illustration 73 g00738789

Pull up on the back cushion angle lever (3) in order to adjust the angle of the back cushion. Release the lever in order to lock the back cushion into position.

Push in the knob (4) in order to increase the stiffness of the suspension. Pull the knob in order to decrease the stiffness of the suspension.

Note: The engine start switch key must be in the ON position in order to increase the stiffness of the seat.

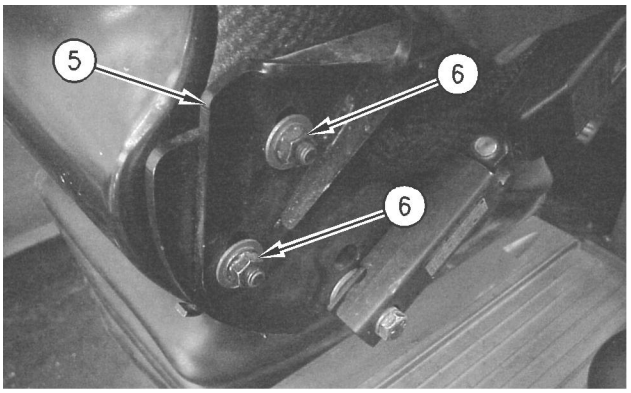

Illustration 74 g00733368

Loosen the nuts (6) on the bracket for the armrest (5) in order to adjust the armrest. Tighten the nuts in order to secure the armrest.

Deluxe Air Seat

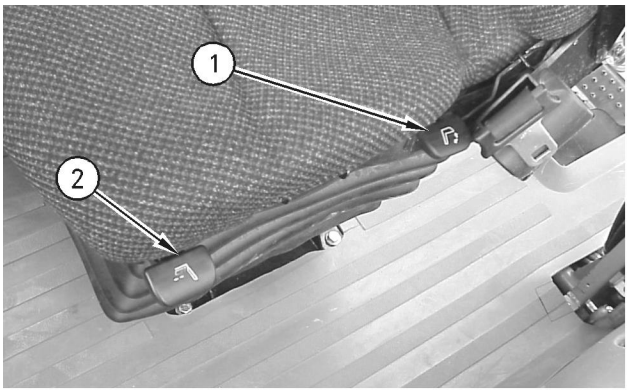

Illustration 75 g00733345

Pull up or push down on the grab handle (1) in order to adjust the backrest.

Pull up on the grab handle (2) in order to slide the seat cushion forward or backward. Release the handle in order to lock the seat cushion in the desired position.

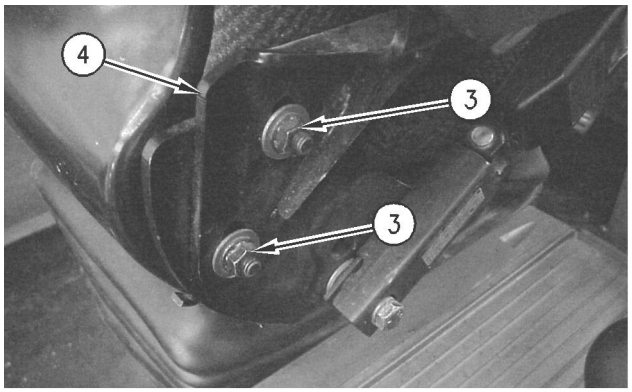

Illustration 76 g00733348

Loosen the nuts (3) on the bracket for the armrest (4) in order to adjust the armrest. Tighten the nuts in order to secure the armrest.

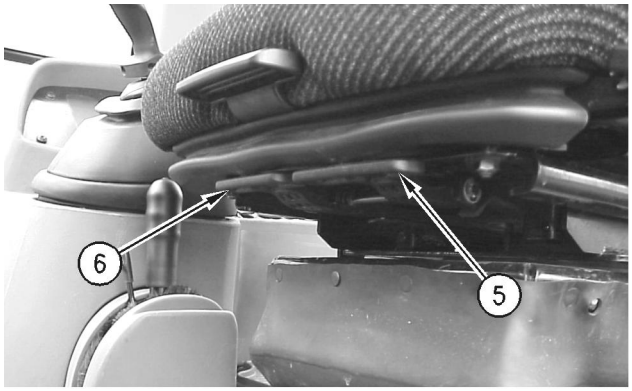

Illustration 77 g00733346

Pull up the fore/aft lever (5). Hold up the lever and slide the seat to the desired position. Release the lever in order to lock the seat into position.

Pull up on the rotate lever (6). The seat will rotate to the rear of the machine in order to operate the backhoe.

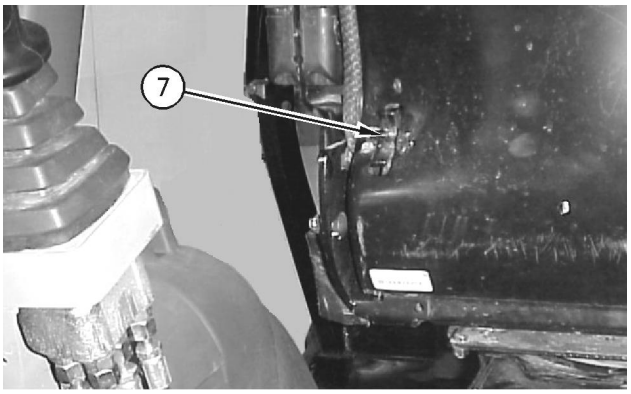

Illustration 78 g00733347

Rotate the wheel for the lumbar support(7) on the rear of the seat pan in order to adjust the lumbar support.

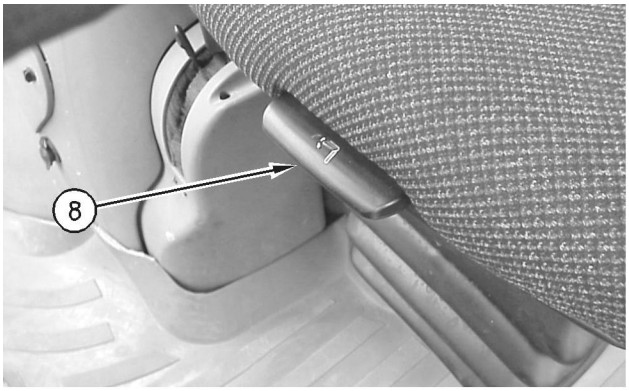

Illustration 79 g00733342

Pull up the lever (8) for the angle of seat cushion and raise the front of the seat cushion to the desired angle. To lower the cushion into the desired position, pull up the lever and push down the front of the seat cushion. Release the lever in order to lock the seat cushion into the desired position.

Illustration 80 g00733341

Push in the knob (9) in order to increase the stiffness of the suspension. Pull the knob in order to decrease the stiffness of the suspension.

Note: The engine start switch key must be in the ON position in order to increase the stiffness of the seat.

i04200349

Seat Belt

SMCS Code: 7327

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

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

Seat Belt Adjustment for Non-Retractable Seat Belts

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

Lengthening the Seat Belt

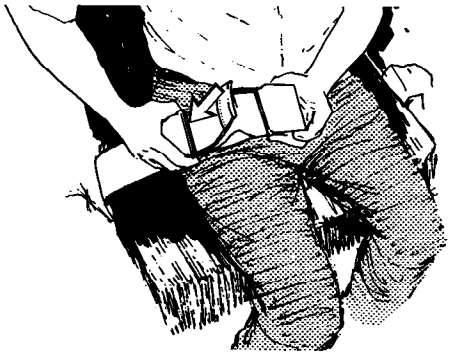

Illustration 81 g00100709

1. Unfasten the seat belt.

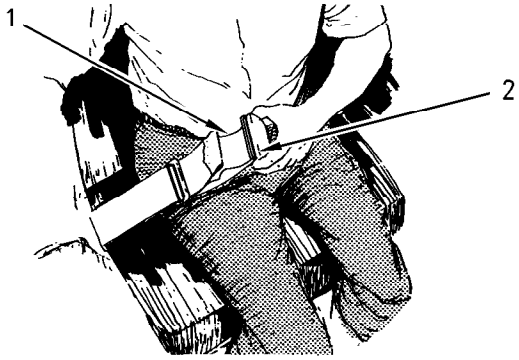

Illustration 82 g00932817

2. To remove the slack in outer loop (1), rotate buckle (2). This will free the lock bar. This permits the seat belt to move through the buckle.

3. Remove the slack from the outer belt loop by pulling on the buckle.

4. Loosen the other half of the seat belt in the same manner. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Shortening the Seat Belt

Illustration 83 g00100713

1. Fasten the seat belt. Pull out on the outer belt loop in order to tighten the seat belt.

2. Adjust the other half of the seat belt in the same manner.

3. If the seat belt does not fit snugly with the buckle in the center, readjust the seat belt.

Fastening The Seat Belt

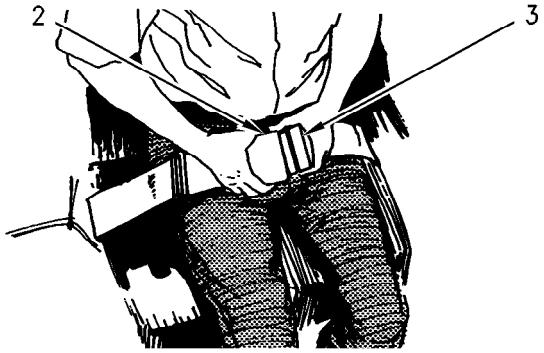

Illustration 84 g00932818

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

Releasing The Seat Belt

Illustration 85 g00100717

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

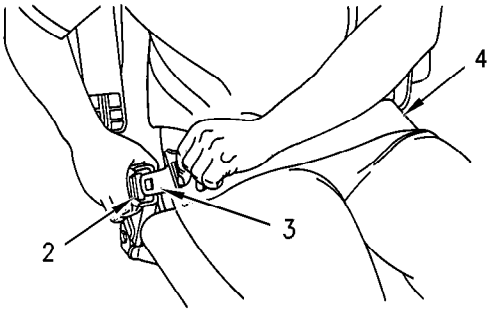

Illustration 86 g00867598

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

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

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

Releasing The Seat Belt

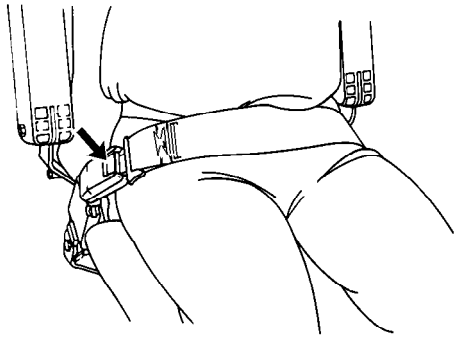

Illustration 87 g00039113

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

Extension of the Seat Belt

⚠ WARNING

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

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

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

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

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

i02568943

Operator Controls

SMCS Code: 7300; 7451

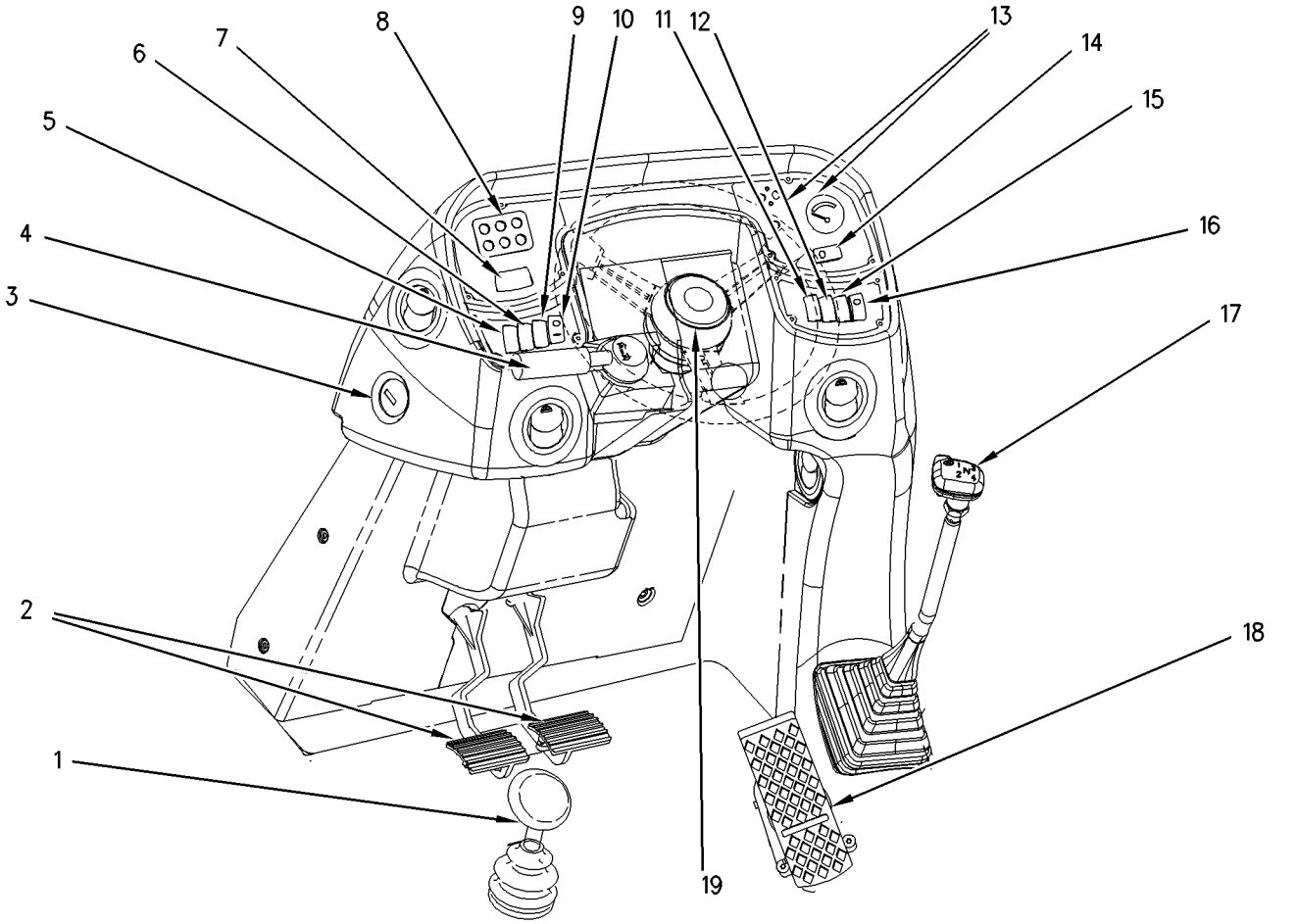

Illustration 88 g00935155

(1) Differential Lock Control
(2) Service Brakes
(3) Hour Meter
(4) Transmission Direction Control
(5) Quick Coupler Control (If Equipped)
(6) Auxiliary Circuit Control (Momentary Switch)
(7) All Wheel Drive Control
(8) Alert Indicators
(9) Auxiliary Circuit Control
(10) Transmission Neutral Lock
(11) Autoshift Control (If Equipped)
(12) Ride Control (If Equipped)
(13) All Wheel Steer Control (If Equipped)
(14) Hazards
(15) Front Running Lights
(16) Horn
(17) Transmission Speed Control (If Equipped)
(18) Governor Control
(19) Steering Control

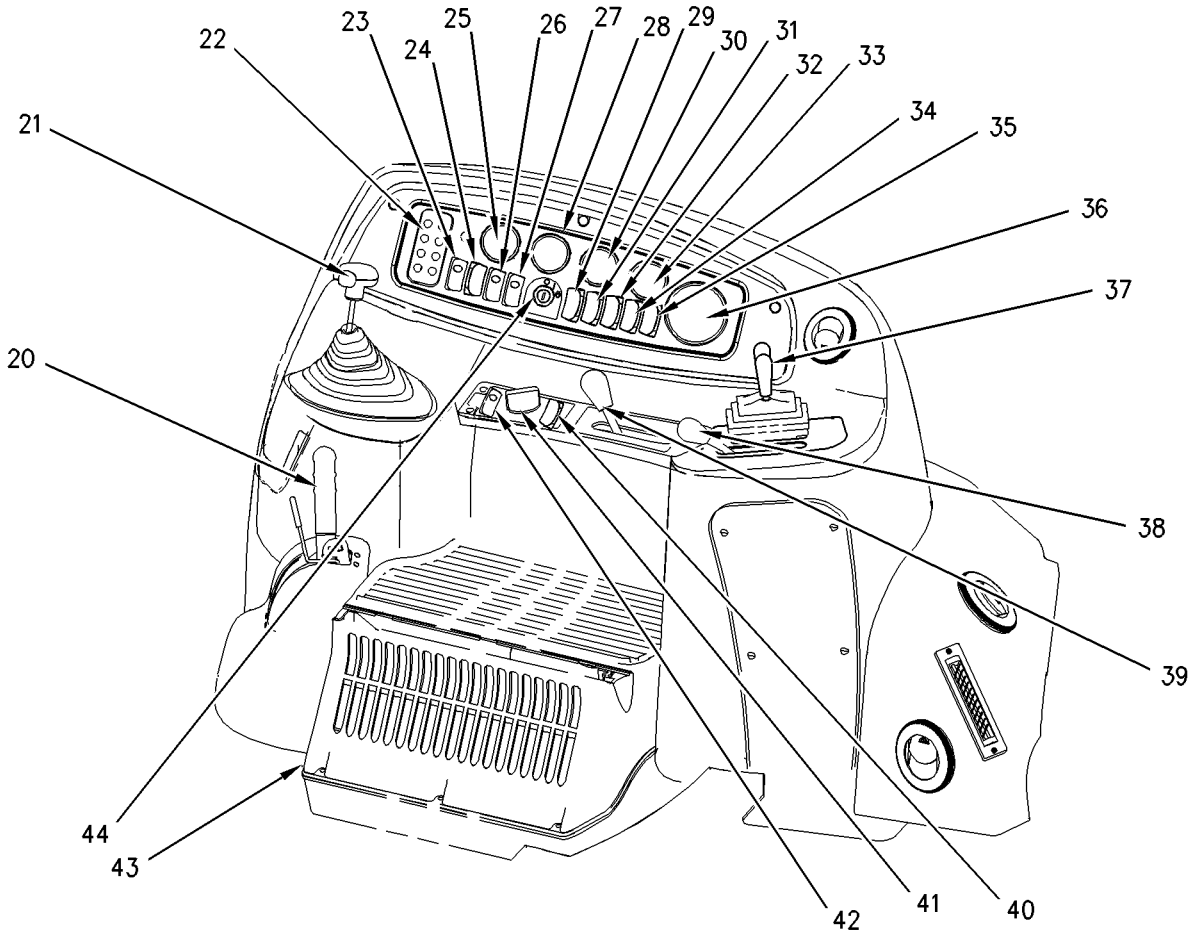

Illustration 89 g00935263

(20) Parking Brake Control
(21) Loader Control
(22) Alert Indicators
(23) Flood Lights (Front).
(24) Rotating Beacon
(25) Voltmeter
(26) Flood Lights (Rear).
(27) Glow Plug Switch
(28) Transmission Oil Temperature
(29) Hydraulic Lock
(30) Fuel Level
(31) Sideshift Lock (If Equipped)
(32) Rear Fog Lights
(33) Engine Coolant Temperature
(34) Rear Window Wiper
(35) Horn
(36) Tachometer
(37) Stabilizer Controls
(38) Boom Lock
(39) Throttle Control
(40) Heater Fan Switch
(41) Variable Temperature Control
(42) Heating and Cooling Control
(43) Fresh Air Control
(44) Engine Start Switch

Differential Lock Control (1)

NOTICE
Do not engage the differential lock if the machine is in third gear or above. Machine damage may occur.

Differential Lock Pedal – Push down the pedal in order to engage the differential lock. The differential lock can prevent wheel slippage. Use the differential lock pedal when the machine is moving on soft ground or on wet ground. Apply the differential lock when the wheel is slipping. This will ensure positive engagement. Reduce the engine speed to the idle speed range before you engage the differential lock in order to minimize shock loads on the rear axle.

Release the differential lock after engagement is noticed. The differential will automatically disengage when the torque allows the differential to disengage.

Use the differential lock to prevent one wheel from slipping. If the wheels continue to slip in soft material, reduce the engine speed.

When the differential lock is engaged, the differential is locked. Both rear wheels will turn at the same speed.

Note: The differential lock will only function in the two-wheel steer mode if the machine is equipped with All Wheel Steer. The differential lock will become disabled when circle steer mode is selected or independent rear maneuvering is selected.

Service Brakes (2)

⚠ WARNING

Personal injury or death could result if brake pedal lock bar is not engaged when recommended. Machine can swerve out of control if only one brake is applied for a quick stop. Follow the recommendations below for proper braking.

NOTICE
Some areas may have a legal requirement to have the pedals locked when roading. Check state and local laws.

Brake Pedals – Push both pedals downward in order to slow down the machine. Push both pedals downward in order to stop the machine. Use the brake pedals while you are operating on a downgrade in order to prevent the engine from overspeeding.

The rear brake lights must come on when you apply the brakes. If the rear brake lights are not functioning, repair the brake lights. Repair the brake lights before you operate the machine.

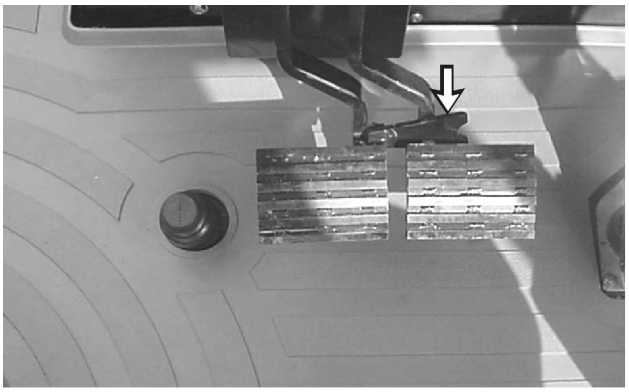

Illustration 90 g00833274

As shown, connect the left pedal and the right pedal together. Move the lock bar between both of the pedals. If the machine is operating in second gear, in third gear, and in fourth gear, you must connect the lock bar.

Disengage the lock bar for first gear. Use the left pedal or the right pedal to aid in maneuvering in tight quarters.

Use the pedals with the steering wheel in order to make sharp turns. Use the left pedal to help with sharp left turns. Use the right pedal to help with sharp right turns.

Hour Meter (3)

Service Hour Meter (6) – This gauge indicates the total operating hours of the engine. The service hour meter should be used to determine service hour maintenance intervals.

Transmission Direction Control (4)

Autoshift Transmissions Only

Direction Selector

F **FORWARD – Move the transmission lever upward. The machine will move forward.**

N **NEUTRAL – Move the transmission lever to the middle position for the NEUTRAL position. The machine should not move when the transmission lever is in NEUTRAL.**

R **REVERSE – Move the transmission lever downward. The machine will move in reverse.**

Forward directional changes and reverse directional changes are possible while the machine is moving. However, reducing the engine speed is recommended, when directional changes are being made. Reducing the machine ground speed and/or braking is recommended, when directional changes are being made. This permits operator comfort and maximum service life of the power train components.

Speed Selector

The transmission has five forward speeds and three reverse speeds. Rotate the transmission lever to the desired gear speed:

"1" – First Speed

"2" – Second Speed

"3" – Third Speed

"4" – Fourth Speed

If the transmission is in fourth gear and the direction control is in the FORWARD position, the transmission will shift into fifth gear automatically. The autoshift control in the manual mode will prevent the transmission from shifting to fifth gear. If the transmission is in fourth gear and the direction control is in the REVERSE position, the transmission will only shift into the third gear.

The transmission can be manually downshifted by using the neutralizer/downshift switch that is located on the loader control.

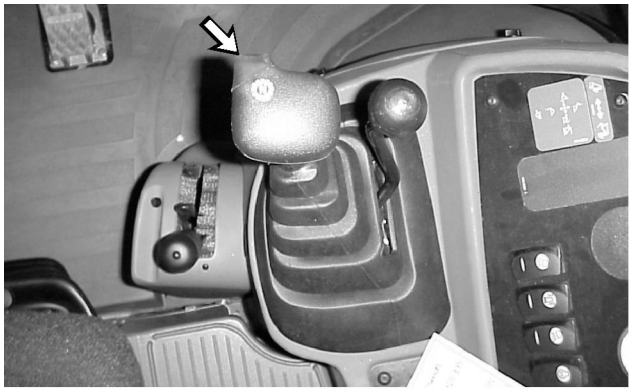

Illustration 91 g00755154

Neutralizer/Downshift switch for the mechanical loader control

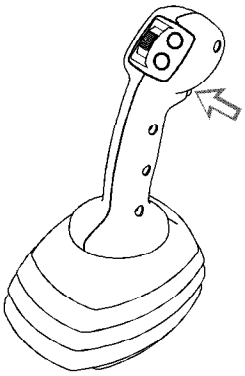

Illustration 92 g01031940

Neutralizer/Downshift switch for the pilot loader control

Press the downshift switch and release the downshift switch on the loader control. The transmission downshifts one gear speed, provided that an engine overspeed would not occur.

Note: The initial transmission downshift will always respond. Subsequent downshifts will occur provided that an engine overspeed would not occur.

Press the downshift switch and release the downshift switch on the loader control for continued downshifts until the machine is in first gear. Automatic downshifts into first gear are not allowed. The normal autoshift function continues in five seconds after the downshift switch is released.

Direct Drive

F **FORWARD – Move the transmission lever upward. The machine will move forward.**

N **NEUTRAL – Move the transmission lever to the middle position for the NEUTRAL position. The machine should not move when the transmission lever is in the neutral position.**

R **REVERSE – Move the transmission lever downward. The machine will move in reverse.**

Forward directional changes and reverse directional changes are possible while the machine is moving. However, reducing the engine speed is recommended, when directional changes are being made. Reducing the machine ground speed and/or braking is recommended, when directional changes are being made. This permits operator comfort and maximum service life of the power train components.

To avoid an unstable machine, the machine should be stopped before any directional changes are made with a raised load.

The lever should be moved to the NEUTRAL position when you are using the backhoe or when you are leaving the machine. The transmission neutral lock should be engaged when you are using the backhoe or when you are leaving the machine.

Note: The alarm (if equipped) will sound when the stabilizers are being raised and the machine is shifted to FORWARD or REVERSE position.

Quick Coupler Control (5)

⚠ WARNING

Improper attachment of work tools could result in injury or death.

Do not operate this machine until you have positive indication that the coupler pins are fully engaged. Check for engagement by:

1. Tilt the work tool down.

2. Put downward pressure on the work tool.

3. Back the machine up and make sure there is not any movement between the work tool and the quick coupler assembly.

The quick coupler pin switch with the red lock button is used to engage the pins. The quick coupler pin switch is also used to disengage the quick coupler pins.

NOTICE
Auxiliary hoses for work tools must be removed before the quick coupler pins are disengaged.

Pulling the work tools with the auxiliary hoses could result in machine damage.

Disengage – Pull the red buttondownward and push down on the top of the quick coupler pin switch to the unlocked position. When the quick coupler pin switch is in the UNLOCKED position, hold the switch for approximately 5 seconds until the coupler pins disengage.

Engage – Press the bottom of the quick coupler pin switch in order to engage the quick coupler pins. The quick coupler pin switch should be in the LOCKED position when you are not disengaging the quick coupler pins.

Note: Before connecting the quick couplers, you must relieve the hydraulic pressure. Refer to Operation and Maintenance Manual, “Leaving the Machine” for more information on relieving the hydraulic pressure.

Auxiliary Circuit Control (Momentary Switch) (6)

Momentary Switch – The momentary switch is located on the front console on the left hand side. This switch works with the thumb switch on the loader control. Once the operator selects the desired flow rate with the thumb switch press the momentary switch in order to maintain the desired flow. Press the switch again in order to return flow control to the thumb switch on the loader control.

All Wheel Drive Control (7)

Two-Position Switch

All Wheel Drive – Push the left side of the switch in order to activate all wheel drive. Push the right side of the switch for two-wheel drive mode.

All Wheel Drive can be activated anytime when additional traction is desired.

All Wheel Drive should always be activated when you are operating the machine on a slope.

Three-Position Switch

All Wheel Drive – Push the left side of the switch to the ON position in order to activate all wheel drive.

All Wheel Drive can be activated anytime when additional traction is desired.

All Wheel Drive should always be activated when you are operating the machine on a slope.

All Wheel Drive Braking – Place the switch in the middle position in order to enable the All Wheel Drive Braking. The machine will operate in two-wheel drive until you push on the brake pedals. Pushing on the brake pedals will activate the All Wheel Drive.

Note: For machines that are equipped with two-wheel steer, you must press on both of the brake pedals at the same time in order to enable the All Wheel Drive Braking. Steering using the brakes is still possible for two-wheel steer machines, when you press one brake pedal.

All Wheel Drive Braking should always be activated when you are roading the machine.

OFF – Push the right side of the switch to the OFF position for two-wheel drive. The All Wheel Drive Braking is deactivated when the switch is in this position.

Alert Indicators (8)

Refer to Operation and Maintenance Manual, “Alert Indicators”.

Auxiliary Circuit Control (9)

AUXILIARY (1) – The switch allows the operator to activate a 12 volt auxiliary circuit. Press the top of the switch in order to energize the auxiliary function. Press the bottom of the switch in order to turn off the auxiliary function. The auxiliary circuit can control a separate function such as a water sprayer for a broom.

Transmission Neutral Lock (10)

TRANSMISSION NEUTRAL LOCK – The transmission neutral lock is located on the left side of the front console.

LOCKED – Press the top of the switch in order to lock the transmission direction control lever into the NEUTRAL position.

UNLOCKED – Press the bottom of the switch in order to deactivate the transmission neutral lock.

Note: If the transmission neutral lock has been activated, you must shift the direction control lever into the NEUTRAL position before you shift the direction control lever into the FORWARD position. If the transmission neutral lock has been activated, you must shift the direction control lever into the NEUTRAL position before you shift the direction control lever into the REVERSE position. The direction control lever must be shifted into the NEUTRAL position in order to allow movement of the machine.

Note: When you exit the machine push the top of the transmission neutral lock switch in order to prevent the machine from moving out of the NEUTRAL position. Engage the parking brake in order to prevent machine movement when the transmission is in neutral. Refer to the Operation and Maintenance Manual, “Transport Positions”.

Autoshift Control (11)

Automatic Mode (1) – Push the top of the switch for the autoshift function in the automatic mode. Push the top of the switch prior to shifting the transmission into forward or reverse in order to activate the autoshift function. The operator selects the highest desired gear for the transmission with the transmission shift lever. The control will then select the proper transmission gear according to the ground speed of the machine. Third gear may be skipped in the automatic mode under certain circumstances.

Manual Mode (2) – Press the bottom of the switch in order to prevent the transmission from automatically shifting into fifth gear when the transmission is in fourth gear. The position is also used for the manual mode of the transmission control.

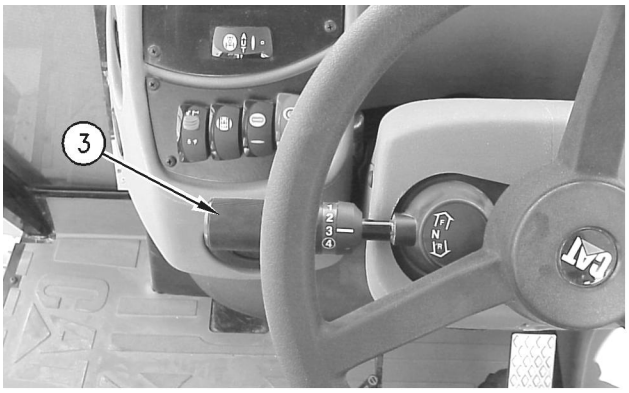

Illustration 93 g00755953

The manual mode allows the operator to select the desired speed and the desired direction of the machine with the transmission shift lever (3).

Ride Control (12)

Ride Control – Travel at high speeds over rough terrain causes bucket movement and a swinging motion. The system for ride control acts as a shock absorber by absorbing forces from the bucket and by dampening forces from the bucket. This system also stabilizes the entire machine.

⚠ WARNING

Ride control can cause inadvertent movement of the loader arms if not used correctly. Don't use when using loader or backhoe.

The ride control must be turned off in order to raise the front tires off the ground with the loader bucket.

Note: In some countries that require lock valves for material handling operations, the ride control must be turned off so that the lock valves can function properly. Lock valves and ride control cannot function at the same time.

Autoshift Transmission

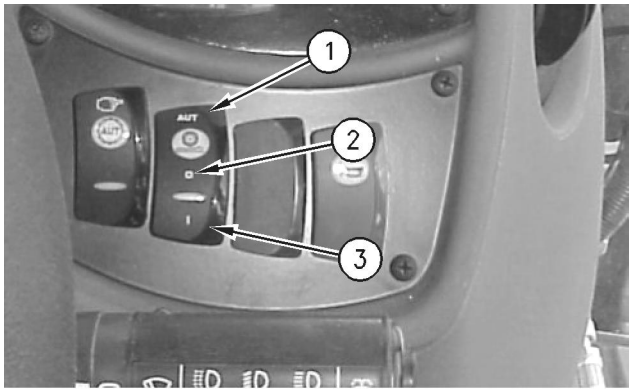

Illustration 94 g00729928

ON – Push the bottom of the switch (3) in order to turn on the system for ride control.

The ride control will smooth the ride of the machine during travel.

Automatic Ride Control – Push the top of the switch (1) in order to turn on the automatic ride control.

The automatic ride control automatically turns on when the ground speed exceeds a preset speed of approximately 9.5 kilometer per hour. The automatic ride control automatically shuts off during low speed travel mode.

OFF – Put the switch in the center position (2) in order to turn off the ride control.

Standard Transmission

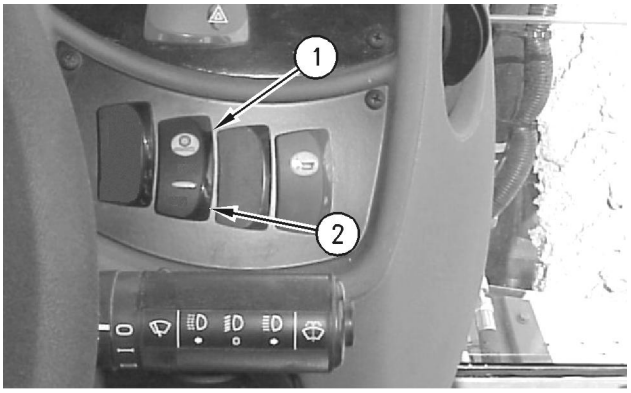

Illustration 95 g00732442

ON – Push the top of the switch (1) in order to turn on the system for ride control.

The ride control will smooth the ride of the machine during travel.

OFF – Push the bottom of the switch (2) in order to turn off the ride control.

All Wheel Steer Control (13)

⚠ WARNING

Personal injury or death can result if the machine is roaded in any mode other than front wheel steer.

Always road the machine with the rear wheels centered and the machine in the front wheel steer mode.

The All Wheel Steer (AWS) has three steering modes: Circle Steer, Two-Wheel Steer and an Independent Rear Maneuvering. When you operate the machine for the first time, become familiar with the three modes by trying each one. This should be done in an area that is clear of personnel and of obstacles.

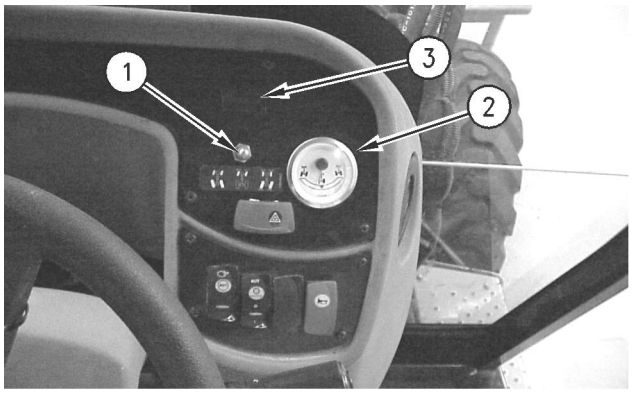

Illustration 96 g00756057

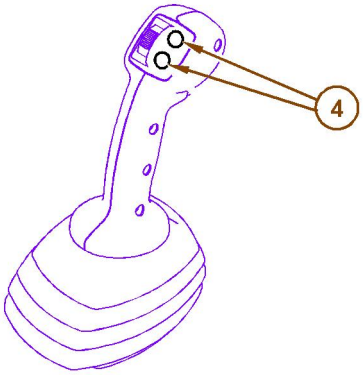

Illustration 97 g01030672

All wheel steer control for the pilot loader control

The All Wheel Steer mode consists of the following components:

- an All Wheel Steer switch (1) that allows the operator to choose from the three modes
- a rear axle position gauge (2)
- an alert indicator (3)
- controls for independent rear maneuvering (4)

Note: The auxiliary control for the loader will not operate when the machine is in the All Wheel Steer mode.

Three modes provide maximum machine performance under various conditions at the job site.

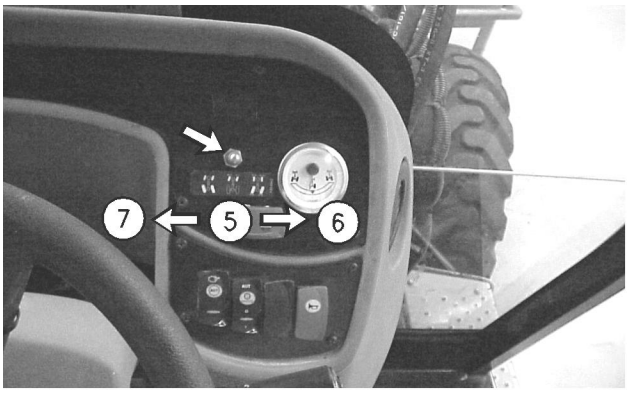

Illustration 98 g00756058

Two-Wheel Steer – The Two-Wheel Steer mode (5) offers the capability to operate the machine on the road. The Two-Wheel Steer mode is used when additional maneuvering capability is not needed. Only the front axle is used to steer the machine. Use this mode when you are roading the machine. When you are operating the machine in this mode the indicator light (3) will not be on.

Independent Rear Steer – The All Wheel Steer mode (6) allows the operator to choose independent rear maneuvering for positioning the rear axle and for controlling the rear axle. The switch that is located on the loader control lever is used for positioning and for controlling the rear axle. When you are operating the machine in the All Wheel Steer mode, the indicator light (3) will be on.

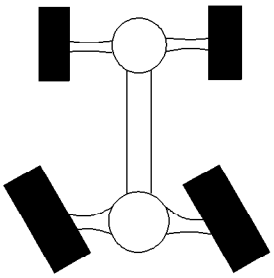

Illustration 99 g00830965

Push the bottom button (4) on the pilot loader control in order to activate independent rear maneuvering. The wheels will move the back of the machine to the left when the machine is moving in a forward direction.

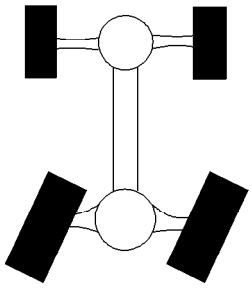

Illustration 100 g00830960

Push the top button (4) on the pilot loader control in order to activate independent rear maneuvering. The wheels will move the back of the machine to the right when the machine is moving in a forward direction.

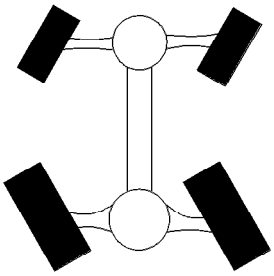

Illustration 101 g00282686

Position the front wheels and back wheels in opposite directions in order to maneuver around a very tight corner.

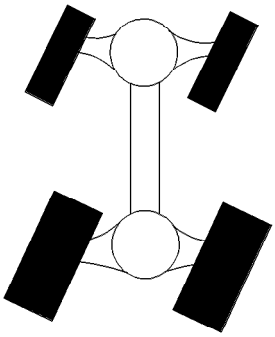

Illustration 102 g00282687

Position the front wheels and back wheels in the same direction for crab steering.

Circle Steer Mode – The Circle Steer Mode (7) provides reduced turning radii and tighter operation in confined spaces. The front and rear axles are used to steer the machine. When you are operating the machine in the Circle Steer mode, the indicator light (3) will come on.

NOTICE
Before changing from one steering mode to another, always center both the front and rear wheels.

Before you return to the Two-Wheel Steer mode or to the Circle Steer mode, the front wheels and rear wheels must be centered. Observe the rear axle position gauge (2) on the front console. Use the independent rear maneuvering switch (4) to center the rear wheels until the zero position is obtained. Then, move the All Wheel Steer switch to the desired mode.

