



Operation and Maintenance Manual

D-Series, D2-Series Compact Track Loaders (CTL), Multi-Terrain Loaders (MTL), and Skid Steer Loaders (SSL)

HRD 1-UP (226D)	JSL 1-UP (246D)	RE5 1-UP (262D)	WE5 1-UP (289D)
HR6 1-UP (226D)	MKT 1-UP (246D)	B5W 1-UP (272D)	KB9 1-UP (289D)
DPR 1-UP (232D)	PN5 1-UP (246D)	ETL 1-UP (272D XHP)	BE7 1-UP (279D)
KXC 1-UP (232D)	GWR 1-UP (249D)	BL2 1-UP (272D2)	HP7 1-UP (279D XHP)
EH2 1-UP (232D)	AH9 1-UP (249D)	MD2 1-UP (272D2 XHP)	BL7 1-UP (297D2)
BGZ 1-UP (236D)	D9E 1-UP (249D)	FMT 1-UP (277D)	HP2 1-UP (279D2 XHP)
MPW 1-UP (236D)	EZW 1-UP (257D)	MLT 1-UP (277D)	GTC 1-UP (299D)
SEN 1-UP (236D)	EML 1-UP (257D)	NTL 1-UP (277D)	JST 1-UP (299D XHP)
K2D 1-UP (236D)	FMR 1-UP (257D)	GTL 1-UP (279D)	FD2 1-UP (299D2)
BL9 1-UP (239D)	D5T 1-UP (257D)	PPT 1-UP (279D)	BY4 1-UP (299D2)
CD4 1-UP (239D)	FTL 1-UP (259D)	RCX 1-UP (279D)	DX2 1-UP (299D2 XHP)
T9S 1-UP (239D)	GTK 1-UP (259D)	TP5 1-UP (279D)	DX9 1-UP (299D2 XHP)
DZT 1-UP (242D)	FTK 1-UP (259D)	HMT 1-UP (287D)	HLM 1-UP (299D2 XHP)
A9W 1-UP (242D)	LW5 1-UP (259D)	STK 1-UP (287D)	
DML 1-UP (242D)	DTB 1-UP (262D)	TLK 1-UP (287D)	
HFB 1-UP (242D)	KTS 1-UP (262D)	TAW 1-UP (289D)	
BYF 1-UP (246D)	LST 1-UP (262D)	WCT 1-UP (289D)	
HMR 1-UP (246D)	AJ7 1-UP (262D)	A9Z 1-UP (289D)	

Language: Original Instructions



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



Important Safety Information

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

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

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

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

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



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

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

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

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

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

NOTICE

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

Other parts may not meet certain original equipment specifications.

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

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

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Foreword

California Proposition 65 Warning

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



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

www.P65Warnings.ca.gov

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



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

www.P65Warnings.ca.gov

Wash hands after handling components that may contain lead.

Literature Information

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

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

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

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

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

Safety

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

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

Operation

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

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

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

Maintenance

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

Maintenance Intervals

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

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

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

Certified Engine Maintenance

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

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

Machine Capacity

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

Product Identification Number

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

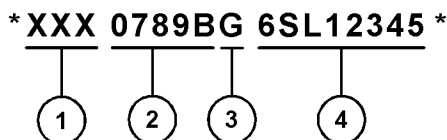


Illustration 1

g03891925

Where:

1. World Manufacturing Code (characters 1-3)

2. Machine Descriptor (characters 4-8)

3. Check Character (character 9)

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

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

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

Safety Section

i05840662

Safety Messages (Only Japanese market)

SMCS Code: 7000; 7405

There are several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Be familiar 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 Cat dealer can provide new safety messages.

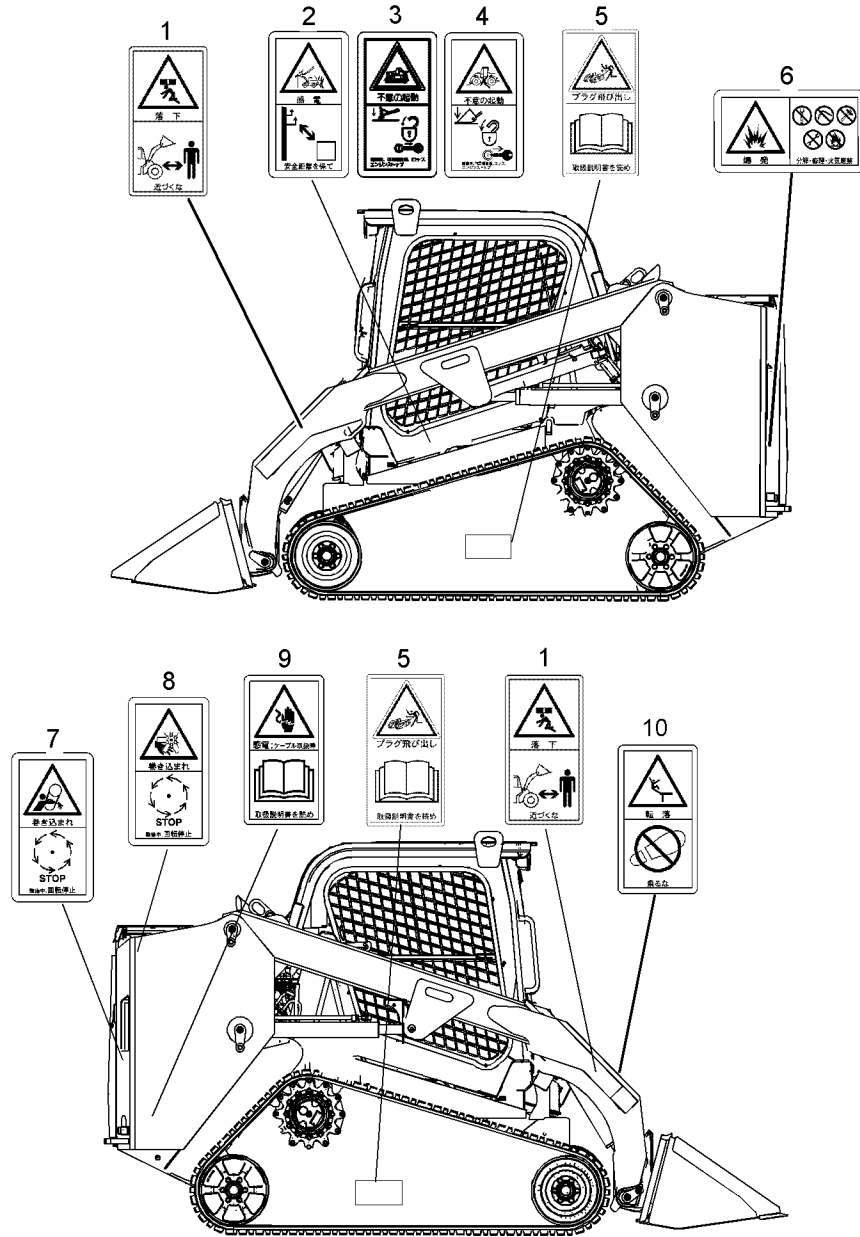


Illustration 2

g03693276

Crushing Hazard (1)

This safety message is located on both sides of the lift arm.



Illustration 3

g03094656

⚠ WARNING
Stay clear of the work tool during operation. Entanglement could result in personal injury or death.

Electrical Power Lines (2)

This safety message is Located inside cab.

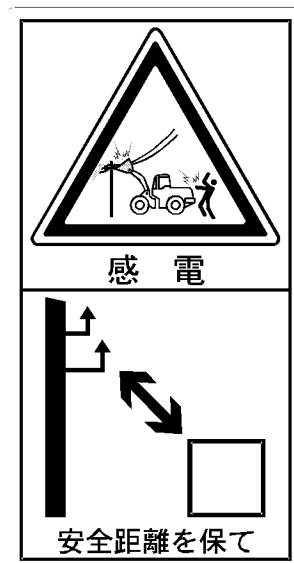


Illustration 4

g03094560

⚠ DANGER

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

Crash Hazard (3)

This safety message is located inside cab.



Illustration 5

g03690403

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

Crushing Hazard (4)

This safety message is located inside cab.

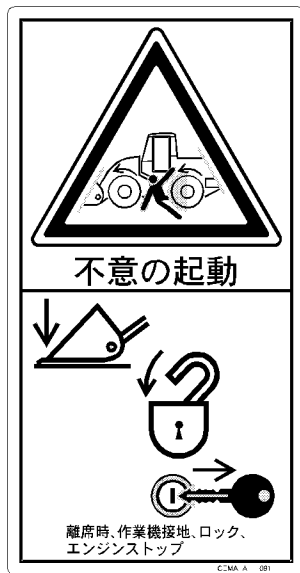


Illustration 6

g03094541

⚠ WARNING

Crush Hazard! A machine may move unexpectedly and without warning resulting in personal injury or death.

Before leaving the machine lower the work tool to the ground, lock operator controls, shut off the engine and remove the key.

High Pressure Cylinder (5)

This Safety message is positioned on the track adjusters.



Illustration 7

g02061296

⚠ WARNING

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

Explosion Hazard (6)

This safety message is located at rear of the machine.



Illustration 8

g03229317

⚠ WARNING

Personal injury can result from improper troubleshooting and repair procedures.

The following troubleshooting and repair procedures should only be performed by qualified personnel familiar with this equipment.

Cutting Hazard (7)

This safety message is located at the rear of the machine.



Illustration 9

g02061677

WARNING

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

Rotating Fan (8)

This safety message is located at the rear of the machine.

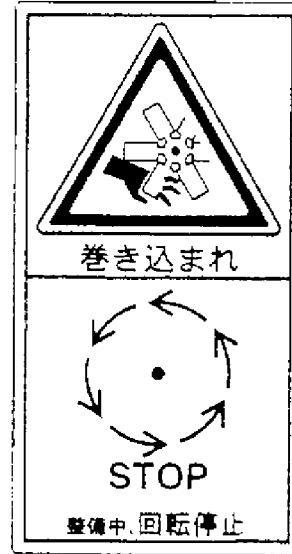


Illustration 10

g03369790

WARNING

Explosion Hazard! Improper jumper cable connections can cause an explosion resulting in serious injury or death. Batteries may be located in separate compartments. Refer to the Operation and Maintenance Manual for the correct jump starting procedure.

Jump Start Cables (9)

This warning is located at rear of the machine.

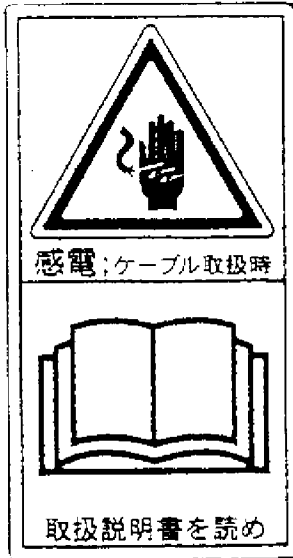


Illustration 11

g03369796

⚠ WARNING

Explosion Hazard! Improper jumper cable connections can cause an explosion resulting in serious injury or death. Batteries may be located in separate compartments. Refer to the Operation and Maintenance Manual for the correct jump starting procedure.

Falling Hazard (10)

This safety message is located on lift arm.

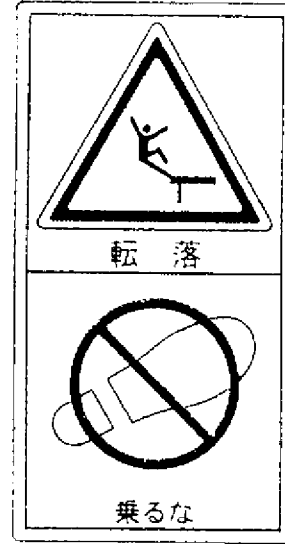


Illustration 12

g03369781

⚠ WARNING

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

i07694097

Safety Messages

SMCS Code: 7000; 7405

There are several specific safety messages on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Be familiar with all safety messages.

Make sure that all the safety messages are legible. Clean the safety messages or replace the safety messages if you cannot read the words. Replace the illustrations if the illustrations are not 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.

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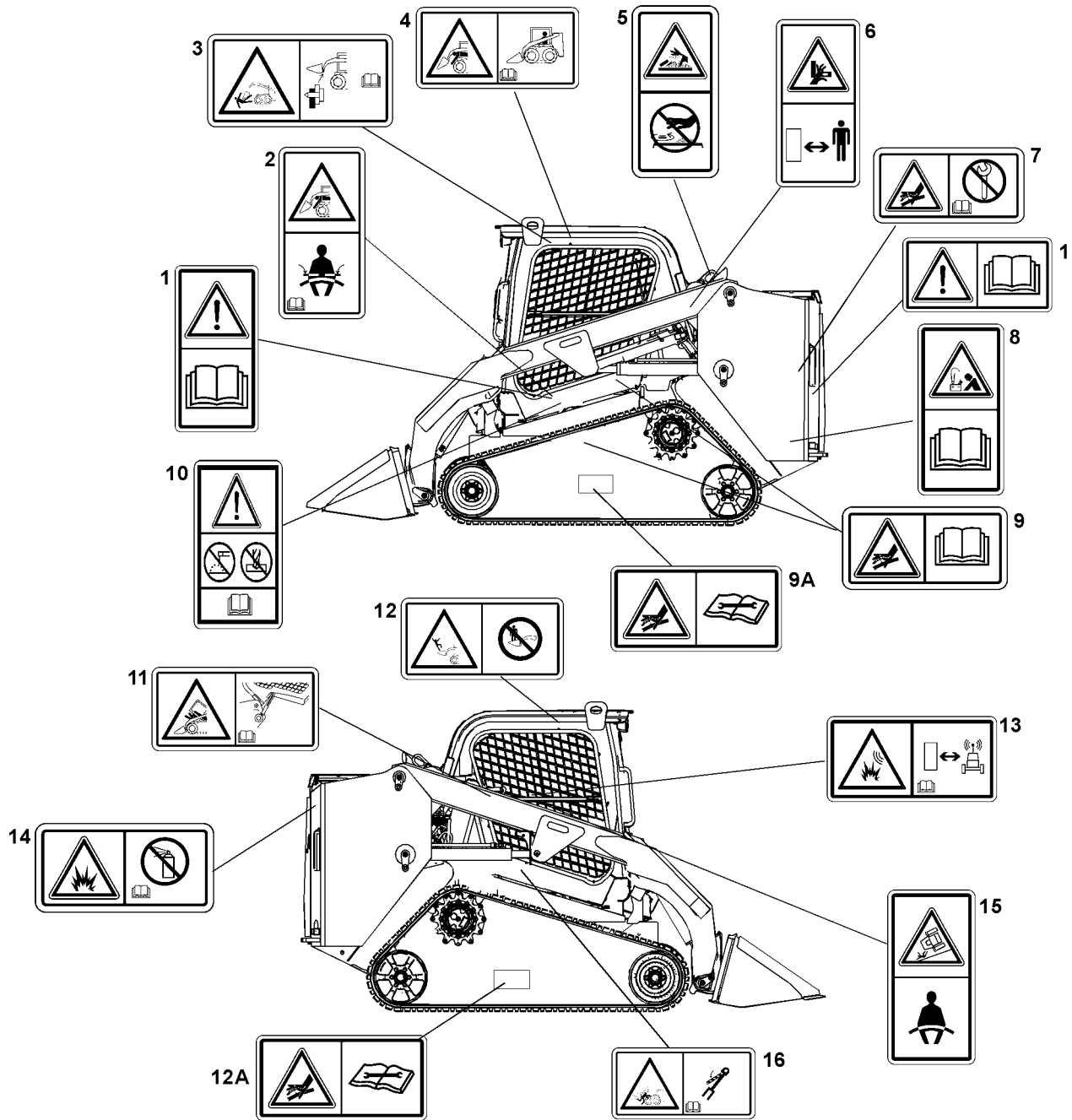


Illustration 13

g06398461

- | | | |
|---|---|--|
| <ul style="list-style-type: none"> (1) Do Not Operate. (2) Armrests (3) Work Tool Coupler (4) Stay Inside Operator Station (5) Pressurized System (6) Crushing Hazard | <ul style="list-style-type: none"> (7) High-Pressure Fuel (8) Jump Starting (9) Accumulator (9A) High-Pressure Cylinder (10) Rollover Protective Structure/Falling Object Protective Structure | <ul style="list-style-type: none"> (11) Cab Support (12) Never Permit Riders. (13) Product Link (14) Aerosol Starting Aid (15) Seat Belt (16) Brace for the Loader Lift Arms |
|---|---|--|

Do Not Operate (1)

This warning film is located inside the cab on the left-hand rear ROPS post.

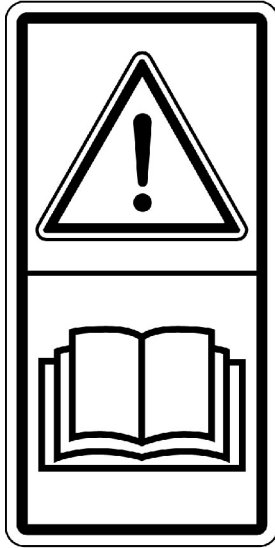


Illustration 14

g01379128

WARNING

Read and understand the instructions and warnings in the operation and maintenance manuals. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

Be alert! Know work conditions. Note and avoid all hazards and obstructions. Keep by-standers away when operating.

Fasten seat belt and lower armrests.

Make certain all controls are in neutral position and start engine.

Disengage parking brake.

Machine controls are active.

Failure to follow the instructions or heed the warnings could result injury or death.

Do Not Operate (1) (Engine)

This message is also on the engine.



Illustration 15

g01370904

WARNING

Read and understand the instructions and warnings in the operation and maintenance manuals. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

Be alert! Know work conditions. Note and avoid all hazards and obstructions. Keep by-standers away when operating.

Fasten seat belt and lower armrests.

Make certain all controls are in neutral position and start engine.

Disengage parking brake.

Machine controls are active.

Failure to follow the instructions or heed the warnings could result injury or death.

Armrests (2)

This warning message is located inside the cab on the left-hand joystick console.

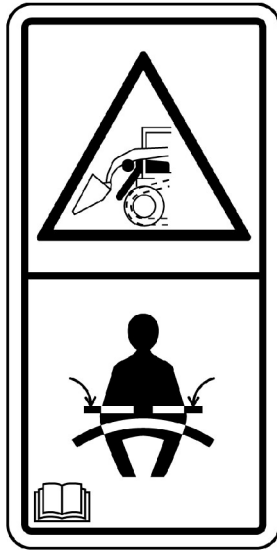


Illustration 16

g01427454

WARNING

Crush/Ejection Hazard! Could cause serious injury or death.

Always wear seatbelt and lower both armrests while operating machine. Read the Operation and Maintenance Manual.

Work Tool Coupler (3)

This warning message is located inside the cab on the upper left-hand switch console.

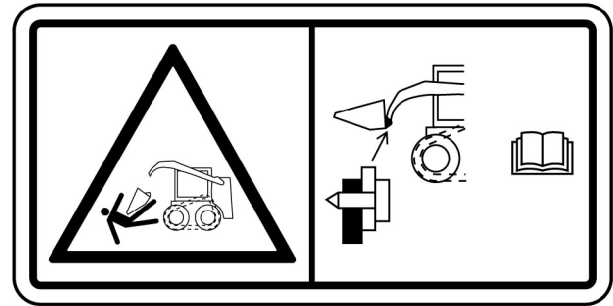


Illustration 17

g01427447

WARNING

Improper Attachment of the Work Tool could result in injury or death.

Do not operate the machine without confirmation that the coupler pins are fully engaged. Follow the operating procedures in the Operation and Maintenance Manual.

Refer to Operation and Maintenance Manual, "Work Tool Coupler Operation" for the proper procedure for the work tool coupler.

Stay Inside Operator Station (4)

This warning message is located inside the cab on the upper left-hand switch console.

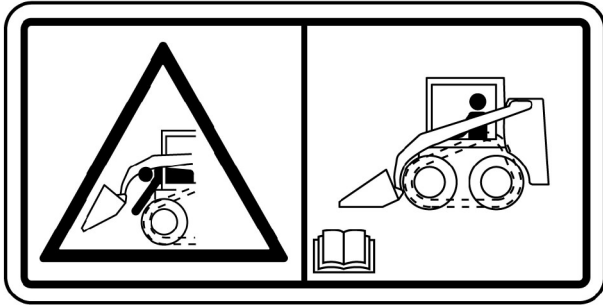


Illustration 18

g01427449

⚠ WARNING

Keep your body inside the operator station while operating the loader.

Never work with your arms, feet or legs beyond the operator station.

Failure to follow the instructions or heed the warnings will result in injury or death.

Pressurized System (5)

This warning message is on the radiator by the radiator cap.



Illustration 19

g01378799

⚠ 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.

Crush Hazard (6)

This warning is on the loader arm linkage of the machines that are equipped with vertical lift.



Illustration 20

g01378775

WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

High Pressure Fuel (7)

This safety message is located inside the engine compartment on the engine on or near the common rail fuel lines.



Illustration 21

g01381180

WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

Jump Start (8)

This warning message is located near the battery on the inside of the engine compartment.

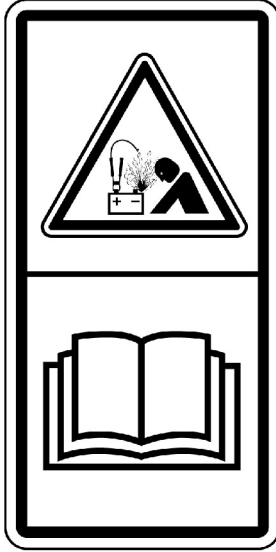


Illustration 22

g01409730

WARNING

Improper jumper cable connections can cause explosion resulting in personal injury. Batteries may be located in separate compartments, always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (-) cable from external source to engine block or frame.

Accumulator (9)

This warning message is located near the accumulator behind the cab. If your machine is equipped with ride control, there will be an additional accumulator in this location.

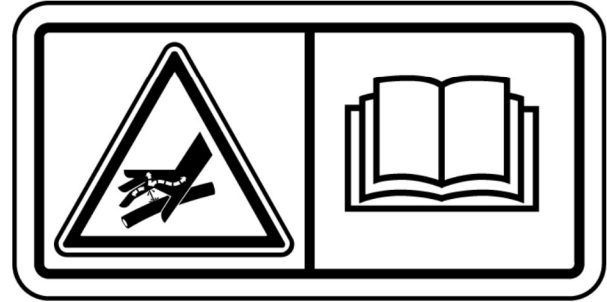


Illustration 23

g01371642

WARNING

Pressurized System!

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

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

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

High Pressure Cylinder (9A)

This safety message is on the undercarriage by the access panel. (Only on the CTL).

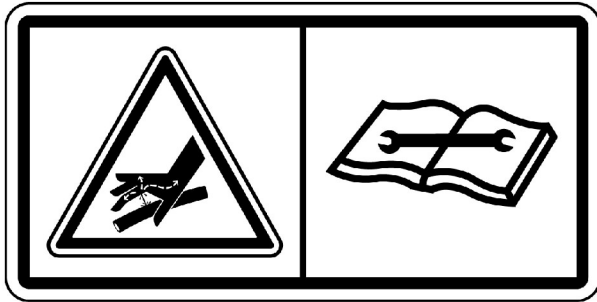


Illustration 24

g01372252

! WARNING

Personal injury can result from grease under high pressure.

The adjuster cylinder for the track is under high hydraulic pressure. Grease under high pressure can cause injury.

Do not visually inspect the adjuster cylinder to see if grease is released when the valve is opened. Look to see that the track has loosened.

Refer to Operation and Maintenance Manual, "Track - Inspect/Adjust (Detension the Track)" for more information.

Rollover Protective Structure/ Falling Object Protective Structure (10)

The no drill/no weld warning film is located inside the cab on the left hand rear ROPS post. The ROPS certification film is located inside the cab on the right hand rear ROPS post.



Illustration 25

g01212168

! WARNING

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

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

Cab Support (11)

This warning message is located outside the cab on the right-hand side near the cab support latch.

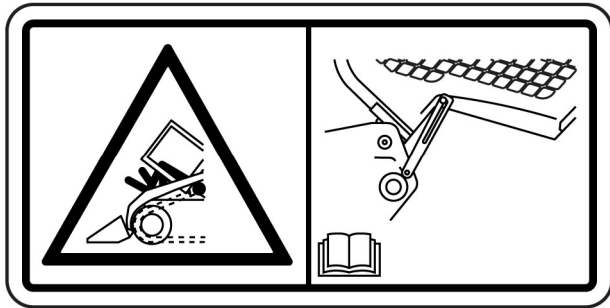


Illustration 26

g02708397

! WARNING

Do not go beneath cab unless cab is empty and support lever is engaged.

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

Never Permit Riders (12)

This warning message is located inside the cab on the upper right-hand switch console.

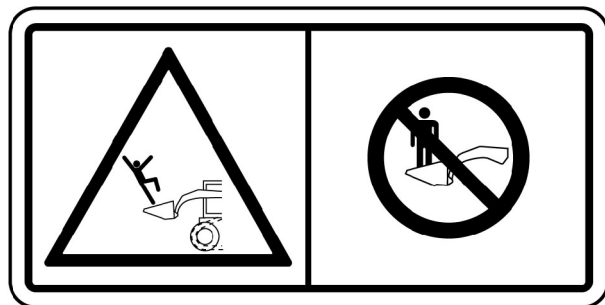


Illustration 27

g01427444

! WARNING

Never permit riders.

Never use work tool for a work platform.

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

Product Link (If equipped) (13)

This safety message is located inside the cab on the right-hand window.

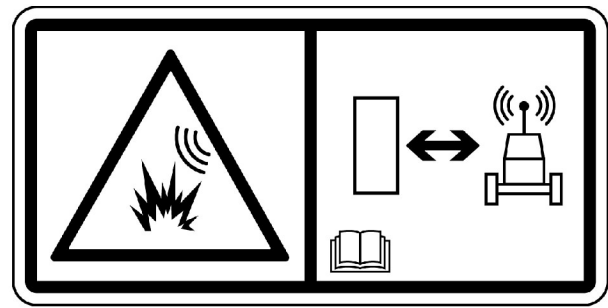


Illustration 28

g01370917

! WARNING

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

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

Aerosol Starting Aid (14)

This warning message is on the side of the air cleaner housing or inside the engine compartment on the frame wall near the air cleaner.

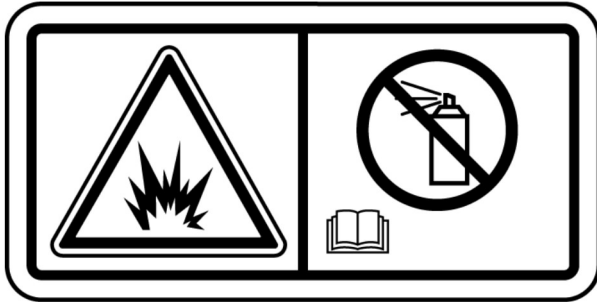


Illustration 29

g01372254

⚠ WARNING

Do not use ether. This machine is equipped with glow plugs. Using ether can create explosions or fires that can cause personal injury or death. Read and follow the engine starting procedure in the Operation and Maintenance Manual.

Seat Belt (15)

This warning message is located inside the cab on the right-hand joystick console.

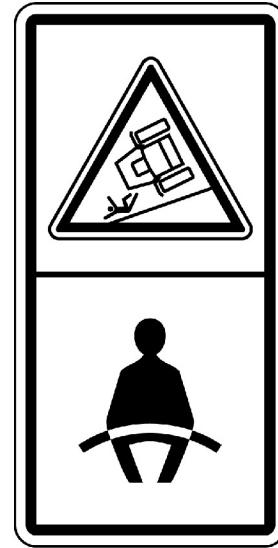


Illustration 30

g01371636

⚠ WARNING

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

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

Brace for the Loader Lift Arms (16)

This warning message is on the brace for the loader lift arms.

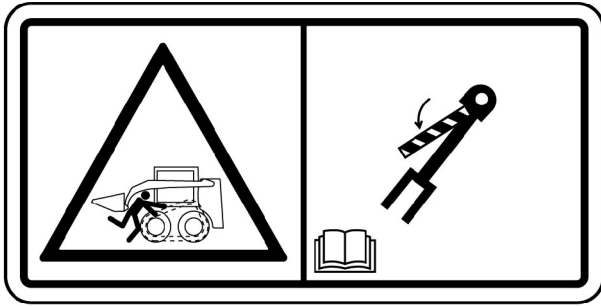


Illustration 31

g01427443

⚠ WARNING

Loader lift arm brace must be in place when working under raised lift arms.

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

Refer to Operation and Maintenance Manual, "Loader Lift Arm Brace Operation" for operating information.

Work Tools

Safety Section
Safety Messages

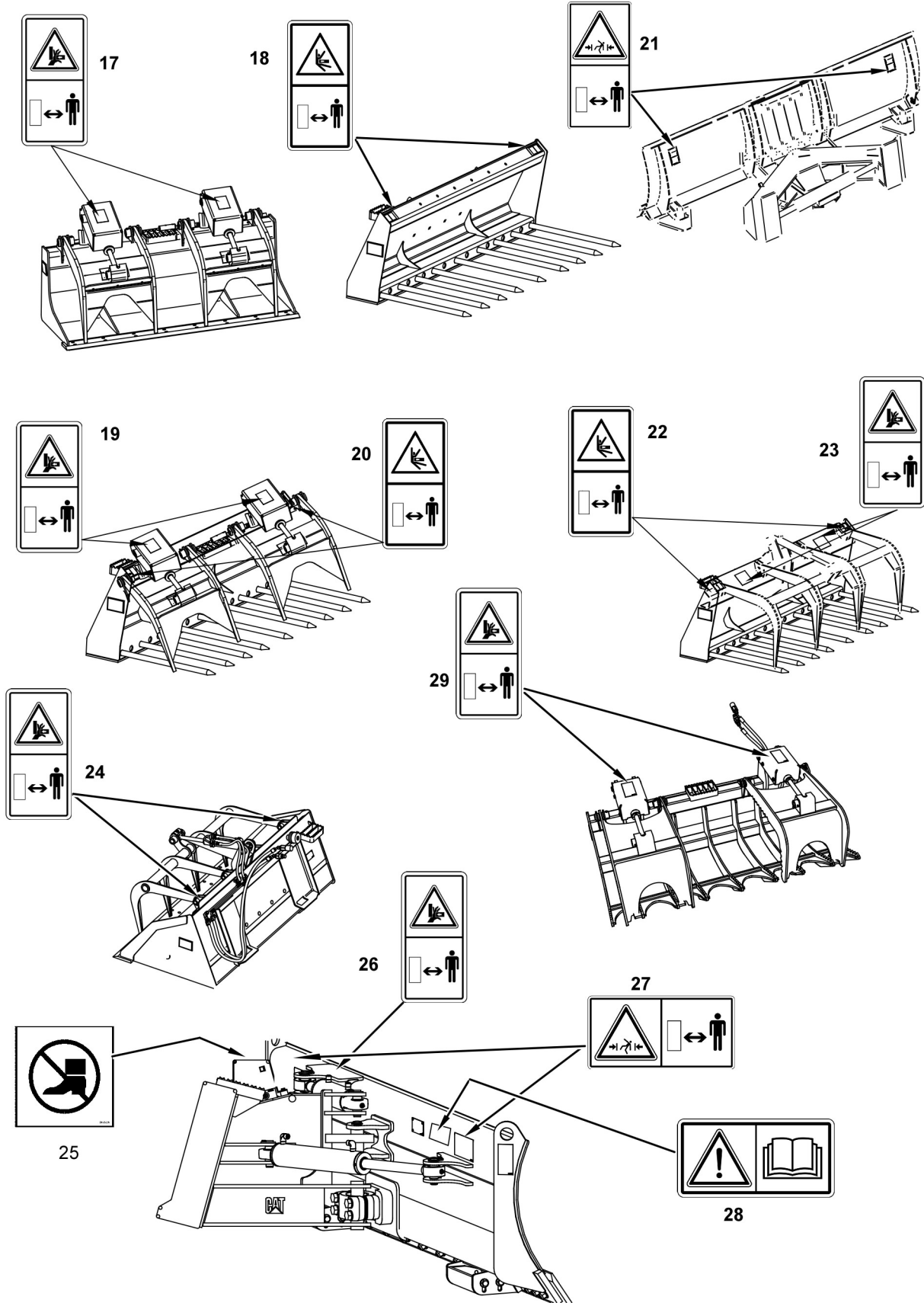


Illustration 32

g02616220

Work Tools

⚠ WARNING

Do not operate or work on this work tool unless you have read and understand the instructions and warnings in the Operation And Maintenance Manual for both the work tool and the host machine.

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

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

Industrial Grapple Bucket (17)

These warning messages are on top of the guards for the grapple cylinders.



Illustration 33

g01378775

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Utility Fork (18)

These warning messages are on top of the fork carriage.

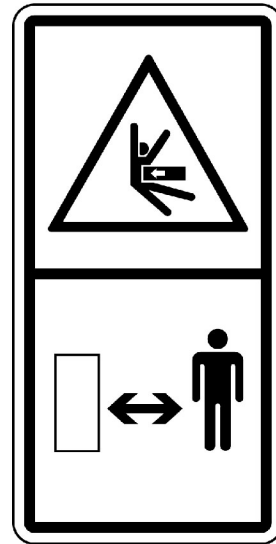


Illustration 34

g01389170

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from impalement could occur. Stay away from the work tool while it is in operation.

Industrial Grapple Fork (19)

These warning messages are on the guards for the grapple cylinders.



Illustration 35

g01378775

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Industrial Grapple Fork (20)

These warning messages are on top of the fork carriage.

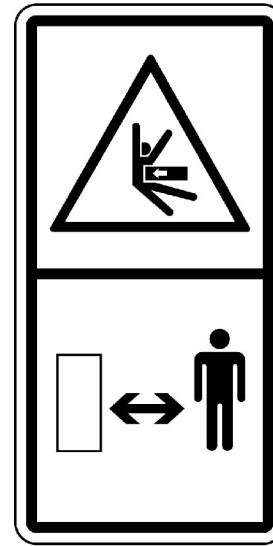


Illustration 36

g01389170

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from impalement could occur. Stay away from the work tool while it is in operation.

Angle Blade (21)

These warning messages are on the back side of the blade.

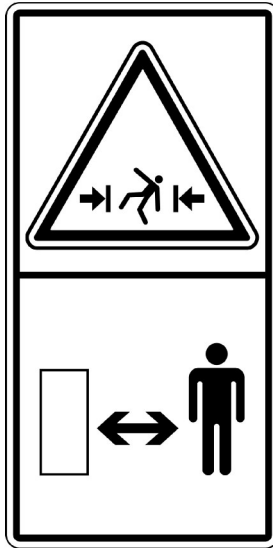


Illustration 37

g01377717

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Utility Grapple Fork (22)

These warning messages are on top of the fork carriage.

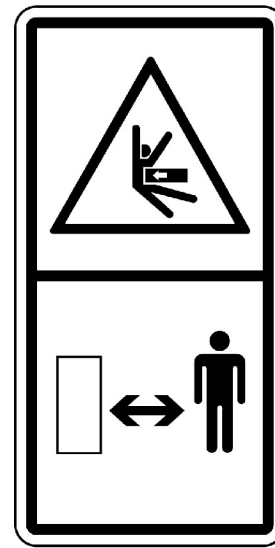


Illustration 38

g01389170

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from impalement could occur. Stay away from the work tool while it is in operation.

Utility Grapple Fork (23)

These warning messages are on top of the grapple frame.



Illustration 39

g01378775

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Utility Grapple Bucket (24)

These warning messages are on top of the grapple frame.

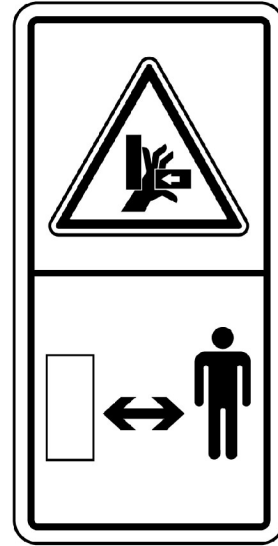


Illustration 40

g01378775

⚠ WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Dozer Blade (25)

This warning message is on top of the dozer blade.



Illustration 41

g00946617

! WARNING
Falling Hazard - Area may be oily and slippery. Do not step on cylinders. Serious injury or death could occur from a fall.

Dozer Blade (26)

This warning message is on top of the dozer blade.

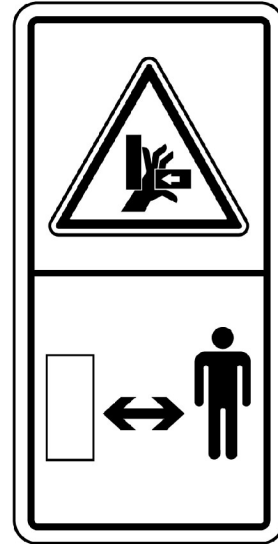


Illustration 42

g01378775

! WARNING
No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Dozer Blade (27)

These warning messages are on the back side of the blade.

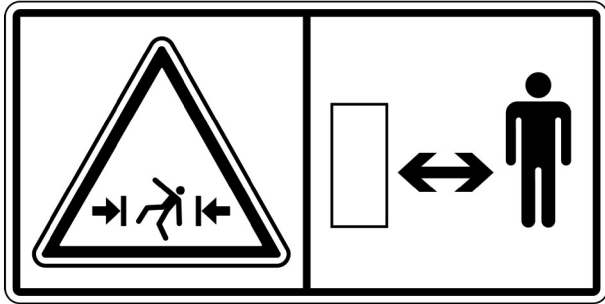


Illustration 43

g01371644

! WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

Dozer Blade (28)

This warning is on right-hand side on the back of the blade.



Illustration 44

g01370904

! WARNING

Do not operate or work on this product unless you have read and understood the instructions and warnings in the relevant Operation and Maintenance Manuals and relevant service literature. Failure to follow the instructions or heed the warnings could result in injury or death. Proper care is your responsibility.

Grapple Rake (29)

These warning messages are on top of the grapple frame.

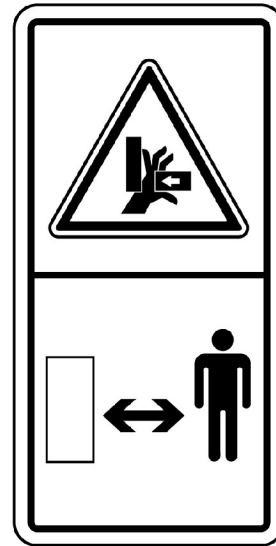


Illustration 45

g01378775

! WARNING

No clearance for person in this area during operation. Severe injury or death from crushing could occur. Stay away from the work tool while it is in operation.

i07326820

Additional Messages

SMCS Code: 7000; 7405

There are several specific messages on this machine. The exact location of the messages and the description of the messages are reviewed in this section. Become familiarized with all messages.

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

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

Alternate Exit

This message is located inside the cab on the window glass.

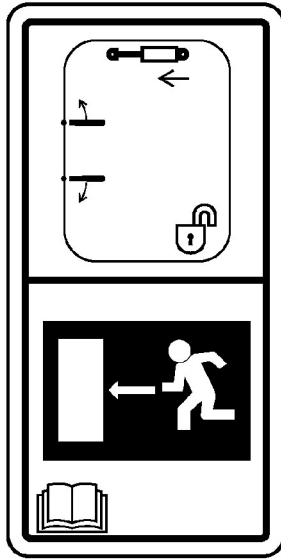


Illustration 46

g01260324

The primary alternate exit is the rear window. However, the front door may also be used if necessary. Refer to Operation and Maintenance Manual, "Alternate Exit" for detailed instructions.

Air Conditioner (If Equipped)

This message is located under the cab, attached to the air conditioning line near the service port.

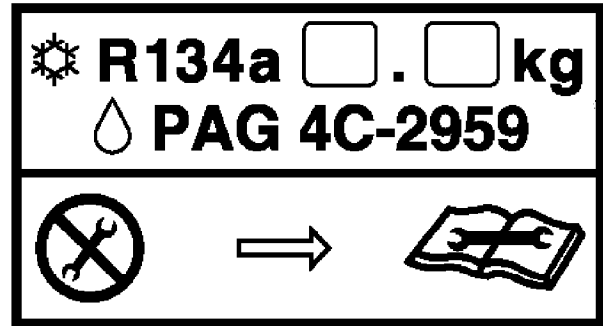



Illustration 47

g00990500

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

Air Conditioner Refrigerant (If Equipped)

 R134a (1430)	<input type="checkbox"/>	<input type="checkbox"/>
(kg)	X.XX	X.X
CO ₂ e (t)	X.XXX	X.XXX

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



 → 

Illustration 48

g06156136

If equipped, this message is located underneath the cab near the charge ports of the AC system.

Do not service the air conditioner system unless you are following the correct maintenance/repair procedures specified in the Service Manual.

R134a is a fluorinated greenhouse gases with a Global Warming Potential of 1430. "CO₂e" means the CO₂ equivalent. This product contains R134a. The amount of R134a and the CO₂e for this product is indicated by the tick box. The chart below shows the appropriate R134a and CO₂e levels for each machine.

Table 1

Sales Model	Weight	CO ₂ e
246D, 262D, 277D, 279D, 287D, 289D	1.0 kg	1.430 t
226D, 232D, 239D, 249D, 236D, 242D, 257D, 259D, 272D2, 272D2 XHP, 297D2, 297D2 XHP, 299D2, 299D2 XHP	0.81 kg	1.158 t

No Step

This message is located in areas that prohibit standing.

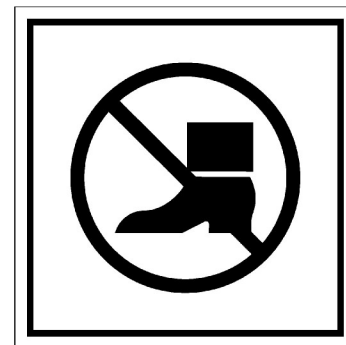


Illustration 49

g01206181

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

Product Link (If Equipped)

If equipped, this following message is located in the cab on the left post.

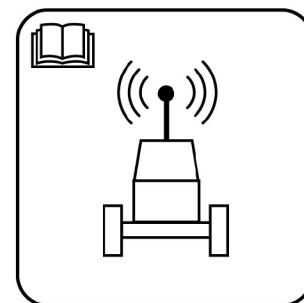


Illustration 50

g01418953

Machine Hydraulic System

This machine hydraulic system is filled with Cat HYDO Advanced oil. The following message is located by the hydraulic tank.



Illustration 51

g02096113

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

DEF Purge (If Equipped)

DEF purge indicator lamp film is located inside the engine compartment near the battery disconnect switch on machines that require DEF usage.

Note: If the machine does not have a battery disconnect switch installed this film is not used.

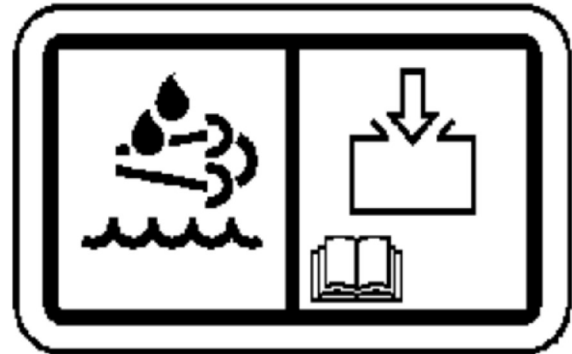


Illustration 53

g03816783

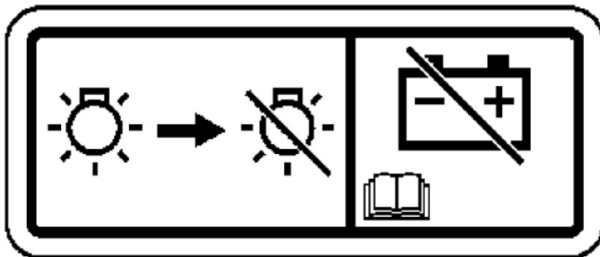


Illustration 52

g03816765

NOTICE

Wait until light shuts off to apply the battery disconnect. This waiting period will allow the DEF system to be purged. Purging prevents DEF from freezing in the lines.

DEF Fill (If Equipped)

DEF fill film is on the right-hand side of the machine near the DEF fill access door.

Japanese Market Only

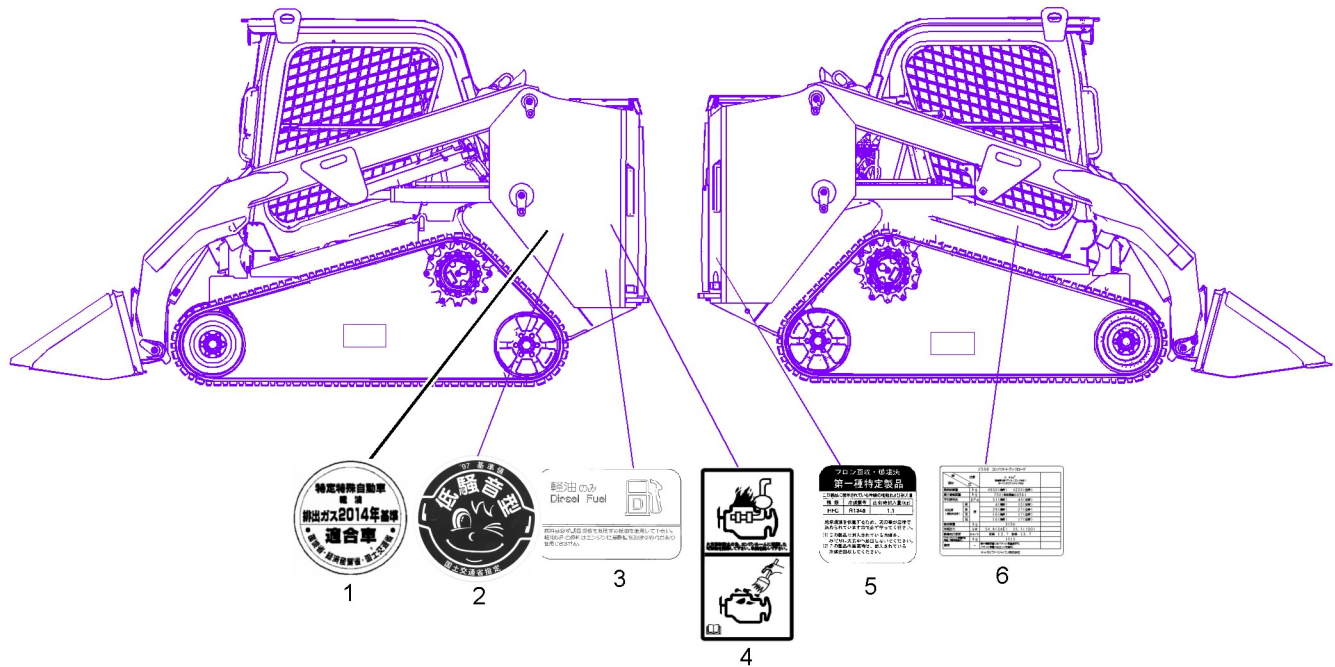


Illustration 54

g06107681

Emissions (1)

This message is on the left side of the machine.



Illustration 55

g03866756

Low Sound Certification (2)

This message is on the left side of the machine.



Illustration 56

g03316436

Diesel Fuel (3)

This message is located at the rear of the machine.

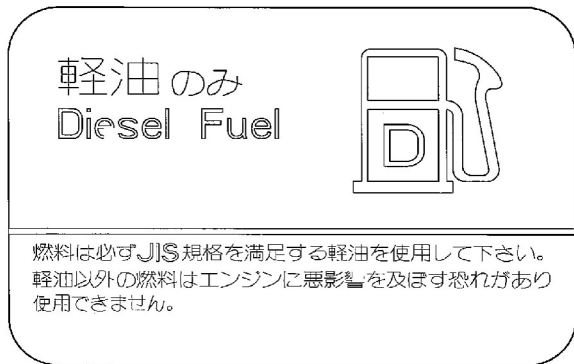


Illustration 57

g03146321

Clean Engine (4)

This message is located at the rear of the machine.



Illustration 58

g03146323

Recycle HFC Refrigerant (5)

This message is located at the rear of the machine.

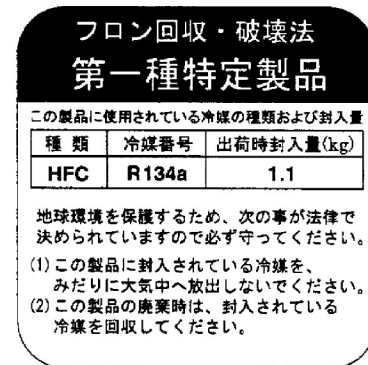


Illustration 59

g03351365

OSHA Plate (6)

This message is located at rear side of the machine.

i08313103

General Hazard Information

SMCS Code: 7000

項目		仕 様		X.X m ³ 製品認定用バケット(エッジ付) オープンROPSキャブ付	
単 位					
機械総質量	kg	XXXX (積荷)	XXXX (空荷)		
最大積載質量	kg	XXX (配座荷重の X%)			
平均接地圧	kPa	XX (積荷)	XX (空荷)		
安定度 (静的安定度)	前	左	XX (積荷)	XX (空荷)	
			XX (積荷)	XX (空荷)	
	後	左	XX (積荷)	XX (空荷)	
			XX (積荷)	XX (空荷)	
機体質量	kg	XXXX			
定格出力	kW	XX.X(SAE)	XX.X(SO)		
最高走行速度	km/h	前進 XX.X	後進 XX.X		
最大積載質量バケット(製品認定用)	kg	XXXX			
備考	-	最大積載質量バケット(製品認定用)はバケット質量に1.1倍を考慮せよ。			

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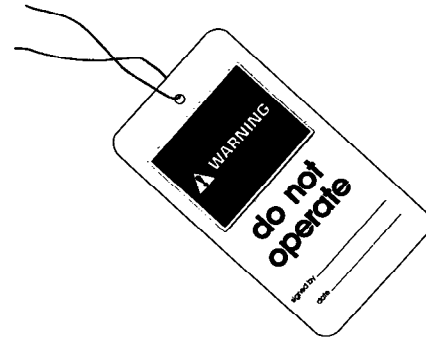


Illustration 60

g06177907

i05793252

General Hazard Information (Only Japanese market)

SMCS Code: 7000



Illustration 61

g03253902

Attach a “Do Not Operate” , or a similar warning tag to the start switch or to the controls before you service or repair the equipment. These warning tags (Special Instruction, RJX88874) are available from your Cat dealer.

Illustration 62

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.



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.

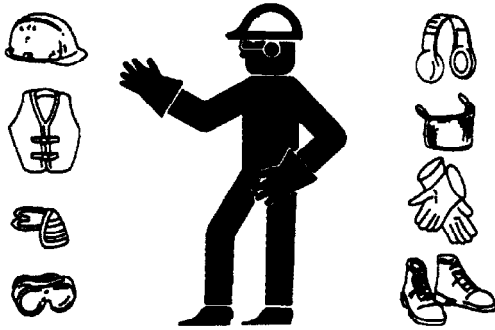


Illustration 63

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.

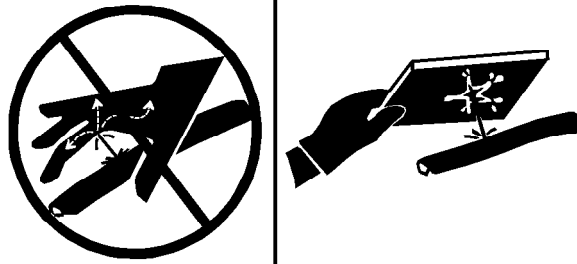


Illustration 64

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

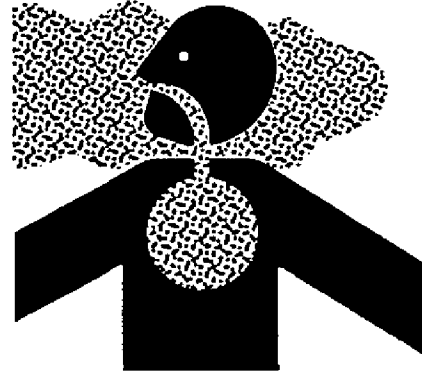


Illustration 65

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

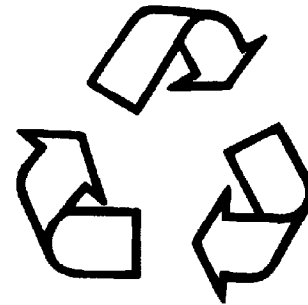


Illustration 66

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.

i05160631

Burn Prevention

SMCS Code: 7000

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

Exhaust Gas Recirculation Cooler

The exhaust gas recirculation (EGR) cooler may contain a small amount of sulfuric acid. The use of fuel with sulfur levels greater than 15 ppm may increase the amount of sulfuric acid that is formed. The sulfuric acid may spill from the EGR cooler during service of the engine. The sulfuric acid will burn the eyes, skin, and clothing on contact. Always wear eye shields, rubber gloves, and protective clothing when you may come in contact with fluids that may spill from the EGR cooler. If fluid contacts the eyes, immediately flush with water and seek medical help.

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 in order 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 in order to remove the hydraulic tank filler cap.

Batteries

Electrolyte is an acid. Electrolyte can cause personal injury. Do not allow electrolyte to contact the skin or the eyes. Always wear protective glasses for servicing batteries. Wash hands after touching the batteries and connectors. Use of gloves is recommended.

i06179517

Fire Prevention and Explosion Prevention

SMCS Code: 7000



Illustration 67

g00704000

Regeneration

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

General

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

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

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

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

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



Illustration 68

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 69

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.

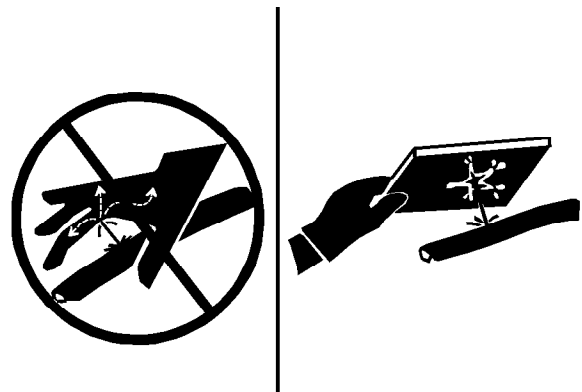


Illustration 70

g00687600

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

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

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

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

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

Ether

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

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

WARNING

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

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

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

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

Fire Extinguisher

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

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

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

i07041871

Fire Safety

SMCS Code: 7000

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

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

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

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

i07415693

Fire Extinguisher Location

SMCS Code: 7000; 7419

S/N: BL21–Up
S/N: DX21–Up
S/N: FD21–Up
S/N: HP21–Up
S/N: MD21–Up
S/N: BY41–Up
S/N: CD41–Up
S/N: AJ71–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: AH91–Up
S/N: BL91–Up
S/N: DX91–Up
S/N: KB91–Up
S/N: DTB1–Up
S/N: GTC1–Up
S/N: KXC1–Up
S/N: HRD1–Up
S/N: BYF1–Up
S/N: FTK1–Up
S/N: GTK1–Up
S/N: STK1–Up
S/N: TLK1–Up
S/N: DML1–Up
S/N: EML1–Up
S/N: ETL1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: JSL1–Up
S/N: NTL1–Up

S/N: SEN1–Up
S/N: DPR1–Up
S/N: FMR1–Up
S/N: GWR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: MLT1–Up
S/N: PPT1–Up
S/N: WCT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: EZW1–Up
S/N: MPW1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up
S/N: BGZ1–Up

It is recommended to install a fire extinguisher on the machine. Make sure that you are familiar with the operation and usage of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly according to the fire extinguisher manufacturer recommendations.

i00771840

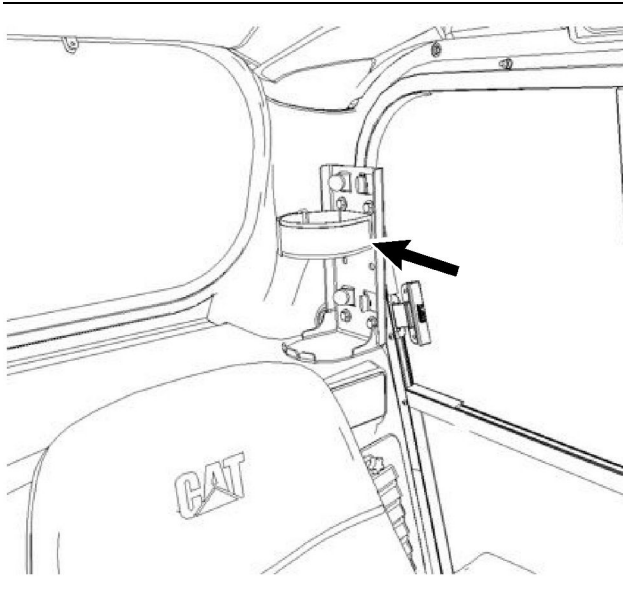


Illustration 71

g06314966

The recommended location for mounting the fire extinguisher is inside the cab on the machine left rear cab post. Your machine may be equipped with a fire extinguisher mounting bracket located in this location. A 2.2 kg (5 lb) charge capacity fire extinguisher can be secured to this location. Ensure that the fire extinguisher is secure and that the location will not interfere with machine operation.

Note: Do not weld the ROPS or drill extra holes in the ROPS to install the fire extinguisher or mounting bracket. If your machine is not equipped with mounting holes from the factory, consult your Cat dealer for the proper procedure for mounting the fire extinguisher.

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.

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.

i07497031

Restricted Visibility

SMCS Code: 7000; 7605

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

Illustration 72 provide an approximate visual indication of the areas at ground level inside a radius of 12 m (39 ft) from the operator with restricted visibility when machine is not equipped with available rear camera. Illustration 73 provides an approximate visual indication of the areas at ground level inside a radius of 12 m (39 ft) from the operator with restricted visibility when machine is equipped with available rear camera. All restricted visibility areas less than 300mm wide may not be shown. These illustrations do not indicate areas of restricted visibility for distances outside of the shown radius. The areas of restricted visibility shown in the illustrations are with the work tool of the machine in the Travel position. The Travel position is worktool at lowest height and fully racked back.

Illustration 72 indicates restricted visibility areas at ground level inside the shown radius from the operator with the use of standard equipment and equipped with enclosed cab.

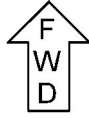


Illustration 72

g06338806

Top view of the machine, ground level visibility equipped with enclosed cab.

(A) 12 m (39 ft)

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

Illustration 73 indicates restricted visibility areas at ground level inside the shown radius from the operator with the use of available rear camera and equipped with enclosed cab.

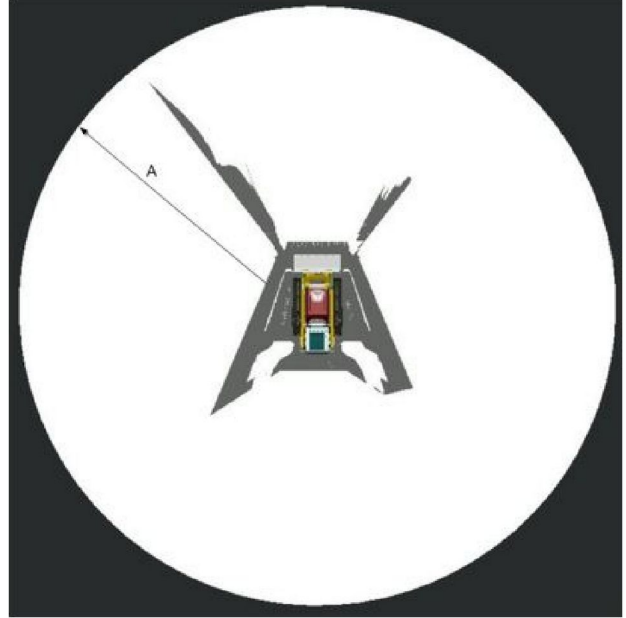


Illustration 73

g06338815

Top view of the machine, ground level visibility with available rear camera, and equipped with enclosed cab

(A) 12 m (39 ft)

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

i08473852

Visibility Information

SMCS Code: 7000

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

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

Your machine may be equipped with visual aids. Some examples of visual aids are Closed Circuit Television (CCTV) and mirrors. Before operating the machine, ensure that the visual aids are in proper working condition and that the visual aids are clean. Shut down the machine until damaged or nonfunctional visual aid(s) are repaired (if applicable) or until appropriate job site organization is used to minimize hazards that are caused by any resulting restricted visibility. Adjust the visual aids using the procedures that are located in this Operation and Maintenance Manual. If equipped, the Work Area Vision System shall be adjusted according to Operation and Maintenance Manual, SEBU8157, "Work Area Vision System". If equipped, the Cat Detect Object Detection shall be adjusted according to the Operation and Maintenance Manual, "Cat Detect Object Detection" for your machine.

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

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

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

i07327729

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 NEUTRAL position before you start the engine.

Set the engine speed control knob to the low idle position before you start the engine. See Operation Maintenance Manual, Engine Starting for specific engine starting and warm up procedures, and an explanation of several engine protection modes that may be active under certain conditions which might impact the expected or desired engine speed.

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.

i02680030

Before Operation

SMCS Code: 7000

Video tapes and safety information are available in English for the machine. A list of some of the material is available in the Operation and Maintenance Manual, "Reference Material". Consult your Caterpillar dealer in order to obtain copies of the material. The information should be reviewed by every person that operates the machine.

Clear all personnel from the machine and from the area.

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

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

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

Fasten the seat belt securely. Lower the armrests.

i08530076

Operation

SMCS Code: 7000

Machine Operation

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

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

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

Do not allow riders on the machine. Never use the work tool for a work platform.

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

Use Caterpillar Approved Work Tools on this machine. Obey all the lift restrictions. Refer to Operation and Maintenance Manual, "Caterpillar Approved Work Tools" for the approved work tools and the lift restriction information.

Carry work tools low. Lower the lift arms fully. Tilt back the work tool to keep the work tool off the ground. 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.

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

Know the maximum dimensions of your machine.

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

Observe all applicable local government regulations when you use the Skid Steer Loader, Multi-Terrain Loader, or Compact Track Loader to lift heavy objects.

Sound the horn and allow adequate time for bystanders to clear the area before moving the machine into a restricted visibility area. Follow local practices for your machine application. For more information refer to Operation and Maintenance Manual, Restricted Visibility.

Machine Operating Temperature Range

The standard machine configuration is intended for use within an ambient temperature of -32°C (-25°F) to 43°C (109.4°F). Special configurations for different ambient temperatures may be available. Consult your Cat dealer for additional information on special configurations of your machine.

Fueling Machine

WARNING

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

WARNING

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

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

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

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

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

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

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

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

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

Limiting Conditions and Criteria

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

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

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

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

Critical Failures

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

Table 2

System or Component Name	Limiting Condition	Criteria for Action	Required Action
Line, tubes, and hoses	End fittings are damaged or leaking. Outer coverings are chafed or cut. Wires are exposed. Outer coverings are swelling or ballooning. Flexible parts of the hoses are kinked. Outer covers have exposed embedded armoring. End fittings are displaced.	Visible corrosion, loose, or damaged lines, tubes, or hoses. Visible fluid leaks.	Immediately repair any lines, tubes, or hoses that are corroded, loose, or damaged. Immediately repair any leaks as these may provide fuel for fires.
Electrical Wiring	Signs of fraying, abrasion, cracking, discoloration, cuts on the insulation	Visible damage to electrical wiring	Immediately replace damaged wiring

(continued)

(Table 2, contd)

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

i06299648

Engine Stopping

SMCS Code: 1000; 4450; 6461; 6700; 7000; 7451

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.

i05333750

High Pressure Fuel Lines

SMCS Code: 1000; 1252; 1274; 7000**S/N:** BL21–Up**S/N:** DX21–Up**S/N:** EH21–Up**S/N:** FD21–Up**S/N:** HP21–Up**S/N:** MD21–Up**S/N:** BY41–Up**S/N:** LW51–Up**S/N:** PN51–Up**S/N:** RE51–Up**S/N:** TP51–Up**S/N:** WE51–Up**S/N:** HR61–Up**S/N:** BE71–Up**S/N:** BL71–Up**S/N:** HP71–Up**S/N:** BL91–Up**S/N:** DTB1–Up**S/N:** HFB1–Up**S/N:** GTC1–Up**S/N:** HRD1–Up**S/N:** K2D1–Up**S/N:** D9E1–Up**S/N:** BYF1–Up**S/N:** ETL1–Up**S/N:** FTL1–Up**S/N:** GTL1–Up**S/N:** HLM1–Up**S/N:** DPR1–Up**S/N:** GWR1–Up**S/N:** T9S1–Up**S/N:** D5T1–Up**S/N:** DZT1–Up**S/N:** FMT1–Up**S/N:** HMT1–Up**S/N:** JST1–Up**S/N:** B5W1–Up**S/N:** EZW1–Up**S/N:** TAW1–Up**S/N:** BGZ1–Up

WARNING

Contact with high pressure fuel may cause fluid penetration and burn hazards. High pressure fuel spray may cause a fire hazard. Failure to follow these inspection, maintenance and service instructions may cause personal injury or death.

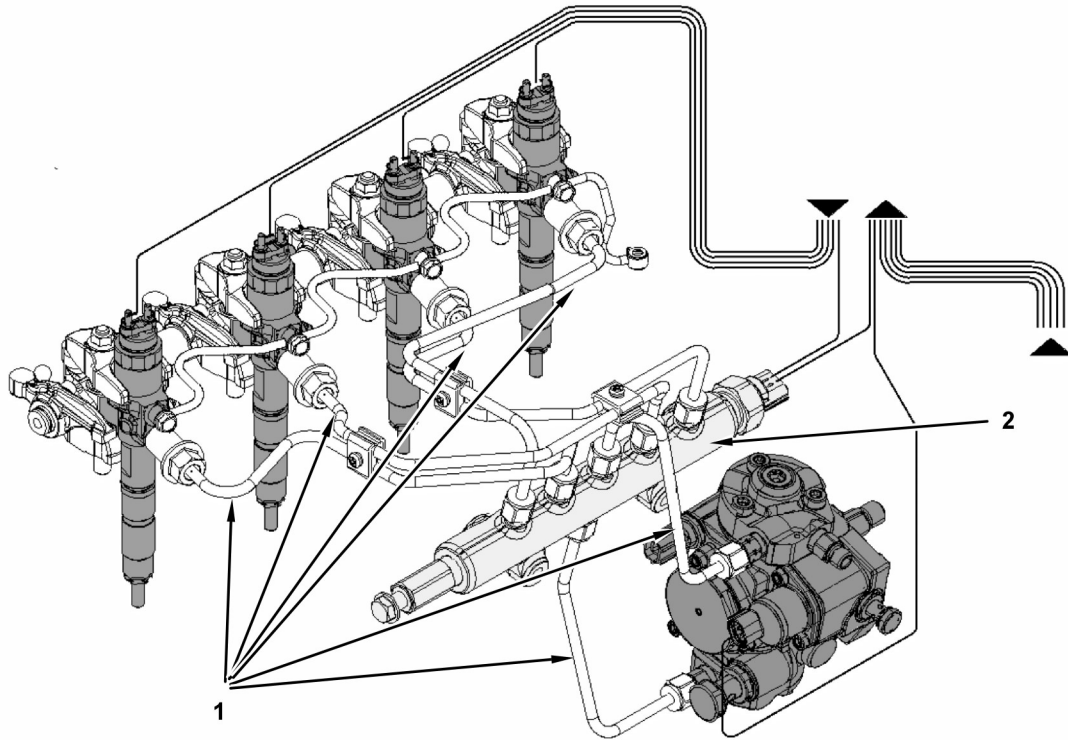


Illustration 74

g02780757

(1) High-pressure line

(2) High-pressure fuel manifold (rail)

The high-pressure fuel lines are the fuel lines that are between the high-pressure fuel pump and the high-pressure fuel manifold. There are also fuel lines between the fuel manifold and cylinder head. These fuel lines are different from fuel lines on other fuel systems.

- The high-pressure fuel lines are constantly charged with high pressure.
- The internal pressures of the high-pressure fuel lines are higher than other types of fuel system.
- The high-pressure fuel lines are formed to shape and then strengthened by a special process.

Do not step on the high-pressure fuel lines. Do not deflect the high-pressure fuel lines. Do not bend or strike the high-pressure fuel lines. Deformation or damage of the high-pressure fuel lines may cause a point of weakness and potential failure.