Hazard Flashers (14)

Hazard Flashers – The hazard switch is located on the right hand side of the front console. Push the left side of the switch in order to activate the hazard flashers. Both turn signal lights will flash. Push the right side of the switch in order to deactivate the hazard flashers.

Front Running Lights (15)

Front Running Lights (If Equipped) – The front running light switch is located on the right side of the front console. Push the bottom of the switch for the OFF position. The middle position is for the panel lights, for the tail lights, and for the position lights. The top position adds running lights (If Equipped) to the following lighting groups: panel lights, tail lights and position lights.

Horn (16)

Horn – Press the top of the switch in order to sound the horn. Use the horn for alerting personnel or for signalling personnel.

Transmission Speed Control (17)

Transmission Speed Shift Lever – Push the transmission neutralizer button and holdthe transmission neutralizer button in order to neutralize the transmission. Then, move the leverto one of the four desired travel speeds. Speed changes are possible when you are moving and when the machine is at full engine speed.

Move the transmission speed lever according to the shift pattern on the machine.

Decelerating the machine and/or applying the brakes is recommended when you are changing speeds. This permits operator comfort and maximum service life of the power train components.

Illustration 103 g00754945

Transmission Neutralizer Button – Push the button and hold the button when you are changing speed ranges. This will disengage the transmission from the driving wheels.

When all available engine power is desired for the loader hydraulics, push the transmission neutralizer button that is located on the loader control lever.

Governor Control (18)

Accelerator Pedal – Push down the pedal in order to increase travel speed. Release the pedal in order to decrease travel speed. The accelerator pedal will return to the low idle setting.

Use the pedal to reduce engine rpm for directional shifts when you use the loader.

Steering Control (19)

The steering wheel controls the directional steering of the machine. The machine will turn in the same direction as the steering wheel is turned.

LEFT TURN – Move the steering wheel counterclockwise in order to steer the machine to the left. Turn the steering wheel farther in order to achieve a more acute turn.

RIGHT TURN – Move the steering wheel clockwise in order to steer the machine to the right. Turn the steering wheel farther in order to achieve a more acute turn.

Parking Brake Control (20)

Parking Brake – The parking brake lever is located on the right side of the seat. Always stop the engine and engage the parking brake before you get off the machine.

If the parking brake is engaged, the action alarm will sound when the transmission direction control lever is in the FORWARD position or in the REVERSE position.

Note: Switching the direction control lever from either direction to NEUTRAL back to either direction may cause the machine to move while the parking brake lever is engaged. Refer to Operation and Maintenance Manual, “Braking System - Test” for more information.

Parking Brake Engaged – Pull up the parking brake lever in order to engage the parking brake. The parking brake indicator light on the front console will come on when the engine start switch is turned on and when the parking brake is engaged.

Parking Brake disengaged – Push down the parking brake lever in order to disengage the parking brake. Slightly raise the parking brake lever and pull in the release lever before you disengage the parking brake.

Secondary Brake – The secondary brake uses the same lever as the parking brake. The secondary brake should be used if the service brakes fail to stop the machine.

Loader Control (21)

Refer to Operation and Maintenance Manual, “Loader Control”.

Alert Indicators (22)

Refer to Operation and Maintenance Manual, “Alert Indicators”.

Front Floodlights (23)

Front Floodlights (If Equipped) – The switch is a two-position switch (If Equipped).

Push the bottom of the switch for the front running lights (If Equipped) or the OFF position if the machine is not equipped with front running lights. Push the top of the switch for the two front floodlights.

Front Floodlights (If Equipped) – The switch is a three-position switch (If Equipped).

Push the bottom of the switch for the Front Running Lights. Push the switch to the middle position for the two front floodlights. Push the top of the switch in order to turn on all four front floodlights.

Rotating Beacon (24)

Rotating Beacon Light (If Equipped) – Press the top of the switch in order to turn on the rotating beacon light. Press the bottom of the switch in order to turn off the rotating beacon light. The rotating beacon light is used to alert other vehicles when the machine is being roaded from one job to another job.

Voltmeter (25)

Voltmeter (1) – This gauge indicates the voltage of the electrical system. The needle in the red range indicates low voltage or high voltage.

Rear Floodlights (26)

Rear Floodlights (If Equipped) – The switch is a two-position switch (If Equipped).

Press the bottom of the switch for the OFF position in order to turn off the rear floodlights. Press the top of the switch in order to turn on the rear floodlights.

Rear Floodlights (If Equipped) – The switch is a three-position switch (If Equipped).

Push the bottom of the switch to the OFF position in order to turn off the rear floodlights. Press the switch to the middle position for two rear floodlights. Press top of the switch in order to turn on all four rear floodlights.

Glow Plugs (27)

WARNING

Do not spray ether into engine when using thermal starting aid to start engine. Personal injury and machine damage could result. Follow the procedures in this manual.

Glow Plug Switch – The glow plug switch is located on the right side console.

If the machine fails to start due to cold ambient temperatures, the glow plugs can be activated in order to provide heated fuel to the inlet manifold. Refer to Operation and Maintenance Manual, “Starting Below 0°C (32°F)” for the starting procedure with the glow plugs.

Transmission Oil Temperature (28)

Transmission Oil Temperature (2) – This gauge indicates the temperature of the transmission oil. The needle in the red range indicates excessive transmission oil temperature.

Hydraulic Lockout (29)

Lockout for Pilot Operated Hydraulic Controls (If Equipped)

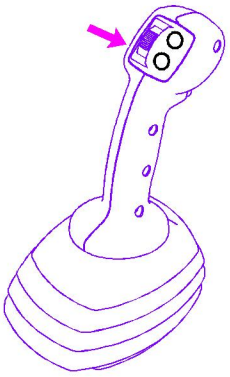

Illustration 104 g01030837

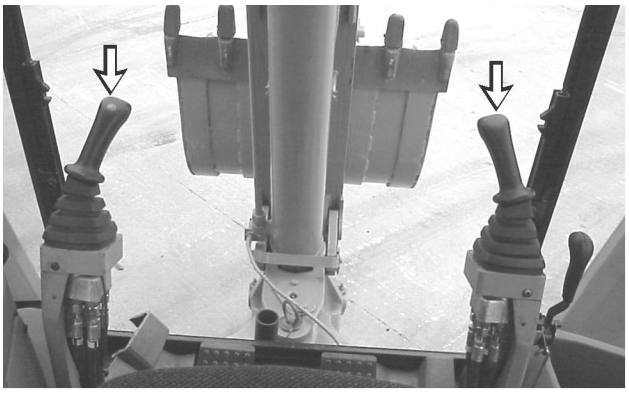

Illustration 105 g00835533

Pilot Operated Backhoe Controls

Note: The hydraulic lockout will only lock the pilot operated controls for the loader and for the backhoe. The stabilizers will not be locked by the switch.

Illustration 106 g00832869

Hydraulic Lock Switch – The switch allows the operator to lock the pilot operated hydraulic controls for the loader and for the backhoe. Press the top of the switch in order to prevent movement of the pilot operated hydraulic controls during the following procedures:

- transporting the machine
- roading the machine

Lockout for Mechanical Backhoe Controls (If Equipped)

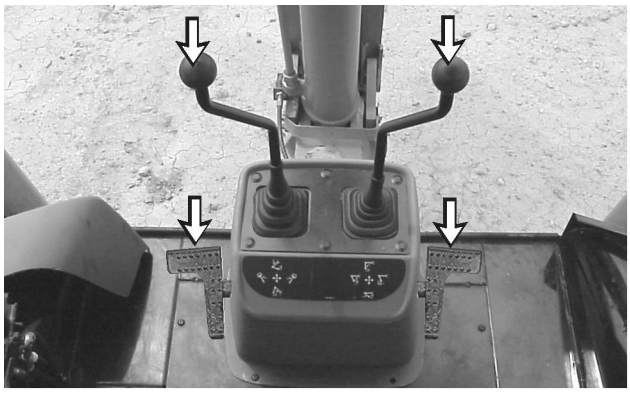

Illustration 107 g00949683

Mechanical Backhoe Controls

Note: The hydraulic lockout will only lock the mechanical controls for the backhoe. Machines that are equipped with mechanical hydraulic controls for the loader will not be locked by the switch. The stabilizers will not be locked by the switch.

Illustration 108 g00832869

Hydraulic Lock Switch – The switch allows the operator to lock the mechanical hydraulic controls for the backhoe. Press the top of the switch in order to prevent movement of the backhoe during the following procedures:

- transporting the machine
- roading the machine

Fuel Level (30)

Fuel Level (3) – This gauge indicates the amount of fuel in the fuel tank. The needle in the yellow range indicates low fuel.

Sideshift Lock (31)

Sideshift Lock – Press the top of the switch to the UNLOCKED position in order to unlock the sideshift carriage. Press the bottom of the switch to the LOCKED position in order to lock the sideshift carriage into the desired position.

Refer to Operation and Maintenance Manual, “Backhoe Operation” for the procedure for moving the sideshift carriage.

Rear Fog Lights (32)

Rear Fog Lamps (5) (If Equipped) – Press the top of the switch in order to turn on the rear fog lamps. Press the bottom of the switch in order to turn off the rear fog lamps.

Engine Coolant Temperature (33)

Engine Coolant (4) – This gauge indicates the temperature of the engine coolant. The needle in the red range indicates abnormal engine temperature.

Rear Window Wiper (34)

Rear Window Wiper – Place the switch in the middle position in order to activate the rear window wiper. Push the bottom of the switch in order to shut off the window wiper. Push the top of the switch and hold in order to activate the rear window washer.

Horn (35)

Horn – Press the top of the switch in order to sound the horn. Use the horn for alerting personnel or for signalling personnel.

Tachometer (36)

Tachometer (5) – This gauge monitors the engine speed of the machine. Do not operate the machine in the red area of the gauge.

Stabilizer Controls (37)

The instructions for the backhoe stabilizer and for the bucket operation are viewed from the operator's seat. You will be looking at the backhoe bucket.

Sideshift Frame

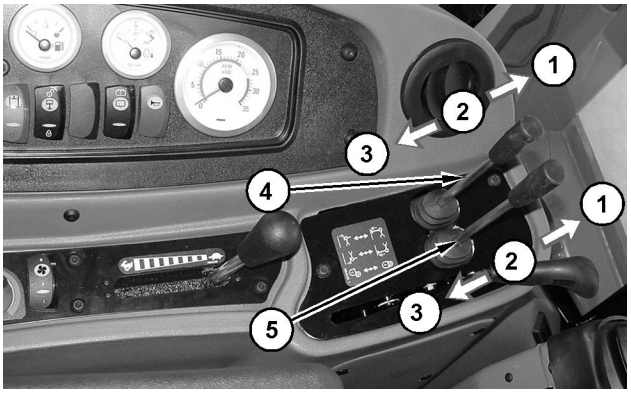

Illustration 109 g01033565

Move lever (4) in order to control the left stabilizer.

Move lever (5) in order to control the right stabilizer.

STABILIZER DOWN (1) – Move the lever to this position in order to lower the stabilizer. This will raise the rear of the machine.

HOLD (2) – Release the lever from the STABILIZER DOWN position or from the STABILIZER UP position in order to stop the stabilizer movement.

STABILIZER UP (3) – Move the lever to this position in order to raise the stabilizer. This will lower the machine.

Note: Be careful when you raise the stabilizers. The stabilizers can be the only restraint that is preventing the machine from falling into the area that is being excavated. When you operate on a slope, engage the parking brake before you raise the stabilizers.

Before you operate the backhoe, use the stabilizers in order to lift the machine and use the stabilizers in order to level the machine.

Note: The action alarm (if equipped) will sound when you raise one or both stabilizers in order to lower the machine to the ground and the transmission direction control lever is in the FORWARD position or in the REVERSE position.

Center Pivot Frame

⚠ WARNING

Stabilizer auto up feature is operated on a ten second timer. Make sure stabilizers are raised completely before moving the machine. Failure to do so could result in injury or death.

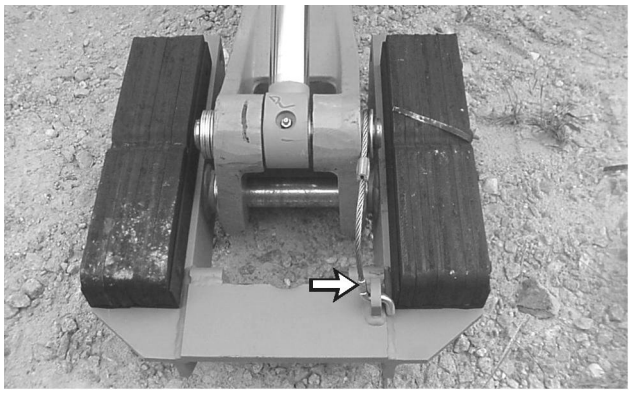

Illustration 110 g00835264

The grousers are facing downward.

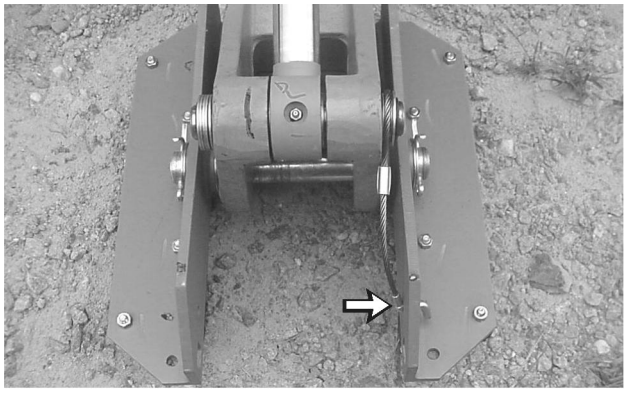

Illustration 111 g00836129

The stabilizer street pad is facing downward.

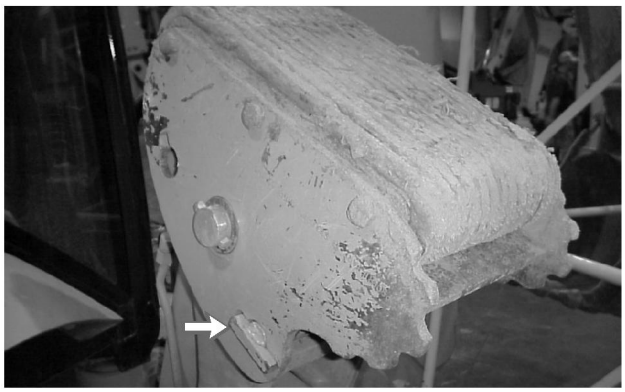

Illustration 112 g01033442

The grousers are facing downward.

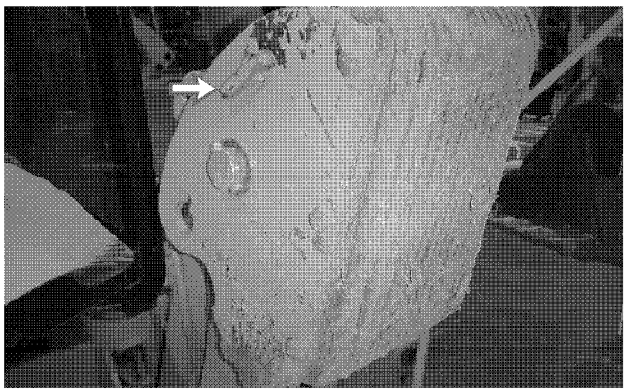

Illustration 113 g01033445

The stabilizer street pad is facing downward.

A flip-over stabilizer pad (If Equipped) gives the operator the advantage of having one pad that can be used on either soil or pavement. The stabilizer pad may be equipped with a retention cable or a retention bolt. The retention cable or the retention bolt is only available on flip-over stabilizer pads that do not have rock guards.

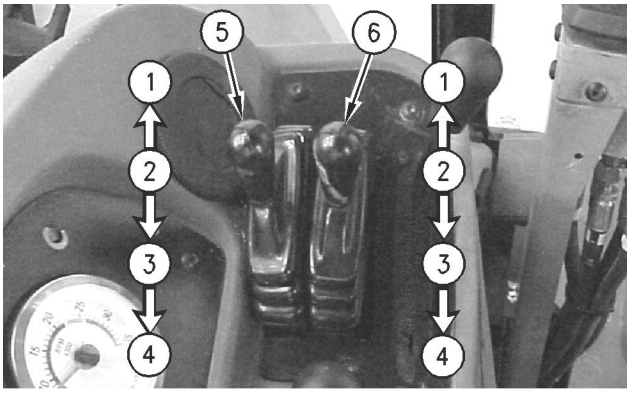

Illustration 114 g00732282

Move lever (5) in order to control the left stabilizer.

Move lever (6) in order to control the right stabilizer.

STABILIZER DOWN (1) – Move the lever to this position in order to lower the stabilizer. This will raise the rear of the machine.

HOLD (2) – Release the lever from the STABILIZER DOWN position or from the STABILIZER UP position in order to stop the stabilizer movement.

STABILIZER UP (3) – Move the lever to this position in order to raise the stabilizer. This will lower the machine.

Auto Up Mode (4) (If Equipped) – Move the lever to this position in order to automatically raise the

stabilizer. The lever will remain in this position for 10 seconds.

Note: Be careful when you raise the stabilizers. The stabilizers can be the only restraint that is preventing the machine from falling into the area that is being excavated. When you operate on a slope, engage the parking brake before you raise the stabilizers.

When you swing the backhoe to either side, fully raise the stabilizer or fully lower the stabilizers in order to prevent the backhoe from hitting the stabilizers.

Before you operate the backhoe, use the stabilizers in order to lift the machine and use the stabilizers in order to level the machine.

Note: The action alarm (if equipped) will sound when you raise one or both stabilizers in order to lower the machine to the ground and the transmission direction control lever is in the FORWARD position or in the REVERSE position.

Boom Lock (38)

NOTICE
Never lift objects with the boom transport lock engaged. Severe machine damage can result if the boom transport lock is engaged while lifting objects.

Boom Lock

Illustration 115 g00759839

1. Close the bucket and completely move in the stick. Slowly move the boom upward until the boom is completely inward.

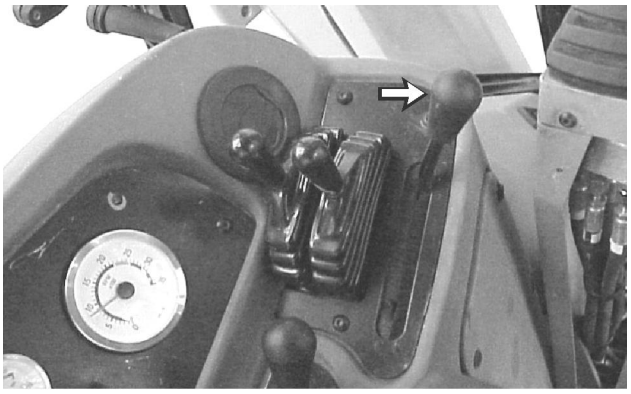

Illustration 116 g00732244

2. Move the boom lock lever toward the rear of the machine to the lock position.

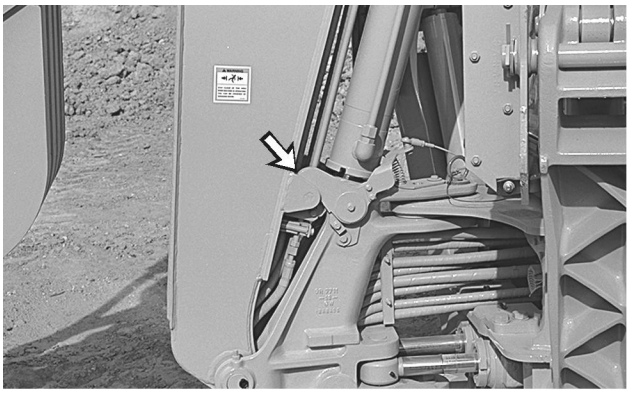

Illustration 117 g00283389

3. Make sure that the hook engages over the lock in order to secure the boom into the LOCK position. Activate the boom downward in order to force the boom against the boom transport lock. This will improve the ride of the machine.

Boom Release

1. Slowly move the boom upward until the boom is completely inward.

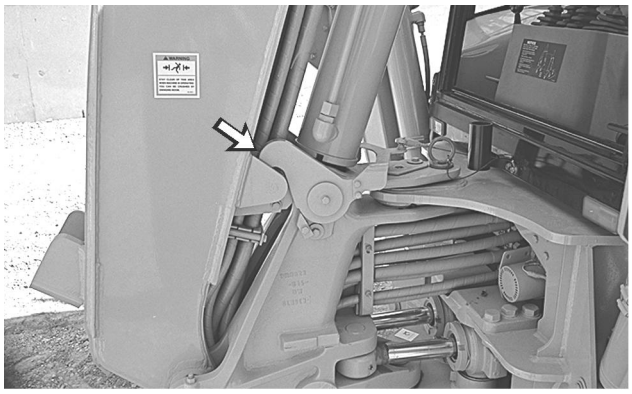

Illustration 118 g00283390

2. Pull the boom lock lever toward the front of the machine in order to disengage the boom lock. This will allow movement of the backhoe for operation.

Throttle Control (39)

Accelerator Lever – This lever controls the engine speed for backhoe operation.

Operate the machine in the green operating range on the tachometer.

High Idle – Move the lever toward the front of the machine for a faster idle speed.

Low Idle – Move the lever toward the rear of the machine for a lower idle speed.

For roading or loader operation, keep the lever in the low idle position. Use the accelerator pedal to change the engine speed.

Note: The maximum recommended operating engine speed is 2100 rpm.

Heater Fan Switch (40)

Heater Fan Switch – This switch controls the three-speed blower fan motor.

Press the bottom of the switch for the LOW position of the fan.

Press the switch to the middle position for the MEDIUM fan speed.

Press the top of the switch for the HIGH fan speed.

Variable Temperature Control (41)

Heating Variable – Turn the knob between COOL (left) and WARM (right).

Heating and Cooling Control (42)

Heating – Press the top of the switch to the ON position. Turn the blower fan switch control to the desired speed (LOW, MEDIUM, or HIGH). Adjust the temperature control knob for the desired temperature.

Press the switch to the middle position for the blower OFF position.

Cooling (If Equipped) – Press the bottom of the switch to the air conditioning ON position. Turn the blower fan switch control to the desired speed (LOW, MEDIUM, or HIGH). Adjust the temperature control knob for the desired temperature.

Pressurizing – When heating or cooling is not desired, pressure inside the cab will help keep dust out.

To produce the volume of air that is needed to keep dust out, set the blower fan switch control to LOW, to MEDIUM, or to HIGH. Adjust the temperature control knob to the desired temperature.

Defogging – Use the cooling system to remove moisture from the air in the cab. This will prevent moisture from forming on the windshield and on the windows.

Press the switch to the air conditioning ON position. Turn the blower fan switch control to the desired speed (LOW, MEDIUM, or HIGH). Adjust both control knobs until the moisture level is lowered and the windshield and side windows are free of moisture.

VENTILATION – When heating, cooling, or defogging is not desired, the system can be used in order to provide ventilation. Turn the blower fan switch to the desired speed (LOW, MEDIUM, or HIGH). Adjust the temperature control knob to the desired temperature.

Fresh Air Control (43)

The system is equipped with a door for fresh air that can be opened and closed. The knob is located on the front of the unit near the floor.

Engine Start Switch (44)

OFF (1) – Turn the engine start switch key to the OFF position in order to stop the engine. Insert the engine start switch key only while the start switch is in the OFF position. Remove the engine start switch key only while the start switch is in the OFF position. If the engine is not running, turn the engine start switch key to the OFF position in order to prevent the fault alarm from sounding.

ON (2) – The engine start switch will return to the ON position when the engine start switch key is released from the START position. When the engine is not running, the indicator lights and the fault alarm will remain on until the engine start switch is turned to the OFF position.

START (3) – Turn the engine start switch key to the START position in order to start the engine. Release the engine start switch key after the engine starts. The fault alarm should shut off after the engine oil pressure rises.

The transmission control lever must be in the NEUTRAL position and the hydraulic control levers must be in the HOLD position before you turn the engine start switch and before you start the engine.

Note: The engine may fail to start after the key is turned to the start position. If this happens, the key must be returned to the OFF position. Attempt to start the engine again.

When you are not operating the machine, remove the key.

Front Window Wiper

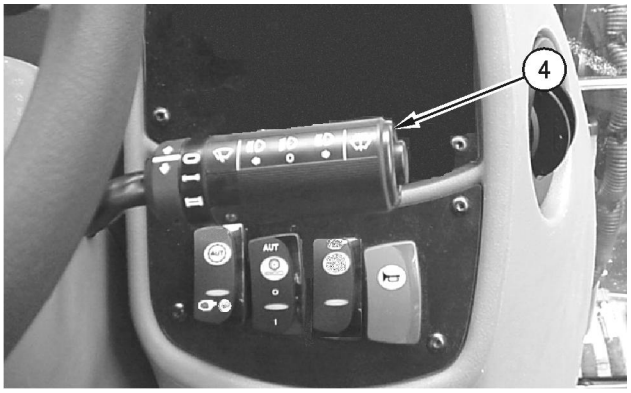

Illustration 119 g00738930

Dimmer Switch (4) (If Equipped) – The dimmer switch is located on the right side of the steering column. Pull the dimmer switch in order to activate the high beams momentarily. Push the switch backward in order to activate the high beams of the front running lights. The alert indicator for the high beams will come on.

Note: The dimmer switch is functional only while the running lights are on.

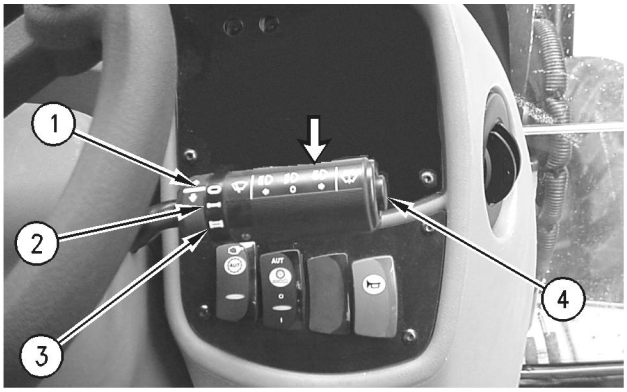

Illustration 120 g00730909

Front Window Wiper – Rotate the window wiper switch from the stop position (1) to position (2) in order to activate the low speed. Rotate the window wiper switch to position (3) in order to activate the high speed. Push the button (4) on the end of the front window wiper switch in order to activate the front window washer.

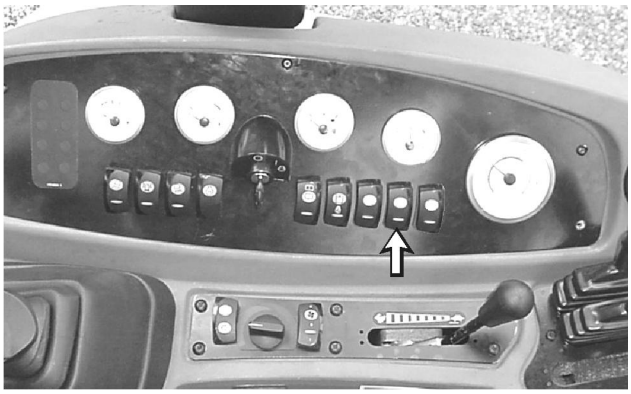

Illustration 121 g00754237

Rear Window Wiper – The rear window wiper switch is located on the side console. Place the switch in the middle position in order to activate the rear window wiper. Push the bottom of the switch in order to shut off the window wiper. Push the top of the switch and hold in order to activate the rear window washer.

Directional Turn Signals – The directional turn signal lever is on the right side of the steering column.

In order to activate the left turn signal, push the turn signal lever to position (1). An indicator light on the left side of the console will flash.

In order to activate the right turn signal, pull the turn signal lever to position (2). An indicator light on the left side of the console will flash.

Move the turn signal lever to the center position in order to deactivate either turn signal.

Cab Door

Illustration 122 g00754767

Cab Doors – Pull the door latch in order to open the door. Open the door all the way to the fully open position. The door will remain in this position. Both doors operate the same way.

The doors should be closed while you operate the machine. While the doors are shut, the windows can be opened for better cab air flow.

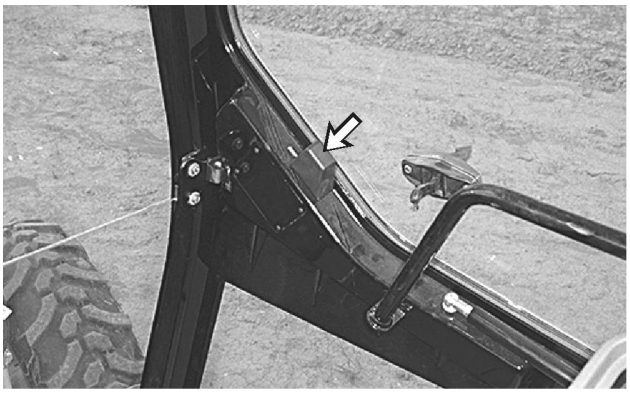

Illustration 123 g00719872

Cab Door Release Lever – Move the lever in order to unlatch the door and open the door.

Windows

Door Windows

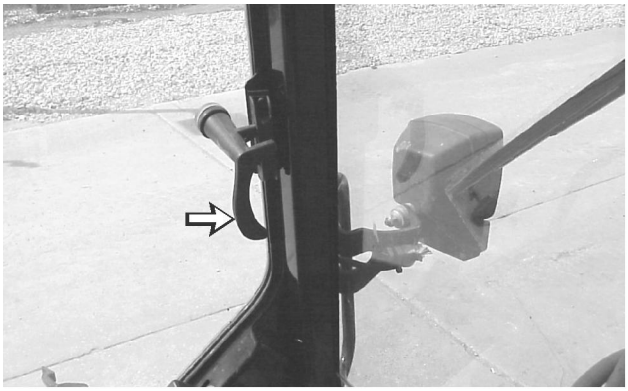

Illustration 124 g00636442

Move the window latch in order to open the window.

Rear Window

Note: The rear windows must be closed when the machine is operated with a work tool that could throw debris. A polycarbonate shield must be used when the machine is not equipped with windows and when a work tool could throw debris.

The cab rear window has several operational features from the inside of the cab by the operator.

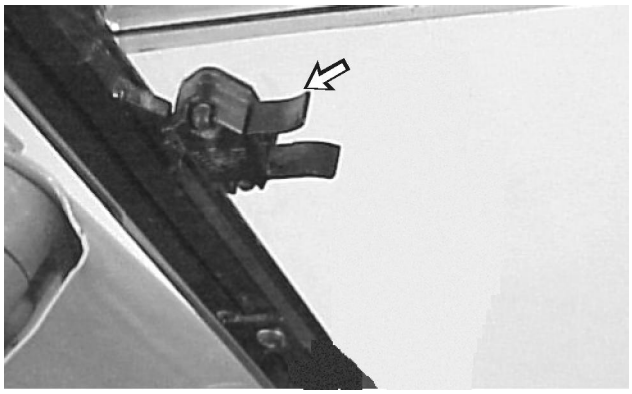

Illustration 125 g00734180

Move the latches that are located at the top corners of the lower window in order to raise the lower window. Move the latches that are located at the top corners of the lower window in order to lower the lower window.

The lower window can be left in the LOCKED position, stowed with the upper window, or removed.

Illustration 126 g00734194

Move the latches above the rubber handles in order to release the upper window from the LOCKED position. Pull the handles toward the seat and then push the handles upward until the latches engage in order to stow the window.

To lower the windows from the stowed position, move the latches by the rubber handles. Pull the handles downward, and push the handles toward the rear of the machine until the latches lock into position.

i01353798

Backup Alarm

SMCS Code: 7406

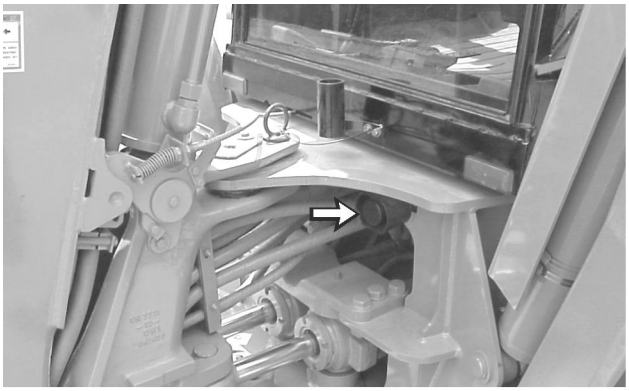

Illustration 127 g00732495

Backup Alarm (If Equipped) – The alarm will sound when the transmission direction control lever is in the REVERSE position. The alarm is used to alert people behind the machine that the machine is backing up.

The backup alarm is mounted on the rear of the machine.

i01994986

Alert Indicators

SMCS Code: 7450; 7451

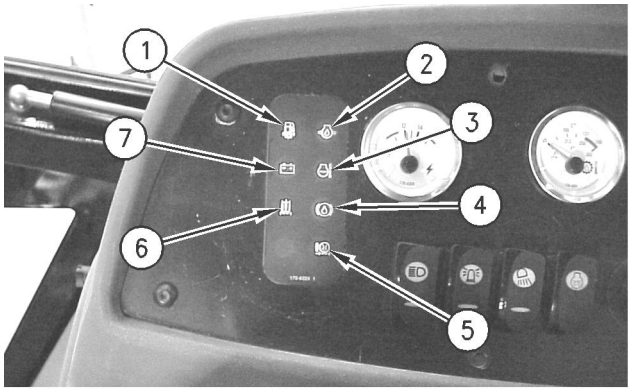

Illustration 128 g00731962

Fuel System Water Separator (1) – The alert indicator indicates a plugged fuel/water separator. If this alert indicator comes on during operation, stop the machine immediately and engage the parking brake. Stop the engine and investigate the cause of the fault.

Engine Oil Pressure (2) – The alert indicator will light and an audible alarm will sound when the engine oil pressure is low. If this alert indicator comes on, stop the machine immediately. Stop the engine and investigate the cause.

Engine Coolant (3) – The alert indicator will light and an audible alarm will sound when the engine coolant temperature is too high. If this alert indicator comes on, stop the machine immediately. Stop the engine and investigate the cause.

Brake Oil Level (4) – The alert indicator will light and an audible alarm will sound when the brake reservoir oil is low. If this alert indicator comes on, stop the machine immediately. Investigate the cause and add oil to the correct level. Do not operate the machine if the indicator light stays on.

Air Filter Indicator (5) (If Equipped) – The alert indicator will light when the air filter becomes clogged. If this alert indicator comes on, stop the machine and investigate the cause.

Hydraulic Oil Filter (6) (If Equipped) – The alert indicator indicates a plugged hydraulic oil filter. If this alert indicator flashes during operation, stop the machine immediately and engage the parking brake. Stop the engine and investigate the cause of the fault.

Charging System (7) – The alert indicator comes on if there is a malfunction in the electrical system. If this alert indicator comes on, the system voltage is too high for normal machine operation or too low for normal machine operation.

If electrical loads (air conditioning and/or lighting) are high and the engine speed is near idle, increase the engine speed to high idle. This will generate more output from the alternator. If the alert indicator for the electrical system turns off within one minute, the electrical system is probably operating in a normal manner. However, the electrical system may be overloaded during periods of low engine speeds.

Modify the operating cycle in order to prevent overloading the electrical system and discharging the batteries.

Low idle must be set correctly. Adjust for the high side of the Low Idle specification while the most often used electrical loads are turned on. In order to reduce the loads, use the Medium fan speed instead of the High fan speed.

If this procedure does not cause the alert indicator to turn off, move to a convenient location. Investigate the cause (loose alternator belt, broken alternator belt, faulty batteries, etc).

If the engine speed is near operating speeds and if the electrical loads are light, the alert indicator may remain on. If the alert indicator remains on, move to a convenient location. Investigate the cause (loose alternator belt, broken alternator belt, faulty batteries, etc).

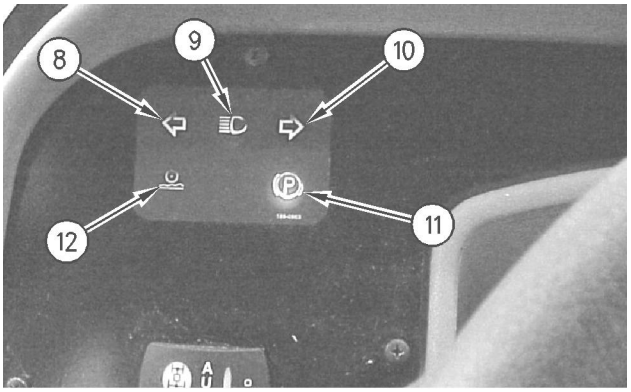

Illustration 129 g00726012

Left Turn Signal (8) – The alert indicator will flash when the left turn signal is activated.

High Beams (9) – The alert indicator will light when you press the top of the dimmer switch. The alert indicator should go out when you press the bottom of the dimmer switch.

Right Turn Signal (10) – The alert indicator will flash when the right turn signal is activated.

Parking Brake (11) – The alert indicator will light and an audible alarm will sound when the parking brake is engaged and the transmission is put into forward or reverse. The alert indicator should come on during start-up. The alert indicator should go out when the parking brake is released.

Ride Control (12) – The alert indicator will light when the ride control is activated.

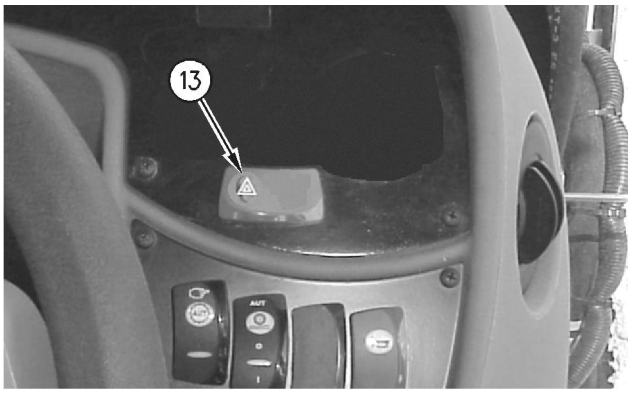

Illustration 130 g00735342

Hazard (13) – The alert indicator will flash and the turn signals will flash when the hazard flashers are activated.

i01872270

Operation Information

SMCS Code: 7000

The machine must be under control at all times.

Do not place the transmission in NEUTRAL in order to allow the machine to coast.

Select the gear speed that is necessary before you start down a grade. Do not change the gears while you are going down a hill.

When you go downgrade, use the same gear speed that would be used to go upgrade.

Do not allow the engine to overspeed when you go downhill. Use the brake pedals in order to reduce engine overspeed when you are going downhill.

When the load will be pushing the machine, put the transmission lever in FIRST SPEED before you start downhill.

Engage the All Wheel Drive (if equipped).

To avoid early brake wear or early brake damage, do not use the brake pedals as foot rests.

1. Adjust the operator's seat.
2. Fasten the seat belt.
3. Raise all of the lowered work tools enough to clear any unexpected obstacles.

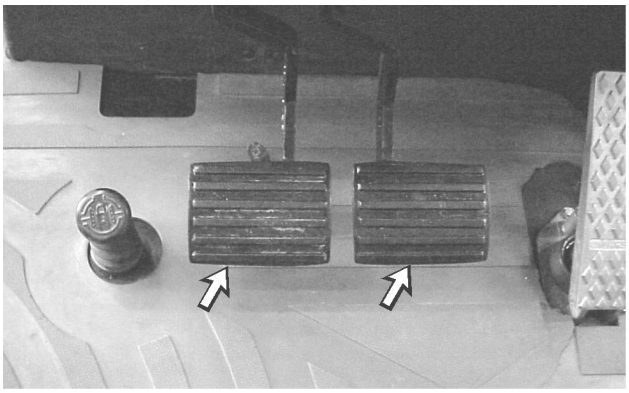

Illustration 131 g00732030

4. Push the brake pedals downward in order to stop the machine from moving.

   Install the brake pedal lock bar between the brake pedals if the machine is not operating in FIRST gear.
5. Release the parking brake.
6. Disengage the transmission neutral lock and move the transmission control levers to the desired direction and to the desired speed.
7. Release the brake pedals in order to move the machine.
8. Move the accelerator pedal to the desired engine speed.
9. Move the machine forward for best visibility and for best control.

i04156455

Quick Coupler Operation (Backhoe)
(Pin Grabber Quick Coupler (If Equipped))

SMCS Code: 6129

Securing the Work Tool

⚠ WARNING

Inspect quick coupler engagement before operating the backhoe.

Serious injury or death may result from improperly engaged coupler.

Note: Caterpillar offers an assortment of coupler and bucket combinations. Refer to the Parts Manual for your machine. The illustrations give accurate views of the couplers and the captions can help resolve problems with compatibility. Also, your Caterpillar Dealer can help you determine the proper combinations.

Illustration 132 and illustration 133 may help the operator in order to identify the coupler that is on the machine.

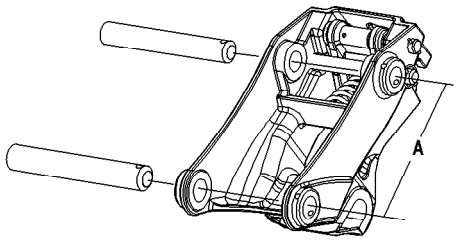

Illustration 132 g00988298

This Quick Coupler is used with High Rotation Linkage and older buckets.

(A) 400 mm (15.75 inch)

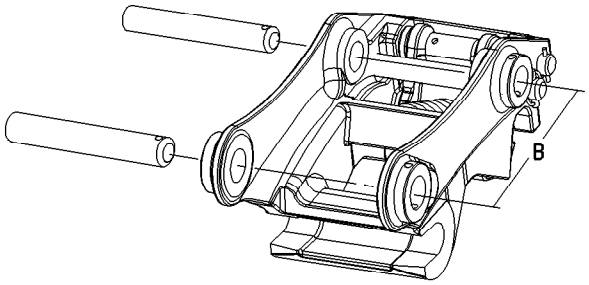

Illustration 133 g00988327

This Quick Coupler is used with High Rotation Linkage and newer buckets.

(B) 345 mm (13.50 inch)

1. Position the work tool on a level surface.
2. Retract the bucket cylinder. Position the quick coupler in alignment between the bosses of the work tool.

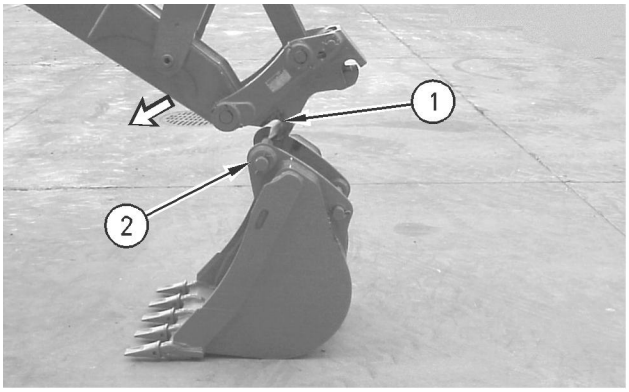

Illustration 134 g00739365

3. Move the stick inward and lower the stick until the lower boss (1) engages the pivot pin (2) of the work tool.

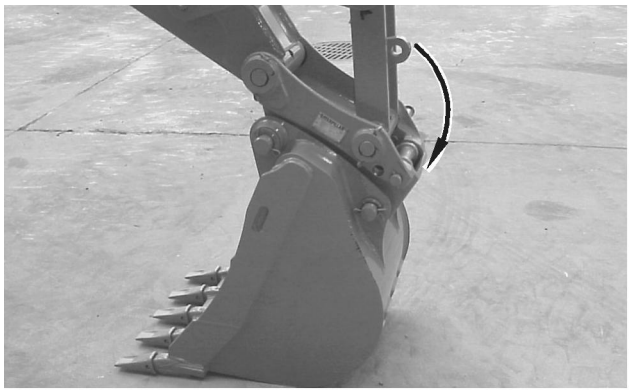

Illustration 135 g00739369

4. Extend the bucket cylinder in order to rotate the quick coupler toward the work tool until the upper boss engages the linkage pin of the work tool.

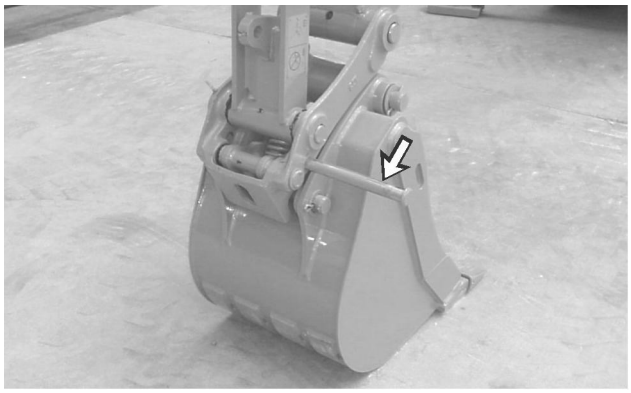

Illustration 136 g00739373

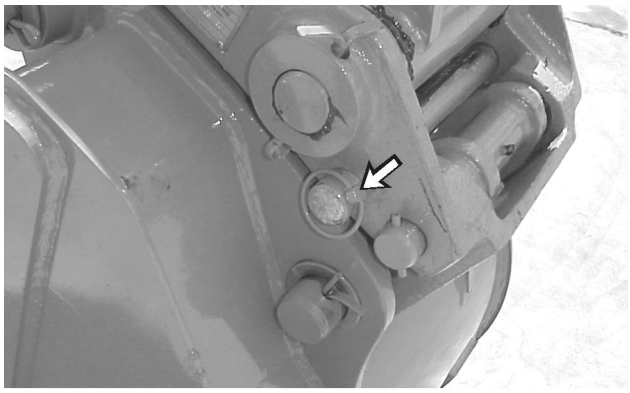

Illustration 137 g00739418

5. Install the lock pin on the quick coupler. Install the lynch pin in order to secure the lock pin.

6. Raise the boom or raise the stick. The work tool is locked in place. The work tool is ready to use.

Securing a Work Tool to a Caterpillar / Case Coupler

Caterpillar offers an assortment of couplers that fit work tools that are produced by other manufacturers. Use the correct coupler and pins for your work tool. Contact your Caterpillar Dealer for the correct mounting hardware.

Perform steps 1 to 3 in order to install either a Caterpillar bucket or certain Case buckets onto the quick coupler.

Extend the bucket cylinder in order to rotate the quick coupler toward the work tool until the pin hole aligns with the appropriate hole for your bucket.

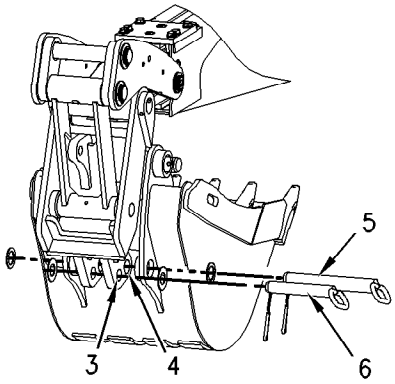

Illustration 138 g00831042

Install longer pin (5) into hole (4) for a Caterpillar bucket. Install shorter pin (6) into hole (3) for a Case bucket.

Securing a Work Tool to a Caterpillar / Deere Coupler

Caterpillar offers an assortment of couplers that fit work tools that are produced by other manufacturers. Use the correct coupler and pins for your work tool. Contact your Caterpillar Dealer for the correct mounting hardware.

Perform steps 1 to 3 in order to install either a Caterpillar bucket or certain Deere buckets onto the quick coupler.

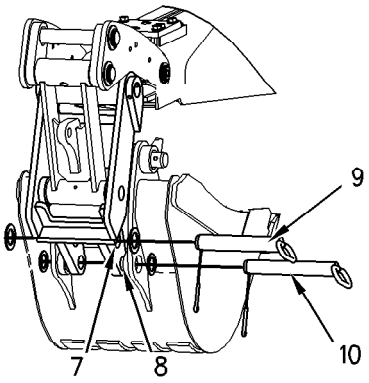

Illustration 139 g00831043

Install longer pin (9) into hole (7) for a Caterpillar bucket. Install shorter pin (10) into hole (8) for a Deere bucket.

Releasing the Work Tool

⚠ WARNING

Place the work tool or bucket in a safe position before disengaging the coupler. Disengaging the coupler will release the work tool or bucket from control of the operator.

Serious injury or death may result from disengaging the work tool or bucket when it is in an unstable position or carrying a load.

1. Level the work tool on the ground.

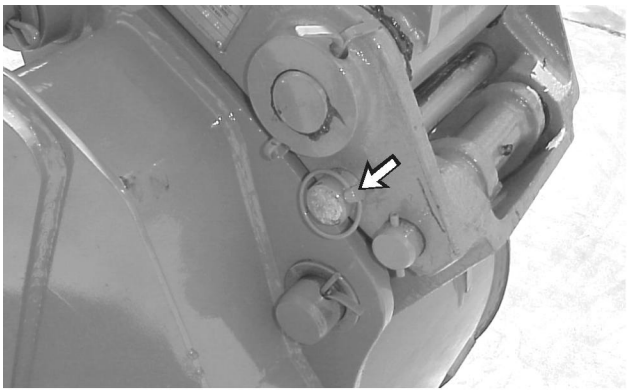

Illustration 140 g00739418

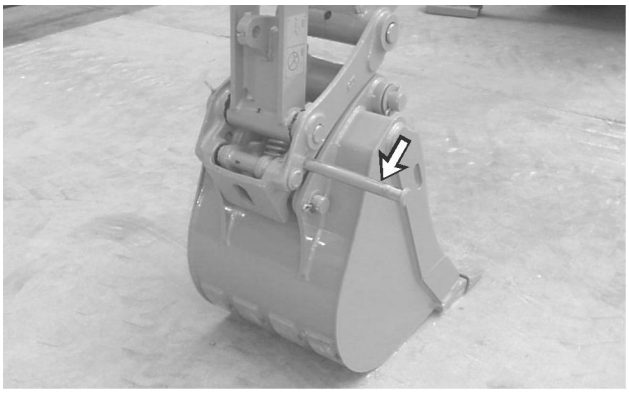

Illustration 141 g00739373

2. Remove the lynch pin from the lock pin and remove the lock pin.

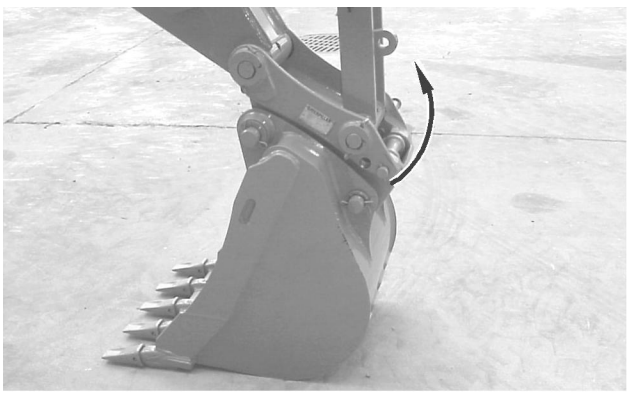

Illustration 142 g00739377

3. Retract the bucket cylinder in order to remove the quick coupler from the linkage pin.

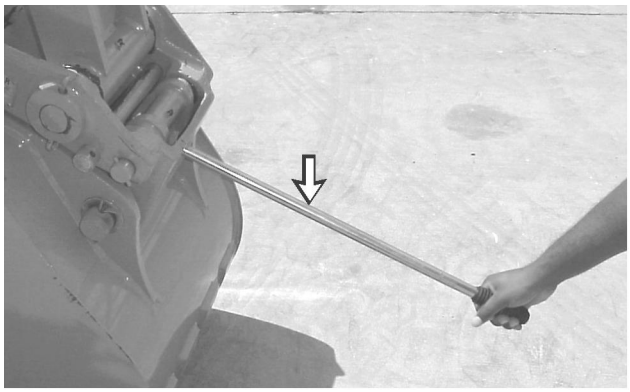

Illustration 143 g00739384

Note: If the quick coupler does not release the linkage pin, use the 132-3821 Actuating Lever to release the linkage pin. Push down on the lever in order to release the linkage pin.

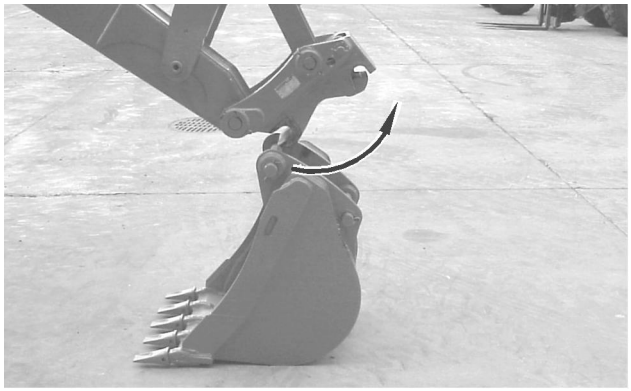

Illustration 144 g00739367

4. Raise the stick and move the stick away from the machine in order to release the quick coupler from the pivot pin of the work tool.

Releasing a Work Tool From a Caterpillar / Case Coupler

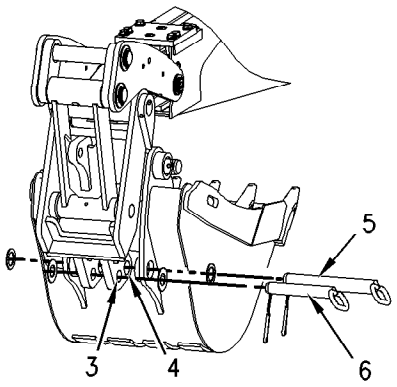

Illustration 145 g00831042

Remove pin (5) from hole (4) for a Caterpillar bucket. Remove pin (6) from hole (3) for a Case bucket.

Retract the bucket cylinder in order to remove the quick coupler from the linkage pin.

Raise the stick and move the stick away from the machine in order to release the quick coupler from the pivot pin of the work tool.

Releasing a Work Tool From a Caterpillar / Deere Coupler

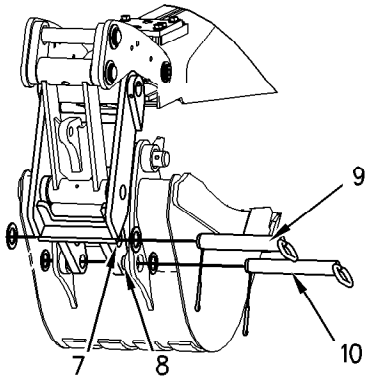

Illustration 146 g00831043

Remove pin (9) from hole (7) for a Caterpillar bucket. Remove pin (10) from hole (8) for a Deere bucket.

Retract the bucket cylinder in order to remove the quick coupler from the linkage pin.

Raise the stick and move the stick away from the machine in order to release the quick coupler from the pivot pin of the work tool.

i00596994

Changing Direction and Speed

SMCS Code: 1000; 7000

Changing from low speed to high speed at full engine speed is possible. Directional changes at full engine speed are possible. However, if you are changing direction, reducing the machine speed and/or braking the machine is recommended. This will provide operator comfort and the maximum service life of the power train components. Keep a loaded bucket low to the ground. Stop the machine in order to avoid an unstable machine.

1. Lower the engine speed with the accelerator pedal.

2. Push the brake pedals downward in order to slow the machine. Push the brake pedals downward in order to stop the machine.

3. Move the transmission direction control lever to the desired speed and to the desired direction.

4. Release the brake pedals.

5. Increase the engine speed with the accelerator pedal.

i01579550

Machine Security System (If Equipped)

SMCS Code: 7631

NOTICE
This machine is equipped with a Caterpillar Machine Security System (MSS) and may not start under certain conditions. Read the following information and know your machine's settings. Your Caterpillar Dealer can identify your machine settings.

Machine Security System (MSS) – Machines that are equipped with a Caterpillar Machine Security System (MSS) can be identified by a decal in the operator station. MSS is designed to prevent theft of the machine or unauthorized operation.

Basic Operation

MSS may be programmed to read a standard Caterpillar key or an electronic key. The electronic key contains an electronic chip within the plastic housing for the key. Each key emits a unique signal to the MSS. The keys can be identified by a gray housing or a yellow housing. MSS can have programmed settings to require an electronic key or a standard Caterpillar key for starting during certain periods of time.

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

Table 68

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

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

Security Management

The MSS has the capability to allow you to program the system to automatically activate at different time periods with different keys. The MSS can also be programmed to reject a specific electronic key after a selected date and time. When you turn the key to the OFF position and the MSS is active, you have a 30 second interval in order to restart the machine with an unauthorized key. Also if the machine stalls, there is a 30 second interval for restarting the machine. This 30 second interval is counted from the time of turning the key to the OFF position.

Note: Know your machine's settings because the use of an electronic key is no guarantee that the machine can be restarted.

An expiration date can be set for each electronic key that is contained in the list of keys for the machine. The key will no longer start the machine when the internal clock in the security system passes the expiration date. Each entry in the list of keys can have a different expiration date.

Spare keys are available from your dealer. Before a key can operate the machine, the MSS must be set to accept that particular key. Contact your Caterpillar dealer for information on additional features of the MSS.

i01626501

Vandalism Guard (Rotating Gauge Panel)
(If Equipped)

SMCS Code: 7315; 7451-MT

Use proper hand placement when you rotate the vandalism guard. Refer to the following photos.

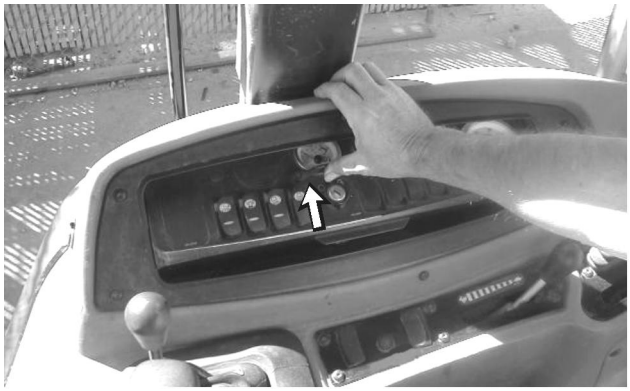

Illustration 147 g00842380

Rotate the side panel upward in order to protect the gauge panel.

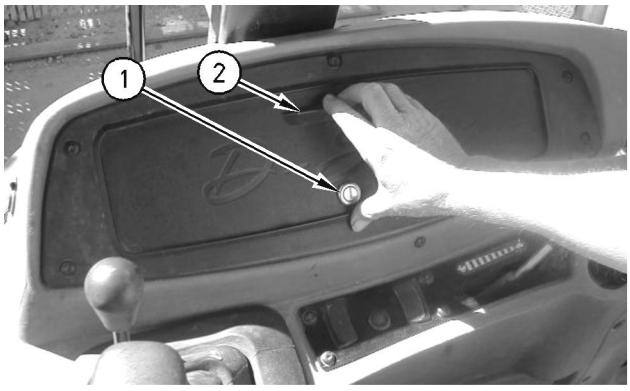

Illustration 148 g00842372

Use the key to lock (1) the vandalism guard. You should lock the vandalism guard before you leave the machine.

Pull down on the handle (2) in order to return the vandalism guard to the operation mode.

Controls

i01993190

Joystick Control (Backhoe)

SMCS Code: 5063; 6107

Joystick Control (Excavator Pattern)

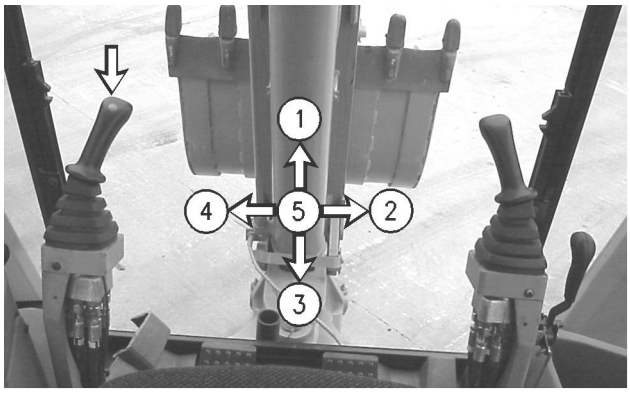

Illustration 149 g00734059

STICK OUT (1) – Move the joystick to this position in order to move the stick outward.

Swing Right (2) – Move the joystick to this position in order to swing the upper structure to the right.

STICK IN (3) – Move the joystick to this position in order to move the stick inward.

Swing Left (4) – Move the joystick to this position in order to swing the upper structure to the left.

HOLD (5) – When you release the joystick from any position, the joystick will return to the HOLD position. Movement of the structure will stop.

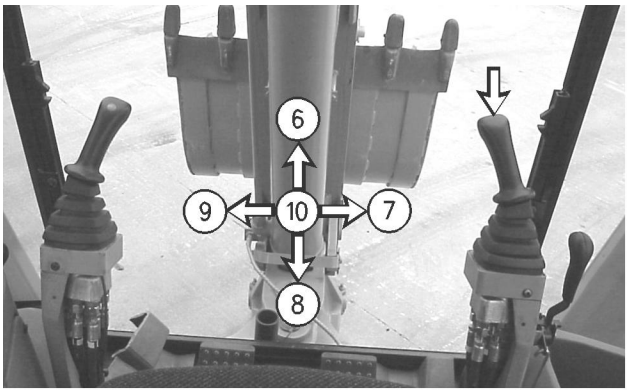

Illustration 150 g00734061

BOOM LOWER (6) – Move the joystick to this position in order to lower the boom.

BUCKET DUMP (7) – Move the joystick to this position in order to dump the bucket or the work tool.

BOOM RAISE (8) – Move the joystick to this position in order to raise the boom.

BUCKET CLOSE (9) – Move the joystick to this position in order to close the bucket or the work tool.

HOLD (10) – When you release the joystick from any position, the joystick will return to the HOLD position. Movement of the structure will stop.

Two functions may be performed at the same time by moving the joysticks diagonally.

Selector Valve (If Equipped)

⚠ WARNING

Verify control pattern selection (1 or 2) before operating. Check switching valve indicator behind left rear wheel. Failure to understand control function could result in injury or death.

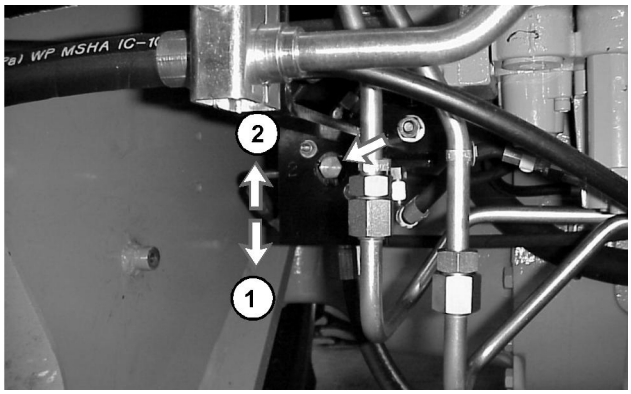

Illustration 151 g01031875

The selector valve for sideshift machines is located under the rear of the cab on the left side of the machine.

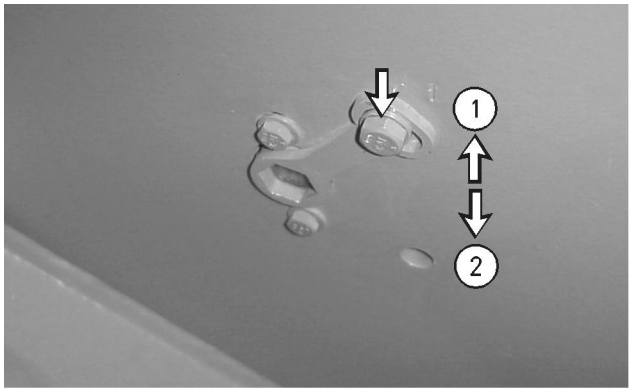

Illustration 152 g00757954

The selector valve for center pivot machines is located inside the left rear wheel well.

The joystick control selector is located under the left side of the cab.

The machine may be equipped with a joystick control selector. The machine control pattern can be varied by turning the valve underneath the left side of the cab. Position (1) of the joystick control selector allows the functionality of the joysticks to be in the excavator style control. The alternate position (2) allows the operator to change the functionality of the joysticks to the backhoe style control.

Perform the following steps in order to change the functionality of the joysticks.

1. Remove the bolt that secures the joystick control selector.

2. Rotate the joystick control selector to the desired position.

3. Insert the bolt.

Alternate Joystick Control (Backhoe Control)

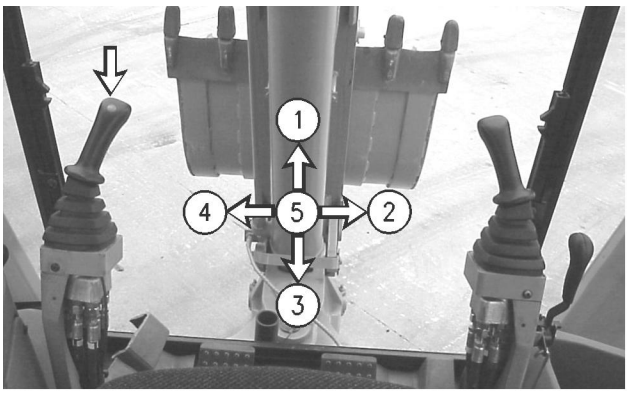

Illustration 153 g00734062

BOOM LOWER (1) – Move the joystick to this position in order to lower the boom.

Swing Right (2) – Move the joystick to this position in order to swing the upper structure to the right.

BOOM RAISE (3) – Move the joystick to this position in order to raise the boom.

Swing Left (4) – Move the joystick to this position in order to swing the upper structure to the left.

HOLD (5) – When you release the joystick from any position, the joystick will return to the HOLD position. Movement of the structure will stop.

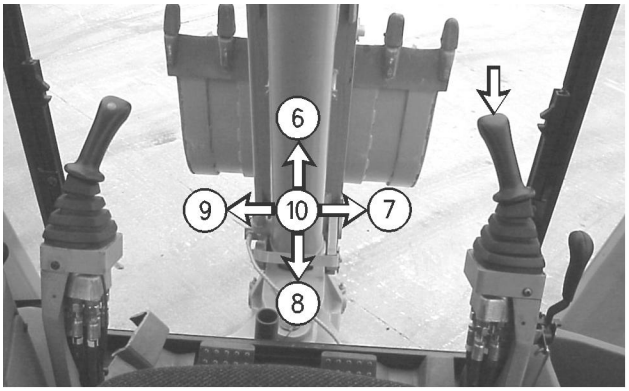

Illustration 154 g00734063

STICK OUT (6) – Move the joystick to this position in order to move the stick outward.

BUCKET DUMP (7) – Move the joystick to this position in order to dump the bucket or the work tool.

STICK IN (8) – Move the joystick to this position in order to move the stick inward.

BUCKET CLOSE (9) – Move the joystick to this position in order to close the bucket or the work tool.

HOLD (10) – When you release the joystick from any position, the joystick will return to the HOLD position. Movement of the structure will stop.

Two functions may be performed at the same time by moving the joysticks diagonally.

i03592100

Two Lever Control (Backhoe) (Excavator Pattern)
(If Equipped)

SMCS Code: 5063; 5450

Backhoe Boom and Bucket

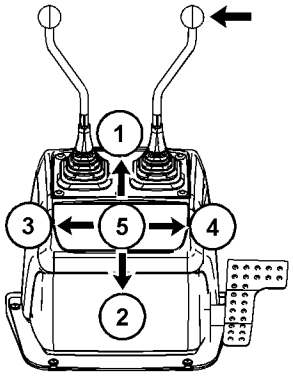

Illustration 155 g01917753

Note: The stabilizers should be in the full up position or in the full down position when the boom is swinging 90 degrees to either side.

Lower Boom (1) – Move the lever to this position in order to lower the boom.

Raise Boom (2) – Move the lever to this position in order to raise the boom.

Bucket Load (3) – Move the lever to this position in order to dig with the bucket.

Bucket Dump (4) – Move the lever to this position in order to empty the bucket.

Hold (5) – Move the lever to this position in order to stop the movement of the boom. Release the lever from any of the positions. The lever will return to the HOLD position.

Backhoe Stick and Swing

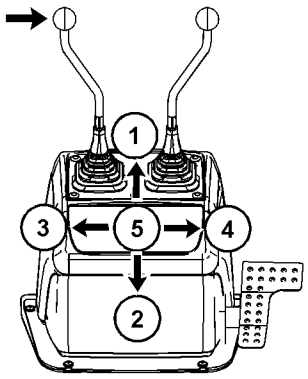

Illustration 156 g01917713

Stick Out (1) – Move the lever to this position in order to move the stick outward.

Stick In (2) – Move the lever to this position in order to move the stick inward.

Swing Left (3) – Move the lever to this position in order to move the boom to the left. The boom should move in the same direction as the lever.

Swing Right (4) – Move the lever to this position in order to move the boom to the right. The boom should move in the same direction as the lever.

Hold (5) – Move the lever to this position in order to stop the movement of the stick and of the bucket. Release the lever from any of the positions. The lever will return to the HOLD position.

i02573044

Two Lever Control (Backhoe) (Universal Pattern)

SMCS Code: 5063; 5450

Standard Pattern (If Equipped)

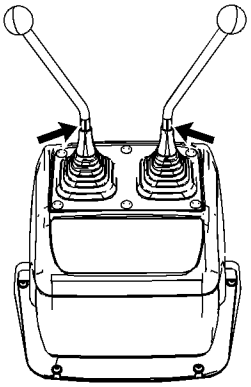

Illustration 157 g01213058

Standard Pattern – When the controls are in this position, the functionality of the controls are in the standard pattern.

Backhoe Boom and Swing

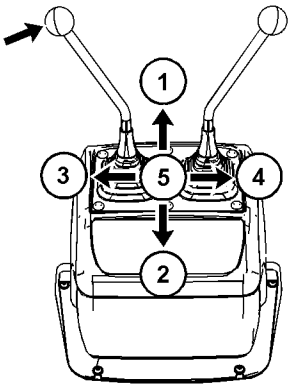

Illustration 158 g01213128

Note: The stabilizers should be in the full up position or in the full down position when the boom is swinging 90 degrees to either side.

Lower Boom (1) – Move the lever to this position in order to lower the boom.

Raise Boom (2) – Move the lever to this position in order to raise the boom.

Swing Left (3) – Move the lever to this position in order to move the boom to the left. The boom should move in the same direction as the lever.

Swing Right (4) – Move the lever to this position in order to move the boom to the right. The boom should move in the same direction as the lever.

Hold (5) – Move the lever to this position in order to stop the movement of the boom. Release the lever from any of the positions. The lever will return to the HOLD position.

Backhoe Stick and Bucket

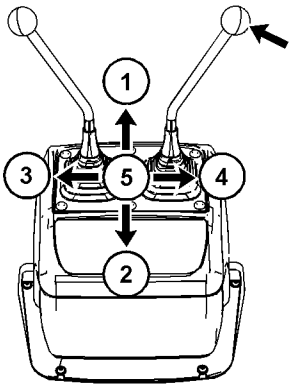

Illustration 159 g01213133

Stick Out (1) – Move the lever to this position in order to move the stick outward.

Stick In (2) – Move the lever to this position in order to move the stick inward..

Bucket Load (3) – Move the lever to this position in order to dig with the bucket.

Bucket Dump (4) – Move the lever to this position in order to empty the bucket.

Hold (5) – Move the lever to this position in order to stop the movement of the stick and of the bucket. Release the lever from any of the positions. The lever will return to the HOLD position.

Cross Pattern (If Equipped)

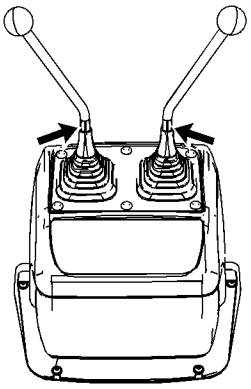

Illustration 160 g01213058

Cross Pattern – When the controls are in this position, the functionality of the controls are in the cross pattern.

Backhoe Boom and Swing

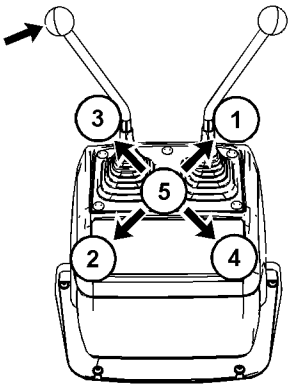

Illustration 161 g01213139

Note: The stabilizers should be in the full up position or in the full down position when the boom is swinging 90 degrees to either side.

Lower Boom (1) – Move the lever to this position in order to lower the boom.

Raise Boom (2) – Move the lever to this position in order to raise the boom.

Swing Left (3) – Move the lever to this position in order to move the boom to the left. The boom should move in the same direction as the lever.

Swing Right (4) – Move the lever to this position in order to move the boom to the right. The boom should move in the same direction as the lever.

Hold (5) – Move the lever to this position in order to stop the movement of the boom. Release the lever from any of the positions. The lever will return to the HOLD position.

Backhoe Stick and Bucket

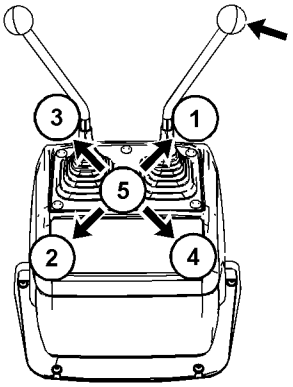

Illustration 162 g01213217

Bucket Dump (1) – Move the lever to this position in order to empty the bucket.

Bucket Load (2) – Move the lever to this position in order to dig with the bucket.

Stick Out (3) – Move the lever to this position in order to move the stick outward.

Stick In (4) – Move the lever to this position in order to move the stick inward..

Hold (5) – Move the lever to this position in order to stop the movement of the stick and of the bucket. Release the lever from any of the positions. The lever will return to the HOLD position.

i01379590

Backhoe Three Lever with Foot Swing Control

SMCS Code: 5063; 5258

Note: When you operate the three lever foot swing controls, do not stand on the pedals or do not put excessive pressure on the pedals.

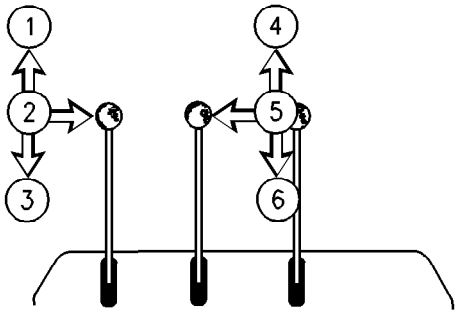

Illustration 163 g00732995

BUCKET DUMP (1) – Move the lever to this position in order to empty the bucket.

HOLD (2) – Move the lever to this position in order to stop the movement of the bucket. When the lever is released from either position, the lever will return to the HOLD position.

BUCKET LOAD (3) – Move the lever to this position in order to fill the bucket.

STICK OUT (4) – Move the lever to this position in order to move the stick outward.

HOLD (5) – Move the lever to this position in order to stop the movement of the stick. Release the lever. The lever will return to the HOLD position.

STICK IN (6) – Move the lever to this position in order to move the stick inward.

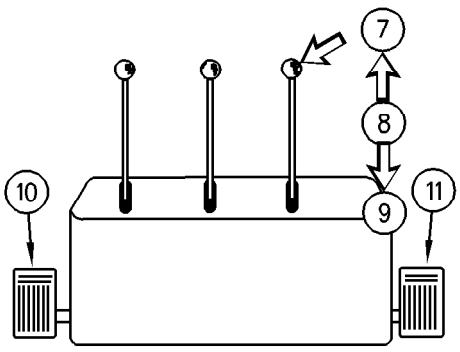

Illustration 164 g00732998

LOWER BOOM (7) – Move the lever to this position in order to lower the boom.

HOLD (8) – Move the lever to this position in order to stop movement of the boom. Release the lever. The lever will return to the HOLD position.

Raise Boom (9) – Move the lever to this position in order to raise the boom.

SWING LEFT (10) – Push down on the toe end of the left pedal in order to swing the boom to the left. Release the pedal in order to stop the movement.

SWING RIGHT (11) – Push down on the toe end of the right pedal in order to swing the boom to the right. Release the pedal in order to stop the movement.

i01379588

Backhoe Three Lever with Auxiliary Lever Control

SMCS Code: 5063; 5258

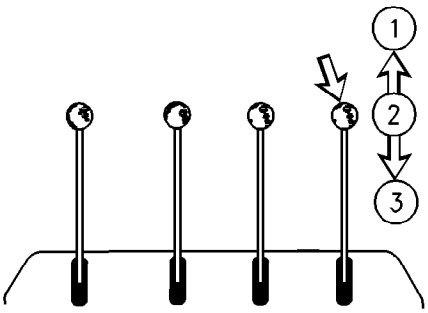

Illustration 165 g00733493

STICK EXTEND (1) – Move the lever to this position in order to extend the stick outward.

HOLD (2) – Move the lever to this position in order to stop the movement of the stick. Release the lever. The lever will return to the HOLD position.

STICK RETRACT (3) – Move the lever to this position in order to retract the stick.

i01872116

Backhoe Four Lever Control
(Ford Pattern)

SMCS Code: 5063; 5258

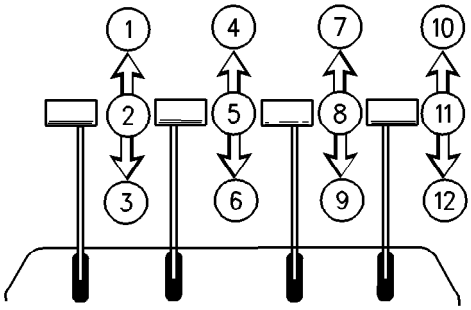

Illustration 166 g00876894

STICK OUT (1) – Move the lever to this position in order to move the stick outward.

HOLD (2) – Move the lever to this position in order to stop stick movement. The lever will return to the HOLD position when the lever is released from the STICK OUT position or from the STICK IN position.

STICK IN (3) – Move the lever to this position in order to move in the stick.

LOWER BOOM (4) – Move the lever to this position in order to lower the boom.

HOLD (5) – Move the lever to this position in order to stop boom movement. The lever will return to the HOLD position when the lever is released from the LOWER BOOM position or from the RAISE BOOM position.

RAISE BOOM (6) – Move the lever to this position in order to raise the boom.

BUCKET DUMP (7) – Move the lever to this position in order to empty the bucket.

HOLD (8) – Move the lever to this position in order to stop bucket movement. The lever will return to the HOLD position when the lever is released from the BUCKET DUMP position or from the BUCKET LOAD position.

BUCKET LOAD (9) – Move the lever to this position in order to fill the bucket.

SWING LEFT (10) – Move the lever to this position in order to swing the boom to the left.

HOLD (11) – Move the lever to this position in order to stop swing movement. The lever will return to the HOLD position when the lever is released from the SWING LEFT position or from the SWING RIGHT position.

SWING RIGHT (12) – Move the lever to this position in order to swing the boom to the right.

Extendable Stick Control Pedal (If Equipped) – Refer to Operation and Maintenance Manual, “Backhoe Extendable Stick Control (Foot Operated)”.

Auxiliary Control Pedal (If Equipped) – Refer to Operation and Maintenance Manual, “Backhoe Auxiliary Control (Foot Operated)”.

i01916014

Backhoe Extendable Stick Control (Foot Operated)
(If Equipped)

SMCS Code: 5063; 5474

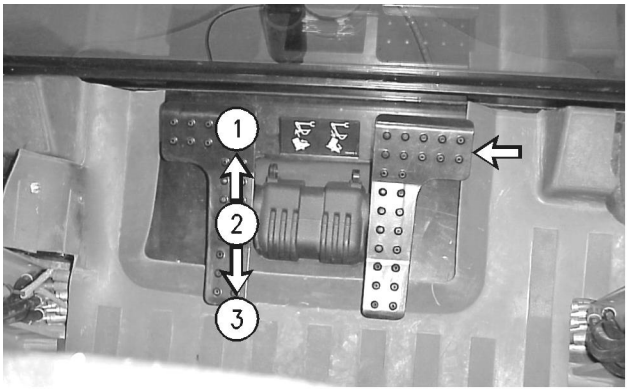

Illustration 167 g00733007

STICK EXTEND (1) – Push down on the toe end of the pedal in order to extend the stick. Push down on the toe end of the pedal for additional reach with the stick.

HOLD (2) – The pedal will return to the HOLD position when the pedal is released from the STICK EXTEND position or from the STICK RETRACT position. Stick movement will stop.

STICK RETRACT (3) – Push down on the heel of the pedal in order to retract the stick.

i01379293

Backhoe Auxiliary Control (Foot Operated)
(If Equipped)

SMCS Code: 5063

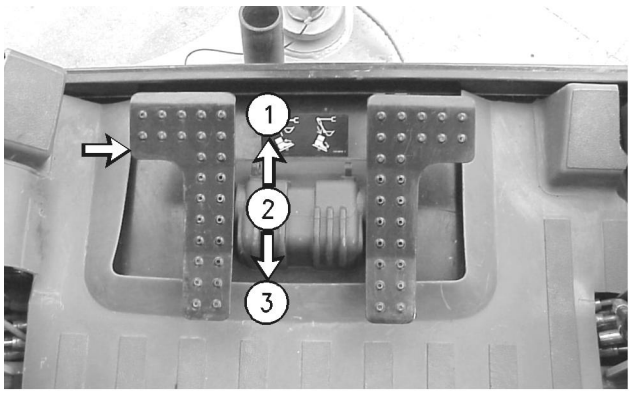

Illustration 168 g00733082

Use the auxiliary pedal in order to pressurize the hydraulic lines of a work tool.