Do not check the high-pressure fuel lines with the engine or the starting motor in operation. After the engine has stopped, allow 5 minutes to pass in order to allow the pressure to be purged. Then, any service or repair may be performed on the engine fuel lines.

Do not loosen the high-pressure fuel lines in order to remove air from the fuel system. This procedure is not required.

Visually inspect the high-pressure fuel lines before the engine is started. This inspection should be each day.

If you inspect the engine in operation, always use the proper inspection procedure in order to avoid a fluid penetration hazard. Refer to Operation and Maintenance Manual, "General hazard Information".

- Inspect the high-pressure fuel lines for damage, deformation, a nick, a cut, a crease, or a dent.
- Do not operate the engine with a fuel leak. If there is a leak, do not tighten the connection in order to stop the leak. The connection must only be tightened to the recommended torque. Refer to Disassembly and Assembly, "Fuel injection lines - Remove and Fuel injection lines - Install".
- If the high-pressure fuel lines are torqued correctly and the high-pressure fuel lines are leaking, the high-pressure fuel lines must be replaced.
- Ensure that all clips on the high-pressure fuel lines are in place. Do not operate the engine with clips that are damaged, missing, or loose.
- Do not attach any other item to the high-pressure fuel lines.

i05336713

Work Tools

SMCS Code: 6700

Only use work tools that are approved by Caterpillar for use on Caterpillar machines. Refer to the Operation and Maintenance Manual, "Caterpillar Approved Work Tools".

If you are in doubt about the compatibility of a particular work tool with your machine, consult your Caterpillar dealer.

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

Note: A Debris Barrier Kit is required for use in applications which create airborne debris. Consult your Caterpillar dealer for information about this kit.

Use of the following equipment or operation in the following applications may create airborne debris:

- mulching head
- brush cutter
- hammers
- recycling of paper products certain agriculture applications
- cold planing

Keep all windows and doors closed on the host machine. Always wear protective glasses. Always wear the protective equipment that is recommended in the work tool operation manual. 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.

i06158704

Demolition

SMCS Code: 6700

There may be local regulations and/or government regulations that govern the use of machines which are designed and used as demolition machinery.

Note: Obey all local and government regulations.

Demolition machinery is designed for demolishing by pushing or pulling, or fragmenting. Demolition is done by crushing or shearing, buildings and/or other civil engineering structures and component parts and/or separating the resultant debris.

If this machine is used as a demolition machine, within an area that is controlled by the European Directive 2006/42/EC the machine must be equipped with:

- Polycarbonate Front Door
- FOPS Level II
- Camera, Rear View, and Display

Note: This machine may require additional options to operate demolition tools such as a hammer or a shear within the EU. Contact your Cat dealer for additional information.

Demolition applications may generate flying debris. Ensure that there are no personnel in the area around the machine where flying debris may travel.

Demolition applications may generate airborne dust that can be hazardous to your health. If you operate the machine in a dust generating applications, use appropriate safeguarding or adequate ventilation to minimize risk.

i05336739

Parking

SMCS Code: 7000

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

1. Move the joystick control slowly to the NEUTRAL position in order to stop the machine.
2. Move the engine speed control knob to the LOW IDLE position.
3. Lower the loader arms and tilt the linkage so that the work tool rests firmly on the ground.
4. Move the hydraulic controls to the NEUTRAL position.
5. Turn the engine start switch key to OFF position and remove the key.
6. Raise the armrests, remove the seat belt, and exit the machine.

i07746366

Slope Operation

SMCS Code: 7000

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

i08229294

Equipment Lowering with Engine Stopped

SMCS Code: 7000

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.

i07694547

Sound Information and Vibration Information

SMCS Code: 7000

Sound Level Information

The declared operator Equivalent Sound Pressure Level (Leq) is shown in Table 1 when "ANSI/SAE J1166 SEP 2014" is used to measure the value for an enclosed cab. This is a work cycle sound exposure level. The cab was properly installed and maintained. The test was conducted with the cab doors and the cab windows closed. The sound level may vary at different engine cooling fan speeds and during diesel particulate filter regeneration (if equipped).

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

Hearing protection may be needed when the machine is operated with an open operator station for extended periods or in a noisy environment. Hearing protection may be needed when the machine is operated with a cab that is not properly maintained or when the doors and windows are open for extended periods or in a noisy environment.

The declared average exterior sound pressure level is 76 dB(A) when the "SAE J88 JUN2013 - Constant Speed Moving Test" procedure is used to measure the value for the standard machine. The measurement was conducted under the following conditions: distance of 15 m (49.2 ft) and "the machine moving forward in an intermediate gear ratio". The sound level may vary during diesel particulate filter regeneration.

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

Note: The information below applies only to machines that have the CE mark on the PIN plate.

The declared dynamic operator sound pressure level is shown in Table 1 when "ISO 6396:2008" is used to measure the value for an enclosed cab. The measurement was conducted with the cab doors and the cab windows closed. The cab was properly installed and maintained. The sound level may vary at different engine cooling fan speeds and during diesel particulate filter regeneration (if equipped).

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

Table 3

Serial Number Prefixes	Declared Operator Equivalent Sound Pressure Level (Leq)	Declared Dynamic Operator Sound Pressure Level per 2000/14/EC and ISO 6396
	ANSI/SAE J1166 Feb 2014	ISO 6396:2008
226D (HRD & HR6), 232D (DPR & EH2), 239D (BL9 & T9S), 249D (GWR & D9E)	85 dB(A)	83 dB(A)
236D (BGZ & K2D), 242D (DZT & HFB), 257D (EZW & D5T), 259D (FTL & LWS)	85 dB(A)	83 dB(A)
246D (BYF & PN5), 262D (DTB & RE5), 277D (FMT), 279D (GTL & TP5), 287D (HMT), 289D (TAW & WE5)	85 dB(A)	81 dB(A)
232D (KXC), 239D (CD4), 249D (AH9)	85 dB(A)	81 dB(A)
236D (MPW & SEN), 242D (A9W & DML), 257D (EML & FMR), 259D (GTK & FTK)	85 dB(A)	83 dB(A)
246D (HMR, JSL & MKT), 262D (KTS, LST & AJ7), 277D (MLT & NTL), 279D (PPT & RCX), 287D (STK & TLK), 289D (WCT, A9Z & KB9)	85 dB(A)	83 dB(A)
272D (B5W), 272D XHP (ETL), 297D (BE7), 297D XHP (HP7), 299D (GTC), 299D XHP (JST)	85 dB(A)	83 dB(A)
272D2 (BL2), 272D2 XHP (MD2), 297D2 (BL7), 297D2 XHP (HP2), 299D2 (FD2), 299D2 XHP (DX2 & HLM)	85 dB(A)	83 dB(A)
299D2 (BY4), 299D2 XHP (DX9)	85 dB (A)	83 dB(A)

The sound power level (L_{WA}) that is labeled on the machine is shown in Table 2. The measurement of the sound power level was made according to the test procedures and conditions that are specified in the European Union Directive "2000/14/EC" as amended by "2005/88/EC".

Table 4

Models	Sound Power Level (L_{WA})
226D, 232D, 236D, 242D, 246D, 262D	101 dB (A)
239D, 249D, 259D, 279D, 289D	103 dB (A)
257D, 277D, 287D	103 dB (A)
272D, 272D XHP, 272D2, 272D2 XHP	102 dB (A)
297D, 297 XHP, 297D2, 297D2 XHP	104 dB (A)
299D, 299D XHP, 299D2, 299D2 XHP	104 dB (A)
299D2, 299D2 XHP With Steel Track Undercarriage	107 dB (A)

Sound Level Information for Machines in Eurasian Economic Union Countries

The declared dynamic operator sound pressure level is 85 dB(A) when "ISO 6396:2008" is used to measure the value for an enclosed cab. The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds. The measurement was conducted with the cab doors and the cab windows closed.

The declared exterior sound power level L_{WA} , shown in Table 5, is when the value is measured according to the dynamic test procedures and the conditions that are specified in "ISO 6395:2008". The measurement was conducted at 70 % of the maximum engine cooling fan speed. The sound level may vary at different engine cooling fan speeds.

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

Table 5

Models	Sound Power Level (L _{WA})
226D, 232D, 236D, 242D	102 dB (A)
239D, 249D, 257D, 259D	103 dB (A)
246D, 262D, 272D, 272D2, 272D XHP, 272D2 XHP	102 dB (A)
277D, 279D, 287D, 289D, 297D, 297D2, 297D XHP, 297D2 XHP, 299D, 299D2, 299D XHP, 299D2 XHP	105 dB (A)

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

Vibration Data for the Loaders

Information concerning hand/arm vibration level

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

Information concerning whole body vibration level

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

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

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

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in Table7 to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

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

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

Table 6

"ISO 5349-1:2001 Hand Transmitted Vibration"									
Machine Type	Operating Cycle (SAEJ1166:2014)	Left Hand/Arm				Right Hand/Arm			
		Fore/Aft (X Axis)	Side/Side (Y Axis)	Vertical (Z Axis)	Total Vibration	Fore/Aft (X Axis)	Side/Side (Y Axis)	Vertical (Z Axis)	Total Vibration
226D, 232D	"Wheel Loader"	0.6	0.7	0.6	1.1	0.5	0.5	0.9	1.1
236D, 242D	"Wheel Loader"	0.8	1.4	0.7	1.7	0.6	1.1	0.7	1.4
246D, 262D	"Wheel Loader"	0.8	1.0	0.8	1.5	1.1	0.9	1.3	1.9
272D, 272D XHP	"Wheel Loader"	0.4	0.5	0.4	0.7	0.4	0.6	0.4	0.8
272D2, 272D2 XHP	"Wheel Loader"	0.8	0.9	0.6	1.4	0.6	1	0.6	1.4
257D	"Crawler Loader"	0.8	1.3	1.0	1.8	0.8	1.5	1.1	2.1
277D, 287D	"Crawler Loader"	1.0	1.6	1.3	2.3	1.1	1.6	1.2	2.3
239D, 249D	"Crawler Loader"	2.0	1.6	1.9	3.2	1.8	1.8	1.8	3.1
259D	"Crawler Loader"	0.9	2.6	1.2	3.0	1.0	2.5	1.7	3.2
279D, 289D	"Crawler Loader"	0.7	0.9	1.3	1.7	0.7	1.1	1.0	1.6
297D, 297D XHP 299D, 299D XHP	"Crawler Loader"	0.6	1.0	0.7	1.3	0.8	1.5	0.9	1.9
297D2, 297D2 XHP	"Crawler Loader"	0.7	1.2	1.2	1.8	0.6	1.4	0.9	1.7
299D2, 299D2 XHP	"Crawler Loader"	0.7	1.1	0.9	1.6	0.7	1.3	1.1	1.8
299D, 299D XHP with Steel Track	"Crawler Loader"	1.9	1.8	2.2	3.4	1.1	1.7	2.1	2.9
299D2, 299D2 XHP w/ Steel Track	"Crawler Loader"	0.8	1.5	1.6	2.3	0.8	1.5	1.4	2.2

Table 7

"ISO 2631-1:1997 Whole Body Vibration"						
Machine Type	Operating Cycle (SAEJ1166:2014)	Whole Body				
		Fore/Aft (X Axis)	Side/Side (Y Axis)	Vertical (Z Axis)	Total Vibration	
226D, 232D	"Wheel Loader"	0.7	0.4	0.5	n/a	
236D, 242D	"Wheel Loader"	0.7	0.4	0.4	n/a	
246D, 262D	"Wheel Loader"	0.7	0.4	0.8	n/a	
272D, 272D XHP	"Wheel Loader"	0.5	0.3	0.3	n/a	
272D2, 272D2 XHP	"Wheel Loader"	0.6	0.4	0.4	n/a	

(continued)

Safety Section
Sound Information and Vibration Information

(Table 7, contd)

257D	"Crawler Loader"	0.7	0.4	0.6	n/a
277D, 287D	"Crawler Loader"	0.8	0.3	0.5	n/a
239D, 249D	"Crawler Loader"	0.8	0.6	0.7	n/a
259D	"Crawler Loader"	0.5	0.3	0.4	n/a
279D, 289D	"Crawler Loader"	0.8	0.4	0.4	n/a
297D 297D XHP 299D, 299D XHP	"Crawler Loader"	0.7	0.4	0.5	n/a
297D2, 297D2 XHP	"Crawler Loader"	0.5	0.2	0.4	n/a
299D2, 299D2 XHP	"Crawler Loader"	0.4	0.2	0.4	n/a
299D, 299D XHP with Steel Track	"Crawler Loader"	0.7	0.8	0.6	n/a
299D2, 299D2 XHP w/ Steel Track	"Crawler Loader"	0.4	0.3	0.6	n/a

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

The Caterpillar suspension seat meets the criteria of "ISO 7096". This represents vertical vibration level under severe operating conditions. This seat is tested with the input "spectral class EM9". The seat has a transmissibility factor of "SEAT<0.9".

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations.
 - a. Tire pressures
 - b. Brake and steering systems

- c. Controls, hydraulic system, and linkages
3. Keep the terrain in good condition.
 - a. Remove any large rocks or obstacles.
 - b. Fill any ditches and holes.
 - c. Provide machines and schedule time to maintain the conditions of the terrain.
4. Use a seat that meets "ISO 7096". Keep the seat maintained and adjusted.
 - a. Adjust the seat and suspension for the weight and the size of the operator.
 - b. Inspect and maintain the seat suspension and adjustment mechanisms.
5. Perform the following operations smoothly.
 - a. Steer
 - b. Brake
 - c. Accelerate.
 - d. Shift the gears.
6. Move the attachments smoothly.
7. Adjust the machine speed and the route in order to minimize the vibration level.
 - a. Drive around obstacles and rough terrain.
 - b. Slow down when it is necessary to go over rough terrain.

8. Minimize vibrations for a long work cycle or a long travel distance.
 - a. Use machines that are equipped with suspension systems.
 - b. Use the ride control system on skid steer loaders.
 - c. If no ride control system is available, reduce speed to prevent bounce.
 - d. Haul the machines between workplaces.
9. Less operator comfort may be caused by other risk factors. The following guidelines can be effective to provide better operator comfort:
 - a. Adjust the seat and adjust the controls to achieve good posture.
 - b. Adjust the mirrors to minimize twisted posture.
 - c. Provide breaks to reduce long periods of sitting.
 - d. Avoid jumping from the cab.
 - e. Minimize repeated handling of loads and lifting of loads.
 - f. Minimize any shocks and impacts during sports and leisure activities.

Sources

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

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

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

Refer to Operation and Maintenance Manual, SEBU8257, "The European Union Physical Agents (Vibration) Directive 2002/44/EC" for more information about vibration.

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

Use the web site to find your local dealer.

Caterpillar, Inc.
www.cat.com

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Guards (Operator Protection)

SMCS Code: 7150-MCH; 7325

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

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

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

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

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

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

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

Other Guards (If Equipped)

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

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

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

- Demolition applications
- Rock quarries
- Forestry products

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

Product Information Section

General Information

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Model View Illustrations

SMCS Code: 1000; 1926; 4450; 4469; 4480; 4490; 4491; 6282; 6700; 7000; 7007; 7451; 7606

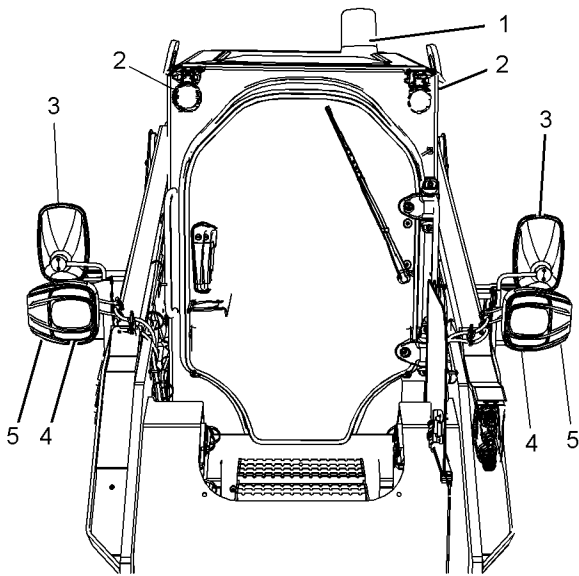


Illustration 75 g03356686
 Rotating Beacon (1), Front Work Lights (2), Side View Mirrors (3), Front Running Lights (4) and Turn Signals (5)

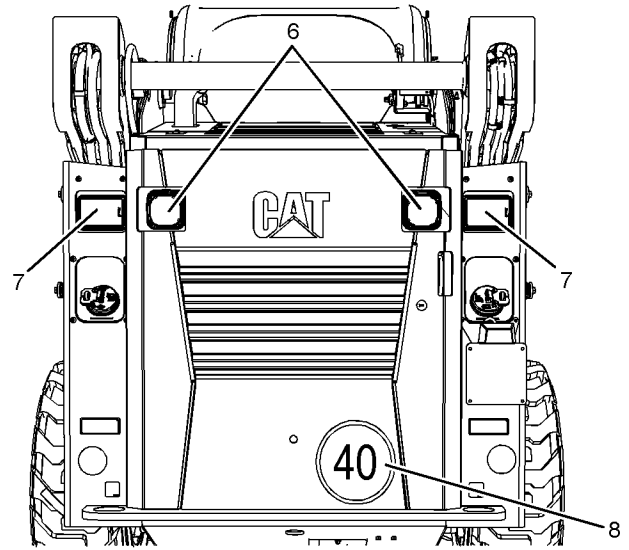


Illustration 76 g03817663

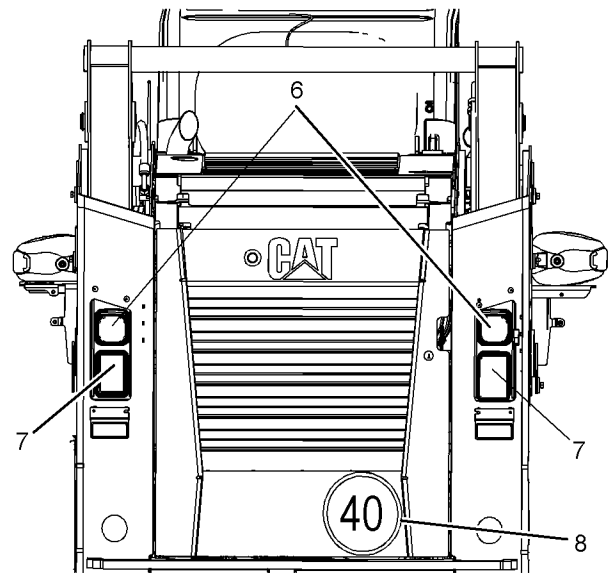


Illustration 77 g03356744
 Rear Work Lights (6)
 Rear Turn Signals, Position Lights, Stop Lights(7)
 and Speed Decal (8)

Japanese Market Only

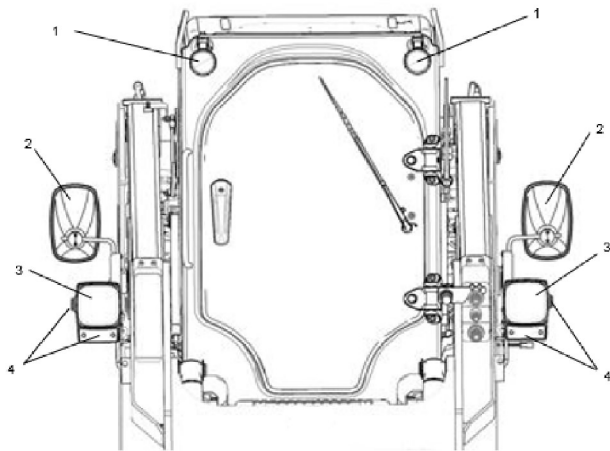


Illustration 78 g06107238
 (1) Front Work Lights
 (2) Side View Mirrors
 (3) Low and High Beam Driving Lights
 (4) Turn Signals

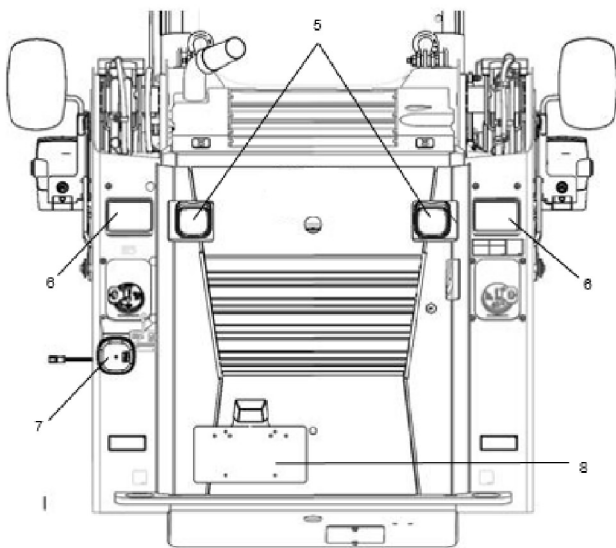


Illustration 79 g06107518
 (5) Rear Work Lights
 (6) Rear Turn Signals, Position Lights
 (7) Reverse Light
 (8) License Plate Holder and Lamp

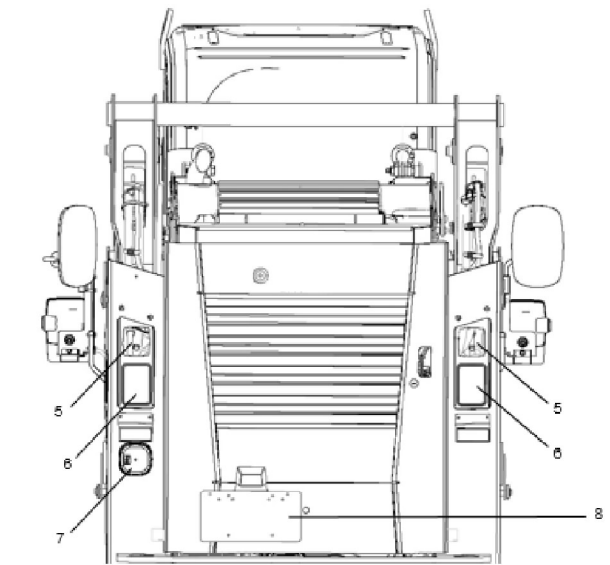


Illustration 80 g06107530
 (5) Rear Work Lights
 (6) Rear Turn Signals, Position Lights
 (7) Reverse Light
 (8) License Plate Holder and Lamp

i07322535

Rated Load

SMCS Code: 6001; 6136; 6542; 7000

Bucket Rated Load

⚠ WARNING

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

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.

WARNING

Machine stability is affected by many factors, including the type of work tool and the position of a work tool.

Machine stability and machine control can be significantly affected if a work tool is not installed. Operating a machine without a work tool can lead to loss of control or tipping of the machine which could result in serious injury or death.

When you operate a machine without a work tool, avoid the following conditions:

- excessive speed
- sharp turns
- abrupt implement movement
- slopes and uneven ground

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

- lubricants
- full fuel tank
- Cat bucket
- 75 kg (165 lb) operator
- 10 x 16.5 tires on 226D, 232D
- 12 x 16.5 tires on 236D, 242D, 246D, 262D, 272D, 272D2
- 14 x 17.5 tires on 272D XHP, 272D2 XHP
- Undercarriage with 320 mm (12.6 inch) wide tracks and dual flange front/single flange rear idlers on 239D, 249D, and 259D machines.
- Undercarriages with either 400 mm (15.75 inch) or 450 mm (17.72 inch) wide tracks and triple flange front/rear idlers on 279D, and 289D machines.
- Undercarriages with 450 mm (17.72 inch) wide tracks and dual flange front/single flange rear idlers on 299D, and 299D2 machines.
- Undercarriages with 400 mm (15.75 inch) wide tracks and triple flange front/rear idlers on 299D XHP, and 299D2 XHP machines.

Note: All Caterpillar Premium Conventional tires are at the suggested operating inflation pressure. Refer to the Operation and Maintenance Manual, "Tire Inflation - Check" for the proper tire inflation pressure.

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

Note: The Steel Track Undercarriage attachment will increase the rated operating loads in the following tables by 191 kg (421 lb) for 299D and 299D XHP and by 103 kg (227 lb) for 299D2 and 299D2 XHP machines.

The rated operating capacity (ROC) is defined by "SAE J818:2007", "ISO 14397-1:2007" and "EN 474-3:2006 + A1:2009" as the least amount of weight of the following conditions:

- 50% of the full static tipping load for wheeled machines
- 35% of the full static tipping load for track machines
- The lifting capacity to maximum height

The corresponding dump clearance is given for each bucket at maximum lift height and at a 40 degree dump angle. The reach is given for each bucket at maximum lift height and at a 40 degree dump angle. Clearance is measured from the ground to the bucket edge to dump the load. The reach is measured from the front tire to the bucket edge.

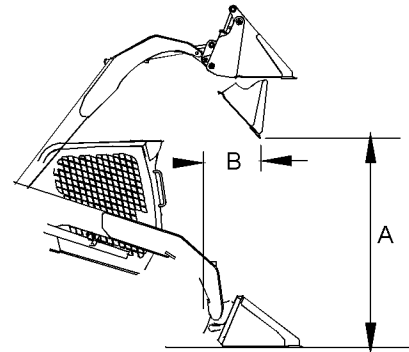


Illustration 81

g02616842

Dimension (A) represents the dump clearance.
Dimension (B) represents the reach.

The following tables provide the rated operating loads (ROC) for the standard machine configuration with a bucket.

Note: The dump angle and the clearance angle on all buckets is 40 degrees.

Product Information Section
Rated Load

Buckets

Table 8

Low Profile Buckets with bolt-on-Edge - Skid Steer Loader											
Model	P/N	279-5435		279-5438		279-5441		285-6090		268-4083	
	Tool Mass	177 kg	391 lb	204 kg	451 lb	232 kg	511 lb	248 kg	546 lb	264 kg	582 lb
	Bucket Specs.	54"		60"		66"		72"		78"	
226D	Tipping Load	1372 kg	3024 lb	1337 kg	2948 lb	1310 kg	2888 lb	1293 kg	2851 lb	1278 kg	2817 lb
	ROC 50%	686 kg	1512 lb	669 kg	1474 lb	655 kg	1444 lb	646 kg	1425 lb	639 kg	1409 lb
	Dump Clearance @ 40 degree dump angle	2102 mm	83 inch	2101 mm	83 inch	2100 mm	83 inch	2099 mm	83 inch	2098 mm	83 inch
	Reach @ 40 degree dump angle	628 mm	25 inch	631 mm	25 inch	633 mm	25 inch	634 mm	25 inch	636 mm	25 inch
232D	Tipping Load	1650 kg	3639 lb	1616 kg	3563 lb	1589 kg	3503 lb	1572 kg	3466 lb	1557 kg	3433 lb
	ROC 50%	825 kg	1819 lb	808 kg	1781 lb	794 kg	1751 lb	786 kg	1733 lb	778 kg	1717 lb
	Dump Clearance @ 40 degree dump angle	2284 mm	90 inch	2282 mm	90 inch	2281 mm	90 inch	2280 mm	90 inch	2279 mm	90 inch
	Reach @ 40 degree dump angle	757 mm	30 inch	760 mm	30 inch	763 mm	30 inch	765 mm	30 inch	766 mm	30 inch
236D	Tipping Load	1607 kg	3544 lb	1573 kg	3468 lb	1545 kg	3407 lb	1529 kg	3371 lb	1513 kg	3337 lb
	ROC 50%	804 kg	1772 lb	786 kg	1734 lb	773 kg	1704 lb	764 kg	1685 lb	757 kg	1668 lb
	Dump Clearance @ 40 degree dump angle	2408 mm	95 inch	2407 mm	95 inch	2405 mm	95 inch	2404 mm	95 inch	2404 mm	95 inch
	Reach @ 40 degree dump angle	478 mm	19 inch	480 mm	19 inch	481 mm	19 inch	482 mm	19 inch	483 mm	19 inch
242D	Tipping Load	1957 kg	4315 lb	1922 kg	4238 lb	1895 kg	4178 lb	1878 kg	4141 lb	1863 kg	4108 lb
	ROC 50%	979 kg	2158 lb	961 kg	2119 lb	947 kg	2089 lb	939 kg	2071 lb	932 kg	2054 lb

(continued)

(Table 8, contd)

	Dump Clearance @ 40 degree dump angle	2362 mm	93 inch	2361 mm	93 inch	2359 mm	93 inch	2359 mm	93 inch	2358	93 inch
	Reach @ 40 degree dump angle	691 mm	27 inch	693 mm	27 inch	694 mm	27 inch	695 mm	27 inch	696 mm	27 inch
246D	Tipping Load	2003 kg	4417 lb	1968 kg	4340 lb	1940 kg	4279 lb	1924 kg	4242 lb	1908 kg	4208 lb
	ROC 50%	1001 kg	2208 lb	984 kg	2170 lb	970 kg	2139 lb	962 kg	2121 lb	954 kg	2104 lb
	Dump Clearance @ 40 degree dump angle	2429 mm	96 inch	2428 mm	96 inch	2427 mm	96 inch	2427 mm	96 inch	2426 mm	96 inch
	Reach @ 40 degree dump angle	566 mm	22 inch	567 mm	22 inch	568 mm	22 inch	568 mm	22 inch	569 mm	22 inch
262D	Tipping Load	2531 kg	5582 lb	2495 kg	5502 lb	2468 kg	5442 lb	2452 kg	5406 lb	2436 kg	5372 lb
	ROC 50%	1266 kg	2791 lb	1248 kg	2751 lb	1234 kg	2721 lb	1226 kg	2703 lb	1218 kg	2686 lb
	Dump Clearance @ 40 degree dump angle	2452 mm	97 inch	2451 mm	96 inch	2449 mm	96 inch	2449 mm	96 inch	2448	96 inch
	Reach @ 40 degree dump angle	910 mm	36 inch	911 mm	36 inch	913 mm	36 inch	914 mm	36 inch	914 mm	36 inch
272D	Tipping Load	2845 kg	6274 lb	2809 kg	6193 lb	2781 kg	6133 lb	2765 kg	6097 lb	2750 kg	6064 lb
	ROC 50%	1423 kg	3137 lb	1404 kg	3097 lb	1391 kg	3066 lb	1382 kg	3048 lb	1375 kg	3032 lb
	Dump Clearance @ 40 degree dump angle	2504 mm	99 inch	2503 mm	99 inch	2502 mm	98 inch	2501 mm	98 inch	2500 mm	98 inch
	Reach @ 40 degree dump angle	937 mm	37 inch	938 mm	37 inch	939 mm	37 inch	940 mm	37 inch	941 mm	37 inch
272D XHP	Tipping Load	3327 kg	7335 lb	3289 kg	7253 lb	3261 kg	7192 lb	3245 kg	7156 lb	3230 kg	7123 lb
	ROC 50%	1663 kg	3668 lb	1645 kg	3626 lb	1631 kg	3596 lb	1623 kg	3578 lb	1615 kg	3561 lb
	Dump Clearance @ 40 degree dump angle	2544 mm	100 inch	2543 mm	100 inch	2542 mm	100 inch	2541 mm	100 inch	2541 mm	100 inch

(continued)

Product Information Section
Rated Load

(Table 8, contd)

	Reach @ 40 degree dump angle	898 mm	35 inch	899 mm	35 inch	900 mm	35 inch	901 mm	35 inch	901 mm	35 inch
272 D2	Tipping Load	3088 kg	6809 lb	3051 kg	6728 lb	3023 kg	6667 lb	3007 kg	6631 lb	2992 kg	6598 lb
	ROC 50%	1544 kg	3404 lb	1526 kg	3364 lb	1512 kg	3333 lb	1504 kg	3316 lb	1496 kg	3299 lb
	Dump Clearance @ 40 degree dump angle	2498 mm	98 inch	2497 mm	98 inch	2496 mm	98 inch	2495 mm	98 inch	2495 mm	98 inch
	Reach @ 40 degree dump angle	922 mm	36 inch	924 mm	36 inch	926 mm	36 inch	927 mm	36 inch	928 mm	37 inch
272D-2 XHP	Tipping Load	3305 kg	7287 lb	3267 kg	7204 lb	3239 kg	7143 lb	3223 kg	7107 lb	3208 kg	7074 lb
	ROC 50%	1652 kg	3643 lb	1634 kg	3602 lb	1620 kg	3571 lb	1612 kg	3554 lb	1604 kg	3537 lb
	Dump Clearance @ 40 degree dump angle	2535 mm	100 inch	2534 mm	100 inch	2533 mm	100 inch	2533 mm	100 inch	2532 mm	100 inch
	Reach @ 40 degree dump angle	890 mm	35 inch	892 mm	35 inch	893 mm	35 inch	894 mm	35 inch	895 mm	35 inch

Table 9

Low Profile Buckets with bolt-on-Edge Multi-Terrain Loader							
Model	P/N	279 - 5441		285 - 6090		268 - 4083	
	Tool Mass	232 kg	511 lb	248 kg	546 lb	264 kg	582 lb
	Bucket Specs.	66"		72"		78"	
257D	Tipping Load	2449 kg	5401 lb	2433 kg	5366 lb	2419 kg	5334 lb
	ROC 35%	857 kg	1890 lb	852 kg	1878 lb	847 kg	1867 lb
	Dump Clearance @ 40 degree dump angle	2340 mm	92 inch	2340 mm	92 inch	2339	92 inch
	Reach @ 40 degree dump angle	861 mm	34 inch	863 mm	34 inch	865 mm	30 inch
277D	Tipping Load	2890 kg	6373 lb	2874 kg	6338 lb	2860 kg	6306 lb
	ROC 35%	1012 kg	2230 lb	1006 kg	2218 lb	1001 kg	2207 lb
	Dump Clearance @ 40 degree dump angle	2456 mm	97 inch	2455 mm	97 inch	2454 mm	97 inch
	Reach @ 40 degree dump angle	611 mm	24 inch	613 mm	24 inch	614 mm	24 inch
287D	Tipping Load	3615 kg	7972 lb	3600 kg	7937 lb	3585 kg	7906 lb

(continued)

(Table 9, contd)

	ROC 35%	1265 kg	2790 lb	1260 kg	2778 lb	1255 kg	2767 lb
	Dump Clearance @ 40 degree dump angle	2443 mm	96 inch	2442 mm	96 inch	2442 mm	96 inch
	Reach @ 40 degree dump angle	939 mm	37 inch	941 mm	37 inch	943 mm	37 inch

Table 10

Low Profile Buckets with bolt-on-Edge - Multi Terra inch Loader											
Model	P/N	279 - 5435		279 - 5438		279 - 5441		285 - 6090		268 - 4083	
	Tool Mass	177 kg	391 lb	204 kg	451 lb	232 kg	511 lb	248 kg	546 lb	264 kg	582 lb
	Bucket Specs.	54"		60"		66"		72"		78"	
297D	Tipping Load	4117 kg	9077 lb	4089 kg	9017 lb	4067 kg	8967 lb	4056 kg	8943 lb	4043 kg	8915 lb
	ROC 35%	1441 kg	3177 lb	1431 kg	3156 lb	1423 kg	3139 lb	1420 kg	3130 lb	1415 kg	3120 lb
	Dump Clearance @ 40 degree dump angle	2447 mm	96 inch	2445 mm	96 inch	2444 mm	96 inch	2443 mm	96 inch	2442 mm	96 inch
	Reach @ 40 degree dump angle	966 mm	38 inch	969 mm	38 inch	971 mm	38 inch	973 mm	38 inch	975 mm	38 inch
297D XHP	Tipping Load	4505 kg	9933 lb	4477 kg	9871 lb	4454 kg	9821 lb	4443 kg	9797 lb	4430 kg	9769 lb
	ROC 35%	1577 kg	3476 lb	1567 kg	3455 lb	1559 kg	3437 lb	1555 kg	3429 lb	1551 kg	3419 lb
	Dump Clearance @ 40 degree dump angle	2450 mm	96 inch	2449 mm	96 inch	2448 mm	96 inch	2447 mm	96 inch	2446	96 inch
	Reach @ 40 degree dump angle	959 mm	38 inch	961 mm	38 inch	964 mm	38 inch	966 mm	38 inch	967 mm	38 inch
297D-2	Tipping Load	4245 kg	9361 lb	4207 kg	9277 lb	4180 kg	9217 lb	2531 kg	5582 lb	4150 kg	9151 lb
	ROC 35%	1486 kg	3276 lb	1473 kg	3247 lb	1463 kg	3226 lb	886 kg	1954 lb	1453 kg	3203 lb
	Dump Clearance @ 40 degree dump angle	2532 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch
	Reach @ 40 degree dump angle	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch

(continued)

Product Information Section
Rated Load

(Table 10, contd)

297D-2 XHP	Tipping Load	4330 kg	9548 lb	4292 kg	9464 lb	4265 kg	9404 lb	4249 kg	9369 lb	4235 kg	9338 lb
	ROC 35%	1516 kg	3342 lb	1502 kg	3312 lb	1493 kg	3291 lb	1487 kg	3279 lb	1482 kg	3268 lb
	Dump Clearance @ 40 degree dump angle	2532 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch	2531 mm	100 inch
	Reach @ 40 degree dump angle	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch	894 mm	35 inch

Table 11

Low Profile Buckets with Bolt-On Edge - Compact Track Loader									
Model	P/N	279-5438		279-5441		285-6090		268-4083	
	Tool Mass	204 kg	451 lb	232 kg	511 lb	248 kg	546 lb	264 kg	582 lb
	Bucket Specs.	60"		66"		72"		78"	
239D	Tipping Load	1826 kg	4025 lb	1799 kg	3966 lb	1783 kg	3931 lb	1768 kg	3899 lb
	ROC 35%	639 kg	1409 lb	630 kg	1388 lb	624 kg	1376 lb	619 kg	1365 lb
	Dump Clearance @ 40° dump angle	2101 mm	83 inch	2101 mm	83 inch	2101 mm	83 inch	2101 mm	83 inch
	Reach @ 40° dump angle	727 mm	29 inch	727 mm	29 inch	727 mm	29 inch	727 mm	29 inch
249D	Tipping Load	2044 kg	4508 lb	2018 kg	4449 lb	2002 kg	4413 lb	1987 kg	4381 lb
	ROC 35%	716 kg	1578 lb	706 kg	1557 lb	701 kg	1545 lb	695 kg	1533 lb
	Dump Clearance @ 40° dump angle	2276 mm	90 inch	2276 mm	90 inch	2276 mm	90 inch	2276 mm	90 inch
	Reach @ 40° dump angle	870 mm	34 inch	870 mm	34 inch	870 mm	34 inch	870 mm	34 inch

Table 12

Low Profile Buckets with Bolt-On Edge - Compact Track Loader							
Model	P/N	279-5441		285-6090		268-4083	
	Tool Mass	232 kg	511 lb	248 kg	546 lb	264 kg	582 lb
	Bucket Specs.	66"		72"		78"	
259D	Tipping Load	2535 kg	5590 lb	2519 kg	5555 lb	2505 kg	5523 lb
	ROC 35%	887 kg	1956 lb	882	1944 lb	877 kg	1933 lb
	Dump Clearance @ 40 degree dump angle	2356 mm	93 inch	2355 mm	93 inch	2354 mm	93 inch

(continued)

(Table 12, contd)

Low Profile Buckets with Bolt-On Edge - Compact Track Loader							
	Reach @ 40 degree dump angle	760 mm	30 inch	762 mm	30 inch	764 mm	30 inch
279D	Tipping Load	2565 kg	5657 lb	2549 kg	5621 lb	2535 kg	5589 lb
	ROC 35%	898 kg	1980 lb	892 kg	1967 lb	887 kg	1956 kg
	Dump Clearance @ 40 degree dump angle	2449 mm	96 inch	2449 mm	96 inch	2448 mm	96 inch
	Reach @ 40 40 degree dump angle	549 mm	22 inch	552 mm	22 inch	553 mm	22 inch
289D	Tipping Load	3333 kg	7349 lb	3317 kg	7314 lb	3303 kg	7282 lb
	ROC 35%	1166 kg	2572	1161 kg	2560 lb	1156 kg	2549 lb
	Dump Clearance @ 40 degree dump angle	2452 mm	97 inch	2452 mm	97 inch	2451 mm	96 inch
	Reach @ 40 degree dump angle	896 mm	35 inch	897 mm	35 inch	899 mm	35 inch
299D (Rubber)	Tipping Load	3761 kg	8294 lb	3750 kg	8268 lb	3737 kg	8240 lb
	ROC 35%	1316 kg	2903 lb	1312 kg	2894 lb	1308 kg	2884 lb
	Dump Clearance @ 40 degree dump angle	2463 mm	97 inch	2462 mm	97 inch	2461 mm	97 inch
	Reach @ 40 degree dump angle	935 mm	37 inch	937 mm	37 inch	939 mm	37 inch
299D XHP (Rubber)	Tipping Load	4140KG	9128 lb	4128 kg	9102 lb	4115 kg	9074 lb
	ROC 35%	1449 kg	3195 lb	1445 kg	3186 lb	1440 kg	3176
	Dump Clearance @ 40° dump angle	2467 mm	97 inch	2466 mm	97 inch	2465 mm	97 inch
	Reach @ 40° dump angle	926 mm	36 inch	928 mm	37 inch	930 mm	37 inch
299D (Steel)	Tipping Load	4342 kg	9575 lb	4331 kg	9551 lb	4319 kg	9523 lb
	ROC 35%	1520 kg	3351 lb	1516 kg	3343 lb	1512 kg	3333 lb
	Dump Clearance @ 40° dump angle	2463 mm	97 inch	2462 mm	97 inch	2461 mm	97 inch
	Reach @ 40° dump angle	935 mm	37 inch	937 mm	37 inch	939 mm	37 inch

(continued)

Product Information Section
Rated Load

(Table 12, contd)

Low Profile Buckets with Bolt-On Edge - Compact Track Loader							
299D XHP (Steel)	Tipping Load	4718 kg	10403 lb	4707 kg	10379 lb	4694 kg	10351 lb
	ROC 35%	1651 kg	3641 lb	1647 kg	3633 lb	1643 kg	3623 lb
	Dump Clearance @ 40 degree dump angle	2467 mm	97 inch	2466 mm	97 inch	2465 mm	97 inch
	Reach @ 40 degree dump angle	926 mm	36 inch	928 mm	37 inch	930 mm	37 inch
299D2 (Rubber)	Tipping Load	4098 kg	9037 lb	4083 kg	9002 lb	4068 kg	8971 lb
	ROC 35%	1434 kg	3163 lb	1429 kg	3151 lb	1424 kg	3140 lb
	Dump Clearance @ 40 degree dump angle	2505 mm	99 inch	2505 mm	99 inch	2505 mm	99 inch
	Reach @ 40 degree dump angle	994 mm	39 inch	994 mm	39 inch	994 mm	39 inch
299D2 XHP (Rubber)	Tipping Load	4209 kg	9281 lb	4194 kg	9247 lb	4179 kg	9215 lb
	ROC 35%	1473 kg	3248 lb	1468 kg	3236 lb	1463 kg	3225 lb
	Dump Clearance @ 40 degree dump angle	2505 mm	99 inch	2505 mm	99 inch	2505 mm	99 inch
	Reach @ 40 degree dump angle	994 mm	39 inch	994 mm	39 inch	994 mm	39 inch
299D2 (Steel)	Tipping Load	4439 kg	9788 lb	4423 kg	9753 lb	4409 kg	9721 lb
	ROC 35%	1554 kg	3426 lb	1548 kg	3414 lb	1543 kg	3402 lb
	Dump Clearance @ 40 degree dump angle	2505 mm	99 inch	2505 mm	99 inch	2505 mm	99 inch
	Reach @ 40 degree dump angle	994 mm	39 inch	994 mm	39 inch	994 mm	39 inch
299D2 XHP (Steel)	Tipping Load	4522 kg	9970 lb	4506 kg	9936 lb	4492 kg	9904 lb
	ROC 35%	1583 kg	3490 lb	1577 kg	3477 lb	1572 kg	3466 lb
	Dump Clearance @ 40 degree dump angle	2505 mm	99 inch	2505 mm	99 inch	2505 mm	99 inch
	Reach @ 40 degree dump angle	994 mm	39 inch	994 mm	39 inch	994 mm	39 inch

Table 13

Low Profile Buckets											
	P/N	279 - 5434		279 - 5437		279 - 5440		285 - 6089		268 - 4084	
	Tool Mass (kg. lb.)	154 kg	340 lb	170 kg	375 lb	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	54"		60"		66"		72"		78"	
236D	Tipping Load	1678 kg	3699 lb	1656 kg	3652 lb	1633 kg	3601 lb	1621 kg	3573 lb	1609 kg	3548 lb
	ROC 50%	839 kg	1850 lb	828 kg	1826 lb	817 kg	1800 lb	810 kg	1787 lb	805 kg	1774 lb
	Dump Clearance @ 40° dump angle	2428 mm	96 inch	2427 mm	96 inch	2426 mm	96 inch	2426 mm	96 inch	2426 mm	96 inch
	Reach @ 40° dump angle	447 mm	18 inch	448 mm	18 inch	450 mm	18 inch	451 mm	18 inch	452 mm	18 inch
242D	Tipping Load	1998 kg	4406 lb	1976 kg	4358 lb	1953 kg	4307 lb	1941 kg	4280 lb	1930 kg	4256 lb
	ROC 50%	999 kg	2203 lb	988 kg	2179 lb	977 kg	2154 lb	971 kg	2140 lb	965 kg	2128 lb
	Dump Clearance @ 40° dump angle	2384 mm	94 inch	2383 mm	94 inch	2383 mm	94 inch	2382 mm	94 inch	2382 mm	94 inch
	Reach @ 40° dump angle	667 mm	26 inch	668 mm	26 inch	669 mm	26 inch	670 mm	26 inch	671 mm	26 inch

Table 14

Low Profile Buckets							
	P/N	279 - 5440		285 - 6089		268 - 4084	
	Tool Mass	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	66"		72"		78"	
257D	Tipping Load	2528 kg	5574 lb	2516 kg	5548 lb	2505 kg	5524 lb
	ROC 35%	885 kg	1951 lb	881 kg	1942 lb	877 kg	1934 lb
	Dump Clearance @ 40° dump angle	2396 mm	94 inch	2396 mm	94 inch	2396 mm	94 inch
	Reach @ 40° dump angle	796 mm	31 inch	796 mm	31 inch	796 mm	31 inch
259D	Tipping Load	2614 kg	5764 lb	2602 kg	5738 lb	2592 kg	5715 lb
	ROC 35%	915 kg	2017 lb	911 kg	2008 lb	907 kg	2000 lb
	Dump Clearance @ 40° dump angle	2379 mm	94 inch	2379 mm	94 inch	2379 mm	94 inch

(continued)

Product Information Section
Rated Load

(Table 14, contd)

Low Profile Buckets							
	Reach @ 40° dump angle	767 mm	30 inch	767 mm	30 inch	767 mm	30 inch

Table 15

Low Profile Buckets											
	P/N	279-5434		279-5437		279-5440		285-6089		268-4084	
	Tool Mass (kg. lb.)	154 kg	340 lb	170 kg	375 lb	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	54"		60"		66"		72"		78"	
246D	Tipping Load	2029 kg	4474 lb	2007 kg	4426 lb	1984 kg	4375 lb	1972 kg	4347 lb	1960 kg	4322 lb
	ROC 50%	1014 kg	2237 lb	1004 kg	2213 lb	992 kg	2187 lb	986 kg	2174 lb	980 kg	2161 lb
	Dump Clearance @ 40° dump angle	2452 mm	97 inch	2452 mm	97 inch	2451 mm	96 inch	2451 mm	96 inch	2450 mm	96 inch
	Reach @ 40° dump angle	542 mm	21 inch	543 mm	21 inch	545 mm	21 inch	545 mm	21 inch	546 mm	21 inch
262D	Tipping Load	2576 kg	5681 lb	2554 kg	5631 kg	2531 kg	5581 lb	2519 kg	5554 lb	2508 kg	5530 lb
	ROC 50%	1288 kg	2840 lb	1277 kg	2816 lb	1265 kg	2790 lb	1259 kg	2777 lb	1254 kg	2765 lb
	Dump Clearance @ 40° dump angle	2475 mm	97 inch	2474 mm	97 inch	2473 mm	97 inch	2473 mm	97 inch	2472 mm	97 inch
	Reach @ 40° dump angle	886 mm	35 inch	887 mm	35 inch	889 mm	35 inch	889 mm	35 inch	890 mm	35 inch

Table 16

Low Profile Buckets							
	P/N	279-5440		285-6089		268-4084	
277D	Tool Mass	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	66"		72"		78"	
	Tipping Load	2968 kg	6544 lb	2956 kg	6518 lb	2945 kg	6494 lb
	ROC 35%	1039 kg	2290 lb	1035 kg	2281 lb	1031 kg	2273 lb
	Dump Clearance @ 40° dump angle	2476 mm	97 inch	2476 mm	97 inch	2476 mm	97 inch

(continued)

(Table 16, contd)

Low Profile Buckets							
	Reach @ 40° dump angle	582 mm	23 inch	582 mm	23 inch	582 mm	23 inch
279D	Tipping Load	2651 kg	5845 lb	2639 kg	5818 lb	2628 kg	5794 lb
	ROC 35%	928 kg	2046 lb	924 kg	2036 lb	920 kg	2028 lb
	Dump Clearance @ 40° dump angle	2472 mm	97 inch	2472 mm	97 inch	2472 mm	97 inch
	Reach @ 40° dump angle	556 mm	22 inch	556 mm	22 inch	556 mm	22 inch
287D	Tipping Load	3689 kg	8133 lb	3677 kg	8108 lb	3667 kg	8085 lb
	ROC 35%	1291 kg	2847 lb	1287 kg	2838 lb	1283 kg	2830 lb
	Dump Clearance @ 40° dump angle	2477 mm	98 inch	2477 mm	98 inch	2477 mm	98 inch
	Reach @ 40° dump angle	929 mm	37 inch	929 mm	37 inch	929 mm	37 inch
287D	Tipping Load	3405 kg	7508 lb	3393 kg	7482 lb	3383 kg	7459 lb
	ROC 35%	1192 kg	2628 lb	1188 kg	2619 lb	1184 kg	2611 lb
	Dump Clearance @ 40° dump angle	2477 mm	98 inch	2477 mm	98 inch	2477 mm	98 inch
	Reach @ 40° dump angle	906 mm	36 inch	906 mm	36 inch	906 mm	36 inch

Table 17

Low Profile Buckets											
P/N	279-5434		279-5437		279-5440		285-6089		268-4084		
Tool Mass (kg. lb.)	154 kg	340 lb	170 kg	375 lb	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb	
Bucket Specs.	54"		60"		66"		72"		78"		
272D-2	Tipping Load	3147 kg	6939 lb	3124 kg	6887 lb	3101 kg	6837 lb	3089 kg	6811 lb	3078 kg	6787 lb
	ROC 50%	1573 kg	3469 lb	1562 kg	3444 lb	1550 kg	3419 lb	1544 kg	3405 lb	1539 kg	3393 lb
	Dump Clearance @ 40° dump angle	2529 mm	100 inch	2528 mm	100 inch	2527 mm	100 inch	2527 mm	99 inch	2527 mm	99 inch
	Reach @ 40° dump angle	910 mm	36 inch	911 mm	36 inch	912 mm	36 inch	913 mm	36 inch	914 mm	36 inch

(continued)

Product Information Section
Rated Load

(Table 17, contd)

272D-2 XHP	Tipping Load	3367 kg	7423 lb	3343 kg	7371 lb	3320 kg	7321 lb	3308 kg	7295 lb	3297 kg	7271 lb
	ROC 50%	1683 kg	3712 lb	1671 kg	3685 lb	1660 kg	3660 lb	1654 kg	3647 lb	1649 kg	3635 lb
	Dump Clearance @ 40° dump angle	2566 mm	101 inch	2565 mm	101 inch	2565 mm	101 inch	2564 mm	101 inch	2564 mm	101 inch
	Reach @ 40° dump angle	878 mm	35 inch	879 mm	35 inch	880 mm	35 inch	881 mm	35 inch	881 mm	35 inch

Table 18

Low Profile Buckets							
	P/N	279 - 5440		285 - 6089		268 - 4084	
		Tool Mass	194 kg	428 lb	207 kg	456 lb	212 kg
	Bucket Specs.	66"		72"		78"	
299D2 STD (Rubber)	Tipping Load	4188 kg	9234 lb	4176 kg	9209 lb	4166 kg	9186 lb
	ROC 35%	1466 kg	3232 lb	1462 kg	3223 lb	1458 kg	3215 lb
	Dump Clearance @ 40° dump angle	2535 mm	100 inch	2535 mm	100 inch	2535 mm	100 inch
	Reach @ 40° dump angle	982 mm	39 inch	982 mm	39 inch	982 mm	39 inch
299D2 XHP (Rubber)	Tipping Load	4300 kg	9481 lb	4288 lb	9456 lb	4278 kg	9433 lb
	ROC 35%	1505 kg	3318 lb	1501 kg	3310 lb	1497 kg	3302 lb
	Dump Clearance @ 40° dump angle	2535 mm	100 inch	2535 mm	100 inch	2535 mm	100 inch
	Reach @ 40° dump angle	982 mm	39 inch	982 mm	39 inch	982 mm	39 inch
299D2 STD (Steel)	Tipping Load	4533 kg	9996 lb	4522 kg	9971 lb	4511 kg	9948 lb
	ROC 35%	1587 kg	3499 lb	1583 kg	3490 lb	1579 kg	3482 lb
	Dump Clearance @ 40° dump angle	2535 mm	100 inch	2535 mm	100 inch	2535 mm	100 inch
	Reach @ 40° dump angle	982 mm	39 inch	982 mm	39 inch	982 mm	39 inch
299D2 XHP (Steel)	Tipping Load	4617 kg	10181 lb	4606 kg	10155 lb	4595 kg	10132 lb
	ROC 35%	1616 kg	3563 lb	1612 kg	3554 lb	1608 kg	3546 lb

(continued)

(Table 18, contd)

Low Profile Buckets							
	Dump Clearance @ 40° dump angle	2535 mm	100 inch	2535 mm	100 inch	2535 mm	100 inch
	Reach @ 40° dump angle	982 mm	39 inch	982 mm	39 inch	982 mm	39 inch

Table 19

Low Profile Buckets											
Model	P/N	279-5434		279-5437		279-5440		285-6089		268-4084	
	Tool Mass (kg. lb.)	154 kg	340 lb	170 kg	375 lb	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	54"		60"		66"		72"		78"	
226D	Tipping Load	1414 kg	3118 lb	1393 kg	3072 lb	1370 kg	3020 lb	1357 kg	2992 lb	1346 kg	2968 lb
	ROC 50%	707 kg	1559 lb	697 kg	1536 lb	685 kg	1510 lb	679 kg	1496 lb	673 kg	1484 lb
	Dump Clearance @ 40° dump angle	2124 mm	84 inch	2132 mm	84 inch	2131 mm	84 inch	2131 mm	84 inch	2130 mm	84 inch
	Reach @ 40° dump angle	628 mm	25 inch	617 mm	24 inch	619 mm	24 inch	620 mm	24 inch	621 mm	24 inch
232D	Tipping Load	1695 kg	3738 lb	1674 kg	3691 lb	1651 kg	3641 lb	1639 kg	3613 lb	1628 kg	3589 lb
	ROC 50%	848 kg	1869 lb	837 kg	1846 lb	826 kg	1820 lb	819 kg	1807 lb	814 kg	1795 lb
	Dump Clearance @ 40° dump angle	2315 mm	91 inch	2314 mm	91 inch	2313 mm	91 inch	2312 mm	91 inch	2312 mm	91 inch
	Reach @ 40° dump angle	744 mm	29 inch	746 mm	29 inch	748 mm	29 inch	749 mm	30 inch	751 mm	30 inch

Table 20

Low Profile Buckets									
Model	P/N	279-5437		279-5440		285-6089		268-4084	
	Tool Mass (kg. lb.)	170 kg	375 lb	194 kg	428 lb	207 kg	456 lb	212 kg	467 lb
	Bucket Specs.	60"		66"		72"		78"	
239D	Tipping Load	1885 kg	4157 lb	1863 kg	4107 lb	1851 kg	4081 lb	1840 kg	4058 lb
	ROC 35%	660 kg	1455 lb	652 kg	1438 lb	648 kg	1428 lb	644 kg	1420 lb

(continued)

Product Information Section
Rated Load

(Table 20, contd)

	Dump Clearance @ 40° dump angle	2131 mm	84 inch	2131 mm	84 inch	2131 mm	84 inch	2131 mm	84 inch
	Reach @ 40° dump angle	716 mm	28 inch	716 mm	28 inch	716 mm	28 inch	716 mm	28 inch
249D	Tipping Load	2106 kg	4644 lb	2084 kg	4595 lb	2072 kg	4569 lb	2061 kg	4545 lb
	ROC 35%	737 kg	1625 lb	729 kg	1608 lb	725 kg	1599 lb	721 kg	1591 lb
	Dump Clearance @ 40° dump angle	2306 mm	91 inch	2306 mm	91 inch	2306 mm	91 inch	2306 mm	91 inch
	Reach @ 40° dump angle	858 mm	34 inch	858 mm	34 inch	858 mm	34 inch	858 mm	34 inch

Table 21

General Purpose Buckets											
Model	P/N	279-5364		279-5368		279-5372		279-5376		292-9270	
	Tool Mass (kg, lb)	173 kg	381 lb	221 kg	487 lb	234 kg	516 lb	247 kg	544 lb	279 kg	614 lb
	Bucket Specs.	60"		66"		72"		78"		84" High Capacity	
226D	Tipping Load	1358 kg	2995 lb	1308 kg	2883 lb	1294 kg	2854 lb	1282 kg	2826 lb	1220 kg	2690 lb
	ROC 50%	679 kg	1497 lb	654 kg	1442 lb	647 kg	1427 lb	641 kg	1413 lb	610 kg	1345 lb
	Dump Clearance @ 40° dump angle	2097 mm	83 inch	2095 mm	82 inch	2094 mm	82 inch	2093 mm	82 inch	2031 mm	80 inch
	Reach @ 40° dump angle	655 mm	26 inch	659 mm	26 inch	661 mm	26 inch	661 mm	26 inch	735 mm	29 inch
232D	Tipping Load	1633 kg	3601 lb	1582 kg	3489 lb	1569 kg	3460 lb	1556 kg	3431 lb	1489 kg	3284 lb
	ROC 50%	816 kg	1800 lb	791 kg	1744 lb	785 kg	1730 lb	778 kg	1716 lb	745 kg	1642 lb
	Dump Clearance @ 40° dump angle	2278 mm	90 inch	2276 mm	90 inch	2275 mm	90 inch	2275 mm	90 inch	2211 mm	87 inch
	Reach @ 40° dump angle	785 mm	31 inch	789 mm	31 inch	791 mm	31 inch	792 mm	31 inch	866 mm	34 inch
236D	Tipping Load	1591 kg	3508 lb	1540 kg	3395 lb	1526 kg	3366 lb	1513 kg	3337 lb	1449 kg	3194 lb
	ROC 50%	795 kg	1754 lb	770 kg	1697 lb	763 kg	1683 lb	757 kg	1668 lb	724 kg	1597 lb
	Dump Clearance @ 40° dump angle	2403 mm	95 inch	2401 mm	95 inch	2400 mm	95 inch	2400 mm	94 inch	2388 mm	92 inch

(continued)

(Table 21, contd)

	Reach @ 40° dump angle	506 mm	20 inch	508 kg	20 inch	509 mm	20 inch	510 mm	20 inch	583 mm	23 inch
242D	Tipping Load	1934 kg	4264 lb	1882 kg	4151 lb	1869 kg	4122 lb	1856 kg	4092 lb	1783 kg	39328 lb
	ROC 50%	967 kg	2132 lb	941 kg	2075 lb	935 kg	2061 lb	928 kg	2046 lb	892 kg	1966 lb
	Dump Clearance @ 40° dump angle	2357 mm	93 inch	2355 mm	93 inch	2354 mm	93 inch	2354 mm	93 inch	2292 mm	90 inch
	Reach @ 40° dump angle	719 mm	28 inch	721 mm	28 inch	722 mm	28 inch	722 mm	28 inch	795 mm	31 inch
246D	Tipping Load	1981 kg	4368 lb	1929 kg	4254 lb	1916 kg	4225 lb	1902 kg	4195 lb	1832 kg	4041 lb
	ROC 50%	991 kg	2184 lb	965 kg	2127 lb	958 kg	2112 kg	951 kg	2097 lb	916 kg	2020 lb
	Dump Clearance @ 40° dump angle	2424 mm	95 inch	2423 mm	95 inch	2422 mm	95 inch	2422 mm	95 inch	2360 mm	93 inch
	Reach @ 40° dump angle	593 mm	23 inch	595 mm	23 inch	596 mm	23 inch	596 mm	23 inch	669 mm	26 inch
262D	Tipping Load	2500 kg	5512 lb	2447 kg	5396 lb	2434 kg	5367 lb	2420 kg	5335 lb	2338 kg	5155 lb
	ROC 50%	1250 kg	2756 lb	1224 kg	2698 lb	1217 kg	2684 lb	1210 kg	2668 lb	1169 kg	2578 lb
	Dump Clearance @ 40° dump angle	2447 mm	96 inch	2445 mm	96 inch	2444 mm	96 inch	2444 mm	96 inch	2381 mm	94 inch
	Reach @ 40° dump angle	937 mm	37 inch	940 mm	37 inch	940 mm	37 inch	941 mm	37 inch	1014 mm	40 inch
272D	Tipping Load	2809 kg	6194 lb	2756 kg	6077 lb	2743 kg	6047 lb	2728 kg	6015 lb	2641 kg	5823 lb
	ROC 50%	1405 kg	3102 lb	1378 kg	3038 lb	1371 kg	3024 lb	1364 kg	3007 lb	1320 kg	2911 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2497 mm	98 inch	2496 mm	98 inch	2496 mm	98 inch	2433 mm	96 inch
	Reach @ 40° dump angle	965 mm	38 inch	967 mm	38 inch	967 mm	38 inch	968 mm	38 inch	1040 mm	41 inch
272 D XHP	Tipping Load	3282 kg	7237 lb	3228 kg	7117 kg	3215 kg	7088 lb	3199 kg	7054 lb	3103 kg	6843 lb
	ROC 50%	1641 kg	3619 lb	1614 kg	3559 lb	1607 kg	3544 lb	1600 kg	3527 lb	1552 kg	3421 lb
	Dump Clearance @ 40° dump angle	2539 mm	100 inch	2537 mm	100 inch	2537 mm	100 inch	2536 mm	100 inch	2474 mm	97 inch
	Reach @ 40° dump angle	926 mm	36 inch	927 mm	37 inch	928 mm	37 inch	928 mm	37 inch	1001 mm	39 inch

(continued)

Product Information Section
Rated Load

(Table 21, contd)

272D-2	Tipping Load	3048 kg	6722 lb	2995 kg	6603 lb	2981 kg	6574 lb	2966 kg	6540 lb	2875 kg	6338 lb
	ROC 50%	1524 kg	3361 lb	1497 kg	3301 lb	1491 kg	3287 lb	1483 kg	3270 lb	1437 kg	3169 lb
	Dump Clearance @ 40° dump angle	2492 mm	98 inch	2491 mm	98 inch	2490 mm	98 inch	2490 mm	98 inch	2427 mm	96 inch
	Reach @ 40° dump angle	950 mm	37 inch	953 mm	38 inch	953 mm	38 inch	954 mm	38 inch	1026 mm	40 inch
272D-2 XHP	Tipping Load	3260 kg	7189 lb	3206 kg	7069 lb	3193 kg	7040 lb	3177 kg	7006 lb	3081 kg	6795 lb
	ROC 50%	1630 kg	3594 lb	1603 kg	3535 lb	1596 kg	3520 lb	1589 kg	3503 lb	1541 kg	3397 lb
	Dump Clearance @ 40° dump angle	2530 mm	100 inch	2528 mm	100 inch	2528 mm	100 inch	2527 mm	100 inch	2465 mm	97 inch
	Reach @ 40° dump angle	918 mm	36 inch	920 mm	36 inch	921 mm	36 inch	921 mm	36 inch	994 mm	39 inch

Table 22

General Purpose Buckets									
	P/N	279-5368		279-5372		279-5376		292-9270	
	257D	Tool Mass	221 kg	487 lb	234 kg	516 lb	247 kg	544 lb	279 kg
Bucket		66"		72"		78"		84" High Capacity	
Tipping Load		2429 kg	5357 lb	2416 kg	5328 lb	2402 kg	5297 lb	2316 kg	5107 lb
ROC 35%		850 kg	1875 lb	846 kg	1865 lb	841 kg	1854 lb	811 kg	1787 lb
Dump Clearance @ 40° dump angle		2336 mm	92 inch	2335 mm	92 inch	2334 mm	92 inch	2271 mm	89 inch
Reach @ 40° dump angle		887 mm	35 inch	889 mm	35 inch	890 mm	35 inch	964 mm	38 inch
277D		Tipping Load	2865 kg	6318 lb	2852 kg	6290 lb	2838 kg	6258 lb	2729 kg
	ROC 35%	1003 kg	2211 lb	998 kg	2201 lb	993 kg	2190 lb	955 kg	2106 lb
	Dump Clearance @ max dump angle	2420 mm	95 inch	2451 mm	97 inch	2451 mm	96 inch	2388 mm	94 inch
	Reach @ max dump angle	653 mm	26 inch	639 mm	25 inch	640 mm	25 inch	714 mm	28 inch
287D	Tipping Load	3576 kg	7886 lb	3563 kg	7857 lb	3547 kg	7822 lb	3437 kg	7579 lb
	ROC 35%	1252 kg	2760 lb	1247 kg	2750 lb	1242 kg	2738 lb	1203 kg	2653
	Dump Clearance @ 40° dump angle	2438 mm	96 inch	2438 mm	96 inch	2437 mm	96 inch	2374 mm	93 inch
	Reach @ 40° dump angle	965 mm	38 inch	967 mm	38 inch	968 mm	38 inch	1042 mm	41 inch

Table 23

GP Buckets											
	P/N	279-5364		279-5368		279-5372		279-5376		292-9270	
	Tool Mass (kg, lb)	173 kg	381 lb	221 kg	487 lb	234 kg	516 lb	247 kg	544 lb	279 kg	614 lb
297D	Bucket Specs.	60"		66"		72"		78"		84" High Capacity	
	Tipping Load	4054 kg	8939 lb	4008 kg	8837 lb	3998 kg	8815 lb	3982 kg	8780 lb	3876 kg	8547 lb
	ROC 35%	1419 kg	3129 lb	1403 kg	3093 lb	1399 kg	3085 lb	1394 kg	3073 lb	1357 kg	2991 lb
	Dump Clearance @ 40° dump angle	2441 mm	96 inch	2439 mm	96 inch	2438 mm	96 inch	2437 mm	96 inch	2374 mm	93 inch
	Reach @ 40° dump angle	994 mm	39 inch	998 mm	39 inch	1000 mm	39 inch	1001 mm	39 inch	1074 mm	42 inch
		Tipping Load	4436 kg	9782 lb	4389 kg	9678 lb	4379 kg	9655 lb	4362 kg	9619 lb	4249 kg
297D XHP	ROC 35%	1553 kg	3424 lb	1536 kg	3387 lb	1533 kg	3379 lb	1527 kg	3367 lb	1487 kg	3279 lb
	Dump Clearance @ 40° dump angle	2445 mm	96 inch	2442 mm	96 inch	2442 mm	96 inch	2441 mm	96 inch	2378 mm	94 inch
	Reach @ 40° dump angle	986 mm	39 inch	991 mm	39 inch	992 mm	39 inch	993 mm	39 inch	1066 mm	42 inch
		Tipping Load	4188 kg	9236 lb	4133 kg	9113 lb	4120 kg	9084 lb	4103 kg	9047 lb	3979 kg
297D-2	ROC 35%	1466 kg	3232 lb	1447 kg	3190 lb	1442 kg	3179 lb	1436 kg	3166 lb	1393 kg	3071 lb
	Dump Clearance @ 40° dump angle	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2464 mm	97 inch
	Reach @ 40° dump angle	922 mm	36 inch	922 mm	36 inch	922 mm	36 inch	922 mm	36 inch	992 mm	39 inch
		Tipping Load	4272 kg	9420 lb	4216 kg	9297 lb	4203 kg	9268 lb	4186 kg	9231 lb	4061 kg
297D-2 XHP	ROC 35%	1495 kg	3297 lb	1476 kg	3254 lb	1471 kg	3244 lb	1465 kg	3231 lb	1421 kg	3134 lb
	Dump Clearance @ 40° dump angle	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2464 mm	97 inch
	Reach @ 40° dump angle	922 mm	36 inch	922 mm	36 inch	922 mm	36 inch	922 mm	36 inch	992 mm	39 inch
		Tipping Load	4272 kg	9420 lb	4216 kg	9297 lb	4203 kg	9268 lb	4186 kg	9231 lb	4061 kg

Table 24

GP Buckets											
Model	P/N	279-5364		279-5368		279-5372		279-5376		292-9270	
	Tool Mass (kg, lb)	173 kg	381 lb	221 kg	487 lb	234 kg	516 lb	247 kg	544 lb	279 kg	614 lb
239D	Bucket Specs.	60"		66"		72"		78"		84" High Capacity	
	Tipping Load	1842 kg	4061 lb	1791 kg	3950 lb	1778 kg	3921 lb	1765 kg	3892 lb	1692 kg	3730 lb

(continued)

Product Information Section
Rated Load

(Table 24, contd)

	ROC 35%	645 kg	1421 lb	627 kg	1383 lb	622 kg	1372 lb	618 kg	1362 lb	592 kg	1305 lb
	Dump Clearance @ 40° dump angle	2095 mm	82 inch	2095 mm	82 inch	2095 mm	82 inch	2095 mm	82 inch	2034 mm	80 inch
	Reach @ 40° dump angle	755 mm	30 inch	755 mm	30 inch	755 mm	30 inch	755 mm	30 inch	825 mm	32 inch
249D	Tipping Load	2057 kg	4536 lb	2006 kg	4424 lb	1993 kg	4395 lb	1980 kg	4366 lb	1902 kg	4195 lb
	ROC 35%	720 kg	1587 lb	702 kg	1548 lb	698 kg	1538 lb	693 kg	1528 lb	666 kg	1468 lb
	Dump Clearance @ 40° dump angle	2271 mm	89 inch	2270 mm	89 inch	2270 mm	89 inch	2270 mm	89 inch	2209 mm	87 inch
	Reach @ 40° dump angle	897 mm	35 inch	897 mm	35 inch	897 mm	35 inch	897 mm	35 inch	968 mm	38 inch

Table 25

General Purpose Buckets									
	P/N	279-5368		279-5372		279-5376		292-9270	
	Tool Mass	221 kg	487 lb	234 kg	516 lb	247 kg	544 lb	279 kg	614 lb
259D	Bucket Specs.	66"		72"		78"		84" High Capacity	
		Tipping Load	2514 kg	5544 lb	2501 kg	5515 lb	2487 kg	5484 lb	2399 kg
	ROC 35%	880 kg	1940 lb	875 kg	1930 kg	870 lb	1919 kg	839 kg	1851 lb
	Dump Clearance @ 40° dump angle	2351 mm	93 inch	2350 mm	93 inch	2349 mm	92 inch	2286 mm	90 inch
	Reach @ 40° dump angle	785 mm	31 inch	787 mm	31 inch	788 mm	31 inch	863 mm	34 inch
279D	Tipping Load	2551 kg	5626 lb	2551 kg	5626 lb	2551 kg	5626 lb	2551 kg	5626 lb
	ROC 35%	893 kg	1969 lb	893 kg	1969 lb	893 kg	1969 lb	893 kg	1969 lb
	Dump Clearance @ 40° dump angle	2445 mm	96 inch	2444 mm	96 inch	2443 mm	96 inch	2381 mm	94 inch
	Reach @ 40° dump angle	575 mm	23 inch	577 mm	23 inch	578 mm	23 inch	653 mm	26 inch
289D	Tipping Load	3304 kg	7286 lb	3291 kg	7257 lb	3276 kg	7223 lb	3170 kg	6989 lb
	ROC 35%	1157 kg	2550 lb	1152 kg	2540 lb	1147 kg	2528 lb	1109 kg	2446 lb
	Dump Clearance @ 40° dump angle	2448 mm	96 inch	2447 mm	96 inch	2446 mm	96 inch	2383 mm	94 inch
	Reach @ 40° dump angle	921 mm	36 inch	923 mm	36 inch	924 mm	36 inch	999 mm	39 inch
299D Rubber	Tipping Load	3203 kg	7063 lb	3188 kg	7030 lb	3116 kg	6870 lb	3101 kg	6837 lb
	ROC 35%	1121 kg	2472 lb	1116 kg	2460 lb	1090 kg	2404 lb	1085 kg	2393 lb

(continued)

(Table 25, contd)

299D XHP Rubber	Tipping Load	3527 kg	7776 lb	3511 kg	7743 lb	3439 kg	7582 lb	3424 kg	7550 lb
	ROC 35%	1234 kg	2722 lb	1229 kg	2710 lb	1204 kg	2654 lb	1198 kg	2642 lb
299D (Steel)	Tipping Load	3631 kg	8007 lb	3617 kg	7974 lb	3546 kg	7819 lb	3532 kg	7787 lb
	ROC 35%	1271 kg	2802 lb	1266 kg	2791 lb	1241 kg	2737 lb	1236 kg	2726 lb
299D XHP (Steel)	Tipping Load	3948 kg	8705 lb	3933 kg	8673 lb	3863 kg	8517 lb	3848 kg	8485 lb
	ROC 35%	1382 kg	3047 lb	1377 kg	3035 lb	1352 kg	2981 lb	1347 kg	2970 lb
299D2 Rubber	Tipping Load	4054 kg	8939 lb	4041 kg	8910 lb	4024 kg	8873 lb	3906 kg	8612 lb
	ROC 35%	1419 kg	3129 lb	1414 kg	3118 lb	1408 kg	3106 lb	1367 kg	3014 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch	2438 mm	96 inch
	Reach @ 40° dump angle	1021 mm	40 inch	1021 mm	40 inch	1021 mm	40 inch	1092 mm	43 inch
299D2 XHP Rubber	Tipping Load	4163 kg	9179 lb	4150 kg	9150 lb	4133 kg	9113 lb	4013 kg	8848 lb
	ROC 35%	1457 kg	3213 lb	1452 kg	3203 lb	1447 kg	3190 lb	1404 kg	3097 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch	2438 mm	96 inch
	Reach @ 40° dump angle	1021 mm	40 inch	1021 mm	40 inch	1021 mm	40 inch	1092 mm	43 inch
299D2 (Steel)	Tipping Load	4388 kg	9676 lb	4375 kg	9646 lb	4358 kg	9608 lb	4232 kg	9332 lb
	ROC 35%	1536 kg	3387 lb	1531 kg	3376 lb	1525 kg	3363 lb	1481 kg	3266 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch	2438 mm	96 inch
	Reach @ 40° dump angle	1021 mm	40 inch	1021 mm	40 inch	1022 mm	40 inch	1092 mm	43 inch
299D2 XHP (Steel)	Tipping Load	4470 kg	9856 lb	4456 kg	9826 lb	4439 kg	9788 lb	4312 kg	9508 lb
	ROC 35%	1564 kg	3450 lb	1560 kg	3439 lb	1554 kg	3426 lb	1509 kg	3328 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch	2438 mm	96 inch
	Reach @ 40° dump angle	1021 mm	40 inch	1021 mm	40 inch	1021 mm	40 inch	1092 mm	43 inch

Table 26

Multi-Purpose Buckets											
Model	P/N	279-5382		279-5390		279-5398		279-5403		293-0139	
	Tool Mass	335 kg	738 lb	355 kg	782 lb	374 kg	824 lb	393 kg	866 lb	412 kg	908 lb
	Bucket Specs.	60"		66"		72"		78"		84"	
226D	Tipping Load	1187 kg	2617 lb	1165 kg	2568 lb	1146 kg	2526 lb	1134 kg	2500 lb	1116 kg	2460 lb

(continued)

Product Information Section
Rated Load

(Table 26, contd)

	ROC 50%	593 kg	1308 lb	582 kg	1284 lb	573 kg	1263 lb	567 kg	1250 lb	558 kg	1230 lb
	Dump Clearance @ 40° dump angle	2083 mm	82 inch	2082 mm	82 inch	2081 mm	82 inch	2080 mm	82 inch	2079 mm	82 inch
	Reach @ 40° dump angle	673 mm	26 inch	675 mm	27 inch	676 mm	27 inch	678 mm	27 inch	680 mm	27 inch
232D	Tipping Load	1459 kg	3216 lb	1437 kg	3168 lb	1418 kg	3126 lb	2263 kg	4990 lb	1389 kg	3064 lb
	ROC 50%	729 kg	1608 lb	718 kg	1584 lb	709 kg	1563 lb	1132 kg	2495 lb	695 kg	1532 lb
	Dump Clearance @ 40° dump angle	2263 mm	89 inch	2262 mm	89 inch	2261 mm	89 inch	2429 mm	96 inch	2258 mm	89 inch
	Reach @ 40° dump angle	805 mm	32 inch	807 mm	32 inch	809 mm	32 inch	952 mm	37 inch	813 mm	32 inch
236D	Tipping Load	1416 kg	3121 lb	1394 kg	3073 lb	1375 kg	3031 lb	1363 kg	3006 lb	1345 kg	2966 lb
	ROC 50%	708 kg	1561 lb	697 kg	1536 lb	687 kg	1515 lb	682 kg	1503 lb	673 kg	1483 lb
	Dump Clearance @ 40° dump angle	2388 mm	94 inch	2387 mm	94 inch	2386 mm	94 inch	2385 mm	94 inch	2384 mm	94 inch
	Reach @ 40° dump angle	519 mm	20 inch	520 mm	20 inch	521 mm	21 inch	522 mm	21 inch	523 mm	21 inch
242D	Tipping Load	1754 kg	3868 lb	1732 kg	3819 lb	1713 kg	3778 lb	1704 kg	3758 lb	1686 kg	3719 lb
	ROC 50%	877 kg	1934 lb	866 kg	1910 lb	857 kg	1889 lb	852 kg	1879 lb	843 kg	1859 lb
	Dump Clearance @ 40° dump angle	2342 mm	92 inch	2341 mm	92 inch	2340 mm	92 inch	2339 mm	92 inch	2338 mm	92 inch
	Reach @ 40° dump angle	730 mm	29 inch	732 mm	29 inch	733 mm	29 inch	733 mm	29 inch	734 mm	29 inch
246D	Tipping Load	1800 kg	3970 lb	1778 kg	3921 lb	1759 kg	3879 lb	1749 kg	3858 lb	1731 kg	3817 lb
	ROC 50%	900 kg	1985 lb	889 kg	1961 lb	880 kg	1939 lb	875 kg	1929 lb	866 kg	1909 lb
	Dump Clearance @ 40° dump angle	2412 mm	95 inch	2411 mm	95 inch	2410 mm	95 inch	2409 mm	95 inch	2409 mm	95 inch
	Reach @ 40° dump angle	603 mm	24 inch	604 mm	24 inch	605 mm	24 inch	605 mm	24 inch	606 mm	24 inch
262D	Tipping Load	2311 kg	5095 lb	2289 kg	5047 lb	2270 kg	5005 lb	2263 kg	4990 lb	2245 kg	4951 lb
	ROC 50%	1155 kg	2548 lb	1144 kg	2523 lb	1135 kg	2502 lb	1132 kg	2495 lb	1123 kg	2475 lb
	Dump Clearance @ 40° dump angle	2432 mm	96 inch	2431 mm	96 inch	2430 mm	96 inch	2429 mm	96 inch	2428 mm	96 inch
	Reach @ 40° dump angle	949 mm	37 inch	950 mm	37 inch	951 mm	37 inch	952 mm	37 inch	953 mm	38 inch
272D	Tipping Load	2615 kg	5766 lb	2593 kg	5717 lb	2574 kg	5675 lb	2569 kg	5664 lb	2551 kg	5625 lb
	ROC 50%	1308 kg	2883 lb	1296 kg	2859 lb	1287 kg	2838 lb	1284 kg	2832 lb	1275 kg	2812 lb

(continued)

(Table 26, contd)

	Dump Clearance @ 40° dump angle	2484 mm	98 inch	2483 mm	98 inch	2482 mm	98 inch	2482 mm	98 inch	2481 mm	98 inch
	Reach @ 40° dump angle	975 mm	38 inch	976 mm	38 inch	977 mm	38 inch	978 mm	38 inch	979 mm	39 inch
272D XHP	Tipping Load	3080 kg	6792 lb	3058 kg	6742 lb	3039 kg	6700 lb	3036 kg	6695 lb	3018 kg	6655 lb
	ROC 50%	1540 kg	3396 lb	1529 kg	3371 lb	1519 kg	3350 lb	1518 kg	3347 lb	1509 kg	3328 lb
	Dump @ 40° dump angle	2526 mm	99 inch	2525 mm	99 inch	2524 mm	99 inch	2523 mm	99 inch	2522 mm	99 inch
	Reach @ 40° dump angle	935 mm	37 inch	936 mm	37 inch	937 mm	37 inch	937 mm	37 inch	938 mm	37 inch
272D2	Tipping Load	2850 kg	6285 lb	2828 kg	6236 lb	2809 kg	6194 lb	2805 kg	6185 lb	2787 kg	6145 lb
	ROC 50%	1425 kg	3142 lb	1414 kg	3118 lb	1404 kg	3097 lb	1403 kg	3093 lb	1394 kg	3073 lb
	Dump @ 40° dump angle	2480 mm	98 inch	2479 mm	98 inch	2478 mm	98 inch	2477 mm	98 inch	2477 mm	98 inch
	Reach @ 40° dump angle	963 mm	38 inch	964 mm	38 inch	965 mm	38 inch	966 mm	38 inch	967 mm	38 inch
272D2 XHP	Tipping Load	3058 kg	6743 lb	3036 kg	6694 lb	3017 kg	6652 lb	3014 kg	6647 lb	2996 kg	6607 lb
	ROC 50%	1529 kg	3372 lb	1518 kg	3347 lb	1508 kg	3326 lb	1507 kg	3323 lb	1498 kg	3304 lb
	Dump @ 40° dump angle	2518 mm	99 inch	2517 mm	99 inch	2516 mm	99 inch	2516 mm	99 inch	2515 mm	99 inch
	Reach @ 40° dump angle	929 mm	37 inch	930 mm	37 inch	931 mm	37 inch	932 mm	37 inch	933 mm	37 inch

Table 27

Multi-Purpose Buckets									
	P/N	279-5390		279-5398		279-5403		293-0139	
	257D	Tool Mass	355 kg	782 lb	374 kg	824 lb	393 kg	866 lb	412 kg
Bucket Specs.		66"		72"		78"		84"	
Tipping Load		2272 kg	5010 lb	2253 kg	4969 lb	2247 kg	4956 lb	2230 kg	4917 lb
ROC 35%		795 kg	1753 lb	789 kg	1739 lb	787 lb	1734 lb	780 kg	1721 lb
Dump Clearance @ 40° dump angle		2322 mm	91 inch	2321 mm	91 inch	2320 mm	91 inch	2319 mm	91 inch
Reach @ 40° dump angle		904 mm	36 inch	906 mm	36 inch	908 mm	36 inch	910 mm	36 inch
277D		Tipping Load	2705 kg	5963 lb	2686 kg	5923 lb	2681 kg	5912 lb	2664 kg
	ROC 35%	947 kg	2087 lb	940 kg	2073 lb	938 kg	2069 lb	932 kg	2056 lb
	Dump Clearance @ max dump angle	2437 mm	96 inch	2436 mm	96 inch	2435 mm	96 inch	2434 mm	96 inch

(continued)

Product Information Section
Rated Load

(Table 27, contd)

	Reach @ max dump angle	652 mm	26 inch	653 mm	26 inch	655 mm	26 inch	656 mm	26 inch
287D	Tipping Load	3400 kg	7498 lb	3382 kg	7457 lb	3381 kg	7456 lb	3364 kg	7417 lb
	ROC 35%	1190 kg	2624 lb	1184 kg	2610 lb	1183 kg	2609 lb	1177 kg	2596 lb
	Dump Clearance @ 40° dump angle	2425 mm	95 inch	2424mm	95 inch	2423 mm	95 inch	2422 mm	95 inch
	Reach @ 40° dump angle	982 mm	39 inch	984 mm	39 inch	986 mm	39 inch	987 mm	39 inch

Table 28

Multi-Purpose Buckets											
	P/N	279-5382		279-5390		279-5398		279-5403		293-0139	
	Tool Mass	335 kg	738 lb	355 kg	782 lb	374 kg	824 lb	393 kg	866 lb	412 kg	908 lb
	Bucket Specs.	60"		66"		72"		78"		84"	
	297D	Tipping Load	3861 kg	8514 lb	3846 kg	8480 lb	3831 kg	8447 lb	3836 kg	8457 lb	3822 kg
ROC 35%		1351 kg	2980 lb	1346 kg	2968 lb	1341 kg	2956 lb	1342 kg	2960 lb	1338 kg	2949 lb
Dump Clearance @ 40° dump angle		2426 mm	96 inch	2425 mm	95 inch	2424 mm	95 inch	2424 mm	95 inch	2423 mm	95 inch
Reach @ 40° dump angle		1012 mm	40 inch	1014 mm	40 inch	1016 mm	40 inch	1017 mm	40 inch	1019 mm	40 inch
297D XHP	Tipping Load	4237 kg	9342 lb	4221 kg	9307 lb	4206 kg	9274 lb	4212 kg	9288 lb	4199 kg	9258 lb
	ROC 35%	1483 kg	3270 lb	1477 kg	3257 lb	1472 kg	3246 lb	1474 kg	3251 lb	1470 kg	3240 lb
	Dump Clearance @ 40° dump angle	2430 mm	96 inch	2429 mm	96 inch	2428 mm	96 inch	2428 mm	96 inch	2427 mm	96 inch
	Reach @ 40° dump angle	1005 mm	40 inch	1006 mm	40 inch	1008 mm	40 inch	1009 mm	40 inch	1011 mm	40 inch
297D2	Tipping Load	3969 kg	8752 lb	3947 kg	8703 lb	3928 kg	8661 lb	3930 kg	8665 lb	3912 kg	8626 lb
	ROC 35%	1389 kg	3063 lb	1381 kg	3046 lb	1375 kg	3031 lb	1375 kg	3033 lb	1369 kg	3019 lb
	Dump Clearance @ 40° dump angle	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch
	Reach @ 40° dump angle	925 mm	36 inch	925 mm	36 inch	926 mm	36 inch	926 mm	36 inch	926 mm	36 inch
297D2 XHP	Tipping Load	4051 kg	8933 lb	4029 kg	8884 lb	4010 kg	8842 lb	4012 kg	8846 lb	3995 kg	8808 lb
	ROC 35%	1418 kg	3127 lb	1410 kg	3109 lb	1404 kg	3095 lb	1404 kg	3096 lb	1398 kg	3083 lb
	Dump Clearance @ 40° dump angle	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch	2519 mm	99 inch
	Reach @ 40° dump angle	925 mm	36 inch	925 mm	36 inch	926 mm	36 inch	926 mm	36 inch	926 mm	36 inch

Table 29

Multi-Purpose Buckets											
Model	P/N	279-5382		279-5390		279-5398		279-5403		293-0139	
	Tool Mass	335 kg	738 lb	355 kg	782 lb	374 kg	824 lb	393 kg	866 lb	412 kg	908 lb
	Bucket Specs.	60"		66"		72"		78"		84"	
239D	Tipping Load	1665 kg	3671 lb	1643 kg	3623 lb	1624 kg	3581 lb	1614 kg	3560 lb	1597 kg	3522 lb
	ROC 35%	583 kg	1285 lb	575 kg	1268 lb	568 kg	1253 lb	565 kg	1246 lb	559 kg	1233 lb
	Dump Clearance @ 40° dump angle	2088 mm	82 inch	2088 mm	82 inch	2088 mm	82 inch	2088 mm	82 inch	2088 mm	82 inch
	Reach @ 40° dump angle	759 mm	30 inch	759 mm	30 inch	759 mm	30 inch	759 mm	30 inch	759 mm	30 inch
249D	Tipping Load	1877 kg	4138 lb	1855 kg	4090 lb	1837 kg	4050 lb	1828 kg	4030 lb	1810 kg	3992 lb
	ROC 35%	657 kg	1488 lb	649 kg	1432 lb	643 kg	1417 lb	640 kg	1411 lb	634 kg	1397 lb
	Dump Clearance @ 40° dump angle	2263 mm	89 inch	2263 mm	89 inch	2263 mm	89 inch	2263 mm	89 inch	2263 mm	89 inch
	Reach @ 40° dump angle	901 mm	35 inch	901 mm	35 inch	901 mm	35 inch	901 mm	35 inch	901 mm	35 inch

Table 30

Multi-Purpose Buckets									
	P/N	279-5390		279-5398		279-5403		293-0139	
		Tool Mass	355 kg	782 lb	374 kg	824 lb	393 kg	866 lb	412 kg
	Bucket Specs.	66"		72"		78"		84"	
259D	Tipping Load	2355 kg	5194 lb	2337 kg	5153 lb	2331 kg	5140 lb	2314 kg	5102 lb
	ROC 35%	824 kg	1818 lb	818 kg	1804 lb	816 kg	1799 lb	810 kg	1786 lb
	Dump Clearance @ 40° dump angle	2337 mm	92 inch	2336 mm	92 inch	2335 mm	92 inch	2334 mm	92 inch
	Reach @ 40° dump angle	805 mm	32 inch	807 mm	32 inch	809 mm	32 inch	811 mm	32 inch
279D	Tipping Load	2393 kg	5277 lb	2375 kg	5236 lb	2365 kg	5216 kg	2348 kg	5177 lb
	ROC 35%	838 kg	1847 lb	831 kg	1833 lb	828 kg	1826 lb	822 kg	1812 lb
	Dump Clearance @ 40° dump angle	2432 mm	96 inch	2431 mm	96 inch	2431 mm	96 inch	2430 mm	96 inch
	Reach @ 40° dump angle	594 mm	23 inch	596 mm	23 inch	598 mm	24 inch	600 mm	24 inch
289D	Tipping Load	3133 kg	6907 lb	3114 kg	6866 lb	3109 kg	6856 lb	3092 kg	6818 lb
	ROC 35%	1096 kg	2418 lb	1090 kg	2403 lb	1088 kg	2400 lb	1082 kg	2386 lb

(continued)

Product Information Section
Rated Load

(Table 30, contd)

	Dump Clearance @ 40° dump angle	2434 mm	96 mm	2433 mm	96 mm	2432 mm	96 mm	2431 mm	96 mm
	Reach @ 40° dump angle	939 mm	37 inch	941 mm	37 inch	943 mm	37 inch	945 mm	37 inch
299D Rubber	Tipping Load	3556 kg	7840 lb	3541 kg	7807 lb	3541 kg	7808 lb	3527 kg	7777 lb
	ROC 35%	1245 kg	2744 lb	1239 kg	2732 lb	1239 kg	2733 lb	1234 kg	2722
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2442 mm	96 inch	2441 mm	96 inch	2440 mm	96 inch
	Reach @ 40° dump angle	980 mm	39 inch	982 mm	39 inch	984 mm	39 inch	986 mm	39 inch
299 D XHP Rubber	Tipping Load	3923 kg	8650 lb	3908 kg	8616 lb	3909 kg	8620 lb	3895 kg	8589 lb
	ROC 35%	1373 kg	3027 lb	1368 kg	3016 lb	1368 kg	3017 lb	1363 kg	3006 lb
	Dump Clearance @ 40° dump angle	2448 mm	96 inch	2447 mm	96 inch	2446 mm	96 inch	2445 mm	96 inch
	Reach @ 40° dump angle	970 mm	38 inch	972 mm	38 inch	974 mm	38 inch	976 mm	38 inch
299D (Steel)	Tipping Load	4116 kg	9076 lb	4101 kg	9043 lb	4106 kg	9055 lb	4093 kg	9025 lb
	ROC 35%	1441 kg	3176 lb	1435 kg	3165 lb	1437 kg	3169 lb	1432 kg	3159 lb
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2442 mm	96 inch	2441 mm	96 inch	2440 mm	96 inch
	Reach @ 40° dump angle	980 mm	39 inch	982 mm	39 inch	984 mm	39 inch	986 mm	39 inch
299D XHP (Steel)	Tipping Load	4480 kg	9878 lb	4465 kg	9845 lb	4472 kg	9860 lb	4458 kg	9830 lb
	ROC 35%	1568 kg	3457 lb	1563 kg	3446 lb	1565 kg	3461 lb	1560 kg	3441 lb
	Dump Clearance @ 40° dump angle	2448 mm	96 inch	2447 mm	96 inch	2446 mm	96 inch	2445 mm	96 inch
	Reach @ 40° dump angle	970 mm	38 inch	972 mm	38 inch	974 mm	38 inch	976 mm	38 inch
299D2 Rubber	Tipping Load	3871 kg	8535 lb	3852 kg	8494 lb	3853 kg	8496 lb	3836 kg	8457 lb
	ROC 35%	1355 kg	2987 lb	1348 kg	2973 lb	1349 kg	2973 lb	1342 kg	2960 lb
	Dump Clearance @ 40° dump angle	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 XHP Rubber	Tipping Load	3978 kg	8772 lb	3959 kg	8730 lb	3961 kg	8733 lb	3943 kg	8695 lb
	ROC 35%	1392 kg	3070 lb	1386 kg	3056 lb	1386 kg	3057 lb	1380 kg	3043 lb

(continued)

(Table 30, contd)

	Dump Clearance @ 40° dump angle	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 (Steel)	Tipping Load	4198 kg	9257 lb	4179 kg	9215 lb	4182 kg	9221 lb	4164 kg	9182 lb
	ROC 35%	1469 kg	3240 lb	1463 kg	3225 lb	1464 kg	3227 lb	1457 kg	3214 lb
	Dump Clearance @ 40° dump angle	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 XHP (Steel)	Tipping Load	4278 kg	9434 lb	4259 kg	9392 lb	4262 kg	9398 lb	4245 kg	9360 lb
	ROC 35%	1497 kg	3302 lb	1491 kg	3287 lb	1492 kg	3289 lb	1486 kg	3276 lb
	Dump Clearance @ 40° dump angle	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch	2492 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch

Table 31

Multi-Purpose Buckets with Bolt-On Edge and Debris Guard											
Model	P/N	325 - 7040		325 - 7050		325 - 7060		325 - 7070		325 - 7080	
	Tool Mass	374 kg	824 lb	397 kg	876 lb	421 kg	928 lb	444 kg	979 lb	468 kg	1031 lb
	Bucket Specs.	60"		66"		72"		78"		84"	
226D	Tipping Load	1143 kg	2520 lb	1112 kg	2452 lb	1090 kg	2403 lb	1075 kg	2370 lb	1051 kg	2318 lb
	ROC 50%	571 kg	1260 lb	556 kg	1226 lb	545 kg	1202 lb	537 kg	1185 lb	526 kg	1159 lb
	Dump Clearance @ 40° dump angle	2051 mm	81 inch	2050 mm	81 inch	2049 mm	81 inch	2048 mm	81 inch	2046 mm	81 inch
	Reach @ 40° dump angle	687 mm	27 inch	689 mm	27 inch	691 mm	27 inch	693 mm	27 inch	695 mm	27 inch
232D	Tipping Load	1413 kg	3116 lb	1382 kg	3048 lb	1360 kg	3000 lb	1347 kg	2970 lb	1324 kg	2919 lb
	ROC 50%	707 kg	1558 lb	691 kg	1524 lb	680 kg	1500 lb	673 kg	1485 lb	662 kg	1459 lb
	Dump Clearance @ 40° dump angle	2231 mm	88 inch	2229 mm	88 inch	2228 mm	88 inch	2227 mm	88 inch	2225 mm	88 inch
	Reach @ 40° dump angle	819 mm	32 inch	822 mm	32 inch	824 mm	32 inch	826 mm	33 inch	829 mm	33 inch

(continued)

Product Information Section
Rated Load

(Table 31, contd)

236D	Tipping Load	1353 kg	2983 lb	1328 kg	2928 lb	1302 kg	2871 lb	1284 kg	2832 lb	1260 kg	2778 lb
	ROC 50%	676 kg	1492 lb	664 kg	1464 lb	651 kg	1436 lb	642 kg	1416 lb	630 kg	1389 lb
	Dump Clearance @ 40° dump angle	2360 mm	93 inch	2359 mm	93 inch	2358 mm	93 inch	2357 mm	93 inch	2355 mm	93 inch
	Reach @ 40° dump angle	536 mm	21 inch	538 mm	21 inch	539 mm	21 inch	540 mm	21 inch	542 mm	21 inch
242D	Tipping Load	1686 kg	3718 lb	1661 kg	3664 lb	1636 kg	3606 lb	1620 kg	3572 lb	1596 kg	2778 lb
	ROC 50%	843 kg	1859 lb	831 kg	1832 lb	818 kg	1803 lb	810 kg	1786 lb	798 kg	1459 lb
	Dump Clearance @ 40° dump angle	2314 mm	91 inch	2313 mm	91 inch	2312 mm	91 inch	2311 mm	91 inch	2309 mm	91 inch
	Reach @ 40° dump angle	747 mm	29 inch	749 mm	29 inch	750 mm	30 inch	751 mm	30 inch	752 mm	30 inch
246D	Tipping Load	1734 kg	3823 lb	1709 kg	3768 lb	1683 kg	3710 lb	1666 kg	3674 lb	1642 kg	3621 lb
	ROC 50%	867 kg	1911 lb	854 kg	1884 lb	841 kg	1855 lb	833 kg	1837 lb	821 kg	1810 lb
	Dump Clearance @ 40° dump angle	2384 mm	94 inch	2383 mm	94 inch	2382 mm	94 inch	2381 mm	94 inch	2380 mm	94 inch
	Reach @ 40° dump angle	619 mm	24 inch	620 mm	24 inch	621 mm	24 inch	622 mm	24 inch	623 mm	25 inch
262D	Tipping Load	2237 kg	4932 lb	2212 kg	4877 lb	2185 kg	4819 lb	2172 kg	4789 lb	2148 kg	4736 lb
	ROC 50%	1118 kg	2466 lb	1106 kg	2438 lb	1093 kg	2409 lb	1086 kg	2395 lb	1074 kg	2368 lb
	Dump Clearance @ 40° dump angle	2404 mm	95 inch	2402 mm	95 inch	2401 mm	95 inch	2400 mm	94 inch	2398 mm	94 inch
	Reach @ 40° dump angle	966 mm	38 inch	967 mm	38 inch	968 mm	38 inch	970 mm	38 inch	971 mm	38 inch
272D	Tipping Load	2562 kg	5649 lb	2531 kg	5580 lb	2508 kg	5530 lb	2500 kg	5512 lb	2477 kg	5461 lb
	ROC 50%	1281 kg	2824 lb	1265 kg	2790 lb	1254 kg	2765 lb	1250 kg	2756 lb	1238 kg	2730 lb
	Dump Clearance @ 40° dump angle	2456 mm	97 inch	2455 mm	97 inch	2454 mm	97 inch	2453 mm	97 inch	2452 mm	97 inch

(continued)

(Table 31, contd)

	Reach @ 40° dump angle	992 mm	39 inch	993 mm	39 inch	994 mm	39 inch	995 mm	39 inch	996 mm	39 inch
272D XHP	Tipping Load	3023 kg	6666 lb	2992 kg	6597 lb	2969 kg	6546 lb	2963 kg	6534 lb	2940 kg	6482 lb
	ROC 50%	1512 kg	3333 lb	1496 kg	3298 lb	1484 kg	3273 lb	1482 kg	3267 lb	1470 kg	3241 lb
	Dump @ 40° dump angle	2498 mm	98 inch	2497 mm	98 inch	2496 mm	98 inch	2495 mm	98 inch	2494 mm	98 inch
	Reach @ 40° dump angle	951 mm	37 inch	952 mm	37 inch	953 mm	38 inch	954 mm	38 inch	955 mm	38 inch
272D2	Tipping Load	2795 kg	6163 lb	2764 kg	6095 lb	2741 kg	6044 lb	2734 kg	6029 lb	2711 kg	5977 lb
	ROC 50%	1398 kg	3082 lb	1382 kg	3047 lb	1371 kg	3022 lb	1367 kg	3014 lb	1355 kg	2989 lb
	Dump @ 40° dump angle	2448 mm	96 inch	2447 mm	96 inch	2446 mm	96 inch	2446 mm	96 inch	2445 mm	96 inch
	Reach @ 40° dump angle	976 mm	38 inch	977 mm	38 inch	978 mm	39 inch	980 mm	39 inch	981 mm	39 inch
272D2 XHP	Tipping Load	3001 kg	6618 lb	2970 kg	6549 lb	2947 kg	6498 lb	2941 kg	6486 lb	2918 kg	6434 lb
	ROC 50%	1501 kg	3309 lb	1485 kg	3274 lb	1473 kg	3249 lb	1471 kg	3243 lb	1459 kg	3217 lb
	Dump @ 40° dump angle	2486 mm	98 inch	2485 mm	98 inch	2485 mm	98 inch	2484 mm	98 inch	2483 mm	98 inch
	Reach @ 40° dump angle	942 mm	37 inch	943 mm	37 inch	944 mm	37 inch	945 mm	37 inch	946 mm	37 inch

Table 32

Multi-Purpose Buckets with Bolt-On Edge and Debris Guard									
	P/N	325 - 7050		325 - 7060		325 - 7070		325 - 7080	
		Tool Mass	397 kg	876 lb	421 kg	928 lb	444 kg	979 lb	468 kg
	Bucket Specs.	66"		72"		78"		84"	
257D	Tipping Load	2196 kg	4842 lb	2170 kg	4785 lb	2157 kg	4757 lb	2134 kg	4705 lb
	ROC 35%	769 kg	1695 lb	760 kg	1675 lb	755 kg	1665 lb	747 kg	1647 lb
	Dump Clearance @ 40° dump angle	2294 mm	90 inch	2293 mm	90 inch	2291 mm	90 inch	2290 mm	90 inch
	Reach @ 40° dump angle	923 mm	36 inch	926 mm	36 inch	928 mm	37 inch	931 mm	37 inch
277D	Tipping Load	2626 kg	5790 lb	2600 kg	5733 lb	2589 kg	5708 lb	2566 kg	5657 lb
	ROC 35%	919 kg	2027 lb	910 kg	2007 lb	906 kg	1998 lb	898 kg	1980 lb

(continued)

Product Information Section
Rated Load

(Table 32, contd)

	Dump Clearance @ max dump angle	2408 mm	95 inch	2406 mm	95 inch	2405 mm	95 inch	2403 mm	95 inch
	Reach @ max dump angle	669 mm	26 inch	671 mm	26 inch	672 mm	26 inch	674 mm	27 inch
287D	Tipping Load	3310 kg	7298 lb	3283 kg	7239 lb	3276 kg	7223 lb	3252l kg	7171 lb
	ROC 35%	1158 kg	2554 lb	1149 kg	2534 lb	1146 kg	2528 lb	1138 kg	2510 lb
	Dump Clearance @ 40° dump angle	2397 mm	94 inch	2395 mm	94 inch	2394 mm	94 inch	2393 mm	94 inch
	Reach @ 40° dump angle	1001 mm	39 inch	1003 mm	39 inch	1005 mm	40 inch	1008 mm	40 inch

Table 33

Multi-Purpose Buckets with Bolt-On Edge and Debris Guard											
	P/N	325 - 7040		325 - 7050		325 - 7060		325 - 7070		325 - 7080	
	297D	Tool Mass	374 kg	824 lb	397 kg	876 lb	421 kg	928 lb	444 kg	979 lb	468 kg
Bucket Specs.		60"		66"		72"		78"		84"	
Tipping Load		3810 kg	8401 lb	3792 kg	8362 lb	3772 kg	8318 lb	3777 kg	8328 lb	3759 kg	8289 lb
ROC 35%		1334 kg	2941 lb	1327 kg	2927 lb	1320 kg	2911 lb	1322 kg	2915 lb	1316 kg	2901 lb
Dump Clearance @ 40° dump angle		2394 mm	94 inch	2393 mm	94 inch	2392 mm	94 inch	2392 mm	94 inch	2391 mm	94 inch
Reach @ 40° dump angle		1026 mm	40 inch	1028 mm	40 inch	1030 mm	41 inch	1031 mm	41 inch	1033 mm	41 inch
297D XHP		Tipping Load	4183 kg	9223 lb	4164 kg	9183 lb	4144 kg	9138 lb	4150 kg	9152 lb	4133 kg
	ROC 35%	1464 kg	3228 lb	1458 kg	3214 lb	1451 kg	3198 lb	1453 kg	3203 lb	1447 kg	3190 lb
	Dump Clearance @ 40° dump angle	2398 mm	94 inch	2397 mm	94 inch	2396 mm	94 inch	2396 mm	94 inch	2395 mm	94 inch
	Reach @ 40° dump angle	1018 mm	40 inch	1020 mm	40 inch	1022 mm	40 inch	1023 mm	40 inch	1025 mm	40 inch
297D2	Tipping Load	3905 kg	8610 lb	3873 kg	8541 lb	3850 kg	8489 lb	3849 kg	8487 lb	3826 kg	8437 lb
	ROC 35%	1367 kg	3014 lb	1356 kg	2989 lb	1348 kg	2971 lb	1347 kg	2970 lb	1339 kg	2953 lb
	Dump Clearance @ 40° dump angle	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch

(continued)

(Table 33, contd)

	Reach @ 40° dump angle	936 mm	37 inch	937 mm	37 inch	937 mm	37 inch	937 mm	37 inch	937 mm	37 inch
297D2 XHP	Tipping Load	3986 kg	8790 lb	3955 kg	8721 lb	3931 kg	8669 lb	3931 kg	8667 lb	3908 kg	8618 lb
	ROC 35%	1395 kg	3076 lb	1384 kg	3052 lb	1376 kg	3034 lb	1376 kg	3034 lb	1368 kg	3016 lb
	Dump Clearance @ 40° dump angle	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch	2488 mm	98 inch
	Reach @ 40° dump angle	936 mm	37 inch	937 mm	37 inch	937 mm	37 inch	937 mm	37 inch	937 mm	37 inch

Table 34

Multi-Purpose Buckets with Bolt-On Edge and Debris Guard											
Model	P/N	325 - 7040		325 - 7050		325 - 7060		325 - 7070		325 - 7080	
	Tool Mass	374 kg	824 lb	397 kg	876 lb	421 kg	928 lb	444 kg	979 lb	468 kg	1031 lb
	Bucket Specs.	60"		66"		72"		78"		84"	
239D	Tipping Load	1618 kg	3567 lb	1588 kg	3501 lb	1566 kg	3453 lb	1554 kg	3426 lb	1530 kg	3374 lb
	ROC 35%	566 kg	1249 lb	556 kg	1225 kg	548 kg	1208 lb	544 kg	1199 lb	536 kg	1181 lb
	Dump Clearance @ 40° dump angle	2058 mm	81 inch	2058 mm	81 inch	2058 mm	81 inch	2058 mm	81 inch	2058 mm	81 inch
	Reach @ 40° dump angle	770 mm	30 inch	770 mm	30 inch	770 mm	30 inch	770 mm	30 inch	770 mm	30 inch
249D	Tipping Load	1829 kg	4033 lb	1798 kg	3965 lb	1777 kg	3917 lb	1765 kg	3892 lb	1742 kg	3841 lb
	ROC 35%	640 kg	1411 lb	629 kg	1388 lb	622 kg	1371 lb	618 kg	1362 lb	610 kg	1345 lb
	Dump Clearance @ 40° dump angle	2233 mm	88 inch	2233 mm	88 inch	2233 mm	88 inch	2233 mm	88 inch	2233 mm	88 inch
	Reach @ 40° dump angle	912 mm	36 inch	912 mm	36 inch	912 mm	36 inch	912 mm	36 inch	912 mm	36 inch

Table 35

Multi-Purpose Buckets with Bolt-On Edge and Debris Guard									
259D	P/N	325 - 7050		325 - 7060		325 - 7070		325 - 7080	
	Tool Mass	397 kg	876 lb	421 kg	928 lb	444 kg	979 lb	468 kg	1031 lb
	Bucket Specs.	66"		72"		78"		84"	

(continued)

Product Information Section
Rated Load

(Table 35, contd)

	Tipping Load	2279 kg	5025 lb	2253 kg	4968 lb	2240 kg	4940 lb	2217 kg	4888 lb
	ROC 35%	798 kg	1759 lb	789 kg	1739 lb	784 kg	1729 lb	776 kg	1711 lb
	Dump Clearance @ 40° dump angle	2309 mm	91 inch	2308 mm	91 inch	2307 mm	91 inch	2305 mm	91 inch
	Reach @ 40° dump angle	824 mm	32 inch	827 mm	33 inch	830 mm	33 inch	833 mm	33 inch
279D	Tipping Load	2322 kg	5121 lb	2297 kg	5064 lb	2282 kg	5032 lb	2259 kg	4980 lb
	ROC 35%	813 kg	1792 lb	804 kg	1773 lb	799 kg	1761 lb	790 kg	1743 lb
	Dump Clearance @ 40° dump angle	2404 mm	95 inch	2403 mm	95 inch	2402 mm	95 inch	2401 mm	95 inch
	Reach @ 40° dump angle	613 mm	24 inch	616 mm	24 inch	618 mm	24 inch	621 mm	24 inch
289D	Tipping Load	3050 kg	6725 lb	3024 kg	6667 lb	3013 kg	6644 lb	2990 kg	6592 lb
	ROC 35%	1067 kg	2354 lb	1058 kg	2334 lb	1055 kg	2325 lb	1046 kg	2307 lb
	Dump Clearance @ 40° dump angle	2406 mm	95 inch	2405 mm	95 inch	2403 mm	95 inch	2402 mm	95 inch
	Reach @ 40° dump angle	958 mm	38 inch	961 mm	38 inch	963 mm	38 inch	966 mm	38 inch
299D Rubber	Tipping Load	3505 kg	7729 lb	3486 kg	7686 lb	3486 kg	7686 lb	3468 kg	7647 lb
	ROC 35%	1227 kg	2705 lb	1220 kg	2690 lb	1220 kg	2690 lb	1214 kg	2677 lb
	Dump Clearance @ 40° dump angle	2415 mm	95 inch	2414 mm	95 inch	2412 mm	95 inch	2411 mm	95 inch
	Reach @ 40° dump angle	999 mm	39 inch	1002 mm	39 inch	1004 mm	40 inch	1006 mm	40 inch
299D XHP Rubber	Tipping Load	3870 kg	8533 lb	3850 kg	8489 lb	3852 kg	8493 lb	3834 kg	8454 lb
	ROC 35%	1354 kg	2987 lb	1347 kg	2971 lb	1348 kg	2972 lb	1342 kg	2959 lb
	Dump Clearance @ 40° dump angle	2420 mm	95 inch	2419 mm	95 inch	2418 mm	95 inch	2416 mm	95 inch
	Reach @ 40° dump angle	989 mm	39 inch	991 mm	39 inch	994 mm	39 inch	996 mm	39 inch
299D (Steel)	Tipping Load	4061 kg	8954 lb	4041 kg	8911 lb	4046 kg	8922 lb	4029 kg	8884 lb
	ROC 35%	1421 kg	3134 lb	1414 kg	3119 lb	1416 kg	3123 lb	1410 kg	3109 lb
	Dump Clearance @ 40° dump angle	2415 mm	95 inch	2414 mm	95 inch	2412 mm	95 inch	2411 mm	95 inch

(continued)

(Table 35, contd)

	Reach @ 40° dump angle	999 mm	39 inch	1002 mm	39 inch	1004 mm	40 inch	1006 mm	40 inch
299D XHP (Steel)	Tipping Load	4422 kg	9751 lb	4402 kg	9707 lb	4409 kg	9721 lb	4392 kg	9684 lb
	ROC 35%	1548 kg	3413 lb	1541 kg	3397 lb	1543 kg	3402 lb	1537 kg	3389 lb
	Dump Clearance @ 40° dump angle	2420 mm	95 inch	2419 mm	95 inch	2418 mm	95 inch	2416 mm	95 inch
	Reach @ 40° dump angle	989 mm	39 inch	991 mm	39 inch	994 mm	39 inch	996m	39 inch
299D2 Rubber	Tipping Load	3799 kg	8378 lb	3776 kg	8326 lb	3774 kg	8322 lb	3752 kg	8272 lb
	ROC 35%	1330 kg	2932 lb	1322 kg	2914 lb	1321 kg	2913 lb	1313 kg	2895 lb
	Dump Clearance @ 40° dump angle	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch
	Reach @ 40° dump angle	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch
299D2 XHP Rubber	Tipping Load	3906 kg	8613 lb	3883 kg	8561 lb	3881 kg	8558 lb	3858 kg	8508 lb
	ROC 35%	1367 kg	3014 lb	1359 kg	2996 lb	1358 kg	2995 lb	1350 kg	2978 lb
	Dump Clearance @ 40° dump angle	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch
	Reach @ 40° dump angle	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch
299D2 (Steel)	Tipping Load	4123 kg	9092 lb	4100 kg	9040 lb	4099 kg	9039 lb	4077 kg	8989 lb
	ROC 35%	1443 kg	3182 lb	1435 kg	3164 lb	1435 kg	3164 lb	1427 kg	3146 lb
	Dump Clearance @ 40° dump angle	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch
	Reach @ 40° dump angle	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch
299D2 XHP (Steel)	Tipping Load	4203 kg	9268 lb	4179 kg	9215 lb	4179 kg	9215 lb	4156 kg	9165 lb
	ROC 35%	1471 kg	3244 lb	1463 kg	3225 lb	1463 kg	3225 lb	1455 kg	3208 lb
	Dump Clearance @ 40° dump angle	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch	2461 mm	97 inch
	Reach @ 40° dump angle	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch	1036 mm	41 inch

Product Information Section
Rated Load

Table 36

Utility Buckets							
Model	P/N	285 - 6096		285 - 6099		285 - 6102	
	Tool Mass	211 kg	465 lb	226 kg	498 lb	240 kg	529 lb
	Bucket Specs.	60"		66"		72"	
226D	Tipping Load	1327 kg	2926 lb	1312 kg	2892 lb	1298 kg	2862 lb
	ROC 50%	663 kg	1463 lb	656 kg	1446 lb	649 kg	1431 lb
	Dump Clearance @ 40° dump angle	2070 mm	81 inch	2069 mm	81 inch	2069 mm	81 inch
	Reach @ 40° dump angle	693 mm	27 inch	694 mm	27 inch	696 mm	27 inch
232D	Tipping Load	1602 kg	3532 lb	1587 kg	3499 lb	1573 kg	3468 lb
	ROC 50%	801 kg	1766 lb	794 kg	1749 lb	787 kg	1734 lb
	Dump Clearance @ 40° dump angle	2251 mm	89 inch	2250 mm	2250 mm	2250 mm	89 inch
	Reach @ 40° dump angle	823 mm	32 inch	824 mm	824 mm	826 mm	33 inch
236D	Tipping Load	1560 kg	3440 lb	1545 kg	3406 lb	1531 kg	3376 lb
	ROC 50%	780 kg	1720 lb	772 kg	1703 lb	765 kg	1687 lb
	Dump Clearance @ 40° dump angle	2377 mm	94 inch	2376 mm	94 inch	2376 mm	94 inch
	Reach @ 40° dump angle	543 mm	21 inch	543 mm	21 inch	544 mm	21 inch
242D	Tipping Load	1905 kg	4199 lb	1890 kg	4166 lb	1876 kg	4136 lb
	ROC 50%	952 kg	2099 lb	945 kg	2083 lb	938 kg	2068 lb
	Dump Clearance @ 40° dump angle	2331 mm	92 inch	2330 mm	92 inch	2329 mm	92 inch
	Reach @ 40° dump angle	755 mm	30 inch	756 mm	30 inch	757 mm	30 inch
246D	Tipping Load	1952 kg	4303 lb	1936 kg	4270 lb	1923 kg	4239 lb
	ROC 50%	976 kg	2152 lb	968 kg	2135 lb	961 kg	2119 lb
	Dump Clearance @ 40° dump angle	2399 mm	94 inch	2398 mm	94 inch	2397 mm	94 inch
	Reach @ 40° dump angle	629 mm	25 inch	630 mm	25 inch	630 mm	25 inch
262D	Tipping Load	2472 kg	5449 lb	2457 kg	5416 lb	2443 kg	5386 lb
	ROC 50%	1236 kg	2725 lb	1228 kg	2708 lb	1222 kg	2693 lb

(continued)

(Table 36, contd)

	Dump Clearance @ 40° dump angle	2421 mm	95 inch	2420 mm	95 inch	2419 mm	95 inch
	Reach @ 40° dump angle	974 mm	38 inch	975 mm	38 inch	975 mm	38 inch
272D	Tipping Load	2782 kg	6134 lb	2767 kg	6101 lb	2753 kg	6071 lb
	ROC 50%	1391 kg	3066 lb	1383 kg	3050 lb	1377 kg	3035 lb
	Dump Clearance @ 40° dump angle	2473 mm	97 inch	2472 mm	97 inch	2471 mm	97 inch
	Reach @ 40° dump angle	1001 mm	39 inch	1001 mm	39 inch	1002 mm	39 inch
272D XHP	Tipping Load	3257 kg	7182 lb	3243 kg	7149 lb	3229 kg	7118 lb
	ROC 50%	1629 kg	3591 lb	1621 kg	3574 lb	1614 kg	3559 lb
	Dump Clearance @ 40° dump angle	2513 mm	99 inch	2512 mm	99 inch	2512 mm	99 inch
	Reach @ 40° dump angle	962 mm	38 inch	962 mm	38 inch	963 mm	38 inch
272D2	Tipping Load	3021 kg	6662 lb	3006 kg	6629 lb	2993 kg	6599 lb
	ROC 50%	1511 kg	3330 lb	1503 kg	3314 lb	1496 kg	3299 lb
	Dump @ 40° dump angle	2466 mm	97 inch	2465 mm	97 inch	2465 mm	97 inch
	Reach @ 40° dump angle	986 mm	39 inch	987 mm	39 inch	988 mm	39 inch
272D2 XHP	Tipping Load	3236 kg	7133 lb	3221 kg	7100 lb	3207 kg	7070 lb
	ROC 50%	1618 kg	3567 lb	1610 kg	3550 lb	1603 kg	3535 lb
	Dump @ 40° dump angle	2503 mm	99 inch	2503 mm	99 inch	2502 mm	99 inch
	Reach @ 40° dump angle	954 mm	38 inch	955 mm	38 inch	955 mm	38 inch

Table 37

Utility Buckets					
	P/N	285 - 6099		285 - 6102	
	257D	Tool Mass	224 kg	494 lb	239 kg
Bucket Specs.		66"		72"	
Tipping Load		2433 kg	5366 lb	2420 kg	5337 lb
ROC 35%		852 kg	1878 lb	847 kg	1868 lb
Dump Clearance @ 40° dump angle		2311 mm	91 inch	2310 mm	91 inch
Reach @ 40° dump angle		922 mm	36 inch	923 mm	36 inch

(continued)

Product Information Section
Rated Load

(Table 37, contd)

277D	Tipping Load	2870 kg	6329 lb	2857 kg	6300
	ROC 35%	1005 kg	2215 lb	1000 kg	2205 lb
	Dump Clearance @ max dump angle	2428 mm	96 inch	2427 mm	96 inch
	Reach @ max dump angle	673 mm	26 inch	674 mm	37 inch
287D	Tipping Load	3584 kg	7902 lb	3571 kg	7873 lb
	ROC 35%	1254 kg	2766 lb	1250 kg	2756 lb
	Dump Clearance @ 40° dump angle	2413 mm	95 inch	2413 mm	95 inch
	Reach @ 40° dump angle	1000 mm	39 inch	1001 mm	39 inch

Table 38

Utility Buckets							
Model	P/N	285 - 6096		285 - 6099		285 - 6102	
	Tool Mass	211 kg	465 lb	226 kg	498 lb	240 kg	529 lb
	Bucket Specs.	60"		66"		72"	
239D	Tipping Load	1805 kg	3981 lb	1791 kg	3950 lb	1778 kg	3919 lb
	ROC 35%	632 kg	1393 lb	627 kg	1382 lb	622 kg	1372 lb
	Dump Clearance @ 40° dump angle	2070 mm	82 inch	2070 mm	82 inch	2070 mm	82 inch
	Reach @ 40° dump angle	789 mm	31 inch	789 mm	31 inch	789 mm	31 inch
249D	Tipping Load	2021 kg	4456 lb	2007 kg	4425 lb	1993 kg	4396 lb
	ROC 35%	707 kg	1560 lb	702 kg	1549 lb	698 kg	1538 lb
	Dump Clearance @ 40° dump angle	2246 mm	88 inch	2246 mm	88 inch	2246 mm	88 inch
	Reach @ 40° dump angle	931 mm	37 inch	932 mm	37 inch	932 mm	37 inch

Table 39

Utility Buckets					
259D	P/N	285 - 6099		285 - 6102	
	Tool Mass	224 kg	494 lb	239 kg	526 lb
	Bucket Specs.	66"		72"	
	Tipping Load	2517 kg	5551 lb	2504 kg	5522 lb
	ROC 35%	881 kg	1943 lb	876 kg	1933 lb
	Dump Clearance @ 40° dump angle	2326 mm	92 inch	2325 mm	92 inch

(continued)

(Table 39, contd)

	Reach @ 40° dump angle	820 mm	32 inch	822 mm	32 inch
279D	Tipping Load	2545 kg	5611 lb	2531 kg	5582 lb
	ROC 35%	891 kg	1964 lb	886 kg	1954 lb
	Dump Clearance @ 40° dump angle	2419 mm	95 inch	2419 mm	95 inch
	Reach @ 40° dump angle	610 mm	24 inch	611 mm	24 inch
289D	Tipping Load	3300 kg	7277 lb	3287 kg	7248 lb
	ROC 35%	1155 kg	2547 lb	1150 kg	2537 lb
	Dump Clearance @ 40° dump angle	2423 mm	95 inch	2422 mm	95 inch
	Reach @ 40° dump angle	956 mm	38 inch	958 mm	38 inch
299D (Rubber)	Tipping Load	3712 kg	8185 lb	3702 kg	8162 lb
	ROC 35%	1299 kg	2865 lb	1296 kg	2857 lb
	Dump Clearance @ 40° dump angle	2432 mm	96 inch	2431 mm	96 inch
	Reach @ 40° dump angle	997 mm	39 inch	998 mm	39 inch
299D XHP (Rubber)	Tipping Load	4085 kg	9007 lb	4074 kg	8984 lb
	ROC 35%	1430 kg	3152 lb	1426 kg	3144 lb
	Dump Clearance @ 40° dump angle	2437 mm	96 inch	2436 mm	96 inch
	Reach @ 40° dump angle	987 mm	39 inch	989 mm	39 inch
299D (Steel)	Tipping Load	4287 kg	9454 lb	4277 kg	9432 lb
	ROC 35%	1501 kg	3309 lb	1497 kg	3301 lb
	Dump Clearance @ 40° dump angle	2432 mm	96 inch	2431 mm	96 inch
	Reach @ 40° dump angle	997 mm	39 inch	998 mm	39 inch
299D XHP (Steel)	Tipping Load	4657 kg	10269 lb	4647 kg	10247 lb
	ROC 35%	1630 kg	3594 lb	1627 kg	3587 lb
	Dump Clearance @ 40° dump angle	2437 mm	96 inch	2436 mm	96 inch
	Reach @ 40° dump angle	987 mm	39 inch	989 mm	39 inch
299D2 (Rubber)	Tipping Load	4061 kg	8955 lb	4048 kg	8925 lb
	ROC 35%	1421 kg	3134 lb	1471 kg	3124 lb
	Dump Clearance @ 40° dump angle	2474 mm	97 inch	2474 mm	97 inch

(continued)

Product Information Section
Rated Load

(Table 39, contd)

	Reach @ 40° dump angle	1055 mm	42 inch	1056 mm	42 inch
299D2 XHP (Rubber)	Tipping Load	4170 kg	9196 lb	4157 kg	9167 lb
	ROC 35%	1460 kg	3219 lb	1455 kg	3208 lb
	Dump Clearance @ 40° dump angle	2474 mm	97 inch	2474 mm	97 inch
	Reach @ 40° dump angle	1056 mm	42 inch	1056 mm	42 inch
299D2 (Steel)	Tipping Load	4398 kg	9699 lb	4385 kg	9669 lb
	ROC 35%	1539 kg	3394 lb	1535 kg	3384 lb
	Dump Clearance @ 40° dump angle	2474 mm	97 inch	2474 mm	97 inch
	Reach @ 40° dump angle	1056 mm	42 inch	1056 mm	42 inch
299D2 XHP (Steel)	Tipping Load	4480 kg	9879 lb	4467 kg	9849 lb
	ROC 35%	1568 kg	3458 lb	1563 kg	3447 lb
	Dump Clearance @ 40° dump angle	2474 mm	97 inch	2474 mm	97 inch
	Reach @ 40° dump angle	1056 mm	42 inch	1056 mm	42 inch

Table 40

Light Material Buckets									
Model	P/N	279-5421		279-5424		279-5429, BO Edge		296-7597, BO Edge	
	Tool Mass	266 kg	587 lb	280 kg	618 lb	338 kg	744 lb	368 kg	811 lb
	Bucket Specs.	72"		78"		84"		96"	
226D	Tipping Load	1358 kg	2995 lb	1343 kg	2961 lb	1255 kg	2767 lb	1096 kg	2416 lb
	ROC 50%	679 kg	1497 lb	671 kg	1480 lb	628 kg	1383 lb	548 kg	1208 lb
	Dump Clearance @ 40° dump angle	2036 mm	80 inch	2035 mm	80 inch	2002 mm	79 inch	2000 mm	79 inch
	Reach @ 40° dump angle	729 mm	29 inch	730 mm	29 inch	747 mm	29 inch	750 mm	30 inch
232D	Tipping Load	1648 kg	3633 lb	1633 kg	3599 lb	1543 kg	3402 lb	1362 kg	3003 lb
	ROC 50%	824 kg	1817 lb	816 kg	1800 lb	772 kg	1701 lb	681 kg	1502 lb
	Dump Clearance @ 40° dump angle	2216 mm	87 inch	2216 mm	87 inch	2182 mm	86 inch	2180 mm	86 inch
	Reach @ 40° dump angle	860 mm	34 inch	861 mm	34 inch	879 mm	35 inch	882 mm	35 inch

(continued)

(Table 40, contd)

236D	Tipping Load	1603 kg	3535 lb	1588 kg	3500 lb	1572 kg	3466 lb	1390 kg	3066 lb
	ROC 50%	802 kg	1767 lb	794 kg	1750 lb	786 kg	1733 lb	695 kg	1533 lb
	Dump Clearance @ 40° dump angle	2343 mm	92 inch	2342 mm	92 inch	2341 mm	92 inch	2340 mm	92 inch
	Reach @ 40° dump angle	577 mm	23 inch	578 mm	23 inch	579 mm	23 inch	581 mm	23 inch
242D	Tipping Load	1975 kg	4354 lb	1959 kg	4320 lb	1944 kg	4286	1722 kg	3796 lb
	ROC 50%	987 kg	2177 lb	980 kg	2160 lb	972 kg	2143 lb	861 kg	1898 lb
	Dump Clearance @ 40° dump angle	2297 mm	90 inch	2296 mm	90 inch	2295 mm	90 inch	2294 mm	90 inch
	Reach @ 40° dump angle	789 mm	31 inch	790 mm	31 inch	791 mm	31 inch	792 mm	31 inch
246D	Tipping Load	2016 kg	4446 lb	2001 kg	4411 lb	1909 kg	4210 lb	1771 kg	3906 lb
	ROC 50%	1008 kg	2223 lb	1000 kg	2205 lb	955 kg	2105 lb	886 kg	1953 lb
	Dump Clearance @ 40° dump angle	2365 mm	93 inch	2365 mm	93 inch	2364 mm	93 inch	2363 mm	93 inch
	Reach @ 40° dump angle	663 mm	26 inch	663 mm	26 inch	664 mm	26 inch	2363 mm	93 inch
262D	Tipping Load	2574 kg	5675 lb	2558 kg	5640 lb	2543 kg	5606 lb	2272 kg	5008 lb
	ROC 50%	1287 kg	2837 lb	1279 kg	2820 lb	1272 kg	2803 lb	1136 kg	2504 lb
	Dump Clearance @ 40° dump angle	2387 mm	94 inch	2386 mm	94 inch	2385 mm	94 inch	2383 mm	94 inch
	Reach @ 40° dump angle	1008 mm	40 inch	1009 mm	40 inch	1009 mm	40 inch	1011 mm	40 inch
272D	Tipping Load	2903 kg	6400 lb	2887 kg	6365 lb	2872 kg	6332 lb	2572 kg	5671 lb
	ROC 50%	1451 kg	3200 lb	1443 kg	3182 kg	1436 lb	3166 lb	1286 kg	2835 lb
	Dump Clearance @ 40° dump angle	2439 mm	96 inch	2438 mm	96 inch	2405 mm	95 inch	2403 mm	95 inch
	Reach @ 40° dump angle	1034 mm	41 inch	1035 mm	41 inch	1049 mm	41 inch	1050 mm	41 inch
272D XHP	Tipping Load	3414 kg	7527 lb	3398 kg	7491 lb	3291 kg	7256 lb	2951 kg	6505 lb
	ROC 50%	1707 kg	3764 lb	1699 kg	3746 lb	1646 kg	3628 lb	1475 kg	3252 lb
	Dump @ 40° dump angle	2479 mm	98 inch	2479 mm	98 inch	2446 mm	96 inch	2445 mm	96 inch

(continued)

Product Information Section
Rated Load

(Table 40, contd)

	Reach @ 40° dump angle	995 mm	39 inch	995 mm	39 inch	1009 mm	40 inch	1010 mm	40 inch
272D2	Tipping Load	3155 kg	6956 lb	3139 kg	6921 lb	3035 kg	6693 lb	2725 kg	6009 lb
	ROC 50%	1577 kg	3478 lb	1569 kg	3460 lb	1518 kg	3346 lb	1363 kg	3004 lb
	Dump @ 40° dump angle	2432 mm	96 inch	2432 mm	96 inch	2399 mm	94 inch	2398 mm	94 inch
	Reach @ 40° dump angle	1020 mm	40 inch	1021 mm	40 inch	1036 mm	41 inch	1038 mm	41 inch
272D2 XHP	Tipping Load	3392 kg	7478 lb	3376 kg	7442 lb	3269 kg	7207 lb	2929 kg	6457 lb
	ROC 50%	1696 kg	3739 lb	1688 kg	3721 lb	1635 kg	3604 lb	1464 kg	3228 lb
	Dump @ 40° dump angle	2470 mm	97 inch	2470 mm	97 inch	2437 mm	96 inch	2436 mm	96 inch
	Reach @ 40° dump angle	988 mm	39 inch	988 mm	39 inch	1002 mm	39 inch	1004 mm	40 inch

Table 41

Light Material Buckets									
	P/N	279-5421		279-5424		279-5429, BO Edge		296-7597, BO Edge	
		Tool Mass	266 kg	587 lb	280 kg	618 lb	338 kg	744 lb	368 kg
	Bucket Specs.	72"		78"		84"		96"	
257D	Tipping Load	2538 kg	5595 lb	2522 kg	5561 lb	2508 kg	5530 lb	2248 kg	4958 lb
	ROC 35%	888 kg	1958 lb	883 kg	1946 lb	878 kg	1935 lb	787 kg	1735 lb
	Dump Clearance @ 40° dump angle	2277 mm	90 inch	2276 mm	90 inch	2275 mm	90 inch	2274 mm	90 inch
	Reach @ 40° dump angle	957 mm	38 inch	959 mm	38 inch	960 mm	38 inch	964 mm	38 inch
277D	Tipping Load	2988 kg	6590 lb	2973 kg	6556 lb	2959 kg	6525 lb	2677 kg	5904 lb
	ROC 35%	1046 kg	2306 lb	1041 kg	2295 lb	1036 kg	2284 lb	937 kg	2066 lb
	Dump Clearance @ max dump angle	2394 mm	94 inch	2393 mm	94 inch	2392 mm	94 inch	2390 mm	94 inch
	Reach @ max dump angle	707 mm	28 inch	709 mm	28 inch	710 mm	28 inch	712 mm	28 inch
287D	Tipping Load	3755 kg	8279 lb	3739 kg	8244 lb	3725 kg	8213 lb	3357 kg	7403 lb
	ROC 35%	1314 kg	2898 lb	1309 kg	2885 lb	1304 kg	2875 lb	1175 kg	2591 lb

(continued)

(Table 41, contd)

	Dump Clearance @ 40° dump angle	2380 mm	94 inch	2379 mm	94 inch	2378 mm	94 inch	2376 mm	94 inch
	Reach @ 40° dump angle	1035 mm	41 inch	1036 mm	41 inch	1038 mm	41 inch	1041 mm	41 inch

Table 42

Light Material Buckets										
	P/N	279-5421		279-5424		279-5429, BO Edge		296-7597, BO Edge		
		Tool Mass	266 kg	587 lb	280 kg	618 lb	338 kg	744 lb	368 kg	811 lb
	Bucket Specs.	72"		78"		84"		96"		
297D	Tipping Load	4228 kg	9324 lb	4215 kg	9295 lb	4130 kg	9108 lb	3741 kg	8250 lb	
	ROC 35%	1480 kg	3263 lb	1475 kg	3253 lb	1446 kg	3187 lb	1309 kg	2887 lb	
	Dump Clearance @ 40° dump angle	2380 mm	94 inch	2379 mm	94 inch	2346 mm	92 inch	2345 mm	92 inch	
	Reach @ 40° dump angle	1067 mm	42 inch	1068 mm	42 inch	1085 mm	43 inch	1087 mm	43 inch	
		Tipping Load	4631 kg	10209 lb	4618 kg	10180 lb	4529 kg	9984 lb	4107 kg	9055 lb
		ROC 35%	1621 kg	3573 lb	1616 kg	3563 lb	1585 kg	3494 lb	1438 kg	3169 lb
		Dump Clearance @ 40° dump angle	2384 mm	94 inch	2383 mm	94 inch	2350 mm	93 inch	2349 mm	92 inch
297D XHP	Reach @ 40° dump angle	1060 mm	42 inch	1061 mm	42 inch	1077 mm	42 inch	1080 mm	43 inch	
		Tipping Load	4330 kg	9548 lb	4314 kg	9512 lb	4199 kg	9259 lb	3804 kg	8388 lb
		ROC 35%	1516 kg	3341 lb	1510 kg	3329 lb	1470 kg	3240 lb	1331 kg	2935 lb
		Dump Clearance @ 40° dump angle	2469 mm	97 inch	2469 mm	97 inch	2439 mm	96 inch	2439 mm	96 inch
297D2	Reach @ 40° dump angle	987 mm	39 inch	987 mm	39 inch	998 mm	39 inch	998 mm	39 inch	
		Tipping Load	4418 kg	9741 lb	4402 kg	9704 lb	4286 kg	9450 lb	3884 kg	8563 lb
		ROC 35%	1546 kg	3409 lb	1541 kg	3396 lb	1500 kg	3307 lb	1360 kg	2997 lb
		Dump Clearance @ 40° dump angle	2469 mm	97 inch	2469 mm	97 inch	2439 mm	96 inch	2439 mm	96 inch
297D2 XHP	Reach @ 40° dump angle	987 mm	39 inch	987 mm	39 inch	998 mm	39 inch	998 mm	39 inch	