Push down on the toe end of the pedal to position (1) in order to pressurize the hydraulic line on the right side of the stick.

HOLD (2) – The pedal will return to the HOLD position when the pedal is released from position (1) or released from position (3).

Push down on the heel end of the pedal to position (3) in order to pressurize the hydraulic line on the left side of the stick.

i01987671

Joystick Control (Loader)

SMCS Code: 5063; 6107

Mechanical Controls

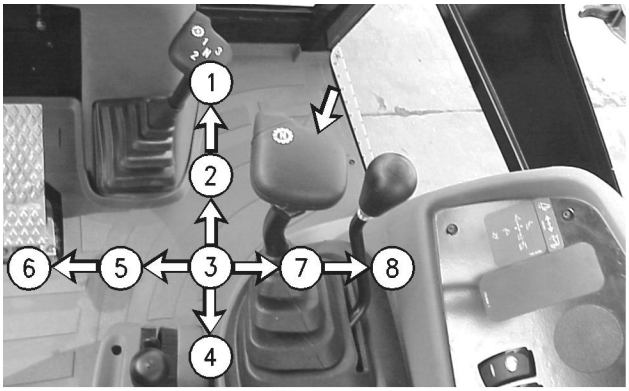

Illustration 169 g00732734

FLOAT (1) – Move the lever forward to position (1). This position will allow the loader bucket to move along the ground contour.

Do not use this position to lower the loader bucket. The lever will stay in the FLOAT position until the lever is moved back to the HOLD position or to another position.

LOWER (2) – Move the lever to position (2) in order to lower the loader bucket.

HOLD (3) – Move the lever to position (3) in order to stop movement of the loader bucket. When you release the lever from any position except for the FLOAT position, the lever will return to the HOLD position.

RAISE (4) – Move the lever to position (4) in order to raise the loader bucket.

TILT BACK (5) – Move the lever to position (5) in order to rack back the loader bucket.

RETURN-TO-DIG (6) – Move the lever to position (6) in order to return the loader bucket to the dig position. The lever will stay in this position until the bucket is level. Then, the lever will automatically return to the HOLD position.

DUMP (7) – Move the lever to position (7) in order to empty the loader bucket.

QUICK DUMP (8) – Move the lever all the way toward the right. This will shorten the time that is required to tilt the attachment forward.

Pilot Controls

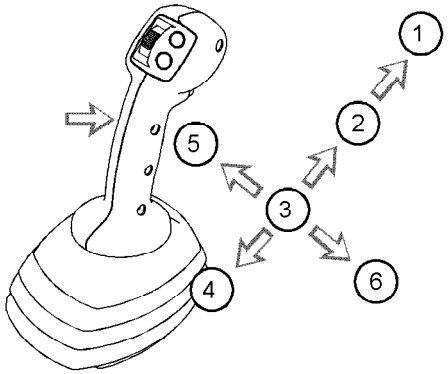

Illustration 170 g01031841

FLOAT (1) – Move the joystick forward to position (1). This position will allow the loader bucket to move along the ground contour.

Do not use this position to lower the loader bucket. The joystick will stay in the FLOAT position until the joystick is moved back to the HOLD position or to another position.

LOWER (2) – Move the joystick to position (2) in order to lower the loader bucket.

HOLD (3) – Move the joystick to position (3) in order to stop movement of the loader bucket. When you release the joystick from any position except for the FLOAT position, the joystick will return to the HOLD position.

RAISE (4) – Move the joystick to position (4) in order to raise the loader bucket.

TILT BACK (5) – Move the joystick to position (5) in order to rack back the loader bucket.

DUMP (6) – Move the joystick to position (6) in order to empty the loader bucket.

i01987674

Multipurpose Controls

SMCS Code: 5063; 5258

Multipurpose Bucket Function

Mechanical Control

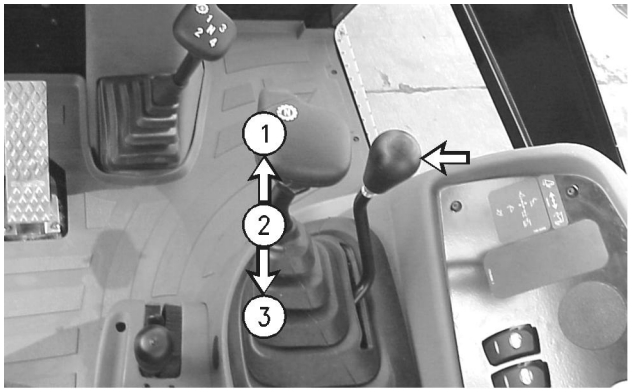

Illustration 171 g00732833

OPEN BUCKET CLAM (1) – Move the lever to this position in order to open the bucket clam.

HOLD (2) – Move the lever to this position in order to stop the movement of the bucket clam. The lever will return to the HOLD position when you release the lever from any position.

CLOSE BUCKET CLAM (3) – Move the lever to this position in order to close the bucket clam.

Pilot Control

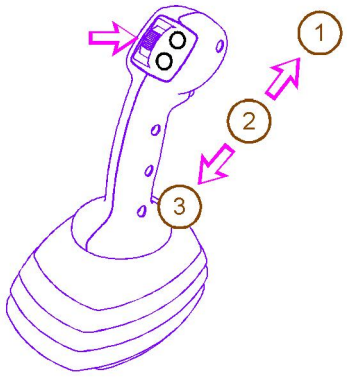

Illustration 172 g01031826

OPEN BUCKET CLAM (1) – Move the switch to this position in order to open the bucket clam.

HOLD (2) – Move the switch to this position in order to stop the movement of the bucket clam. The switch will return to the HOLD position when you release the switch from any position.

CLOSE BUCKET CLAM (3) – Move the switch to this position in order to close the bucket clam.

Auxiliary Functions

Mechanical Control

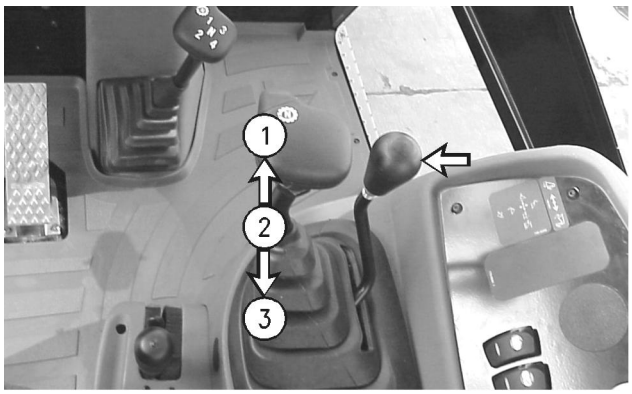

Illustration 173 g00732833

The multipurpose lever controls the function of a work tool (a broom for example).

ON (1) – Move the lever to this position in order to pressurize the hydraulic line on the right side of the machine.

OFF (2) – Move the lever to this position in order to turn off the hydraulic lines.

ON (3) – Move the lever to this position in order to pressurize the hydraulic line on the left side of the machine.

Pilot Control

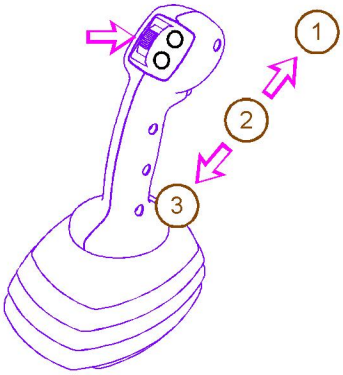

Illustration 174 g01031826

The multipurpose switch controls the function of a work tool.

ON (1) – Move the switch to this position in order to pressurize the hydraulic line on the right side of the machine.

OFF (2) – Move the switch to this position in order to turn off the hydraulic lines.

ON (3) – Move the switch to this position in order to pressurize the hydraulic line on the left side of the machine.

Multipurpose Button (4) – Press the button in order to activate an electrical connection on the front of the machine.

Multipurpose Button (5) – Press the button in order to activate an electrical connection on the front of the machine.

Note: The operation of the controls will vary depending on the work tool. While you operate the machine and the work tool slowly in an open area, check the operation of all controls for the work tool.

i01359188

Extendable Stick Lock Control

SMCS Code: 6533

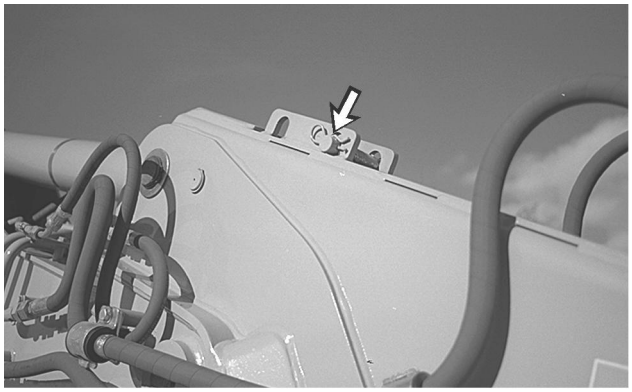

Illustration 175 g00291493

Place the extendable stick lock in the transport position when you are transporting the machine. Place the extendable stick lock in the transport position when you are using a powered work tool on the backhoe.

Illustration 176 g00292658

Place the extendable stick lock in the operating position when use of the extendable stick is desired.

i01359182

Swing Lock Pin Control

SMCS Code: 6506

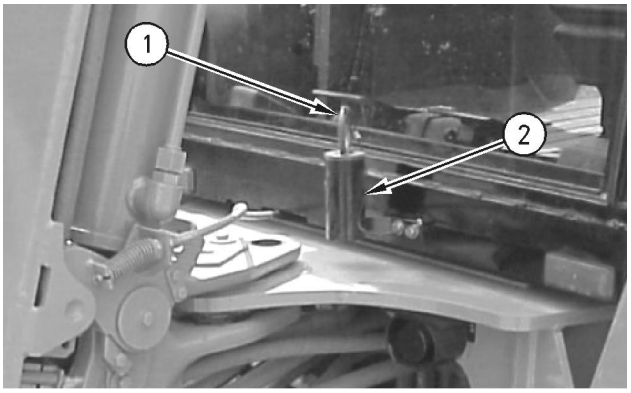

Illustration 177 g00732270

Remove the swing lock pin (1) when you operate the backhoe or when the swing lock pin is not required. Place the swing lock pin in the storage bracket (2) on the back of the machine.

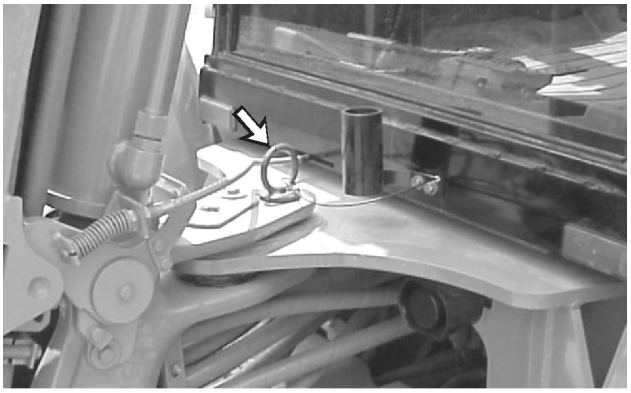

Illustration 178 g00732274

Install the swing lock pin in order to ensure that the backhoe will not move. This will also ensure that the backhoe will not swing into objects or into traffic. Always install the swing lock pin under the following conditions.

- roading the machine
- using the loader bucket
- transporting the machine

i02274129

Work Tool Flow Control
(If Equipped)

SMCS Code: 1329; 5057-AX; 5137

S/N: MBH1–Up

S/N: BNK5900–Up

S/N: BML4800–Up

S/N: BLN10300–Up

S/N: BFP12900–Up

S/N: FDP18400–Up

The auxiliary lines are capable of providing one-way flow or two-way flow.

The one-way flow is used with attachments such as hydraulic hammers. The two-way flow is used with attachments such as augers.

Before you change the flow mode of the hydraulic auxiliary circuit, ensure that the following criteria have been met:

- machine on level ground
- all implement and all attachments lowered to the ground.
- hydraulic pressure released
- swing lock pin is installed
- engine shutoff

⚠ WARNING

Make sure that the machine and all attachments are in the recommended servicing position. Install the swing lock pin and shut off the engine. Make sure that all personnel are clear of the attachment before the manual lever on the ball valve is moved. Changing the valve position may cause the attachment to move unexpectedly. Serious injury or death may result.

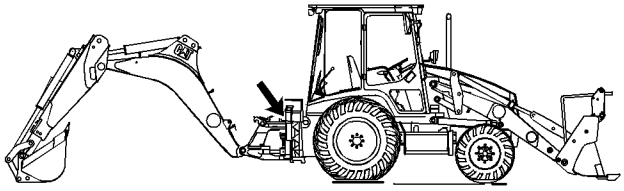

Illustration 179 g01137010

Machine shown in the servicing position

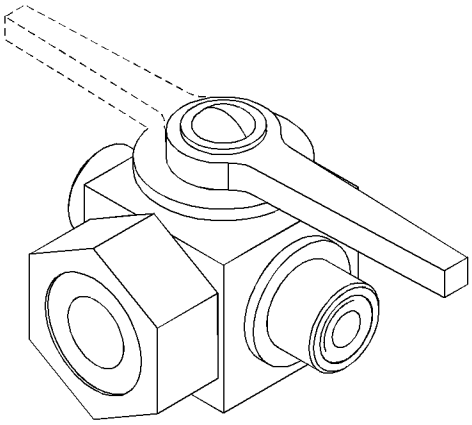

Illustration 180 g01135965

Valve in the two-way flow position

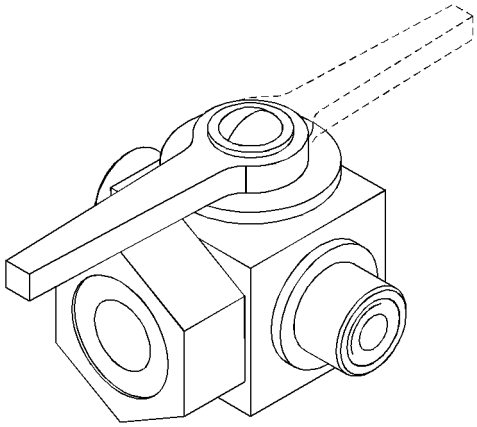

Illustration 181 g01135966

Valve in the one-way flow position

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

In order to change the valve from two-way flow to one-way flow, turn the valve clockwise.

In order to change the valve from one-way flow to two-way flow, turn the valve counterclockwise.

Engine Starting

i03479322

Engine Starting

SMCS Code: 1000; 7000

1. Engage the parking brake.

2. Lower any raised work tools to the ground and move the hydraulic controls to the HOLD position.

3. Move the direction control lever to NEUTRAL. Push the top of the transmission neutral lock switch in order to engage the transmission neutral lock.

Note: The engine will not start unless the direction control lever is in NEUTRAL.

4. Hold the throttle control at the LOW IDLE position before you start the engine.

5. Turn the engine start switch key to the START position.

Note: In applications for cold weather, pause until the indicator lamp for the Starting Aid turns off. When the engine start switch is in the ON position, this indicates the activation of the glow plugs. Once the indicator light for the Starting Aid goes off you may start the engine.

Note: If the machine is equipped with the Machine Security System turn the engine start switch key to the ON position for three seconds before you start the machine. This reduces the amount of cranking.

NOTICE
Do not crank the engine for more than 30 seconds. Allow the starter to cool for two minutes before cranking again.

Turbocharger (if equipped) damage can result, if the engine speed is not kept low until the engine oil light/gauge verifies the oil pressure is sufficient.

6. Release the engine start switch key after the engine starts.

i01832994

Engine Starting with Starting Aid

SMCS Code: 1000; 7000

WARNING

Do not use aerosol types of starting aids such as ether. Such use could result in an explosion and personal injury.

1. Engage the parking brake.

2. Lower any raised work tools to the ground and move the hydraulic controls to the HOLD position.

3. Move the direction control lever to NEUTRAL. Push the top of the transmission neutral lock switch in order to engage the transmission neutral lock.

Note: The engine will not start unless the directional control lever is in NEUTRAL.

4. Push down on the accelerator pedal and hold the accelerator pedal at the HIGH IDLE position before you start the engine.

5. Depress the thermal starting aid switch for 20 seconds.

6. Continue to depress the thermal starting aid switch and turn the engine start switch key to the START position in order to start the engine.

7. When the engine starts, release the engine start switch key. Continue to depress the thermal starting aid switch until the engine runs smoothly up to high idle speed.

8. If the engine does not start within 20 seconds, release the engine start switch key and continue to depress the thermal starting aid switch. Wait for 10 seconds and continue with Step 6.

9. After the engine begins to run smoothly, release the thermal starting aid switch and allow the engine to warm up at HALF THROTTLE for five minutes.

For starting below −18°C (0°F), the use of additional cold weather starting aids is recommended. Any of the following may be required.

- a coolant heater
- a fuel heater
- an oil heater

- an extra capacity battery

At temperatures below −23°C (−10°F), consult your Caterpillar dealer. Also, refer to Special Publications, SEBU5898, “Cold Weather Recommendations”. This publication is available from your Caterpillar dealer.

Cold Weather Starting Capabilities

⚠ WARNING

Do not spray ether into engine when using Thermal-Starting Aid to start engine.

Personal injury and machine damage could result.

Follow the procedures in this manual.

The starting capabilities of the backhoe loaders at different cold temperatures are listed in the following chart. The temperatures that are listed are the minimum starting temperatures for the given machine criteria. Engine oil viscosity is VERY important to the cold weather starting capability of the engine.

The minimum engine starting speed is 100 rpm. The engine starting speed can be achieved if the batteries are capable of delivering a minimum of 485 amperes, and the correct fuel and the correct engine oil are used for the given starting ambient conditions.

Table 69

Coldest Ambient Temperature °C (°F)	Engine Oil Viscosity	Fuel Type	Battery	Starting Aid
0°C (32°F)	10W30	No. 2 Diesel	Single	Starting Aid is not required.

(continued)

(Table 69, contd)

−18°C (0°F)	10W30	No. 1 Diesel	Double	Thermal Starting Aid
−29°C (−20°F)	5W20	No. 1 Diesel	Double	Thermal Starting Aid and Block Heater

i01833171

Engine and Machine Warm-Up

SMCS Code: 1000; 7000

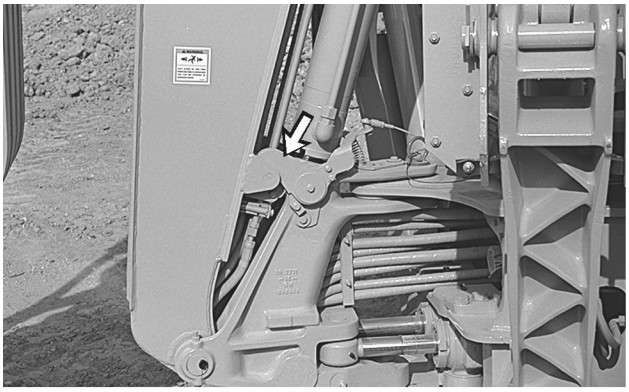

Illustration 182 g00291409

NOTICE
Keep the engine speed low until the engine oil fault alarm shuts off and the indicator light shuts off. Wait for ten seconds. If the indicator light stays on, stop the engine. Investigate the cause of the problem before you start the engine again.

1. Warm up the engine at low idle for five minutes. With the boom in the LOCKED position, cycle the hydraulic cylinders in order to circulate the oil. Move the control for the boom to the BOOM DOWN position for one minute. Release the control for the boom for one minute. Repeat this procedure until the hydraulic system is warm enough to operate the attachments.
2. Monitor the gauges while you operate the machine controls.
3. The parking brake indicator will remain on until you release the parking brake.

While you idle the engine for warm-up, observe the following recommendations:

- If the temperature is greater than 0° C (32° F), warm up the engine for approximately 15 minutes.

- If the temperature is less than 0° C (32° F), warm up the engine for approximately 30 minutes.
- If the temperature is less than − 18°C (0°F) or if hydraulic functions are sluggish, additional time may be required.

Parking

i01355060

Stopping the Machine

SMCS Code: 7000

1. Reduce the engine speed slightly.

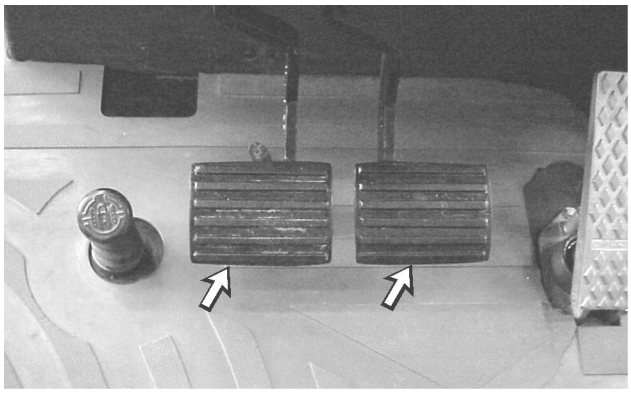

Illustration 183 g00732030

2. Apply the service brakes in order to stop the machine.

Stop the machine on level ground, when possible.

3. Move the transmission control to NEUTRAL.

4. Engage the transmission neutral lock.

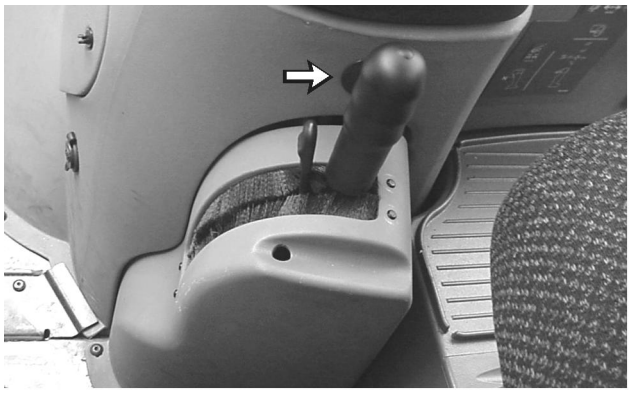

Illustration 184 g00731039

5. Engage the parking brake.

6. Lower all raised work tools to the ground and apply slight downward pressure.

7. Move all hydraulic control levers into the HOLD position.

i01355053

Stopping the Engine

SMCS Code: 1000; 7000

NOTICE
Stopping the engine immediately after it has been working under load, can result in overheating and accelerated wear of the engine components.

Refer to the following procedure, to allow the engine to cool, and to prevent excessive temperatures in the turbocharger housing (if equipped), which could cause oil coking problems.

1. Operate the engine for five minutes at low idle with no load.

This allows hot areas in the engine to cool gradually. This will extend the engine life.

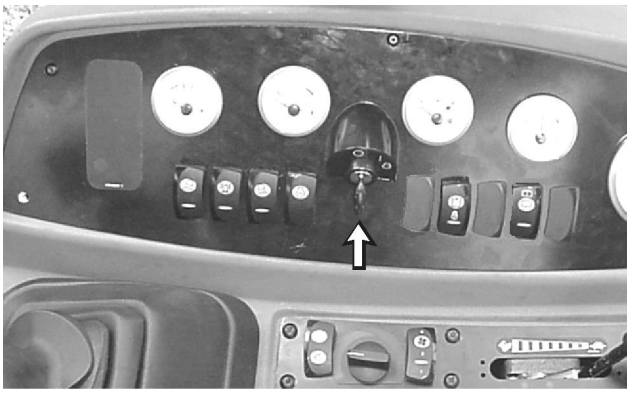

Illustration 185 g00730472

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

i01992354

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

1. Empty the bucket. Remove the pin that secures the brace for the loader lift arm to the left loader lift arm. Raise the loader arm to the maximum height.

Illustration 186 g00732216

2. Position the brace for the loader lift arm over the left lift cylinder rod with the flat end against the cylinder end.

3. Push the pin through the holes of the brace for the loader lift arm and install the cotter pin.

4. Slowly lower the loader arms until the brace for the loader lift arm contacts the top of the lift cylinder and the bosses on the loader arm.

Illustration 187 g00732225

5. Remove the engine access panel that is located on the left side of the machine.

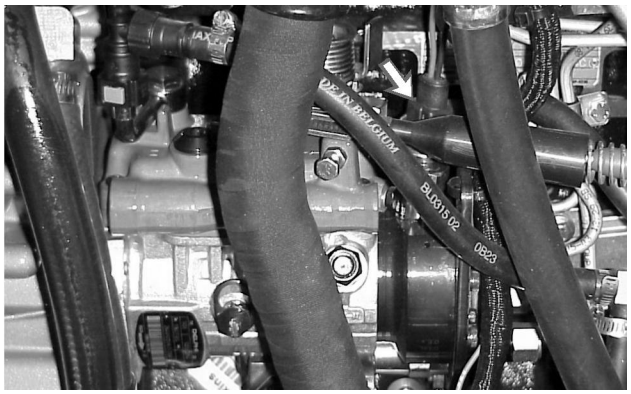

Illustration 188 g01031805

6. Remove the wire connector in order to stop the engine.

Note: Do not operate the machine again until the malfunction has been corrected.

i01928935

Equipment Lowering with Engine Stopped
(Mechanical Controls)

SMCS Code: 7000

Lowering the Loader Bucket

⚠ WARNING

Personal injury or death can result from a bucket falling.

Keep personnel away from the front of the machine when lowering the bucket.

Two lift load control valves are used. The control valve (if equipped) is used to hold the lift arms in place in case of a hose failure in the lift circuit.

One lift load control valve is located on each lift cylinder.

If there is a loss of hydraulic power, perform the following procedure to lower the lift arms to the ground.

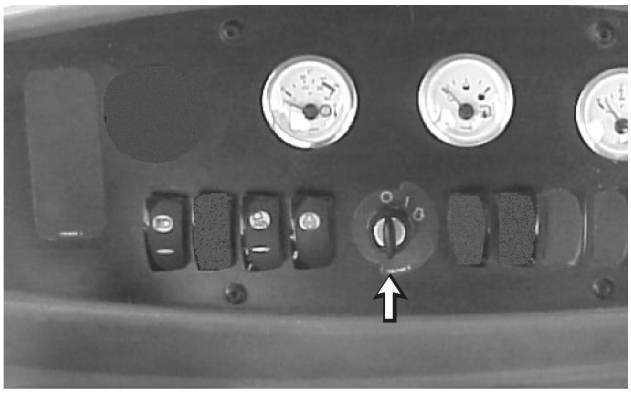

Illustration 189 g00732680

1. Turn the engine start switch key to the ON position.

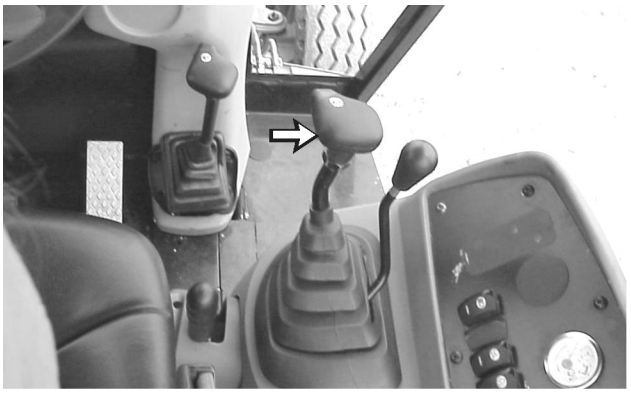

Illustration 190 g00732683

2. Slowly tap the loader control lever into the FLOAT position in order to lower the bucket to the ground.

Lowering a Loader with Lock Valves

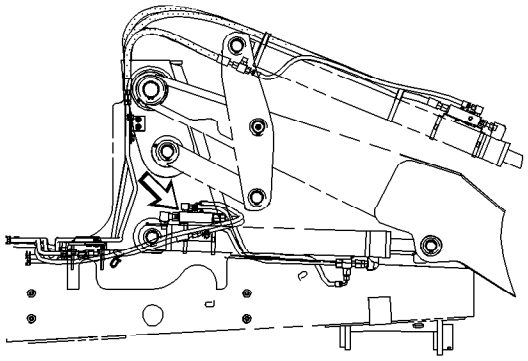

Illustration 191 g00833068

The load control valve (if equipped) for the loader is located on each lift cylinder.

The load control valve for the loader is used to hold the loader in place in case of a hose failure in the lift circuit.

To lower the loader to the ground, perform the following procedure.

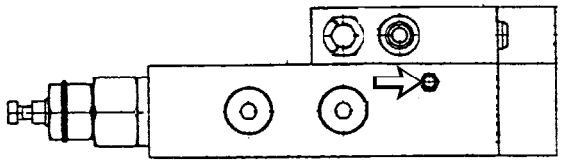

Illustration 192 g00514917

1. Install a 6 mm (0.25 inch) hose onto the purging screw. Route the other end of the hose into a suitable container in order to drain the oil.
2. Loosen the purging screw slightly and allow the oil to drain until the loader lowers to the ground. Tighten the purging screw after the loader is on the ground.

Lowering the Boom

⚠ WARNING

Personal injury or death can result from the boom falling.

Keep personnel away from the rear of the machine when lowering the boom.

If there is a loss of hydraulic power, perform the following procedure to lower the boom to the ground.

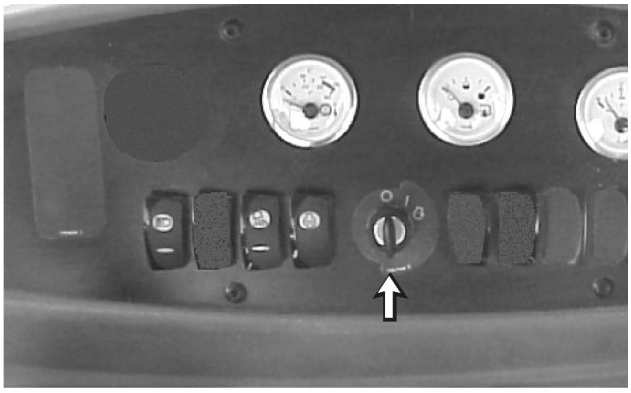

Illustration 193 g00732680

1. Turn the engine start switch key to the ON position.
2. Slowly tap the boom control lever into the “Boom Lower” position in order to lower the backhoe bucket to the ground.

Lowering the Boom with Lock Valves

⚠ WARNING

Personal injury or death can result from the boom falling.

Keep personnel away from the rear of the machine when lowering the boom.

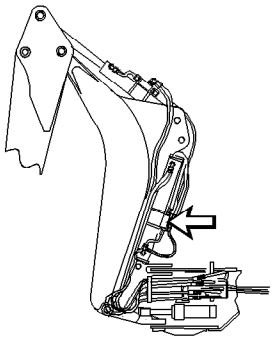

Illustration 194 g00287734

The boom load control valve (if equipped) is located on the boom cylinder.

The boom load control valve is used to hold the boom in place in case of a hose failure in the boom circuit.

To lower the boom to the ground, perform the following procedure.

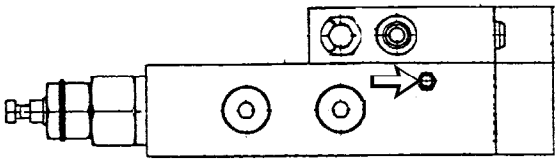

Illustration 195 g00514917

1. Install a 6 mm (0.25 inch) hose onto the purging screw. Route the other end of the hose into a suitable container in order to drain the oil.

2. Loosen the purging screw slightly and allow the oil to drain until the boom lowers to the ground. Tighten the purging screw after the boom is on the ground.

i01992207

Equipment Lowering with Engine Stopped
(Pilot Controls)

SMCS Code: 7000

Lowering the Loader Bucket

⚠ WARNING

Personal injury or death can result from a bucket falling.

Keep personnel away from the front of the machine when lowering the bucket.

Two lift load control valves are used. The control valve (if equipped) is used to hold the lift arms in place in case of a hose failure in the lift circuit.

One lift load control valve is located on each lift cylinder.

If there is a loss of hydraulic power, perform the following procedure to lower the lift arms to the ground.

Illustration 196 g00832869

1. Place the hydraulic lockout switch in the UNLOCK position.

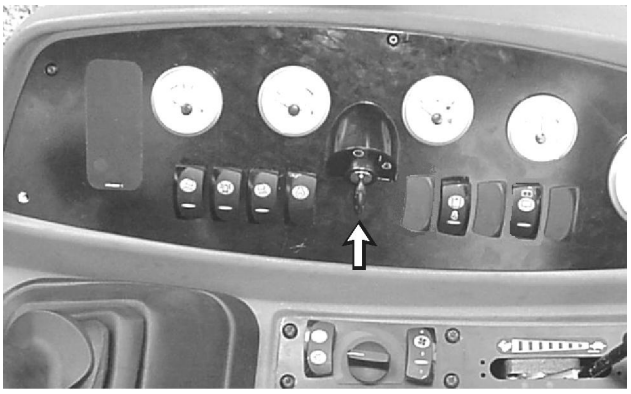

Illustration 197 g00730472

2. Turn the engine start switch key to the ON position and crank for five seconds.

3. Leave the key in the ON position.

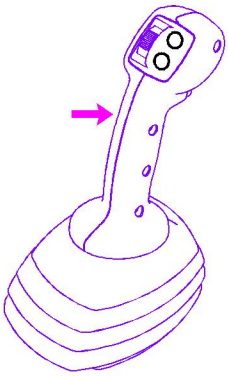

Illustration 198 g01031770

4. Slowly tap the joystick control for the loader into the FLOAT position in order to lower the bucket to the ground.

Manual Lowering of the Loader Bucket

Perform these steps if your machine is equipped with a pilot operated joystick for the loader.

If there is no electrical power or the accumulator is not charged, the loader cannot be lowered with the joystick control. The loader must be lowered manually.

The loader control valve is located on the right side of the machine under the cab floor.

Keep personnel away from the front of the machine.

Illustration 199 g00742336

1. Remove the floorplate and remove the cover for the parking brake in order to gain access to the loader control valve.

2. The bolt that is used to manually lower the loader bucket is located in the packet with this manual. The packet is identified with the part number 205-6388 Bolt.

Note: The bolt is located in the battery box on earlier machines.

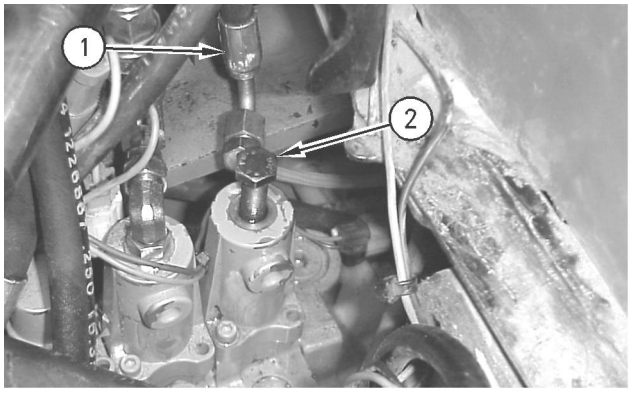

Illustration 200 g00742334

3. Remove the pilot supply line (1).

4. Slowly thread the 205-6388 Bolt (2) in the top of the loader valve. The lift arms will lower to the ground.

5. Make the necessary repairs before you operate the machine.

Lowering a Loader with Lock Valves

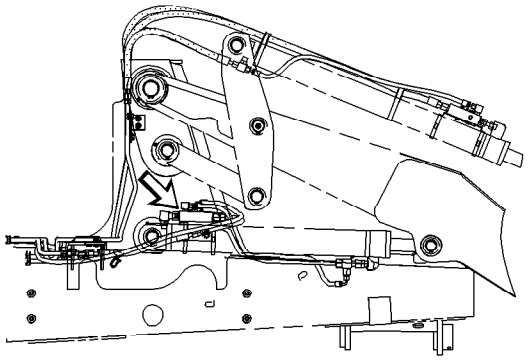

Illustration 201 g00833068

The load control valve (if equipped) for the loader is located on each lift cylinder.

The load control valve for the loader is used to hold the loader in place in case of a hose failure in the lift circuit.

To lower the loader to the ground, perform the following procedure.

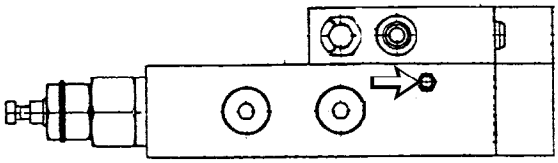

Illustration 202 g00514917

1. Install a 6 mm (0.25 inch) hose onto the purging screw. Route the other end of the hose into a suitable container in order to drain the oil.

2. Loosen the purging screw slightly and allow the oil to drain until the loader lowers to the ground. Tighten the purging screw after the loader is on the ground.

Lowering the Boom

⚠ WARNING

Personal injury or death can result from the boom falling.

Keep personnel away from the rear of the machine when lowering the boom.

Perform the following steps if your machine is equipped with pilot operated joysticks for the backhoe.

If there is a loss of hydraulic power, perform the following procedure to lower the boom to the ground.

Illustration 203 g00832869

1. Place the hydraulic lockout switch in the UNLOCK position.

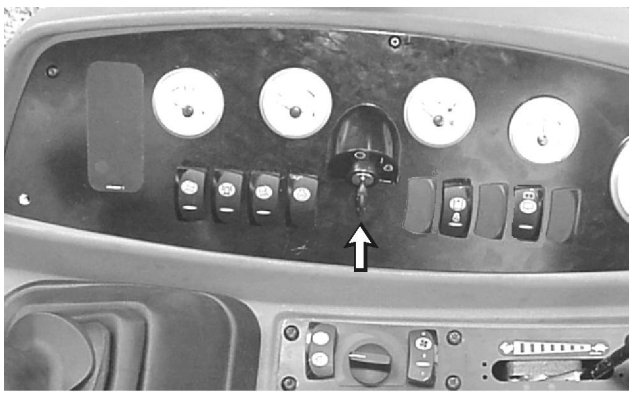

Illustration 204 g00730472

2. Turn the engine start switch key to the ON position and crank for five seconds.

3. Leave the key in the ON position.

4. Slowly tap the joystick control for the boom into the DOWN position in order to lower the boom to the ground.

Manual Lowering of the Boom

If there is not electrical power or the accumulator is not charged, the boom cannot be lowered with the joystick control. The boom must be lowered manually.

The boom control valve is located under the cab floor.

Keep personnel away from the front of the machine.

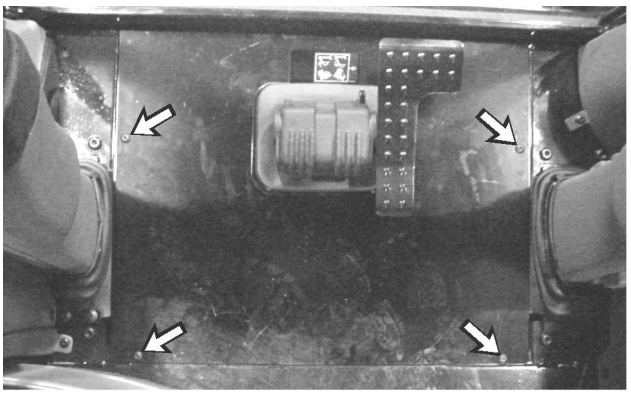

Illustration 205 g00832118

1. Remove the floorplate in order to gain access to the boom control valve.

Note: The foot pedal must be removed in order to remove the floorplate.

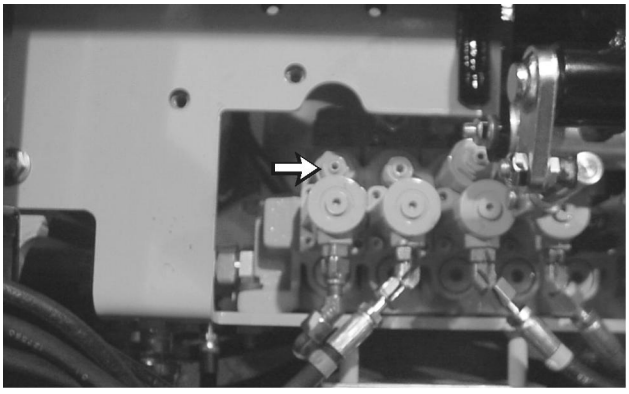

Illustration 206 g00833086

View from the seat

2. Loosen the nut that locks down the stem. Slowly turn the stem of the relief valve in a counterclockwise direction. The boom will lower to the ground.

Note: The boom valve will be the second valve on machines that are equipped with a six bank valve.

3. Slowly turn the stem of the relief valve in a clockwise direction. Rotate the stem until the stem bottoms out in the hole. Tighten the nut in order to lock down the stem. This procedure will change the setting for the relief valve. Contact your Caterpillar dealer for the proper relief valve setting.