Product Information Section
Rated Load

Table 43

Light Material Buckets									
Model	P/N	279 - 5421		279 - 5424		279 - 5429, BO Edge		296 - 7597, BO Edge	
	Tool Mass	266 kg	587 lb	280 kg	618 lb	338 kg	744 lb	368 kg	811 lb
	Bucket Specs.	72"		78"		84"		96"	
239D	Tipping Load	1847 kg	4072 lb	1830 kg	4036 lb	1741 kg	3840 lb	1560 kg	3440 lb
	ROC 35%	646 kg	1425 lb	641 kg	1413 lb	609 kg	1344 lb	546 kg	1204 lb
	Dump Clearance @ 40° dump angle	2039 mm	80 inch	2039 mm	80 inch	2008 mm	79 inch	2008 mm	79 inch
	Reach @ 40° dump angle	820 mm	32 inch	820 mm	32 inch	831 mm	33 inch	831 mm	33 inch
249D	Tipping Load	2074 kg	4573 lb	2058 kg	4539 lb	1967 kg	4338 lb	1768 kg	3898 lb
	ROC 35%	726 kg	1600 lb	720 kg	1589 lb	689 kg	1518 lb	619 kg	1364 lb
	Dump Clearance @ 40° dump angle	2214 mm	87 inch	2214 mm	87 inch	2184 mm	86 inch	2183 mm	86 inch
	Reach @ 40° dump angle	962 mm	38 inch	962 mm	38 inch	974 mm	38 inch	974 mm	38 inch
259D	Tipping Load	2622 kg	5782 lb	2607 kg	5748 lb	2593 kg	5717 lb	2330 kg	5137 lb
	ROC 35%	918 kg	2024 lb	912 kg	2012 lb	907 kg	2001 lb	815 kg	1798 lb
	Dump Clearance @ 40° dump angle	2292 mm	90 inch	2291 mm	90 inch	2290 mm	90 inch	2289 mm	90 inch
	Reach @ 40° dump angle	856 mm	34 inch	858 mm	34 inch	860 mm	34 inch	863 mm	34 inch
279D	Tipping Load	2598 kg	5729 lb	2583 kg	5695 lb	2569 kg	5664 lb	2366 kg	5217 lb
	ROC 35%	909 kg	2005 lb	904 kg	1993 lb	899 kg	1982 lb	828 kg	1826 lb
	Dump Clearance @ 40° dump angle	2386 mm	94 inch	2385 mm	94 inch	2385 mm	94 inch	2384 mm	94 inch
	Reach @ 40° dump angle	646 mm	25 inch	647 mm	25 inch	649 mm	26 inch	652 mm	26 inch
289D	Tipping Load	3408 kg	7514 lb	3392 kg	7478 lb	3378 kg	7448 lb	3089 lb	6811 lb
	ROC 35%	1193 kg	2630 lb	1187 kg	2617 lb	1182 kg	2607 lb	1081 kg	2384 lb
	Dump Clearance @ 40° dump angle	2389 mm	94 inch	2388 mm	94 inch	2387 mm	94 inch	2386 mm	94 inch
	Reach @ 40° dump angle	991 mm	39 inch	993 mm	39 inch	995 mm	39 inch	998 mm	39 inch

(continued)

(Table 43, contd)

299D Rubber	Tipping Load	3854 kg	8497 lb	3841 kg	8469 lb	3762 kg	8295 lb	3453 kg	7614 lb
	ROC 35%	1349 kg	2974 lb	1344 kg	2964 lb	1317 kg	2903 lb	1209 kg	2665 lb
	Dump Clearance @ 40° dump angle	2398 mm	94 inch	2398 mm	94 inch	2364 mm	93 inch	2363 mm	93 inch
	Reach @ 40° dump angle	1032 mm	41 inch	1034 mm	41 inch	1051 mm	41 inch	1054 mm	42 inch
299D XHP Rubber	Tipping Load	4241 kg	9352 lb	4228 kg	9323 lb	4146 kg	9141 lb	3810 kg	8402 lb
	ROC 35%	1484 kg	3273 lb	1480 kg	3263 lb	1451 kg	3199 lb	1334 kg	2941 lb
	Dump Clearance @ 40° dump angle	2403 mm	95 inch	2402 mm	95 inch	2369 mm	93 inch	2368 mm	93 inch
	Reach @ 40° dump angle	1022 mm	40 inch	1024 mm	40 inch	1041 mm	41 inch	1044 mm	41 inch
299D (Steel)	Tipping Load	4495 kg	9911 lb	4482 kg	9883 lb	4472 kg	9862 lb	4063 kg	8959 lb
	ROC 35%	1573 kg	3469 lb	1569 kg	3459 lb	1565 kg	3452 lb	1422 kg	3136 lb
	Dump Clearance @ 40° dump angle	2398 mm	94 inch	2398 mm	94 inch	2364 mm	93 inch	2363 mm	93 inch
	Reach @ 40° dump angle	1032 mm	41 inch	1034 mm	41 inch	1051 mm	41 inch	1054 mm	42 inch
299D XHP (Steel)	Tipping Load	4882 kg	10764 lb	4868 kg	10735 lb	4859 kg	10715 lb	4420 kg	9746 lb
	ROC 35%	1709 kg	3767 lb	1704 kg	3757 lb	1701 kg	3750 lb	1547 kg	3411 lb
	Dump Clearance @ 40° dump angle	2403 mm	95 inch	2402 mm	95 inch	2369 mm	93 inch	2368 mm	93 inch
	Reach @ 40° dump angle	1022 mm	40 inch	1024 mm	40 inch	1041 mm	41 inch	1044 mm	41 inch
299D2 Rubber	Tipping Load	4248 kg	9366 lb	4231 kg	9330 lb	4119 kg	9083 lb	3736 kg	8238 lb
	ROC 35%	1487 kg	3278 lb	1481 kg	3266 lb	1442 kg	3179 lb	1308 kg	2883 lb
	Dump Clearance @ 40° dump angle	2442 mm	96 inch	2442 mm	96 inch	2412 mm	95 inch	2412 mm	95 inch
	Reach @ 40° dump angle	1086 mm	43 inch	1086 mm	43 inch	1098 mm	43 inch	1098 mm	43 inch
299D2 XHP Rubber	Tipping Load	4363 kg	9620 lb	4346 kg	9584 lb	4233 kg	9334 lb	3841 kg	8469 lb
	ROC 35%	1527 kg	3367 lb	1521 kg	3354 lb	1482 kg	3267 lb	1344 kg	2964 lb
	Dump Clearance @ 40° dump angle	2442 mm	96 inch	2442 mm	96 inch	2412 mm	95 inch	2412 mm	95 inch

(continued)

Product Information Section
Rated Load

(Table 43, contd)

	Reach @ 40° dump angle	1086 mm	43 inch	1086 mm	43 inch	1098 mm	43 inch	1098 mm	43 inch
299D2 (Steel)	Tipping Load	4613 kg	10172 lb	4596 kg	10135 lb	4478 kg	9875 lb	4056 kg	8943 lb
	ROC 35%	1615 kg	3560 lb	1609 kg	3547 lb	1567 kg	3456 lb	1419 kg	3130 lb
	Dump Clearance @ 40° dump angle	2442 mm	96 inch	2442 mm	96 inch	2412 mm	95 inch	2412 mm	95 inch
	Reach @ 40° dump angle	1086 mm	43 inch	1086 mm	43 inch	1098 mm	43 inch	1098 mm	43 inch
299D2 XHP (Steel)	Tipping Load	4700 kg	10363 lb	4683 kg	10325 lb	4564 kg	10063 lb	4134 kg	9116 lb
	ROC 35%	1645 kg	3627 lb	1639 kg	3614 lb	1597 kg	3522 lb	1447 kg	3190 lb
	Dump Clearance @ 40° dump angle	2442 mm	96 inch	2442 mm	96 inch	2412 mm	95 inch	2412 mm	95 inch
	Reach @ 40° dump angle	1086 mm	43 inch	1086 mm	43 inch	1098 mm	43 inch	1098 mm	43 inch

Table 44

Industrial Grapple Buckets									
Model	P/N	157-7223		157-7224		157-7225		217-6229	
	Tool Mass	409 kg	902 lb	425 kg	937 lb	440 kg	970 lb	459 kg	1012 lb
	Bucket Specs.	60"		66"		72"		78"	
226D	Tipping Load	1211 kg	2670 lb	1195 kg	2635 lb	1180 kg	2602 lb	1161 kg	2561 lb
	ROC 50%	605 kg	1335 lb	598 kg	1317 lb	590 kg	1301 lb	581 kg	1280 lb
	Dump Clearance @ 40° dump angle	2085 mm	82 inch	2084 mm	82 inch	2084 mm	82 inch	2083 mm	82 inch
	Reach @ 40° dump angle	684 mm	27 inch	685 mm	27 inch	687 mm	27 inch	688 mm	27 inch
232D	Tipping Load	1499 kg	3304 lb	1483 kg	3270 lb	1469 kg	3238 lb	1450 kg	3197 lb
	ROC 50%	749 kg	1652 lb	742 kg	1635 lb	734 kg	1619 lb	725 kg	1598 lb
	Dump Clearance @ 40° dump angle	2264 mm	89 inch	2263 mm	89 inch	2262 mm	89 inch	2261 mm	89 inch
	Reach @ 40° dump angle	817 mm	32 inch	819 mm	32 inch	820 mm	32 inch	823 mm	32 inch
236D	Tipping Load	1451 kg	3200 lb	1436 kg	3166 lb	1421 kg	3133 lb	1402 kg	3091 lb
	ROC 50%	726 kg	1600 lb	718 kg	1583 lb	710 kg	1566 lb	701 kg	1545 lb

(continued)

(Table 44, contd)

Industrial Grapple Buckets									
	Dump Clearance @ 40° dump angle	2390 mm	94 inch	2389 mm	94 inch	2388 mm	94 inch	2387 mm	94 inch
	Reach @ 40° dump angle	526 mm	21 inch	527 mm	21 inch	528 mm	21 inch	529 mm	21 inch
242D	Tipping Load	1819 kg	4010 lb	1803 kg	3976 lb	1789 kg	3943 lb	1770 kg	3902 lb
	ROC 50%	909 kg	2005 lb	902 kg	1988 lb	894 kg	1972 lb	885 kg	1951 lb
	Dump Clearance @ 40° dump angle	2344 mm	92 inch	2343 mm	92 inch	2343 mm	92 inch	2342 mm	92 inch
	Reach @ 40° dump angle	736 mm	29 inch	737 mm	29 inch	738 mm	29 inch	739 mm	29 inch
246D	Tipping Load	1857 kg	4095 lb	1841 kg	4060 lb	1826 kg	4027 lb	1808 kg	3986 lb
	ROC 50%	929 kg	2047 lb	921 kg	2030 lb	913 kg	2013 lb	904 kg	1992 lb
	Dump Clearance @ 40° dump angle	2415 mm	95 inch	2414 mm	95 inch	2414 mm	95 inch	2413 mm	95 inch
	Reach @ 40° dump angle	608 mm	24 inch	608 mm	24 inch	609 mm	24 inch	610 mm	24 inch
262D	Tipping Load	2408 kg	5308 lb	2392 kg	5274 lb	2377 kg	5241 lb	2359 kg	5200 lb
	ROC 50%	1204 kg	2654 lb	1196 kg	2637 lb	1189 kg	2621 lb	1179 kg	2600 lb
	Dump Clearance @ 40° dump angle	2434 mm	96 inch	2433 mm	96 inch	2432 mm	96 inch	2431 mm	96 inch
	Reach @ 40° dump angle	954 mm	38 inch	955 mm	38 inch	956 mm	38 inch	957 mm	38 inch
272D	Tipping Load	2731 kg	6021 lb	2715 kg	5987 lb	2701 kg	5955 lb	2682 kg	5914 lb
	ROC 50%	1365 kg	3010 lb	1358 kg	2993 lb	1350 kg	2977 lb	1341 kg	2956 lb
	Dump Clearance @ 40° dump angle	2487 mm	98 inch	2486 mm	98 inch	2485 mm	98 inch	2484 mm	98 inch
	Reach @ 40° dump angle	980 mm	39 inch	980 mm	39 mm	981 mm	39 mm	982 mm	39 inch
272D XHP	Tipping Load	3230 kg	7122 lb	3215 kg	7088 lb	3200 kg	7055 lb	3182 kg	7014 lb
	ROC 50%	1615 kg	3561 lb	1607 kg	3544 lb	1600 kg	3528 lb	1591 kg	3507 lb
	Dump @ 40° dump angle	2529 mm	100 inch	2528 mm	100 inch	2527 mm	100 inch	2527 mm	99 inch
	Reach @ 40° dump angle	939 mm	37 inch	939 mm	37 inch	940 mm	37 inch	941m	37 inch
272D2	Tipping Load	2979 kg	6569 lb	2964 kg	6535 lb	2949 kg	6503 lb	2931 kg	6462 lb
	ROC 50%	1490 kg	3284 lb	1482 kg	3267 lb	1475 kg	3251 lb	1465 kg	3230 lb

(continued)

Product Information Section
Rated Load

(Table 44, contd)

Industrial Grapple Buckets									
	Dump @ 40° dump angle	2483 mm	98 inch	2483 mm	98 inch	2482 mm	98 inch	2481 mm	98 inch
	Reach @ 40° dump angle	969 mm	38 inch	970 mm	38 inch	971 mm	38 inch	972 mm	38 inch
272D2 XHP	Tipping Load	3209 kg	7074 lb	3193 kg	7039 lb	3178 kg	7007 lb	3160 kg	6966 lb
	ROC 50%	1604 kg	3537 lb	1597 kg	3520 lb	1589 kg	3503 lb	1580 kg	3483 lb
	Dump @ 40° dump angle	2522 mm	99 inch	2521 mm	99 inch	2521 mm	99 inch	2520 mm	99 inch
	Reach @ 40° dump angle	935 mm	37 inch	935 mm	37 inch	936 mm	37 inch	937 mm	37 inch

Table 45

Industrial Grapple Buckets							
	P/N	157-7224		157-7225		217-6229	
	257D	Tool Mass	425 kg	937 lb	440 kg	970 lb	459 kg
Bucket Specs.		66"		72"		78"	
Tipping Load		2372 kg	5229 lb	2357 kg	5198 lb	2339 kg	5158 lb
ROC 35%		830 kg	1830 lb	825 kg	1819 lb	819 kg	5158 lb
Dump Clearance @ 40° dump angle		2326 mm	92 inch	2325 mm	92 inch	2324 mm	92 inch
Reach @ 40° dump angle		912 mm	36 inch	913 mm	36 inch	915 mm	36 inch
277D		Tipping Load	2819 kg	6217 lb	2805 kg	6186 lb	2788 kg
	ROC 35%	987 kg	2176 lb	982 kg	2165 lb	976 kg	2151 lb
	Dump Clearance @ max dump angle	2440 mm	96 inch	2440 mm	96 inch	2438 mm	96 inch
	Reach @ max dump angle	657 mm	26 inch	658 mm	26 inch	660 mm	26 inch
287D	Tipping Load	3574 kg	7881 lb	3560 kg	7849 lb	3542 kg	7810 lb
	ROC 35%	1251 kg	2758 lb	1246 kg	2747 lb	1240 kg	2734 lb
	Dump Clearance @ 40° dump angle	2429 mm	96 inch	2428 mm	96 inch	2427 mm	96 inch
	Reach @ 40° dump angle	989 mm	39 inch	990 mm	39 inch	992 mm	39 inch

Table 46

Industrial Grapple Buckets					
297D	P/N	157-7223	157-7224	157-7225	217-6229

(continued)

(Table 46, contd)

Industrial Grapple Buckets									
	Tool Mass (kg, lb)	409 kg	902 lb	425 kg	937 lb	440 kg	970 lb	459 kg	1012 lb
	Bucket Specs.	60"		66"		72"		78"	
	Tipping Load	4084 kg	9005 lb	4072 kg	8979 lb	4061 kg	8955 lb	4047 kg	8925 lb
	ROC 35%	1429 kg	3151 lb	1425 kg	3142 lb	1421 kg	3134 lb	1417 kg	3123
	Dump Clearance @ 40° dump angle	2431 mm	96 inch	2430 mm	96 inch	2429 mm	96 inch	2428 mm	96 inch
	Reach @ 40° dump angle	1018 mm	40 inch	1019 mm	40 inch	1020 mm	40 inch	1022 mm	40 inch
297D XHP	Tipping Load	4482 kg	9881 lb	4470 kg	4459 lb	4459 kg	9831 lb	4446 kg	9801 lb
	ROC 35%	1569 kg	3458 lb	1565 kg	3449 lb	1561 kg	3441 lb	1556 kg	3430 lb
	Dump Clearance @ 40° dump angle	2435 mm	96 inch	2434 mm	96 inch	2433 mm	96 inch	2433 mm	96 inch
	Reach @ 40° dump angle	1010 mm	40 inch	1011 mm	40 inch	1013 mm	40 inch	1014 mm	40 inch
297D2	Tipping Load	4164 kg	9182 lb	4150 kg	9150 lb	4135 kg	9119 lb	4118 kg	9079 lb
	ROC 35%	1457 kg	3213 lb	1452 kg	3202 lb	1447 kg	3191 lb	1441 kg	3177 lb
	Dump Clearance @ 40° dump angle	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch
	Reach @ 40° dump angle	925 mm	36 inch	925 mm	36 inch	925 mm	36 inch	925 mm	36 inch
297D2 XHP	Tipping Load	4251 kg	9373 lb	4237 kg	4459 lb	4223 kg	9309 lb	4205 kg	9270 lb
	ROC 35%	1488 kg	3280 lb	1483 kg	3269 lb	1478 kg	3258 lb	1472 kg	3244 lb
	Dump Clearance @ 40° dump angle	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch	2526 mm	99 inch
	Reach @ 40° dump angle	925 mm	36 inch	925 mm	36 inch	925 mm	36 inch	925 mm	36 inch

Table 47

Industrial Grapple Buckets									
Model	P/N	157-7223		157-7224		157-7225		217-6229	
	Tool Mass (kg, lb)	409 kg	902 lb	425 kg	937 lb	440 kg	970 lb	459 kg	1012 lb
	Bucket Specs.	60"		66"		72"		78"	
239D	Tipping Load	1706 kg	3762 lb	1691 kg	3728 lb	1676 kg	3697 lb	1658 kg	3657 lb
	ROC 35%	592 kg	1304 lb	592 kg	1305 lb	587 kg	1294 lb	580 kg	1280 lb

(continued)

Product Information Section
Rated Load

(Table 47, contd)

Industrial Grapple Buckets									
	Dump Clearance @ 40° dump angle	2096 mm	83 inch	2096 mm	83 inch	2096 mm	83 inch	2096 mm	83 inch
	Reach @ 40° dump angle	758 mm	30 inch	758 mm	30 inch	758 mm	30 inch	758 mm	30 inch
249D	Tipping Load	1931 kg	4258 lb	1916 kg	4226 lb	1902 kg	4194 lb	1884 kg	4154 lb
	ROC 35%	676 kg	1490 lb	671 kg	1479 lb	666 kg	1468 lb	659 kg	1454 lb
	Dump Clearance @ 40° dump angle	2271 mm	89 inch	2271 mm	89 inch	2271 mm	89 inch	2271 mm	89 inch
	Reach @ 40° dump angle	901 mm	35 inch	901 mm	35 inch	901 mm	35 inch	901 mm	35 inch

Table 48

Industrial Grapple Buckets							
	P/N	157-7224		157-7225		217-6229	
	259D	Tool Mass	425 kg	937 lb	440 kg	970 lb	459 kg
Bucket Specs.		66"		72"		78"	
Tipping Load		2458 kg	5419 lb	2443 kg	5388 lb	2426 kg	5348 lb
ROC 35%		860 kg	1897 lb	855 kg	1886 lb	849 kg	1872 lb
Dump Clearance @ 40° dump angle		2341 mm	92 inch	2340 mm	92 inch	2340 mm	92 inch
Reach @ 40° dump angle		813 mm	32 inch	815 mm	32 inch	817 mm	32 inch
279D		Tipping Load	2451 kg	5405 lb	2437 kg	5373 lb	2419 kg
	ROC 35%	858 kg	1892 lb	853 kg	1881 lb	847 kg	1867 lb
	Dump Clearance @ 40° dump angle	2437 mm	96 inch	2436 mm	96 inch	2436 mm	96 inch
	Reach @ 40° dump angle	601 mm	24 inch	603 mm	24 inch	605 mm	24 inch
289D	Tipping Load	3253 kg	7272 lb	3238 kg	7141 lb	3221 kg	7101 lb
	ROC 35%	1138 kg	2510 lb	1133 kg	2499 lb	1127 kg	2485 lb
	Dump Clearance @ 40° dump angle	2438 mm	96 inch	2437 mm	96 inch	2436 mm	96 inch
	Reach @ 40° dump angle	946 mm	37 inch	948 mm	37 mm	950 mm	37 inch
299D Rubber	Tipping Load	3725 kg	8213 lb	3713 kg	8188 lb	3699 kg	8157 lb
	ROC 35%	1304 kg	2874 lb	1300 kg	2866 lb	1295 kg	2855 lb

(continued)

(Table 48, contd)

	Dump Clearance @ 40° dump angle	2447 mm	96 inch	2446 mm	96 inch	2445 mm	96 inch
	Reach @ 40° dump angle	987 mm	39 inch	989 mm	39 inch	990 mm	39 inch
299D XHP Rubber	Tipping Load	4111 kg	9065 lb	4100 kg	9041 lb	4086 kg	9010 lb
	ROC 35%	1439 kg	3173 lb	1435 kg	3164 lb	1430 kg	3153 lb
	Dump Clearance @ 40° dump angle	2452 mm	97 inch	2452 mm	97 inch	2451 mm	96 inch
	Reach @ 40° dump angle	977 mm	38 inch	978 mm	39 inch	980 mm	39 inch
299D (Steel)	Tipping Load	4348 kg	9587 lb	4337 kg	9563 lb	4324 kg	9534 lb
	ROC 35%	1522 kg	3355 lb	1518 kg	3347 lb	1513 kg	3337 lb
	Dump Clearance @ 40° dump angle	2447 mm	96 inch	2446 mm	96 inch	2445 mm	96 inch
	Reach @ 40° dump angle	987 mm	39 inch	989 mm	39 inch	990 mm	39 inch
299D XHP (Steel)	Tipping Load	4733 kg	10435 lb	4722 kg	10412 lb	4709 kg	10382 lb
	ROC 35%	1656 kg	3652 lb	1653 kg	3644 lb	1648 kg	3634 lb
	Dump Clearance @ 40° dump angle	2452 mm	97 inch	2452 mm	97 inch	2451 mm	96 inch
	Reach @ 40° dump angle	977 mm	38 inch	978 mm	39 inch	980 mm	39 inch
299D2 Rubber	Tipping Load	4064 kg	8961 lb	4050 kg	8930 lb	4032 kg	8890 lb
	ROC 35%	1422 kg	3136 lb	1417 kg	3125 lb	1411 kg	3112 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 XHP Rubber	Tipping Load	4178 kg	9212 lb	4164 kg	9181 lb	4146 kg	9141 lb
	ROC 35%	1462 kg	3224 lb	1457 kg	3213 lb	1451 kg	3199 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 (Steel)	Tipping Load	4417 kg	9740 lb	4403 kg	9709 lb	4385 kg	9669 lb
	ROC 35%	1546 kg	3409 lb	1541 kg	3398 lb	1535 kg	3384 lb

(continued)

Product Information Section
Rated Load

(Table 48, contd)

	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch
299D2 XHP (Steel)	Tipping Load	4503 kg	9928 lb	4488 kg	9896 lb	4470 kg	9856 lb
	ROC 35%	1576 kg	3475 lb	1571 kg	3464 lb	1564 kg	3450 lb
	Dump Clearance @ 40° dump angle	2499 mm	98 inch	2499 mm	98 inch	2499 mm	98 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1025 mm	40 inch	1025 mm	40 inch

Table 49

Utility Grapple Buckets with Bolt-On Edge					
Model	P/N	285 - 6111		285 - 6112	
	Tool Mass	363 kg	800 lb	379 kg	835 lb
	Bucket Specs.	66"		72"	
226D	Tipping Load	1166 kg	2571 lb	1150 kg	2536 lb
	ROC 50%	583 kg	1285 lb	575 kg	1268 lb
	Dump Clearance @ 40° dump angle	2032 mm	80 inch	2031 mm	80 inch
	Reach @ 40° dump angle	720 mm	28 inch	721 mm	28 inch
232D	Tipping Load	1441 kg	3176 lb	1425 kg	3142 lb
	ROC 50%	720 kg	1588 lb	713 kg	1571 lb
	Dump Clearance @ 40° dump angle	2211 mm	87 inch	2211 mm	87 inch
	Reach @ 40° dump angle	852 mm	34 inch	854 mm	34 inch
236D	Tipping Load	1397 kg	3081 lb	1382 kg	3046 lb
	ROC 50%	699 kg	1540 lb	691 kg	1523 lb
	Dump Clearance @ 40° dump angle	2338 mm	92 inch	2337 mm	92 inch
	Reach @ 40° dump angle	565 mm	22 inch	566 mm	22 inch
242D	Tipping Load	1741 kg	3838 lb	1725 kg	3803 lb
	ROC 50%	871 kg	1919 lb	863 kg	1902 lb
	Dump Clearance @ 40° dump angle	2292 mm	90 inch	2291 mm	90 inch
	Reach @ 40° dump angle	776 mm	31 inch	776 mm	31 inch

(continued)

(Table 49, contd)

Utility Grapple Buckets with Bolt-On Edge					
246D	Tipping Load	1780 kg	3924 lb	1763 kg	3887 lb
	ROC 50%	890 kg	1962 lb	881 kg	1943 lb
	Dump Clearance @ 40° dump angle	2362 mm	93 inch	2361 mm	93 inch
	Reach @ 40° dump angle	648 mm	25 inch	648 mm	26 inch
262D	Tipping Load	2304 kg	5080 lb	2288 kg	5044 lb
	ROC 50%	1152 kg	2540 lb	1144 kg	2522 lb
	Dump Clearance @ 40° dump angle	2381 mm	94 inch	2380 mm	94 inch
	Reach @ 40° dump angle	994 mm	39 inch	995 mm	39 inch
272D	Tipping Load	2613 kg	5761 lb	2596 kg	5724 lb
	ROC 50%	1306 kg	2880 lb	1298 kg	2862 lb
	Dump Clearance @ 40° dump angle	2434 mm	96 inch	2433 mm	96 inch
	Reach @ 40° dump angle	1019 mm	40 inch	1020 mm	40 inch
272D XHP	Tipping Load	3085 kg	6801 lb	3068 kg	6764 lb
	ROC 50%	1542 kg	3400 lb	1534 kg	3382 lb
	Dump @ 40° dump angle	2476 mm	97 inch	2475 mm	97 inch
	Reach @ 40° dump angle	979 mm	39 inch	980 mm	39 inch
272D2	Tipping Load	2850 kg	6285 lb	2834 kg	6248 lb
	ROC 50%	1425 kg	3142 lb	1417 kg	3124 lb
	Dump @ 40° dump angle	2429 mm	96 inch	2429 mm	96 inch
	Reach @ 40° dump angle	1007 mm	40 inch	1008 mm	40 inch
272D2 XHP	Tipping Load	3063 kg	6752 lb	3046 kg	6716 lb
	ROC 50%	1531 kg	3376 lb	1523 kg	3358 lb
	Dump @ 40° dump angle	2468 mm	97 inch	2467 mm	97 inch
	Reach @ 40° dump angle	974 mm	38 inch	974 mm	38 inch

Table 50

Utility Grapple Buckets with Bolt-On Edge			
257D	P/N	285-6111	285-6112

(continued)

Product Information Section
Rated Load

(Table 50, contd)

Utility Grapple Buckets with Bolt-On Edge					
	Tool Mass	363 kg	800 lb	379 kg	835 lb
	Bucket Specs.	66"		72"	
	Tipping Load	2283 kg	5035 lb	2268 kg	5000 lb
	ROC 35%	799 kg	1762 lb	794 kg	1750 lb
	Dump Clearance @ 40° dump angle	2273 mm	89 inch	2272 mm	89 inch
	Reach @ 40° dump angle	948 mm	37 inch	950 mm	37 inch
277D	Tipping Load	2720 kg	5997 lb	2704 kg	5962 lb
	ROC 35%	952 kg	2099 lb	946 kg	2087 lb
	Dump Clearance @ max dump angle	2388 mm	94 inch	2387 mm	94 inch
	Reach @ max dump angle	696 mm	27 inch	697 mm	25 inch
287D	Tipping Load	3425 kg	7553 lb	3409 kg	7517 lb
	ROC 35%	1199 kg	2643 lb	1193 kg	2631 lb
	Dump Clearance @ 40° dump angle	2376 mm	94 inch	2375 mm	91 inch
	Reach @ 40° dump angle	1025 mm	40 inch	1027 mm	40 inch

Table 51

Utility Grapple Buckets with Bolt-On Edge					
Model	P/N	285-6111		285-6112	
	Tool Mass	363 kg	800 lb	379 kg	835 lb
	Bucket Specs.	66"		72"	
297D	Tipping Load	3894 kg	8586 lb	3880 kg	8554 lb
	ROC 35%	1363 kg	3005 lb	1358 kg	2994 lb
	Dump Clearance @ 40° dump angle	2377 mm	94 inch	2376 mm	94 inch
	Reach @ 40° dump angle	1056 mm	42 inch	1057 mm	42 inch
297D XHP	Tipping Load	4273 kg	9420 lb	4258 kg	9388 lb
	ROC 35%	1496 kg	3297 lb	1490 kg	3286 lb
	Dump Clearance @ 40° dump angle	2381 mm	94 inch	2380 mm	94 inch
	Reach @ 40° dump angle	1048 mm	41 inch	1050 mm	41 inch
297D2	Tipping Load	3975 kg	8765 lb	3958 kg	8728 lb

(continued)

(Table 51, contd)

Utility Grapple Buckets with Bolt-On Edge					
	ROC 35%	1391 kg	3067 lb	1385 kg	3054 lb
	Dump Clearance @ 40° dump angle	2470 mm	97 inch	2470 mm	97 inch
	Reach @ 40° dump angle	967 mm	38 inch	967 mm	38 inch
297D2 XHP	Tipping Load	4058 kg	8947 lb	4041 kg	8910 lb
	ROC 35%	1420 kg	3131 lb	1414 kg	3118 lb
	Dump Clearance @ 40° dump angle	2470 mm	97 inch	2470 mm	97 inch
	Reach @ 40° dump angle	967 mm	38 inch	967 mm	38 inch

Table 52

Utility Grapple Buckets with Bolt-On Edge					
Model	P/N	285 - 6111		285 - 6112	
	Tool Mass	363 kg	800 lb	379 kg	835 lb
	Bucket Specs.	66"		72"	
239D	Tipping Load	1644 kg	3625 lb	1628 kg	3590 lb
	ROC 35%	575 kg	1269 lb	570 kg	1257 lb
	Dump Clearance @ 40° dump angle	2040 mm	80 inch	2040 mm	80 inch
	Reach @ 40° dump angle	800 mm	32 inch	800 mm	32 inch
249D	Tipping Load	1859 kg	4098 lb	1843 kg	4064 lb
	ROC 35%	651 kg	1434 lb	645 kg	1422 lb
	Dump Clearance @ 40° dump angle	2215 mm	87 inch	2215 mm	87 inch
	Reach @ 40° dump angle	943 mm	37 inch	943 mm	37 inch
259D	Tipping Load	2367 kg	5219 lb	2351 kg	5184 lb
	ROC 35%	828 kg	1826 lb	823 kg	1814 lb
	Dump Clearance @ 40° dump angle	2288 mm	90 inch	2287 mm	90 inch
	Reach @ 40° dump angle	849 mm	33 inch	850 mm	33 inch
279D	Tipping Load	2393 kg	5276 lb	2377 kg	5241 lb
	ROC 35%	837 kg	1847 lb	832 kg	1834 lb
	Dump Clearance @ 40° dump angle	2383 mm	94 inch	2382 mm	94 inch

(continued)

Product Information Section
Rated Load

(Table 52, contd)

Utility Grapple Buckets with Bolt-On Edge					
	Reach @ 40° dump angle	637 mm	25 inch	639 mm	23 inch
289D	Tipping Load	3143 kg	6930 lb	3127 kg	6894 lb
	ROC 35%	1100 kg	2426 lb	1094 kg	2413 lb
	Dump Clearance @ 40° dump angle	2385 mm	94 inch	2384 mm	94 inch
	Reach @ 40° dump angle	983 mm	39 inch	984 mm	39 inch
299D Rubber	Tipping Load	3587 kg	7910 lb	3573 kg	7879 lb
	ROC 35%	1256 kg	2769 lb	1251 kg	2758 lb
	Dump Clearance @ 40° dump angle	2394 mm	94 inch	2394 mm	94 inch
	Reach @ 40° dump angle	1023 mm	40 inch	1024 mm	40 inch
299D XHP Rubber	Tipping Load	3958 kg	8726 lb	3943 kg	8695 lb
	ROC 35%	1385 kg	3054 lb	1380 kg	3043 lb
	Dump Clearance @ 40° dump angle	2399 mm	94 inch	2399 mm	94 inch
	Reach @ 40° dump angle	1013 mm	40 inch	1014 mm	40 inch
299D (Steel)	Tipping Load	4163 kg	9179 lb	4148 kg	9147 lb
	ROC 35%	1457 kg	3213 lb	1452 kg	3202 lb
	Dump Clearance @ 40° dump angle	2394 mm	94 inch	2394 mm	94 inch
	Reach @ 40° dump angle	1023 mm	40 inch	1024 mm	40 inch
299D XHP (Steel)	Tipping Load	4530 kg	9988 lb	4515 kg	9957 lb
	ROC 35%	1585 kg	3496 lb	1580 kg	3485 lb
	Dump Clearance @ 40° dump angle	2399 mm	94 inch	2399 mm	94 inch
	Reach @ 40° dump angle	1013 mm	40 inch	1014 mm	40 inch
299D2 Rubber	Tipping Load	3899 kg	8598 kg	3882 kg	8561 lb
	ROC 35%	1365 kg	3009 lb	1359 kg	2996 lb
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2443 mm	96 inch
	Reach @ 40° dump angle	1067 mm	42 inch	1067 mm	42 inch
299D2 XHP Rubber	Tipping Load	4008 kg	8837 lb	3991 kg	8800 lb
	ROC 35%	1403 kg	3093 lb	1397 kg	3080 lb

(continued)

(Table 52, contd)

Utility Grapple Buckets with Bolt-On Edge					
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2443 mm	96 inch
	Reach @ 40° dump angle	1067 mm	42 inch	1067 mm	42 inch
299D2 (Steel)	Tipping Load	4232 kg	9332 lb	4215 kg	9294 lb
	ROC 35%	1481 kg	3266 lb	1475 kg	3253 lb
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2443 mm	96 inch
	Reach @ 40° dump angle	1067 mm	42 inch	1067 mm	42 inch
299D2 XHP (Steel)	Tipping Load	4313 kg	9511 lb	4296 kg	9473 lb
	ROC 35%	1510 kg	3329 lb	1504 kg	3315 lb
	Dump Clearance @ 40° dump angle	2443 mm	96 inch	2443 mm	96 inch
	Reach @ 40° dump angle	1067 mm	42 inch	1067 mm	42 inch

Rated Loads for Forks

⚠ WARNING

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

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.

The rated operating capacity (ROC) is defined by “SAE J1197-2011”, “ISO 14397-1:2007” and “EN 474-3:2006+A1:2009” as the least amount of weight of the following conditions:

- 50% of the full static tipping load for wheeled machines
- 35% of the full static tipping load for track machines
- The lifting capacity to maximum height

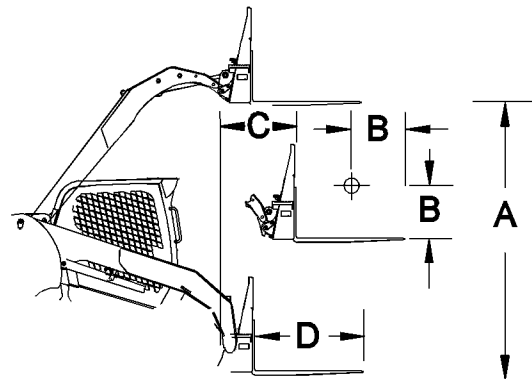


Illustration 82

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Dimension (A) represents the maximum fork height. Dimension (B) represents the load center. Dimension (C) represents the reach. Dimension (D) represents the fork tine length.

The maximum fork height (ground to top face of fork) is given for a pallet fork that is horizontal at maximum lift height. The reach (front tires to front face of fork) is given for a pallet fork that is horizontal maximum reach.

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

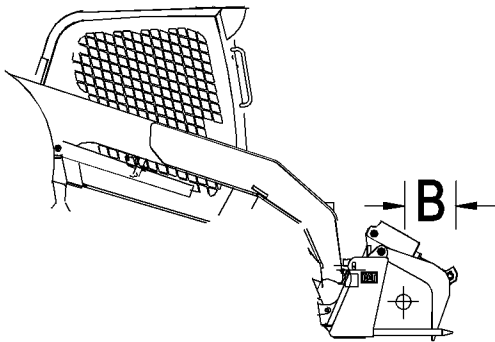
Product Information Section
Rated Load

- 10 x 16.5 tires on 226D, and 232D
- 12 x 16.5 tires on 236D, 242D, 246D, 262D, 272D, and 272D2
- 14 x 17.5 tires on 272D XHP, and 272D2 XHP
- lubricants
- full fuel tank
- 75 kg (165 lb) operator
- Cat fork, carriage, and tines
- Undercarriage with 320 mm wide tracks and dual flange front/single flange rear idlers on 239D, 249D, and 259D machines.
- Undercarriages with either 400 mm (15.75 inch) or 450 mm (17.72 inch) wide tracks and triple flange front/rear idlers on 279D, and 289D machines.
- Undercarriages with 450 mm (17.72 inch) wide tracks and dual flange front/single flange rear idlers on 299D, and 299D2 machines.
- Undercarriages with 400 mm (15.75 inch) wide tracks and triple flange front/rear idlers on 299D XHP, and 299D2 XHP machines.

Note: All Caterpillar Premium Conventional tires are at the suggested operating inflation pressure. Refer to the Operation and Maintenance Manual, "Tire Inflation - Check" for the proper tire inflation pressure.

Note: The Steel Track Undercarriage attachment will increase the rated operating loads in the following tables by 111 kg (245 lb) for 299D and 299D XHP and by 69 kg (152 lb) for 299D2 and 299D2 XHP machines.

The following tables provide the rated operating loads for the standard machine configuration with a fork.



Forks

Table 53

Pallet Fork - Skid Steer Loader							
Model	P/N	353 - 1694		353 - 1696		353 - 1697	
	Tool Mass	175 kg	386 lb	186 kg	409 lb	195 kg	430 lb
	Fork Specs.	36"		42"		48"	
	Load Center	455 mm	18 inch	535 mm	21 inch	610 mm	24 inch
226D	Tipping Load	1049 kg	2312 lb	989 kg	2180 lb	936 kg	2064 lb
	ROC 50%	524 kg	1156 lb	494 kg	1090 lb	468 kg	1032 lb
	Max Fork Height	2705 mm	107 inch	2706 mm	107 inch	2704 mm	106 inch
	Max Reach to Carriage Face	747 mm	29 inch	748 mm	29 inch	749 mm	29 inch
232D	Tipping Load	1267 kg	2793 lb	1197 kg	2638 lb	1136 kg	2504 lb
	ROC 50%	633 kg	1396 lb	598 kg	1319 lb	568 kg	1252 lb
	Max Fork Height	2885 mm	114 inch	2884 mm	114 inch	2882 mm	113 inch
	Max Reach to Carriage Face	707 mm	28 inch	707 mm	28 inch	709 mm	28 inch
236D	Tipping Load	1238 kg	2729 lb	1171 kg	2582 lb	1113 kg	2453 lb
	ROC 50%	619 kg	1365 lb	586 kg	1291 lb	556 kg	1227 lb
	Max Fork Height	3020 mm	119 inch	3021 mm	119 inch	3022 mm	119 inch
	Max Reach to Carriage Face	795 mm	31 inch	804 mm	32 inch	802 mm	32 inch
242D	Tipping Load	1490 kg	3284 lb	1409 kg	3106 lb	1339 kg	2951 lb
	ROC 50%	745 kg	1642 lb	704 kg	1553 lb	669 kg	1476 lb
	Max Fork Height	2970 mm	117 inch	2970 mm	117 inch	2970 mm	117 inch
	Max Reach to Carriage Face	691 mm	27 inch	699 mm	28 inch	698 mm	27 inch
246D	Tipping Load	1552 kg	3421 lb	1473 kg	3248 lb	1405 kg	3098 lb
	ROC 50%	776 kg	1711 lb	737 kg	1624 lb	703 kg	1549 lb
	Max Fork Height	3043 mm	120 inch	3043 mm	120 inch	3042 mm	120 inch
	Max Reach to Carriage Face	842 mm	33 inch	850 mm	33 inch	849 mm	33 inch
262D	Tipping Load	1941 kg	4279 lb	1842 kg	4060 lb	1756 kg	3871 lb
	ROC 50%	970 kg	2140 lb	921 kg	2030 lb	878 kg	1936 lb
	Max Fork Height	3066 mm	121 inch	3066 mm	121 inch	3064 mm	121 inch
	Max Reach to Carriage Face	730 mm	29 inch	738 mm	29 inch	737 mm	29 inch
272D	Tipping Load	2182 kg	4811 lb	2072 kg	4568 lb	1977 kg	4359 lb
	ROC 50%	1091 kg	2405 lb	1036 kg	2284 lb	989 kg	2179 lb

(continued)

Product Information Section
Rated Load

(Table 53, contd)

Pallet Fork - Skid Steer Loader							
	Max Fork Height	3118 mm	123 inch	3118 mm	123 inch	3117 mm	123 inch
	Max Reach to Carriage Face	737 mm	29 inch	745 mm	29 inch	744 mm	29 inch
272D XHP	Tipping Load	2533 kg	5583 lb	2405 kg	5303 lb	2295 kg	5060 lb
	ROC 50%	1266 kg	2792 lb	1203 kg	2651 lb	1148 kg	2530 lb
	Max Fork Height	3158 mm	124 inch	3158 mm	124 inch	3157 mm	124 inch
	Max Reach to Carriage Face	699 mm	28 inch	707 mm	28 inch	705 mm	28 inch
272D2	Tipping Load	2369 kg	5222 lb	2250 kg	4960 lb	2147 kg	4733 lb
	ROC 50%	1184 kg	2611 lb	1125 kg	2480 lb	1074 kg	2367 lb
	Max Fork Height	3119 mm	123 inch	3118 mm	123 inch	3117 mm	123 inch
	Max Reach to Carriage Face	739 mm	29 inch	739 mm	29 inch	740 mm	29 inch
272D2 XHP	Tipping Load	2513 kg	5539 lb	2386 kg	5260 lb	2276 kg	5018 lb
	ROC 50%	1256 kg	2770 lb	1193 kg	2630 lb	1138 kg	2509 lb
	Max Fork Height	3156 mm	124 inch	3156 mm	124 inch	3154 mm	124 inch
	Max Reach to Carriage Face	703 mm	28 inch	704 mm	28 inch	705 mm	28 inch

Table 54

Pallet Fork - Multi-Terrain Loader							
	P/N	353 - 1694		353 - 1696		353 - 1697	
	257D	Tool Mass	175 kg	386 lb	186 kg	409 lb	195 kg
Fork Specs.		36"		42"		48"	
Load Center		455 mm	18 inch	535 mm	21 inch	610 mm	24 inch
Tipping Load		1951 kg	4301 lb	1847 kg	4072 lb	1757 kg	3875 lb
ROC 35%		683 kg	1505 lb	646 kg	1425 lb	615 kg	1356 lb
Max Fork Height		2959 mm	116 inch	2958 mm	116 inch	2957 mm	116 inch
Max Fork Height		814 mm	32 inch	822 mm	32 inch	821 mm	32 inch
277D		Tipping Load	2101 kg	4632 lb	2001 kg	4413 lb	1915 kg
	ROC 35%	735 kg	1621 lb	700 kg	1544 lb	670 kg	1478 lb
	Max Fork Height	2974 mm	117 inch	2974 mm	117 inch	2973 mm	117 inch
	Max Fork Height	940 mm	37 inch	949 mm	37 inch	947 mm	37 inch
287D	Tipping Load	2656 kg	5858 lb	2525 kg	5567 lb	2411 kg	5316 lb
	ROC 35%	930 kg	2050 lb	884 kg	1948 lb	844 kg	1860 lb
	Max Fork Height	3011 mm	119 inch	3011 mm	119 inch	3009 mm	118 inch
	Max Reach to Carriage Face	791 mm	31 inch	799 mm	31 inch	798 mm	31 inch

Table 55

Pallet Fork - Multi-Terrain Loader							
	P/N	353 - 1694		353 - 1696		353 - 1697	
	297D	Tool Mass	175 kg	386 lb	186 kg	409 lb	195 kg
Fork Specs.		36"		42"		48"	
Load Center		455 mm	18 inch	535 mm	21 inch	610 mm	24 inch
Tipping Load		3166 kg	6980 lb	3009 kg	6634 lb	2876 kg	6340 lb
ROC 35%		1108 kg	2443 lb	1053 kg	2322 lb	1006 kg	2219 lb
Max Fork Height		3065 mm	121 inch	3065 mm	121 inch	3063 mm	121 inch
Max Reach to Carriage Face		747 mm	29 inch	748 mm	29 inch	750 mm	30 inch
297D XHP	Tipping Load	3469 kg	7648 lb	3298 kg	7271 lb	3152 kg	6949 lb
	ROC 35%	1214 kg	2677 lb	1154 kg	2545 lb	1103 kg	2432 lb
	Max Fork Height	3069 mm	121 inch	3069 mm	121 inch	3067 mm	121 inch
	Max Reach to Carriage Face	739 mm	29 inch	740 mm	29 inch	742 mm	29 inch
297D2	Tipping Load	3316 kg	7309 lb	3147 kg	6937 lb	3001 kg	6617 lb
	ROC 35%	1160 kg	2558 lb	1101 kg	2428 lb	1051 kg	2316 lb
	Max Fork Height	3132 mm	123 inch	3132 mm	123 inch	3130 mm	123 inch
	Max Reach to Carriage Face	735 mm	29 inch	736 mm	29 inch	738 mm	29 inch
297D2 XHP	Tipping Load	3382 kg	7456 lb	3210 kg	7076 lb	3062 kg	6751 lb
	ROC 35%	1184 kg	2610 lb	1123 kg	2477 lb	1072 kg	2363 lb
	Max Fork Height	3132 mm	123 inch	3131 mm	123 inch	3130 mm	123 inch
	Max Reach to Carriage Face	735 mm	29 inch	736 mm	29 inch	738 mm	29 inch

Table 56

Pallet Fork - Compact Track Loader							
Model	P/N	353 - 1694		353 - 1696		353 - 1697	
	Tool Mass	175 kg	386 lb	186 kg	409 lb	195 kg	430 lb
	Fork Specs.	36"		42"		48"	
	Load Center	455 mm	18 inch	535 mm	21 inch	610 mm	24 inch
239D	Tipping Load	1474 kg	3249 lb	1394 kg	3074 lb	1325 kg	2922 lb
	ROC 35%	516 kg	1137 lb	488 kg	1076 lb	464 kg	1023 lb
	Max Fork Height	2709 mm	107 inch	2709 mm	107 inch	2707 mm	107 inch
	Max Reach to Carriage Face	815 mm	32 inch	816 mm	32 inch	818 mm	32 inch
249D	Tipping Load	1644 kg	3626 lb	1556 kg	3432 lb	1480 kg	3264 lb
	ROC 35%	575 kg	1269 lb	545 kg	1201 lb	518 kg	1142 lb

(continued)

Product Information Section
Rated Load

(Table 56, contd)

Pallet Fork - Compact Track Loader							
	Max Fork Height	2889 mm	114 inch	2888 mm	114 inch	2887 mm	114 inch
	Max Reach to Carriage Face	774 mm	30 inch	775 mm	31 inch	777 mm	31 inch
259D	Tipping Load	2028 kg	4471 lb	1920 kg	4234 lb	1828 kg	4030 lb
	ROC 35%	710 kg	1565 lb	672 kg	1482 lb	640 kg	1411 lb
	Max Fork Height	2975 mm	117 inch	2974 mm	117 inch	2973 mm	117 inch
	Max Reach to Carriage Face	750 mm	30 inch	758 mm	30 inch	757 mm	30 inch
279D	Tipping Load	2198 kg	4848 lb	2095 kg	4619 lb	2005 kg	4420 lb
	ROC 35%	769 kg	1697 lb	733 kg	1617 lb	702 kg	1547 lb
	Max Fork Height	2976 mm	117 inch	2976 mm	117 inch	2975 mm	117 inch
	Max Reach to Carriage Face	913 mm	36 inch	921 mm	36 inch	920 mm	36 inch
289D	Tipping Load	2756 kg	6077 lb	2620 kg	5776 lb	2502 kg	5516 lb
	ROC 35%	965 kg	2127 lb	917 kg	2022 lb	876 kg	1931 lb
	Max Fork Height	3021 mm	119 inch	3021 mm	119 inch	3019 mm	119 inch
	Max Reach to Carriage Face	760 mm	30 inch	769 mm	30 inch	768 mm	30 inch
299D (Rubber)	Tipping Load	3059 kg	6745 lb	2913 kg	6423 lb	2787 kg	6146 lb
	ROC 35%	1071 kg	2361 lb	1019 kg	2248 lb	976 kg	2151 lb
	Max Fork Height	3084 mm	121 inch	3084 mm	121 inch	3082 mm	121 inch
	Max Reach to Carriage Face	729 mm	29 inch	738 mm	29 inch	737 mm	29 inch
299D XHP (Rubber)	Tipping Load	3368 kg	7427 lb	3208 kg	7073 lb	3071 kg	6771 lb
	ROC 35%	1179 kg	2599 lb	1123 kg	2476 lb	1075 kg	2370 lb
	Max Fork Height	3089 mm	122 inch	3089 mm	122 inch	3087 mm	122 inch
	Max Fork Height	724 mm	29 inch	733 mm	29 inch	732 mm	29 inch
299D (Steel)	Tipping Load	3426 kg	7554 lb	3258 kg	7183 lb	3114 kg	6867 lb
	ROC 35%	1199 kg	2644 lb	1140 kg	2514 lb	1090 kg	2404 lb
	Max Fork Height	3084 mm	121 inch	3084 mm	121 inch	3082 mm	121 inch
	Max Fork Height	729 mm	29 inch	738 mm	29 inch	737 mm	29 inch
299D XHP (Steel)	Tipping Load	3726 kg	8216 lb	3544 kg	7815 lb	3389 kg	7472 lb
	ROC 35%	1304 kg	2876 lb	1240 kg	2735 lb	1186 kg	2615 lb
	Max Fork Height	3089 mm	122 inch	3089 mm	122 inch	3087 mm	122 inch
	Max Fork Height	724 mm	29 inch	733 mm	29 inch	732 mm	29 inch
299D2 (Rubber)	Tipping Load	3259 kg	7186 lb	3096 kg	6828 lb	2957 kg	6520 lb
	ROC 35%	1141 kg	2515 lb	1084 kg	2390 lb	1035 kg	2282 lb

(continued)

(Table 56, contd)

Pallet Fork - Compact Track Loader							
	Max Fork Height	3099 mm	122 inch	3099 mm	122 inch	3098 mm	122 inch
	Max Fork Height	780 mm	31 inch	781 mm	31 inch	782 mm	31 inch
299D2 XHP (Rubber)	Tipping Load	3345 kg	7377 lb	3179 kg	7010 lb	3036 kg	6695 lb
	ROC 35%	1171 kg	2582 lb	1113 kg	2454 lb	1063 kg	2343 lb
	Max Fork Height	3099 mm	122 inch	3099 mm	122 inch	3097 mm	122 inch
	Max Fork Height	780 mm	31 inch	781 mm	31 inch	782 mm	31 inch
299D2 (Steel)	Tipping Load	3499 kg	7715 lb	3325 kg	7331 lb	3175 kg	7000 lb
	ROC 35%	1225 kg	2700 lb	1164 kg	2566 lb	1111 kg	2450 lb
	Max Fork Height	3090 mm	122 inch	3090 mm	122 inch	3089 mm	122 inch
	Max Fork Height	790 mm	31 inch	791 mm	31 inch	792 mm	31 inch
299D2 XHP (Steel)	Tipping Load	3563 kg	7857 lb	3386 kg	7466 lb	3234 kg	7130 lb
	ROC 35%	1247 kg	2750 lb	1185 kg	2613 lb	1132 kg	2496 lb
	Max Fork Height	3090 mm	122 inch	3090 mm	122 inch	3089 mm	122 inch
	Max Fork Height	790 mm	31 inch	791 mm	31 inch	792 mm	31 inch

Table 57

Utility Fork					
Model	P/N	285-6105		285-6110	
	Tool Mass	198 kg	436 lb	219 kg	484 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
226D	Tipping Load	1123 kg	2475 lb	1107 kg	2441 lb
	ROC 50%	561 kg	1238 lb	554 kg	1220 lb
232D	Tipping Load	1356 kg	2990 lb	1341 kg	2955 lb
	ROC 50%	678 kg	1495 lb	670 kg	1478 lb
236D	Tipping Load	1322 kg	2915 lb	1306 kg	2879 lb
	ROC 50%	661 kg	1457 lb	653 kg	1440 lb
242D	Tipping Load	1598 kg	3524 lb	1583 kg	3490 lb
	ROC	799 kg	1762 lb	791 kg	1745 lb
246D	Tipping Load	1657 kg	3652 lb	1641 kg	3617 lb
	ROC 50%	828 kg	1826 kg	820 kg	1809 lb
262D	Tipping Load	2080 kg	4585 lb	2064 kg	4551 lb
	ROC	1040 kg	2293 lb	1032 kg	2275 lb
272D	Tipping Load	2341 kg	5160 lb	2325 kg	5125 lb
	ROC 50%	1170 kg	2580 lb	1162 kg	2563 lb

(continued)

Product Information Section
Rated Load

(Table 57, contd)

Utility Fork					
272D XHP	Tipping Load	2726 kg	6011 kg	2711 kg	5976 lb
	ROC	1363 kg	3005 lb	1355 kg	2988 lb
272D2	Tipping Load	2542 kg	5603 lb	2526 kg	5569 lb
	ROC	1271 kg	2802 lb	1263 kg	2784 lb
272D2 XHP	Tipping Load	2706 kg	5965 lb	2690 kg	5931 lb
	ROC	1353 kg	2983 lb	1345 kg	2965 lb

Table 58

Utility Fork					
Model	P/N	285-6105		285-6110	
	Tool Mass	198 kg	436 lb	219 kg	484 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
257D	Tipping Load	2075 kg	4575 lb	2059 kg	4541 lb
	ROC 35%	726 kg	1601 lb	721 kg	1589 lb
277D	Tipping Load	2174 kg	4794 lb	2158 kg	4758 lb
	ROC 35%	761 kg	1678 lb	755 kg	1665 lb
287D	Tipping Load	2780 kg	6130 lb	2764 kg	6095 lb
	ROC 35%	973 kg	2145 lb	968 kg	2133 lb

Table 59

Utility Fork					
Model	P/N	285-6105		285-6110	
	Tool Mass	198 kg	436 lb	219 kg	484 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
297D	Tipping Load	3375 kg	7440 lb	3360 kg	7407 lb
	ROC 35%	1181 kg	2604 lb	1176 kg	2593 lb
297D XHP	Tipping Load	3697 kg	8151 lb	3683 kg	8119 lb
	ROC 35%	1294 kg	2853 lb	1289 kg	2842 lb
297D2	Tipping Load	3521 kg	7762 lb	3506 kg	7729 lb
	ROC 35%	1232 kg	2717 lb	1227 kg	2705 lb
297D2 XHP	Tipping Load	3592 kg	7918 lb	3576 kg	7884 lb
	ROC 35%	1257 kg	2771 lb	1252 kg	2760 lb

Table 60

Utility Fork					
Model	P/N	285-6105		285-6110	
	Tool Mass	198 kg	436 lb	219 kg	484 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
239D	Tipping Load	1556 kg	3431 lb	1540 kg	3397 lb
	ROC 35%	545 kg	1201 lb	539 kg	1189 lb
249D	Tipping Load	1738 kg	3832 lb	1722 kg	3798 lb
	ROC 35%	608 kg	1341 lb	603 kg	1329 lb
259D	Tipping Load	2152 kg	4744 lb	2136 kg	4711 lb
	ROC 35%	753 kg	1661 lb	748 kg	1649 lb
279D	Tipping Load	2273 kg	5012 lb	2257 kg	4977
	ROC 35%	796 kg	1754 lb	790 kg	1742 lb
289D	Tipping Load	2881 kg	6353 lb	2866 kg	6318 lb
	ROC 35%	1008 kg	2224 lb	1003 kg	2211 lb
299D (Rubber)	Tipping Load	3203 kg	7063 lb	3188 kg	7030 lb
	ROC 35%	1121 kg	2472 lb	1116 kg	2460 lb
299D XHP (Rubber)	Tipping Load	3527 kg	7776 lb	3511 kg	7743 lb
	ROC 35%	1234 kg	2722 lb	1229 kg	2710 lb
299D (Steel)	Tipping Load	3631 kg	8007 lb	3617 kg	7974 lb
	ROC 35%	1271 kg	2802 lb	1266 kg	2791 lb
299D XHP (Steel)	Tipping Load	3948 kg	8705 lb	3933 kg	8673 lb
	ROC 35%	1382 kg	3047 lb	1377 kg	3035 lb
299D2 (Rubber)	Tipping Load	3463 kg	7635 lb	3447 kg	7601 lb
	ROC 35%	1212 kg	2672 lb	1207 kg	2660 lb
299D2 XHP (Rubber)	Tipping Load	3555 kg	7839 lb	3540 kg	7805 lb
	ROC 35%	1244 kg	2744 lb	1239 kg	2732 lb
299D2 (Steel)	Tipping Load	3730 kg	8225 lb	3715 kg	8191 lb
	ROC 35%	1306 kg	2879 lb	1300 kg	2867 lb
299D2 XHP (Steel)	Tipping Load	3799 kg	8377 lb	3784 kg	8343 lb
	ROC 35%	1330 kg	2932 lb	1324 kg	2920 lb

Table 61

Utility Grapple Fork					
Model	P/N	285-6114		285-6115	
	Tool Mass	304 kg	671 lb	326 kg	718 lb

(continued)

Product Information Section
Rated Load

(Table 61, contd)

Utility Grapple Fork					
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 mm	314 mm	12 inch
226D	Tipping Load	1023 kg	2256 lb	1005 kg	2216 lb
	ROC 50%	512 kg	1128 lb	503 kg	1108 lb
232D	Tipping Load	1258 kg	2773 lb	1240 kg	2733 lb
	ROC 50%	629 kg	1386	620 kg	1366 lb
236D	Tipping Load	1222 kg	2695 lb	1204 kg	2654 lb
	ROC 50%	611 kg	1347 lb	602 kg	1327 lb
242D	Tipping Load	1500 kg	3307 lb	1482 kg	3267 lb
	ROC 50%	750 kg	1653 lb	741 kg	1634 lb
246D	Tipping Load	1557 kg	3433 lb	1539 kg	3392 lb
	ROC 50%	779 kg	1716 lb	769 kg	1696 lb
262D	Tipping Load	1981 kg	4368 lb	1963 kg	4328 lb
	ROC 50%	991 kg	2184 lb	982 kg	2164 lb
272D	Tipping Load	2242 kg	4942 lb	2224 kg	4903 lb
	ROC 50%	1121 kg	2471 lb	1112 kg	2451 lb
272D XHP	Tipping Load	2628 kg	5793 lb	2610 kg	5753 lb
	ROC 50%	1314 kg	2897 lb	1305 kg	2877 lb
272D2	Tipping Load	2443 kg	5386 lb	2425 kg	5346 lb
	ROC 50%	1221 kg	2993 lb	1212 kg	2673 lb
272D2 XHP	Tipping Load	2607 kg	5748 lb	2589 kg	5708 lb
	ROC 50%	1304 kg	2874 lb	1295 kg	2854 lb

Table 62

Utility Grapple Fork					
Model	P/N	285-6114		285-6115	
	Tool Mass	304 kg	671 lb	326 kg	718 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
257D	Tipping Load	1976 kg	4358 lb	1959 kg	4319 lb
	ROC 35%	692 kg	1525 lb	686 kg	1512 lb
277D	Tipping Load	2073 kg	4571 lb	2055 kg	4531 lb
	ROC 35%	725 kg	1600 lb	719 kg	1586 lb
287D	Tipping Load	2680 kg	5909 lb	2662 kg	5870 lb
	ROC 35%	938 kg	2068 lb	932 kg	2055 lb

Table 63

Utility Grapple Fork					
Model	P/N	285-6114		285-6115	
	Tool Mass	304 kg	671 lb	326 kg	718 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 mm	314 mm	12 inch
297D	Tipping Load	3290 kg	7253 lb	3276 kg	7221 lb
	ROC 35%	1152 kg	2539 lb	1146 kg	2527 lb
297D XHP	Tipping Load	3613 kg	7965 lb	3598 kg	7933 lb
	ROC 35%	1264 kg	2788 lb	1259 kg	2777 lb
297D2	Tipping Load	3422 kg	7545 lb	3405 kg	7506 lb
	ROC 35%	1198 kg	2641 lb	1192 kg	2627 lb
297D2 XHP	Tipping Load	3493 kg	7700 lb	3475 kg	7662 lb
	ROC 35%	1223 kg	2695 lb	1216 kg	2682 lb

Table 64

Utility Grapple Fork					
Model	P/N	285-6114		285-6115	
	Tool Mass	304 kg	671 lb	326 kg	718 lb
	Fork Specs.	66"		72"	
	Load Center	314 mm	12 inch	314 mm	12 inch
239D	Tipping Load	1457 kg	3212 lb	1439 kg	3172 lb
	ROC 35%	510 kg	1124 lb	503 kg	1110 lb
249D	Tipping Load	1639 kg	3613 lb	1621 kg	3574 lb
	ROC 35%	574 kg	1265 lb	567 kg	1251 lb
259D	Tipping Load	2053 kg	4527 lb	2036 kg	4488 lb
	ROC 35%	719 kg	1584 lb	712 kg	1571 lb
279D	Tipping Load	2172 kg	4789 lb	2154 kg	4749 lb
	ROC 35%	760 kg	1676 lb	754 kg	1662 lb
289D	Tipping Load	2781 kg	6132 lb	2763 kg	6093 lb
	ROC 35%	973 kg	2146 lb	967 kg	2133 lb
299D (Rubber)	Tipping Load	3116 kg	6870 lb	3101 kg	6837 lb
	ROC 35%	1090 kg	2404 lb	1085 kg	2393 lb
299D XHP (Rubber)	Tipping Load	3439 kg	7582 lb	3424 kg	7550 lb
	ROC 35%	1204 kg	2654 lb	1198 kg	2642 lb
299D (Steel)	Tipping Load	3546 kg	7819 lb	3532 kg	7787 lb
	ROC 35%	1241 kg	2737 lb	1236 kg	2726 lb

(continued)

Product Information Section
Rated Load

(Table 64, contd)

Utility Grapple Fork					
299D XHP (Steel)	Tipping Load	3863 kg	8517 lb	3848 kg	8485 lb
	ROC 35%	1352 kg	2981 lb	1347 kg	2970 lb
299D2 (Rubber)	Tipping Load	3364 kg	7418 lb	3346 kg	7379 lb
	ROC 35%	1177 kg	2596 lb	1171 kg	2583 lb
299D2 XHP (Rubber)	Tipping Load	3456 kg	7621 lb	3439 kg	7583 lb
	ROC 35%	1210 kg	2668 lb	1204 kg	2654 lb
299D2 (Steel)	Tipping Load	3631 kg	8007 lb	3614 kg	7968 lb
	ROC 35%	1271 kg	2803 lb	1265 kg	2789 lb
299D2 XHP (Steel)	Tipping Load	3700 kg	8159 lb	3683 kg	8120 lb
	ROC 35%	1295 kg	2856 lb	1289 kg	2842 lb

Table 65

Industrial Grapple Fork					
Model	P/N	279-5350		279-5360	
	Tool Mass	502 kg	1106 lb	548 kg	1208 lb
	Fork Specs.	66"		72"	
	Load Center	280 mm	11 inch	280 mm	11 inch
226D	Tipping Load	821 kg	1811 lb	781 kg	1722 lb
	ROC 35%	411 kg	905 lb	391 kg	861 lb
232D	Tipping Load	1054 kg	2324 lb	1014 kg	2236 lb
	ROC 35%	527 kg	1162 lb	507 kg	1118 lb
236D	Tipping Load	1018 kg	2243 lb	977 kg	2154 lb
	ROC 35%	509 kg	1122 lb	489 kg	1077 lb
242D	Tipping Load	1292 kg	2849 lb	1253 kg	2762 lb
	ROC 50%	646 kg	1425 lb	626 kg	1381 lb
246D	Tipping Load	1347 kg	2970 lb	1307 kg	2881 lb
	ROC 50%	674 kg	1485 lb	653 kg	1440 lb
262D	Tipping Load	1766 kg	3894 lb	1726 kg	3806 lb
	ROC 50%	883 kg	1947 lb	863 kg	1903 lb
272D	Tipping Load	2023 kg	4460 lb	1983 kg	4371 lb
	ROC 50%	1011 kg	2230 lb	991 kg	2186 lb
272D XHP	Tipping Load	2401 kg	5294 lb	2361 kg	5206 lb
	ROC 50%	1201 kg	2647 lb	1181 kg	2603 lb
272D2	Tipping Load	2221 kg	4896 lb	2181 kg	4807 lb
	ROC 50%	1110 kg	2448 lb	1090 kg	2404 lb
272D2 XHP	Tipping Load	2381 kg	5249 lb	2341 kg	5161 lb
	ROC 50%	1190 kg	2625 lb	1171 kg	2581 lb

Table 66

Industrial Grapple Fork					
Model	P/N	279-5350		279-5360	
	Tool Mass	502 kg	1106 lb	548 kg	1208 lb
	Fork Specs.	66"		72"	
	Load Center	280 mm	11 inch	280 mm	11 inch
257D	Tipping Load	1764 kg	3890 lb	1725 kg	3803 lb
	ROC 35%	617 kg	1361 lb	604 kg	1331 lb
277D	Tipping Load	1866 kg	4114 lb	1825 kg	4024 lb
	ROC 35%	653 kg	1440 lb	639 kg	1409 lb
287D	Tipping Load	2463 kg	5431 lb	2423 kg	5343 lb
	ROC 35%	862 kg	1901 lb	848 kg	1870 lb

Table 67

Industrial Grapple Fork					
Model	P/N	279-5350		279-5360	
	Tool Mass	502 kg	1106 lb	548 kg	1208 lb
	Fork Specs.	66"		72"	
	Load Center	280 mm	11 inch	280 mm	11 inch
297D	Tipping Load	3095 kg	6823 lb	3062 kg	6750 lb
	ROC 35%	1083 kg	2388 lb	1072 kg	2362 lb
297D XHP	Tipping Load	3413 kg	7524 lb	3380 kg	7451 lb
	ROC 35%	1195 kg	2633 lb	1183 kg	2608 lb
297D2	Tipping Load	3190 kg	7033 lb	3151 kg	6946 lb
	ROC 35%	1117 kg	2462 lb	1103 kg	2431 lb
297D2 XHP	Tipping Load	3260 kg	7187 lb	3220 kg	7100 lb
	ROC 35%	1141 kg	2515 lb	1127 kg	2485 lb

Table 68

Industrial Grapple Fork					
Model	P/N	279-5350		279-5360	
	Tool Mass	502 kg	1106 lb	548 kg	1208 lb
	Fork Specs.	66"		72"	
	Load Center	280 mm	11 inch	280 mm	11 inch
239D	Tipping Load	1253 kg	2763 lb	1213 kg	2675 lb
	ROC 35%	438 kg	967 lb	425 kg	936 lb
249D	Tipping Load	1432 kg	3159 lb	1393 kg	3071 lb
	ROC 35%	501 kg	1106 lb	487 kg	1075 lb

(continued)

Product Information Section
Rated Load

(Table 68, contd)

Industrial Grapple Fork					
259D	Tipping Load	1840 kg	4058 lb	1801 kg	3971 lb
	ROC 35%	644 kg	1420 lb	630 kg	1390 lb
279D	Tipping Load	1964 kg	4330 lb	1923 kg	4241 lb
	ROC 35%	687 kg	1516 lb	673 kg	1484 lb
289D	Tipping Load	2563 kg	5652 lb	2523 kg	5563 lb
	ROC 35%	897 kg	1978 lb	883 kg	1947 lb
299D (Rubber)	Tipping Load	2927 kg	6453 lb	2892 kg	6377 lb
	ROC 35%	1024 kg	2259 lb	1012 kg	2232 lb
299D XHP (Rubber)	Tipping Load	3246 kg	7157 lb	3212 kg	7081 lb
	ROC 35%	1136 kg	2505 lb	1124 kg	2479 lb
299D (Steel)	Tipping Load	3349 kg	7385 lb	3316 kg	7311 lb
	ROC 35%	1172 kg	2585 lb	1160 kg	2559 lb
299D XHP (Steel)	Tipping Load	3661 kg	8073 lb	3628 kg	8000 lb
	ROC 35%	1281 kg	2826 lb	1270 kg	2800 lb
299D2 (Rubber)	Tipping Load	3133 kg	6908 lb	3093 kg	6820 lb
	ROC 35%	1096 kg	2418 lb	1083 kg	2387 lb
299D2 XHP (Rubber)	Tipping Load	3224 kg	7109 lb	3184 kg	7021 lb
	ROC 35%	1128 kg	2488 lb	114 kg	2457 lb
299D2 (Steel)	Tipping Load	3395 kg	7486 lb	3355 kg	77398 lb
	ROC 35%	1188 kg	2620 lb	1174 kg	2589 lb
299D2 XHP (Steel)	Tipping Load	3463 kg	7635 lb	3423 kg	7548 lb
	ROC 35%	1212 kg	2672 lb	1198 kg	2642 lb

Table 69

Industrial Grapple Rakes					
Model	P/N	286-9300		286-9301	
	Tool Mass	467 kg	1030 lb	516 kg	1137 lb
	Fork Specs.	72"		84"	
	Load Center	280 mm	11 inch	280 mm	11 inch
226D	Tipping Load	864 kg	1904 lb	821 kg	1811 lb
	ROC 50%	432 kg	952 lb	411 kg	905 lb
232D	Tipping Load	1102 kg	2430 lb	1060 kg	2337 lb
	ROC 50%	551 kg	1215 lb	530 kg	1169 lb
236D	Tipping Load	1067 kg	2352 lb	1024 kg	2259 lb
	ROC 50%	533 kg	1176 lb	512 kg	1129

(continued)

(Table 69, contd)

Industrial Grapple Rakes					
242D	Tipping Load	1351 kg	2978 lb	1309 kg	2886 lb
	ROC 50%	675 kg	1489 lb	655 kg	1443 lb
246D	Tipping Load	1408 kg	3103 lb	1365 kg	3009 lb
	ROC 50%	704 kg	1552 lb	682 kg	1504 lb
262D	Tipping Load	1840 kg	4056 lb	1798 kg	3963 lb
	ROC 50%	920 kg	2028 lb	899 kg	1982 lb
272D	Tipping Load	2104 kg	4638 lb	2062 kg	4545 lb
	ROC 50%	1052 kg	2319 lb	1031 kg	2273 lb
272D XHP	Tipping Load	2496 kg	5503 lb	2454 kg	5411 lb
	ROC 50%	1248 kg	2752 lb	1227 kg	2705 lb
272D2	Tipping Load	2307 kg	5087 lb	2265 kg	4994 lb
	ROC 50%	1154 kg	2543 lb	1133 kg	2497 lb
272D2 XHP	Tipping Load	2475 kg	5457 lb	2434 kg	5365 lb
	ROC 50%	1238 kg	2729 lb	1217 kg	2683 lb

Table 70

Industrial Grapple Rakes					
Model	P/N	286-9300		286-9301	
	Tool Mass	467 kg	1030 lb	516 kg	1137 lb
	Fork Specs.	72"		84"	
	Load Center	469 mm	18 inch	469 mm	18 inch
257D	Tipping Load	1830 kg	4034 lb	1789 kg	3944 lb
	ROC 35%	640 kg	1412 lb	626 kg	1380 lb
277D	Tipping Load	1913 kg	4218 lb	1871 kg	4125 lb
	ROC 35%	670 kg	1476 lb	655 kg	1444 lb
287D	Tipping Load	2530 kg	5579 lb	2489 kg	5488 lb
	ROC 35%	886 kg	1953 lb	871 kg	1921 lb

Table 71

Industrial Grapple Rakes					
Model	P/N	286-9300		286-9301	
	Tool Mass	467 kg	1030 lb	516 kg	1137 lb
	Fork Specs.	72"		84"	
	Load Center	469 mm	18 inch	469 mm	18 inch
297D	Tipping Load	3240 kg	7142 lb	3208 kg	7071 lb
	ROC 35%	1134 kg	2500 lb	1123 kg	2475 lb

(continued)

Product Information Section
Rated Load

(Table 71, contd)

Industrial Grapple Rakes					
297D XHP	Tipping Load	3566 kg	7862 lb	3534 kg	7791 lb
	ROC 35%	1248 kg	2752 lb	1237 kg	2727 lb
297D2	Tipping Load	3292 kg	7257 lb	3251 kg	7167 lb
	ROC 35%	1152 kg	2540 lb	1138 kg	2508 lb
297D2 XHP	Tipping Load	3363 kg	7415 lb	3322 kg	7325 lb
	ROC 35%	1177 kg	2595 lb	1163 kg	2564 lb

Table 72

Industrial Grapple Rakes					
	P/N	286-9300		286-9301	
	Tool Mass	467 kg	1030 lb	516 kg	1137 lb
	Fork Specs.	72"		84"	
	Load Center	469 mm	18 inch	469m	18 inch
239D	Tipping Load	1299 kg	2864 lb	1258 kg	2773 lb
	ROC 35%	455 kg	1002 lb	440 kg	971 lb
249D	Tipping Load	1483 kg	3271 lb	1442 kg	3180 lb
	ROC 35%	519 kg	1145 lb	505 kg	1113 lb
259D	Tipping Load	1906 kg	4203 lb	1865 kg	4112 lb
	ROC 35%	667 kg	1471 lb	653 kg	1439 lb
279D	Tipping Load	2012 kg	4436 lb	1970 kg	4344 lb
	ROC 35%	704 kg	1553 lb	689 kg	1520 lb
289D	Tipping Load	2631 kg	5802 lb	2590 kg	5711 lb
	ROC 35%	921 kg	2031 lb	907 kg	1999 lb
299D (Rubber)	Tipping Load	3045 kg	6714 lb	3012 kg	6641 lb
	ROC 35%	1066 kg	2350 lb	1054 kg	2324 lb
299D XHP (Rubber)	Tipping Load	3371 kg	7432 lb	3338 kg	7359 lb
	ROC 35%	1180 kg	2601 lb	1168 kg	2576 lb
299D (Steel)	Tipping Load	3494 kg	7704 lb	3462 kg	7634 lb
	ROC 35%	1223 kg	2697 lb	1212 kg	2672 lb
299D XHP (Steel)	Tipping Load	3814 kg	8409 lb	3782 kg	8339 lb
	ROC 35%	1335 kg	2943 lb	1324 kg	2919 lb
299D2 (Rubber)	Tipping Load	3234 kg	7131 lb	3193 kg	7041 lb
	ROC 35%	1132 kg	2496 lb	1118 kg	2464 lb
299D2 XHP (Rubber)	Tipping Load	3328 kg	7338 lb	3287 kg	7247 lb

(continued)

(Table 72, contd)

Industrial Grapple Rakes					
	ROC 35%	1165 kg	2568 lb	1150 kg	2536 lb
299D2 (Steel)	Tipping Load	3507 kg	7732 lb	3465 kg	7641 lb
	ROC 35%	1227 kg	2706 lb	1213 kg	2674 lb
299D2 XHP (Steel)	Tipping Load	3577 kg	7886 lb	3535 kg	7795 lb
	ROC 35%	1252 kg	2760 lb	1237 kg	2728 lb

Product Information Section
Rated Load

Agriculture Tools

Table 73

Ag Tool - Bale Spear									
*tipping limit is beyond the tool's strength limit		39" Single Bale Spear		49" Bale Spear		39" Double Bale Spear		49" Double Bale Spear	
	Tool Limit	907 kg	2000 lbs	907 kg	2000 lbs	1361 kg	3000 lbs	1361 kg	3000 lbs
	Tool Mass	70 kg	155 lbs	72 kg	159 lbs	125 kg	276 lbs	129 kg	285 lbs
226D	Tipping Load	1022 kg	2254 lbs	1020 kg	2249 lbs	1066 kg	2349 kg	1061 kg	2339 kg
	ROC 50%	511 kg	1127 lbs	510 kg	1125 lbs	533 kg	1175 kg	531 kg	1170 lbs
232D	Tipping Load	1215 kg	2679 lbs	1213 kg	2674 lbs	1278 kg	2819 lbs	1274 kg	2809 lbs
	ROC 50%	608 kg	1340 lbs	607 kg	1337 lbs	639 kg	1409 lbs	637 kg	1404 lbs
239D	Tipping Load	1368 kg	3016 lbs	1366 kg	3012 lbs	1483 kg	3270 lbs	1478 kg	3259 lbs
	ROC 35%	479 kg	1055 lbs	478 kg	1054 lbs	519 kg	114 lbs	517 kg	1141 lbs
249D	Tipping Load	1518 kg	3347 lbs	1516 kg	3342 lbs	1650 kg	3638 lbs	1645 kg	3628 lbs
	ROC 35%	531 kg	1171 lbs	531 kg	1170 lbs	577 kg	1273 lbs	576 kg	1270 lbs
236D	Tipping Load	1220 kg	2689 lbs	1217 kg	2684 lbs	1276 kg	2812 lbs	1271 kg	2802 lbs
	ROC 50%	610 kg	1344 lbs	609 kg	1342 lbs	638 kg	1406 lbs	636 kg	1401 lbs
242D	Tipping Load	1416 kg	3122 lbs	1414 kg	3118 lbs	1494 kg	3294 lbs	1490 kg	3284 lbs
	ROC 50%	708 kg	1561 lbs	707 kg	1559 lbs	747 kg	1647 lbs	745 kg	1642 lbs
257D	Tipping Load	1804 kg	3976 lbs	1802 kg	3972 lbs	1958 kg	4316 lbs	1953 kg	4306 lbs
	ROC 35%	631 kg	1392 lbs	631 kg	1390 lbs	685 kg	1511 lbs	684 kg	1507 lbs
259D	Tipping Load	1864 kg	4110 lbs	1862 kg	4106 lbs	2033 kg	4483 lbs	2029 kg	4472 lbs
	ROC 35%	653 kg	1439 lbs	652 kg	1437 lbs	712 kg	1569 lbs	710 kg	1565 lbs
246D	Tipping Load	1480 kg	3264 lbs	1478 kg	3259 lbs	1548 kg	3413 lbs	1544 kg	3403 lbs
	ROC 50%	740 kg	1632 lbs	739 kg	1629 lbs	774 kg	1707 lbs	772 kg	1702 lbs
262D	Tipping Load	1830 kg	4034 lbs	1828 kg	4029 lbs	1937 kg	4270 lbs	1932 kg	4260 lbs

(continued)

(Table 73, contd)

Ag Tool - Bale Spear									
	ROC 50%	915 kg	2017 lbs	914 kg	2015 lbs	968 kg	2135 lbs	966 kg	2130 lbs
277D	Tipping Load	1910 kg	4210 lbs	1908 kg	4206 lbs	2116 kg	4664 lbs	2111 kg	4654 lbs
	ROC 35%	668 kg	1474 lbs	668 kg	1472 lbs	741 kg	1633 lbs	739 kg	1629 lbs
279D	Tipping Load	2251 kg	4964 lbs	2249 kg	4959 lbs	2445 kg	5390 lbs	2440 kg	5380 lbs
	ROC 35%	788 kg	1737 lbs	787 kg	1736 lbs	856 kg	1887 lbs	854 kg	1883 lbs
287D	Tipping Load	2590 kg	5711 lbs	2588 kg	5706 lbs	2828 kg	6234 lbs	2823 kg	6224 lbs
	ROC 35%	907 kg	1999 lbs	906 kg	1997 lbs	990 kg	2182 lbs	988 kg	2178 lbs
289D	Tipping Load	2459 kg	5422 lbs	2457 kg	5417 lbs	2741 kg	6043 lbs	2737 kg	6033 lbs
	ROC 35%	861 kg	1898 lbs	860 kg	1896 lbs	959 kg	2115 lbs	958 kg	2112 lbs
272D2	Tipping Load	2223 kg	4900 lbs	2221 kg	4895 lbs	2361 kg	5205 lbs	2357 kg	5195 lbs
	ROC 50%	1111 kg	2450 lbs	1110 kg	2448 lbs	1181 kg	2603 lbs	1178 kg	2598 lbs
272D2-XHP	Tipping Load	2356 kg	5195 lbs	2354 kg	5190 lbs	2499 kg	5510 lbs	2495 kg	5500 lbs
	ROC 50%	1178 kg	2597 lbs	1177 kg	2595 lbs	1250 kg	2755 lbs	1247 kg	2750 lbs
297D2	Tipping Load	2986 kg	6583 lbs	2984 kg	6579 lbs	3287 kg	7247 lbs	3283 kg	7237 lbs
	ROC 35%	1045 kg	2304 lbs	1044 kg	2303 lbs	1150 kg	2536 lbs	1149 kg	2533 lbs
297D2-XHP	Tipping Load	3045 kg	6712 lbs	3042 kg	6707 lbs	3352 kg	7390 lbs	3347 kg	7380 lbs
	ROC 35%	1066 kg	2349 lbs	1065 kg	2348 lbs	1173 kg	2586 lbs	1172 kg	2583 lbs
299D2 (Rubber Track)	Tipping Load	2960 kg	6526 lbs	2958 kg	6521 lbs	3235 kg	7131 lbs	3230 kg	7121 lbs
	ROC 35%	1036 kg	2284 lbs	1035 kg	2282 lbs	1132 kg	2496 lbs	1131 kg	2492 lbs
299D2 -XHP (Rubber Track)	Tipping Load	3035 kg	6691 lbs	3033 kg	6687 lbs	3318 kg	7314 lbs	3313 kg	7304 lbs
	ROC 35%	1062 kg	2342 lbs	1062 kg	2340 lbs	1161 kg	2560 lbs	1160 kg	2556 lbs
299D2 (STL Track)	Tipping Load	3184 kg	7020 lbs	3182 kg	7015 lbs	3468 kg	7646 lbs	3464 kg	7636 lbs
	ROC 35%	1114 kg	2457 lbs	1114 kg	2455 lbs	1214 kg	2676 lbs	1212 kg	2673 lbs

(continued)

Product Information Section
Rated Load

(Table 73, contd)

Ag Tool - Bale Spear									
299D2 -XHP (STL Track)	Tipping Load	3259 kg	7186 lbs	3257 kg	7181 lbs	3551 kg	7829 lbs	3547 kg	7819 lbs
	ROC 35%	1141 kg	2515 lbs	140 kg	2513 lbs	1243 kg	2740 lbs	1241 kg	2737 lbs

Table 74

Ag Tool - Bale Grapple					
*tipping limit is beyond the tool's strength limit		71" Single Bale Grapple		84" Bale Grapple	
	Tool Limit	1089 kg	2400 lbs	1089 kg	2400 lbs
	Tool Mass	227 kg	501 lbs	250 kg	551 lbs
226D	Tipping Load	811 kg	1787 lbs	715 kg	1576 lbs
	ROC 50%	405 kg	893 lbs	357 kg	788 lbs
232D	Tipping Load	986 kg	2175 lbs	873 kg	1925 lbs
	ROC 50%	493 kg	1087 lbs	437 kg	963 lbs
239D	Tipping Load	1135 kg	2503 lbs	1009 kg	2224 lbs
	ROC 35%	397 kg	876 lbs	353 kg	778 lbs
249D	Tipping Load	1271 kg	2802 lbs	1131 kg	2493 lbs
	ROC 35%	445 kg	981 lbs	396 kg	873 lbs
236D	Tipping Load	992 kg	2186 lbs	880 kg	1940 lbs
	ROC 50%	496 kg	1093 lbs	440 kg	970 lbs
242D	Tipping Load	1168 kg	2574 lbs	1036 kg	2283 lbs
	ROC 50%	584 kg	1287 lbs	518 kg	1142 lbs
257D	Tipping Load	1527 kg	3367 lbs	1359 kg	2996 lbs
	ROC 35%	535 kg	1178 lbs	476 kg	1049 lbs
259D	Tipping Load	1584 kg	3492 lbs	1411 kg	3110 lbs
	ROC 35%	554 kg	1222 lbs	494 kg	1088 lbs
246D	Tipping Load	1230 kg	2712 lbs	1098 kg	2420 lbs
	ROC 50%	615 kg	1356 lbs	549 kg	1210 lbs
262D	Tipping Load	1545 kg	3406 lbs	1378 kg	3038 lbs
	ROC 50%	772 kg	1703 lbs	689 kg	1519 lbs
277D	Tipping Load	1651 kg	3640 lbs	1487 kg	3279 lbs
	ROC 35%	578 kg	1274 lbs	521 kg	1148 lbs
279D	Tipping Load	1944 lbs	4285 lbs	1742 kg	3840 lbs
	ROC 35%	680 kg	1500 lbs	610 kg	1344 lbs
287D	Tipping Load	2241 kg	4941 lbs	2001 kg	4411 lbs
	ROC 35%	784 kg	1729 lbs	700 kg	1544 lbs

(continued)

(Table 74, contd)

289D	Tipping Load	2144 kg	4728 lbs	1923 kg	4240 lbs
	ROC 35%	751 kg	1655 lbs	673 kg	1484 lbs
272D2	Tipping Load	1900 kg	4188 lbs	1698 kg	3743 lbs
	ROC 50%	950 kg	2094 lbs	849 kg	1871 lbs
272D2-XHP	Tipping Load	2016 kg	4446 lbs	1800 kg	3969 lbs
	ROC 50%	1008 kg	2223 lbs	900 kg	1985 lbs
297D2	Tipping Load	2604 kg	5740 lbs	2327 kg	5129 lbs
	ROC 35%	911 kg	2009 lbs	814 kg	1795 lbs
297D2-XHP	Tipping Load	2657 kg	5857 lbs	2374 kg	5234 lbs
	ROC 35%	930 kg	2050 lbs	831 kg	1832 lbs
299D2 (Rubber Track)	Tipping Load	2581 kg	5691 lbs	2311 kg	5095 lbs
	ROC 35%	904 kg	1992 lbs	809 kg	1783 lbs
299D2 -XHP (Rubber Track)	Tipping Load	2650 kg	5842 lbs	2372 kg	5230 lbs
	ROC 35%	927 kg	2045 lbs	830 kg	1831 lbs
299D2 (STL Track)	Tipping Load	2779 kg	6127 lbs	2487 kg	5482 lbs
	ROC 35%	973 kg	2144 lbs	870 kg	1919 lbs
299D2 -XHP (STL Track)	Tipping Load	2847 kg	6277 lbs	2548 kg	5618 lbs
	ROC 35%	997 kg	2197 lbs	892 kg	1966 lbs

Rated Load with a Material Handling Arm

WARNING

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

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.

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

The rated operating capacity (ROC) is defined by "ISO 14397-1:2007" and "EN 474-3:2006+a1:2009+" as the least amount of weight of the following conditions:

- 50% of the full static tipping load for wheeled machines
- 35% of the full static tipping load for track machines
- A working load limit of 907 kg (2000 lb)
- The lifting capacity to maximum height

Note: The static test coefficient per EU directive "2006/42/EC" exceeded 1.25 times the working load limit that is marked on the device. Always select properly sized lifting accessories. Always inspect the lifting accessories.

The following tables provide the rated operating loads for the standard machine configuration that is equipped with the following items:

- 10 x 16.5 tires on 226D, and 232D
- 12 x 16.5 tires on 236D, 242D, 246D, 262D, 272D, and 272D2
- 14 x 17.5 tires on 272D XHP, and 272D2 XHP
- lubricants
- full fuel tank
- 75 kg (165 lb) operator

- Cat Material Handling Arm
- Undercarriage with 320 mm (12.6 inch) wide tracks and dual flange front/single flange rear idlers on 239D, 249D, and 259D machines.
- Undercarriages with either 400 mm (15.75 inch) or 450 mm (17.72 inch) wide tracks and triple flange front/rear idlers on 279D, and 289D machines.
- Undercarriages with 450 mm (17.72 inch) wide tracks and dual flange front/single flange rear idlers on 299D, and 299D2 machines.
- Undercarriages with 400 mm (15.75 inch) wide tracks and triple flange front/rear idlers on 299D XHP, and 299D2 XHP machines.

Note: All Caterpillar Premium Conventional tires are at the suggested operating inflation pressure. Refer to the Operation and Maintenance Manual, "Tire Inflation - Check" for the proper tire inflation pressure.

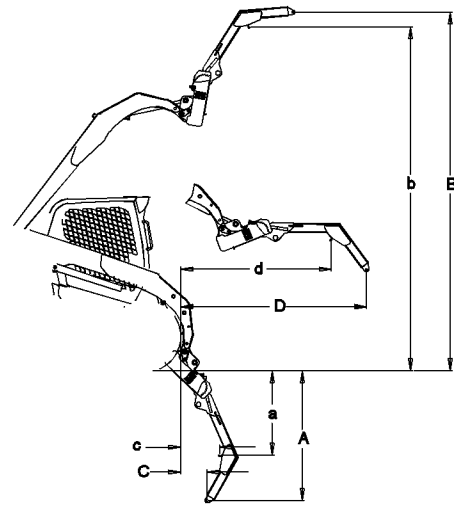


Illustration 85

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Dimension (A) represents the clearance at the full down position from Lifting Point 2. Dimension (a) represents the clearance at the full down position from Lifting Point 1. Dimension (B) represents the clearance at maximum height from Lifting Point 2. Dimension (b) represents the clearance at maximum height from Lifting Point 1. Dimension (C) represents the minimum reach from Lifting Point 2. Dimension (c) represents the minimum reach from Lifting Point 1. Dimension (D) represents the maximum reach from Lifting Point 2. Dimension (d) represents the maximum reach from Lifting Point 1.

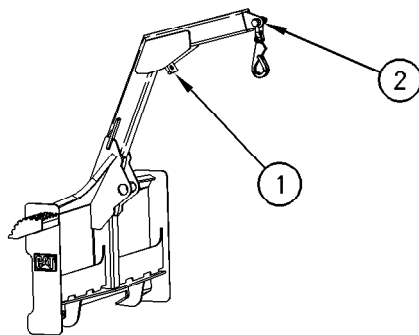


Illustration 84

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Lifting point 1 (1)
Lifting point 2 (2)

Table 75

Material Handling Arm					
	P/N	216-8756			
	Tool Mass	131 kg		289 lb	
	MHA Specs	Point 1		Point 2	
226D	Tipping Load	834 kg	1839 lb	690 kg	1520 lb
	ROC	417 kg	920 lb	345 kg	760 lb
	Clearance at Full Down	-913 mm	-36 inch	-1407 mm	-55 inch
	Clearance at Maximum Height	4023 mm	158 inch	4468 mm	176 inch

(continued)

(Table 75, contd)

Material Handling Arm					
	Minimum Reach	499 mm	20 inch	379 mm	15 inch
	Maximum Reach	1659 mm	65 inch	2102 mm	83 inch
232D	Tipping Load	1003 kg	2211 lb	829 kg	1827 lb
	ROC	501 kg	1105 lb	414 kg	914 lb
	Clearance at Full Down	-912 mm	-36 inch	-1406 mm	-55 inch
	Clearance at Maximum Height	4205 mm	166 inch	4651 mm	183 inch
	Minimum Reach	506 mm	20 inch	389 mm	15 inch
	Maximum Reach	1618 mm	64 inch	2061 mm	81 inch
236D	Tipping Load	1009 kg	2226 lb	838 kg	1847 lb
	ROC	505 kg	1113 lb	419 kg	923 lb
	Clearance at Full Down	-994 mm	-39 inch	-1473 mm	-58 inch
	Clearance at Maximum Height	4337 mm	171 inch	4784 mm	188 inch
	Minimum Reach	436 mm	17 inch	264 mm	10 inch
	Maximum Reach	1708 mm	67 inch	2153 mm	85 inch
242D	Tipping Load	1177 kg	2594 lb	971 kg	2140 lb
	ROC	588 kg	1297 lb	485 kg	1070 lb
	Clearance at Full Down	-986 mm	-39 inch	-1462mm	-58 inch
	Clearance at Maximum Height	4294 mm	169 inch	4740 mm	187 inch
	Minimum Reach	386 mm	15 inch	210 mm	8 inch
	Maximum Reach	1605 mm	63 inch	2049 mm	81 inch
246D	Tipping Load	1251 kg	2757 lb	1042 kg	2298 lb
	ROC	625 kg	1379 lb	521 kg	1149 lb
	Clearance at Full Down	-946 mm	-37 inch	-1442 mm	-57 inch
	Clearance at Maximum Height	4376 mm	172 inch	4824 mm	190 inch
	Minimum Reach	555 mm	22 inch	446 mm	18 inch
	Maximum Reach	1752 mm	69 inch	2197 mm	87 inch
262D	Tipping Load	1629 kg	3591 lb	1349 kg	2974 lb
	ROC	814 kg	1795 lb	674 kg	1487 lb
	Clearance at Full Down	-938 mm	-37 inch	-1439 mm	-57 inch
	Clearance at Maximum Height	4398 mm	173 inch	4846 mm	191 inch

(continued)

Product Information Section
Rated Load

(Table 75, contd)

Material Handling Arm					
	Minimum Reach	560 mm	22 inch	452 mm	18 inch
	Maximum Reach	1642 mm	65 inch	2089 mm	82 inch
272D	Tipping Load	1733 kg	3820 lb	1435 kg	3164 lb
	ROC 50%	866 kg	1910 lb	718 kg	1582 lb
	Clearance at Full Down	-940 mm	-37 inch	-1438 mm	-57 inch
	Clearance at Maximum Height	4455 mm	175 inch	4902 mm	193 inch
	Minimum Reach	592 mm	23 inch	492 mm	19 inch
	Maximum Reach	1649 mm	65 inch	2094 mm	82 inch
	272D XHP	Tipping Load	2002 kg	4414 lb	1656 kg
ROC 50%		907 kg	2000 lb	828 kg	1825 lb
Clearance at Full Down		-947 mm	-37 inch	-1444 mm	-57 inch
Clearance at Maximum Height		4494 mm	177 inch	4941 mm	195 inch
Minimum Reach		519 mm	20 inch	411 mm	16 inch
Maximum Reach		1611 mm	63 inch	2056 mm	81 inch
272D2	Tipping Load	1877 kg	4138 lb	1554 kg	3427 lb
	ROC 50%	907 kg	2000 lb	777 kg	1713 lb
	Clearance at Full Down	-939 mm	-37 inch	-1437 mm	-57 inch
	Clearance at Maximum Height	4456 mm	175 inch	4903 mm	193 inch
	Minimum Reach	594 mm	23 inch	495 mm	19 inch
	Maximum Reach	1646 mm	65 inch	2092 mm	82 inch
272D2 XHP	Tipping Load	1985 kg	4376 lb	1641 kg	3617 lb
	ROC 50%	907 kg	2000 lb	820 kg	1809 lb
	Clearance at Full Down	-942 mm	-37 inch	-1438 mm	-57 inch
	Clearance at Maximum Height	4493 mm	177 inch	4940 mm	194 inch
	Minimum Reach	523 mm	21 inch	416 mm	16 inch
	Maximum Reach	1611 mm	63 inch	2056 mm	81 inch

Table 76

Material Handling Arm			
	P/N	216-8756	
	Tool Mass	131 kg	289 lb
	MHA Specs.	Point 1	Point 2

(continued)

(Table 76, contd)

Material Handling Arm					
257D	Tipping Load	1527 kg	3368 lb	1259 kg	2775 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	535 kg	1179 lb	441 kg	97142 lb
	Clearance at Full Down	-955 mm	-38 inch	-1432 mm	-56 inch
	Clearance at Maximum Height	4322 mm	170 inch	4768 mm	188 inch
	Minimum Reach	462 mm	18 inch	286 mm	11 inch
	Maximum Reach	1390 mm	55 inch	1834 mm	72 inch
277D	Tipping Load	1853 kg	4085 lb	1539 kg	3394 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	648 kg	1430 lb	539 kg	1188 lb
	Clearance at Full Down	-1007 mm	-40 inch	-1496 mm	-59 inch
	Clearance at Maximum Height	4354 mm	171 inch	4802 mm	189 inch
	Minimum Reach	459 mm	18 inch	322 mm	13 inch
	Maximum Reach	1303 mm	51 inch	1748 mm	69 inch
287D	Tipping Load	2231 kg	4920 lb	1838 kg	4052 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	781 kg	1722 lb	643 kg	1418 lb
	Clearance at Full Down	-1017 mm	-40 inch	-1507 mm	-59 inch
	Clearance at Maximum Height	4347 mm	171 inch	4795 mm	189 inch
	Minimum Reach	471 mm	19 inch	336 mm	13 inch
	Maximum Reach	1310 mm	52 inch	1755 mm	69 inch

Table 77

Material Handling Arm					
	P/N	216-8756			
	Tool Mass	131 kg		289 lb	
	MHA Specs	Point 1		Point 2	
297D	Tipping Load	2458 kg	5419 lb	2023 kg	4461 lb
	ROC 35%	860 kg	1897 lb	708 kg	1561 lb
	Clearance at Full Down	-1024 mm	-40 inch	-1519 mm	-60 inch
	Clearance at Maximum Height	4411 mm	174 inch	4859 mm	191 inch

(continued)

Product Information Section
Rated Load

(Table 77, contd)

Material Handling Arm					
	Minimum Reach	517 mm	20 inch	403 mm	16 inch
	Maximum Reach	1647 mm	65 inch	2093 mm	82 inch
297D XHP	Tipping Load	2693 kg	5936 lb	2217 kg	4887 lb
	ROC 35%	907 kg	2000 lb	776 kg	2000 lb
	Clearance at Full Down	-1024 mm	-40 inch	-1519 mm	-60 inch
	Clearance at Maximum Height	4411 mm	174 inch	4859 mm	191 inch
	Minimum Reach	517 mm	20 inch	403 mm	16 inch
	Maximum Reach	1647 mm	65 inch	2093 mm	82 inch
297D2	Tipping Load	2584 kg	5696 lb	2126 kg	4688 lb
	ROC 35%	904 kg	1994 lb	744 kg	1641 lb
	Clearance at Full Down	-967 mm	-38 inch	-1463 mm	-58 inch
	Clearance at Maximum Height	4467 mm	176 inch	4915 mm	193 inch
	Minimum Reach	536 mm	21 inch	426 mm	17 inch
	Maximum Reach	1316 mm	52 inch	1761 mm	69 inch
297D2 XHP	Tipping Load	2635 kg	5809 lb	2169 kg	4781 lb
	ROC 35%	907 kg	2000 lb	759 kg	1673 lb
	Clearance at Full Down	-967 mm	-38 inch	-1463 mm	-58 inch
	Clearance at Maximum Height	4467 mm	176 inch	4915 mm	193 inch
	Minimum Reach	536 mm	21 inch	425 mm	17 inch
	Maximum Reach	1316 mm	52 inch	1761 mm	69 inch

Table 78

Material Handling Arm					
	P/N	216-8756			
	Tool Mass	131 kg		289 lb	
	MHA Specs.	Point 1		Point 2	
239D	Tipping Load	1161 kg	2559 lb	961 kg	2118 lb
	ROC 35%	406 kg	896 lb	336 kg	741 lb
	Clearance at Full Down	-934 mm	-37 inch	-1419 mm	-56 inch
	Clearance at Maximum Height	4027 mm	159 inch	4472 mm	176 inch
	Minimum Reach	482 mm	19 inch	331 mm	13 inch
	Maximum Reach	1330 mm	52 inch	1773 mm	70 inch

(continued)

(Table 78, contd)

Material Handling Arm					
249D	Tipping Load	1292 kg	2849 lb	1069 kg	2356 lb
	ROC 35%	452 kg	997 lb	374 kg	825 lb
	Clearance at Full Down	-909 mm	-36 inch	-1402 mm	-55 inch
	Clearance at Maximum Height	4210 mm	166 inch	4654 mm	183 inch
	Minimum Reach	548 mm	22 inch	427 mm	17 inch
	Maximum Reach	1327 mm	52 inch	1770 mm	70 inch

Table 79

Material Handling Arm					
	P/N	216-8756			
	Tool Mass	131 kg		289 lb	
	MHA Specs.	Point 1		Point 2	
259D	Tipping Load	1586 kg	3497 lb	1307 kg	2882 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	555 kg	1224 lb	458 kg	1009 lb
	Clearance at Full Down	-978 mm	-39 inch	-1454 mm	-57 inch
	Clearance at Maximum Height	4300 mm	169 inch	4746 mm	187 inch
	Minimum Reach	429 mm	17 inch	250 mm	10 inch
	Maximum Reach	1362 mm	54 inch	1806 mm	71 inch
279D	Tipping Load	1911 kg	4214 lb	1589 kg	3503 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	669 kg	1475 lb	556 kg	1226 lb
	Clearance at Full Down	-934 mm	-37 inch	-1429 mm	-56 inch
	Clearance at Maximum Height	4407 mm	173 inch	4855 mm	191 inch
	Minimum Reach	500 mm	20 inch	386 mm	15 inch
	Maximum Reach	1290 mm	51 inch	1736 mm	68 inch
289D	Tipping Load	2169 kg	4782 lb	1797 kg	3963 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	759 kg	1674 lb	629 kg	1387 lb
	Clearance at Full Down	-951 mm	-37 inch	-1446 mm	-57 inch
	Clearance at Maximum Height	4411 mm	174 inch	4859 mm	191 inch

(continued)

Product Information Section
Rated Load

(Table 79, contd)

Material Handling Arm					
	Minimum Reach	498 mm	20 inch	384 mm	15 inch
	Maximum Reach	1289 mm	51 inch	1734 mm	68 inch
299D (Rubber)	Tipping Load	2389 kg	5231 lb	1979 kg	4363 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	836 kg	1844 lb	693 kg	1527 lb
	Clearance at Full Down	-982 mm	-39 inch	-1479 mm	-58 inch
	Clearance at Maxi- mum Height	4420 mm	174 inch	4868 mm	192 mm
	Minimum Reach	549 mm	22 inch	443 mm	17 inch
	Maximum Reach	1320 mm	52 inch	1766 mm	70 inch
	299D XHP (Rubber)	Tipping Load	2630 kg	5800 lb	2178 kg
Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit		907 kg	2000 lb	762 kg	1681 lb
Clearance at Full Down		-981 mm	-39 inch	-1478 mm	-58 inch
Clearance at Maxi- mum Height		4421 mm	174 inch	4869 mm	192 inch
Minimum Reach		550 mm	22 inch	444 mm	17 inch
Maximum Reach		1635 mm	64 inch	2080 mm	82 inch
299D (Steel)	Tipping Load	2661 kg	5868 lb	2193 kg	4836 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	907 kg	2000 lb	768 kg	1693 lb
	Clearance at Full Down	-982 mm	-39 inch	-1479 mm	-58 inch
	Clearance at Maxi- mum Height	4420 mm	174 inch	4868 mm	192 inch
	Minimum Reach	549 mm	22 inch	443 mm	17 inch
	Maximum Reach	1320 mm	52 inch	1766 mm	70 inch
299D XHP (Steel)	Tipping Load	2894 kg	6381 lb	2385 kg	5259 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	907 kg	2000 lb	835 kg	1841 lb
	Clearance at Full Down	-981 mm	-39 inch	-1478 mm	-58 inch
	Clearance at Maxi- mum Height	4421 mm	174 inch	4869 mm	192 inch
	Minimum Reach	550 mm	22 inch	444 mm	17 inch
	Maximum Reach	1635 mm	64 inch	2080 mm	82 inch
299D2 (Rubber)	Tipping Load	2557 kg	5639 lb	2113 kg	4658 lb

(continued)

(Table 79, contd)

Material Handling Arm					
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	895 kg	1974 lb	739 kg	1630 lb
	Clearance at Full Down	-1001 mm	-39 inch	-1493 mm	-59 inch
	Clearance at Maximum Height	4436 mm	175 inch	4884 mm	192 inch
	Minimum Reach	491 mm	19 inch	364 mm	14 inch
	Maximum Reach	1312 mm	52 inch	1757 mm	69 inch
299D2 XHP (Rubber)	Tipping Load	2625 kg	5788 lb	2168 kg	4782 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	907 kg	2000 lb	759 kg	1674 lb
	Clearance at Full Down	-1002 mm	-39 inch	-1493 mm	-59 inch
	Clearance at Maximum Height	4435 mm	175 inch	4883 mm	192 inch
	Minimum Reach	491 mm	19 inch	364 mm	14 inch
	Maximum Reach	1312 mm	52 inch	1757 mm	69 inch
299D2 (Steel)	Tipping Load	2742 kg	6045 lb	2262 kg	4989 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	907 kg	2000 lb	792 kg	1746 lb
	Clearance at Full Down	-1014 mm	-40 inch	-1505 mm	-59 inch
	Clearance at Maximum Height	4423 mm	174 inch	4871 mm	192 inch
	Minimum Reach	484 mm	19 inch	353 mm	14 inch
	Maximum Reach	1314 mm	52 inch	1759 mm	69 inch
299D2 XHP (Steel)	Tipping Load	2792 kg	6156 lb	2304 kg	5080 lb
	Least of ROC 35%, Hyd Lift Cap, or 907 kg tool limit	907 kg	2000 lb	806 kg	1778 lb
	Clearance at Full Down	-1014 mm	-40 inch	-1505 mm	-59 inch
	Clearance at Maximum Height	4423 mm	174 inch	4871 mm	192 inch
	Minimum Reach	484 mm	19 inch	353 mm	14 inch
	Maximum Reach	1314 mm	52 inch	1759 mm	69 inch

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Specifications

SMCS Code: 7000

Intended Use

This machine is classified as a Skid Steer Loader with wheels or tracks as described in “EN ISO 6165:2012”. This machine normally has a front mounted bucket or another work tool for the principle intended functions of digging, loading, lifting, carrying, and moving material such as earth, crushed rock, gravel, or agricultural products.

Application/Configuration Restrictions

Refer to Operation and Maintenance Manual, “Machine Data” below for information about maximum machine weight.

Refer to Operation and Maintenance Manual, “Caterpillar Approved Work Tools” for information about acceptable work tools.

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

The maximum fore and aft slope for proper lubrication is 25 degrees continuous and 35 degrees intermittent. Intermittent time is 2 minutes.

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

Expected Life

The expected life, defined as total machine hours, of this machine is dependent upon many factors including the machine owner’s desire to rebuild the machine back to factory specifications. The expected life interval of this machine is 8,000 service hours. The expected life interval corresponds to the service hours to engine overhaul or replacement. Service hours to engine overhaul or replacement may vary based on overall machine duty cycle. At the expected life interval, remove the machine from operation and consult your Cat dealer for inspect, repair, rebuild, install remanufactured, install new components, or disposal options and to establish a new expected life interval. If a decision is made to remove this machine from service, refer to Operation and Maintenance Manual, “Decommissioning and Disposal”.

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

- Perform regular preventive maintenance procedures as described in the Operation and Maintenance Manual.

- Perform machine inspections as described in the Operation and Maintenance Manual and correct any problems discovered.
- Perform system testing as described in the Operation and Maintenance Manual and correct any problems discovered.
- Ensure that machine application conditions comply with Caterpillar’s recommendations.
- Ensure that the operating weight does not exceed limits set by manufacturer.
- Ensure that all frame cracks are identified, inspected, and repaired to prevent further development.

Machine Data

The specifications that are given herein describe the machine as the machine is manufactured by Caterpillar Inc. The machine is full of fluids. The machine is equipped with all options. The weight does not include the operator, work tools, or other attachments.

Table 80

Sales Model	Maximum Machine Weight	Length	Width	Height
226D	2665kg	2524mm	1497mm	2028mm
	5875lb	99in	59in	80in
232D	2989kg	2523mm	1497mm	2029mm
	6589lb	99in	59in	80in
236D	3544 kg	2792 mm	1676 mm	2120 mm
	7814 lb	110 in	66 in	83 in
239D	3543kg	2522mm	1756mm	2034mm
	7811lb	99in	69in	80in
242D	3616 kg	2792 mm	1676 mm	2120 mm
	7973 lb	110 in	66 in	83 in
246D	4005 kg	3000 mm	1829 mm	2120 mm
	8828 lb	118 in	72 in	83 in
249D	3723kg	2523mm	1756mm	2039mm
	8207lb	99in	69in	80in
257D	3775 kg	2721 mm	1676 mm	2120 mm
	8322 lb	107 in	66 in	83 in
262D	4232 kg	3000 mm	1829 mm	2120 mm
	9329 lb	118 in	72 in	83 in
259D	4271 kg	2780 mm	1676 mm	2120 mm

(continued)

(Table 80, contd)

	9416 lb	109 in	66 in	83 in
272D	4459 kg	2967 mm	1829 mm	2120 mm
	9830 lb	117 in	72 in	83 in
272D2	4574kg	3242 mm	1829 mm	2094 mm
	10084 lb	128 in	72 in	82 in
272D XHP	4646 kg	2967 mm	1930 mm	2120 mm
	10242 lb	117 in	76 in	83 in
272D2 XHP	4327 kg	3226 mm	1930 mm	2133 mm
	9540 lb	127 in	76 in	84 in
277D	4459 kg	2967 mm	1981 mm	2120 mm
	9830 lb	117 in	78 in	83 in
279D	4646 kg	2967 mm	1981 mm	2120 mm
	10242 lb	117 in	78 in	83 in
287D	4684 kg	2974 mm	1981 mm	2120 mm
	10326 lb	117 in	78 in	83 in
289D	4871 kg	2974 mm	1981 mm	2120 mm
	10738 lb	117 in	78 in	83 in
297D	4740 kg	3136 mm	1981 mm	2127 mm
	10451 lb	123 in	78 in	84 in
297D2	4327 kg	3201 mm	1981 mm	2114 mm
	9540 lb	126 in	78in	83in
297D XHP	4743 kg	3136 mm	1981 mm	2127 mm
	10457 lb	123 in	78 in	84 in
297D2 XHP	4327 kg	3201 mm	1981 mm	2114 mm
	9540 lb	126 in	78 in	83 in
299D	4684 kg	2974 mm	1981 mm	2120 mm
	10326 lb	117 in	78 in	83 in
299D w/ Steel	5334 kg	3136 mm	1981 mm	2127 mm
	11759 lb	123 in	78 in	84 in
299D2	5352 kg	3189 mm	1981 mm	2125 mm
	11800 lb	126 in	78 in	84 in
299D2 w/ Steel	5658 kg	3189 mm	1931 mm	2125 mm
	12473 lb	126 in	76 in	84 in
299D XHP	4871 kg	2974 mm	1981 mm	2120 mm
	10738 lb	117 in	78 in	83 in
299D XHP w/Steel	5337 kg	3136 mm	1931 mm	2127 mm
	11765 lb	123 in	76 in	84 in

(Table 80, contd)

299D2 XHP	5352 kg	3189 mm	1981 mm	2125 mm
	11800 lb	126 in	78 in	84 in
299D2 XHP w/Steel	5658 kg	3189 mm	1931 mm	2125 mm
	12473 lb	126 in	76 in	84 in
299D2 XHP Land Management	5705 kg	3189 mm	1981 mm	2125 mm
	12577 lb	126 in	78 in	84 in

(continued)

Identification Information

i08271963

Plate Locations and Film Locations

SMCS Code: 1000; 7000

Product Identification Number (PIN) Plate

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

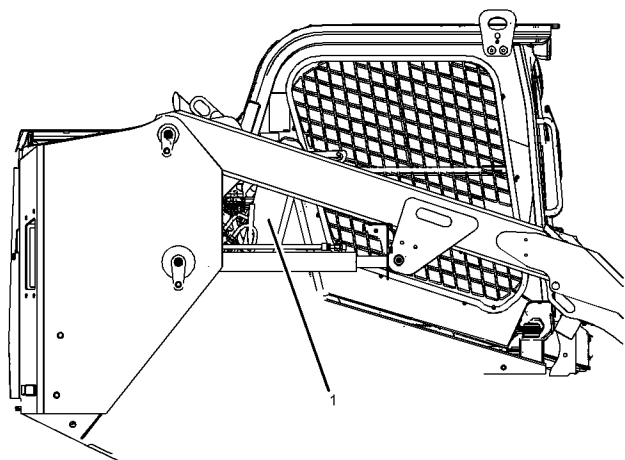


Illustration 86

g03395421

The machine PIN plate (1) is located under the lift arms on the right-hand side of the machine frame.

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

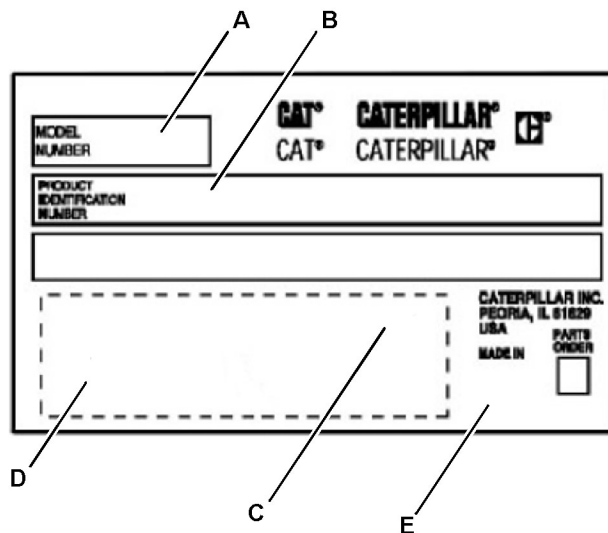


Illustration 87

g06140613

Model Number (A) _____

Machine PIN (B) _____

Month and Year of Manufacturing Plate (if required) (C) _____

Regional Certification Plate (if required) (D) _____

Country of Origin (E) _____

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

European Union

The CE information is on machines that are certified to the European Union requirements that are listed on the "Document of Conformity". If the machine is equipped with the plate for the European Union, this information will be incorporated on the Machine PIN plate in the lower left-hand area.

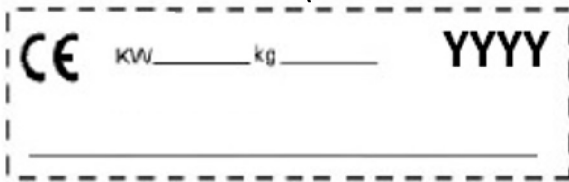
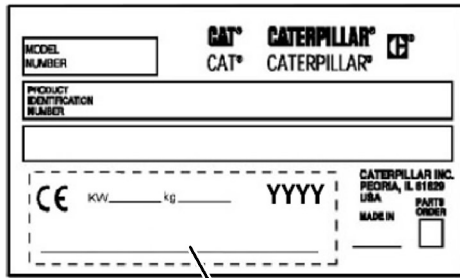


Illustration 88 g06140625

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

- Engine Power (kW) _____
- Typical Machine Operating Weight for European Market (kg) _____
- Year of Manufacture _____
- Machine Function (Type) _____

Eurasian Economic Union

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

Note: One of the below plates may be installed on the machine.



Illustration 89 g06094564

If equipped, the Month and Year of Manufacture are on the PIN plate.

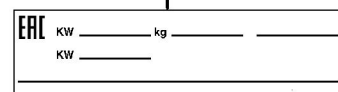
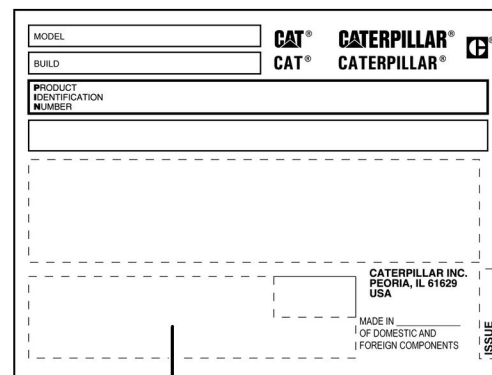


Illustration 90 g06532250

If equipped, the following information is stamped onto the EAC plate. For quick reference, record this information in the spaces provided below.

- Primary Engine Power (kW) _____
- Additional Engine Power (kW) _____
- Typical Machine Operating Weight for Eurasian Economic Union (kg) _____
- Month and Year of Manufacture _____
- Machine Type _____

Manufacturer Information

Manufacturer:

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

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

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

Electromagnetic Emissions for Canada

Note: For machines destined for the Canadian Market, the following label is located next to the Machine PIN Plate.

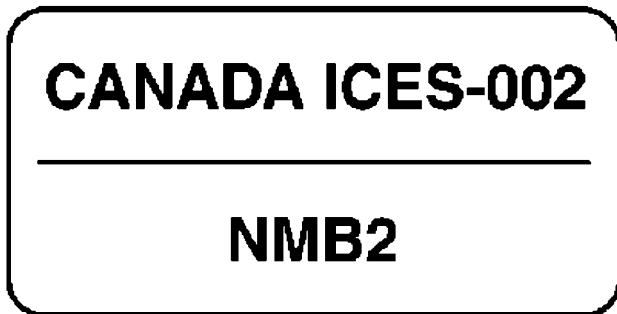


Illustration 91

g06063443

This label verifies that the product meets the requirements of ICES-002 Issue 6. Compliance to ICES-002 Issue 6 is accomplished by meeting electromagnetic emissions industry standard CISPR-12.

Sound Certification Film for European Union

If equipped, the certification label is used to verify the environmental sound certification of the machine to the requirements of the European Union. The value that is listed on the film indicates the guaranteed exterior sound power level L_{wa} at the time of manufacture for the conditions that are specified in "2000/14/EC".

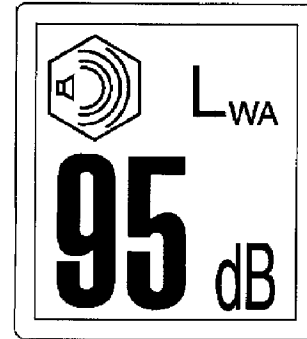


Illustration 92

g06037066

Engine Serial Number Plate

The engine serial number plate is on the top of the engine.

For quick reference, record the identification numbers in the space that is provided below.

Engine Serial Number _____

i06624896

Emissions Certification Film

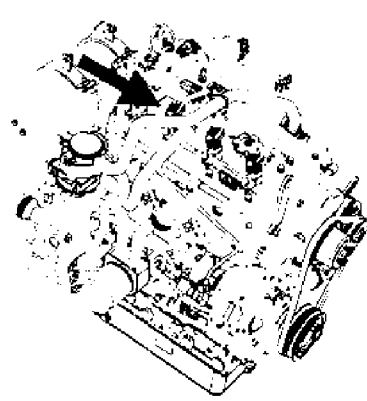
SMCS Code: 1000; 7000; 7405

Certification Label for Emissions

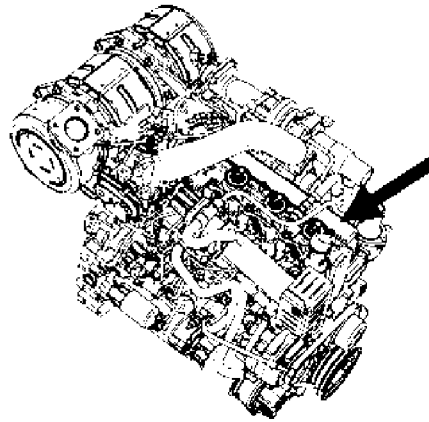
Note: This information is pertinent in the United States, in Canada, and in Europe.

Consult your Cat dealer for an Emission Control Warranty Statement.

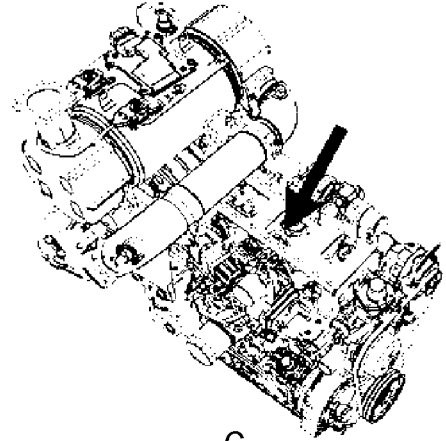
This label is located on the engine valve cover.



A



B



C

Illustration 93

g06051821

(A) C2.2

(B) C3.3B

(C) C3.8

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: BL21-Up

S/N: EH21-Up

S/N: MD21-Up

S/N: PN51-Up

S/N: RE51-Up

S/N: HR61-Up

S/N: AJ71-Up

S/N: DTB1-Up

S/N: HFB1-Up

S/N: KXC1-Up

S/N: HRD1-Up

S/N: K2D1-Up

S/N: BYF1-Up

S/N: DML1-Up

S/N: ETL1-Up

S/N: JSL1-Up

S/N: HLM1-Up

S/N: SEN1-Up

S/N: DPR1-Up

S/N: HMR1-Up

S/N: KTS1-Up

S/N: DZT1-Up

S/N: LST1-Up

S/N: MKT1-Up

S/N: A9W1-Up

S/N: B5W1-Up

S/N: MPW1-Up

S/N: BGZ1-Up

Table 81

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

Original EC or EU DECLARATION OF CONFORMITY

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description: Generic Denomination: Earth-moving Equipment
Function: Wheeled Loader
Model/Type: 226D,232D,236D,242D,246D,262D,272D,272D2, 272D
 XHP,272D2 XHP Skid Steer Loader

Serial Number:

Commercial Name: Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at:

Signature

Date:

Name/Position

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

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: DX21-Up

S/N: FD21-Up

S/N: CD41-Up

S/N: LW51-Up

S/N: TP51-Up

S/N: WE51-Up

S/N: AH91-Up

S/N: BL91-Up

S/N: KB91-Up

S/N: GTC1-Up

S/N: D9E1-Up

S/N: FTK1-Up

S/N: GTK1-Up

S/N: FTL1-Up

S/N: GTL1-Up

S/N: HLM1-Up

S/N: GWR1-Up

S/N: T9S1-Up

S/N: JST1-Up

S/N: PPT1-Up

S/N: WCT1-Up

S/N: TAW1-Up

S/N: RCX1-Up

S/N: A9Z1-Up

Table 82

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

Original EC or EU DECLARATION OF CONFORMITY OF MACHINERY

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth moving Equipment
	Function:	Rubber Tracked Loader
	Model/Type:	239D,249D,259D,279D,289D,299D,299D2,299D XHP,299D2 XHP Compact Track Loader
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at:

Signature

Date:

Name/Position

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

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: HP21-Up

S/N: BE71-Up

S/N: BL71-Up

S/N: HP71-Up

S/N: STK1-Up

S/N: TLK1-Up

S/N: EML1-Up

S/N: NTL1-Up

S/N: HLM1-Up

S/N: FMR1-Up

S/N: D5T1-Up

S/N: FMT1-Up

S/N: HMT1-Up

S/N: MLT1-Up

S/N: EZW1-Up

Table 83

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

Original EC or EU DECLARATION OF CONFORMITY

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

Person authorized to compile the Technical File and to communicate relevant parts of the Technical File to the Authorities of European Union Member States on request:

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth moving Equipment
	Function:	Rubber Tracked Loader
	Model/Type:	257D,277D,287D,297D,297D2,297D2XHP,297D2 XHP Multi-Terrain Loader
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at:

Signature

Date:

Name/Position

Note: The above information was correct as of January 2016, but may be subject to change, refer to the individual Declaration of Conformity issued with the machine for exact details.

Declaration of Conformity

SMCS Code: 1000; 7000

Table 84

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

Original EC or EU DECLARATION OF CONFORMITY

Manufacturer:

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

Person authorized to compile the Technical File and to communicate relevant part (s) of the Technical File to the Authorities of European Union Member States on request:Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble , France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Bucket with Top Clamp
	Model/Type:	Industrial Grapple Bucket, Utility Grapple Bucket
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2014/30/EU	N/A	

Note (1) Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at:**Signature****Date:****Name/Position**

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

Declaration of Conformity

SMCS Code: 1000; 7000

Table 85

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

EC DECLARATION OF CONFORMITY OF MACHINERY

Manufacturer:

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble , France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Rake with Top Clamp
	Model/Type:	Industrial Grapple Rake
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2014/30/EU	N/A	

Note (1) Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at:

Signature

Date:

Name/Position

Note: The above information was correct as of May 2013, but may be subject to change, please refer to the individual declaration of conformity issued with the machine for exact details.

Declaration of Conformity

SMCS Code: 1000; 7000

Table 86

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

Original EC or EU DECLARATION OF CONFORMITY

Manufacturer:

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble , France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Fork with Top Clamp
	Model/Type:	Industrial Grapple Fork, Utility Grapple Fork
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2014/30/EU	N/A	

Note (1) Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at:

Signature

Date:

Name/Position

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

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: BL21–Up

S/N: DX21–Up

S/N: EH21–Up

S/N: FD21–Up

S/N: HP21–Up

S/N: MD21–Up

S/N: BY41–Up

S/N: CD41–Up

S/N: LW51–Up

S/N: PN51–Up

S/N: RE51–Up

S/N: TP51–Up

S/N: WE51–Up

S/N: HR61–Up

S/N: AJ71–Up

S/N: BE71–Up

S/N: BL71–Up

S/N: HP71–Up

S/N: AH91–Up

S/N: BL91–Up

S/N: DX91–Up

S/N: DTB1–Up

S/N: HFB1–Up

S/N: GTC1–Up

S/N: KXC1–Up

S/N: HRD1–Up

S/N: K2D1–Up

S/N: D9E1–Up

S/N: BYF1–Up

S/N: FTK1–Up

S/N: GTK1–Up

S/N: STK1–Up

S/N: TLK1–Up

S/N: DML1–Up

S/N: EML1–Up

Product Information Section
Declaration of Conformity

S/N: ETL1-Up
S/N: FTL1-Up
S/N: GTL1-Up
S/N: JSL1-Up
S/N: NTL1-Up
S/N: HLM1-Up
S/N: SEN1-Up
S/N: DPR1-Up
S/N: FMR1-Up
S/N: GWR1-Up
S/N: HMR1-Up
S/N: KTS1-Up
S/N: T9S1-Up
S/N: D5T1-Up
S/N: DZT1-Up
S/N: FMT1-Up
S/N: HMT1-Up
S/N: JST1-Up
S/N: LST1-Up
S/N: MKT1-Up
S/N: MLT1-Up
S/N: PPT1-Up
S/N: WCT1-Up
S/N: A9W1-Up
S/N: B5W1-Up
S/N: EZW1-Up
S/N: MPW1-Up
S/N: TAW1-Up
S/N: RCX1-Up
S/N: A9Z1-Up
S/N: BGZ1-Up

Table 87

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

Original EC or EU DECLARATION OF CONFORMITY

Manufacturer:

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Multipurpose Bucket
	Model/Type:	Multipurpose (MP) Bucket
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2014/30/EU	N/A	

Note (1) Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at:**Signature****Date:****Name/Position**

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

Declaration of Conformity

SMCS Code: 1000; 7000

Table 88

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

Original EC or EU DECLARATION OF CONFORMITY

Manufacturer:

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth-moving Equipment
	Function:	Material Handling Arm
	Model/Type:	Material Handling Arm (MHA), Truss Boom, Lifting Hook
	Serial Number:	

Commercial Name: Caterpillar

Fulfills all the relevant provisions of the following Directives

Directives	Notified Body	Document No.
2006/42/EC	N/A	
2014/30/EU	N/A	

Note (1) Technical Documentation accessible through person listed above authorized to compile the Technical File

Done at:

Signature

Date:

Name/Position

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

Declaration of Conformity

SMCS Code: 1000; 7000

S/N: BY41-Up

S/N: DX91-Up

S/N: HLM1-Up

Table 89

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

Original EC or EU DECLARATION OF CONFORMITY

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

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

Standards & Regulations Manager, Caterpillar France SAS
40 Avenue Leon-Blum 38000 Grenoble, France

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

Description:	Generic Denomination:	Earth moving Equipment
	Function:	Steel Tracked Loader
	Model/Type:	299D2,299D2 XHP Compact Track Loader
	Serial Number:	
	Commercial Name:	Caterpillar

Fulfills all the relevant provisions of the following Directives

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

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

Done at:

Signature

Date:

Name/Position

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

Operation Section

Before Operation

i07786730

Mounting and Dismounting

SMCS Code: 7000

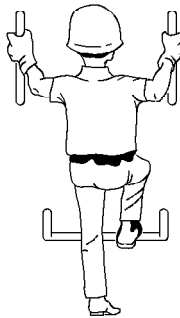


Illustration 94

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 or 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 2867:2011 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".

i04744529

Daily Inspection

SMCS Code: 1000; 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.

For maximum service life of the machine, make a thorough daily inspection before you operate the machine. Remove any debris from the engine compartment and the undercarriage. 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.

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

Note: Watch closely for leaks. If you observe a leak, find the source of the leak and correct the leak. If you suspect a leak or you observe a leak, check the fluid levels more frequently.

Visually inspect the high-pressure fuel lines before the engine is started. If you inspect the engine in operation, always use the proper inspection procedure in order to avoid a fluid penetration hazard. Refer to Operation and Maintenance Manual, "High Pressure Fuel Lines", in the Safety Section.

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

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

Remove any trash buildup and debris. Inspect the area between lift cylinder and lower plate of the lift tower for debris and clean as necessary. Inspect the rear portion of the right side lift cylinder tower for debris and clean as necessary.

Perform all necessary repairs before you operate the machine.

Ensure that all covers and guards are securely attached.

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

Grease all of the fittings that are scheduled on a daily basis.

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

Machine Operation

i08016810

Alternate Exit

SMCS Code: 7000

Primary Exit

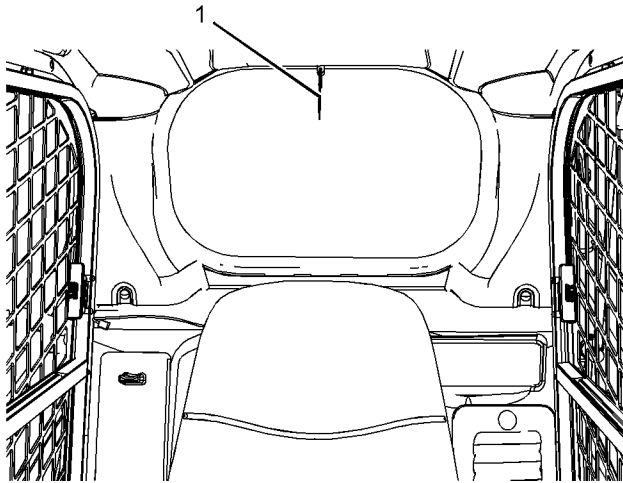


Illustration 95
(1) Latch pin

g03378582

The rear window in the machine serves as the primary alternate exit. The window will need to be removed to use the primary alternate exit. Pull on the ring at the top of the window to remove the window. This will remove the seal that holds the window in place. When the seal is taken out, carefully remove the window.

Secondary Exit

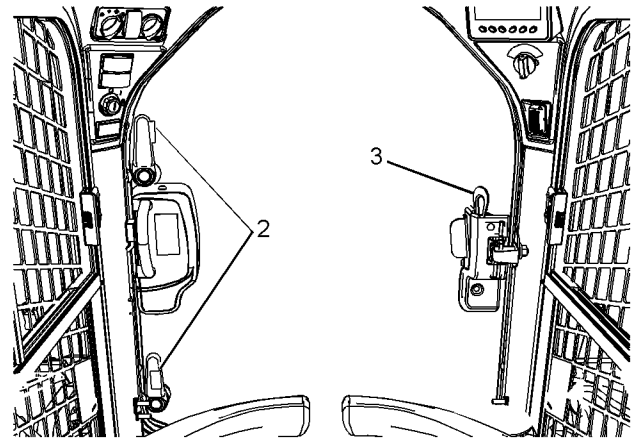


Illustration 96
(2) Release levers for the hinge
(3) Door Latch

g03378783

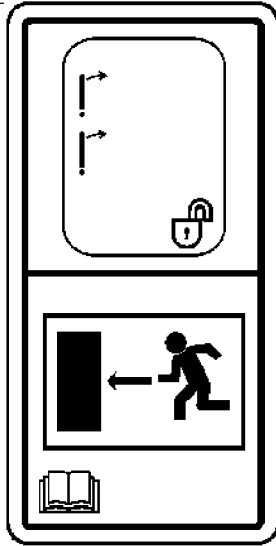


Illustration 97

g03381664

If necessary, the cab door may be removed from the hinges inside the machine. Use the following procedure:

1. Release the door from the striker (4).
2. Use the two levers (2) to release the hinge. Move both levers clockwise
3. Push the door away from the cab.

Reassembly

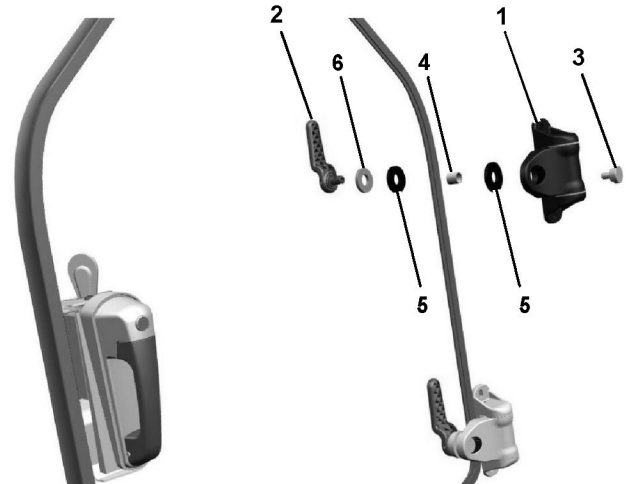


Illustration 98

g06508912

- (1) Hinge Asm
- (2) Handle Asm
- (3) Latch Asm
- (4) Bushing
- (5) Rubber Gasket
- (6) Hard Washer

1. Ensure that the components are assembled in the proper order according to illustration 98 .

Note: Failure to reassemble the hinges properly may negatively impact door life and function of the alternate exit.

2. With the handle assembly in the horizontal position, press the handle assembly into the latch assembly.
3. Rotate the handle assembly to the vertical position to complete the hinge reassembly.
4. Repeat for the other hinge assembly.

i03916430

Seat Belt

SMCS Code: 7327

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

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

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

Seat Belt Adjustment for Retractable Seat Belts

Fastening The Seat Belt

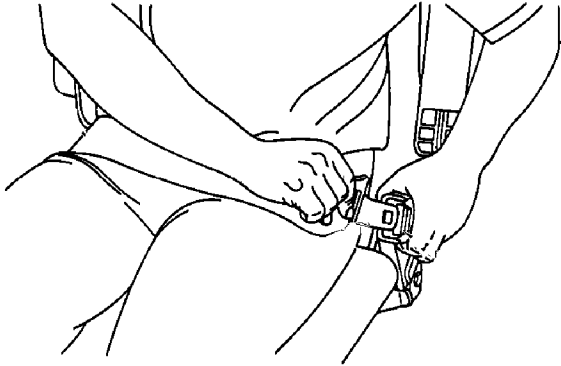


Illustration 99

g02150795

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

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

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

Releasing The Seat Belt

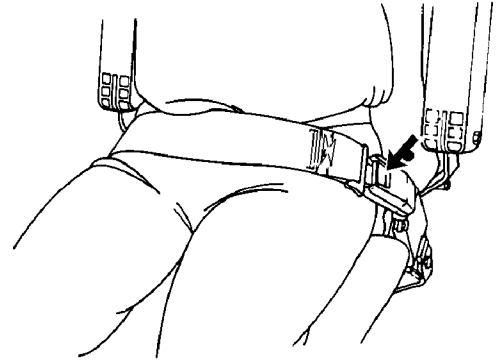


Illustration 100

g02150800

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

i07942236

Operator Controls

SMCS Code: 7300; 7451

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

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

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

Note: Simple hydromechanical work tools may be shipped without hydraulic oil. Uneven movement may occur until all the air has been removed from the work tool. You may need to add hydraulic oil to the machine after the machine fills the circuits of the work tool. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check" for the proper procedure for checking the hydraulic oil level.

Note: If the machine is not equipped with a cab that is enclosed, Caterpillar recommends the use of a flying object guard. If the machine is equipped with an enclosed cab, operate the machine with the cab door in the CLOSED position.