4. Make the necessary repairs before you operate the machine.

Lowering a Boom with Lock Valves

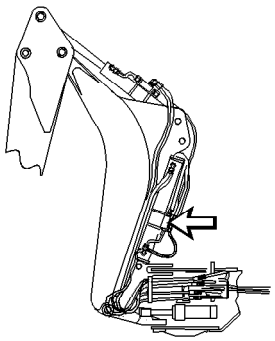

Illustration 207 g00287734

The boom load control valve (if equipped) is located on the boom cylinder.

The boom load control valve is used to hold the boom in place in case of a hose failure in the boom circuit.

To lower the boom to the ground, perform the following procedure.

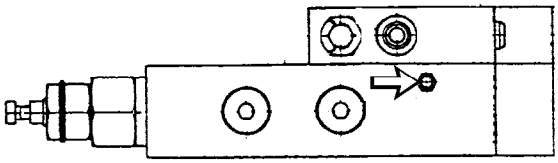

Illustration 208 g00514917

1. Install a 6 mm (0.25 inch) hose onto the purging screw. Route the other end of the hose into a suitable container in order to drain the oil.

2. Loosen the purging screw slightly and allow the oil to drain until the boom lowers to the ground. Tighten the purging screw after the boom is on the ground.

i01361717

Leaving the Machine

SMCS Code: 7000

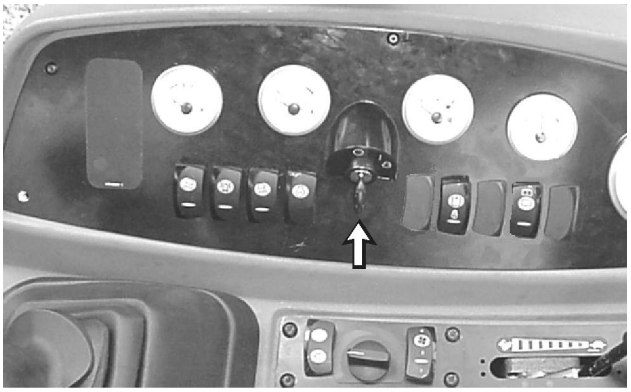

Illustration 209 g00730472

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

2. Move all hydraulic control levers back and forth in order to relieve hydraulic pressure.

3. Move all hydraulic control levers into the HOLD position.

Note: Refer to steps 4 through 8 for pilot controlled machines.

4. Turn the engine start switch key to the OFF position for 4 seconds. Turn the engine start switch key back to the ON position.

5. Place the hydraulic lockout switch into the UNLOCK position.

6. Move all hydraulic control levers back and forth in order to relieve hydraulic pressure.

7. Move all hydraulic control levers into the HOLD position.

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

9. Remove the engine start switch key.

This will prevent unauthorized persons from starting the engine or from turning on the lights.

10. When you exit the machine, close the windows and lock the cab doors, if equipped.

11. Install all vandalism protection locks and all vandalism covers, if equipped.

Illustration 210 g00730507

12. Use the steps and the handholds when you get off the machine. Face the machine and use both hands. Make sure that the steps are clear of debris before you dismount.

13. Ensure that all lights are shut off.

Transportation Information

i01833205

Transport Position

SMCS Code: 6506; 7505

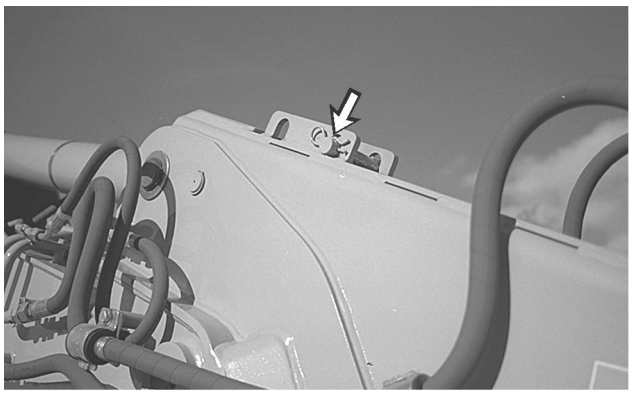

Illustration 211 g00291493

Machines that are equipped with an extendable stick must have the transport pin in place for roading.

Machines that are equipped with an extendable stick must remove the transport pin in order to operate the machine.

Illustration 212 g00732693

Center Pivot

Illustration 213 g00514301

Side Shift

Move the backhoe to the transport position in the following situations:

- You are using the loader.
- You are loading the machine on a truck or on a trailer.
- You are roading the machine.

NOTICE
The bucket may hit the stabilizers oof the machine or the rear of the cab with certain boom and stick combinations. Always check for interference when first operating a new work tool.

Boom Transport Lock – Close the bucket and move in the stick completely. Move the boom upward until the boom is completely retracted.

1. Raise the boom to the full UP position.
2. Raise the boom lock lever in order to engage the boom lock.
3. Move the boom lever to the DOWN position in order to force the boom against the boom lock hook.

Boom Swing Lock Pin – Install the pin when you are roading the machine for long distances or when you haul the machine on a truck or on a trailer.

For machines that are equipped with All Wheel Steer, center the front wheels and rear wheels and place the steering mode switch in the two-wheel steer position before you transport the machine.

Additional locking devices for work tools are required in some countries. Remove locking devices before operations begin.

i01980900

Shipping the Machine

SMCS Code: 1000; 7000; 7500

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance if the machine that is transported is equipped with a ROPS, with a cab, or with a canopy.

Table 70

416D BACKHOE LOADER	
Maximum Weight	9702 kg (21389 lb)
Maximum Length	6890 mm (22.6 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3585 mm (11.8 ft)

Table 71

416D LESS BACKHOE	
Maximum Weight	4900 kg (10800 lb)
Maximum Length	5304 mm (17.4 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	2770 mm (9.0 ft)

Table 72

420D BACKHOE LOADER	
Maximum Weight	9702 kg (21389 lb)
Maximum Length	7260 mm (23.8 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3770 mm (12.4 ft)

Table 73

424D BACKHOE LOADER	
Maximum Weight	9702 kg (21389 lb)
Maximum Length	5761 mm (18.9 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Table 74

428D BACKHOE LOADER	
Maximum Weight	9702 kg (21389 lb)
Maximum Length	5740 mm (18.8 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Table 75

430D BACKHOE LOADER	
Maximum Weight	9800 kg (21605 lb)
Maximum Length	7365 mm (24.2 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Table 76

432D BACKHOE LOADER	
Maximum Weight	9702 kg (21389 lb)
Maximum Length	5740 mm (18.8 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Table 77

442D BACKHOE LOADER	
Maximum Weight	9800 kg (21605 lb)
Maximum Length	5740 mm (18.8 ft)
Width Across Tires	2352 mm (7.7 ft)
Transport Height	3750 mm (12.3 ft)

Before you load the machine, remove ice, snow, or other slippery material from the loading dock and from the truck bed. Remove the slippery material in order to prevent the slipping of the machine. This should also be done in order to prevent a shift while the machine is moving in transit.

NOTICE

Obey all state and local laws governing the weight, width and length of a load.

Make sure the cooling system has proper antifreeze if moving machine to a colder climate.

Observe all regulations governing wide loads.

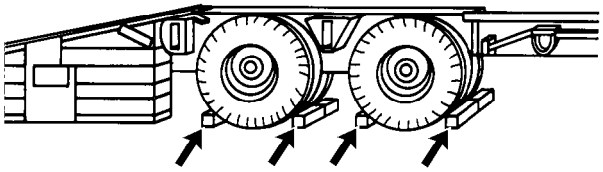

Illustration 214 g00040011

1. Chock the trailer or rail car wheels before you load the machine. (The trailer is shown.)
2. Put the machine in the transport position and load the machine.
3. Move the transmission direction control lever to NEUTRAL. Engage the transmission neutral lock.
4. Engage the parking brake.
5. Turn the engine start switch key to OFF in order to stop the engine. Remove the engine start switch key.
6. Place the boom swing lock pin in the LOCKED position.
7. Engage the boom lock switch (if equipped) in order to prevent the boom from moving.
8. Move all of the hydraulic control levers in order to relieve any trapped pressure.
9. Lock the doors and the access covers and attach any vandalism protection.

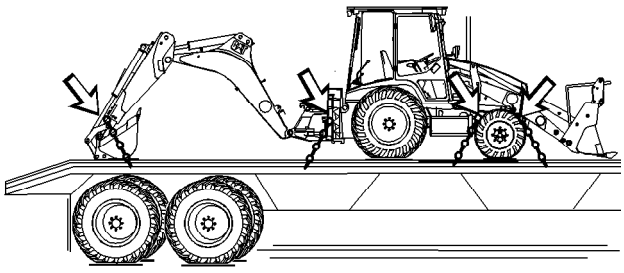

Illustration 215 g00741096
Center Pivot

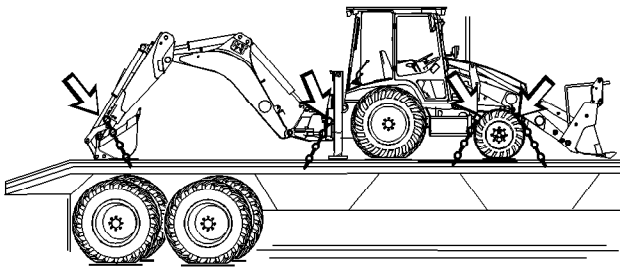

Illustration 216 g00513047
Sideshift

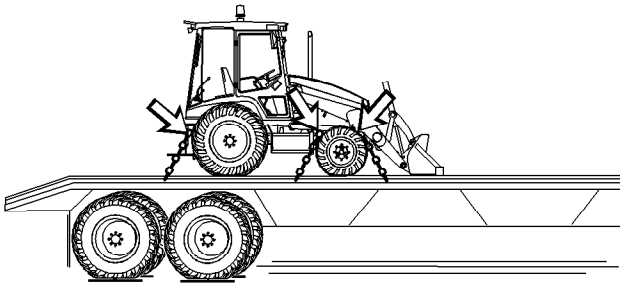

Illustration 217 g00851387
Less Backhoe

10. Release the boom lock lever and lower the backhoe bucket to the floor of the trailer or railcar. Secure the machine with tie-downs when you are transporting the machine on a rail car or on the tractor-trailer. Secure the bucket to the floor of the trailer or railcar in order to prevent the bucket from moving.
11. Cover the exhaust opening. The turbocharger (if equipped) should not rotate when the engine is not operating. Damage to the turbocharger can result.

i00611595

Roading the Machine

SMCS Code: 7000

Before you road a machine, consult your tire dealer for recommended tire pressures and for speed limitations.

Limitations for TON-kilometers per hour (TON-miles 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 stop for 30 minutes after every hour.

Inflate the tires to the correct air pressure.

Use a self-attaching inflation chuck and stand behind the tire tread during the inflation. Refer to Operation and Maintenance Manual, “Tire Inflation - Check”.

Perform a Walk-Around Inspection and measure the fluid levels in the various compartments.

Check with the proper officials in order to obtain the required licenses and other similar items.

Travel at a moderate speed. Observe all speed limitations when you road the machine.

Place the machine in the transport position before you road the machine.

i01833363

Lifting and Tying Down the Machine

SMCS Code: 7000; 7500

NOTICE
Improper lifting or tie-downs can allow the load to shift and cause injury or damage. Install the steering frame lock link before lifting.

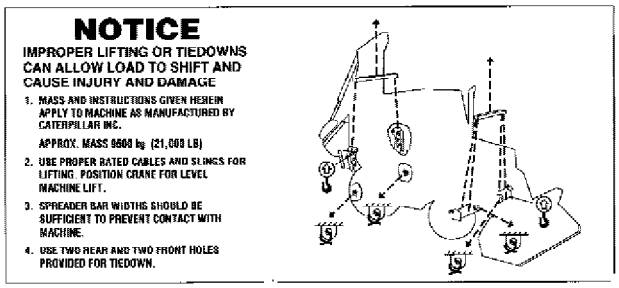

Illustration 218 g00936707

Proper lifting points are marked on the machine by this decal.

Proper tie-down points are marked on the machine by this decal.

Reference: Refer to Operation and Maintenance Manual, “Specifications” for the dimensions of the machine.

Note: Weights may vary with different work tools.

1. For lifting objects, use properly rated cables and properly rated slings. Position the crane for a level machine lift.
2. Spreader bar widths should be sufficient for preventing contact with the machine.
3. Two rear holes and two front holes are provided for tie-downs. Use these holes.

Install the tie-downs at several locations. Install the tie-downs for the backhoe and for the bucket. Place blocks under the front wheels and under the rear wheels.

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.

Towing Information

i01980969

Towing the Machine

SMCS Code: 7000

⚠ WARNING

Personal injury or death could result when towing a disabled machine incorrectly.

Block the machine to prevent movement before releasing the brakes. The machine can roll free if it is not blocked.

Follow the recommendations below, to properly perform the towing procedure.

Follow the recommendations that are listed below in order to properly perform the towing procedure.

This machine is equipped with hydraulically applied wet disc brakes.

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 emergencies. Always haul the machine if long distance moving is required.

Shielding must be provided on both machines. This will protect the operator if the tow line or the tow bar breaks.

Do not allow an operator to be on the machine that is being towed unless the operator can control the steering and/or the braking.

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 strength of the towing line or of the tow bar should be at least 150 percent of the gross weight of the towing machine. This is true for a disabled machine that is stuck in the mud and for towing on a grade.

Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

Quick machine movement could overload the tow line or the tow bar. This could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.

Normally, the towing machine should be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade that is involved and for the distance that is involved.

You must provide sufficient control and sufficient braking when you are moving a disabled machine downhill. This may require a larger towing machine or additional machines that are connected to the rear. This will prevent the machine from rolling away out of control.

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. Maximum towing machine capacity is required on inclines or on surfaces in poor condition.

Attach the towing device and the machine before you release the brakes. If equipped, disengage the front wheel drive.

Consult your Caterpillar dealer for towing a disabled machine.

Running Engine

If the engine is running, the machine can be towed for a short distance under certain conditions. The power train and the steering system must be operable. **Tow the machine for a short distance only.** For example, pull the machine out of mud or pull the machine to the side of the road.

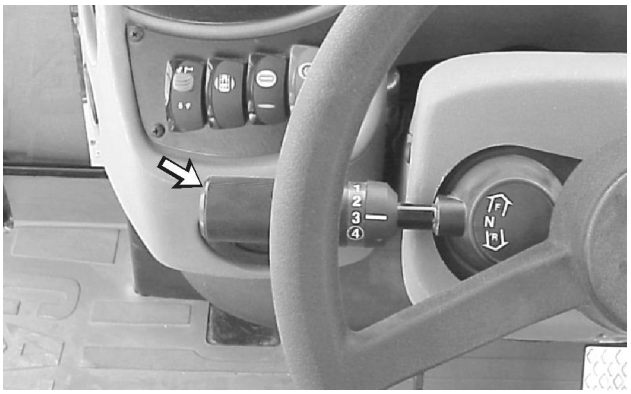

Illustration 219 g00726741

1. Move the transmission control lever to the NEUTRAL position.
2. Engage the transmission neutral lock.
3. Raise the work tools off the ground.
4. Release the parking brake in order to allow the machine to move.

The Engine Stopped

Perform the following steps before you tow the machine with a stopped engine.

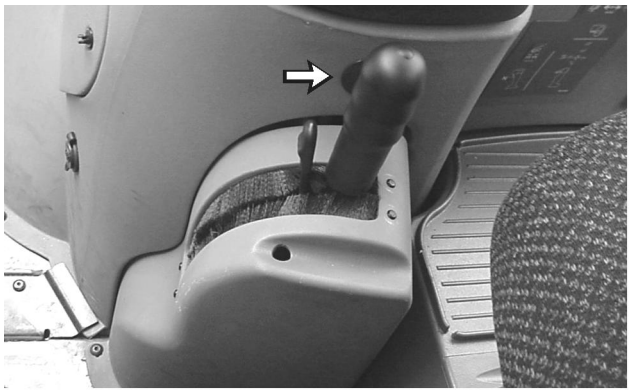

Illustration 220 g00731039

1. Engage the parking brake.

2. Move the transmission control levers to the NEUTRAL position.

3. Engage the transmission neutral lock.

4. Raise all of the work tools off the ground. If necessary, use a hoist in order to lift the work tools. Lift the work tools while you move the control levers to the RAISE position.

Note: The work tools must be blocked up in the raised position. Release the levers after you raise the work tools and after you block up the work tools.

5. Remove the universal joint before the machine is moved. Refer to the Service Manual for the correct procedure.

6. Release the parking brake in order to allow the machine to move.

⚠ WARNING

Be sure all necessary repairs and adjustments have been made before a machine that has been towed to a service area is put back into operation.

Towing from the Front

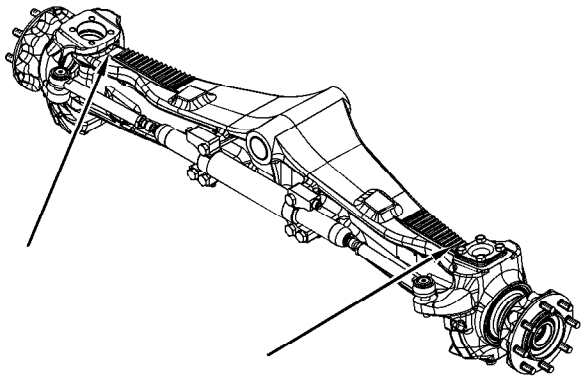

Illustration 221 g01032142

Wrap the tow strap around each side of the front axle just inside the kingpins.

Note: Do not allow the tow strap to contact the steering linkages.

Towing from the Rear

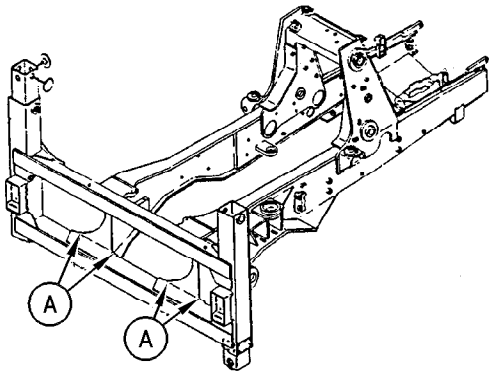

Illustration 222 g00287725

Side Shift

Wrap the tow strap around tow points (A).

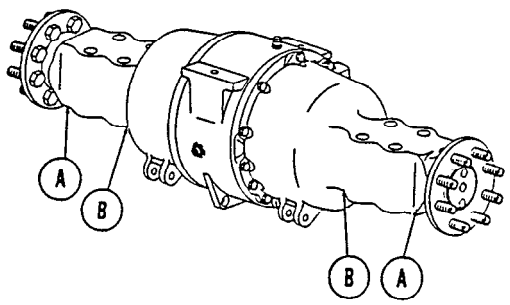

Illustration 223 g00107025

Center Pivot

Wrap the tow strap next to the mounting area. Use either tow points (A) or tow points (B).

Engine Starting (Alternate Methods)

i01872452

Engine Starting with Jump Start Cables

SMCS Code: 1000; 1401; 7000

⚠ WARNING

Failure to properly service the batteries may cause personal injury.

Prevent sparks near the batteries. They could cause vapors to explode. Do not allow the jump start cable ends to contact each other or the machine.

Do not smoke when checking battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear eye protection when starting a machine with jump start cables.

Improper jump start procedures can cause an explosion resulting in personal injury.

Always connect the battery positive (+) to battery positive (+) and the battery negative (−) to battery negative (−).

Jump start only with an energy source with the same voltage as the stalled machine.

Turn off all lights and accessories on the stalled machine. Otherwise, they will operate when the energy source is connected.

NOTICE
When starting from another machine, make sure that the machines do not touch. This could prevent damage to engine bearings and electrical circuits.

Severely discharged maintenance free batteries do not fully recharge from the alternator after jump starting. The batteries must be charged to proper voltage with a battery charger. Many batteries thought to be unusable are still rechargeable.

This machine has a 12 volt starting system. Use only the same voltage for jump starting. Use of a welder or higher voltage damages the electrical system.

Refer to Special Instruction, Battery Test Procedure, SEHS7633, available from your Caterpillar dealer, for complete testing and charging information.

Use of Jump Start Cables

When the auxiliary starting receptacles are not available, use the following procedure.

1. Determine the failure of the engine to start.
2. Place the transmission direction control lever in the NEUTRAL position on the stalled machine. Engage the parking brake. Lower all attachments to the ground. Move all controls to the HOLD position.
3. On a stalled machine, turn the start switch key to the OFF position. Turn off the accessories.
4. Move the machines together in order for the cables to reach. **DO NOT ALLOW THE MACHINES TO CONTACT.**
5. Stop the engine on the machine that is the electrical source. When you use an auxiliary power source, turn off the charging system.
6. Check the battery caps for correct placement and for correct tightness. Make these checks on both machines. Make sure that the batteries in the stalled machine are not frozen. Check the batteries for low electrolyte.
7. Connect the positive jump start cable to the positive cable terminal of the discharged battery.

   Do not allow positive cable clamps to contact any metal except for battery terminals.
8. Connect the positive jump start cable to the positive terminal of the electrical source. Use the procedure from Step 7 in order to determine the correct terminal.
9. Connect one end of the negative jump start cable to the negative terminal of the electrical source.
10. Make the final connection. Connect the negative cable to the frame of the stalled machine. Make this connection away from the battery, the fuel, the hydraulic lines, or moving parts.
11. Start the engine on the machine that is the electrical source. Also, you can energize the charging system on the auxiliary power source.
12. Allow the electrical source to charge the batteries for two minutes.
13. Attempt to start the stalled engine. Refer to Operation and Maintenance Manual, “Engine Starting”.
14. Immediately after the stalled engine starts, disconnect the jump start cables in reverse order.

15. 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

i00095080

Tire Inflation with Air

SMCS Code: 4203

⚠ WARNING

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire.

Proper inflation equipment, and training in using the equipment, are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

Before inflating tire, install on the machine or put tire in restraining device.

NOTICE
Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Consult your Caterpillar dealer for operating pressures.

i01386118

Tire Installation

SMCS Code: 4203

An experienced mechanic should service the tires and the rims.

This mechanic should inflate the tires.

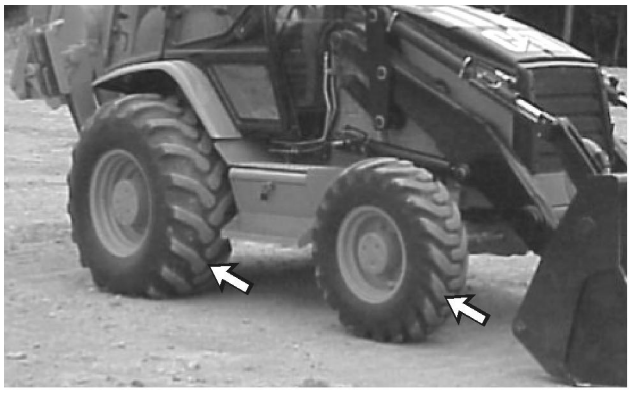

Illustration 224 g00730668

Install the tire on the machine in the direction that is shown above.

i01980142

Tire Shipping Pressure

SMCS Code: 4203; 7500

The tire inflation pressures that are shown in the following table are cold inflation pressures for tires on Caterpillar machines and shipping pressures for tires on Caterpillar machines.

Table 78

FRONT TIRE SHIPPING PRESSURES		
Size	**Ply Rating or Strength Index**	**Shipping Pressure**
11L X 16	12	440 kPa (64 psi)
12.5/80-18	10	310 kPa (45 psi)
340/80R18 IT530	Radial A8 136	300 kPa (44 psi)
340/80R18 IT510	Radial A8 136	300 kPa (44 psi)
335/80R18 XM27	Radial A8 136	300 kPa (44 psi)

Table 79

REAR TIRE SHIPPING PRESSURES		
Size	**Ply Rating or Strength Index**	**Shipping Pressure**
16.9 X 28 R4 ISGT	12	207 kPa (30 psi)
16.9 X 28 R-4	10	207 kPa (30 psi)
16.9/15-28	12	207 kPa (30 psi)
18.4/15 X 26	12	207 kPa (30 psi)
16.9 - 28	12	207 kPa (30 psi)
19.5L - 24	10	207 kPa (30 psi)
19.5LR24	Radial	207 kPa (30 psi)
18.4/15R26	Radial	241 kPa (35 psi)
16.9R28 IT510	Radial	207 kPa (30 psi)
16.9R28 XM27	Radial	241 kPa (35 psi)

The operating inflation pressure is based on the following conditions.

- The weight and the distribution of weight on a ready-to-work machine
- The operational payload
- Average operating conditions.

Tire inflation pressures for each application may vary. These tire inflation pressures should be obtained from your tire supplier.

Contact your tire supplier if your machine is experiencing tire slippage. Tire wear may cause tire slippage.

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

i02738214

Lubricant Viscosities

SMCS Code: 1000; 7000

Note: The footnotes are an integral part of the "Lubricant Viscosities for Ambient Temperatures" tables. Read ALL footnotes!

Table 80

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Classification**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
Engine Crankcase(1)(2)	**Cat DEO Multigrade Cat DEO SYN Cat Arctic DEO SYN(3) Cat ECF-1(4) API CG-4 Multigrade(5)**	SAE0W-20	-40	10	-40	50
		SAE0W-30	-40	30	-40	86
		SAE 0W-40	−40	40	−40	104
		SAE5W-30	-30	30	-22	86
		SAE5W-40	-30	50	-22	104
		SAE10W-30	−18	40	0	104
		SAE 10W-40	−18	50	0	122
		SAE15W-40	−9.5	50	15	122
Standard Transmission and Power Shift Transmission	**Cat TDTO Cat TDTO-TMS Cat Arctic TDTO commercial TO-4**	SAE 0W-20(6)	-40	10	-40	50
		SAE 0W-30(7)	-40	20	-40	68
		SAE5W-30	-30	20	-22	68
		SAE10W	All temperature Ranges(8)			
		SAE 30	0	35	32	95
		SAE 50	10	50	50	122
		Cat TDTO-TMS (9)	-20	43	-4	110
Hydraulic System	**Cat HYDO Cat DEO Cat MTO Cat TDTO Cat TDTO-TMS Cat DEO SYN Cat Arctic DEO SYN Cat Arctic TDTO Cat ECF-1 Cat BIO HYDO (HEES) API CG-4 API CF commercial TO-4 commercial BF-1(10)**	SAE0W-20	-40	40	-40	104
		SAE0W-30	-40	40	-40	104
		SAE0W-40	-40	40	-40	104
		SAE5W-30	-30	40	-22	104
		SAE5W-40	-30	40	-22	104
		SAE 10W	-20	40	-4	104
		SAE 30	10	50	50	122
		SAE10W-30	-20	40	-4	104
		SAE15W-40	-15	50	5	122
		Cat MTO	−25	40	−13	104

(continued)

(Table 80, contd)

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	**Oil Type and Classification**	**Oil Viscosities**	**°C**		**°F**	
			Min	**Max**	**Min**	**Max**
		Cat BIO HYDO HEES[10]	-25	43	-13	110
		Cat TDTO-TMS[9]	−20	50	−4	122
Front All Wheel Drive Axle Front Final Drives	**Cat TDTO Cat TDTO-TMS Cat Arctic TDTO commercial TO-4**	SAE0W-20	-40	0	-40	32
		SAE0W-30	-40	10	-40	50
		SAE5W-30	-30	10	-22	50
		SAE10W	-30	0	-22	32
		SAE 30	All Temperature Ranges[8]			
		SAE 50	-15	50	5	122
		Cat TDTO-TMS[9]	−30	25	-22	77
Rear Final Drive for All Wheel Steer (AWS) Rear Axle for AWS[11]	**Cat GO (Gear Oil) Cat SYNTHETIC GO commercial API GL-5 gear oil**	SAE75W-90	-30	40	-22	104
		SAE 75W-140	-30	45	-22	113
		SAE80W-90	-20	40	-4	104
		SAE85W-140	-10	50	14	122
		SAE 90	0	40	32	104
Rear Axle for Non All Wheel Steer[12]	**Cat TDTO**	SAE 30	-25	40	-13	104
Brake Reservoir	**Cat HYDO**	SAE10W	-20	40	-4	104
Grease Points	**Cat MPGM[13]**					
Cooling System	**Extended Life Coolant (ELC)**					

(1) Supplemental heat is recommended for cold-soaked starts below the minimum ambient temperature. Supplemental heat may be required for cold-soaked starts that are above the minimum temperature that is stated, depending on the parasitic load and other factors. Cold-soaked starts occur when the engine has not been operated for a period of time, allowing the oil to become more viscous due to cooler ambient temperatures.

(2) API CF oils are not recommended for Caterpillar 3500 Series and smaller Direct Injection (DI) diesel engines. API CF-4 oils are not recommended for Caterpillar machine diesel engines.

(3) Cat Arctic DEO SYN is an SAE 0W-30 viscosity grade oil.

(4) API CI-4, API CI-4 PLUS, and API CH-4 oils are acceptable if the requirements of Caterpillar's ECF-1 (Engine Crankcase Fluid specification - 1) are met. API CI-4, API CI-4 PLUS, and API CH-4 oils that have not met the requirements of Caterpillar's ECF-1 specification may cause reduced engine life.

(5) API CG-4 oils are acceptable for use in all Caterpillar machine diesel engines. When API CG-4 oils are used, the oil change interval should not exceed 250 hours. API CG-4 oils that also meet API CI-4, API CI-4 PLUS, or API CH-4 must also meet the requirements of the Caterpillar ECF-1 specification.

(6) First Choice: Cat Arctic TDTO - SAE 0W-20. Second Choice: Oils of full synthetic base stock that do not have viscosity index improvers and do meet the performance requirements of the TO-4 specification for the SAE 30 viscosity grade. Typical lubricant viscosity grades are SAE 0W-20, SAE 0W-30, and SAE 5W-30. Third Choice: Oils that contain a TO-4 additive package and a lubricant viscosity grade of SAE 0W-20, SAE 0W-30, or SAE 5W-30.

(7) First Choice: Oils of full synthetic base stock that do not have viscosity index improvers and do meet the performance requirements of the TO-4 specification for the SAE 30 viscosity grade. Typical viscosity grades are SAE 0W-20, SAE 0W-30, and SAE 5W-30. Second Choice: Oils with a TO-4 type additive package and a lubricant viscosity grade of SAE 0W-20, SAE 0W-30, or SAE 5W-30.

(8) Recommendations in Special Publication, SEBU6250 are also acceptable.

(9) Cat TDTO-TMS (Transmission Multi-Season) (synthetic blend that exceeds the TO-4M multigrade specification requirements).

(10) Commercial biodegradable hydraulic oil must meet the Caterpillar BF-1 specification. The listed ambient temperature range is for the current Cat BIO HYDO (HEES), not for commercial BF-1 oil.

(11) Add 0.55 L (0.58 qt) of 1U-9891 Hydraulic Oil Additive to the rear axle of a machine with All Wheel Steer.

(12) While installing the new 230-4017 Brake Discs , fill the rear axle with TDTO SAE 30 oil. Also, add 150 mL (5.1 oz) of 197-0017 Axle and Brake Oil Additive to the rear axle.The TDTO SAE 30 oil is new for the axle. The TDTO SAE 30 oil should replace the MTO oil that was previously used. The TDTO SAE 30 oil must be used in all axles that have the 230-4017 Brake Discs . If the former 133-7234 Friction Disc is used in an axle, you may use the TDTO SAE 30 oil with 1.0 L (1.0567 qt) of the 197-0017 Axle and Brake Oil Additive .

(13) If MPGM is not available, use multipurpose type grease which contains three to five percent molybdenum.

Recommendation for the Fuel System

Note: These recommendations are subject to change without prior notice. Contact your local Caterpillar dealer for the most up to date fluids recommendations.

Recommendations for Diesel Fuel

Caterpillar recommends the use of a clean, quality diesel fuel.

Note: Caterpillar recommends the filtration of fuel through a fuel filter with a rating of five microns absolute or less.

Fuel Lubricity

The lubricity of a fuel is a concern with low sulfur fuel. To determine the lubricity of the fuel, use ASTM D6079 High Frequency Reciprocating Rig (HFRR) test. The maximum allowable wear scar diameter using the ASTM D6079 test method is 520 mm at 60ºC (140ºF). If the lubricity of a fuel does not meet the minimum requirements, consult your fuel supplier. Do not treat the fuel without consulting the fuel supplier. Some additives are not compatible. These additives can cause problems in the fuel system.

Note: For further information, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

i01980517

Capacities (Refill)

SMCS Code: 1000; 7000; 7560

Table 81

APPROXIMATE REFILL CAPACITIES			
Compartment or System	**Liters**	**US Gallons**	**Imperial Gallons**
Engine Crankcase	7.2	1.8	1.5
Hydraulic Tank	49	12.9	10.8
Transmission for Two-Wheel Drive	19	5.0	4.2
Transmission for All Wheel Drive	20.5	5.4	4.5
Autoshift Transmission	20	5.3	4.4
Cooling System with Heater	25.5	6.7	5.6

(continued)

(Table 81, contd)

Cooling System without Heater	23.6	6.2	5.2
Fuel Tank	128	33.8	28.2
Rear Axle(1)	24.0	6.2	5.3
Rear Axle (All Wheel Steer)(2)	8.3	2.2	1.8
Final Drive for the Rear Axle (All Wheel Steer) (each side)	1.6	0.4	0.4
Front Powered Axle	11	2.9	2.4
Final Drive for the Front Powered Axle (Each Side)	0.7	0.2	0.2
Brake Reservoir	0.7	0.2	0.2

(1) Add one quart of 197-0017 Axle and Brake Oil Additive to the rear axle. Do not add to the final drives.
(2) Add 0.45 L (0.48 qt) of 1U-9891 Hydraulic Oil Additive to the rear axle of a machine with All Wheel Steer.

Note: When you work on extreme slopes, consult your Caterpillar dealer for the correct fluid levels.

i07445339

S·O·S Information

SMCS Code: 1000; 3080; 4070; 4250; 4300; 5050; 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·O·S Services is dependent on timely submission of the sample to the laboratory at recommended intervals.

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

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

Maintenance Support

i01821998

Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

Proper welding procedures are necessary in order to avoid damage to the electronic controls and to the bearings. The following steps should be followed in order to weld on a machine or an engine with electronic controls.

1. Turn off the engine.

2. Turn the battery disconnect switch to the OFF position. If there is no battery disconnect switch, remove the negative battery cable at the battery.

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

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

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

4. Protect any wiring harnesses from the debris which is created from welding. Protect any wiring harnesses from the splatter which is created from welding.

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

i08343461

Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

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

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended to 3000 hours. S·O·S services may extend the oil change even longer. Consult your Cat dealer for details.

When Required

Every 10 Service Hours or Daily

Every 50 Service Hours or Weekly

Every 250 Service Hours or Monthly

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

Every 500 Service Hours or 3 Months

Every 1000 Service Hours

Every 1000 Service Hours or 6 Months

Every 2000 Service Hours

Every 2000 Service Hours or 1 Year

Every Year

Every 3000 Service Hours or 2 Years

Every 3 Years After Date of Installation or Every 5 Years After Date of Manufacture

Every 3000 Service Hours or 3 Years

Every 6000 Service Hours or 6 Years

i01981945

Axle Breathers - Clean/ Replace

SMCS Code: 3278-510-BRE; 3278-070-BRE

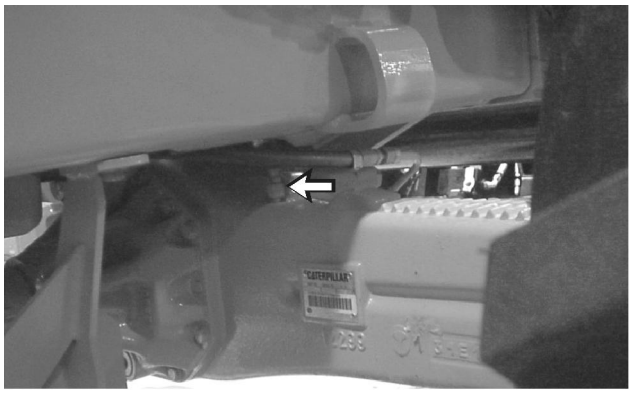

Illustration 225 g00833319

The front axle breather is located on the top right side of the differential housing.

1. Clean the area around the breathers. Remove the breather from the front axle.

Note: Do not turn the adapter when you remove the breather.

2. Wash the breather in clean nonflammable solvent. Wipe the breather dry and check the breather for damage.

3. Install the clean breather back into the axle. Replace the breather if the breather is damaged.

Note: If the adapter is turned make sure that the slot in the adapter is parallel to the axle housing.

i01437649

Axle Universal Joint (Rear) - Lubricate
(All Wheel Steer)

SMCS Code: 3251

Illustration 226 g00753030

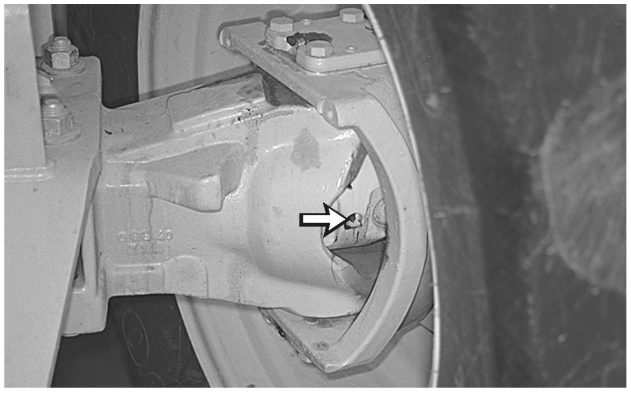

Illustration 227 g00287244

Apply lubricant to the grease fittings for the universal joints of each drive shaft to the final drives. There are two grease fittings for each universal joint.

i01877901

Backhoe Boom, Stick, Bucket, and Cylinder Bearings - Lubricate

SMCS Code: 6501; 6502; 6503; 6510; 6511; 6512; 6513; 6533

Illustration 228 g00723263

Position the backhoe into the service position that is shown above.

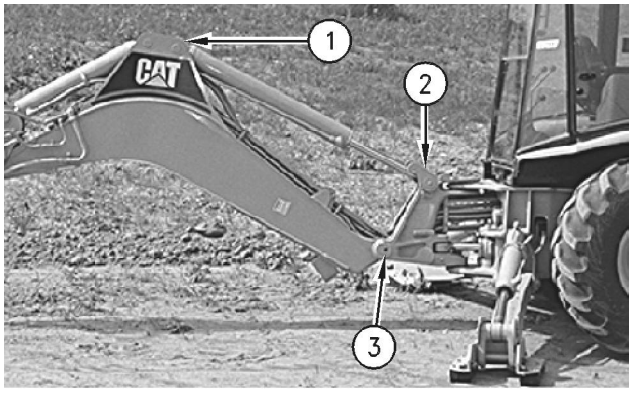

Illustration 229 g00287247

Apply lubricant to the grease fitting (1) for the head end of the boom cylinder. Apply lubricant to the grease fitting (2) for the rod end of the boom cylinder.

Apply lubricant to the grease fitting (3) for the boom pivot. There is one grease fitting on each side of the machine.

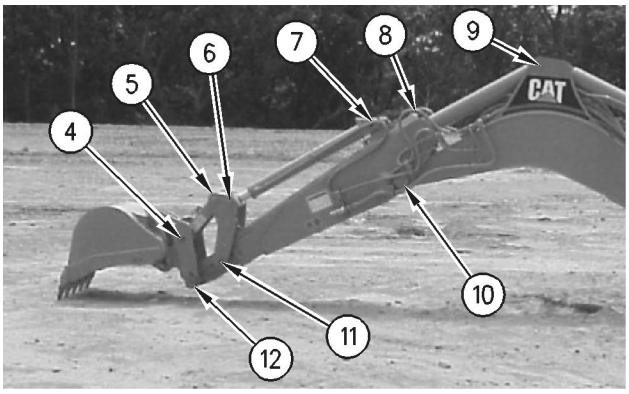

Illustration 230 g00723265

Apply lubricant to the grease fitting (9) for the head end of the stick cylinder. Apply lubricant to the grease fitting (8) for the rod end of the stick cylinder.

Apply lubricant to the grease fitting (10) for the pivot pin for the stick.

Apply lubricant to the grease fitting (7) for the head end of the bucket cylinder. Apply lubricant to the grease fitting (6) for the rod end of the bucket cylinder.

Apply lubricant to the grease fitting (11) for the pivot pin. There is one grease fitting on each side of the machine.

Apply lubricant to the grease fitting (4) for the bucket pivot pin.