Left Side Controls

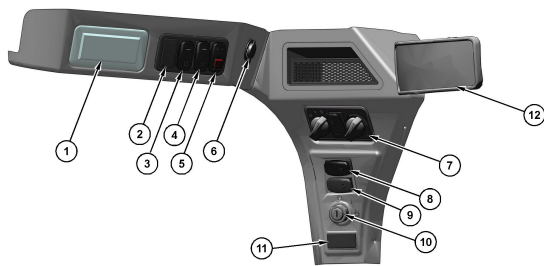


Illustration 101

g06330870

- (1) Cab dome light
- (2) Auxiliary electrical control
- (3) Multifunction switch for left-hand trigger
- (4) Intelligent Leveling System Switch
- (5) Work tool coupler control switch
- (6) Power Supply Port
- (7) Heating and air conditioning controls
- (8) Window wiper and washer control
- (9) Parking brake switch
- (10) Engine key start switch
- (11) Selectable control pattern switch
- (12) Mirror

Cab Dome Light (1)



Cab Dome Light – Press either side of the light to turn on the light. Move the light to the middle position to turn off the light.

Auxiliary Electrical Control “AUX 8” (2)

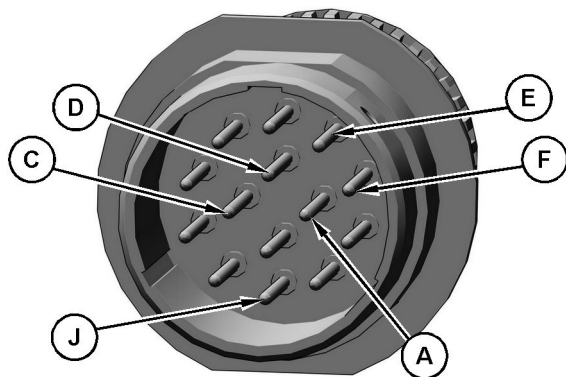


Illustration 102

g06364569

Typical electrical connection on the loading arm

- (A) Left-Hand Trigger Control “AUX 7”
- (C) C- Control
- (D) C+ Control
- (E) C2 Control
- (F) C1 Control
- (J) Auxiliary Electrical Control “AUX 8”



Auxiliary Electrical Control “AUX 8” – The auxiliary electrical control supplies continuous electrical power to pin (J) on the connector for the work tool on the loader arm. Press the bottom of the switch to turn on electrical power. Press the top of the switch to turn off electrical power.

Multifunction Switch for the Left-Hand Trigger (3)

This switch is used to toggle the function of the trigger on the left-hand joystick between Two Speed and the Auxiliary Electrical Function “AUX 7” .

Two-Speed



Two-Speed – Push the top of the multifunction switch to use the trigger for the two-speed control. Press the trigger and release the trigger on the front of the left-hand joystick to activate two-speed travel mode. To return to one-speed travel mode, press the trigger and release the trigger again.

Note: Keep the work tool close to the ground when you travel in two-speed mode. This method will maximize the stability of the machine.

Note: Do not move the multifunction switch while the two-speed function is active. Ensure that the machine is in one-speed mode before the Auxiliary Electrical Function “AUX 7” is activated.

Note: The Creep Mode must be turned off to shift the machine into two speed. If you activate the Creep Mode, the machine will return to one-speed mode. If you set the parking brake, the machine will return to one-speed mode.

Auxiliary Electrical Function “AUX 7”

Note: If the switch is not present, the trigger on the left-hand joystick only provides this auxiliary function.



Auxiliary Electrical Function "AUX 7" – Push the bottom of the switch to enable the seventh auxiliary electrical function.

Pull the trigger and hold the trigger on the left-hand joystick to provide electrical power to pin (A) on the work tool connector on the loader arm. Release the trigger to deactivate the control.

Cat Intelligent Leveling (ILEV) System Switch (4)



Press the bottom of the switch to enable self-level. The alert indicator for ILEV will illuminate indicating the system is on. Press the top of the switch to turn off the ILEV system.

Self-Level

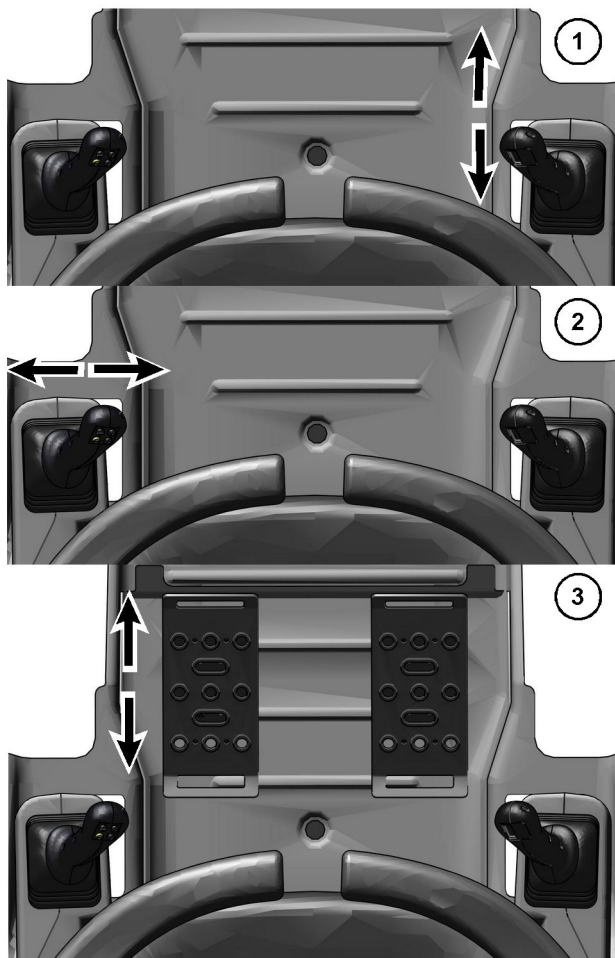


Illustration 103

g06354572

- (1) Cat Control Pattern
- (2) H-Control Pattern
- (3) Hand and Foot Control Pattern

The ILEV's Self-Level feature maintains the approximate starting angle of the work tool as the loader arms are raised. On machines equipped with Dual Direction Self-Level system, this feature maintains the approximate starting angle of the work tool as the loader arms are raised or lowered.

Return to Dig

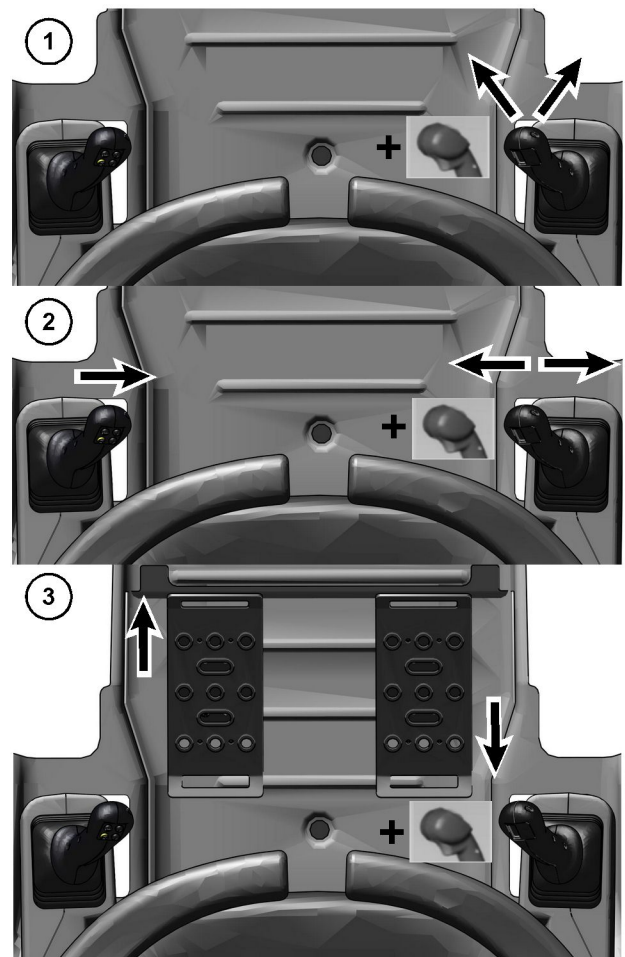


Illustration 104

g06354582

- (1) Cat Control Pattern
- (2) H-Control Pattern
- (3) Hand and Foot Control Pattern

The ILEV's Return to Dig feature lowers the lift arms and returns the work tool to a user-selected target angle. Set the work tool to the desired angle using the controls. Pull the right-hand joystick trigger and hold for 5 seconds to set the target angle. The ILEV alert indicator will flash twice to confirm that the angle was accepted. After a dump cycle, with the lift arms raised, give a momentary Lower and Dump or Lower and Tilt Back command. Momentarily press and release the right-hand joystick trigger to initiate Return to Dig mode. The lift arms will lower to the stops and the work tool will return to the user-selected target angle without further operator input.

Note: The target angle will reset to a factory default when the machine is keyed off. The factory default approximates a level bucket with the lift arms in the lowest position.

Work Tool Positioner

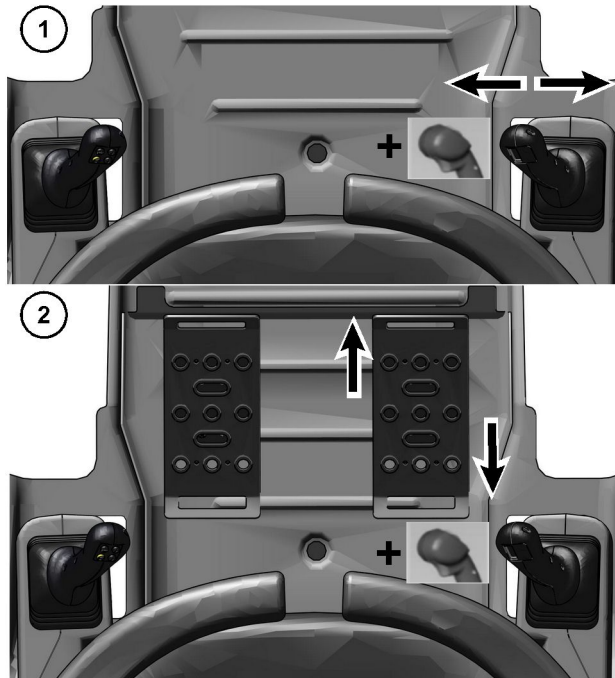


Illustration 105

g06354805

- (1) Cat Control Pattern and H-Control Pattern
(2) Hand and Foot Control Pattern

The ILEV's Work Tool Positioner feature returns the work tool to a user-selected target angle. Set the work tool to the desired angle using the controls. Pull the right-hand joystick trigger and hold for 5 seconds to set the target angle. The ILEV alert indicator will flash twice to confirm that the angle was accepted. Start the work tool in the direction of the target angle by giving a momentary Dump or Tilt Back command. Momentarily press and release the right-hand joystick trigger to initiate Work Tool Positioner mode. The work tool will return to the user-selected target angle without further operator input. Work Tool Positioner mode has no impact on the lift arm position.

Note: The target angle will reset to a factory default when the machine is keyed off. The factory default approximates a level bucket with the lift arms in the lowest position.

Work Tool Coupler Control (5)

⚠ WARNING

Improper Attachment of the Work Tool could result in injury or death.

Do not operate the machine without confirmation that the coupler pins are fully engaged. Follow the operating procedures in the Operation and Maintenance Manual.

Work Tool Coupler Control – The work tool coupler controls the engagement of the coupler pins.

Note: The quick coupler only works while the ENGINE IS RUNNING.



Disengaged – Push the red button upward and press the bottom of the switch. Hold the switch in the downward position until the coupler pins disengage.



Engaged – Press the top of the switch and hold the top of the switch until the coupler pins engage.

Refer to Operation and Maintenance Manual, "Work Tool Coupler Operation" for the proper procedure for the work tool coupler.

Power Supply Port (6)

This electrical outlet is a 12V power round receptacle in machines equipped with the standard display or a USB port in machines equipped with the Advanced Display.

Either may be used to operate electrical accessories. The USB port may be used by the owner to upload a custom image to the Advanced Display. See Operator Controls, Right Side Controls (Alternate), Menu Screen, Service Menu". The USB port is also used by the Cat dealer to service the Advanced Display software as needed.

Heating and Air Conditioning Control Panel (7)

Heating and air conditioning control panel (7) houses the switches for controlling the temperature and operator comfort level inside the cab.

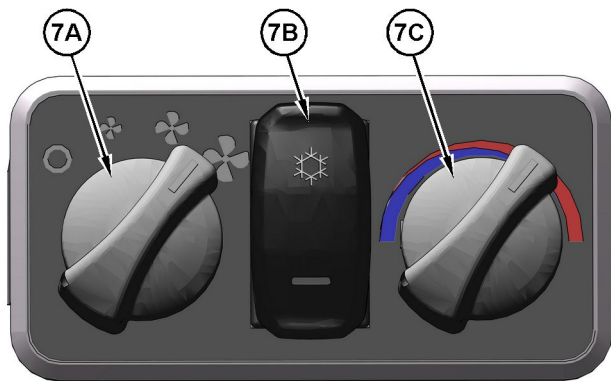


Illustration 106

g06330900



Fan Speed Control (7A) – The fan speed switch controls the three-speed blower fan motor.



Air Conditioning Switch (7B) – Depress A/C switch (7B) to activate the air conditioning system. Turn fan speed switch (7A) to LOW, MEDIUM, or HIGH speed. Adjust temperature variable control (7C) for the desired temperature.



Temperature Variable Control (7C) – Turn the control knob anywhere between the blue area (left) and the red area (right). This action will control the amount of heating and cooling.

Window Wiper and Window Washer (8)



Window Wiper and Window Washer – Move the switch to the middle position to turn on the wiper. Press the right side of the switch to operate the washer. Press the left side of the switch to turn off the wipers.

Parking Brake Control (9)



Parking Brake Control – After starting the engine, press the right side of the switch and release the switch to disengage the parking brake and enable the hydraulic implement system. Successive operation of this switch will only cycle the parking brake on and off and will not impact the hydraulic implement system.

Note: The parking brake will engage when the engine is stopped. The parking brake will engage when the armrests are moved to the RAISED position. The parking brake will engage when the operator leaves the operator seat for a time.

Note: If the switch for the Joystick Control Pattern is installed, select a pattern to release the parking brake. See Selectable Control Pattern Switch (11).

Engine Key Start Switch (10)



OFF – Insert the engine start switch key only from the OFF position and remove the engine start switch key only from the OFF position. Turn the engine start switch key to the OFF position to stop the engine. In the OFF position, there is no power to most electrical circuits on the machine. The cab dome light is operational even when the engine start switch is in the OFF position.



ON – Turn the engine start switch key clockwise to the ON position to activate all the cab circuits.



START – Turn the engine start switch key clockwise to the START position to crank the engine. Release the engine start switch key after the engine starts and the engine start switch key returns to the ON position.

Note: If the Machine Security System is enabled, the correct pin code must be entered before the machine will start. See "Anti-Theft Security System", for further information.

Note: If the engine fails to start, turn the engine start switch key to the OFF position to attempt to start the engine again. Refer to the Operation and Maintenance Manual, "Engine Starting" for more details about starting the engine.

Selectable Control Pattern Switch (11)

If the machine is equipped with the optional Selectable Control Pattern feature, a rocker switch will be present at this location with the number (1) on one side and the number (2) on the other side. After starting the machine, a control pattern must be selected before the parking brake can be released. Press the switch to the (1) position for Cat Control Pattern or press the switch to the (2) position for H-Control Pattern. The alert indicators (1) and (2) will blink until a control pattern is selected. Once a control pattern has been selected, activating the parking brake will not affect the selection of the pattern. Keying the machine off will reset the control pattern selection. Refer to the section "Joystick Controls" for detailed information on the possible joystick control patterns.

Mirror (12)

Adjust the rear view mirror properly to view objects that are behind the machine.

Right Side Controls

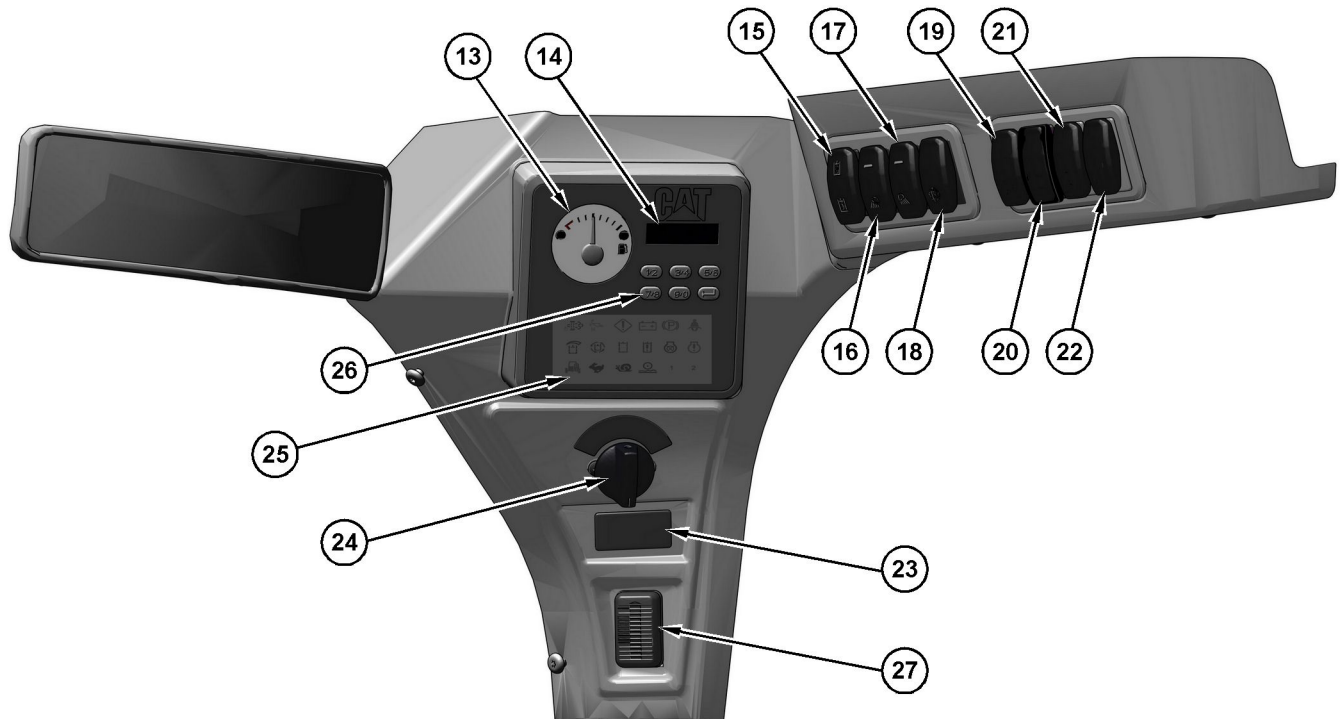


Illustration 107

g06354503

- | | | |
|---|--------------------------------|------------------------------------|
| (13) Fuel gauge | (18) Continuous hydraulic flow | (23) Turn Signal |
| (14) Service hour meter | (19) Ride control | (24) Engine speed control knob |
| (15) Hydraulic lockout and Interlock override | (20) Reversing fan | (25) Alert indicator panel |
| (16) Front working lights | (21) Rooding lights | (26) Anti-Theft security soft keys |
| (17) Rear working lights | (22) Hazard lights | (27) Bluetooth microphone |

Fuel Level Gauge (13)



Fuel Level Gauge – The needle in the red range indicates low fuel.

Service Hour Meter (14)



Service Hour Meter – The service hour meter indicates the total number of hours the engine has been running. The service hour meter should be used to determine service hour maintenance intervals. This window will also display the Basic Machine Security information. See Basic Security Soft Keys.

Hydraulic Lockout and Interlock Override (15)



Hydraulic Lockout – Press the top of the switch to disable the hydraulic functions. Return the switch to the middle position to activate the hydraulic functions.

NOTICE

Before putting the machine into hydraulic interlock override, the work tool hydraulic lines must be connected to the machine couplers. Hooking hydraulic lines up with pressure will result in destroyed seals in the coupler and result in poor hydraulic performance.

Note: Activate the hydraulic lockout when you are roading the machine to prevent unplanned movement of the work tool and the loader arms.



Interlock Override – If equipped, the interlock override allows the auxiliary hydraulic circuits to function with the armrests in the RAISED position. First bring the machine to a complete stop. Activate the continuous flow control. Press the bottom of the interlock override switch and release the switch to activate the interlock override function. To turn off the interlock override and continuous flow, press the top of the switch and release the switch again.

WARNING

Inadvertent movement of the work tool may occur if the interlock override function is used with work tools. This may result in personal injury or death. Only use interlock override function for hand-held work tools.

Note: Certain work tools should not be operated with the hydraulic interlock system overridden. Consult your work tool's Operation and Maintenance Manual for further information. If the machine will run a work tool where the presence of this switch represents a potential safety issue, see your Cat dealer to have the switch replaced with one having the Hydraulic Lockout feature only.

Note: If your machine is equipped with a Hydraulic Lockout switch only and the application requires the ability to override the hydraulic interlock system, see your Cat dealer to have a dual purpose switch installed.

Note: The alert indicator for the parking brake will light when the interlock override is activated. When the interlock override is deactivated, press the parking brake switch to disengage the parking brake and activate the hydraulic functions.

NOTICE

Do not leave the machine unattended while you have the interlock override function activated.

Switch on the Cab Door

A switch is provided on the cab door that prevents the work tool from operating when the cab door is open. If the cab door is not installed or if the cab door is removed, the cab door jumper plug must be installed to operate a hydraulic work tool.

Note: The cab door jumper plug is located behind the seat on the machine's left hand side. The cab door jumper plug is cable-strapped to the cab harness near the point of use. To enable the work tool hydraulics with the front door removed, cut the cable strap securing the jumper plug to the cab harness, disconnect the front door harness from the cab harness behind the seat, and connect the front door jumper plug in its place.

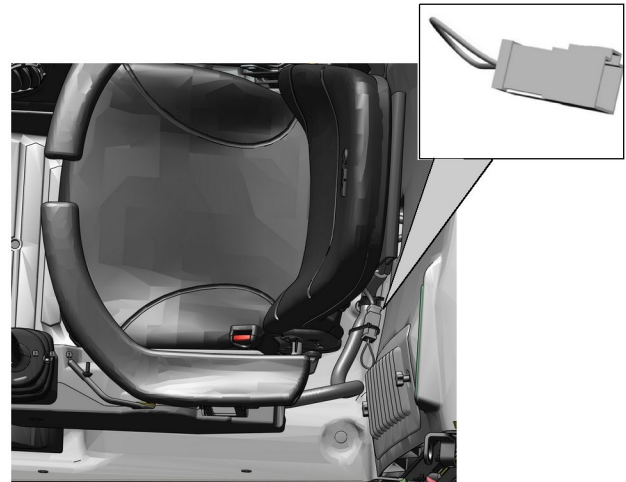


Illustration 108

g06354134

If the cab door jumper plug cannot be found, a plug can be assembled. Refer to M0069152, Assembly of Safety Bypass Plug for the Front Door on Compact Track Loaders, Multi-Terrain Loaders, and Skid steer Loaders for instruction on assembling the plug.

Front Work Lights (16)

lights.

Front Work Lights – Press the bottom of the switch to turn on the lights. Press the top of the switch to turn off the

Rear Work Lights (17)

lights.

Rear Work Lights – Press the bottom of the switch to turn on the lights. Press the top of the switch to turn off the

Continuous Flow Switch (18)

Continuous Flow – Continuous flow control (18) supplies continuous flow of hydraulic fluid to the auxiliary hydraulic circuit without continuously holding the auxiliary hydraulic control. Press the bottom of the continuous flow rocker switch. The continuous flow alert indicator will flash continuously indicating the system is in the “Continuous Flow Ready Mode”. Press either of the two auxiliary hydraulic switches (1) or (2) that are on the right-hand joystick. If equipped, you may also move the thumb wheel on the right-hand joystick to the desired flow position and hold either of these commands for several seconds. The continuous flow alert indicator will stop flashing and remain

lit continuously. Releasing the button or thumbwheel at this time will engage Continuous Flow Mode, providing flow to the auxiliary hydraulic circuit without further command input. To disengage continuous flow, either press the bottom of the continuous flow switch, press either of the two auxiliary hydraulic switches or operate the thumb wheel in either direction.

Ride Control (19)

Ride Control helps with smoothing the ride of the machine. Travel over rough terrain causes bucket movement. The ride control system uses the lift cylinders as shock absorbers. The lift cylinders dampen the forces from the work tool.



Ride Control – Press the bottom of the switch to turn on the ride control. Ride control will activate and the alert indicator will illuminate at the appropriate speed. Press the top of the switch to turn off the ride control.

Note: The ride control will deactivate and the indicator will not be illuminated at the appropriate speed. The ride control will also deactivate if the tilt function for the work tool is operated.

Default activation speed is approximately 8 km/h (5.0 mph) for wheeled machines and 6 km/h (3.7 mph) for tracked machines.

Note: If the Advanced Display is equipped, the Ride Control activation speed may be adjusted to better suit the application if needed. Refer to Operation and Maintenance Manual, “Right Side Controls (Alternate), Ride Control” for more information.

Reversing Fan (20)

The machine may be equipped with a reversing fan. Momentarily reversing the cooling fan direction aids in removing debris from the screened area of the engine enclosure, thereby improving air flow across the engine radiator and hydraulic oil cooler which may help the machine run cooler.



There are 3 modes for the reversing fan to function in, all functions are controlled by a switch in the cab.

- OFF position (normal demand fan operation) Switch CENTERED.
- AUTOMATIC position (this mode sets the fan to reverse at set intervals and duration set by Cat dealer) Switch UP.

- MANUAL OVERRIDE position (a MOMENTARY SWITCH that allows the operator to force a set cycle to occur) Switch is pressed down and springs back up.

Note: The reversing cycle parameters for duration and frequency are user adjustable through the advanced display. See "Operator Controls, Right Side Controls (Alternate), Menu Screen, Machine Settings, Reversing Fan" for details. The reversing cycle parameters are dealer adjustable regardless of the monitor equipped.

Note: The default reversing cycle is once every 30 minutes for 8 seconds.

Roading Lights (21)



Roading Lights – Move the switch to the middle position to turn on the control panel lights and position lights. Press the bottom of the switch to turn on the front low beams. Press the top of the switch to turn off the lights.

Hazard Lights (22)



Hazard Flasher Control – Press the bottom of the switch to activate the hazard flashers. Press the top of the switch to deactivate the hazard flashers.

Turn Signals (23)



Turn Signals – Press the left of the switch to turn on the left turn signals. Press the right of the switch to turn on the right turn signals. Move the switch to the middle position to turn off the turn signals.

Engine Speed Control Knob (24)

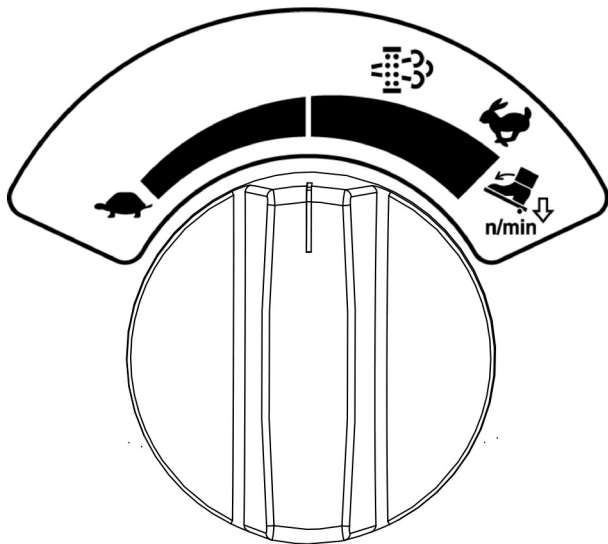


Illustration 109

g03818758

Use the knob to set the engine speed. Use the engine speed control knob when you want to set a constant engine speed. Move the knob clockwise to increase engine speed. Move the knob counter clockwise to decrease engine speed.

When the knob is fully clockwise, the engine speed control pedal, if equipped, become a deceleration pedal to lower engine RPM. The engine speed control pedal will temporarily override the engine speed control set point.

Note: The deceleration function will not lower the RPM to low idle. Do not use this function as a braking function.

Note: There are several features that may impact the available engine speed range of the machine. Refer to Operation and Maintenance Manual, “Engine Starting” for more detailed information.

When the DPF light is on (if equipped), regeneration is needed. The operator can increase the engine speed to the active regeneration threshold. This is the green shaded area on the engine speed control knob that has the DPF symbol.

Refer to this Operation and Maintenance Manual, “Diesel Particulate Filter Regeneration”.

Alert Indicator Panel (25)

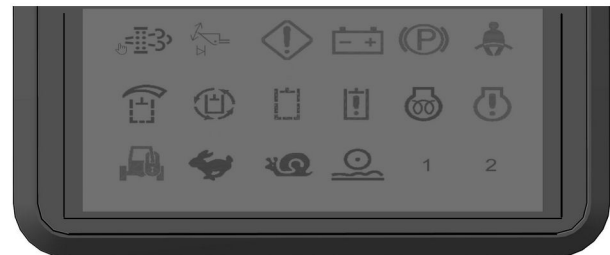


Illustration 110

Basic electronic display window

g06354091

Refer to the section Operator and Maintenance Manual "Alert Indicators" for a description about the status indicators.

Anti-Theft Security System Soft Keys (26)



Illustration 111

g06354085

Basic electronic display window

- (14) Service hour meter window
(26) Anti-Theft Security System

Entering the Pin

If the Anti-Theft Security System is enabled, service hour meter window (14) will display "COdE" at machine start-up. This event occurs when key start switch (10) is moved to the ON position. Enter the secure PIN number using soft keys (26). Press the appropriate key to enter the secure code. For odd numerals (1, 3, 5, 7, or 9), press the appropriate key one time. For even numerals (2, 4, 6, 8 or 0), press the appropriate key twice. After the code is entered, press the arrow key to submit the code.

If the entered PIN number is correct, the machine service hours will display in the service hour meter window (14). Key start switch (10) may be moved to the START position to start the machine.

If the entered PIN number is incorrect, the window will flash the word "CODE" for several seconds before another attempt can be made.

Note: For security purposes, in the event an incorrect PIN is entered five times consecutively, the system will lock down for 15 minutes, during which period even a correct PIN will not allow the engine to crank. After the 15 minute lockdown period, entry of a correct PIN will unlock the system as usual.

Right Side Controls (Alternate)

Changing the Pin

The factory default PIN is "1111" and should be changed by the machine owner as soon as possible after enabling the Anti-Theft Security System. The PIN can be changed through the Standard Display to any 4-6 digit code. To change this, the system must be unlocked first by entering the current secure PIN, then simultaneously holding down the soft keys labeled "1/2" and "5/6" for 3 seconds. The system will prompt for a new "CODE" to be entered twice before accepting this as the new PIN.

Bluetooth Microphone (27)

This microphone may be set up with your mobile telephone to provide a hands-free method of communicating. See the operating manual of your mobile device for instructions of connecting with the Bluetooth microphone.

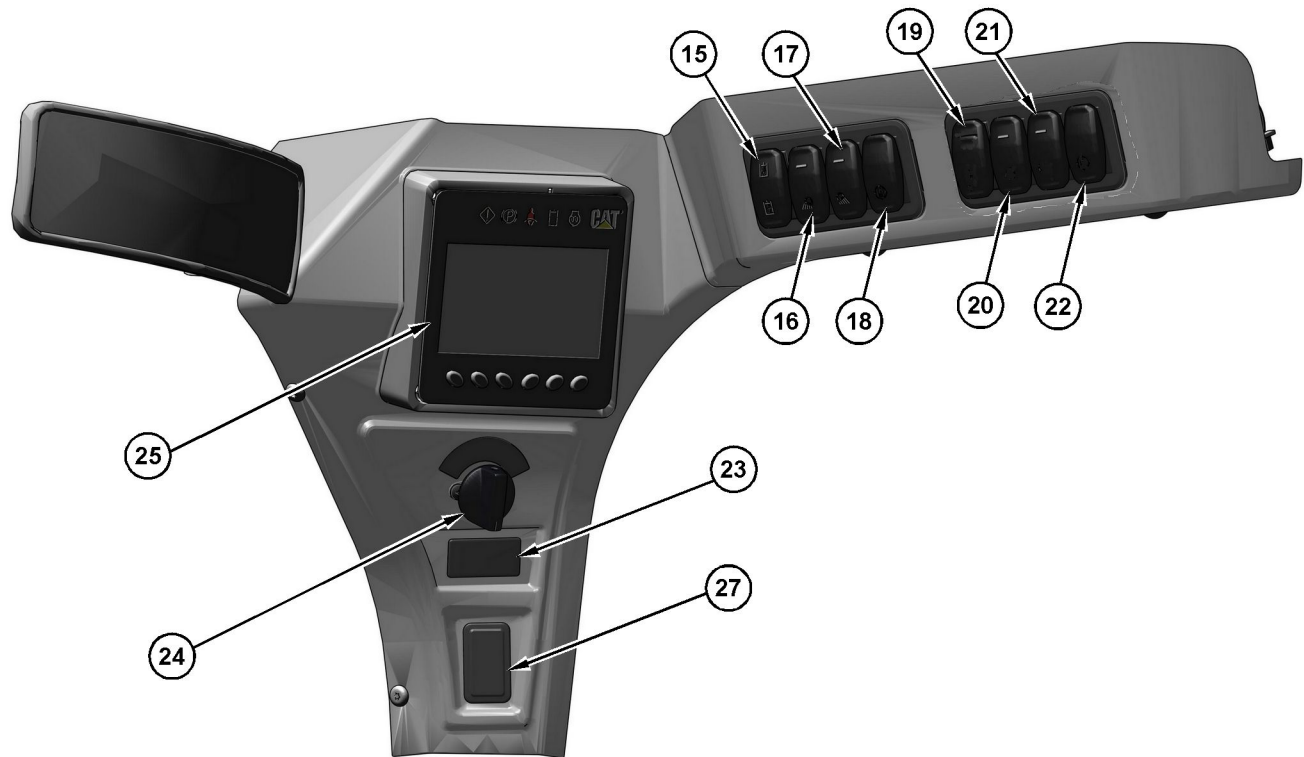


Illustration 112

g06353260

(15) Hydraulic lockout and Interlock override
 (16) Front working lights
 (17) Rear working lights
 (18) Continuous hydraulic flow

(19) Ride control
 (20) Reversing Fan
 (21) Rooding lights
 (22) Hazard lights

(23) Turn Signal
 (24) Engine speed control knob
 (25) Advanced Display Module
 (27) Bluetooth microphone

Advanced Display Module (If Equipped) (25)

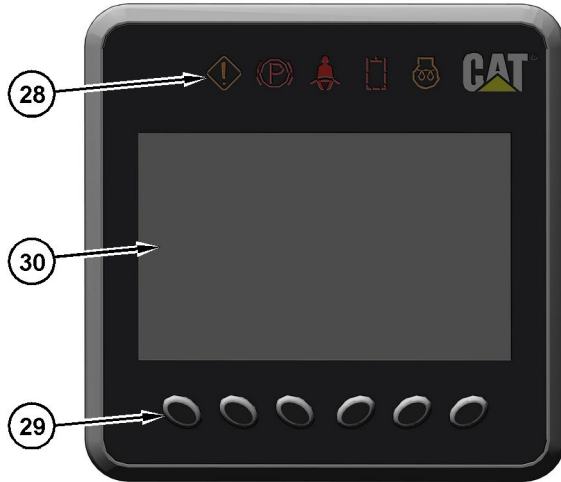


Illustration 113

g06353289

Advanced electronic display window

- (28) Dedicated Alert Indicators
- (29) Soft Input Keys
- (30) Display Window

The optional Advanced Display has several features which are arranged into menu screens.

Dedicated Alert Indicators (28)

There are several dedicated alert indicator lamps located across the top of the Advanced Display. All other alert indicators will be icons located along the sides of the display window & will activate as needed. See "Alert Indicators".

Soft Input Keys (29)

There are six soft input keys located across the bottom of the Advanced Display. These keys are used to navigate among the various menu screens and to input operator selections within the menu screens. The functions will vary depending on the menu. The current function will be displayed as an icon on the display window directly above the key.

Display Window (30)

The Display window will display the welcome screen, the main monitoring screen, and the various menu and adjustment screens. The display window will also become the Backup Camera monitor when that feature is installed and active. See "Backup Camera Mode".

Monitoring Screen

The monitoring screen is the primary screen that displays information to the operator during most operations. Several background color schemes and gauge layouts are available for selection by the operator. See "Menu Screen, Display Settings".

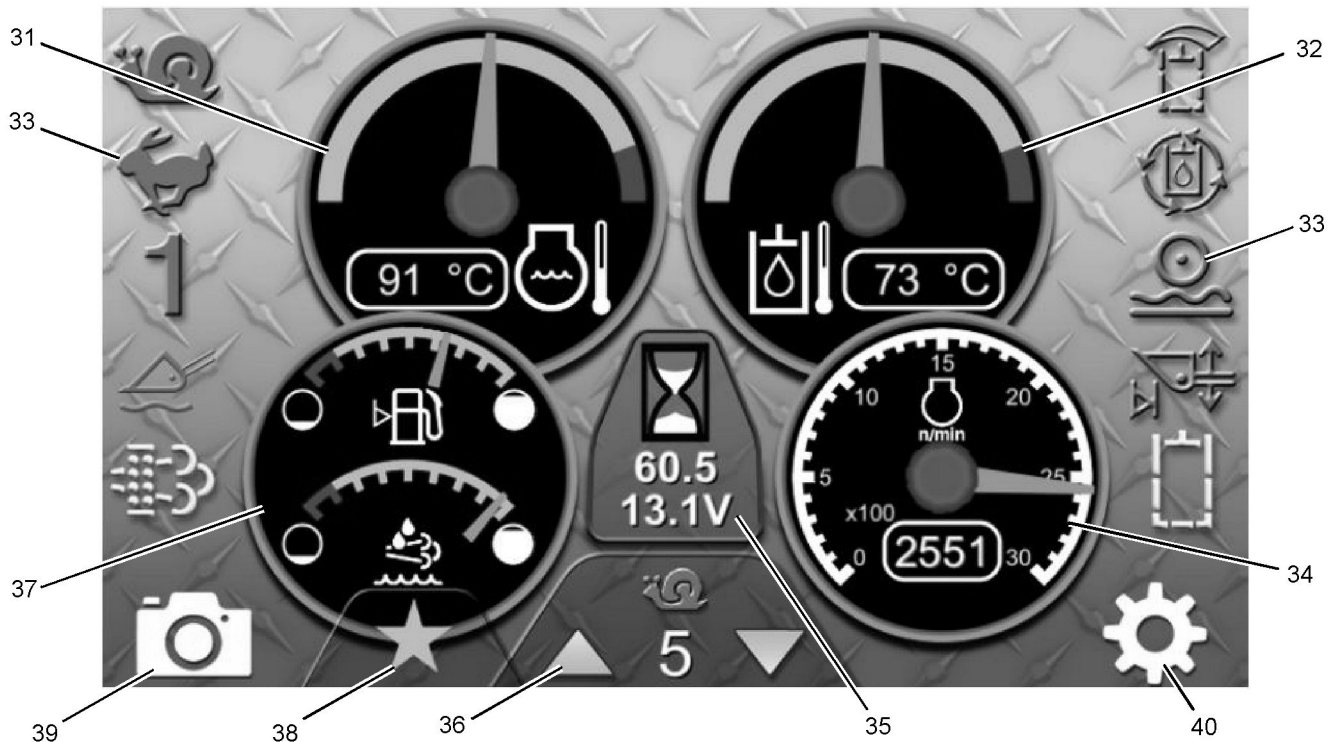


Illustration 114

g06364627

Default layout of monitoring screen

- | | | |
|---|--|-----------------------------|
| (31) Engine Coolant Temperature Gauge | (36) Creep Controller | (40) Menu System Entry Icon |
| (32) Hydraulic Oil Temperature Gauge | (37) Fuel and Diesel Exhaust Fluid (DEF) Level Gauge and SCR Warning Alert Indicator | |
| (33) Alert Indicator Icons | | |
| (34) Engine Speed Gauge | (38) Favorites Icon | |
| (35) Service Hour Meter and Battery Voltage Meter | (39) Backup Camera Icon | |

Engine Coolant Temperature Gauge (31)

The needle in the red zone indicates that the engine coolant temperature is too high. If the gauge's numerical values are enabled, the background will change from black to red to indicate that the engine coolant is approaching an unsafe temperature. The machine should be stopped soon and the engine set to low idle to allow the engine to cool. See "Display Settings, Digital Readout".

Hydraulic Oil Temperature Gauge (32)

The needle in the red zone indicates that the hydraulic oil temperature is too high. If the gauge's numerical values are enabled, the background will change from black to red to indicate that the hydraulic oil temperature is approaching an unsafe temperature. The hydraulics functions should be stopped soon and the engine set to low idle to allow the hydraulic system to cool. See "Display Settings, Digital Readout".

Alert Indicator Icons (33)

There are several alert indicator icons located along the sides of the display window and will activate as needed. See "Alert Indicators" for a description of the warnings.

Engine Speed Gauge (34)

The needle in the red zone indicates that the engine RPM is too high. If the gauge's numerical values are enabled, the background will change from black to red to indicate that the engine speed is above the allowable HIGH IDLE limit. The throttle should be turned down to the acceptable range. A CAT dealer should be contacted to determine the cause. See "Display Settings, Digital Readout".

Service Hour and Battery Voltage Meter (35)

The service hour meter indicates the number of engine running hours for the machine. The hours should be used to determine which maintenance interval service items to perform. The hourglass icon blinks slowly when the engine is running indicating that hours are being accrued. The hour meter also indicates the current battery voltage.

Creep Controller (36)

This controller will be displayed when "Creep Control" is engaged. See "Operator Controls, Ride Side Controls". This controller allows the operator to adjust the creep setting from the main screen without having to enter the Creep Control adjustment screen. See "Menu Screen, Machine Settings, Creep Control".

Note: The optional Advanced Display module is required for Creep Control feature.

Fuel and Diesel Exhaust Fluid (DEF) Level Gauge and SCR Warning Alert Indicator (37)

The fuel level gauge indicates the amount of fuel that remains in the fuel tank. The needle in the red range indicates low fuel.

On machines which require diesel exhaust fluid (DEF), this gauge will contain two independent needles. The top needle will indicate the amount of fuel that remains in the fuel tank. The bottom needle will indicate the amount of DEF that remains in the DEF tank.

Note: DEF will be consumed at a significantly slower rate than diesel fuel.

The icon below the DEF gauge is designated the SCR Warning alert indicator. The status of this icon will vary based on the SCR warning levels. Refer to Operation and Maintenance Manual, "Selective Catalytic Reduction Warning System" for complete details.

Favorites Icon (38)

There are several settings within the "Machine Settings" and "Display Settings" menus that may be selected as the "Favorite". This is useful for quickly recalling an often used setting without having to navigate the menu system in the normal manner.

Any time an open star icon appears over the right most soft key, the currently highlighted setting may be chosen as the "Favorite" by pressing the soft key. The open star icon will become solid indicating that setting is now the "Favorite".

When a "Favorite" is established, a solid star icon will appear above one of the soft keys anytime the main monitoring screen is the active display. Pressing this soft key will immediately jump the user to the sub menu where the "Favorite" setting is located and highlight the setting.

Pressing the right most soft key while any other eligible setting is highlighted will make this setting the new "Favorite". Pressing the right most soft key while the current favorite is highlighted will turn the "Favorite" off, indicated by changing the solid star icon back to an open star.

Note: There can only be one "Favorite" at any time.

Backup Camera Icon (39)

The soft key under this icon is used to access the backup camera view if the optional camera is installed. The display window will change from the current screen to the backup camera view regardless of the direction of travel & remain so until the soft key under the "undo" icon is pressed. See Backup Camera Mode for more information.

Menu System Entry Icon (40)

The menu screens are accessed from the Monitoring Screen by pressing the soft key under this icon.

Menu Screen

The main menu screen is accessed from the Monitoring Screen by pressing the Soft Input Key under the Menu Screen Entry icon. The main menu screen displays the icons and descriptions of available sub menus listed below. The icons will scroll horizontally using the Soft Input Keys. The active selection is always in the center of the screen and appears larger than other inactive selections. The sub menus are selected by pressing the right most Soft Input Key under the "Enter Arrow" icon.

Machine Settings Menu

The "Machine Settings" menu allows the operator to adjust several machine response and performance settings. These settings will be stored under each operator profile. When the Anti-Theft Security System is enabled, the settings take effect each time an Operator Code is entered at the log in prompt. If the Anti-Theft Security System is not enabled, the Machine Settings at the time of the previous KEY OFF will remain in effect. See "Anti-Theft Security System".

Drive System Sensitivity

This parameter is used to change the "Drive Control Mode" which has three settings.

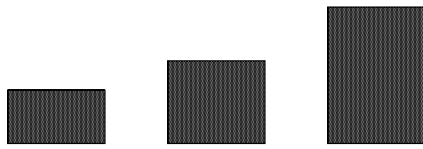


Illustration 115

g03216999

Standard Mode – one bar

Intermediate Mode – two bars

Maximum Mode – three bars

Note: Intermediate Mode (two bars) is the factory default setting.

Note: The Drive Control Mode setting will not return to the factory default level when the ignition key switch is turned OFF.

Note: The machine will start, stop, and steer more aggressively with each progressive drive control mode. Test drive the machine in an open area to become familiar with the new operating characteristics of the machine.

Implement System Sensitivity

This parameter is used to change the “Implement Control Mode” which has three settings.

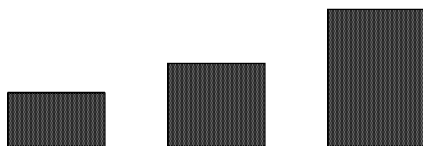


Illustration 116

g03216999

Fine Control Mode – one bar

Standard Mode – two bars (factory default)

Coarse Control Mode – three bars

Note: Standard Mode (two bars) is the factory default setting.

Note: The Implement Control Mode setting will not return to a default level when the ignition switch is turned OFF.

Note: The machine lift arms and work tool coupler will move more aggressively with each progressive implement control mode. Test the implement functions in an open area to become familiar with the new operating characteristics of the machine.

Creep Control

The Creep Control allows the operator to set a maximum machine travel speed at full joystick movement. Use Creep control for operations that require slow, constant speed independent of engine idle speed, such as cold planning or trenching.

The Creep Control has 20 settings:

Slowest Setting – one bar

Default Setting – five bars

Fastest Setting – twenty bars

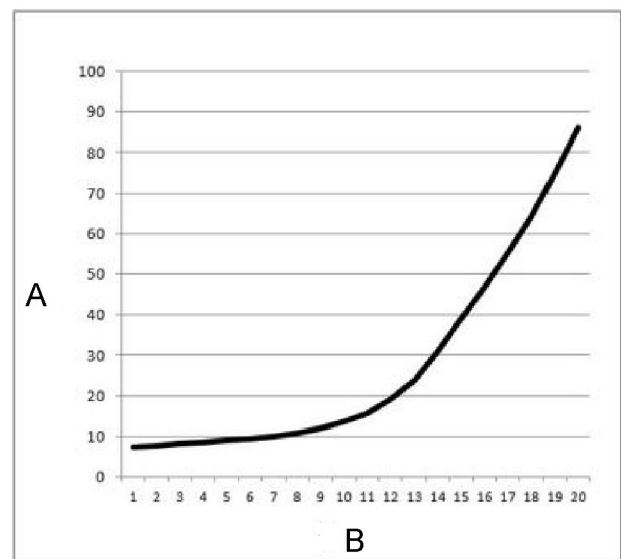


Illustration 117

g06360638

Creep Speed Map

(A) % of Maximum Travel Speed

(B) Creep Speed Setting

Note: The machine may not travel at the lower settings depending on terrain, work tool, load, etc. If the machine does not travel at a particular setting, increment the Creep Control to progressively higher values until travel occurs.

Note: The optional Advanced Display module is required for Creep Control feature. See "Monitoring Screen, Creep Controller".

Ride Control

Ride Control improves the ride quality & material retention over rough terrain while carrying heavy loads by essentially using the lift cylinders as shock absorbers.

The “Ride Control Adjustment” allows the operator to change the activation speed at which the system engages when the Ride Control system is ON. Refer to Operation and Maintenance Manual, “Operator Controls, Right Side Controls”. The adjustment can be made in 0.1 km/h (0.06 mph) increments.

Default activation speed is approximately 8 km/h (5 mph) for wheeled machines and 6 km/h (3.7 mph) for tracked machines.

Machine Speed Limit

The “Machine Speed Limit Adjustment” allows the maximum travel speed to be limited. The adjustment can be made in 1% increments from 20% to 100% of the machine’s maximum travel speed.

Note: If the Anti-Theft Security System is enabled, a user logged in under an Operator Code will only be allowed to adjust this setting up to the value stored in the Master Profile. See “Menu Screen, User Management, Master Code, and Operator Code”.

Note: At some of the lower Speed Limit settings, 2-speed shifting may be automatically disabled.

Reversing Fan Frequency

Reversing Fan Operation Interval Time is adjustable between 6 minutes and 240 minutes. This is the time between reverse cycles in the automatic mode. The lower the setting, the more frequent the reverse cycle will occur. The factory default is 30 minutes.

Note: The fan is more effective at cooling the machine’s engine coolant and hydraulic oil in the forward direction. Running the fan in reverse too frequently may contribute to machine overheating events.

Reversing Fan Duration

The “Reversing Fan Duration” is adjustable between 5 seconds and 12 seconds. This is the duration of each reverse cycle in the automatic mode. The fan will automatically return to the forward air flow direction after each reverse cycle. The factory default is 8 seconds.

Display Settings Menu

The “Display Settings” menu allows the operator to adjust several aspects regarding the look of the display. These adjustments will be stored under each operator profile. When the Anti-Theft Security System is enabled, the settings take effect each time an Operator Code is entered at the log in prompt. If the Anti-Theft Security System is not enabled, the Display Settings at the time of the previous KEY OFF will remain in effect. See “Anti-Theft Security System”.

Units

The “Units Adjustment” allows the operator to switch between Metric and English units. The factory default is English.

Language

The “Language Adjustment” allows the operator to switch the display messages among six languages: English, Spanish, French, German, Portuguese, and Italian. The factory default is English.

Digital Readout

The “Digital Readout” allows the operator to either have the numerical gauge values display turned ON or OFF. The factory default is ON.

Gauge Layout

The “Gauge Layout Adjustment” allows the operator to select the Main Monitor Screen display from several available layouts. See “Monitoring Screen”. The factory default is Gauge Layout 1. A unique night time scheme is represented by the “moon” icon:

Background

The “Background Adjustment” allows the operator to select the background color of the display from several available colors.

Enable Backup lines

NOTICE

Use of backup camera lines do not replace the basic safety precaution and procedures for machine operation in reverse.

The “Enable Backup Lines Adjustment” allows the operator to turn on reference lines when the display is in Backup Camera Mode. The Machine Width reference lines, provide an approximate indication of the backup path of the machine in a straight line. The Rear Distance reference marks provide an approximate gauge of how close objects are to the rear of the machine.

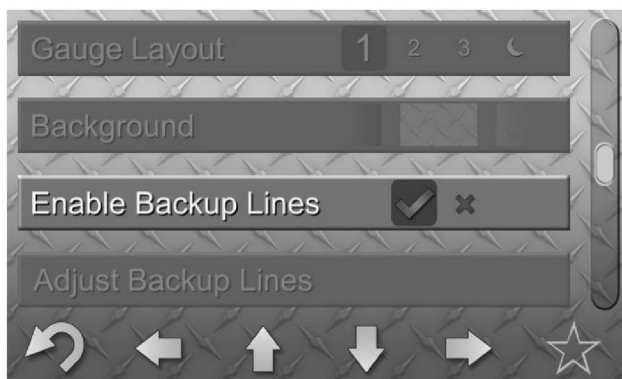


Illustration 118 g06360638

Enable Backup Lines Setting

Select the green “check mark” icon to enable the backup lines. Select the red “X” icon to disable the backup lines.

Note: The backup lines should never replace visually ensuring the area behind the machine is free of objects before traveling in reverse. The backup lines may be adjusted by the operator to better suit their preferences. See "Display Settings, Adjust Backup Lines".

Adjust Backup Lines

NOTICE

Use of backup camera lines do not replace the basic safety precaution and procedures for machine operation in reverse.

If the Backup Lines are enabled, the “Adjust Backup Lines Adjustment” screen provides the user various adjustments for both the Machine Width reference lines and Rear Distance reference marks.

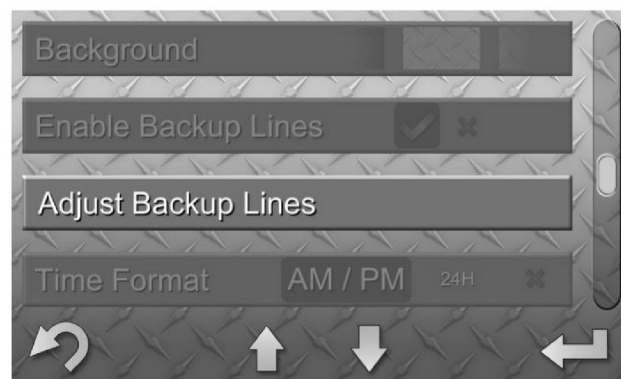


Illustration 119 g06360705

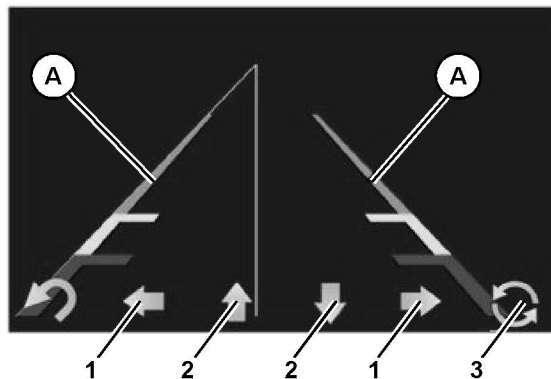


Illustration 120 g06364685

Machine Width Reference Lines Adjustment

- (A) Machine Width Reference Lines
- (1) Left/Right Position Adjustments
- (2) Angle Adjustments
- (3) Adjustment Toggle

The position of the Machine Width reference lines may be adjusted left and right, and the angle of each increased or decreased independently to suit the operator. Refer to 120 . It is recommended to align the Machine Width reference lines with the outside of the machine's tracks or tires and parallel to the machine. A long straight edge, tape, curb, etc. may be useful during this adjustment.

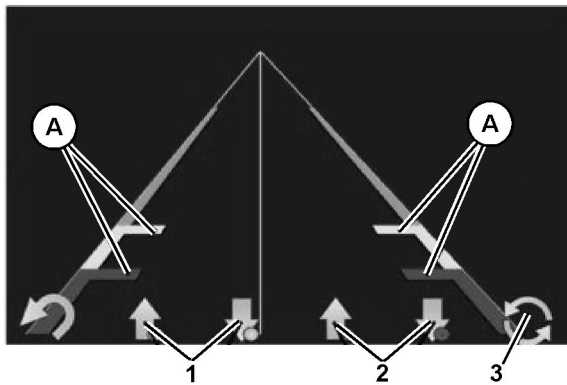


Illustration 121

g06364695

Rear Distance Reference Marks Adjustment

- (A) Rear Distance Reference Marks
- (1) Yellow Marks Adjustments
- (2) Red Marks Adjustments
- (3) Adjustment Toggle

The position of the Rear Distance reference marks may be adjusted in and out (or nearer to and farther from) with respect to the rear of the machine to suit the operator. Refer to 121. It is recommended to set these reference lines known distances from the machine's rear door. A pair of cones, flags, paint marks, ect. may be useful during adjustment.

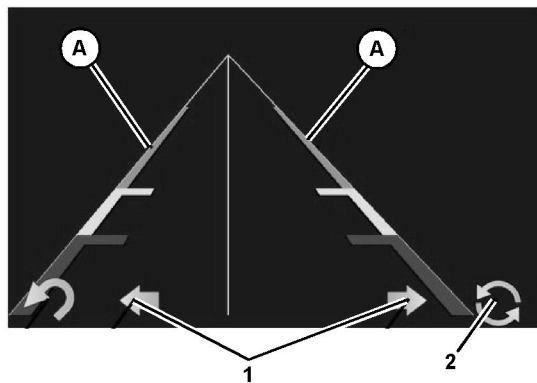


Illustration 122

g06361003

Reference Lines Skew Adjustment

- (A) Reference Lines
- (1) Left and Right Skew Adjustment
- (2) Adjustment Toggle

The left-to-right skewness of the reference lines may be adjusted to account for the off-center location of the backup camera on some models. Refer to 122.

Note: The backup lines should never replace visually ensuring the area behind the machine is free of objects before traveling in reverse.

Note: The meaningfulness of the backup lines depends greatly on the position and angle of the backup camera, which can change over time. The backup lines should be checked or re-adjusted periodically. Each operator should be aware of the backup lines and understand their relative meaning on the machine.

Time Format

The "Time Format Adjustment" allows the operator to select a 12 hr AM/PM, 24 hr clock format, or disable the clock from appearing.

Set the Time

The "Set the Time Adjustment" allows the operator to set the current time of day.

Data Format

The "Date Format Adjustment" allows the operator to select between three date formats; MM/DD/YY, DD/MM/YY, or YY/MM/DD.

Set the Date

The "Set the Date Adjustment" allows the operator to set the current date.

Set Custom Image

This screen allows the owner to upload a custom image that will be used as the "splash" screen image which is visible while the display boots up after each key ON. The image is loaded via a USB thumb drive plugged into the machine's USB port. The image must be either a .jpeg, .jpg, or .png file and formatted 800 x 400 for best fit. See "Operator Controls, Left Side Controls, Power Supply Port".

Security Grace Period

If Machine Security is enabled, the "Security Grace Period Adjustment" allows the user to select from several choices of grace periods, which will determine how long the machine remains unsecured once Keyed OFF. The grace period timer begins at Key OFF and during the grace period, the machine will not require reentry of a PIN when Keyed ON again.

The available grace periods are 15 min, 30 min, 1 hr, 2 hrs, and 4 hrs. The factory default is 30 min. A user logged in via a Master Code may select any of the available grace periods. A user logged in via an Operator Code will only be allowed to adjust this value up to the grace period stored in the Master Profile. See "Anti-Theft Security System", "User Management, Master Code" and "User Management, Operator Code" in this section.

Dealer Name

The “Dealer Name” setting allows the owner to enter a Dealer Name or any other combination of text and numerals. The entry is displayed momentarily on the Welcome Screen each time the machine is “KEYED ON”. This adjustment requires a Master Code to access once a Master Code has been established. An Operator Code will not allow access to this adjustment. See "User Management, Master Code, and Operator Code".

Dealer Phone

The “Dealer Phone” setting allows the owner to enter a Dealer Phone Number or any other combination of numerals. The entry is displayed momentarily on the Welcome Screen each time the machine is “KEYED ON”. This adjustment requires a Master Code to access once a Master Code has been established. An Operator Code will not allow access to this adjustment. See "User Management, Master Code, and Operator Code".

Job Clock Menu

These screen allows the operator to start, stop, and reset a job clock. The job clock saves over the key cycle and starts up automatically on the next startup or operator login. A separate job clock is stored under each operator profile.

Service Menu

The “Service Menu” is composed of several sub menus which allow the user to access valuable information about the machine. These sub menus are described below:

Diagnostics Sub Menu

The screens within this sub menu allow the user to view active (currently occurring) or logged (having occurred; may be active or no longer active) machine condition warnings.

Diagnostics & Events

Diagnostic Codes indicate that a sensor or hardware component is currently faulted (Active Diagnostic), or has faulted previously (Logged Diagnostic) and machine functionality may be impacted.

Event Codes indicate that a sensor is detecting (Active Event), or has previously detected (Logged Event) a condition that could result in machine damage if not corrected as soon as possible.

There are three levels of Diagnostic and Event Codes indicating the relative severity of the warning. The pop-up screens will change color depending on the warning level.

Level 1 – A condition is trending in a direction that may indicate that damage could occur if the

operating condition persists. There is no pop-up screen displayed for this level but the Driver Alert Indicator will illuminate continuously. The diagnostic or event code will be shown on a green background in these screens. The operator should stop the machine at the earliest convenience and investigate the cause. If no additional alert indicators are illuminated, contact your Cat dealer or refer to the service manual for more information. See "Alert Indicators".

Level 2 – A condition has been detected which could result in component damage. A yellow pop-up screen will be displayed providing information on the condition. The Driver Alert will be flashing but no cab alarm will be audible. The diagnostic or event code will be shown on a yellow background in these screens. The operator should change operation or perform the indicated maintenance being displayed. See "Alert Indicators"

Level 3 – A condition has been detected that is likely to result in severe component damage and could result in injury. A red pop-up screen will be displayed providing information on the condition. The Driver Alert will be flashing and the cab alarm will be audible. The diagnostic or event code will be shown on a red background in these screens. The operator should stop the machine immediately and perform the indicated maintenance being displayed or contact your Cat dealer. See "Alert Indicators".

Preventative Maintenance Sub Menu

The "Preventative Maintenance" interval screens are pop-up reminders to indicate that a scheduled maintenance interval is approaching. These intervals are based on machine hours and can be reset by the owner after the maintenance is performed. The screens will provide the operator several pieces of information including:

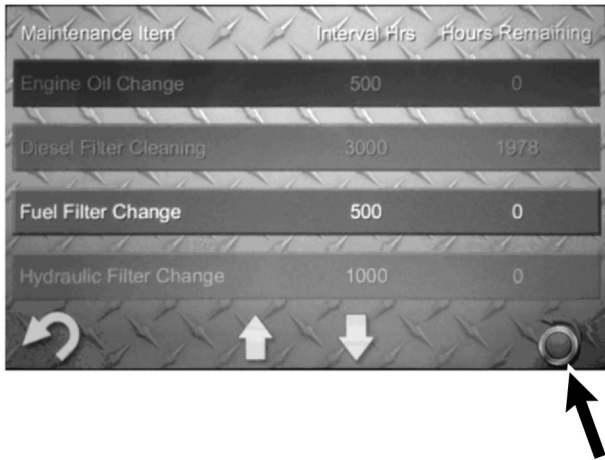
Maintenance Item – The item to be checked or changed

Interval Hours – The service interval or machine hours between repeated services.

Hours Remaining – The number of machine hours remaining before the service item becomes past due.

Activation Hours – The actual value of the machine hours when the service is due

Reset – Select this icon to reset the maintenance interval after a service has been performed.



Maintenance Item	Interval Hrs	Hours Remaining
Engine Oil Change	500	0
Diesel Filter Cleaning	3000	1978
Fuel Filter Change	500	0
Hydraulic Filter Change	1000	0

Illustration 123

g03704585

Note: Only the Master account can reset the maintenance interval.

Status Parameters Sub Menu

The "Status Parameters" screen shows the status of some of the most important machine parameters such as throttle position, engine speed, joystick position, battery voltage, drive motor speed. The parameter status information may be useful for basic troubleshooting.

Information Sub Menu

This screen will display various system-related information including the following items:

- Machine Serial Number
- Engine ECU hardware and software part number
- Advanced Display hardware and software part number

This information can be shared with the Cat Dealer to ensure that the machine has the latest software installed to take advantage of any improvements developed since the machine was manufactured.

USB Software Update Sub Menu

Allows for the Cat dealer to service the Advanced Display's software as needed.

User Management

On machines equipped with the latest Advanced Display software, security may be enabled by the user under this menu. Security may always be enabled by the Cat dealer regardless of machine configuration. See "Anti-Theft Security System" in this section.

If security has been enabled, the User Management menu screens allow the addition, deletion, and editing of operator profiles as well the viewing and re-setting of machine or operator-specific information.

There are two types of profiles; the Master Profile, which is accessed by entry of the Master Code during the logon sequence, and one or more Operator Profiles, which are accessed by entry of an Operator Code. Entry of either a Master Code or an Operator Code will yield specific rights regarding the viewing & editing capability of information.

Master Code

The default Master Code is "1111" and is established when the Anti-Theft Security System is first enabled. This code should be changed by the owner as soon as possible as a security best practice. Options available in the User Management menu while logged in under the Master Code are as follows:

View – The master operator can view and edit the following information for each operator profile.

- An operator profile name up to 15 ASCII characters
- The total machine hours accrued while the operator has been logged in.
- Total Fuel used while the operator has been logged in (electronic engines only).
- The Total Machine Hours and Total Fuel Used may be reset independently.
- The Event and Diagnostic Codes that have occurred while the operator has been logged in.

Add Operator – Allows the Master Operator to add an operator profile and set the Operator Name and Operator Code

Delete Operator – Allows the Master Operator to delete an operator profile. The Master Operator cannot be deleted.

Edit Operator – Allows the Master Operator to Change the current Operator Name and Operator Code.

Set the Time and Date – Allows the Master Operator to set the current time and date.

Restore Default Settings – Allows the Master Operator to restore the factory machine settings of either the Master Profile (Restore My Default Settings), or the Master Profile, and all Operator Profiles (Restore All Default Settings).

Note: The settings that exist in the Master Profile for Security Grace Period, and Machine Speed Limit will be the maximum allowable values for all Operator Profiles. A user logged in via an Operator Code will only be allowed to adjust these settings between the factory allowable minimum value and the value in the Master Profile. See "Machine Settings, Speed Limit" and "Display Settings, Security Grace Period" in this section.

Operator Code

Operator Profiles are only available for creation while logged in under the Master Code. During creation of an Operator Profile, a unique Operator Code (four to six digits) should be chosen. Options available in the User Management menu while logged in under an Operator Code are as follows:

View – The Operator can view the following information for the currently logged in operator.

- The name of the current operator
- The total machine hours accrued while the operator has been logged in.
- Total Fuel used while the operator has been logged in (electronic engines only).
- The Display Event and Diagnostic Codes that have occurred while the operator has been logged in.

Edit Operator – Allows the Operator to Change the current Operator Name and Operator Code.

Note: When switching between profiles, the Security Grace Period must be allowed to expire before the next key ON event will prompt for entry of a logon code. The grace period set by the current profile may be ignored at key OFF by selecting the soft key under the green check mark symbol. This selection will secure the machine within about 30 seconds, allowing for faster switching between profiles.

Anti-Theft Security System

If enabled, this feature requires an operator to enter a valid Operator Code before allowing the engine to crank. There is one Master Code and up to 50 unique Operator Codes.

Entry of a valid code will also automatically load Machine Settings and Display Settings that have been previously saved under the current operator profile. See "Menu Screen, Machine Settings and Display Settings".

- Press the appropriate key once for the odd numerals (1, 3, 5, 7, or 9).
- Press the key twice quickly for the even numerals (2, 4, 6, 8 or 0).

After the code is entered, press the "enter" key to submit the code. If the code is incorrect, the Display Window will show "Invalid Code" and another attempt can be made. If the code is correct, the Welcome Operator Screen will be displayed and the Machine Settings and Display Settings loaded from the operator profile. The key switch may be moved to the "START" position to start the machine.

Note: For security purposes, in the event an incorrect PIN is entered five times consecutively, the system will lock itself down for 15 minutes, during which period even a correct PIN will not allow the engine to crank. After the 15 minute lockdown period, entry of a correct PIN will unlock the system as usual.

Note: On machines equipped with the latest Advanced Display software, security may be enabled by the user under the "User Management" sub menu. Security may always be enabled by the Cat dealer regardless of machine configuration.

Backup Camera Mode

NOTICE

Use of backup camera lines do not replace the basic safety precaution and procedures for machine operation in reverse.

Note:

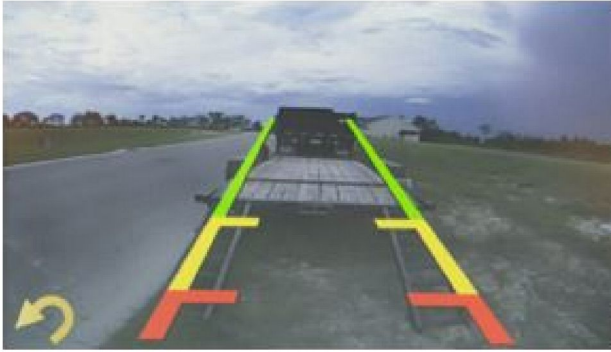


Illustration 124

g06362372

The Camera Screen shows the input from a connected camera if equipped. The display will automatically switch to the Camera Screen anytime the machine is commanded to travel in reverse. Once the reverse travel command is no longer applied, the screen will automatically revert to the prior screen.

The camera display may also be activated from the monitoring screen at any time by pressing the left most soft key which will depict a camera symbol above it while the camera display is not active. Pressing this button again will return the user to the monitoring screen.

Note: The display will momentarily display the camera view each time the parking brake is released.

Note: The backup lines should never replace visually ensuring the area behind the machine is free of objects before traveling in reverse. The backup lines may be adjusted by the operator to better suit their preferences. See "Display Settings, Adjust Backup Lines".

Other Features in the Cab

Interlock Control



Illustration 125

g06353312

Armrests

Interlock Control – Move the armrests to the RAISED position to lock out the hydraulic controls.

Note: When the armrests are moved to the RAISED position, the parking brake will engage. Move the armrests to the LOWERED position and push the switch for the parking brake to activate the hydraulic controls.

Note: When you start the engine, the parking brake must be disengaged in order for the hydraulic controls to be activated. If the armrests are raised and lowered during operation, disengage the parking brake in order for the hydraulic controls to be activated.

Engine Speed Control

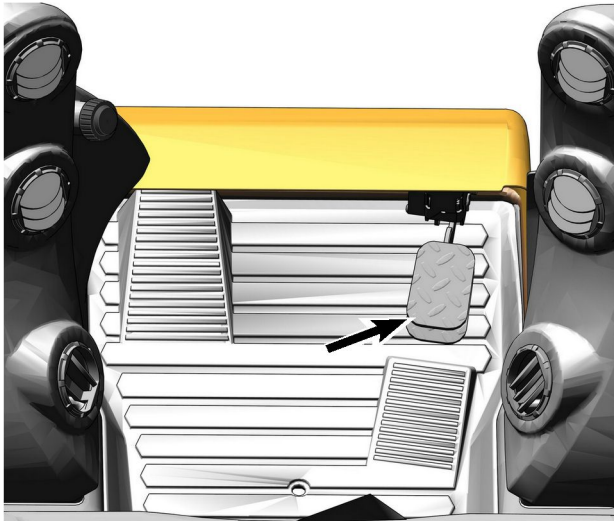


Illustration 126

g06353347



Engine Speed Control – Push down on the Engine Speed Control Pedal to increase engine speed. Release the Engine Speed Control Pedal to decrease engine speed. The Engine Speed Control Pedal will return to the setting of the engine speed control knob.

Note: If the Engine Speed Control Knob is fully clockwise, the Engine Speed Control Pedal will lower engine RPM.

Note: The deceleration function will not lower the RPM to low idle. Do not use this function as a braking function.

Note: There are several features that may impact the available engine speed range of the machine. Refer to Operation and Maintenance Manual, “Engine Starting” for more detailed information.

Suspension Seat



Illustration 127

g06353392

(40) Fore/Aft Adjustment
(41) Adjustment for the suspension

Fore/Aft lever (40) – Move the lever to adjust the seat.

Height (41) – Turn the knob to adjust the suspension of the seat. Turn the knob clockwise for a heavier person. Turn the knob counterclockwise for a lighter person.

Standard Seat



Illustration 128

g06353400

(40) Fore/Aft Adjustment



Illustration 129

g06353409

(40) Fore/Aft Adjustment

Air Suspension Seat



Illustration 130

g06353444

- (40) Fore/Aft Adjustment
- (41) Adjustment for the suspension
- (42) Heat (refer to Seat Heater Controls)
- (43) Seat Angle (Incline/Recline)
- (44) Lumbar



Seat Adjustment

Push in the knob (41) to increase the stiffness of the suspension. Pull the knob to decrease the stiffness of the suspension. The button (42) on the front will turn on heat. The lever on the left side (43) will Incline and decline the seat. To adjust the lumbar, (44) turn the knob on left rear of seat.

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

Seat Heater Controls



Illustration 131

g06353516

⚠ WARNING

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

The control switch (42) for the seat heater is located near the middle of the seat just below the seat cushion.

Press the top of the switch to turn ON the seat heater. The switch's lamp should illuminate indicating the switch is in the ON position. Press the bottom of the switch to turn OFF the seat heater.

Note: If the switch is in the ON position the seat heater will work even if the switch's lamp does not illuminate. Have a failed lamp replaced as soon as possible.

Armbar and Controls - Adjust

The armbar and joystick assemblies may be adjusted to improve operator comfort.

Cab-Mounted Controls for Mechanical Suspension Seat

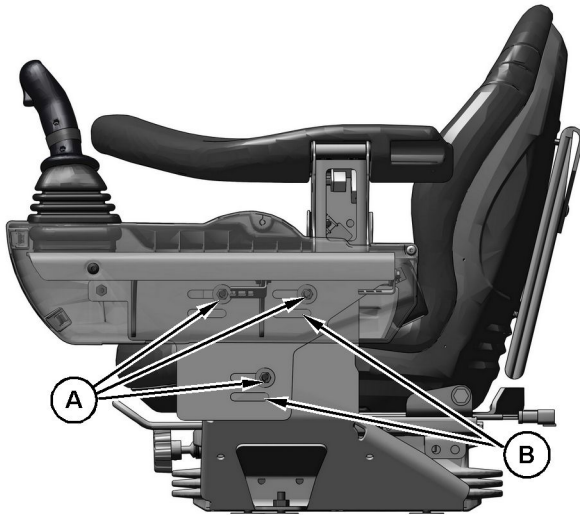


Illustration 132

g06353534

Mechanical Suspension Seat

1. Remove the three locknuts and washers (A).
2. Raise the controls bracket up to the alternate mounting slots (B).
3. Adjust for / aft as desired.
4. Reinstall the washers and locknuts (A).
5. Torque to $15 \pm 3 \text{ N}\cdot\text{m}$ ($11 \pm 2 \text{ lb ft}$).

Seat-Mounted Controls for Air Ride Suspension Seat

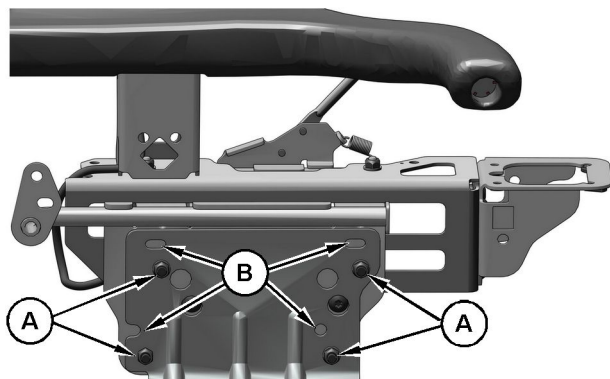


Illustration 133

g06353580

Air Ride Suspension Seat

1. Remove the three locknuts and washers (A).

2. Raise the controls bracket up to the alternate mounting slots (B).
3. Adjust fore/aft as desired.
4. Reinstall the washers and locknuts (A).

Joystick Controls

There are three possible joystick control patterns depending on how the machine is equipped. Each control pattern will affect movement of the work tool and movement of the machine. Each pattern will be discussed in a separate section below.

1. Cat Control Pattern – Default control pattern for machines that are NOT equipped with either the optional Selectable Control Pattern feature or the Dedicated H-Control Pattern feature. Option "1" control pattern for machines that are equipped with the Selectable Control Pattern feature. Refer to Operation and Maintenance Manual, "Operator Controls, Left Side Controls, Selectable Pattern Control Switch".

2. H-Control Pattern – Default control pattern for machines that are equipped with the optional Dedicated H-Control Pattern feature. Option "2" control pattern for machines that are equipped with the Selectable Control Pattern feature. Refer to Operation and Maintenance Manual, "Operator Controls, Left Side Controls, Selectable Pattern Control Switch".

3. Hand and Foot Control Pattern – Default control pattern for machines that are equipped with the optional Electrohydraulic (EH) Hand and Foot Controls.

Refer to the section Operation and Maintenance Manual, "Auxiliary Hydraulic Controls" following the three control patterns for instructions about the Auxiliary Hydraulic System.

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

Cat Control Pattern: Left-Hand Joystick

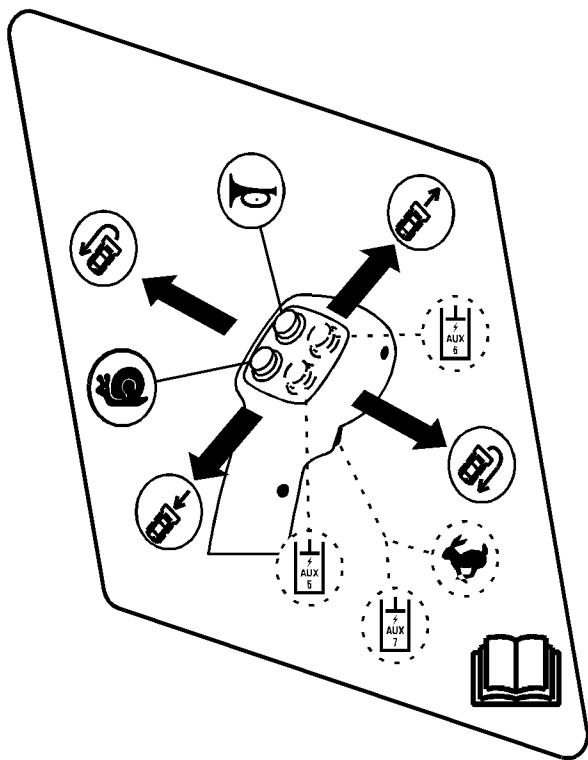


Illustration 134

g03217557

Instruction Film for the Left-Hand Joystick

Forward



Forward Travel – Push the joystick forward to travel forward.

Backward



Backward Travel – Pull back on the joystick to travel in reverse.

Right Turn



Right Turn – Move the joystick to the right to turn the machine to the right.

Left Turn



Left Turn – Move the joystick to the left to turn the machine to the left.

Horn



Horn – Press the switch to sound the horn. Use the horn to alert personnel.

Two Speed Control



Two-Speed – Press the trigger and release the trigger on the front of the left-hand joystick to activate rabbit mode. To activate rabbit mode, the Multifunction Switch must also be in the two-speed position. Refer to “Multifunction Switch for the Left-Hand Trigger (3)” above for instructions about the switch.

Note: Keep the work tool close to the ground when you travel in rabbit mode. This method will maximize the stability of the machine.

Creep Control

The Creep Control allows the operator to select a maximum machine travel speed at full joystick movement. Use creep control for operations that require slow, constant speed independent of engine idle speed.



Creep Control – To activate the creep control, stop the machine and return the joysticks to the **NEUTRAL** position. Press the bottom left-hand switch on the left-hand joystick to turn on the creep control. To deactivate the creep control, stop the machine and return the joysticks to the **NEUTRAL** position. Press the bottom left-hand switch on the left-hand joystick to turn off the creep control.

Refer to "Right Side Controls (Alternate), Creep Control" for detailed information about the creep speed control.

Cat Control Pattern: Right-Hand Joystick

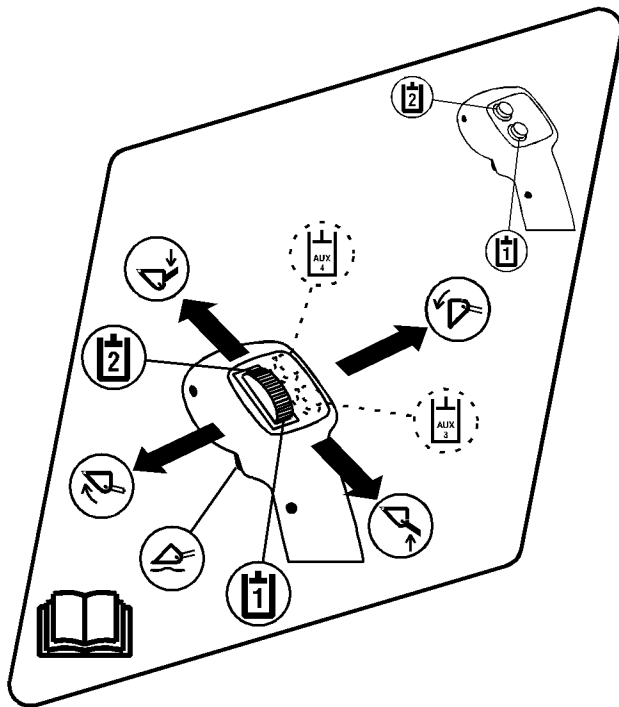


Illustration 135

g01259303

Instruction Film for the Right-Hand Joystick

Lower



Lower – Push the joystick forward to lower the work tool.

Dump



Dump – Move the joystick to the right to tilt the work tool downward.

Raise



Raise – Pull the joystick backward to raise the work tool.

Tilt Back



Tilt Back – Move the joystick to the left to tilt the work tool upward.

Float



Float – Float allows the work tool to follow the contour of the ground.

The following conditions will activate the float function on the machine.

Move the joystick to the LOWER position and press the trigger. Float is activated. You may now release the trigger.

Once the float function is engaged, the joystick can be returned to the neutral position without affecting the float function. Float will remain engaged until the trigger on the right-hand joystick is pressed again. The float function will disengage also when the bucket is raised or when the bucket is lowered by a command greater than approximately 15% of full joystick range.

Auxiliary Shake Out Mode

Auxiliary Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the right-hand joystick thumb wheel over the NEUTRAL position three times within a 2 second period to activate Auxiliary Shake Out mode. Auxiliary Shake Out mode will remain engaged while the thumb wheel is moved back and forth over the NEUTRAL position. Normal auxiliary control mode will return when the movement of the thumb wheel is discontinued.

Bucket Shake Out Mode

Bucket Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the Right-Hand Joystick over the NEUTRAL position three times within a 2 second period to activate Bucket Shake Out mode. Bucket Shake Out mode will remain engaged while the Right-Hand Joystick is moved left and right over the NEUTRAL position. Normal bucket control mode will return when the movement of the Right-Hand Joystick is discontinued.

H-Control Pattern: Left-Hand Joystick

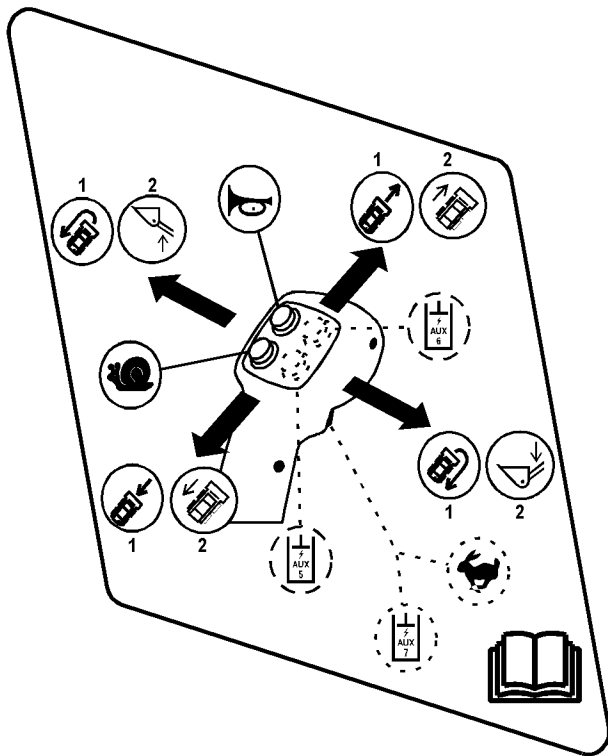


Illustration 136

g03833367

Instruction Film for the Left-Hand Joystick

Forward Drive



Forward – Push the left-hand joystick forward to move the left side of the machine forward.

Push both joysticks forward equally to move the machine in a straight line.

Reverse Drive



Reverse – Pull the left-hand joystick backward to move the left side of the machine backward.

Pull both joysticks backward equally to move the machine backward in a straight line.

Right Turn

Push the left joystick forward to turn the machine to the right.

Push the left joystick forward and pull the right joystick backward to turn the machine rapidly to the right.

Horn



Horn – Press the switch to sound the horn. Use the horn to alert personnel.

Two Speed Control



Two-Speed – Press the trigger and release the trigger on the front of the left-hand joystick to activate rabbit mode. To activate rabbit mode, the Multifunction Switch must also be in the two-speed position. Refer to “Multifunction Switch for the Left-Hand Trigger (3)” above for instructions about the switch.

Note: Keep the work tool close to the ground when you travel in rabbit mode. This method will maximize the stability of the machine.

Lower



Lower – Move the joystick to the right to lower the work tool.

Raise



Raise – Move the joystick to the left to raise the work tool.

Creep Control

The Creep Control allows the operator to select a maximum machine travel speed at full joystick movement. Use creep control for operations that require slow, constant speed independent of engine idle speed.



Creep Control – To activate the creep control, stop the machine and return the joysticks to the **NEUTRAL** position. Press the bottom left-hand switch on the left-hand joystick to turn on the creep control. To deactivate the creep control, stop the machine and return the joysticks to the **NEUTRAL** position. Press the bottom left-hand switch on the left-hand joystick to turn off the creep control.

Refer to "Right Side Controls (Alternate), Creep Control" for detailed information about the creep speed control.

H-Control Pattern: Right-Hand Joystick

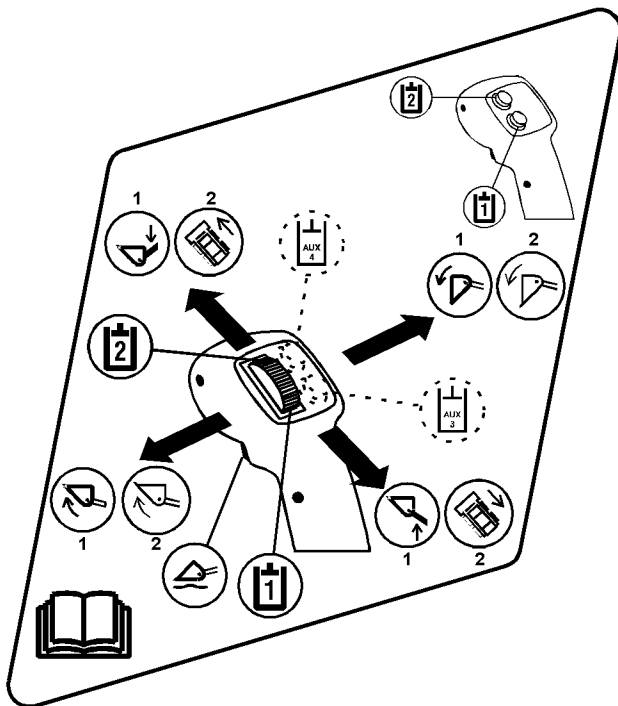


Illustration 137

g03833372

Instruction Film for the Right-Hand Joystick

Forward Drive



Forward – Push the right-hand joystick forward to move the right side of the machine forward.

Push both joysticks forward equally to move the machine forward in a straight line.

Reverse Drive



Reverse – Pull the right-hand joystick backward to move the right side of the machine backward.

Pull both joysticks backward equally to move the machine backward in a straight line.

Left Turn

Push the right joystick forward to turn the machine to the left.

Push the right joystick forward and pull the left joystick backward to turn the machine rapidly to the left.

Dump



Dump – Move the joystick to the right to tilt the work tool downward.

Tilt Back



Tilt Back – Move the joystick to the left to tilt the work tool upward.

Float



Float – Float allows the work tool to follow the contour of the ground.

The following conditions will activate the float function on the machine.

Move the joystick to the LOWER position and press the trigger on the right-hand joystick. Float is activated. You may now release the trigger.

Once the float function is engaged, the joystick can be returned to the neutral position without affecting the float function. Float will remain engaged until the trigger on the right-hand joystick is pressed again. The float function will disengage also when the bucket is raised or when the bucket is lowered by a command greater than approximately 15% of full joystick range.

Auxiliary Shake Out Mode

Auxiliary Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the right-hand joystick thumb wheel over the NEUTRAL position three times within a 2 second period to activate Auxiliary Shake Out mode. Auxiliary Shake Out mode will remain engaged while the thumb wheel is moved back and forth over the NEUTRAL position. Normal auxiliary control mode will return when the movement of the thumb wheel is discontinued.

Bucket Shake Out Mode

Bucket Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the Right-Hand Joystick over the NEUTRAL position three times within a 2 second period to activate Bucket Shake Out mode. Bucket Shake Out mode will remain engaged while the Right-Hand Joystick is moved left and right over the NEUTRAL position. Normal bucket control mode will return when the movement of the Right-Hand Joystick is discontinued.

Hand and Foot Control Pattern: Left Side Controls

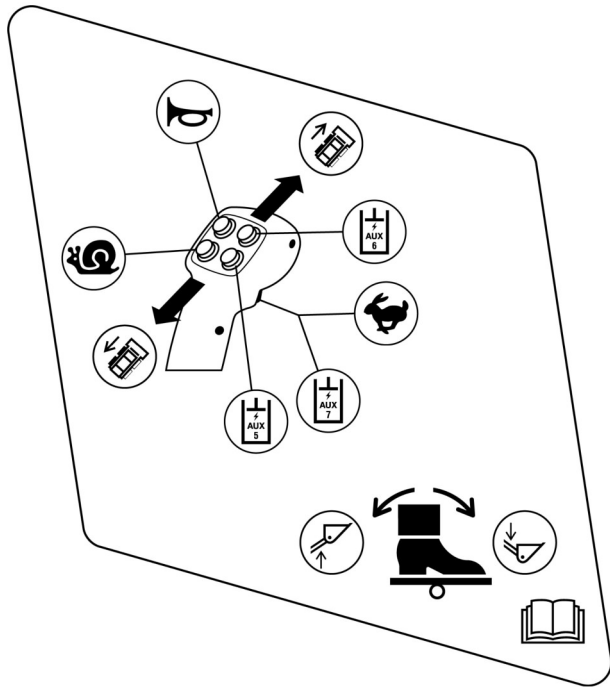


Illustration 138

g03819342

Instruction Film for the Left Side Controls

Note: Film on machine will have black background, white characters, and symbols.

Forward Drive



Forward – Push the left-hand joystick forward to move the left side of the machine forward.

Push both joysticks forward equally to move the machine in a straight line.

Reverse Drive



Reverse – Pull the left-hand joystick backward to move the left side of the machine backwards.

Push both joysticks backwards equally to move the machine backwards in a straight line.

Right Turn

Push the left joystick forward to turn the machine to the right.

Push the left joystick forward and pull the right joystick backward to turn the machine rapidly to the right.

Horn



Horn – Press the switch to sound the horn. Use the horn to alert personnel.

Two Speed Control



Two-Speed – Press the trigger and release the trigger on the front of the left-hand joystick to activate rabbit mode. To activate rabbit mode, the Multifunction Switch must also be in the two-speed position. Refer to “Multifunction Switch for the Left-Hand Trigger (3)” above for instructions about the switch.

Note: Keep the work tool close to the ground when you travel in rabbit mode. This method will maximize the stability of the machine.

Creep Control

The Creep Control allows the operator to select a maximum machine travel speed at full joystick movement. Use creep control for operations that require slow, constant speed independent of engine idle speed.



Creep Control – To activate the creep control, stop the machine and return the joysticks to the NEUTRAL position. Press the bottom left-hand switch on the left-hand joystick to turn on the creep control. To deactivate the creep control, stop the machine and return the joysticks to the NEUTRAL position. Press the bottom left-hand switch on the left-hand joystick to turn off the creep control.

Refer to "Right Side Controls (Alternate), Creep Control" for detailed information about the creep speed control.

Lower



Lower – Press the front portion (Toe) of the foot pedal to lower the work tool.

Raise



Press the rear portion (Heel) of the foot pedal to raise the work tool.

Hand and Foot Control Pattern: Right Side Controls

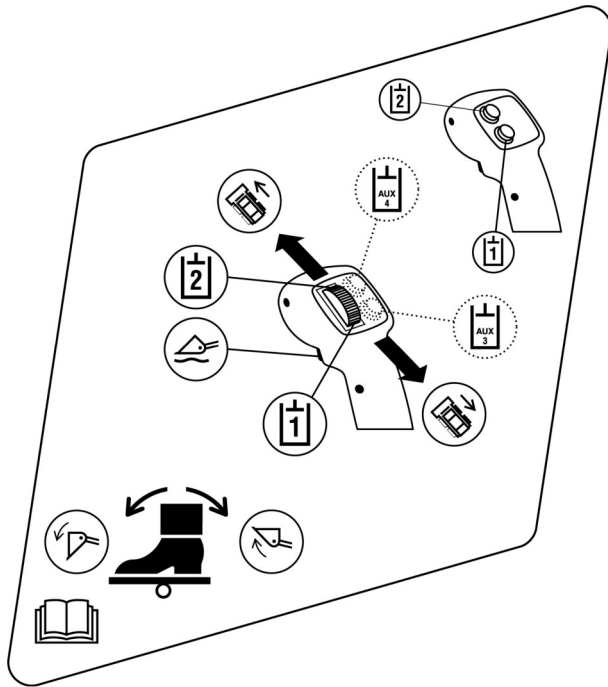


Illustration 139

g03819523

Instruction Film for the Right Side Controls

Note: Film on machine will have black background, white characters, and symbols.

Forward Drive



Forward – Push the right-hand joystick forward to move the right side of the machine forward.

Push both joysticks forward equally to move the machine forward in a straight line.

Reverse Drive



Reverse – Pull the right-hand joystick backward to move the right side of the machine backward.

Pull both joysticks backward equally to move the machine backward in a straight line.

Left Turn

Push the right joystick forward to turn the machine to the left.

Push the right joystick forward and pull the left joystick backward to turn the machine rapidly to the left.

Dump



Dump – Press the front portion (Toe) of the foot pedal to tilt the work tool downward.

Tilt Back



Tilt Back – Press the rear portion (Heel) of the foot pedal to tilt the work tool upward.

Float



Float – Float allows the work tool to follow the contour of the ground.

The following conditions will activate the float function on the machine.

Fully press the front portion (Toe) of the left-hand foot pedal to start the lift arms moving downward and press the right-hand joystick trigger. Float is activated. You may now release the trigger.

Once the float function is engaged, the foot pedal can be returned to the neutral position without affecting the float function. Float will remain engaged until the trigger on the right-hand joystick is pressed again. The float function will disengage also when the bucket is raised or when the bucket is lowered by a command greater than approximately 15% of full foot pedal range.

Auxiliary Shake Out Mode

Auxiliary Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the right-hand joystick thumb wheel over the NEUTRAL position three times within a 2 second period to activate Auxiliary Shake Out mode. Auxiliary Shake Out mode will remain engaged while the thumb wheel is moved back and forth over the NEUTRAL position. Normal auxiliary control mode will return when the movement of the thumb wheel is discontinued.

Bucket Shake Out Mode

Bucket Shake Out mode is an aggressive movement of the work tool to dislodge wet or sticky material.

Move the right side pedal over the NEUTRAL position three times within a 2 second period to activate Bucket Shake Out mode. Bucket Shake Out mode will remain engaged while the right side pedal is moved forward and backward over the NEUTRAL position. Normal bucket control mode will return when the movement of the right side pedal is discontinued.

Foot Pedal - Adjust

The angle of the foot pedal on machines equipped with Hand and Foot control pattern may be adjusted to improve operator comfort.

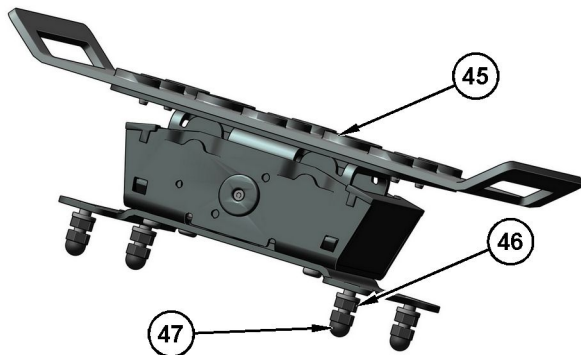


Illustration 140

g06353610

Cat Hand and Foot control pattern foot pedal

- (45) Foot Control Pedal
- (46) Hex nut
- (47) Acorn nut

1. Raise the cab.
2. Remove the acorn nuts (47) and Hex nuts (46) from beneath the cab floor.
3. Install up to a maximum of four washers 2mm thick washers.
4. Replace the Hex nuts (46) and torque to $12 \pm -3 \text{ N}\cdot\text{m}$ ($9 \pm -2 \text{ lb ft}$).
5. Replace the acorn nuts (3) and torque to $6 \pm -1 \text{ N}\cdot\text{m}$ ($4 \pm -1 \text{ lb ft}$).

Auxiliary Hydraulic Controls

If the work tool has a wiring harness, connect the work tool harness to the electrical plug on the loader arm. If your High Flow work tool does not have a wiring harness, a Jumper Plug should be installed on the electrical plug for the work tool control. Without this Jumper Plug, the machine will not provide High Flow to the work tool. Refer to your Parts Manual for the current part number for the Jumper Plug.

Note: High flow mode requires an electrical connection that is on the loader arm. Refer to Operation and Maintenance Manual, "Work Tool Coupler Operation" or Operation and Maintenance Manual, "Work Tool Operation" for additional details.

Note: If the high flow work tool does not have a wiring harness, consult the Operation and Maintenance Manual for the work tool for the proper instructions for attaching the work tool.

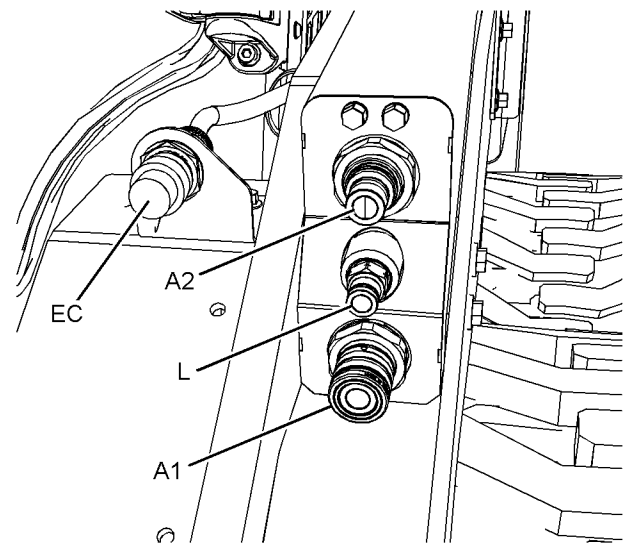


Illustration 141

g03820488

Auxiliary Flow Connections - non-XHP Models

- (EC) Work Tool Electrical Connector
- (A2) 1/2 inch Hydraulic Supply
- (A1) 1/2 inch Hydraulic Return
- (L) 3/8 inch Case Drain

Note: Your machine may not be equipped with all connections shown.

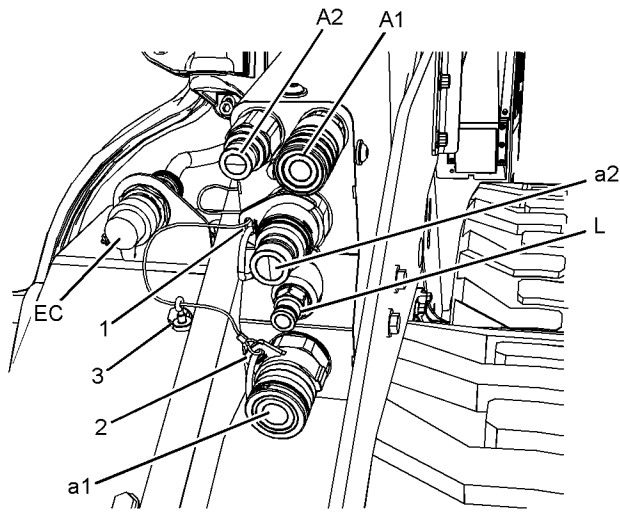


Illustration 142

g03820540

Auxiliary Flow Connections - XHP Models

- (EC) Work Tool Electrical Connector
- (a2) 3/4 inch Hydraulic Supply
- (A2) 1/2 inch Hydraulic Supply
- (a1) 3/4 inch Hydraulic Return
- (A1) 1/2 inch Hydraulic Return
- (L) 3/8 inch Case Drain
- (1) A2 Locking Clip
- (2) A1 Locking Clip
- (3) Magnet

Note: Your machine may not be equipped with all connections shown.

Note: The Locking Clips (1) and (2) are provided to secure the heavier 3/4 inch XHP hydraulic lines to prevent unintended flow and or pressure loss through the case drain (L) and to minimize the potential for line decoupling due to vibration. After making the hydraulic connection, the clips are inserted into the receiving grooves on the 3/4 inch XHP couplings (a1) and (a2). The larger clip (a1) cannot be inserted into the coupling unless a work tool is connected. The magnet (3) is provided to aid in securing this clip to the machine structure when not in use to prevent possible damage.

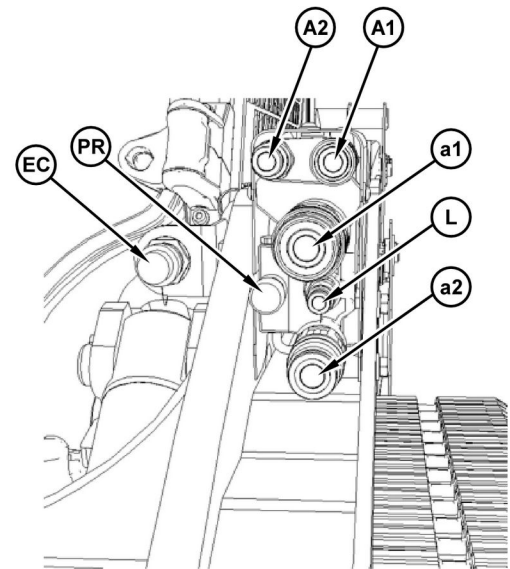


Illustration 143

g06298184

Auxiliary Flow Connections - Land Management Models

- (EC) Work Tool Electrical Connector
- (PR) Pressure Relief Knob
- (a2) 3/4 inch Hydraulic Supply
- (A2) 1/2 inch Hydraulic Supply
- (a1) 3/4 inch Hydraulic Return
- (A1) 1/2 inch Hydraulic Return
- (L) 3/8 inch Case Drain



Auxiliary Hydraulic Control (A1) – This control provides hydraulic oil flow to the auxiliary connections on the loader arm. Engage the control to provide hydraulic oil flow to the female connector (s) (A1) and (a1).



Auxiliary Hydraulic Control (A2) – This control provides hydraulic oil flow to the auxiliary connections on the loader arm. Engage the control to provide hydraulic oil flow to the male connector (s) (A2) and (a2).

Case drain line (L) – Some hydraulic or hydromechanical work tools will have a Case drain line coming off the work tool motor. It is a tube that routes back to the cooler to the low side return and back to the hydraulic tank.

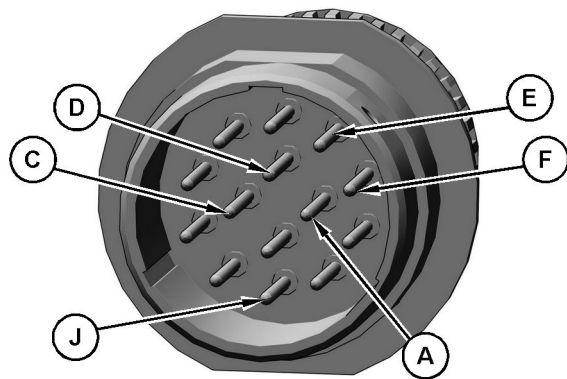


Illustration 144

g06364569

Typical electrical connection on the loading arm

- (A) Left-Hand Trigger Control "AUX 7"
- (C) C- Control
- (D) C+ Control
- (E) C2 Control
- (F) C1 Control
- (J) Auxiliary Electrical Control "AUX 8"



Auxiliary Electrical Control 3 (C-) – This control provides electrical power to activate additional work tool functions using a three-position diverter valve that is on some work tools. Press the switch and hold the switch to send power to the pin (C) this action will activate the required Work Tool function. Release the switch to deactivate the control. If the auxiliary hydraulic controls(A1/A2), and continuous flow is inactive, and a work tool featuring auto reverse functionality (such as cold planers) is connected, pressing the switch will send power to pin (C) and provide hydraulic flow to the female connector (s) (A1) and (a1).



Auxiliary Electrical Control 4 (C+) – This control provides electrical power to activate additional work tool functions using a three-position diverter valve that is on some work tools. Press the switch and hold the switch to send power to the pin (D). This action will activate the required Work Tool function. Release the switch to deactivate the control. If the auxiliary hydraulic controls(A1/A2), and continuous flow is inactive and a work tool featuring auto reverse functionality (such as cold planers) is connected, pressing the switch will send power to pin (D) and provide hydraulic flow to the female connector (s) (A1) and (a1).



Auxiliary Electrical Control 5 (C2) – This control provides electrical power to activate additional work tool functions using a three-position diverter valve that is on some work tools. Press the switch and hold the switch to send power to the pin (E) this will activate the required Work Tool function. Release the switch to deactivate the control.



Auxiliary Electrical Control (C1) – This control provides electrical power to activate additional work tool functions using a three-position diverter valve that is on some work tools. Press the switch and hold the switch to send power to pin (F). This action will activate the required Work Tool function. Release the switch to deactivate the control.



Left Hand Trigger – Pull the trigger and hold the trigger on the left-hand joystick to provide electrical power to pin (A). Release the trigger to deactivate the control.

Multifunction Switch must be in the Aux 7 position. Refer to "Multifunction Switch for the Left Hand Trigger (3) " above for instructions about the switch.

Note: These controls are used with the individual Work Tool Operation and Maintenance Manual to understand fully the functions of each control.



Pressure Relief Knob (PR) – See Operation and Maintenance Manual, Work Tool Coupler Operation Hydraulic System Pressure Relief for information.

i07330193

Battery Disconnect Switch

SMCS Code: 1411-B11; 1411

If equipped, the battery disconnect switch is located in the engine compartment near the battery. A D2-Series model will include a DEF Purge Indicator Lamp, which is not used in D-Series models.

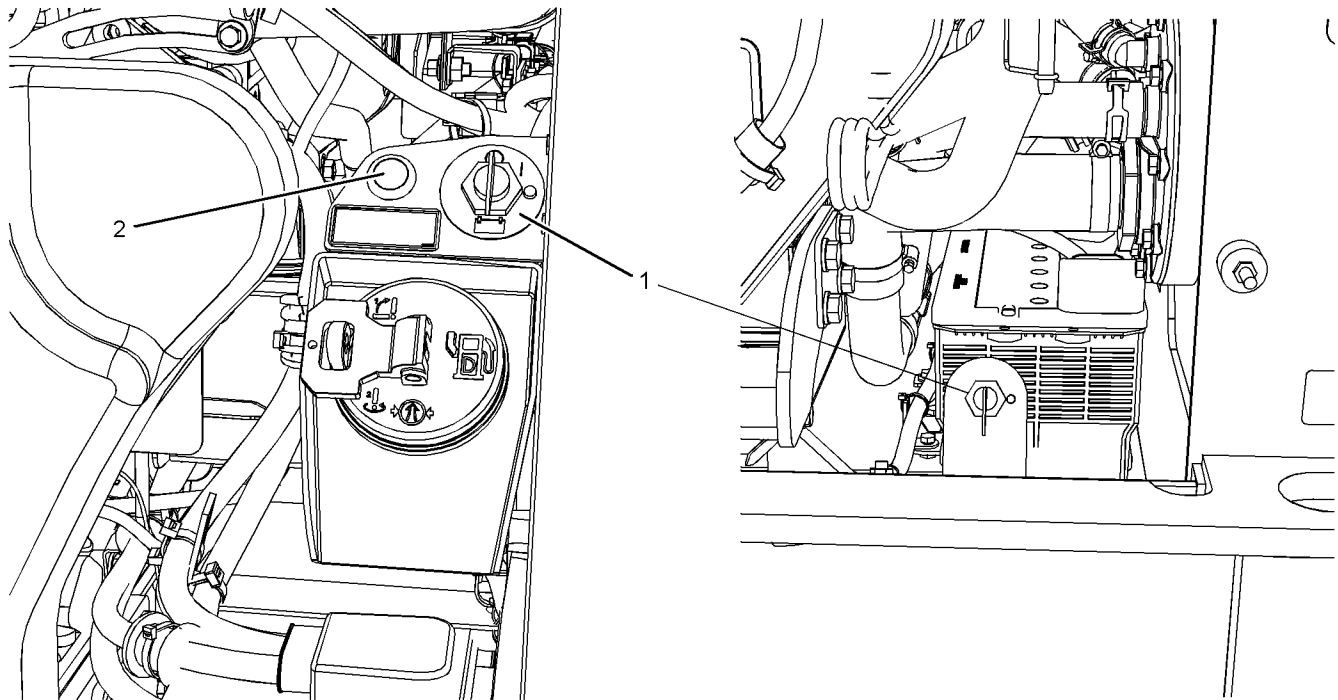


Illustration 145

g03821092

(1) Battery Disconnect Switch

(2) Diesel Exhaust Fluid (DEF) Purge
Indicator Lamp**NOTICE**

Do not conduct any service procedures on the DEF system until the DEF purge indicator lamp is not illuminated. The indicator lamp may remain illuminated for up to 12 minutes when the key switch is OFF. When the indicator is on, the DEF system is still powered.

If equipped, the DEF Purge Indicator Lamp (2) will remain ON after the Key Switch is turned OFF. This procedure is to ensure the DEF injector cool down and DEF system purge processes are complete. Disconnecting the battery while the DEF Purge Indicator Lamp (2) is ON can result in failure of the DEF injector, DEF Pump, or DEF lines.

Note: The DEF Purge Indicator Lamp is required with the battery disconnect on D2-Series machines.



ON – To activate the electrical system, insert the disconnect switch key and turn the battery disconnect switch (1) clockwise. The battery disconnect switch must be turned to the ON position before you start the engine.



OFF – To deactivate the electrical system, turn the battery disconnect switch (1) counterclockwise to the OFF position once the DEF Purge Indicator Lamp (2) is off.

The battery disconnect switch and the Key Switch perform different functions. The entire electrical system is disabled when you turn the Battery Disconnect Switch to OFF. The battery remains connected to the electrical system when you turn the Key Switch to OFF.

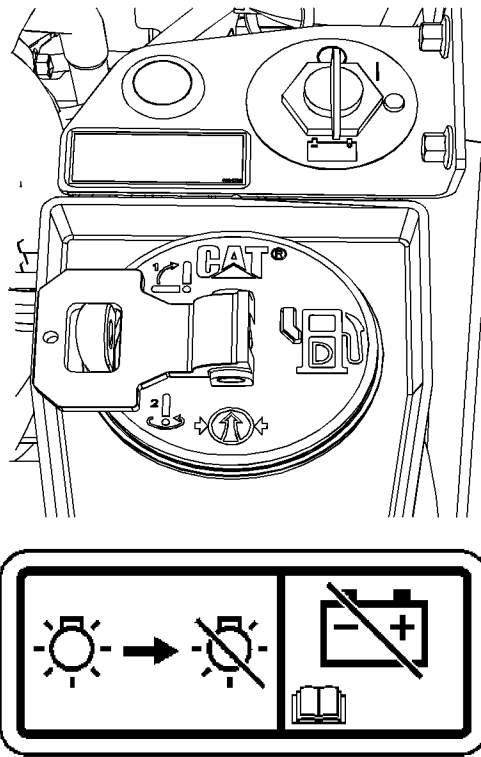


Illustration 146

g03821146

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

- short circuits
- current draw via some components
- vandalism

NOTICE

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

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

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

1. With the battery disconnect switch in the ON position, verify that electrical components in the operator compartment are functioning. Verify that the hour meter is displaying information. Verify that the engine will crank.
2. Turn the battery disconnect switch to the OFF position.

3. Verify that the following items are not functioning: electrical components in the operator compartment, hour meter, and engine cranking. If any of the items continue to function with the battery disconnect switch in the OFF position, consult your Cat dealer.

i08709698

Diesel Particulate Filter Regeneration

SMCS Code: 108F

S/N: BL21–Up

S/N: DX21–Up

S/N: EH21–Up

S/N: FD21–Up

S/N: HP21–Up

S/N: MD21–Up

S/N: BY41–Up

S/N: LW51–Up

S/N: PN51–Up

S/N: RE51–Up

S/N: TP51–Up

S/N: WE51–Up

S/N: HR61–Up

S/N: BE71–Up

S/N: BL71–Up

S/N: HP71–Up

S/N: DX91–Up

S/N: DTB1–Up

S/N: HFB1–Up

S/N: GTC1–Up

S/N: K2D1–Up

S/N: D9E1–Up

S/N: BYF1–Up

S/N: ETL1–Up

S/N: FTL1–Up

S/N: GTL1–Up

S/N: HLM1–Up

S/N: T9S1–Up

S/N: D5T1–Up

S/N: DZT1–Up

S/N: FMT1–Up

S/N: JST1–Up

S/N: B5W1–Up

S/N: EZW1–Up

S/N: TAW1–Up

S/N: BGZ1–Up

General Information

Regeneration is the removal of soot from the Diesel Particulate Filter (DPF). Active and passive regeneration is used to regenerate the DPF. The DPF traps both soot and ash. The soot is removed during regeneration. The ash is removed through a cleaning process. Refer to the Operation and Maintenance Manual, “Diesel Particulate Filter - Clean/Replace” for more information on the service of the DPF.

Modes of Regeneration

Passive – Passive Regeneration occurs when the exhaust temperature is high enough for regeneration to occur. Passive regeneration may occur unnoticed by the operator. No operator action is required. Operating the machine above mid throttle and under load allows for passive regeneration during normal operation. Low idle and low load applications will have lower exhaust temperatures, where passive regeneration is not possible.

Active – Active regeneration is a late injection of fuel into the combustion chamber, which sufficiently raises the exhaust temperature for active regeneration. The engine ECM uses multiple inputs from the engine to determine when active regeneration is needed. All applications, even high load, will require active regenerations. However, active regeneration will not occur as frequently as low idle and low load applications.

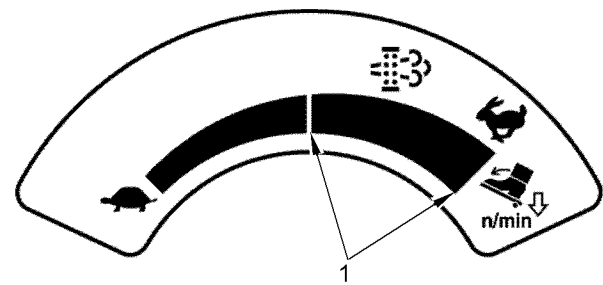


Illustration 147

g03395636

(1) Active regeneration threshold

Note: The green area is the active regeneration threshold.

There will be a slight change in the exhaust noise during active regeneration. Active regenerations may require the engine rpm to be above the active regeneration threshold. The active regeneration may take up to 30 minutes to complete.

When active regeneration is required with the parking brake and hydraulic lockout engaged, automatic adjustments of the engine speed by the ECM may occur to keep the engine RPM above the active regeneration threshold.

When active regeneration is required and the machine is being operated below the active regeneration threshold, the DPF alert indicator may illuminate. The operator can increase the rpm above the active regeneration threshold with the Engine Speed Control Knob. Active regeneration will occur and the DPF light will turn off.

If increasing the RPM is not acceptable, alternatively the operator can allow a parked regeneration. For a parked regeneration to occur. The engine must be at low idle, the parking brake engaged, and the hydraulic lockout engaged. If those conditions are met for approximately 2 minutes, the ECM will slowly increase the engine rpm and active regeneration will begin. After completing the active regeneration, the engine speed will slowly decrease down to low idle.

The following chart describes the alert indicators and what actions, if any, the operator needs to perform to allow active regeneration.

Warning Symbols



1 - DPF



2 - Alert



3- Cab Alarm

Engine Emission Alert

Table 90

Warning ⁽¹⁾	Machine Action	Operator Action
None	If the parking brake and hydraulic lockout are engaged, the ECM may increase the engine speed	No action required.
1 - Solid Amber	If the parking brake is not engaged and the engine speed is below the green shaded area on the Engine Speed Control Knob, the DPF light will turn on.	Increase the engine rpm to the green shaded area on the Engine Speed Control Knob, and the DPF light will turn off. or Bring the machine to a stop. Engage the parking brake and hydraulic lockout. Set the engine speed to low idle. The ECM will automatically increase the engine rpm to the regeneration threshold. The regeneration may take up to 30 minutes.
1 - Solid Amber 2 - Solid Amber	The engine will derate until active regeneration is completed	Bring the machine to a stop. Engage the parking brake and hydraulic lockout. Set the engine speed to low idle The ECM will automatically increase the engine rpm to the regeneration threshold. The regeneration may take up to 30 minutes.
1 - Solid Amber 2 - Flashing Amber 3 - Beeping	Engine will remain derated.	Regeneration can only be done through Cat Electronic Technician (ET), by an authorized Cat dealer. Consult your local Cat dealer. If the engine is run through these warning indicators, the DPF will require servicing and may require replacement. Engine damage can occur. Shut down the machine safely and contact your local Cat dealer.

⁽¹⁾ For Models equipped with either C3.3B or C3.8 Engine Only

Table 91

Warning (1)	Machine Action	Operator Action
None	If the parking brake and hydraulic lockout are engaged, the ECM may increase the engine speed	No action required.
1- Solid Amber	If the parking brake is not engaged and the engine speed is below the green shaded area on the Engine Speed Control Knob, the DPF light will turn on.	Increase the engine rpm to the green shaded area on the Engine Speed Control Knob, and the DPF light will turn off. or Bring the machine to a stop. Engage the parking brake and hydraulic lockout. Set the engine speed to low idle. The ECM will automatically increase the engine rpm to the regeneration threshold. The regeneration may take up to 30 minutes.
1 - Flashing Amber 2 - Solid Amber	If equipped, the Advanced Display will display a pop-up warning once the DPF light has been on for 1 hour.	
1 - Flashing Amber 2 - Flashing Amber	The engine will derate until active regeneration is completed	Bring the machine to a stop. Engage the parking brake and hydraulic lockout. Set the engine speed to low idle The ECM will automatically increase the engine rpm to the regeneration threshold. The regeneration may take up to 30 minutes.
1 - Flashing Amber 2 - Flashing Amber 3 - Beeping	Engine will remain derated.	Regeneration can only be done through Cat Electronic Technician (ET), by an authorized Cat dealer. Consult your local Cat dealer. If the engine is run through these warning indicators, the DPF will require servicing and may require replacement. Engine damage can occur. Shut down the machine safely and contact your local Cat dealer.

(1) For Models equipped with a C2.2 Engine Only

Note: If the machine is equipped with the Advanced Display, additional diagnostic information will be displayed in the monitor.

Carbon Dioxide (CO₂) Emissions Statement

Emissions regulations require that the value of the CO₂ emissions be reported to the end user. These CO₂ values are measured per the EU type approval process. These values are recorded in EU type approval certificates. CO₂ measurement results from testing over a fixed test cycle, under laboratory conditions, with a parent engine representative of the engine family. This value shall not imply or express any guarantee of the performance of a particular engine.

Table 92

Serial Number Prefixes	Engine	CO ₂ Emission Level
226D3 (EK5), 232D3 (GJ5), 239D3 (K5S & RWK), 249D3 (WS5 & WKD)	C2.2	799 g/kWh

(continued)

(Table 92, contd)

236D3 (GK6), 242D3 (ME6, T7Z), 257D3 (S7E), 259D3 (TE9)	C3.3B	807 g/kWh
246D3 (PF6, T9X), 262D3 (W6E, TP3), 279D3 (Z9E), 289D3 (BT9)	C3.3B	807 g/kWh
272D3 (L32, TY3), 272D3 XE (S1L, TY6), 299D3 (P3R, JX3), 299D3 XE (B62, GX9, R23, S38)	C3.8	758 g/kWh

EU Stage V Emissions Control System (European Union)

Operation & Maintenance of the Stage V Emissions Control System

The engine, including the emissions control system, shall be operated, used, and maintained in accordance with the instructions provided to the end users to maintain the emissions performance of the engine within the requirements applicable to the engine category.

Operation Section
Diesel Particulate Filter Regeneration

No deliberate tampering with or misuse of the engine emissions control system should take place. In particular regarding deactivating or not maintaining an exhaust gas recirculation (EGR) or a reagent dosing system if equipped.

It is essential to take prompt action to rectify any incorrect operation, use, or maintenance of the emissions control system in accordance with the rectification measures indicated by the unique warning diagnostic codes outlined below.

Failure Warnings and Operator Inducement Strategy

The EU Stage V Emissions Control system detects failures of the system by PM control diagnosis (PCD) and NOx control diagnosis (NCD). The system logs warning codes in the engine electronic control module (ECM) and signals the operator of system failure detection via a combination of visual and audible warnings in the machine operator station. Ignoring the operator warning signals will lead to the activation of the operator inducement system, which may result in an effective disablement of the machine.

Table 93

EU Stage V Emissions Control System Failure Warnings for C3.3B & C3.8 Engines						
Emission Failure Cause	Control Diagnostics System	Warning Code (SPN-FMI)	Event Level	Visual Warnings via Display	Audible Warning via Cab Alarm	Inducement Response
Removal of the DPF system	PCD (Particulate Matter)	3936-7	3	DPF Alert Indicator ⁽¹⁾ Driver Alert Indicator ⁽¹⁾ Diagnostic Pop-Up	Yes	None
Loss of function of the DPF system		3936-2	2		No	
Failure of the PCD system		3251-3	2		No	
Removal of the EGR system	NCD (NOx Emission)	523578-2	2		No	2 Stage Engine Derate
Removal of the MAF sensor		132-4	3		Yes	

⁽¹⁾ Refer to Operation and Maintenance Manual, Alert Indicators for additional information.

Table 94

EU Stage V Emissions Control System Failure Warnings for C2.2 Engines						
Emission Failure Cause	Control Diagnostic System	Warning Code (SPN-FMI)	Event Level	Visual Warnings via Display	Audible Warning via Cab Alarm	Inducement Response

(continued)

(Table 94, contd)

Loss of Function of the DPF	PCD (Particulate Matter)	5246-16	2	Driver Alert Indicator (flashing) & Diagnostic Pop Up (when equipped with Advanced Display)	None	Yes
		5246-0	3		Yes	Yes
		3251-1	3		Yes	No
Removal of DPF	3251-18	2	None		No	
Loss of Function of the EGR System	NCD (NOx Emission)	27-3	2	None	None	yes
		27-4	2	None	yes	

Alert Indicators

Inducement Levels

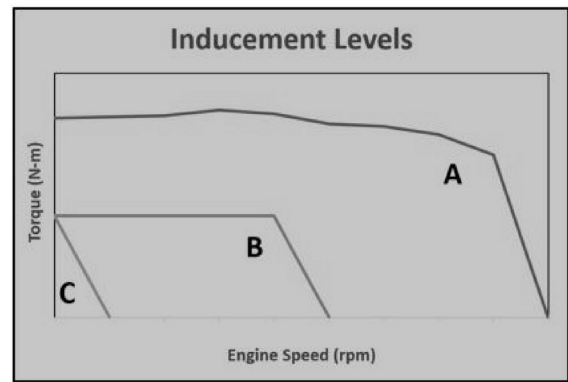


Illustration 148 g06362469

Illustration 149 g06362472

Alert Indicators & Pop-Up Warnings Identification

- (1) Driver Alert Indicator
- (2) DPF Alert Indicator
- (3) Diagnostic Pop-Up

EU Stage V Emissions Control System Inducement Levels

A – No Fault Code, Normal Operation Range

B – Stage 1 Inducement:

- Response: Engine De-rated to within 50% Max Torque, 60% Rated Speed
- Occurrence: After 3 hours 15 minutes of active fault

C – Stage 2 Inducement:

- Response: Engine delivers nearly No Net Torque, Engine Speed near Low Idle
- Occurrence: After 4 hours of active fault

DPF Service Operator Notification (C3.3B & C3.8 Engines Only)

The Diesel Particulate Filter (DPF) traps particulate matter in the form of both soot and ash. Soot is burned off periodically during the regeneration process, but ash will continue to accumulate slowly over time. Eventually, the DPF will become fully loaded with ash and will need to be serviced (cleaned or replaced) by an authorized Cat dealer.

Operation Section
Selective Catalytic Reduction Warning System

The EU Stage V emissions control system estimates the DPF's ash loading to provide maximum DPF life. When the ash load reaches an estimated 100%, the machine control system will generate an active event code and display a message to the operator. At this point it is recommended that the DPF be serviced. The message can be dismissed from the display and will reappear every 8 hours or each key cycle. After 50 hours without a service tool reset, the active event code will escalate and display a similar message every 15 minutes or each key cycle. If the message is continually ignored, the high ash content within the DPF will cause a high frequency of DPF regeneration triggering a diagnostic that is accompanied with an engine derate.



Illustration 150

g06362442

Typical Pop-Up Message of the DPF Service Notification

DPF Service Operator Notification (C2.2 Engines Only)

The Diesel Particulate Filter (DPF) traps particulate matter in the form of both soot and ash. Soot is burned off periodically during the regeneration process, but ash will continue to accumulate very slowly over time. The DPF is considered "fit for life" on these models and should never require servicing during the useful life of the machine. If you suspect a problem with the DPF however, stop the machine safely and contact your local Cat dealer.

Engine Manufacturer Contact Information (C3.3B & C3.8 Engines Only)

Kubota Europe SAS
19-25, Rue Jules Verceyusse, Z.I. BP88
95101 Argenteuil Cedex
France

Kubota Europe S.A.S. Italy Branch
Via Grandi, 29
20068 Peschiera Borrome (MI)
Italy

Kubota (Deutschland) GmbH
Senefelder Str. 3-5
63110 Rodgau / Nieder-Roden
Germany

Engine Manufacturer Contact Information (C2.2 Engines Only)

Manufacturer:

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

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

Caterpillar Eurasia LLC
75, Sadovnicheskaya Emb.
Moscow 115035
Russia

i06135026

Selective Catalytic Reduction Warning System

SMCS Code: 1091-WXX; 7400

S/N: BL21-Up

S/N: DX21-Up

S/N: FD21-Up

S/N: HP21-Up

S/N: MD21-Up

S/N: BY41-Up

S/N: BL71-Up

S/N: DX91-Up

S/N: HLM1-Up

The selective catalytic reduction (SCR) system is a system used to reduce NOx emissions from the engine. Diesel exhaust fluid (DEF) is pumped from the DEF tank and is sprayed into the exhaust stream. The DEF reacts with the SCR catalyst to reduce NOx and leaves a nitrogen and water vapor.

NOTICE

Allow the engine to perform a DEF purge of the DEF system before you turn the battery disconnect switch to OFF. Disconnecting the battery power too soon may prevent proper cool down of DEF injector and purging of the DEF system after the engine is shut down. Refer to Operation and Maintenance Manual, "Battery Disconnect Switch" for more information.



Illustration 151

g03821224

The DEF level gauge icon is designated the "SCR Warning" alert indicator. Refer to "Right Side Controls (Alternate), Monitoring Screen, Fuel & Diesel Exhaust Fluid (DEF) Level Gauge" for location.



Illustration 152

g03821224

- At Level 1 the SCR Warning alert indicator will change from white to solid RED.



Illustration 153

g03821235

- At Level 2 the SCR Warning alert indicator will flash RED, a pop-up warning will appear in the display with the diagnostic code description, and the Driver alert indicator will flash AMBER. Maximum engine speed is reduced to 60% of rated speed and maximum torque is reduced by 50%.



Illustration 154

g03821243

- At Level 3 the SCR Warning alert indicator will flash RED, a pop-up warning will appear in the display with the diagnostic code description. The Driver alert indicator will flash AMBER, and the audible alarm will occur. Engine speed is limited to nearly low idle and no engine torque is available.

The SCR Warning alert indicator will turn ON when the DEF tank level is low, a quality issue with the DEF is detected, or there is a fault in the SCR system. The following are the parameters for each warning type.

Diesel Exhaust Fluid Level – When the DEF gauge is near the red range, the indicator will go to a Warning Level 1. After 45 minutes of operation, the warning will increase to Level 2. When the DEF tank level is empty, the warning will increase to a Level 3.

Diesel Exhaust Fluid Quality – The sensor in the DEF tank measures the quality of the DEF. If non-standard DEF is supplied or is diluted, the lamp will go to Warning Level 1. After operating for 3 hours and 15 minutes, the warning will increase to Level 2. After operating for another 45 minutes, the warning will increase to a Level 3.

SCR System Fault – If any of the SCR system sensors are disconnected or any fault codes occur in the SCR system, the indicator will go to a Warning Level 1. After 3 hours and 15 minutes, the warning will go to a Level 2. After operating for another 45 minutes, the warning will increase to a Level 3.

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Alert Indicators

SMCS Code: 7450; 7451

The alert indicators are on the right-hand display.

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

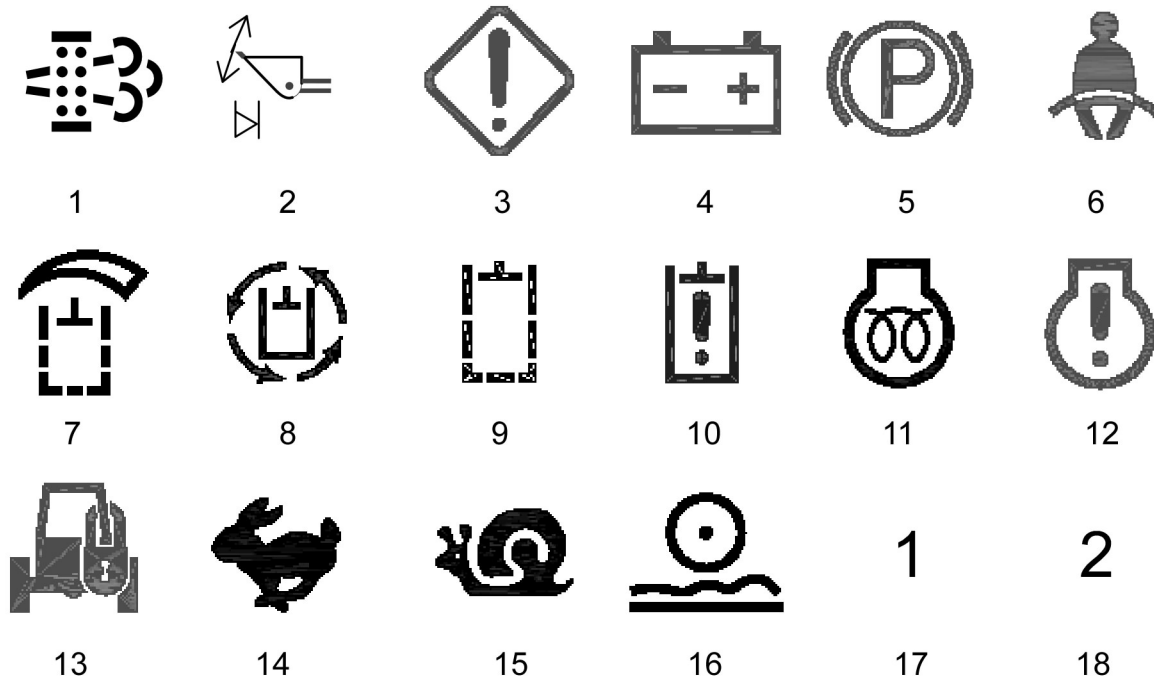


Illustration 155

g02817376

Left Side

- 1 – Diesel Particulate Filter
- 2 – Cat Intelligent Leveling™ (ILEV) System
- 3 – Driver Alert
- 4 – System Voltage
- 5 – Parking Brake
- 6 – Operator Presence
- 7 – Auxiliary Hydraulic High Flow
- 8 – Continuous Flow
- 9 – Work Tool System
- RED Work Tool Lockout
- AMBER Interlock Override
- 10 – Hydraulics
- RED Hydraulic Temperature
- AMBER Hydraulic Filter Bypass
- 11 – Cold Starting Aid
- 12 – Engine Condition Indicator

- RED Coolant Temperature
- RED Oil Pressure
- AMBER Air Cleaner Indicator
- 13 – Anti-Theft Security System
- 14 – Two-Speed Indicator
- 15 – Creep Control Mode Indicator
- 16 – Ride Control
- 17 – Cat Control Pattern
- 18 – H-Control Pattern

1 - Diesel Particulate Filter This alert will activate when the diesel particulate filter needs regeneration. Refer to this Operation and Maintenance Manual, "Diesel Particulate Filter Regeneration" for details.

Note: Machines equipped with EU Stage V Emission Controls will also use this alert indicator to signal system failure. Refer to this Operation and Maintenance Manual, "Diesel Particulate Filter Regeneration", "EU Stage V Emissions Control System" for applicable models and details.

2 - Cat Intelligent Leveling™ (ILEV) System This alert indicator will light when the ILEV System is ON. This alert indicator will blink twice when the user-selected work tool target angle is established. Refer to Operation and Maintenance Manual, "Operator Controls, Left Side Controls, Cat Intelligent Leveling™ (ILEV) System Switch".

3 - Driver Alert This alert indicator will activate when there is a problem which requires operator attention.

Note: Machines equipped with EU Stage V Emission Controls will also use this alert indicator to signal system failure. Refer to this Operation and Maintenance Manual, "Diesel Particulate Filter Regeneration", "EU Stage V Emissions Control System" for applicable models and details.

Note: Other alert indicators that light or the gauges may help investigate the cause of any problems.

There are three levels of severity for the indicator:

Level 1 – If the alert indicator is on continuously, stop the machine at the earliest convenience. Check the following before consulting your Cat dealer.

- Ensure that the machine has been adequately warmed up. Refer to Engine Starting for an explanation of the engine and ambient conditions that may trigger this.
- If the Engine Condition alert indicator is AMBER, water may be present in the fuel. Drain the water from the fuel/water separator. For more information refer to "Operation Maintenance Manual" Fuel System Primary Filter (Water Separator) - Drain.
- If the Engine Condition alert indicator is AMBER, the engine air filter may be restricted. For more information refer to "Operation Maintenance Manual" Engine Air Filter Primary Element - Clean/Replace.
- If the Hydraulics alert indicator is AMBER, the filter is bypassing. Check that the hydraulic oil filter is not plugged. For more information refer to "Operation Maintenance Manual" Hydraulic System Oil Filter - Replace. See also Oil Filter - Inspect.
- Check for proper battery voltage and ensure that the alternator and wiring are good.

Level 2 – If the alert indicator is flashing and there is no audible alarm, severe component damage could occur. Stop the machine at the earliest convenience and check the following before consulting your Cat dealer.

- If the Engine Condition alert indicator is RED and the maximum engine speed is reduced, water may be present in the fuel. Drain the water from the fuel/water separator. For more information refer to "Operation Maintenance Manual" Fuel System Primary Filter (Water Separator) – Drain
- If the Engine Condition alert indicator is RED and the maximum engine speed is reduced, the engine air filter may be restricted. For more information refer to "Operation Maintenance Manual" Engine Air Filter Primary Element - Clean/Replace.
- Check for proper battery voltage and ensure that the alternator and wiring are good.
- If the machine is equipped with a Diesel Particulate Filter, move the machine to a safe location and set the parking brake. If the engine RPM begins to rise shortly, allow the machine to complete a regeneration cycle. For more information refer to "Operation Maintenance Manual" Diesel Particulate Filter Regeneration.
- If the SCR Warning alert indicator is flashing RED, check the Diesel Exhaust Fluid Level. See Diesel Exhaust Fluid - Fill. Refer to Selective Catalytic Reduction Warning System for an explanation of the various SCR warning levels.
- A sensor on the machine may be faulted or has come unplugged. For tracked machines, check that the wiring to the drive motor speed sensor wiring is not damaged. Consult your Cat dealer for advanced troubleshooting support.
- Cab alarm is missing, unplugged, or as failed

Level 3 – If the alert indicator is flashing and there is an audible alarm, injury to the operator or severe component damage could occur. Stop the machine immediately and check the following before consulting your Cat dealer:

- Check the engine oil. See Operation Maintenance manual, Engine Oil level - Check . If the Engine Condition alert indicator is RED, the engine oil filter may be plugged. See Engine Oil and Filter - Change. See also Oil Filter - Inspect.
- If the Engine Condition alert indicator is RED, the engine coolant temperature may be high. Clean the engine radiator, reduce the engine load, and allow the engine to cool. For more information refer to Operation Maintenance Manual, Radiator Core - Clean.

- If the Hydraulics alert indicator is RED, the hydraulic oil temperature is high. Check the hydraulic oil level. Refer to Operation Maintenance Manual, Hydraulic System Oil Level - Check. Clean the hydraulic oil cooler, reduce the hydraulic load, and allow the system to cool. See Radiator Core - Clean.
- If the SCR Warning alert indicator is flashing RED, check the Diesel Exhaust Fluid Level. See Diesel Exhaust Fluid - Fill. Refer to Selective Catalytic Reduction Warning System for an explanation of the various SCR warning levels.
- A sensor on the machine may be faulted or has come unplugged. For tracked machines, check that the wiring to the drive motor speed sensors is not damaged. Consult your Cat dealer for advanced troubleshooting support.