Apply lubricant to the grease fitting (5) for the link.

Apply lubricant to the grease fitting (12) for the pivot pin.

There is a total of thirteen grease fittings.

i00080741

Backup Alarm - Test

SMCS Code: 7406

Turn the engine start switch key to ON in order to perform the test.

Apply the service brake. Move the transmission direction control lever to REVERSE position.

The backup alarm should immediately sound. The backup alarm will continue to sound until the transmission direction control lever is moved to the NEUTRAL position or to the FORWARD position.

i01833495

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401

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

2. Disconnect the negative battery cable from the frame.

Note: Do not allow the disconnected battery cable to contact the frame of the machine.

3. Disconnect the negative battery cable at the battery.

4. Inspect the battery terminals and inspect the battery cables. Keep the terminals clean and keep the terminals coated with petroleum jelly.

5. Perform the necessary repairs. Replace the cable or the battery, as needed.

6. Connect the negative battery cable at the battery.

7. Connect the battery cable to the frame of the machine.

8. Install the engine start switch key.

i01981993

Belts - Inspect/Adjust/Replace

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

If new belts are installed, check belt adjustment after 30 minutes of operation. For multiple belt drive applications, always replace the belts in matched sets. Replacing only one belt of a matched set will cause the new belt to carry more load because the older belts are stretched. The additional load on the new belt could cause the new belt to break.

1. Empty the bucket. Remove the pin that secures the brace for the loader lift arm to the left loader lift arm. Raise the loader arm to the maximum height.

2. Position the brace for the loader lift arm over the left lift cylinder rod with the flat end against the cylinder end.

3. Push the pin through the holes of the brace for the loader lift arm and install the cotter pin.

4. Slowly lower the loader arms until the brace for the loader lift arm contacts the top of the lift cylinder and the bosses on the loader arm.

5. Stop the engine in order to inspect the belts.

Illustration 231 g00731568

6. Remove the engine access panel on the left side of the machine.

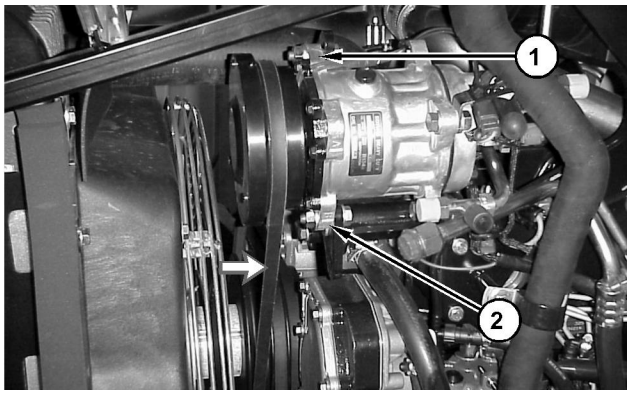

Illustration 232 g01029695

7. Inspect the condition of the air conditioner belt and the adjustment of the air conditioner belt. The air conditioner belt should deflect 10 mm (0.38 inch) under 110 N (25 lb) of force.

8. Loosen the adjusting locknut (1). Loosen the compressor bracket mounting bolt (2).

9. Move the compressor until the correct belt tension is reached.

10. Tighten the adjusting locknut (1). Tighten the compressor bracket mounting bolt (2).

11. Recheck the belt deflection. If the amount of deflection is incorrect, repeat Step 8 to Step 10.

12. Install the engine access panel.

Illustration 233 g00731569

13. Remove the engine access panel on the right side of the machine.

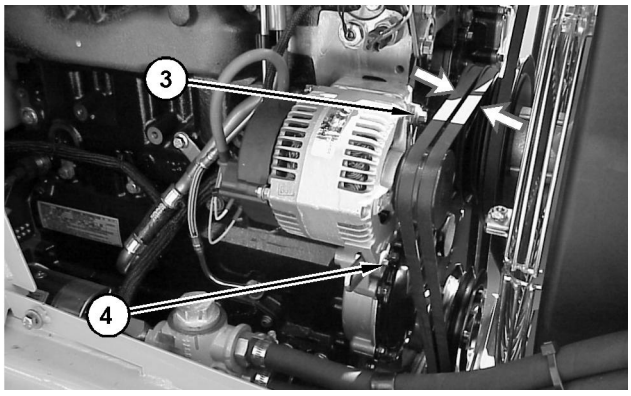

Illustration 234 g01029698

14. Inspect the condition of the alternator belts and the adjustment of the alternator belts. The alternator belts should deflect 10 mm (0.38 inch) under 110 N (25 lb) of force.

15. Loosen the mounting bolt (3). Loosen the adjusting locknut (4).

16. Move the alternator until the correct tension is reached.

17. Tighten the adjusting locknut (4). Tighten the mounting bolt (3).

18. Recheck the belt deflection. If the amount of deflection is incorrect, repeat Step 15 to Step 17.

19. Install the engine access panel.

20. Start the engine. Raise the loader arms to the maximum height.

21. Remove the pin and replace the brace for the loader lift arm to the stored position on the loader lift arm.

22. Lower the bucket to the ground.

i01991706

Brake Reservoir Oil Level - Check

SMCS Code: 4291-535

Open the engine access door on the top of the machine.

Illustration 235 g01031571

Maintain the oil level between the “MIN” mark and “MAX” mark on the brake reservoir. Add oil, if necessary.

i02291147

Braking System - Test

SMCS Code: 4251; 4267; 7000

Service Brake Holding Ability Test

Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

The following tests are used to determine if the service brake is 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.

1. Start the engine. Raise the bucket slightly.

2. Apply the service brake. Release the parking brake.

3. If the machine is equipped with the standard transmission, move the transmission speed shift lever to THIRD gear. Move the transmission direction control lever to FORWARD, to NEUTRAL, and back to FORWARD. If the machine is equipped with a power shift transmission move the transmission control lever to FOURTH SPEED FORWARD, to NEUTRAL, and back to FOURTH SPEED FORWARD. This is done in order to override the transmission neutralizer for this test.

Note: Place machines that are equipped with all wheel drive into two-wheel drive mode.

4. Gradually increase the engine speed to high idle. The machine should not move.

WARNING

If the machine begins to move, reduce the engine speed immediately and engage the parking brake.

5. Reduce the engine speed to low idle. Move the transmission to NEUTRAL. Engage the parking brake. Lower the bucket to the ground. 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

Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.

Test the brakes on a dry, level surface.

Fasten the seat belt before you test the brakes.

The following tests are used to determine if the parking brake is 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.

1. Start the engine. Raise the bucket slightly.

2. Engage the parking brake.

3. If the machine is equipped with the standard transmission, move the transmission speed shift lever to THIRD gear. Move the transmission direction control lever to FORWARD, to NEUTRAL, and back to FORWARD. If the machine is equipped with a power shift transmission move the transmission control lever to FOURTH SPEED FORWARD, to NEUTRAL, and back to FOURTH SPEED FORWARD. This is done in order to override the transmission neutralizer for this test.

Note: Place machines that are equipped with all wheel drive into two-wheel drive mode.

Note: The parking brake indicator light should come on and the parking brake alarm should sound.

4. Gradually increase the engine speed to high idle. The machine should not move.

WARNING

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

5. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the bucket to the ground. 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 parking brakes before returning the machine to operation.

i01920076

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Raise the bucket. Place a block under the bucket.

2. Lower the bucket to the blocking.

Do not block up the bucket too high. Block up the bucket so that the bucket is high enough to remove the cutting edges and the end bits.

3. Remove the bolts. Remove the cutting edge and the end bits.

4. Clean the contact surfaces.

5. Use the opposite side of the cutting edge, if this side is not worn.

6. Install a new cutting edge, if both edges are worn.

7. Install the bolts. Tighten the bolts to the specified torque.

8. Raise the bucket. Remove the blocks.

9. Lower the bucket to the ground.

10. After a few hours of operation, check the bolts for proper torque.

i03657242

Bucket Tips - Inspect/Replace

SMCS Code: 6805

⚠ WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Bucket Tips

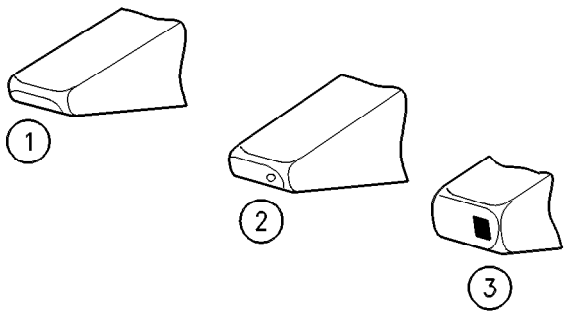

Illustration 236 g00101352

(1) Usable
(2) Replace the tip.
(3) Replace the tip.

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

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

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

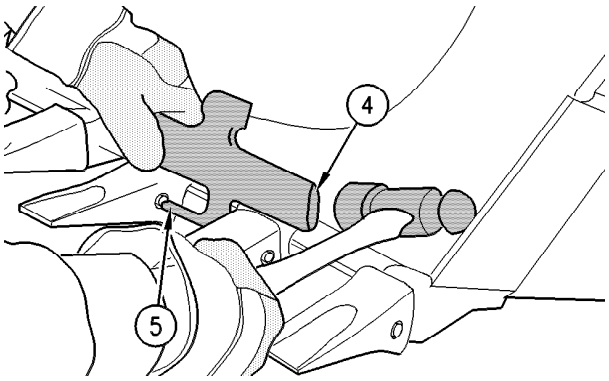

Illustration 237 g00590670

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

a. Place the Pin-Master on the bucket tooth.

b. Align extractor (5) with the pin.

c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

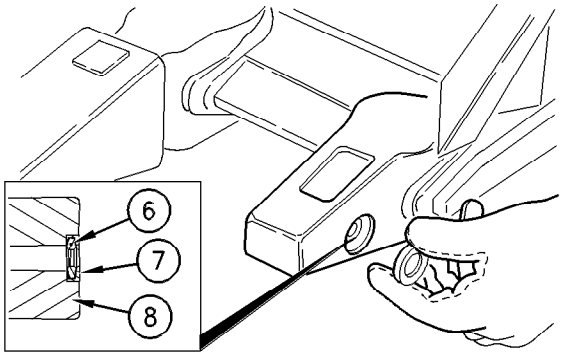

Illustration 238 g00590819

(6) Retainer
(7) Retaining washer
(8) Adapter

2. Clean the adapter and the pin.

3. Fit retainer (6) into retaining washer (7). Install this assembly into the groove that is in the side of adapter (8).

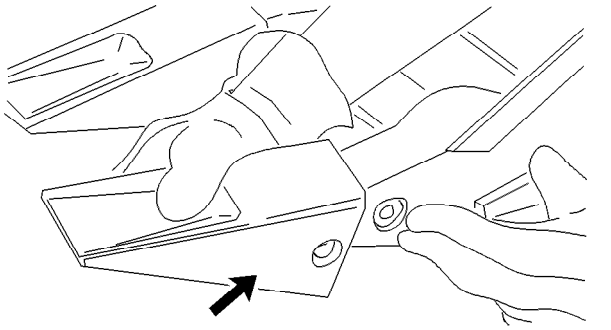

Illustration 239 g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

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

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

Note: To correctly install the pin into the retainer, the pin must be driven in from the right side of the tooth. Improper installation of the pin can result in the loss of the bucket tip.

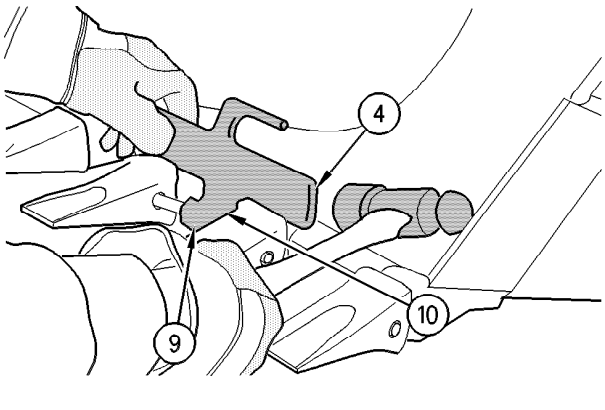

Illustration 240 g00590666

(4) Back of Pin-Master
(9) Pin setter
(10) Pin holder

a. Insert the pin through the bucket tooth.

b. Place the Pin-Master over the bucket tooth and locate the pin in the hole of holder (10).

c. Strike the tool with a hammer at the back of the tool (4) in order to start the pin.

d. Slide pin holder (10) away from the pin and rotate the tool slightly in order to align pin setter (9) with the pin.

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

6. After you drive the pin, make sure that the retainer fits snugly into the pin groove.

K-Series Tip

Removal

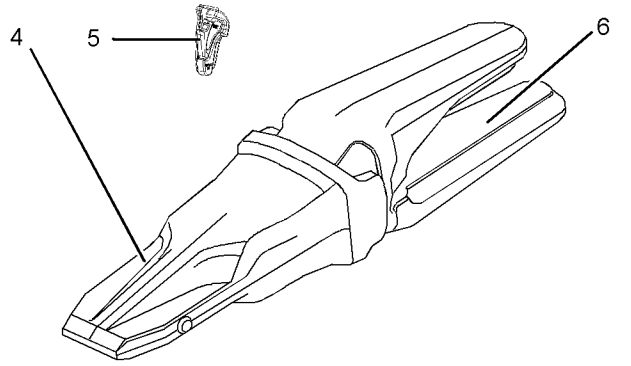

Illustration 241 g01389463

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

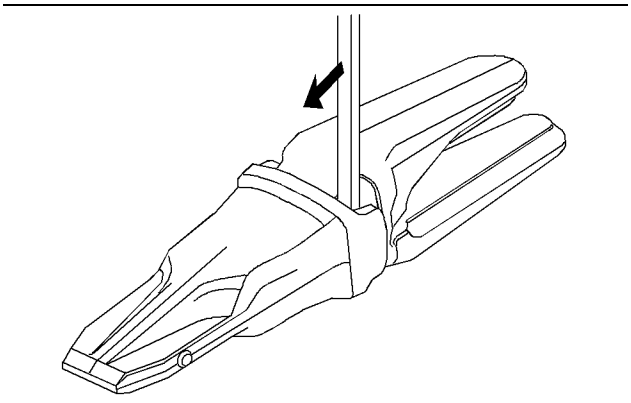

Illustration 242 g01175361

1. Use a pry bar in order to disengage retainer (5).

2. Use the pry bar in order to remove retainer (5) from bucket tip (4).

3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.

4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.

2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

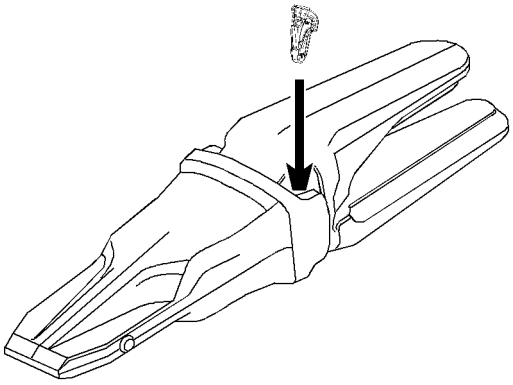

Illustration 243 g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.

4. Make sure that the latch is properly seated by trying to remove the bucket tip.

i01899383

Cab Air Filter - Clean/Replace

SMCS Code: 7311; 7342

Clean the Filter Element

NOTICE
Do not clean the elements by bumping or tapping them.

Inspect the elements after cleaning. Do not use an element with damaged pleats, gaskets or seals.

When cleaning with pressure air, use 205 kPa (30 psi) maximum to prevent element damage by too much air pressure.

When cleaning with pressure water, use 280 kPa (40 psi) maximum to prevent element damage.

Clean the filter element weekly, but clean the filter element daily when there is a reduction of air circulation.

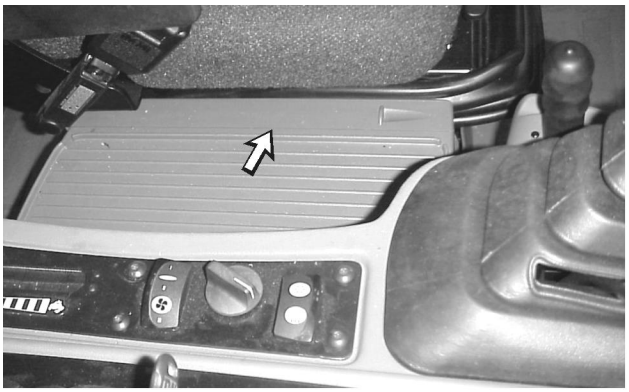

Illustration 244 g00741461

1. Remove the filter cover that is located at the bottom of the right hand console.

2. Remove the filter element.

3. Clean the filter element with compressed air or pressure water. Direct the air or the water along the pleats of the element. You can also wash the element with clean water and nonsudsing household detergent.

4. Rinse the filter element thoroughly with clear water.

5. Allow the filter element to air dry. Inspect the element for damage. If the filter element is damaged, replace the filter element.

6. Install the filter element.

7. Install the filter cover.

Clean the Precleaner (If Equipped).

Illustration 245 g00987918

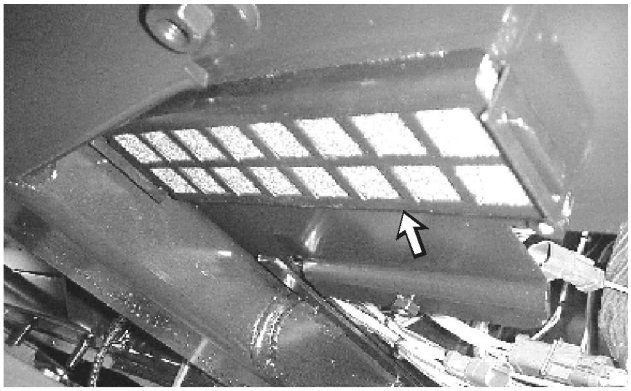

Illustration 246 g00987920

1. Remove the filter cover that is located under the cab. The precleaner is located directly beneath the air conditioner.

2. Remove the foam element.

Note: Most of the debris can be removed by striking the foam element against a hard surface.

3. The foam element can also be cleaned with clean water and nonsudsing household detergent.

4. Rinse the foam element thoroughly with clear water.

5. Allow the foam element to air dry. Inspect the element for damage. If the foam element is damaged, replace the foam element.

6. Install the foam element.

7. Install the filter cover.

i01404606

Cab Interior - Clean

SMCS Code: 7301-070

1. Use high pressure air in order to clean the entire cab and the main electrical box.

2. Wash off any remaining dirt and debris. Use caution and minimize the water around electrical connections and the cab roof.

3. Scrub the floormat, the instrument panel, the windows, and the mirrors. Wipe the cab dry.

i01982029

Cooling System Coolant (ELC) - Change

SMCS Code: 1353; 1395

⚠ WARNING

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

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

This could result in damage to cooling system components.

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

Note: This machine is shipped with Extended Life Coolant. Extended Life Coolant is recommended for use.

For information about the addition of Extender to your cooling system, see the Operation and Maintenance Manual, “Cooling System Coolant Extender (ELC) - Add” or consult your Caterpillar dealer.

Flushing the Extended Life Coolant From the Cooling System

Some engines utilize Extended Life Coolant. See the Operation and Maintenance Manual, “Maintenance Interval Schedule” in order to determine the service interval. If a Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required.

Flushing a Standard Coolant From the Cooling System

If you change the coolant of a machine to Extended Life Coolant from another type of coolant, use a Caterpillar cleaning agent to flush the cooling system. After you drain the cooling system, thoroughly flush the cooling system with clean water. **All of the cleaning agent must be removed from the cooling system.**

Changing the Coolant

⚠ WARNING

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

NOTICE
Do not change the coolant until you read and understand the material in the Cooling System Specifications section.

1. Empty the bucket. Remove the pin that secures the brace for the loader lift arm to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the brace for the loader lift arm over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the brace for the loader lift arm and install the cotter pin.
4. Slowly lower the loader arms until the brace for the loader lift arm contacts the top of the lift cylinder and the bosses on the loader arm.

Drain the coolant whenever the coolant is dirty or whenever foaming is observed.

The radiator cap is located under the access panel on the top of the engine compartment.

1. Open the engine access door on the top of the machine.

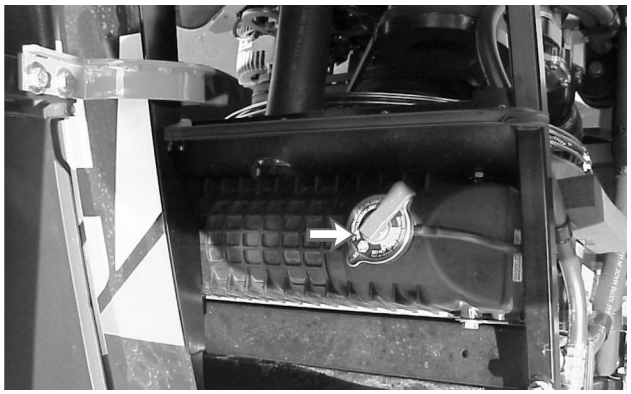

Illustration 247 g01029869

2. Lift the tab on the radiator cap in order to relieve system pressure. Remove the radiator cap slowly.

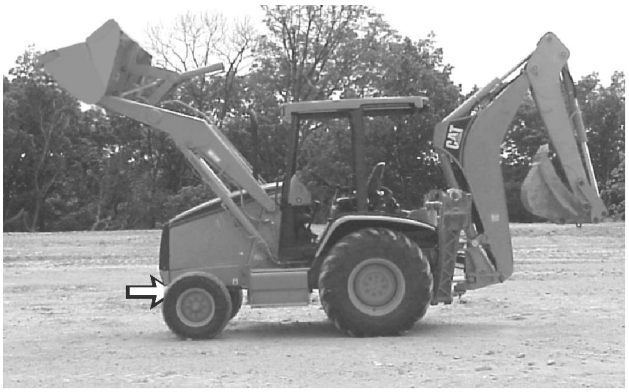

Illustration 248 g00726615

Illustration 249 g00293559

3. Pull the drain hose for the radiator through the hole under the radiator.

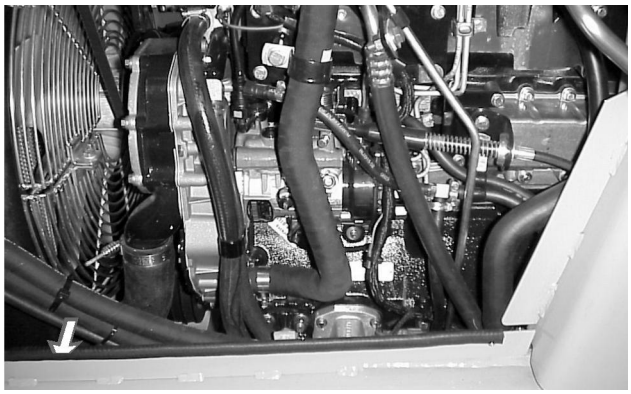

Illustration 250 g01029871

4. Remove the access panel on the left side of the engine compartment. The drain valve is located in an access port of the fan shroud. Open the drain valve. Allow the coolant to drain into a suitable container.

5. Close the drain valve. Fill the system with a solution which consists of clean water and of cooling system cleaner. The concentration of the cooling system cleaner in the solution should be between 6 percent and 10 percent.

6. Start the engine. Run the engine for 90 minutes. Stop the engine. Drain the cleaning solution into a suitable container.

7. While the engine is stopped, flush the system with water. Flush the system until the draining water is transparent.

8. Close the drain valve.

9. Add the coolant solution. See the following topics:

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

Note: If you are using Caterpillar antifreeze, do not add the supplemental coolant additive at this time and/or change the element at this time.

10. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes.

11. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler pipe.

12. Install the radiator cap. Lower the tab on the radiator cap. Replace the radiator cap if the gasket is damaged.

13. Stop the engine.

14. Replace the access panel. Close the access door.

i03114912

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352; 1353; 1395

⚠ WARNING

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

When a Caterpillar Extended Life Coolant is used, an extender must be added to the cooling system. See the Operation and Maintenance Manual, “Maintenance Interval Schedule” for the proper service interval. The amount of extender is determined by the cooling system capacity.

Table 82

RECOMMENDED AMOUNT OF EXTENDER BY COOLING SYSTEM CAPACITY	
Cooling System Capacity	**Recommended Amount of Extender**
22 to 30 L (6 to 8 US gal)	0.57 L (.60 qt)
30 to 38 L (8 to 10 US gal)	0.71 L (.75 qt)
38 to 49 L (10 to 13 US gal)	0.95 L (.95 qt)
49 to 64 L (13 to 17 US gal)	1.18 L (1.25 qt)

For additional information on the addition of extender, see Special Publication, SEBU6250, “Cat Extended Life Coolant (ELC) Cooling System Maintenance” or consult your Caterpillar dealer.

i01982091

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

⚠ WARNING

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

Open the engine access door on the top of the hood.

Illustration 251 g01029869

1. The radiator cap is located on the top of the radiator on the left side of the machine. Lift the tab on top of the cap in order to relieve system pressure. Remove the radiator cap slowly.

2. Maintain the coolant level within 13 mm (0.5 inch) of the bottom of the filler tube. If you need to add coolant daily, check the cooling system for leaks.

3. Inspect the radiator cap seal. Replace the radiator cap seal if the radiator cap seal is damaged.

4. Install the radiator cap. Lower the tab on the radiator cap. Close the access panel.

i02436215

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: Level 1 results may indicate a need for Level 2 Analysis.

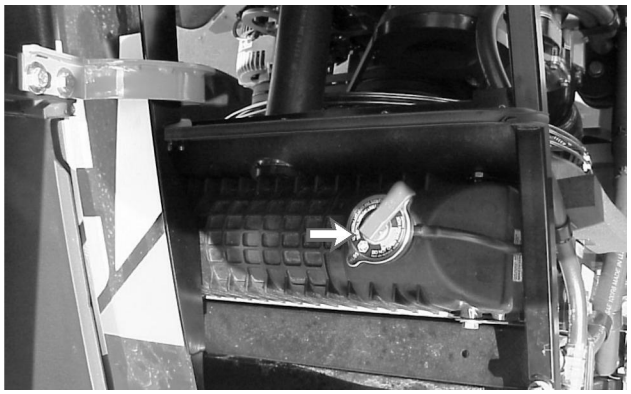

Illustration 252 g01029869

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02436220

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE
Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Dealer Service Tool Catalog” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Illustration 253 g01029869

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.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” or consult your Caterpillar dealer.

i02360639

Cooling System Water Temperature Regulator - Clean/Replace

SMCS Code: 1355; 1393

Replace the thermostat on a regular basis in order to reduce the chance of unscheduled downtime and of problems with the cooling system. Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

The thermostat should be replaced after the cooling system has been cleaned. Replace the thermostat while the cooling system is completely drained or while the cooling system coolant is drained to a level that is below the thermostat housing.

Note: If you are only replacing the thermostat, drain the cooling system coolant to a level that is below the thermostat housing.

Caterpillar engines incorporate a shunt design cooling system. It is mandatory to always operate the engine with a thermostat.

1. Empty the bucket. Remove the pin that secures the lift arm brace to the left loader lift arm. Raise the loader arm to the maximum height.
2. Position the lift arm brace over the left lift cylinder rod with the flat end against the cylinder end.
3. Push the pin through the holes of the lift arm brace and install the cotter pin.
4. Slowly lower the loader arms until the lift arm brace contacts the top of the lift cylinder and the bosses on the loader arm.
5. Remove the engine access panel on the right side of the machine.

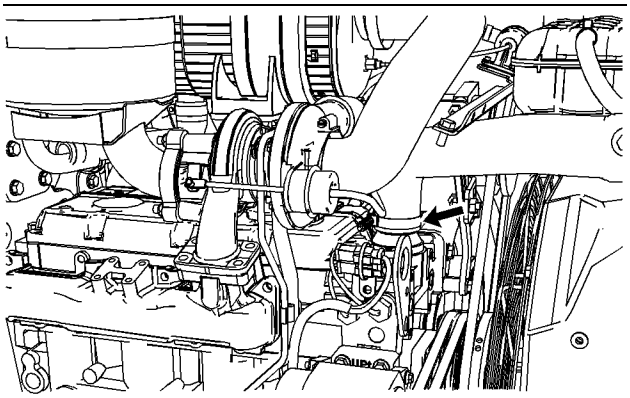

Illustration 254 g01179553

6. Loosen the hose clamp and remove the hose from the thermostat housing assembly.

7. Remove the bolts from the thermostat housing assembly. Remove the thermostat housing assembly.

8. Remove the gasket, the thermostat, and the seal from the thermostat housing assembly.

9. Install a new seal in the thermostat housing assembly. Install a new thermostat and a new gasket. Install the thermostat housing assembly on the engine cylinder head.

The thermostats can be reused under the following conditions.

- The thermostat is tested and the thermostat meets test specifications.
- The thermostat is not damaged.
- The thermostat does not have excessive buildup of deposits.

10. Install the hose. Tighten the hose clamp.

11. Refill the cooling system. Refer to Special Publication, “Cooling System Specifications” and Operation and Maintenance Manual, “Capacities (Refill)”.

i02567860

Differential Oil (Front) - Change

SMCS Code: 3258

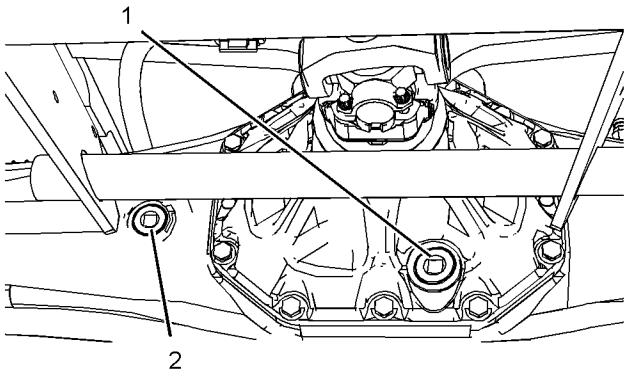

Illustration 255 g01286266

1. Remove oil drain plug (1) and drain the oil into a suitable container.

2. The drain plug is magnetic. Check the plug for metal.

3. Clean the drain plug and install the drain plug.

4. Remove oil level/fill plug (2).

5. Add oil until the oil is level with the threads for the filler plug. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)” for oil.

6. Clean the filler plug and install the filler plug.

i01982218

Differential Oil (Rear) - Change

SMCS Code: 3258

The oil change interval should be decreased to 500 hours if more than 50% of the service hours is used for roading and loading.

Rear Axle

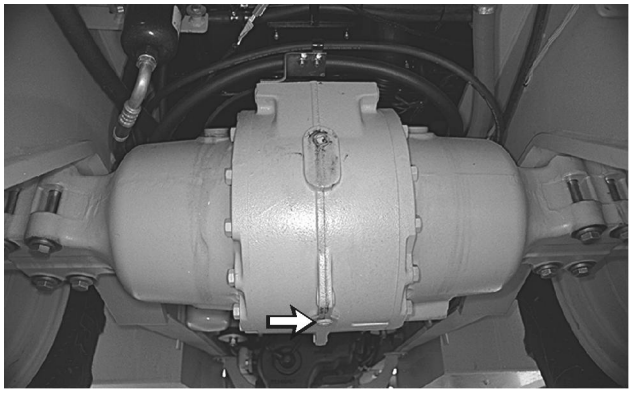

Illustration 256 g00290691

1. Remove the oil drain plug and drain the oil into a suitable container.
2. Clean the drain plug and install the drain plug.

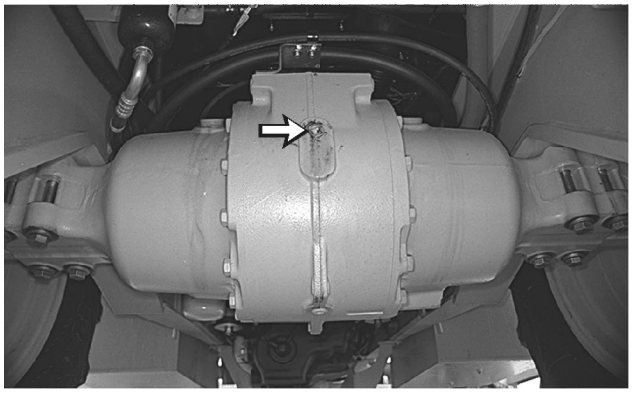

Illustration 257 g00290697

3. Remove the oil level/fill plug. Refer to Special Publication, “Lubricant Specifications” and Operation and Maintenance Manual, “Capacities (Refill)” for oil.
4. Add oil until the oil is level with the threads for the filler plug.
5. Clean the filler plug and install the filler plug.

Rear Axle with All Wheel Steer (AWS)

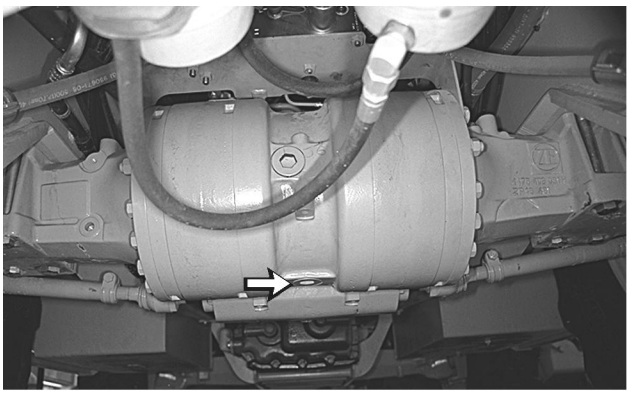

Illustration 258 g00290698

1. Remove the oil drain plug and drain the oil into a suitable container.
2. Clean the drain plug and install the drain plug.

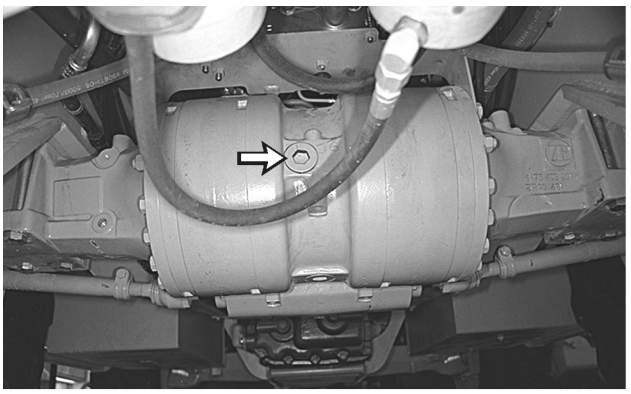

Illustration 259 g00290699

3. Remove the oil level/fill plug. Refer to Operation and Maintenance Manual, “Lubricant Specifications” and Operation and Maintenance Manual, “Refill Capacities” for oil.
4. Add oil until the oil is level with the threads for the filler plug.

5. Clean the filler plug and install the filler plug.

i02363607

Differential Oil Level (Front) - Check

SMCS Code: 3258

The oil level/fill plug is located near the middle of the front axle.

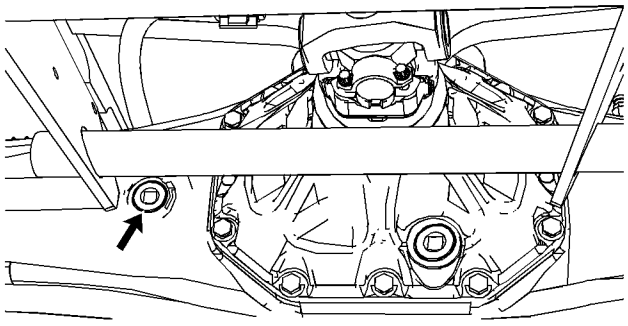

Illustration 260 g01180551

1. Remove the oil level/fill plug in order to check the oil.

2. The oil level should be at the bottom of the plug threads.

3. Clean the oil level/fill plug and install the oil level/fill plug.

i01355918

Differential Oil Level (Rear) - Check

SMCS Code: 3258

The oil level/fill plug is located near the middle of the rear axle.

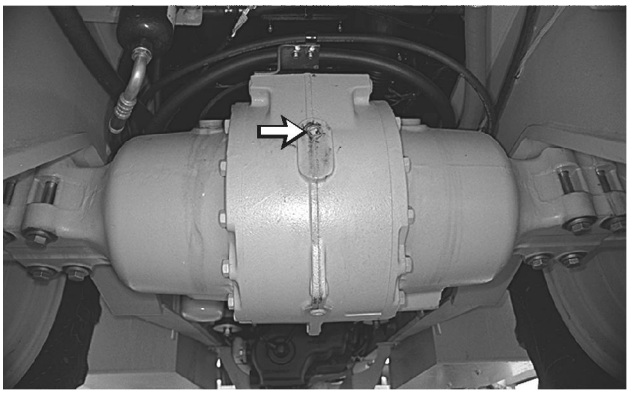

Illustration 261 g00290697

Filler plug on standard rear differential

1. Remove the oil plug in order to check the oil.

2. The oil level should be at the bottom of the plug threads.

3. Clean the oil plug and install the oil plug.

i02363692

Differential Oil Sample (Front) - Obtain

SMCS Code: 3258-008; 7542-008

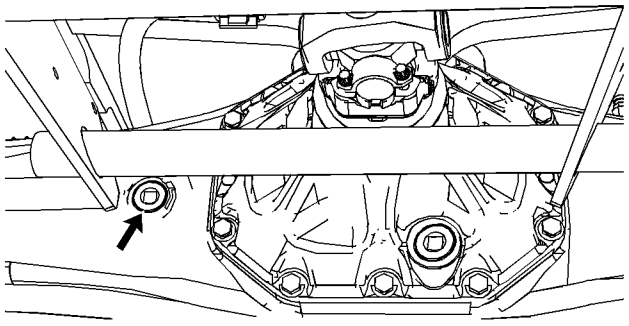

Illustration 262 g01180551

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i02436599

Differential Oil Sample (Rear) - Obtain

SMCS Code: 3258-008; 7542-008

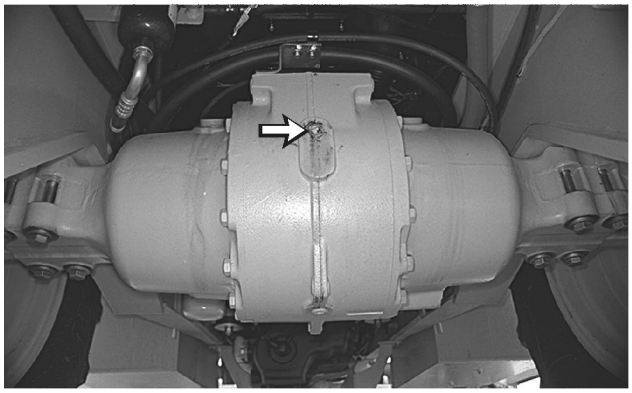

Illustration 263 g00290697

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i01356061

Drive Shaft Spline - Lubricate

SMCS Code: 3253

Illustration 264 g00724029

Access the grease fittings for the drive shaft spline from the bottom of the machine.

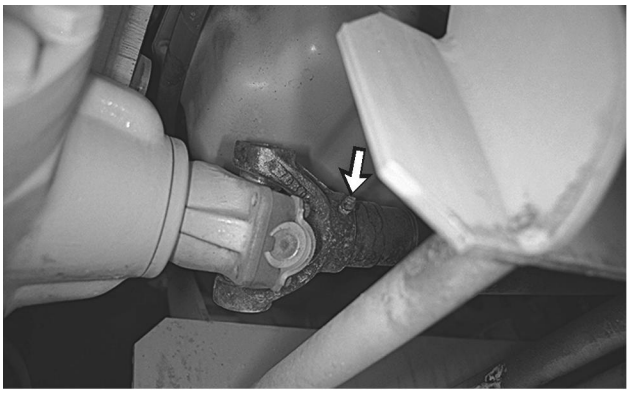

Illustration 265 g00290703

Apply lubricant to the grease fitting for the drive shaft spline of the front drive shaft.

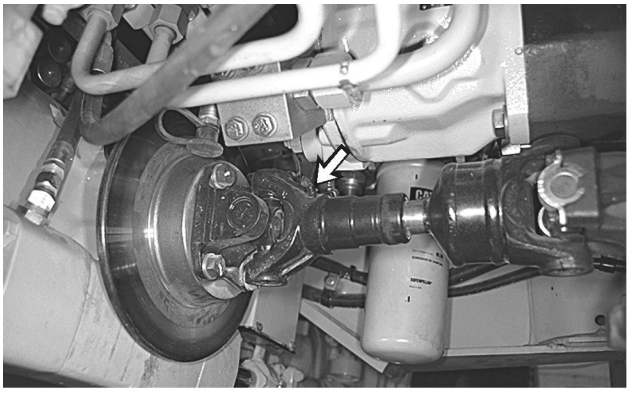

Illustration 266 g00290704

Apply lubricant to the grease fitting for the drive shaft spline of the rear drive shaft.

i05952893

Engine Air Filter Primary Element - Replace

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

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

1. Open the engine access door on the top of the machine.

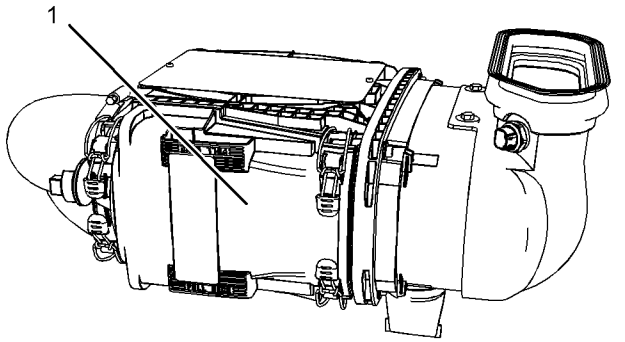

Illustration 267 g02792578

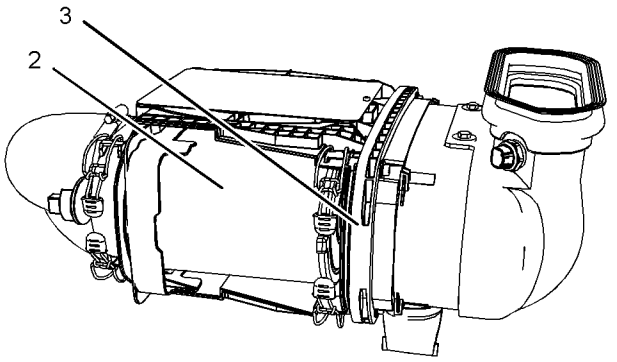

Illustration 268 g02792579

2. Remove cover (1) for the air filter housing .

3. Remove primary filter element (2) from the air filter housing.

4. Slide the primary filter element out of the filter base (3).

5. Clean the inside of the air filter housing.

6. Slide a new primary air filter element into the filter base. Install the new filter into the air filter housing. Install the cover for the air filter housing.

7. Reset the engine air filter service indicator.

8. Close the access door.

If the yellow piston in the indicator moves into the red zone after starting the engine or the exhaust smoke is still black after installation of a clean primary filter element, install a new primary filter element. If the piston remains in the red zone, replace the secondary element.

i01991300

Engine Air Filter Secondary Element - Replace

SMCS Code: 1051; 1054

NOTICE
Always replace the secondary filter element. Never attempt to reuse it by cleaning.

The secondary filter element should be replaced at the time the primary element is serviced for the third time. The secondary filter element should be replaced everytime the primary element is replaced.

The secondary filter element should also be replaced if the yellow piston in the filter element indicator enters the red zone after installation of a clean primary element, or if the exhaust smoke is still black.

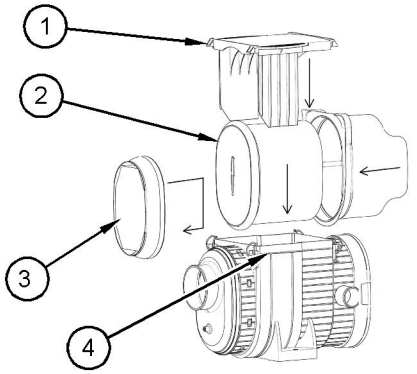

Illustration 269 g01031378

1. Remove the air cleaner housing cover (1).

2. Remove the primary filter element (2) from the air cleaner housing.

3. Clean the inside of the air cleaner housing (4) with a wet rag before the secondary filter element (3) is removed.

4. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.

5. Install a new secondary element.

6. Install the primary element and the air cleaner housing cover. Fasten the clips in order to secure the air cleaner housing cover.

7. Reset the filter element indicator.

8. Close the engine access door.

i01991054

Engine Air Filter Service Indicator - Inspect

SMCS Code: 1051; 1054; 7452

NOTICE
Service the air cleaner only with the engine stopped. Engine damage could result.

Illustration 270 g01031316

The filter service indicator is located under the engine access door in front of the housing for the air filter.

Start the engine. Run the engine at high idle. If the yellow piston in the filter service indicator enters the red zone, service the air cleaner. Stop the engine.

i01404793

Engine Compartment - Clean

SMCS Code: 1000-070

NOTICE
Before spraying the engine compartment with high pressure water turn off the engine and allow the engine to cool. Do not spray water directly on a hot fuel injection pump or damage may occur.

Use a commercially available engine degreaser in order to clean the engine compartment. Use caution and minimize the water around bearings and electrical connections.

i02409844

Engine Crankcase Breather - Replace

SMCS Code: 1317-510

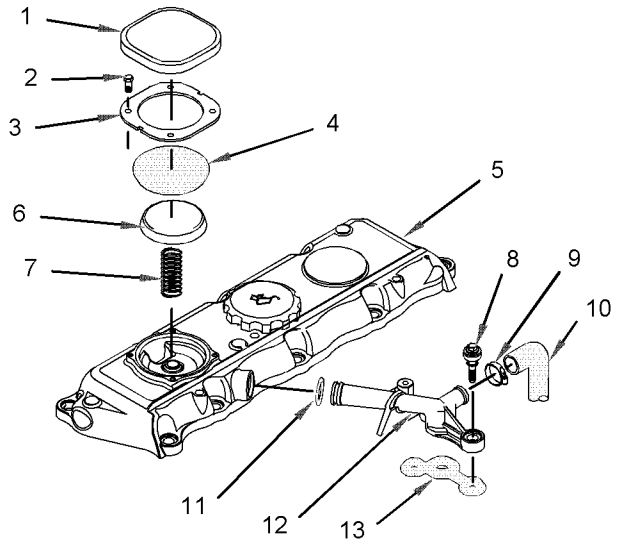

Illustration 271 g01149576

1. Loosen the clamp (9) and remove the hose (10) from the connector (12).

2. Remove the setscrews (8) and remove the connector (12) from the cylinder head. Remove the gasket (13). Remove the O-ring seal (11) from the connector. Discard the gasket (13) and the O-ring seal (11).

3. Remove the cover (1) from the valve mechanism cover (5).

⚠ WARNING

Personal injury can result from parts and/or covers under spring pressure.

Spring force will be released when covers are removed.

Be prepared to hold spring loaded covers as the bolts are loosened.

4. Remove the screws (2). Remove the plate (3).

5. Remove the diaphragm (4) and the cap (6). Remove the spring (7). Discard diaphragm (4).

⚠ WARNING

Improper assembly of parts that are spring loaded can cause bodily injury.

To prevent possible injury, follow the established assembly procedure and wear protective equipment.

6. Install the spring (7), the cap (6), and a new diaphragm (4).

7. Install the plate (3). Install the screws (2).

8. Install the cover (1) on the valve mechanism cover.

9. Install a new O-ring seal (11) on the connector (12). Install a new gasket (13) on the connector (12). Position the connector in the valve mechanism cover.

10. Install the setscrews (8). Tighten the setscrews to a torque of 9 N·m (80 lb in).

11. Install the hose (10) on the connector (12). Tighten the clamp (9) to a torque of 5 N·m (44 lb in).

i01982246

Engine Oil Level - Check

SMCS Code: 1302; 1318; 1326

NOTICE
Do not overfill the crankcase. Engine damage can result.

1. Open the engine access door on the top of the machine.

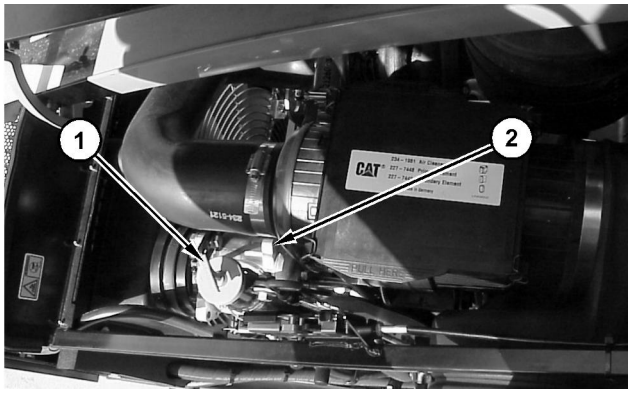

Illustration 272 g01030412

2. While the engine is stopped, maintain the oil level between the “ADD” mark and the “FULL” mark on the engine oil dipstick (2).

3. If necessary, remove the oil filler cap (1) and add oil.

4. Clean the oil filler cap and install the oil filler cap.

5. Close the engine access door.

i01999134

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542-008

Illustration 273 g01034353

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i01982523

Engine Oil and Filter - Change

SMCS Code: 1302; 1318; 1326

Note: If the sulfur content in the fuel is greater than 1.5% by weight, use an oil with a TBN of 30. With the high sulfur fuel, change the oil and the filter element after every 250 hours or after every month. If the API category is CF-4 or less, change the oil and change the filter element after every 250 hours or after every month. Otherwise, change the oil and the filter element after every 500 hours or after every three months.

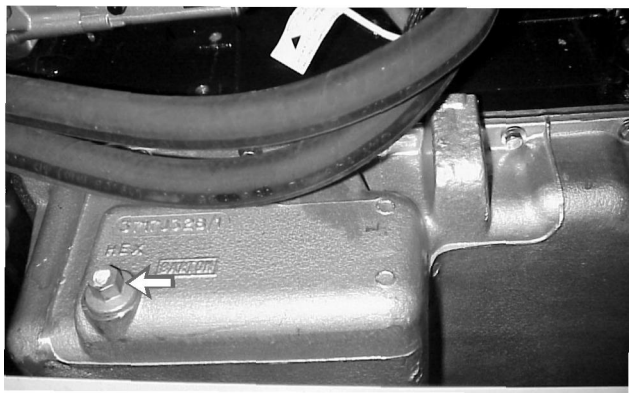

Illustration 274 g01030414

The crankcase drain plug is on the right side of the oil pan.

1. Remove the crankcase drain plug and drain the oil into a suitable container. Clean the crankcase drain plug and replace the crankcase drain plug.

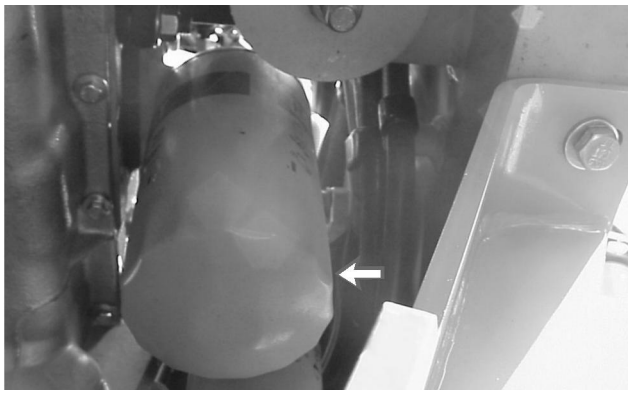

Illustration 275 g01030413

2. Remove the filter element with a strap type wrench.
3. Clean the filter mounting base with a clean cloth. Make sure that the old filter gasket has been removed.
4. Apply a thin film of clean engine oil to the sealing surface of the new filter element.
5. Install the new filter element by hand. When the gasket contacts the filter base, tighten the filter for an additional 3/4 turn.
6. Open the engine access door on the top of the machine.

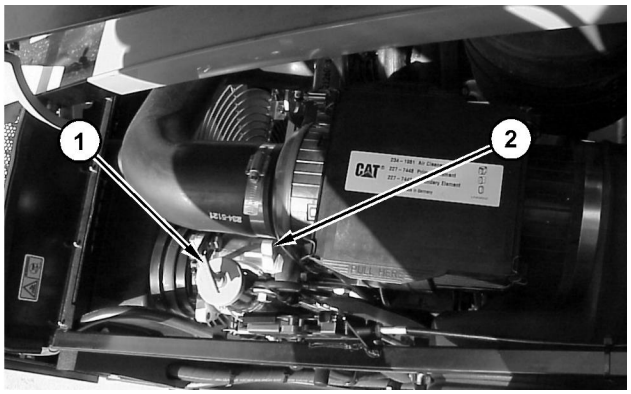

Illustration 276 g01030412

7. Remove the oil filler cap (1). Fill the crankcase with new oil. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”. Clean the oil filler cap and install the oil filler cap.
8. Start the engine and allow the oil to warm. Check for leaks.
9. Stop the engine and allow the oil to drain back into the oil pan. Maintain the oil level in the crosshatched region of the engine oil dipstick (2). Add oil, if necessary.
10. Replace the engine access panel and close the engine access door.

i01897328

Engine Valve Lash - Check

SMCS Code: 1102; 1102-535; 1102-082; 1209; 1209-082

Note: A qualified service person should perform the valve lash check and/or the valve lash adjustment. Special tools and training are required.

Refer to your machine's Service Manual for complete instructions.

i01364126

Extendable Stick Pads - Inspect/Replace
(If Equipped)

SMCS Code: 6533-510-JP; 6533-040-JP

Inspect Wear Pads

Illustration 277 g00724233

Check the extendable stick for slop. Shim the extendable stick pads in order to maintain an acceptable fit and reduce slop.

Note: Do not apply an excessive amount of a silicone based lubricant. Dirt can be attracted to the lubricant and dirt can cause abrasion to the pad assemblies and wear to the pad assemblies.

The extendable stick pads do not normally require any lubrication. If the extendable stick becomes noisy, a small amount of a silicone based lubricant may be applied.

Adjustment for Top Upper Wear Pad

1. Extend the extendable stick to one half of the fully extended position.
2. Move the stick and move the boom down against the ground. This will take pressure off the wear pad.

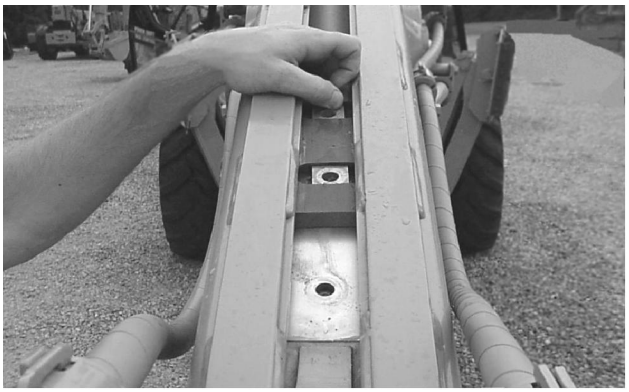

Illustration 278 g00635137

3. Remove the bolts that secure the wear pad. Slide the pad toward the boom. There will be enough space in order to remove the pad. Either replace the wear pads or stack shims behind the pad.
4. Shim the wear pad to 1 mm (0.04 inch) .

Note: In order to make adjustments to the remaining upper wear pads, refer to Disassembly and Assembly Manual, SENR1209, “Stick, Extendable Stick, Extendable Stick Cylinder”.

Adjustment for Lower Pads

1. Extend the extendable stick out until there is enough clearance in order to remove the pads.

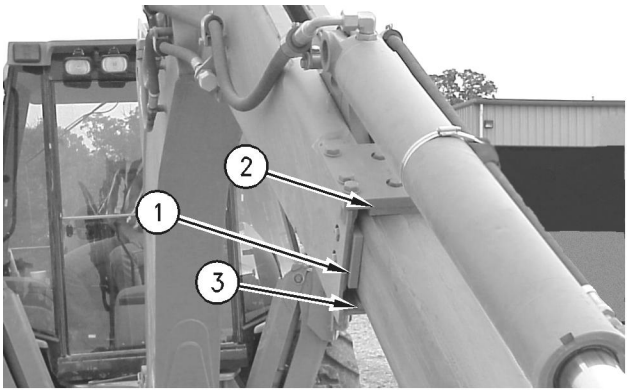

Illustration 279 g00635788

2. The side pads (1) can be shimmed without moving the stick or without moving the boom.
3. Adjust the boom and adjust the stick in order to take pressure away from the top pad (2). Adjust the wear pads by shimming or replacing. Shim the wear pads to 1 mm (0.04 inch).
4. Adjust the boom and adjust the stick in order to take the pressure away from the lower pad (3).

Note: Place the bucket on the ground. Apply slight pressure toward the ground with the stick. Shim the lower pad or replace the lower pad.

i02369952

Final Drive Oil (Front) - Change

SMCS Code: 4050

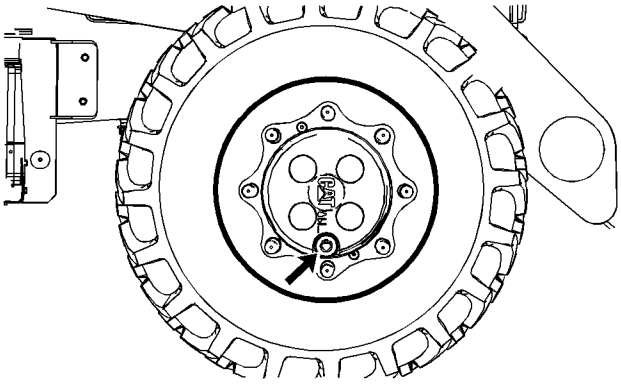

Illustration 280 g01182475

1. Position the oil fill/drain plug at the bottom. Remove the oil fill/drain plug and drain the oil into a suitable container.
2. The plug is magnetic. The plug will attract metal from the oil. Check the plug for an increased amount of metal on the plug. If any abnormal particles are found, consult your Caterpillar dealer.

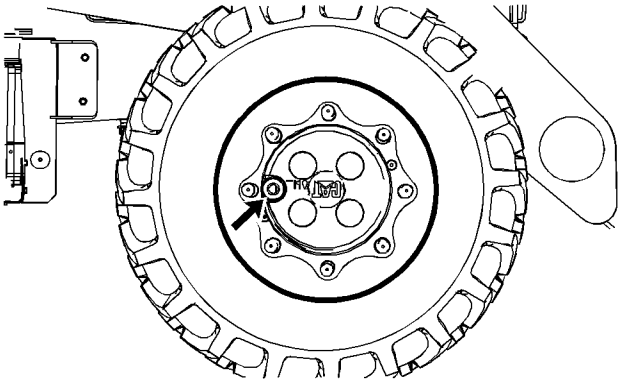

Illustration 281 g01182493

3. Position the plug hole at a horizontal position. Use the line on the final drive as a reference.
4. Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, “Lubricant Specifications” and Operation and Maintenance Manual, “Capacities (Refill)” for the oil.
5. Clean the plug and install the plug.
6. Repeat the procedure for the other final drive.

i01995377

Final Drive Oil (Rear) - Change (All Wheel Steer)

SMCS Code: 4050

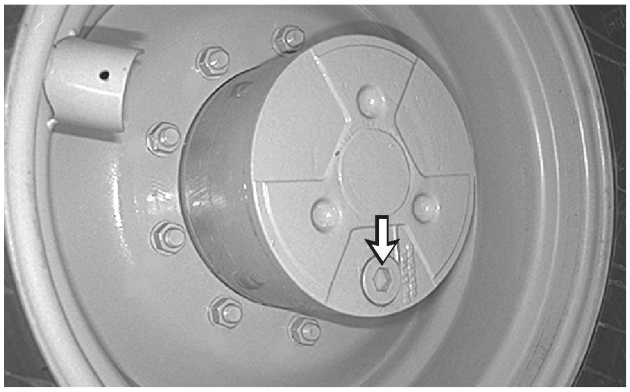

Illustration 282 g00752323

1. Position the oil fill/drain plug at the bottom. Remove the oil fill/drain plug and drain the oil into a suitable container.

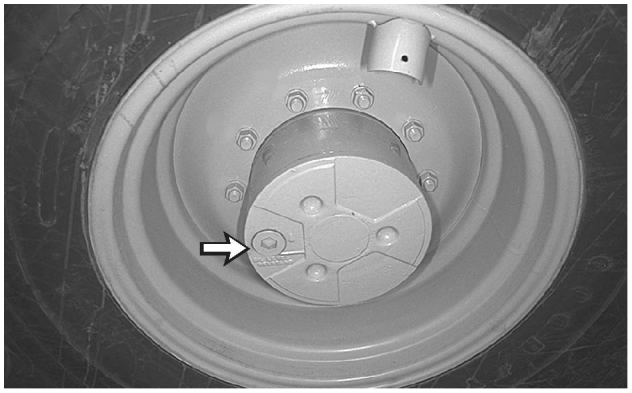

Illustration 283 g00752329

2. Position the plug hole at a horizontal position. Use the line on the final drive as a reference.
3. Add oil until the oil is level with the plug threads. Refer to Operation and Maintenance Manual, “Lubricant Specifications” and Operation and Maintenance Manual, “Capacities (Refill)” for the oil.
4. Clean the plug and install the plug.
5. Repeat the procedure for the other final drive.

i02370034

Final Drive Oil Level (Front) - Check

SMCS Code: 4050

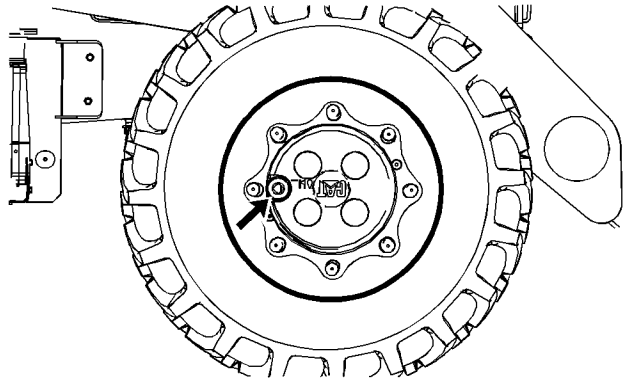

Illustration 284 g01182493

1. Position the oil fill/drain plug at a horizontal position in order to check the oil level.

2. Remove the oil fill/drain plug in order to check the oil level.

3. The oil should be level with the bottom of the plug threads.

4. The plug is magnetic. Check the plug for metal. Clean the plug and install the plug.

5. Repeat the procedure for the other final drive.

i01995404

Final Drive Oil Level (Rear) - Check

(All Wheel Steer)

SMCS Code: 4050

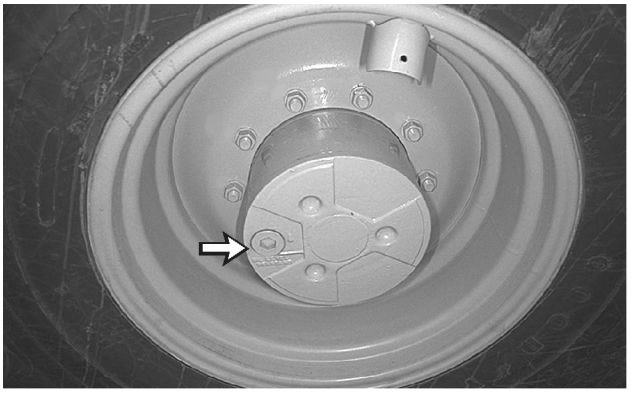

Illustration 285 g00752329

1. Position the oil fill/drain plug at a horizontal position in order to check the oil level.

2. Remove the oil fill/drain plug in order to check the oil level.

3. The oil should be level with the bottom of the plug threads.

4. Clean the plug and install the plug.

5. Repeat the procedure for the other final drive.

i02370039

Final Drive Oil Sample (Front) - Obtain

SMCS Code: 4050-008-FR; 7542-008

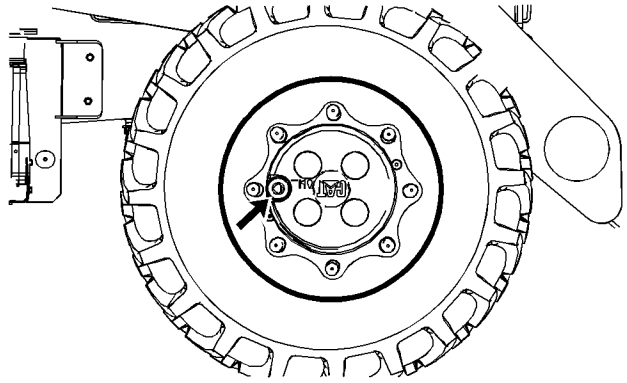

Illustration 286 g01182493

Obtain the oil sample from the fill/drain plug. Refer to Special Publication, SEBU6250, “S·O·S Oil Analysis” for information that pertains to obtaining a sample of the engine oil. Refer to Special Publication, PEHP6001, “How To Take A Good Oil Sample” for more information about obtaining a sample of oil.

i01999152

Final Drive Oil Sample (Rear) - Obtain

SMCS Code: 4050-008-RE; 7542-008

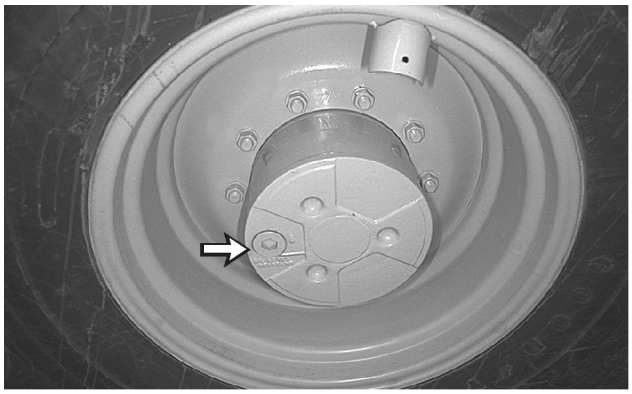

Illustration 287 g00752329

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i08258999

Fuel System - Prime

SMCS Code: 1250-548

If air enters the fuel system, the air must be purged from the fuel system before the engine can be started. Air can enter the fuel system when the following events occur:

- The fuel tank is empty or the fuel tank has been partially drained.
- The low-pressure fuel lines are disconnected.
- A leak exists in the low-pressure fuel system.
- The fuel filter is replaced.
- A new injection pump is installed.

Use one of the following procedures to remove air from the fuel system:

NOTICE
Do not crank the engine continuously for more than 30 seconds. Allow the starting motor to cool for two minutes before cranking the engine again.

Engines with Electric Priming Pumps

There are many different types of electric priming pumps. These fuel pumps can be put into two categories. Remotely mounted fuel priming pump and secondary fuel filter-mounted priming pump.

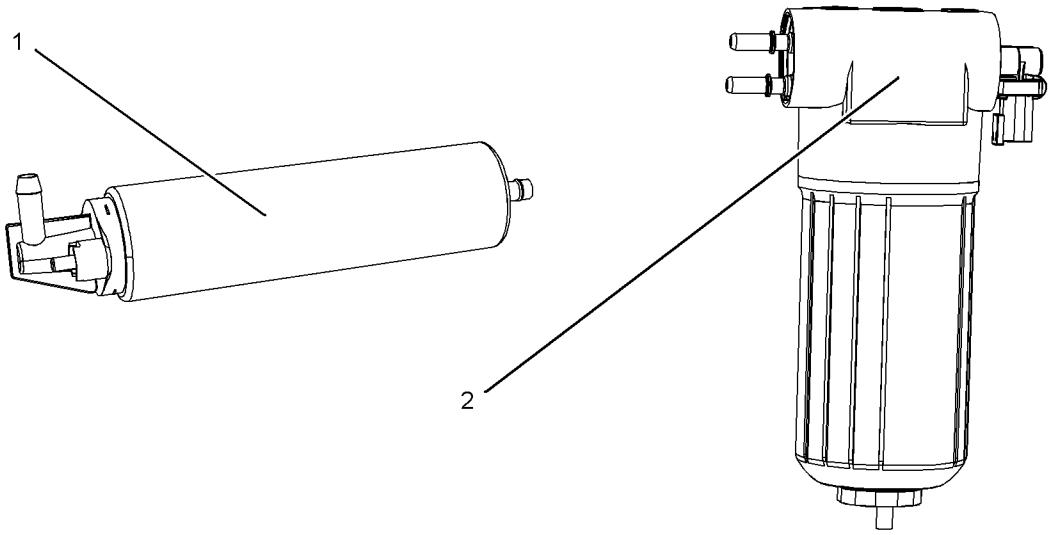

Illustration 288 g03721131

(1) Typical example of a remotely mounted priming pump.
(2) Typical example of a priming pump mounted on a secondary fuel filter.

Priming the Fuel Injection Pump for a Variable Speed Engine

1. Turn the engine start switch to the START position and release. The electric priming pump will begin to prime the system. Allow 180 seconds for the electric priming pump to prime the system.

2. Turn the engine start switch to the OFF position and then start the engine with the throttle in the closed position. Operate the engine at idle with no load for 60 seconds and then shutdown the engine.

3. Wait 30 seconds and start the engine. This procedure will remove any air that could be trapped within the fuel injection pump. Check for leaks in the fuel system.

Refer to “Engine Starting“ for more information.

Priming the Fuel Injection Pump for a Constant Speed Engine

1. Turn the engine start switch to the START position and release. The electric priming pump will begin to prime the system. Allow 180 seconds for the electric priming pump to prime the system.

2. Turn the engine start switch to the OFF position and then start the engine. Operate the engine with no load for 60 seconds and then shutdown the engine.

3. Wait 30 seconds and start the engine. This procedure will remove any air that could be trapped within the fuel injection pump. Check for leaks in the fuel system.

Refer to this Operation and Maintenance Manual, “Starting the Engine” for more information.

Engines with Mechanically Operated Priming Pumps

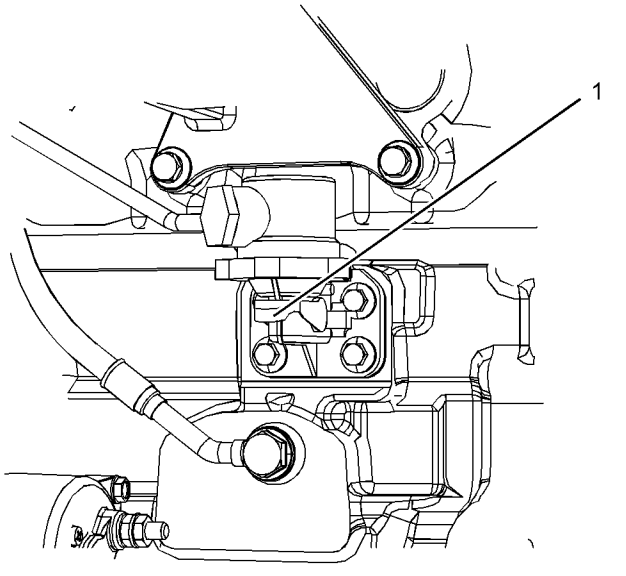

Illustration 289 g03721133

Typical example.

1. Loosen the vent screw on the secondary fuel filter.

Note: The fuel priming pump is mechanically operated by the camshaft. In curtain positions the camshaft lobe can act upon the arm of the fuel priming pump reducing the hand priming pump ability to prime. This condition will be felt as low resistance on the operating arm. Rotating the crankshaft will move the camshaft lobe acting on the priming pump arm. Rotating the camshaft will allow the priming pump full ability to prime.

2. Operate the lever (1) on the priming pump. When fuel free from air can be seen, close the vent screw. Tighten vent screw securely.

3. The fuel injection pump will self-vent. Turn the keyswitch to the ON position and operate the lever on the priming pump. Operate the pump by hand for 2 minutes and then stop.

4. Turn the keyswitch to the OFF position and then start the engine. Operate the engine with no load for 60 seconds and then shutdown the engine.

5. Wait 30 seconds and start the engine. This procedure will remove any air that could be trapped within the fuel injection pump. Check for leaks in the fuel system.

Refer to this Operation and Maintenance Manual, “Starting the Engine” for more information.

i01986276

Fuel System Filter and Water Separator - Replace

SMCS Code: 1261-510; 1263-510-FQ

Some fuel supplies may not meet the minimum standard for fuel lubricity. Caterpillar recommends the use of fuels that meet certain minimum specifications. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

NOTICE
It is extremely important to drain water from the water separator daily, or every ten hours. It is also extremely important to drain water from the fuel tank weekly, or every 50 hours. Failure to do so could result in damage to the fuel system.

1. Empty the bucket. Remove the pin that secures the brace for the loader lift arm to the left loader lift arm. Raise the loader arm to the maximum height.

2. Position the brace for the loader lift arm over the left lift cylinder rod with the flat end against the cylinder end.

3. Push the pin through the holes of the brace for the loader lift arm and install the cotter pin.

4. Slowly lower the loader arms until the brace for the loader lift arm contacts the top of the lift cylinder and the bosses on the loader arm.

5. Stop the engine.

Illustration 290 g00726616

6. Remove the access panel from the left side of the machine.

The machine uses a fuel filter with a push and twist collar.

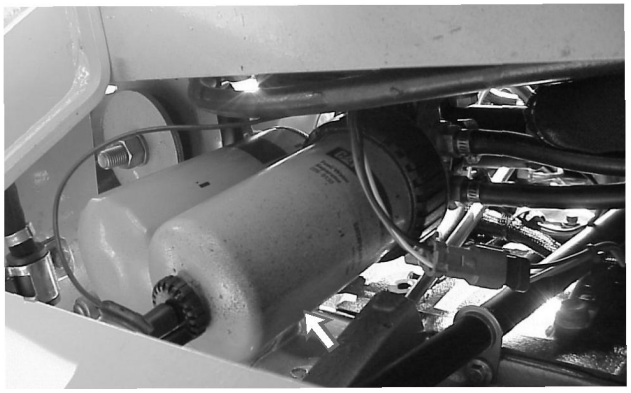

Illustration 291 g01030464

7. Remove the sensor and the wire from the bottom of the filter.

8. Remove the primary fuel filter that is located next to the engine oil filter under the left side of the machine. Rotate the locking ring counterclockwise in order to remove the filter element. Discard the filter properly.

9. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.

10. Coat the seal of the new filter element with clean diesel fuel.

11. Install the new filter element. Rotate the locking ring clockwise in order to fasten the filter to the mounting base.

12. Install the sensor and the wire into the new filter.

13. Replace the access panel.

i01986280

Fuel System Water Separator - Drain

SMCS Code: 1263-543; 1263

Some fuel supplies may not meet the minimum standard for fuel lubricity. Caterpillar recommends the use of fuels that meet certain minimum specifications. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

NOTICE
It is extremely important to drain water from the water separator daily, or every ten hours. It is also extremely important to drain water from the fuel tank weekly, or every 50 hours. Failure to do so could result in damage to the fuel system.

Illustration 292 g00724316

The water separator is located by the drain plug for the engine crankcase.

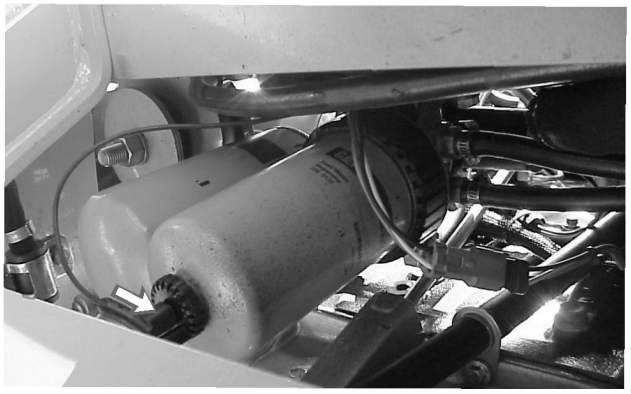

Illustration 293 g01030509

1. Loosen the drain valve on the bottom of the fuel filter. Allow the water and the sediment to drain into a suitable container.

2. Tighten the drain valve.

3. If the engine fails to start, change the fuel filter. If there is a power loss, change the fuel filter.

i01986286

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

Some fuel supplies may not meet the minimum standard for fuel lubricity. Caterpillar recommends the use of fuels that meet certain minimum specifications. Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations”.

NOTICE
It is extremely important to drain water from the water separator daily, or every ten hours. It is also extremely important to drain water from the fuel tank weekly, or every 50 hours. Failure to do so could result in damage to the fuel system.

The fuel tank is located on the left side of the machine.

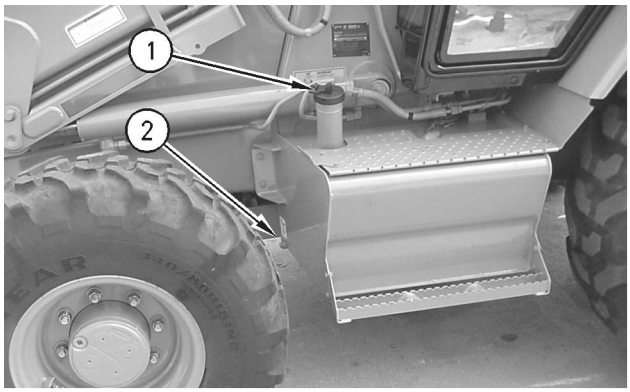

Illustration 294 g00832981

Flip up the tab on the fuel cap. Turn the tab counterclockwise on the fuel cap and slowly remove the fuel tank cap(1) in order to relieve pressure.

The fuel tank drain valve (2) is located on the lower right corner on the front of the fuel tank. Remove the fuel tank drain plug. Allow the water and sediment to drain into a suitable container. Install the fuel tank drain plug. Replace the fuel tank cap.

i03582109

Fuses - Replace

SMCS Code: 1417

Fuses protect the electrical system from damage that is caused by overloaded circuits. Replace the fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

NOTICE
Replace the fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer

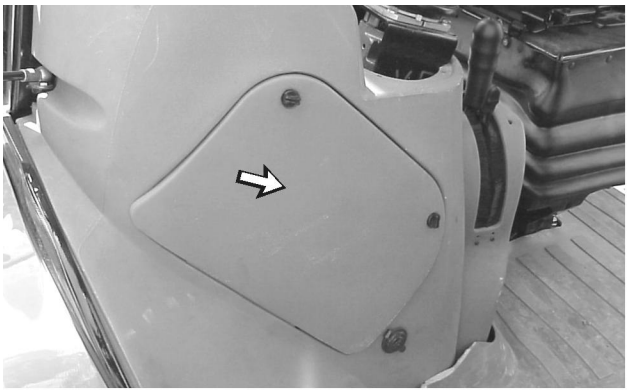

Illustration 295 g00724522

Remove the cover on the front of the right side console in order to access the main fuse panel.

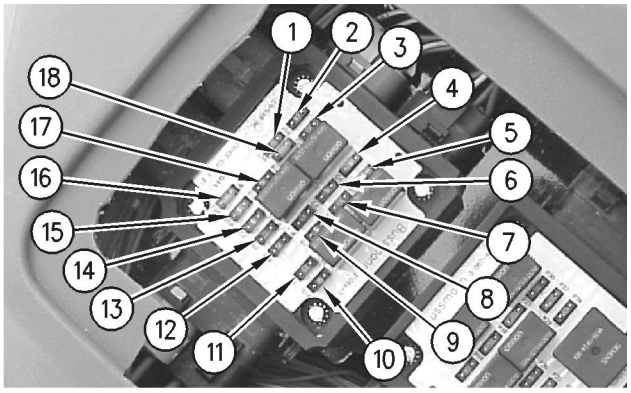

Illustration 296 g00832506

Front Floodlights (1) – 15 Amp

Auxiliary Front Floodlights (2) – 10 Amp

Auxiliary Rear Floodlights (3) – 10 Amp

All Wheel Drive (4) – 5 Amp

Start Relay (5) – 25 Amp

Monitor (6) – 5 Amp

Transmission (7) – 10 Amp

Rear Hydraulics (8) – 10 Amp

Bucket Positioner (9) – 5 Amp

Starting Aid (10) – 15 Amp

Engine (11) – 10 Amp

Signal Lamps (12) – 10 Amp

Power Port (13) – 10 Amp

Radio (14) – 5 Amp

Key Start Switch (15) – 5 Amp

Air Seat (16) – 20 Amp

Horn (17) – 15 Amp

Spare (18) – 10 Amp

Note: Some of the main fuses are tied together with the fuses in the headliner. For example, if all of the lights are not functioning, check the main fuse for the lights in the steering console. If one light is not functioning, check the fuse in the headliner for the specific light.

Remove the cover in order to access the fuses.

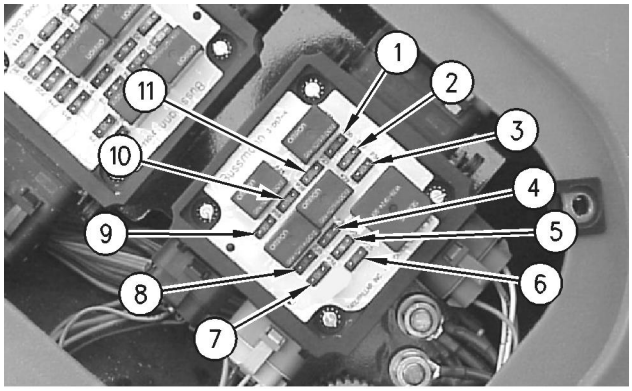

Illustration 297 g00836473

Auxiliary Hydraulics (1) – 15 Amp

Spare (2) – OPEN

Ride Control (3) – 10 Amp

Left Tail Light (4) – 5 Amp

Right Tail Light (5) – 5 Amp

Air Conditioner (6) – 10 Amp

Front Window Wiper (7) – 10 Amp

Rear Window Wiper (8) – 10 Amp

Rotating Beacon (9) – 10 Amp

Spare (10) – 10 Amp

Rear Floodlights (11) – 15 Amp

i01999210

Hydraulic Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

Illustration 298 g01030543

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i01986309

Hydraulic System Oil - Change

SMCS Code: 5056

Note: The normal hydraulic oil change interval is at every 2000 Service Hours or 1 Year. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 Service Hours or 2 Years. S·O·S oil analysis must be performed at every 500 Service Hours or 3 Months in order to extend the hydraulic oil change interval. The results from the S·O·S oil analysis will determine if the hydraulic oil change interval may be extended. If S·O·S oil analysis is not available, the hydraulic oil change interval must remain at every 2000 Service Hours or 1 Year . Refer to the Operation and Maintenance Manual, “S·O·S Information”.

Operate the machine for a few minutes in order to warm the hydraulic system oil.

The machine should be level . Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

The hydraulic tank filler cap is located under the access door on the top of the engine compartment.

1. Open the engine access door on the top of the machine.

Illustration 299 g01030543

2. Remove the hydraulic tank filler cap.

Illustration 300 g00728122

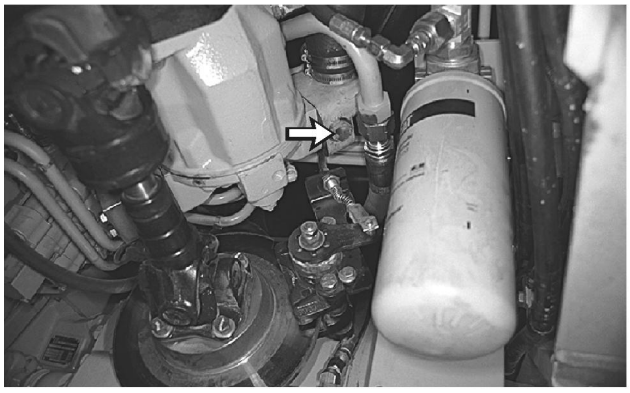

Illustration 301 g00290722

3. Remove the drain plug on the flange that is located on the hydraulic pump. Allow the oil to drain into a suitable container.

4. Clean the drain plug and replace the drain plug. Tighten the drain plug to a torque of 90 ± 10 N·m (66 ± 7 lb ft).

5. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, “Hydraulic System Oil Filter - Change”.

6. Inspect the hydraulic tank breather that is located on a hose from the overflow container. Replace the breather, if necessary.

7. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

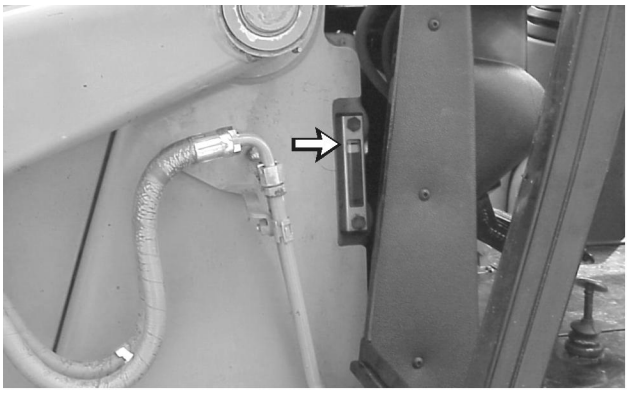

Illustration 302 g00724596

8. Maintain the hydraulic oil level in the sight gauge between the “MIN” mark and the “MAX” mark.

Check the hydraulic oil level with the loader on the ground and with the backhoe in the transport position.

Note: The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.

9. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.

10. Install the hydraulic tank filler cap.

11. Close the access door.

i01986704

Hydraulic System Oil Filter - Replace

SMCS Code: 5056; 5068

1. Open the engine access door on the top of the machine.

Illustration 303 g01030543

2. Remove the hydraulic tank filler cap that is located under the access panel on the top of the engine compartment.

Illustration 304 g00724532

3. The hydraulic oil filter is located on the left side of the machine.

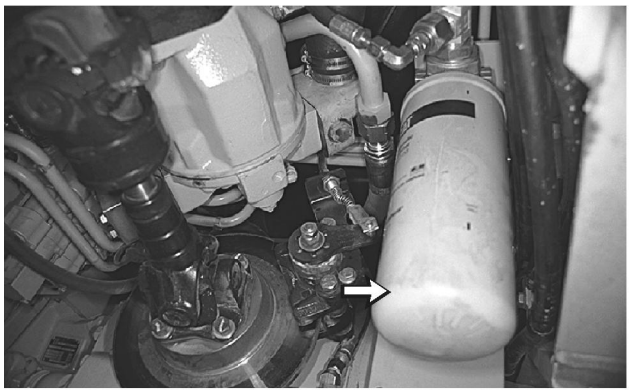

Illustration 305 g00290851

4. Remove the filter element with a strap type wrench.

5. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.

6. Apply a light coat of oil to the gasket of the new filter element.

7. Install the new filter element by hand. When the gasket contacts the filter element mounting base, tighten the filter element for an additional three quarters of a turn.

8. Remove the hydraulic tank breather. Replace the old breather with a new breather.

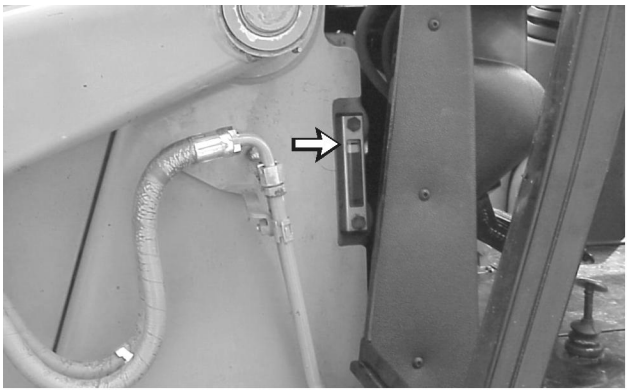

Illustration 306 g00724596

9. Maintain the hydraulic oil level in the sight gauge between the “MIN” mark and the “MAX” mark. Add oil, if necessary.

10. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.

11. Install the hydraulic tank filler cap.

12. Close the access door.

i01352315

Hydraulic System Oil Level - Check

SMCS Code: 5056; 7479

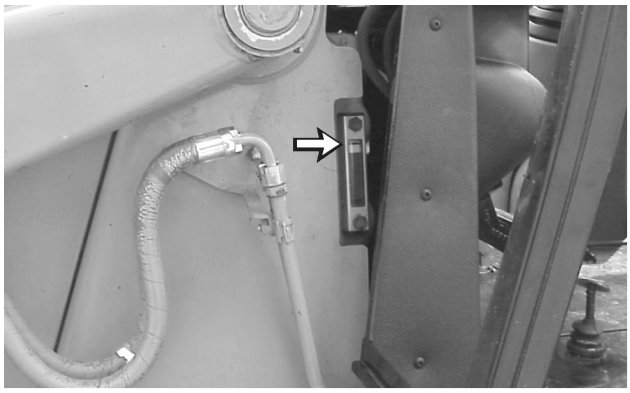

Illustration 307 g00724596

The sight gauge for the hydraulic tank is located on the left side of the machine. Move the backhoe to the transport position and lower the loader bucket to the ground.

Turn off the engine. Wait about five minutes before you check the hydraulic system oil level.

Maintain the oil level in the sight gauge between the “MIN” mark and the “MAX” mark.

i00661457

Kingpin Bearings (Rear) - Lubricate

(All Wheel Steer)

SMCS Code: 4314

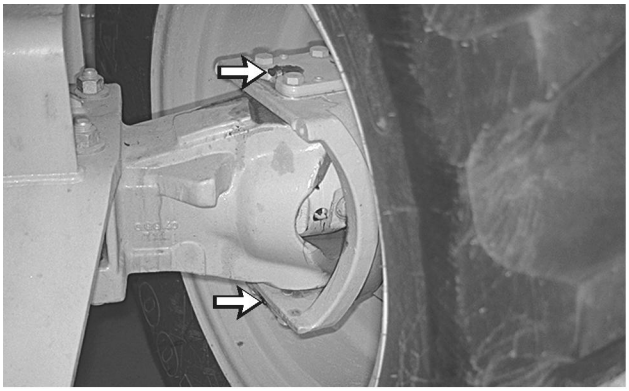

Illustration 308 g00291790

Apply lubricant to the grease fittings for the kingpin bearings of the rear steerable axle. There is a total of four grease fittings.

i01364566

Loader Bucket, Cylinder, and Linkage Bearings - Lubricate

SMCS Code: 7069; 7070; 7071

Single Tilt Machines

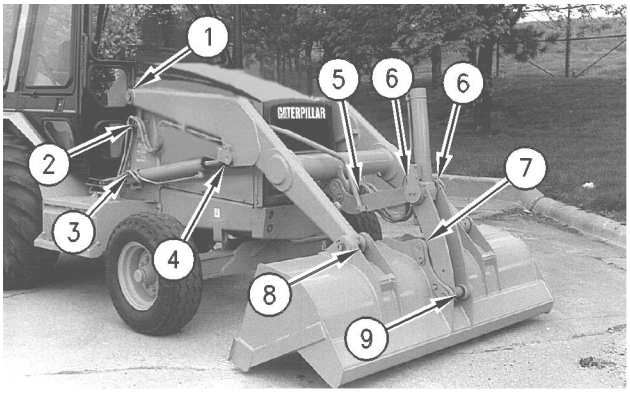

Illustration 309 g00291110

Apply lubricant to the grease fittings (1) for the frame and for the lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fitting (2) for the pivot for the linkage of bucket positioner and lift kickout.

Apply lubricant to the grease fittings (3) for the head end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (4) for the rod end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (5) for the pivot pin at the loader lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (6) for the pivot bearings for the bucket tilt cylinder. There is a grease fitting in each linkage (four total).

Apply lubricant to the grease fitting (7) for the rod end of the tilt cylinder.

Apply lubricant to the grease fittings (8) for the lower pivot pins. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (9) for the upper pivot pin. There is a grease fitting for each side of the machine.

There is a total of 17 grease fittings.

Parallel Lift Machines

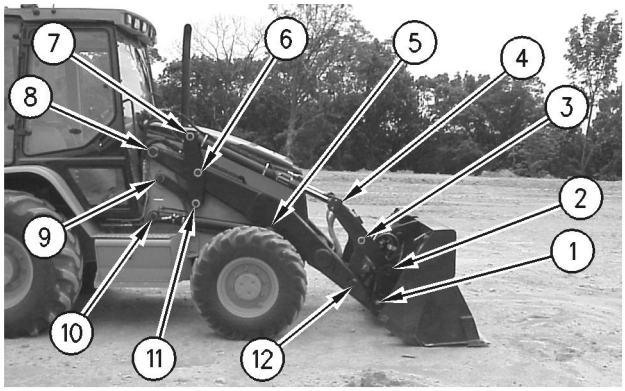

Illustration 310 g00724847

Apply lubricant to the grease fittings (1) for the lower pivot pin of the quick coupler assembly. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (2) for the upper pivot pin of the quick coupler assembly. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (3) for the upper pivot pin of the tilt linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (4) for the rod end of the tilt cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (5) for the rod end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (6) for the center pivot pin of the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (7) for the head end of the tilt cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (8) for the frame and for the lift arm. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (9) for the frame and for the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (10) for the head end of the lift cylinder. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (11) for the lower pivot pin of the parallel linkage. There is a grease fitting for each side of the machine.

Apply lubricant to the grease fittings (12) for the lower pivot pin of the tilt linkage. There is a grease fitting for each side of the machine.

There is a total of 24 grease fittings.

i02106227

Oil Filter - Inspect

SMCS Code: 1318; 3067; 5068

Inspect a Used Filter for Debris

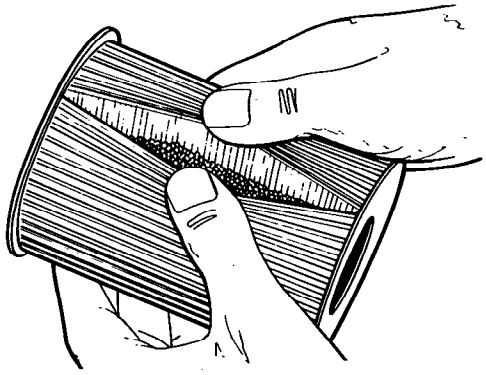

Illustration 311 g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i01364583

Parking Brake - Check/Adjust

SMCS Code: 4267

Check Procedure

Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.

Check the brakes on a dry, level surface.

Fasten the seat belt before you check the brakes.

The following checks are used to determine if the parking brake is functional. These checks 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.

1. Start the engine. Raise the bucket slightly.

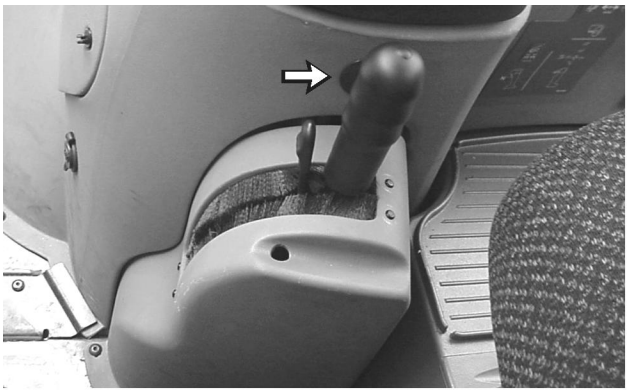

Illustration 312 g00731039

2. Engage the parking brake.

3. If the machine is equipped with the standard transmission, move the transmission speed shift lever to THIRD gear. Move the transmission direction control lever to FORWARD, to NEUTRAL, and back to FORWARD. If the machine is equipped with a power shift transmission move the transmission control lever to FOURTH SPEED FORWARD, to NEUTRAL, and back to FOURTH SPEED FORWARD. This is done in order to override the transmission neutralizer for this test.

Note: Place machines that are equipped with all wheel drive into two-wheel drive mode.

Note: The parking brake indicator light should come on and the parking brake alarm should sound.

4. Gradually increase the engine speed to high idle. The machine should not move.

⚠ WARNING

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

5. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the blade to the ground. Stop the engine.

⚠ WARNING

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

6. Reduce the engine speed. Move the transmission to NEUTRAL. Lower the bucket to the ground. Stop the engine.

Adjustment Procedure

If the machine moved during the test, perform the following procedure in order to adjust the parking brake.

1. Apply the service brakes.

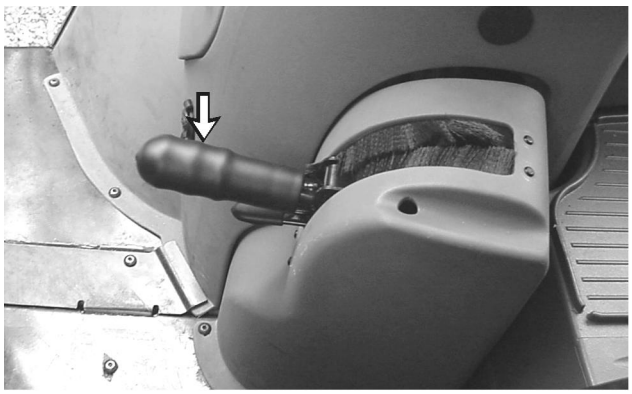

Illustration 313 g00731041

2. Disengage the parking brake.

3. As you view the parking brake adjuster knob from the operator seat, turn the knob counterclockwise for one quarter of a turn.

4. Repeat steps 1 to 6 in the check procedure.

If the machine moves during the parking brake test, then perform the adjustment procedure again. If you run out of adjustment on the parking brake adjuster knob, refer to Systems Operation, Testing and Adjusting, SENR1259, “Parking Brake Control - Adjust”.

i01986724

Radiator Core - Clean

SMCS Code: 1353

Illustration 314 g00725231

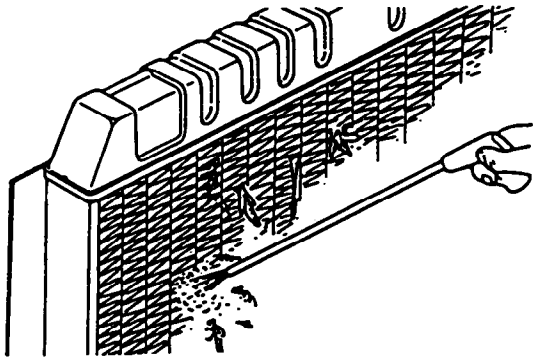

Illustration 315 g00101939

NOTICE
Do not spray high pressure water into the radiator while the engine is running.

You can use compressed air, high pressure water, or steam to remove dust and other debris from the radiator fins. However, the use of compressed air is preferred.

Note: If necessary, tilt the oil cooler away from the radiator in order to remove dust and debris between the radiator and the oil cooler.

Note:

i02977292

Refrigerant Dryer - Replace

SMCS Code: 7322-510

Reference: For the correct procedure, refer to Air Conditioning and Heating Service Manual, SENR5664 or the Disassembly and Assembly Manual for your machine.

Note: A qualified mechanic should replace the components of the refrigerant system since special tooling and training are required.

i01364894

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7325

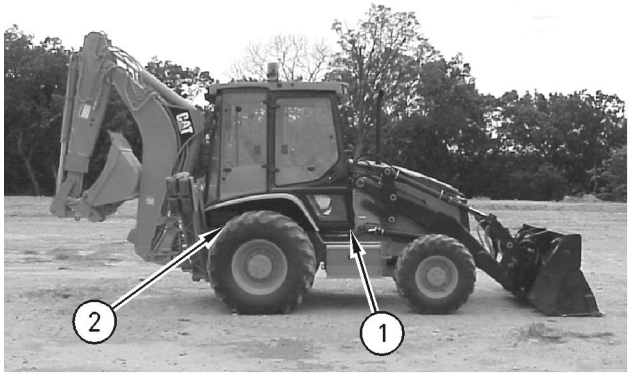

Illustration 316 g00725241

1. Inspect the ROPS for loose bolts or for damaged bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

Tighten the M16 bolts (1) to a torque of 165 ± 30 N·m (122 ± 22 lb ft). Tighten the M24 bolts (2) to a torque of 524 ± 100 N·m (386 ± 74 lb ft).

Note: Apply oil to all ROPS bolt threads before you install the bolts. Failure to apply oil to the bolt threads can result in improper bolt torque.

2. Operate the machine on a rough surface. Replace the ROPS mounting supports if the ROPS emits a noise. Replace the ROPS mounting supports if the ROPS rattles.

Do not straighten the ROPS. Do not repair the ROPS by welding reinforcement plates to the ROPS.

Consult your Caterpillar dealer for repair of any cracks in the ROPS.

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

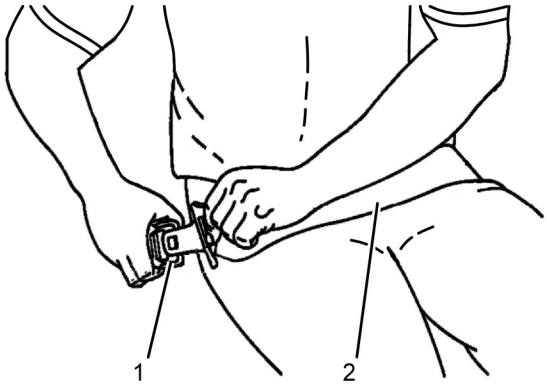

Illustration 317 g02620101
Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i06891605

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

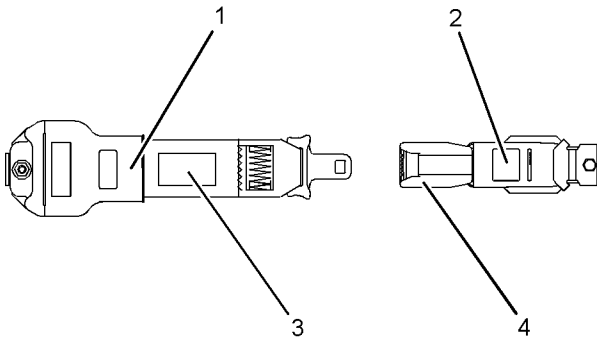

Illustration 318 g01152685

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.

i02969541

Sideshift Stabilizer Wear Pads - Inspect

SMCS Code: 7222-040

The gap between the wear pads for the stabilizer legs and the tube assembly must be checked. The gap between the wear pads and the tube assembly must be no larger than 3.5 ± 0.5 mm (0.14 ± 0.02 inch). If the gap is larger than 3.5 ± 0.5 mm (0.14 ± 0.02 inch), the wear pads can detach. Use the following procedure in order to check the gap and adjust the gap.

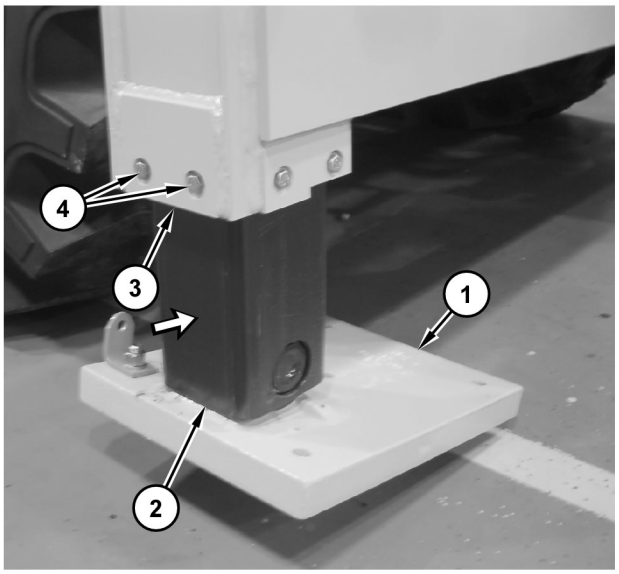

Illustration 319 g01231286

1. Position the stabilizer pad (1) just off the ground.
2. Push tube assembly (2) inward so that the tube assembly contacts the pads toward the center of the machine.
3. By using a gauge or shims that are 1 mm (0.04 inch) thick, measure the clearance (3) between the tube assembly (2) and the pads on the outside of the frame.
4. If the gap is larger than 1 mm (0.04 inch), the pad must be shimmed.
5. Work on one side of the stabilizer at a time. Remove the two bolts (4) that are at the bottom of the frame on the outside of the frame.
6. Remove the retaining plate that is on the inside of the frame. The two bolts held the retaining plate in position.

7. Remove the wear pads. Clean the wear pads. Inspect the wear pads. Clean the location of the wear pads and inspect the location of the wear pads.

8. Install the wear pad. Install 126-5704 Shims so that the gap between the wear pad and the tube assembly (2) is no larger than 1 mm (0.04 inch). If you need to install more than seven of the 126-5704 Shims, replace the wear pad with the thickest wear pad that is available.

9. Install the internal retaining plate and the two bolts (4). The torque for the bolts is 55 ± 10 N·m (40.0 ± 8.0 lb ft).

10. In order to check free movement, raise the tube assembly (2) and lower the tube assembly. The tube assembly should not bind.

11. Repeat this procedure for the three other wear pads on the lower part of the frame.

i01365042

Stabilizer and Cylinder Bearings - Lubricate

SMCS Code: 5468; 7222

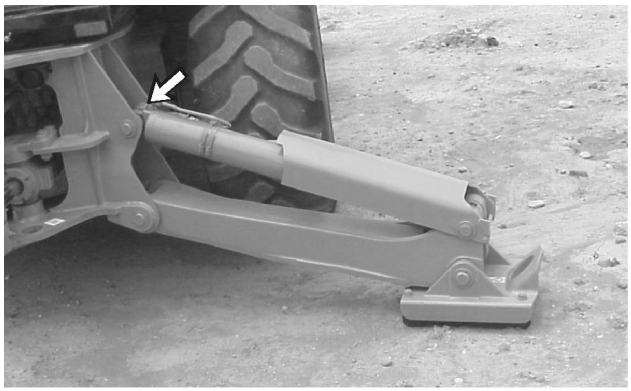

Illustration 320 g00728949

Position the stabilizer, as shown.

Apply lubricant to the grease fitting for the head end of the cylinder.

Repeat for the other stabilizer.

There is a total of two grease fittings.

i01365047

Swing Frame and Cylinder Bearings - Lubricate

SMCS Code: 5105; 6506; 6507; 7063

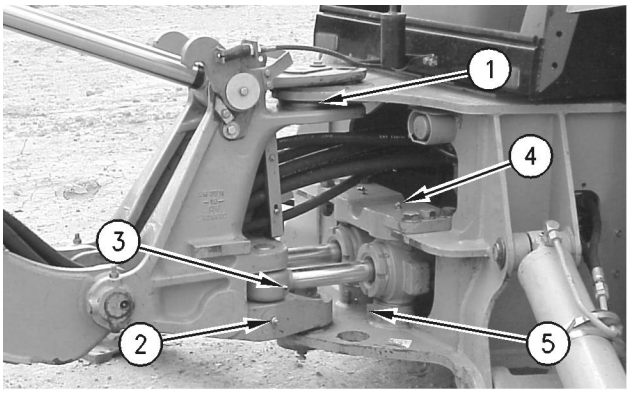

Illustration 321 g00729366

Apply lubricant to the grease fitting (1) for the top swing pin.

Apply lubricant to the grease fitting (2) for the bottom swing pin.

Apply lubricant to the grease fitting (3) for the eye of the swing cylinder. Repeat for the other swing cylinder.

Apply lubricant to the grease fitting (4) for the bearing on the top of the swing cylinder. Repeat for the other swing cylinder.

Apply lubricant to the grease fitting (5) for the bearing on the bottom of the swing cylinder. Repeat for the other swing cylinder.

There is a total of eight grease fittings.

i02369786

Tire Inflation - Check

SMCS Code: 4203

Measure the tire pressure on each tire. Tire inflation pressures for each application may vary. These tire inflation pressures should be obtained from your tire supplier.

Inflate the tires, if necessary. Refer to Operation and Maintenance Manual, “Tire Inflation with Air”.

The operating pressure is based on the following conditions.

- The weight of a ready-to-work machine at the front tires and at the rear tires

- The rated payload
- Average operating conditions

Contact your tire supplier if your machine is experiencing tire slippage. Tire wear may cause tire slippage.

i04003416

Transmission Magnetic Screen - Clean

SMCS Code: 3030

1. Drain the transmission oil. Refer to Operation and Maintenance Manual, “Transmission Oil - Change”.

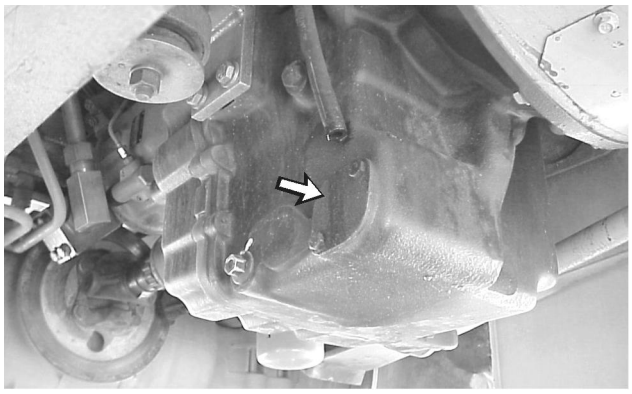

Illustration 322 g00725296

Magnetic strainer cover for the standard transmission

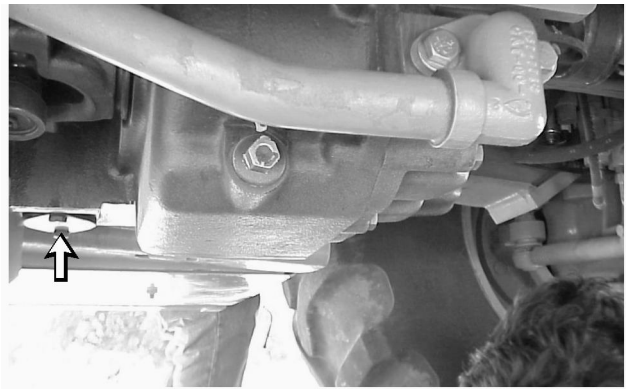

Illustration 323 g00725298

Magnetic strainer cover for the power shift or auto shift transmissions

2. Remove the magnetic strainer cover.

3. Remove the magnets from the housing.

4. Remove the screen from the housing.

5. Wash the tube and the screen in a clean, nonflammable solvent.

NOTICE
Do not drop or rap the magnets against any hard objects. Replace any damaged magnets.

6. Clean the magnets with a cloth, with a stiff bristle brush, or with pressure air.

7. Install the magnets and the tube assembly into the magnetic screen.

8. Install the magnetic screen.

9. Clean the cover and inspect the seal. Replace the seal, if the seal is damaged.

10. Install the cover. Tighten the cover bolts.

11. Fill the transmission. Refer to Operation and Maintenance Manual, “Transmission Oil - Change”.

i01986745

Transmission Oil - Change

SMCS Code: 3030; 3080

Operate the machine for a few minutes in order to warm the transmission oil.

The machine should be level. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

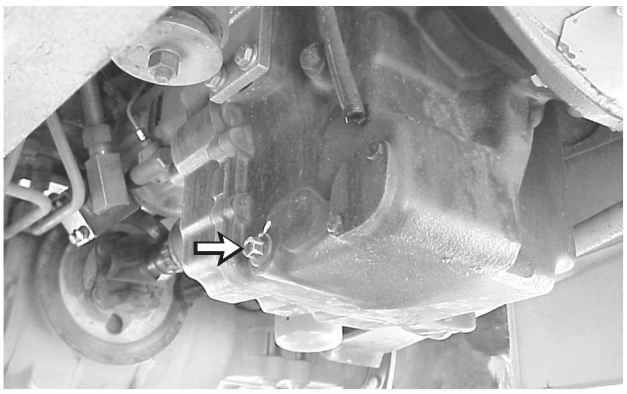

Illustration 324 g00725460

Drain plug for standard transmission

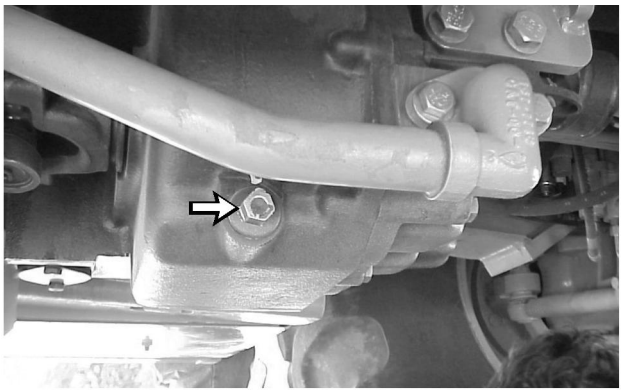

Illustration 325 g00725461

Drain plug for power shift transmission

1. Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container. Clean the transmission drain plug and install the transmission drain plug.

2. Change the transmission oil filter element. Refer to Operation and Maintenance Manual, “Transmission Oil Filter - Replace”.

3. Clean the transmission magnetic screen. Refer to Operation and Maintenance Manual, “Transmission Magnetic Screen - Clean”.

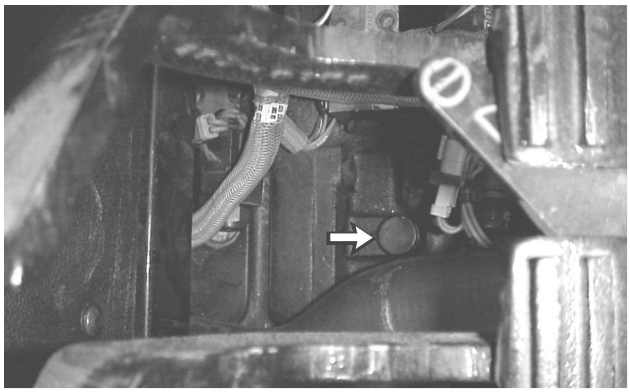

Illustration 326 g00725462

4. Remove the transmission breather from the top of the transmission case. Clean the breather in clean nonflammable solvent and allow the breather to dry. Replace the breather.

5. Open the engine access door on the top of the machine.

Illustration 327 g01030657

6. Remove the dipstick/fill cap and fill the transmission with transmission oil. Refer to Operation and Maintenance Manual, “Lubricant Viscosities” and Operation and Maintenance Manual, “Capacities (Refill)”.

7. Start the engine and run the engine at low idle. Apply the service brake. Slowly operate the transmission controls in order to circulate the oil.

8. Move the transmission control lever to NEUTRAL and engage the parking brake. Inspect the transmission for leaks.

9. Maintain the transmission oil level within the crosshatched region on the “CHECK WITH OIL WARM” side of the dipstick when the transmission is warm. Add transmission oil through the transmission filler tube, if necessary.

Note: The transmission can be checked with cold transmission oil. Check the oil level with the cold oil check side of the dipstick. The engine must be stopped in order to do a cold oil check.

10. Install the dipstick/fill cap and install the engine access door.

11. Stop the engine.

i01986825

Transmission Oil Filter - Replace

SMCS Code: 3067

Illustration 328 g00724532

The transmission filter is located on the left side of the machine .

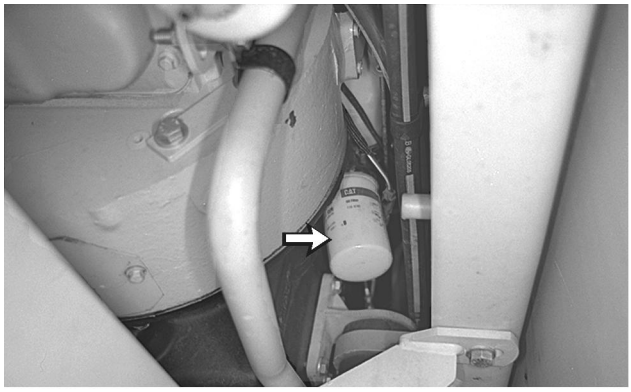

Illustration 329 g00293355

1. Remove the transmission oil filter element with a strap type wrench.
2. Clean the filter element mounting base. Remove any part of the filter element gasket that remains on the filter element mounting base.
3. Apply a light coat of oil to the gasket of the new filter element.
4. Install the new filter element by hand. When the gasket contacts the mounting base, tighten the filter element for an additional three quarters of a turn.
5. Start the engine and apply the service brake. Slowly operate the transmission controls in order to circulate the transmission oil.
6. Move the transmission control lever to NEUTRAL and engage the parking brake. Inspect the filter element for leaks.

Illustration 330 g01030657

7. Maintain the transmission oil level within the crosshatched region on the “CHECK WITH WARM OIL” side of the dipstick when the transmission is warm. Add transmission oil, if necessary.
8. Stop the engine.

i01986801

Transmission Oil Level - Check

SMCS Code: 3030; 3080; 3081

Check the transmission oil level while the machine is on a level surface.

1. Open the engine access door on the top of the machine.

Illustration 331 g01030657

2. Remove the dipstick/fill plug for the transmission.

3. Maintain the oil level within the crosshatched region on the “CHECK WITH OIL WARM” side of the dipstick/fill plug when the transmission is warm and the engine is at low idle. Add transmission oil, if necessary.

Note: The transmission can be checked with cold transmission oil. Check the oil level with the cold oil check side of the dipstick. The engine must be stopped in order to do a cold oil check.

4. Clean the dipstick/fill plug and install the dipstick/fill plug.

i01999161

Transmission Oil Sample - Obtain

SMCS Code: 3030-008; 7542-008

Illustration 332 g01030657

Obtain the oil sample according to the Operation and Maintenance Manual, “Maintenance Interval Schedule”.

Refer to the Operation and Maintenance Manual, “General Hazard Information” for information that pertains to containing fluid spillage.

Refer to the Special Publication, SEBU6250, “S·O·S Oil Analysis” for more information.

i01986834

Wheel Bearings (Front) - Lubricate
(Two-Wheel Drive)

SMCS Code: 4205; 4208

Use the following procedure for both wheels.

1. Raise the front wheels slightly off the ground.

2. Install sufficient blocking under the frame and lower the machine to the blocking.

3. Remove the nuts and both wheels.

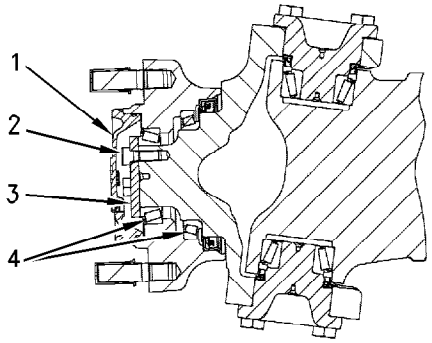

Illustration 333 g00976070

4. Remove the dust cap (1).

5. Remove bolts (2) and retaining plate (3).

6. Pull the hub assembly (4) until the cone and roller assembly come out of the hub assembly. Then, pull off the hub all the way.

7. Clean all of the parts in clean, nonflammable solvent and allow the parts to air dry. Do not use pressure air.

8. Inspect the roller assemblies for heat discoloration and for wear. Inspect the seals for damage. Replace any damaged parts.

9. Make sure that the grease gets packed between the rollers and the cage on both bearings.

Force the grease through the bearing from the large end of the rollers.

10. Pack a 6 mm (0.25 inch) layer of grease between the bearing assemblies in the hub. Do not pack the hub fully with grease.

11. Apply a 6 mm (0.25 inch) thick film of grease on the spindle surface.

12. Install the hub, the bearings, the washer, the nut and the wheel.

13. While you turn the wheel, tighten bolt (2) until a slight drag is noticed.

14. All bearing surfaces must make contact. The wheel should turn freely within 0.025 to 0.25 mm (0.001 to 0.010 inch) end play.

15. Install the dust cap.

i01986855

Wheel Nut Torque - Check

SMCS Code: 4051; 4199; 4200

Illustration 334 g00729576

Check the torque on new wheels or repaired wheels after every ten service hours until the specified torque is maintained.

The nut and the stud should be clean and dry for reassembly. Apply one drop of lubricating oil to the stud before installing the nut onto the stud.

Torque the nuts to 460 ± 60 N·m (339 ± 44 lb ft). Use a star pattern when you torque the nuts.

Check the nuts on all four wheels.

i01990919

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE
When operating in freezing temperatures, use Caterpillar or any commercially available nonfreezing window washer solvent.

Illustration 335 g01031223

The washer fluid bottle is located in the engine compartment.

1. Open the engine access door.
2. Remove the filler cap.
3. Fill the washer fluid bottle with washer fluid through the filler opening.
4. Replace the filler cap.
5. Close the engine access door.

i01437556

Window Wipers - Inspect/ Replace

SMCS Code: 7305

Inspect the condition of the wiper blades. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i03912371

Windows - Clean

SMCS Code: 7310; 7340

Clean the outside of the windows from the ground, unless handholds are available.

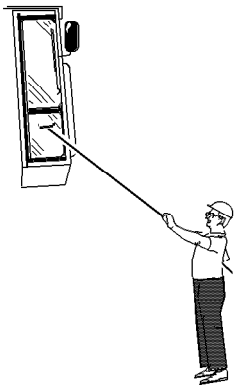

Illustration 336 g00566124

Typical example

Cleaning Methods

Aircraft Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.

Polycarbonate Windows (If equipped)

Wash polycarbonate windows with a mild soap or detergent. Never use a cleaning solvent on polycarbonate windows.

Wash polycarbonate windows with warm water and a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows.

Rinse the windows with a sufficient amount of clean water.

Reference Information Section

Reference Materials

i08292374

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting publications.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

publications.cat.com

i08292382

Decommissioning and Disposal

SMCS Code: 1000; 7000

When the product is removed from service, local regulations for the product decommissioning will vary. Disposal of the product will vary with local regulations.

Improperly disposing of waste can threaten the environment. Obey all local regulations for the decommissioning and disposal of materials.

Utilize appropriate personal protective equipment when decommissioning and disposing product.

Consult the nearest Cat dealer for additional information. Including information for component remanufacturing and recycling options.

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Product and Dealer Information

Note: For product identification plate locations, see the section “Product Identification Information” in the Operation and Maintenance Manual.

Delivery Date: _____

Product Information

Model: _____

Product Identification Number: _____

Engine Serial Number: _____

Transmission Serial Number: _____

Generator Serial Number: _____

Attachment Serial Numbers: _____

Attachment Information: _____

Customer Equipment Number: _____

Dealer Equipment Number: _____

Dealer Information

Name: _____ Branch: _____

Address: _____

_____

_____

	Dealer Contact	Phone Number	Hours
Sales:	_____	_____	_____
Parts:	_____	_____	_____
Service:	_____	_____	_____