4 - System Voltage This alert indicator will light 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 are high and the engine speed is near low idle, increase the engine speed to high idle to get more output from the alternator. If the alert indicator for the electrical system turns off within 1 minute, the electrical system is probably operating in a normal manner. However, the electrical system may be overloaded during periods of low engine speeds.

Increase the engine idle speed with the governor lever to compensate for a higher electrical load on the system.

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, or faulty batteries).

5 - Parking Brake This alert indicator will light when the parking brake is engaged. The alert indicator should come on during start-up. The alert indicator should go out when the parking brake is disengaged.

6 - Operator Presence This alert indicator will light when the armrests are in the RAISED position. The alert indicator will light when the operator gets out of the operator seat. The alert indicator should go out when the operator is in the operator seat and the armrests are in the LOWERED position.

7 - Auxiliary Hydraulic High Flow This alert indicator will light when the high flow hydraulic system is activated.

8 - Continuous Flow This alert indicator will flash when the machine is in "Continuous Flow Ready" mode. This alert indicator will light when continuous flow is activated.

9 - Work Tool System

- This alert indicator will light red when the work tool lockout control is activated.
- This alert indicator will light amber when the interlock override is activated.

10 - Hydraulics

- This alert indicator will light red and an audible alert will sound when the temperature of the hydraulic oil is too high. If this indicator comes on, stop the machine immediately. Stop the engine and investigate the problem.
- This indicator will light amber when the hydraulic oil filter is not functioning properly. Stop the machine and replace the oil filter. The indicator will stay on until the hydraulic oil has warmed up. Do not operate the machine until the light turns off.

11 - Cold Starting Aid With the engine start switch in the ON position, this alert indicator will light when the aid is activated. Refer to Operation and Maintenance Manual, "Engine Starting" for more information about the heater.

12 - Engine Condition Indicator This alert will activate when there is a problem which requires operator attention.

Note: Other alert indicators that light or the gauges may help investigate the cause of any problems.

There are three levels of severity for this indicator:

- Level 1: If the alert indicator is on continuously, stop the machine at the earliest convenience. This alert is for the air cleaner indicator. Stop the machine and service the air cleaner.
- Level 2: If the alert indicator is flashing and there is no audible alarm, severe component damage could occur. Change your operation or perform the indicated maintenance.
- Level 3: If the alert indicator is flashing and there is an audible alarm, injury to the operator or severe component damage could occur. Stop the machine immediately and stop the engine.

13 - Anti-Theft Security System This alert indicator will light when the Anti-Theft Security System is activated. Refer to Operation and Maintenance Manual, "Anti-Theft Security System" for more details about the security system.

14 - Two-Speed Indicator This alert indicator will light when two-speed travel mode is engaged.

15 - Creep Control Mode Indicator This alert indicator will light when Creep Control mode is engaged.

16 - Ride Control This alert indicator will light when the Ride Control switch is "ON" and the necessary ground speed is reached for Ride Control activation.

17 - Cat Control Pattern If your machine is equipped with the optional Selectable Control Pattern Switch, this alert indicator will flash until a control pattern is selected via the switch. This alert indicator will light when the Cat Control Pattern is activated.

Note: Refer to Operation and Maintenance Manual, "Operator Controls - Joystick Controls" for information about the joystick control patterns.

18 - H-Control Pattern If your machine is equipped with the optional Selectable Control Pattern Switch, this alert indicator will flash until a control pattern is selected via the switch. This alert indicator will light when the H-Control Pattern is activated. This alert indicator will also be lit when the machine is equipped with the Dedicated H-Control Pattern option.

Note: Refer to Operation and Maintenance Manual, "Operator Controls - Joystick Controls" for information about the joystick control patterns.

i09603786

Product Link

SMCS Code: 7606

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

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

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

Data Broadcasts

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

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

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

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

Operation in a Blast Site for Product Link Radios

WARNING

This equipment is equipped with a Cat® Product Link communication device. When electric detonators are being used for blasting operations, radio frequency devices can cause interference with electric detonators for blasting operations which can result in serious injury or death. The Product Link communication device should be deactivated within the distance mandated under all applicable national or local regulatory requirements. In the absence of any regulatory requirements Caterpillar recommends the end user perform their own risk assessment to determine safe operating distance.

Refer to your products Operation and Maintenance Manual Supplement, "Regulatory Compliance Information" for more information.

For information regarding the methods to disable the Cat Product Link communication device, please refer to your specific Cat Product Link manual listed below:

- Operation and Maintenance Manual, SEBU8142, "Product Link - PL121, PL321, PL522, and PL523"

- Operation and Maintenance Manual, SEBU8832, “Product Link PLE702, PLE602, PLE601, PL641, PL631, PL542, PL240, PL241, PL243, PL141, PL131, PL161, PL083 and PL042 Systems”

Note: If no radio disable switch is installed and the equipment will be operating near a blast zone, a Product Link radio disable switch may be installed on the equipment. The switch will allow the Cat Product Link communication device to be shut off by the operator from the equipment control panel. For more details and installation procedures, refer to the following:

- Special Instruction, REHS7339, “Installation Procedure for Product Link PLE640 Systems”
- Special Instruction, REHS8850, “Installation Procedure for the Elite Product Link PLE601, PLE641, and PLE631 Systems”
- Special Instruction, SEHS0377, “Installation Procedure for the Product Link PL131, PL141, and PL161 Systems”
- Special Instruction, REHS9111, “Installation Procedure for the Pro Product Link PL641 and PL631 Systems”
- Special Instruction, M0098124, “Installation Procedure for Pro Product Link PL243 Cellular Radio Systems”
- Special Instruction, M0109130, “Installation Procedure for the Elite Product Link PLE602, PLE602p, PLE702, PLE643, PLE643p, and PL743 Systems”
- Special Instruction, M0111437, “Installation Procedure for the Elite Product Link PLE602, PLE602p, PLE702, PLE683, PLE683p, and PL783 Systems”

Engine Starting

i07569140

Engine Starting

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.

Refer to Operation and Maintenance Manual, Cold-Weather Requirements to prepare the machine for operation in temperatures that are below 0 °C (32 °F). Follow the appropriate warm-up procedures when the machine is operated in temperatures that are below 0 °C (32 °F).

Machine preparation for cold weather includes using the correct hydraulic system oil. The factory fills the hydraulic system with 10W hydraulic oil which has a minimum operating temperature of -20 °C (-4 °F). If the machine will be operated at temperatures below -20 °C (-4 °F), the 10W oil must be replaced with 0W30 hydraulic oil to provide the proper oil viscosity. Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities". Refer to Operation and Maintenance Manual, SEBU5898, "Cold-Weather Recommendations for Caterpillar Machines". Refer to Operation and Maintenance Manual, SEBU6250, "Caterpillar Machine Fluids Recommendations".

NOTICE

Keep the engine speed low until the engine oil pressure alert indicator goes out. If the alert indicator does not go out within ten seconds, stop the engine and investigate the cause before starting again. Failure to do so can cause engine damage.

NOTICE

If you fail to follow the steps described below, damage to the engine or damage to the hydraulic system may occur.

1. Fasten the seat belt.
2. Pull the armrests downward.
3. Before the engine is started, check for the presence of bystanders or maintenance personnel. Ensure that all personnel are clear of the machine. Briefly sound the forward horn before you start the engine.
4. Move the engine speed control knob to low idle.

5. Turn the engine start switch key to the ON position. On machines equipped with the Standard Display, wait for the cold starting aid alert indicator light to go out. On machines equipped with the Advanced Display, wait for the LCD display to load the Welcome screen. On any machine with security enabled, enter a valid PIN. Refer to Operation Maintenance Manual, "Operator Controls, Right Side Controls" for more information on the Anti-Theft Security System.

NOTICE

If the engine fails to start after 10 seconds, disengage the starter. Wait 30 seconds and repeat the procedure. Do not allow the starter motor to run continuously for more than 20 seconds.

6. Turn the engine start key to START position to start the engine. Release the key after the engine has started.

Note: If the machine is equipped with the optional Selectable Control Pattern feature, a control pattern must be selected before the parking brake can be disengaged. Refer to Operation and Maintenance Manual, "Operator Controls, Left Side Controls, and Operator Controls, Joystick Controls" for more information on the Selectable Pattern Control switch and available joystick control patterns.

7. Disengage the parking brake.
8. Run the engine for 5 minutes before performing the following procedure. Run the engine at half throttle. Raise the lift arms several feet and hold the work tool joystick control in the TILT BACK position for 30 seconds. Release the control for 30 seconds. Hold the work tool joystick control in the DUMP position for 30 seconds. Release the control for 30 seconds. Perform the procedure for 3 minutes.

Note: If you are operating the machine below 0 °C (32 °F), perform the procedure for 8 minutes.

NOTICE

Do not use the hydraulic interlock override function to warm up the machine.

9. Keep all personnel away from the machine. Move the machine slowly to an open area. Repeat Step 8 as you move the machine back and forth for 3 m (10 ft).

Note: More warm-up time may be required if the hydraulic functions are sluggish.

Cold-Weather Requirements

Machine preparation for cold weather includes using the correct hydraulic system oil. The factory fills the hydraulic system with 10W hydraulic oil which has a minimum operating temperature of -20°C (-4°F). If the machine will be operated at temperatures below -20°C (-4°F), the 10W oil must be replaced with 0W30 hydraulic oil to provide the proper oil viscosity. Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities". Refer to Operation and Maintenance Manual, "Cold-Weather Recommendations for Caterpillar Machines" SEBU5898. Refer to Operation and Maintenance Manual, "Caterpillar Machine Fluids Recommendations" SEBU6250.

Refer to the following table for requirements and recommendations for the engine when operating below -18°C (-0°F)

Reference: Refer to the Machine Price List for the appropriate kit part numbers.

Table 95

Cold-Weather Engine Requirements and Recommendations					
Models	Engine	Serial Number Ranges	Required		Recommended
			-18°C to -32°C (0°F to -25°F)	-33°C to -40°C (-26°F to -40°F)	-18°C to -40°C (0°F to -40°F)
226D, 232D, 239D, 249D	C2.2	All	SAE 0W -40 Engine Oil	Cold Climate Kit	Engine Block Heater #1 Diesel or Anti-Gel Additive Battery Disconnect Switch Kit
		HRD, HR6, DPR, EH2, BL9, T9S, GWR, D9E			
236D, 242D, 246D, 257D, 259D, 262D, 277D, 279D, 287D, 289D	C3.3B	All	SAE 0W -40 Engine Oil	Rear Door Cover Kit	Engine Block Heater #1 Diesel or Anti-Gel Additive Battery Disconnect Switch Kit 1000 CCA Battery
		BGZ, K2D, DZT, HFB, EZW, D5T, FTL, LW5, BYF, PN5, DTB, RE5, FMT, GTL, TP5, HMT, TAW, WE5			
272D, 272D XHP, 272D2, 272D2 XHP, 297D, 297D XHP, 297D2, 297D2 XHP, 299D, 299D XHP, 299D2, 299D2 XHP	C3.8	All	SAE 0W -40 Engine Oil	Rear Door Cover Kit	Engine Block Heater #1 Diesel or Anti-Gel Additive Battery Disconnect Switch Kit 1000 CCA Battery

Engine Torque Limited During DEF Thawing

Note: A 32.5% solution of DEF will begin to crystallize and freeze at -11°C (12°F). At 32.5%, both the urea and water will freeze at the same rate, ensuring that as it thaws, the fluid does not become diluted, or over concentrated. The freezing and thawing of DEF will not cause degradation of the product.

This is only applicable to the models that require Diesel Exhaust Fluid (DEF). When the DEF is frozen, there is no DEF circulating to cool the DEF injector. To prevent the DEF injector from damage, the engine torque is reduced by up to 20%. The message "Engine Derate - Protect against cold temperature" will appear on the monitoring screen of the Advanced Display. Once the DEF is thawed, full engine torque will return automatically. Refer to the engine's Systems Operation manual, DEF Dosing Control System for more information.

Low System Battery Voltage Elevated Low Idle

The low system battery voltage elevated low idle feature will immediately raise the low idle engine speed slightly if the system battery voltage falls below a triggering threshold with the engine speed near low idle. This feature is intended to improve the reliability of charging system components like the alternator and battery and help compensate for increased electrical load resulting from user installed electrical components. The feature will be canceled by the operator when the engine speed is raised by the controls. This feature will automatically cancel if the system battery voltage rises above a predetermined threshold.

Cool Engine Elevated Low Idle (Cold Start)

The cool engine elevated low idle feature will immediately raise the low idle engine speed slightly if the machine senses an ambient temperature or engine coolant temperature below certain thresholds while the parking brake is engaged, hydraulic lockout is engaged, and interlock override is disengaged. This feature is primarily associated with cold startup and is intended to accelerate the warmup of the engine and fluids and improve white smoke cleanup. The feature will be canceled by the operator when the parking brake is disengaged, hydraulic lockout is disengaged, and interlock override is engaged, or the engine speed is raised by the controls. The feature will automatically cancel if the ambient and engine coolant temperatures increase above certain thresholds.

Cold Engine Elevated Low Idle (Parked Idle)

The cold engine elevated low idle feature will slowly increase the engine idle speed to a significantly higher speed when the machine has sat for several minutes with the parking brake is engaged, hydraulic lockout is engaged, and interlock override is disengaged, and the ambient or engine coolant temperature have fallen below certain temperature thresholds. This feature is intended to help prevent certain engine components from damage due to fluids freezing when the machine is left parked in idle. This feature will be canceled by the operator when the parking brake is disengaged, hydraulic lockout is disengaged, and interlock override is engaged. The feature will automatically cancel if the ambient or engine coolant temperature initiating the response increase above certain thresholds. This feature should not be confused with Diesel Particulate Filter Regeneration. Refer to "Diesel Particulate Filter Regeneration" for more information.

Note: There may be other machine conditions required to initiate or terminate any of the elevated low idle modes. Only the primary conditions are listed above.

Turbocharger Protection Mode (Start Up)

Note: It is always recommended to start the engine with the engine speed control knob in the low idle position, and to follow the recommended engine starting & warm up procedures for best engine life.

The turbocharger protection mode helps ensure that proper turbocharger shaft lubrication is achieved before the turbocharger speed increases due to engine speed adjustment and/or load. This is normal and designed to protect vital engine components. This feature results in the following engine behavior relative to throttle position:

- The engine will remain in low idle hold for a few seconds at start-up, regardless of coolant temperature or position of the engine speed control knob or foot pedal.
- After low idle hold, the engine rpm will remain at low idle until either the engine speed control knob or foot pedal is adjusted slightly in either direction, at which time the engine rpm will begin to increase towards the desired setting.

- The maximum engine rpm will be limited to predetermined values based on coolant temperature and driven via a non-adjustable software map. High Idle will not be available until coolant temperature reaches a safe operating threshold. This warm up period can vary between a few seconds and about a minute based on how cold the ambient temperature is.

Operation

i07695148

Operation Information

SMCS Code: 7000

Fueling the Machine

WARNING

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

WARNING

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

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

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

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

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

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

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

The fuel fill may either be located inside the engine compartment on the right-hand side, or outside the machine at the left rear corner of the frame. Replace the fuel cap and lock into place after fueling the machine.

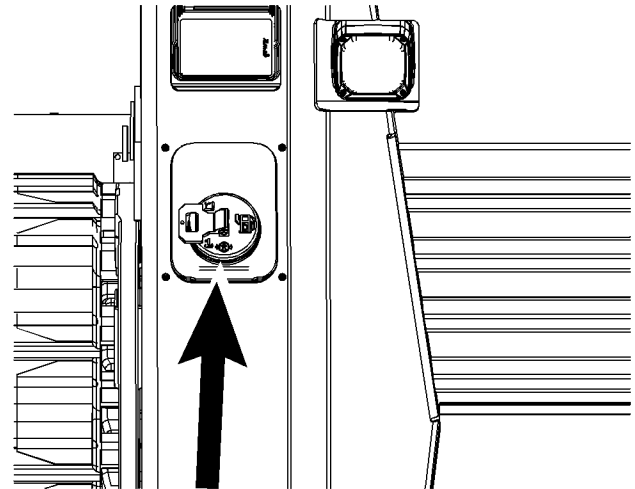


Illustration 156

g03821165

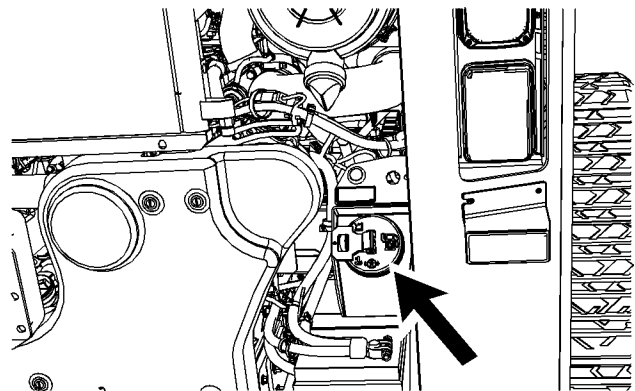


Illustration 157

g03821167

Note: The 299D2 XHP Land Management model

S/N: HLM1-UP

has two fuel tanks, one on either side of the rear corners of the machines. The fuel cap for each tank is located on the top of the tank, under a hinged guard.

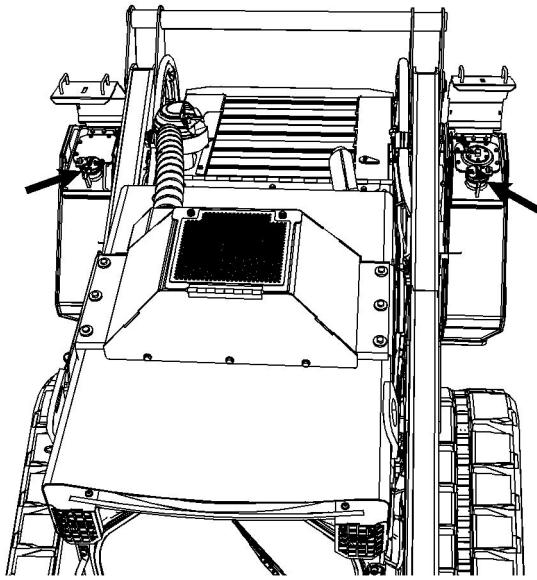


Illustration 158

g06399379

General Information

To prevent injury, make sure that no people are working on the machine or near the machine. To prevent injury, keep the machine under control at all times.

Reduce engine speed when you maneuver in tight quarters or when you are going over a hill.

1. Adjust the operator seat.
2. Fasten the seat belt.
3. Lower the armrests.
4. Start the engine and allow the machine to warm up. Refer to Operation and Maintenance Manual, "Engine Starting".
5. Disengage the parking brake.
6. Raise all lowered work tools and attachments to negotiate any obstacles.
7. Smoothly move the speed and direction control for the desired direction and speed.

Do not allow the machine to overspeed when you go downhill. Move the joystick toward the NEUTRAL position to reduce the speed of the machine when you are going downhill. For additional information, refer to "Operating on a Slope".

Always put the heaviest end of the machine uphill when you are working on an incline.

Fully lower the loader arms onto the stops when you are digging with the machine. Digging with the loader arms in the fully lowered position will transfer the stress that is placed on the loader arm into the frame.

NOTICE

The use of this machine in certain applications can cause premature wear and/or failure of the tracks. Applications that may cause premature wear and/or failure of the tracks include: use in rocky terrain, use in gravel, use in concrete demolition and use in terrain where metal debris is present.

Damage to the tracks that is caused from using the machine in these conditions is not covered under warranty.

Avoid any situation that causes the tracks of the machine to spin on the ground. Avoid spinning the tracks to extend the life of the track.

Note: While you use steel tracks that go over the tires, the work tools may not engage the work tool coupler properly. Work tools may not properly engage the ground. **Steel tracks that go over the tires should only be used with pneumatic tires.** The loader arms may contact the steel tracks which may damage to the machine. When you use steel tracks that go over the tires, the interval for checking the drive chains should be reduced to every 100 Service Hours. Refer to Operation and Maintenance Manual, "Drive Chain Tension - Check/Adjust" for proper service of the drive chain. The use of rubber tracks that go over the tires is not recommended.

Operating on a Slope

When necessary to travel across a slope, never exceed a slope that is greater than 3 to 1 (18.4°).

When possible, avoid operating the machine across a slope. When possible, operate the machine up a slope and down a slope. Never exceed a slope that is greater than 25 degrees for continuous fore/aft slope operation and 35 degrees intermittent fore/aft operation. The engine has an intermittent rating of 2 minutes. Do not turn the machine while you are operating on a slope.

NOTICE

When it is necessary to operate the machine on a slope, keep bucket loads light in order to decrease the possibility of derailing the tracks.

NOTICE

If the correct method for turning is not followed, the tracks may derail.

When necessary to travel across a slope, the following steps should always be followed:

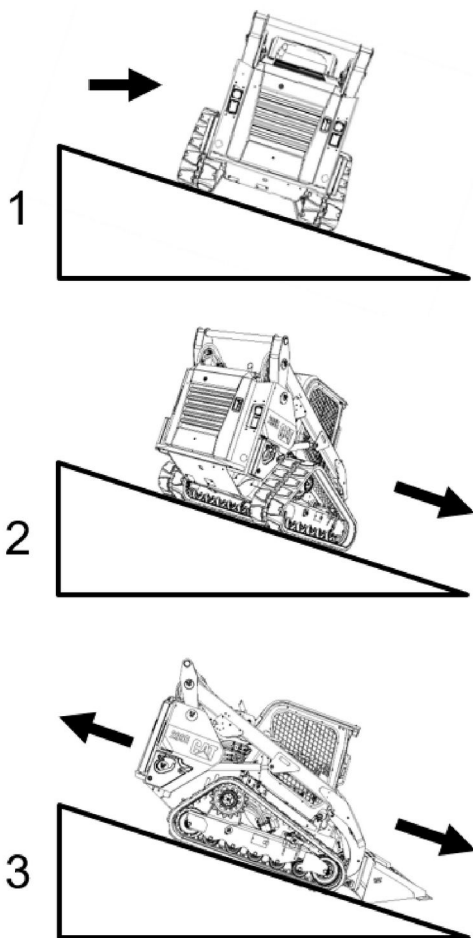


Illustration 159

g06289028

1. Stop the machine. Turn the machine slowly while you are backing down the slope.

Note: Do not back up a hill to turn.

2. Position the machine so that the front of the machine faces the direction for travel that is desired.

Operating on a Transition

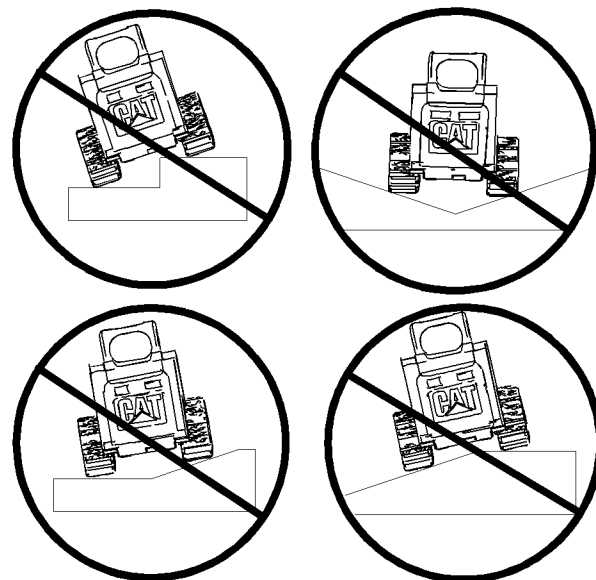


Illustration 160

g01296038

NOTICE

Avoid operating this machine on transitions. Operating this machine on transitions may cause the tracks to derail.

When the machine is operated over a transition, the tracks may not be supported fully.

When the tracks are not supported fully, the wheels may ride on top of the drive lugs of the tracks. The track will derail if you continue to travel over the transition.

Operation Section

Quick Disconnect Couplings Operation

If you must travel over a transition, travel the machine at 90° to the transition. Do not perform hard turns or fast turns when you are operating the machine over the transition.

Counterrotate turn

For maximum life of the undercarriage, use more gradual turns while you slowly move forward or reverse. Gradual turns will help minimize wear on the track and wear on the wheels. Only use counter rotate turns if necessary. Sharp turns will increase the wear on the components of the undercarriage.

i07678674

Quick Disconnect Couplings Operation

SMCS Code: 5057

Release any stored hydraulic fluid pressure in the system before connecting or disconnecting the work tool's hydraulic lines. Refer to Operation and Maintenance Manual, Work Tool Coupler Operation Hydraulic System Pressure Relief for the proper method for your machine.

Remove the dust caps from the couplings which will be used and assemble to keep clean.

Inspect the couplings for damage and replace any coupling believed to be damaged. Never operate the machine with a damaged quick disconnect coupling.

Ensure that the faces of the coupling halves are clean to prevent dirt inclusion.

Note: Identify the style of couplings on the machine and follow the appropriate procedure below.

Push-to-Connect Style Coupling

To connect the work tool, hold the faces of the male and female halves flatly together and push the work tool's hose in until the female coupling's locking sleeve snaps forward completely. Pull back on the hose forcefully to ensure that the coupling halves are locked together.

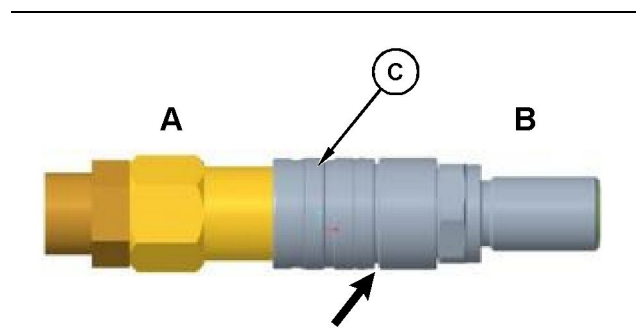


Illustration 161

g06392610

Improperly Coupled

- (A) Male
- (B) Female
- (C) Locking Sleeve

Locking sleeve (C) has not snapped forward. There is no audible "Click".

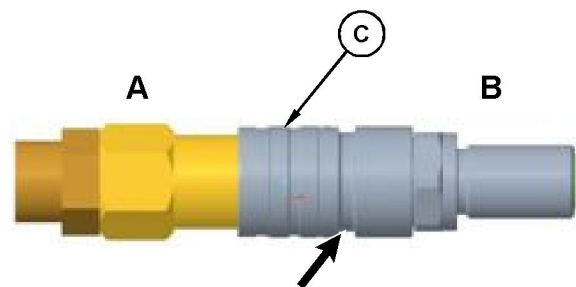


Illustration 162

g06392628

Properly Coupled

- (A) Male
- (B) Female
- (C) Locking Sleeve

Locking sleeve (C) has snapped forward. There is an audible "Click".

To disconnect the work tool, push the hose further into the machine's coupling block (about 3 mm) and hold in this position for about 5 seconds to relieve the hydraulic pressure.

Slide the female coupling's locking sleeve back fully while pulling the work tool's hose away from the machine until they separate.

Ensure that the dust caps are clean and install on open couplers to prevent system contamination.

Note: The couplers may be extremely hot after use. Wear suitable protection

Screw-to-Connect Style Coupling

To connect the work tool, screw the male and female halves together by turning the locking sleeve on the female coupler. During connection the machine-side locking sleeve is turned counterclockwise and the work tool-side locking sleeve is turned clockwise.

Once the halves are coupled fully, the locking sleeve will snap forward over the locking ring, and an audible "Click" may be heard. Do not put into service if the locking sleeve does not slide forward abruptly, completely covering the locking ring. There should be no visible gap between the male and female halves before use.

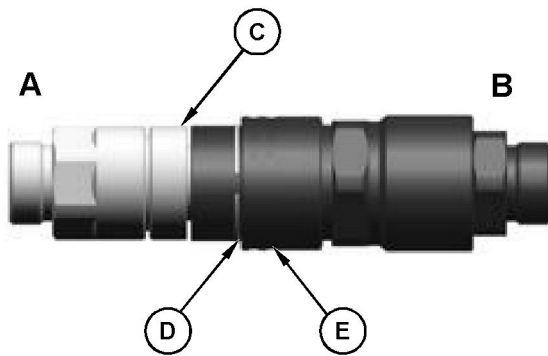


Illustration 163

g06392642

Improperly Coupled

- (A) Male
- (B) Female
- (C) Visible Gap
- (D) Exposed Locking Ring
- (E) Locking Sleeve

Locking sleeve (E) has not snapped forward. There is no audible "Click".

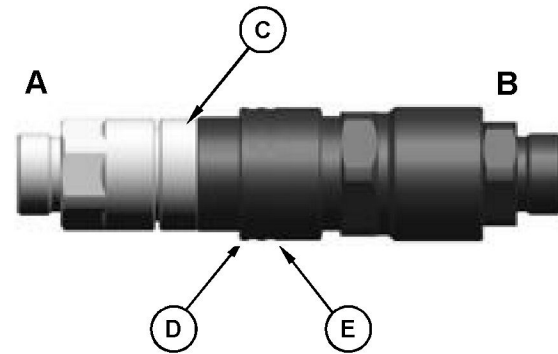


Illustration 164

g06392678

Properly Coupled

- (A) Male
- (B) Female
- (C) No Visible Gap
- (D) No Visible Locking Ring
- (E) Locking Sleeve

Locking sleeve (C) has snapped forward. There is an audible "Click".

To disconnect the work tool, slide the locking sleeve back and unscrew the couplers until separate. It may be necessary to slightly rescrew the coupler halves together first before the locking sleeve will slide back freely.

During disconnection the machine-side locking sleeve is turned clockwise and the work tool-side locking sleeve is turned counterclockwise.

Ensure that the dust caps are clean and install on open couplers to prevent system contamination.

Note: The couplers may be extremely hot after use. Wear suitable protection. A specially sized wrench is available to aid disconnection. Contact your Cat Dealer for more information.

i07765601

Work Tool Coupler Operation

SMCS Code: 6129; 7000

WARNING

Improper Attachment of the Work Tool could result in injury or death.

Do not operate the machine without confirmation that the coupler pins are fully engaged. Follow the operating procedures in the Operation and Maintenance Manual.

Hydraulic System Pressure Relief

These procedures are used to relieve the system pressure that may be stored in the machine's auxiliary hydraulic lines. Relieve the hydraulic system pressure before attaching or removing work tools or servicing the hydraulic system.

Coupling Method (Primary)

If the machine is equipped with push to connect style couplings, push the face of the coupling inwards (towards machine) and hold for 5 seconds. This may also be accomplished by pushing the couplers of the machine and work tool together to displace the machine's coupling face.

Joystick Method (Alternate)

The machine's system pressure may be relieved by operating the auxiliary hydraulic controls in each direction several times when the following conditions are met: operator is in the seat with the armrests down, the engine key start switch is in the ON position but the engine is not running, and the parking brake has been released.

Pressure Relief Knob Method (Alternate)

Note: Pressure Relief Knob is only available on 299D2 XHP Land Management model HLM1-UP.

Pull the knob OUT and then tilt the knob UP and hold for 5 seconds. See "Auxiliary Hydraulic Controls".

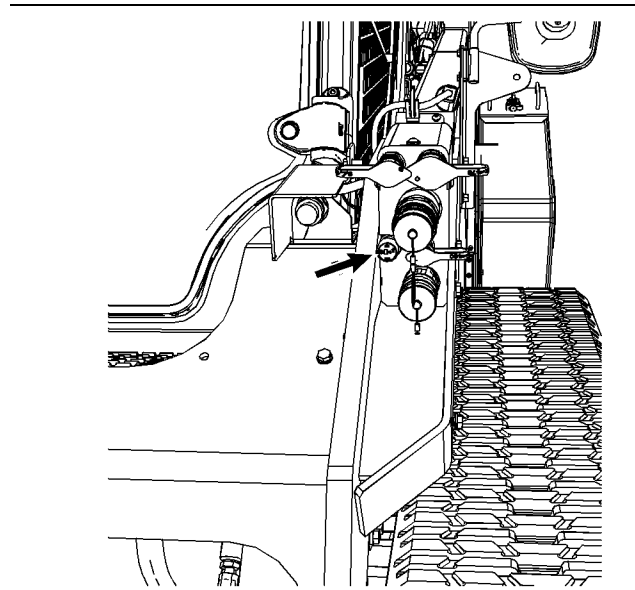


Illustration 165

g06427154

Attaching the Work Tool

Note: Before you install the work tool, inspect the coupler and the work tool mounting bracket for any wear or for any damage. Ensure that the work tool mounting bracket and the face of the coupler are clean. Ensure that the coupler has no accumulation of material. Refer to Operation and Maintenance Manual, "Quick Coupler - Clean/Inspect" and Operation and Maintenance Manual, "Work Tool Mounting Bracket - Inspect" for inspection procedures.

1. Position the work tool on a level surface. Move the hydraulic lines (if equipped) for the work tool and electrical lines (if equipped) away from the work tool mounting bracket.

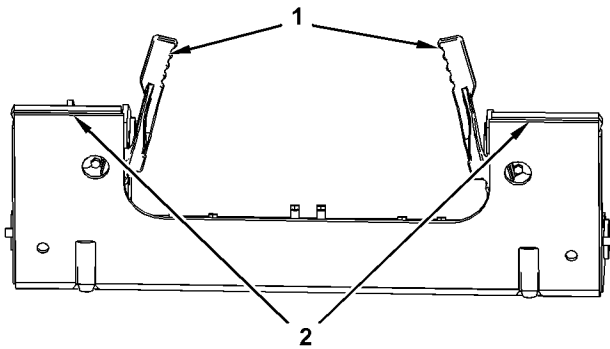


Illustration 166

g01263431

2. If the machine is equipped with a manual quick coupler, ensure that the levers(1) for the coupler are in the DISENGAGED position. If the machine is equipped with an electrical or hydraulic quick coupler, refer to Operation and Maintenance Manual, "Operator Controls" for details on the location and the operation of the coupler control.
3. Enter the machine.
4. Fasten the seat belt and lower the armrests.
5. Start the engine.
6. Disengage the parking brake.
7. Tilt the quick coupler assembly forward.

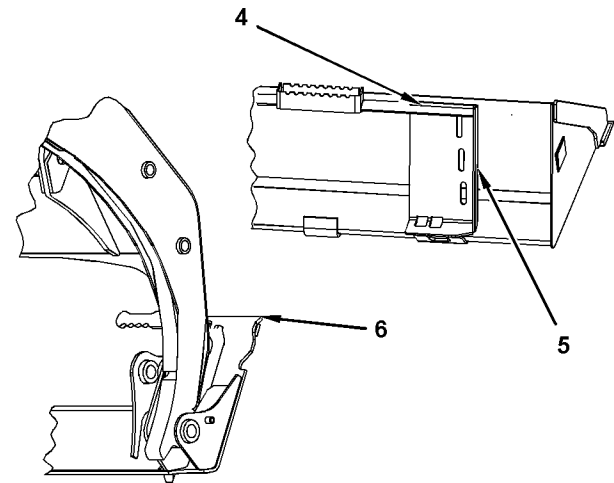


Illustration 167

g01278223

8. Align the quick coupler assembly (6) between the outer plates (5) of the mounting bracket. Move the quick coupler assembly under the angled plate (4) of the mounting bracket and rack back the work tool.
9. Fully lower the loader arms.

⚠ WARNING

Improper attachment of the work tool could result in injury or death. If the work tool touches the ground, the work tool may move away from the coupler. Do not allow the work tool to touch the ground until the coupler pins are fully engaged.

10. Turn the engine start switch key to the OFF position to stop the engine.
11. Exit the machine.

Note: If you are installing a material handling arm that is not equipped with the optional center step, do not exit the machine. A second person needs to perform steps 12 through step 14.

Operation Section
Work Tool Coupler Operation

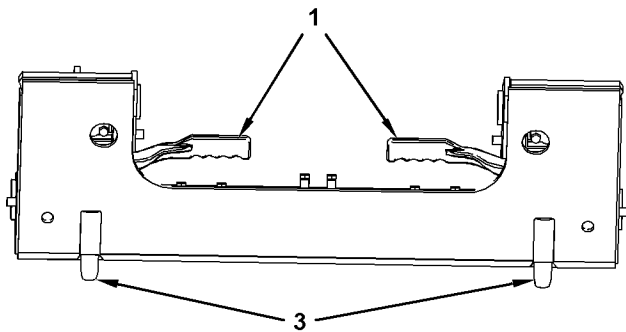


Illustration 168

g01263432

12. Engage the coupler pins(3). If the machine is equipped with a manual quick coupler, ensure that the levers(1) for the coupler are in the ENGAGED position. If the machine is equipped with an electrical or hydraulic quick coupler, refer to Operation and Maintenance Manual, “Operator Controls” for details on engaging the coupler pins.
13. If the work tool requires hydraulics, refer to the following procedure to connect the hydraulic hoses.

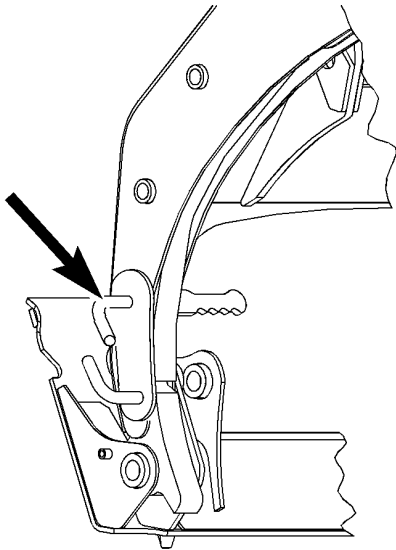


Illustration 169

g02020639

- a. Route the hydraulic hoses through the hose guide on the machine to prevent damage to the hoses. Not all work tools require the hydraulic hoses to be routed through the hose guide. The work tool Operation and Maintenance Manual will inform you if the hydraulic hoses need to be routed through the hose guide. Cat work tools

require the hoses to be routed through the hose guide.

- b. Ensure that the quick connect couplers are clean. Visually inspect the couplers for corroding, cracking, damage, or excessive wear. Replace the couplers if necessary.
- c. Relieve the system pressure that may be stored in the machine's auxiliary hydraulic lines. See Hydraulic System Pressure Relief.
- d. Connect the auxiliary hydraulic hoses for the work tool to the machine. Refer to Operation and Maintenance Manual, Quick Disconnect Couplings Operation.
- e. If the work tool is equipped with electrical lines, then route the electrical lines with the hydraulic hoses. Connect the wire harness to the electrical connector (EC) on the host machine. Check the connections to ensure that the connections are properly secured. Check the connections on the work tool to ensure that the connections are in the correct receptacle.

Note: If your High Flow work tool does not have a wiring harness, a Jumper Plug should be installed on the electrical plug for the work tool control. Without this Jumper Plug, the machine will not provide high flow to the work tool. Consult your Cat dealer for the current part number for the Jumper Plug.

- f. If the work tool is equipped with a water line, then connect the water line from the work tool to the connector on the machine. Move the water line to a position that is away from the work tool mounting bracket.

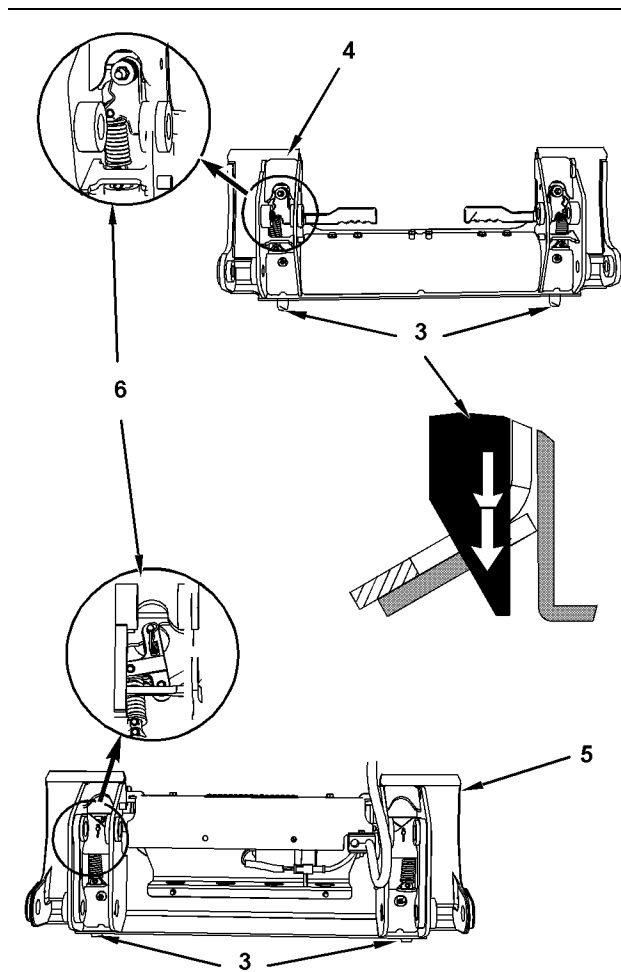


Illustration 170

g02817581

- (3) Coupler Pins
 (4) Manual Work Tool Coupler
 (5) Electric or Hydraulic Work Tool Coupler
 (6) Lever for the Coupler Pin

14. Visually ensure that both coupler pins (3) are extending out of the holes in the work tool mounting bracket.
15. Use the following procedure to verify engagement of the coupler pins.
 - a. Enter the machine.
 - b. Fasten the seat belt and lower the armrests.
 - c. Start the engine.
 - d. Disengage the parking brake.
 - e. Raise the work tool off the ground.
 - f. Visually inspect the coupler pins (3) to ensure that the pins are fully extended through the work tool.

- g. Visually inspect the lever (6) that holds the coupler pins to ensure that the lever is in the proper position.

- h. Activate the tilt control to tilt the work tool downward.

- i. Apply down pressure on the work tool.

Note: The work tool Operation and Maintenance Manual will inform you if forward pressure should not be applied on a work tool.

- j. Move the machine backward. Ensure that the coupler pins do not disengage from the work tool.

16. Test the work tool for leaks and for proper operation.

Removing the Work Tool

⚠ WARNING

Disengaging the coupler pins will release the work tool from control of the operator.

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

Place the work tool in a safe position before disengaging the coupler pins.

NOTICE

Auxiliary hoses for work tools must be disconnected before the Hydraulic Quick Coupler is disengaged.

Pulling the work tool with the auxiliary hoses could result in damage to the host machine or the work tool.

1. Position the machine on level ground.
2. Lower the work tool to the ground.
3. Rack back the work tool until the work tool is slightly off the ground.
4. Turn the engine start switch key to the OFF position to stop the engine.
5. If the work tool requires hydraulics, the hydraulic system pressure must be released.
6. Relieve the system pressure that may be stored in the machine's auxiliary hydraulic lines. See Hydraulic System Pressure Relief.
7. Disconnect the auxiliary hydraulic hoses for the work tool from the machine. Refer to Operation and Maintenance Manual, Quick Disconnect Coupling Operation.

Note: If protective caps are available, clean the caps thoroughly and install protective caps over the quick connect couplers.

8. If hoses are routed through the hose guide, remove the hoses from the hose guide. Move the hoses to a position that is away from the work tool mounting bracket.

Note: Connect the hoses for the work tool together. Connecting the hoses together will reduce the probability of contaminating the hydraulic system. Connecting the hoses together will reduce the buildup of pressure in the hoses. Connecting the hoses together will ease the connection of the hoses to the machine.

9. If the work tool is equipped with an electrical line, then disconnect the wire harness from the connector on the machine. If protective caps are available, install protective caps over the electrical connectors.
10. If the auxiliary electrical line is routed through the hose guide, remove the line from the hose guide. Move the auxiliary electrical line to a position that is away from the work tool mounting bracket.
11. If the work tool is equipped with a water line, then disconnect the water line from the connector on the machine. Move the water line to a position that is away from the work tool mounting bracket.

Note: If you are removing a material handling arm that is not equipped with an optional center step, do not exit the machine. A second person needs to perform step 12.

12. Disengage the coupler pins. If the machine is equipped with a manual quick coupler, ensure that the levers for the coupler are in the DISENGAGED position. If the machine is equipped with an electrical or hydraulic quick coupler, refer to Operation and Maintenance Manual, "Operator Controls" for details on disengaging the coupler pins with the coupler control.
13. Enter the machine.
14. Fasten the seat belt and lower the armrests.
15. Start the engine.
16. Disengage the parking brake.
17. As you slowly back away from the mounting bracket, tilt the quick coupler assembly forward until the top of the quick coupler assembly clears the angled plate.

18. Back away from the work tool.

Removing the Work Tool if an Electrical or Hydraulic Quick Coupler Malfunctions

WARNING

Disengaging the coupler pins will release the work tool from control of the operator.

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

Place the work tool in a safe position before disengaging the coupler pins.

NOTICE

Auxiliary hoses for work tools must be disconnected before the Hydraulic Quick Coupler is disengaged.

Pulling the work tool with the auxiliary hoses could result in damage to the host machine or the work tool.

Note: The electrical or hydraulic quick coupler only work while the ENGINE IS RUNNING. The hydraulic quick coupler only works when the hydraulic interlocks are made and the machine has hydraulic power.

Using suitable blocking material, block the machine to ensure it does not move unexpectedly.

If the electric quick coupler fails to function due to loss of machine electrical power, physically dismantle the actuator or cut through the exposed rod. Insert a pair of 3/8" square drivers into the square openings of the linkage flags and rotate each towards the centerline of the machine to disengage the work tool retention pins from the work tool.

If the hydraulic quick coupler fails to function due to loss of machine electrical or hydraulic power, slightly open the hydraulic lines at the service connectors under the lift arm cross member. Provide a means to capture any hydraulic fluid in a suitable catch container. Insert a pair of 3/8" square drivers into the square openings of the linkage flags and rotate each towards the centerline of the machine to disengage the work tool retention pins from the work tool.

i07695485

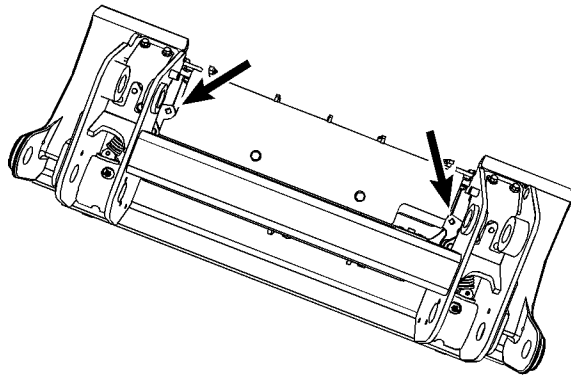


Illustration 171

g03652980

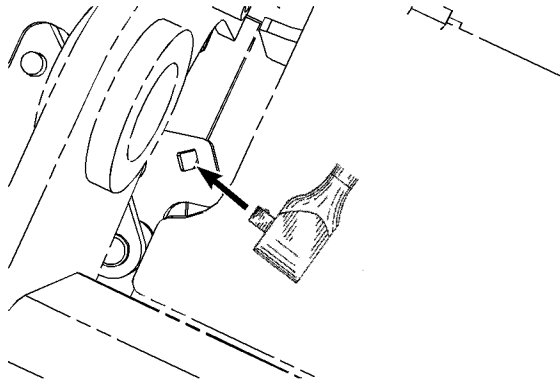


Illustration 172

g03653014

with 3/8" square driver rotates towards centerline

Material Handling Arm Operation

SMCS Code: 6542; 6700; 7000

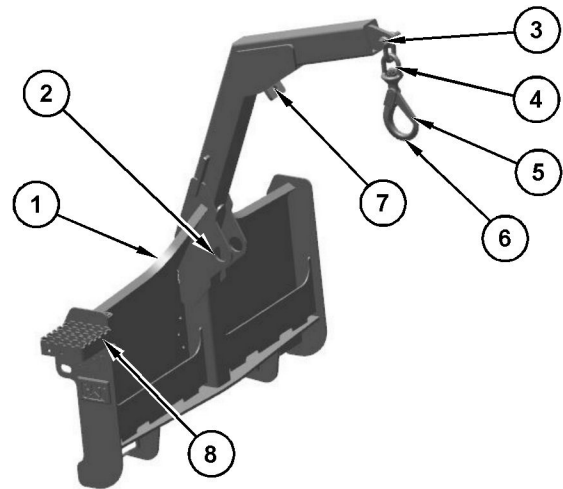


Illustration 173

g06397626

- (1) Location of Optional Center Step
- (2) Tie-Down Point
- (3) Lifting Point 2
- (4) Shackle
- (5) Hook Clasp
- (6) Hook
- (7) Lifting Point 1
- (8) Stored location of Position Lock Pin

Inspect the material handling arm and the attachments for wear and damage. Ensure that the load is properly attached to the material handling arm before you operate the machine.

Note: The physical size and the weight of the load determines the lifting point that is appropriate. Whenever it is possible, use the lifting point 1. This will improve the stability and this will reduce the movement of the load. Refer to the Operation and Maintenance Manual, "Material Handling Arm Rated Load" for the limitations on the weight.

Note: Use only Caterpillar 9V - 2714 Hook and Caterpillar 9V - 2715 Shackle to attach a load to the material handling arm. Never use an open hook. Use a line that is rated for 2.5 times the weight of the load.

WARNING

Do not allow anyone to be near a suspended load unless the position lock pin is installed. If the lift arms must be raised to handle a tall load, do not allow anyone to be near the suspended load unless the lift arms are blocked. Failure to follow the instructions or heed the warnings could result in injury or death.

Two Person Operation

Attaching A Load

1. Verify that the load does not exceed the weight limit. Refer to the Operation and Maintenance Manual, "Material Handling Arm Rated Load" for the rated load capacities.
2. Keep all personnel out of the work area at all times, except when you are attaching or removing a load.
3. Enter the machine. Start the engine.
4. Disengage the parking brake.

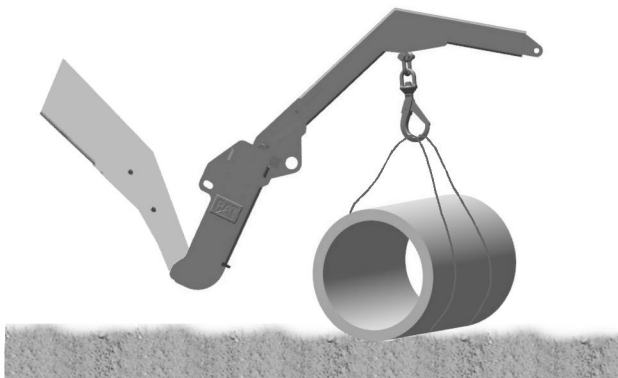


Illustration 174

g06399845

5. Keep the loader arms in the fully lowered position. Slowly position the material handling arm until either lifting point 1 or the lifting point 2 is directly above the load.
6. Tilt the material handling arm forward until the hook is slightly higher than the load in order to minimize swinging of the load.
7. Stop the engine.
8. Wait as the second person attaches the load securely to the hook. The second person needs to ensure that the hook clasp is in the locked position.
9. Ensure that ALL personnel have left the work area.

10. Start the engine.
11. Disengage the parking brake.
12. Slowly tilt back the material handling arm until the material handling arm is fully tilted back.
13. Stop the engine.

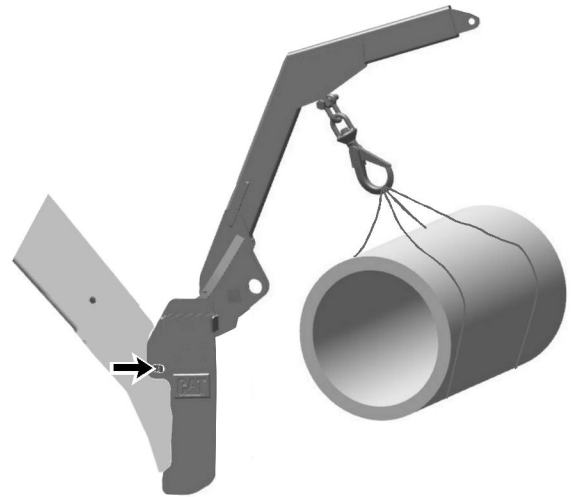


Illustration 175

g06399849

14. Wait as the second person installs the position lock pin through the hole in the material handling arm and the hole in the loader arm of the machine.

Note: This will prevent the material handling arm from tilting forward.

15. Wait as the second person secures the load to the tie-down points with a suitable line in order to minimize load swing.

Note: Do not move the load when you are securing the load. Do not pull the load toward the material handling arm when you are securing the load to the tie-down points.

16. Wait as the second person removes the position lock pin. Wait as the second person places the pin in the STORED position on the material handling arm.

Removing a Load

1. Slowly tilt back the material handling arm until the material handling arm is fully tilted back. Lower the loader arms fully.
2. Stop the engine.

3. Wait as the second person installs the position lock pin through the hole in the material handling arm and the hole in the loader arm of the machine.
4. Wait as the second person removes the line that secures the load to the tie-down points.
5. Wait as the second person removes the position lock pin. Wait as the second person places the pin in the STORED position on the material handling arm.
6. Remove all personnel from the work area.
7. Start the engine.
8. Disengage the parking brake.
9. Lower the load to the ground.
10. Stop the engine.
11. Wait as the second person removes the load from the hook.
12. Remove all personnel from the work area.
13. Start the engine.
14. Disengage the parking brake.
15. Slowly tilt back the material handling arm until the material handling arm is fully tilted back.
16. Back away from the load.

One Person Operation

Note: The material handling arm must be equipped with a center step in order to do the one person operation.

Attaching the Load

1. Verify that the load does not exceed the weight limit. Refer to the Operation and Maintenance Manual, "Material Handling Arm Rated Load" for the rated load capacities.
2. Keep all personnel out of the work area at all times, except when you are attaching or removing a load.
3. Enter the machine. Start the engine.
4. Disengage the parking brake.

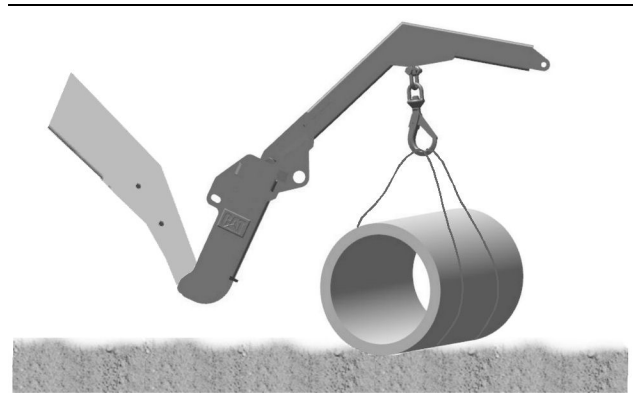


Illustration 176

g06399845

5. Keep the loader arms in the fully lowered position. Slowly position the material handling arm until either lifting point 1 or lifting point 2 is directly above the load.
6. Tilt the material handling arm forward until the hook is slightly higher than the load in order to minimize swinging of the load.
7. Stop the engine. Exit the machine.
8. Attach the load securely to the hook. Ensure that the hook clasp is in the LOCKED position.
9. Keep all personnel out of the work area.
10. Enter the machine. Start the engine.
11. Disengage the parking brake.
12. Slowly tilt back the material handling arm until the material handling arm is fully tilted back.
13. Stop the engine. Exit the machine.

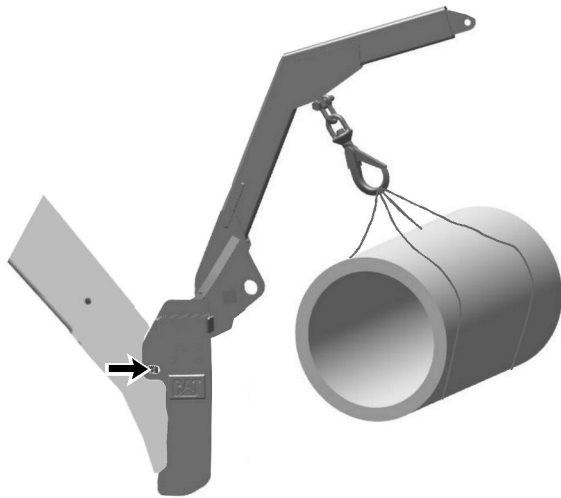


Illustration 177

g06399849

14. Install the position lock pin through the hole in the material handling arm and the hole in the loader arm of the machine.

15. Secure the load to the tie-down points with a suitable line in order to minimize load swing.

Note: Do not move the load when you are securing the load. Do not pull the load toward the material handling arm when you are securing the load to the tie-down points.

16. Remove the position lock pin and place the pin in the STORED position on the material handling arm.

Removing a Load

1. Fully tilt back the material handling arm. Fully lower the loader arms.
2. Stop the engine. Exit the machine.
3. Install the position lock pin through the hole in the loader arm of the machine.
4. Remove the line that secures the load to the tie-down points .
5. Remove the position lock pin and place the pin in the STORED position on the material handling arm.
6. Keep all personnel out of the work area.
7. Enter the machine. Start the engine.
8. Disengage the parking brake.

9. Lower the load to the ground.

10. Stop the engine. Exit the machine.

Note: Make sure that the load is stable.

11. Remove the load from the hook.

12. Keep all personnel out of the work area.

13. Enter the machine. Start the engine.

14. Disengage the parking brake.

15. Slowly tilt back the material handling arm until the material handling arm is fully tilted back.

16. Back away from the load.

Traveling with a Load

1. Ensure that all personnel have left the work area.
2. Start the engine.
3. Disengage the parking brake.
4. Raise the load so that the load is slightly off of the ground.
5. Slowly travel to the destination. Keep the load as close to the ground as possible. Travel up slopes with the load uphill. Travel down slopes with the load uphill. Do not travel across slopes.

i08463536

Pallet Forks Operation

SMCS Code: 6700; 7000

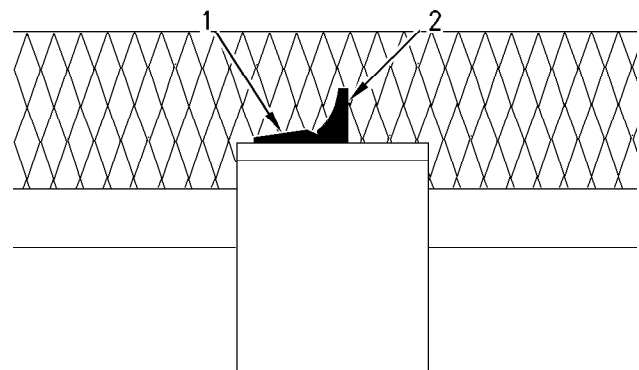


Illustration 178

g00955937

The "type 1" pin that is in the UNLOCKED position (2) and the LOCKED position (1).

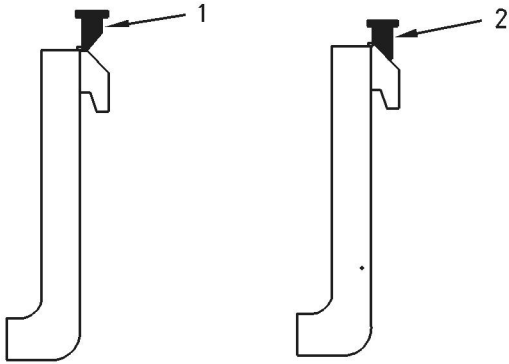


Illustration 179

g00955964

The “type 2” pin that is in the UNLOCKED position (1) and the LOCKED position (2).

1. Put the fork tines in the UNLOCKED position. Space the fork tines as far as possible from each other.
2. Put the fork tines in the LOCKED position.
3. Slowly, move the machine into position and engage the load. The machine should be square with the load. Space the forks evenly between the pallet stringers.
4. Move the machine forward until the load contacts the carriage.
5. Lift and lower the load carefully.
6. Carefully lower the load while you tilt the forks back to the travel position.

Travel with the load as low as possible while you still maintain ground clearance.

Travel with the load uphill on upgrades and on downgrades.

Pallet Fork Tine Operation

1. Place the lift arms fully down and adjust the coupler tilt until the front face of the fork carriage assembly is vertical.

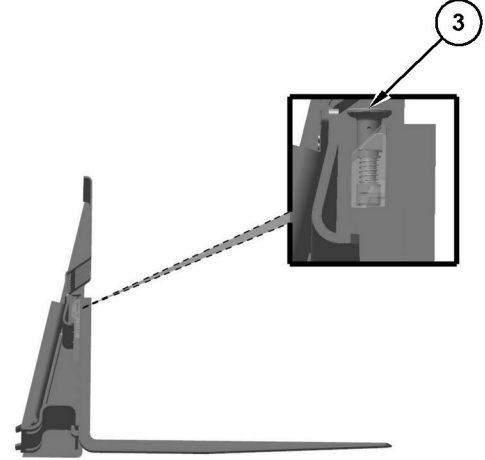


Illustration 180

g06673401

2. On the tine, unlock the pin (3).
3. Move the tine to the desired position by applying side force, alternating between the top or bottom of the tine.
4. Once close to the desired position, lock the pin (3) on the tine and continue moving the tine until the pin locks down into one of the upper carriage rail notches.
5. Adjust the tine as needed to confirm that tine is in a vertical position from the front and side views.

6. Repeat steps 2 - 5 for the second tine.

i07695477

Angle Blade Operation

SMCS Code: 6060; 7000

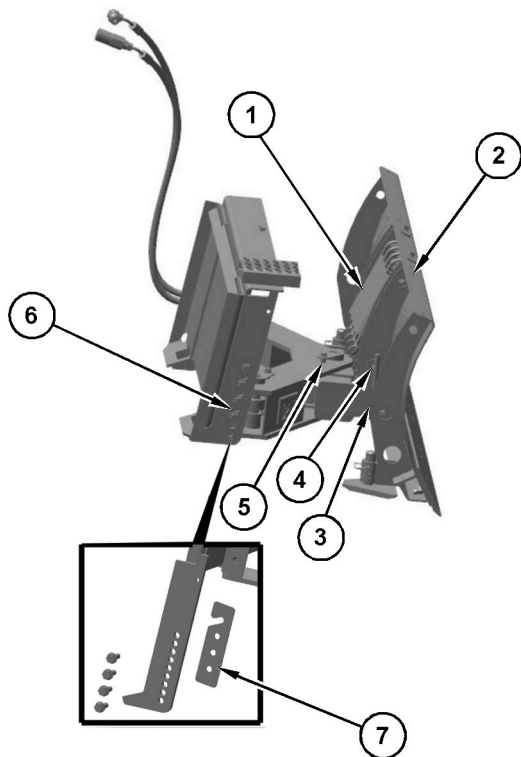


Illustration 181

g06399841

Height Adjustment

In order to properly adjust the height of the blade, use the following procedure:

1. Start the engine.
2. Position the blade so that the vertical pivot pin (5) is in the VERTICAL position.
3. Move the angle of the blade fully from one side to the other side. The blade cutting edge should remain parallel to the ground.

4. If the blade cutting edge does not remain parallel to the ground, the height of the blade needs to be adjusted. Use the following steps in order to adjust the height:

- a. Lower the blade and the frame onto adjustable stands.
- b. Stop the engine and remove the ignition key.
- c. Remove the bolts (6) for adjusting the height.
- d. Move the frame to the desired height.
- e. Ensure that the shims are installed. Install the bolts for adjusting the height. Tighten the bolts to a torque of $270 \pm 40 \text{ N}\cdot\text{m}$ ($199 \pm 30 \text{ lb ft}$).
- f. In order to test the adjustment, start the engine.
- g. Repeat steps 2 and 3.

Tilt Lock

The angle blade has two modes of operation:

- Locked
- Spring load trip

In order to lock the blade, install the locking pin (4). In the LOCKED position, the blade can be used for heavy operations. The blade will not tilt with the locking pin in the LOCKED position.

There may be lighter operations that allow the blade to tilt. Remove the locking pin and store the locking pin in the cab. This will help prevent damage to the blade or to the frame. If the plowing overcomes 306 kg (675 lb) of spring force, the top of the blade will tilt forward.

i07569209

Work Tool Operation

SMCS Code: 6700; 7000

The following table describes the functionality of approved Cat work tools.

Refer to Operation and Maintenance Manual, "Operator Controls, Joystick Controls, and Operator Controls, Auxiliary Hydraulic Controls" for the location and operation of the joystick controls that are referenced below.

Note: All the work tool functions that are described below are viewed as the operator seated in the machine.

Operate the machine and the work tool slowly in an open area. Check for proper operation of all controls and all protective devices on the machine and the work tool.

Note: During initial operation, unexpected motion may occur due to air in the hydraulic system. Cycle the hydraulic system approximately five times to purge air out of the circuit. You may need to add hydraulic oil to the machine after the machine fills the hydraulic circuits of the work tool. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check" for the proper procedure for checking the hydraulic oil level.

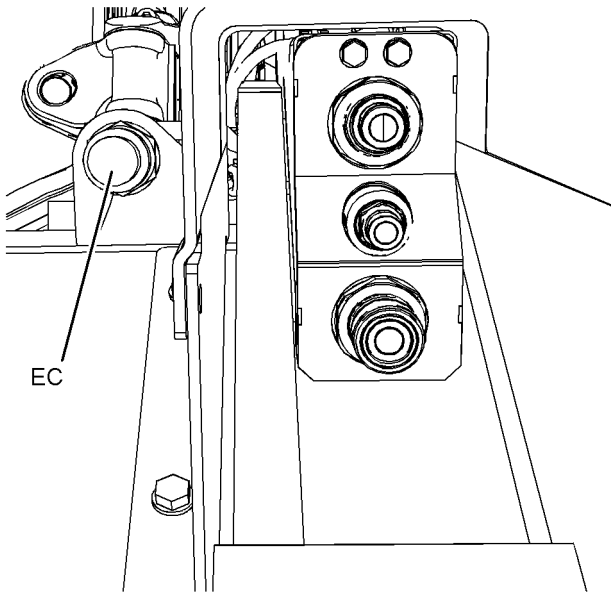


Illustration 182

g06361534

For all High Flow work tools, refer to Operation and Maintenance Manual, Operator Controls, Joystick Controls and Operator Controls, Auxiliary Hydraulic Controls. Connect the wiring harness to the electrical connector (EC).

Note: If your High Flow work tool does not have a wiring harness, a Jumper Plug should be installed on the electrical connector (EC) for the work tool control. Without this Jumper Plug, the machine will not provide High Flow to the work tool. Consult your Cat for the correct part number for your machine.

Simple Hydromechanical Work Tools

Work tools in the following table are approved by Cat. Refer to Operation and Maintenance Manual, "Operator Controls, Joystick Controls, and Operator Controls, Auxiliary Hydraulic Controls" for the location and operation of the joystick controls that are referenced in the table.

Read the manual and understand the instructions and warnings in the Operation and Maintenance Manual for these work tools. Consult your Cat dealer for replacement manuals. Proper care is your responsibility.

Operation Section
Rubber Belt Track Operation

Table 96

Operation of Cat Simple Hydromechanical Work Tools								
Work Tool								Actions
	Aux5 C2	Aux6 C1	Aux1 A1	Aux2 A2	Aux3 C-	Aux4 C+	Aux7	
Multipurpose Bucket			X					The bucket clam closes.
				X				The bucket clam opens.
All Grapple tools			X					The grapple closes.
				X				The grapple opens.
Angle Blade				X				The blade angles to the left.
			X					The blade angles to the right.
Dozer Blade				X				The blade angles to the left.
			X					The blade angles to the right.
	X			X				The blade tilts down to the left.
	X		X					The blade tilts down to the right.
		X		X				The blade tilts down to the left and the blade angles to the left.
		X	X					The blade tilts down to the right and the blade angles to the right.

Proper operation of the work tool is your responsibility. Do not use the work tool improperly.

Please follow the instructions that are listed below to use the grapple tools safely.

- Do not pry with one rake tine. Use multiple rake tines to loosen material.
- Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.
- Do not place the weight of the host machine on the grapples in the open position.

Complex Hydromechanical Work Tools

Note: For the functionality of Cat Complex Work Tools, please read the Operation and Maintenance Manual for the work tool.

Consult your Cat dealer for replacement manuals. Please read all the safety messages and understand all the safety messages for each work tool.

i07167346

Rubber Belt Track Operation (If Equipped)

SMCS Code: 4198

The rubber part of the track assembly can easily be damaged during operation. Operate the machine with the rubber belt only if damage to the rubber belt is shallow and the damage is not harmful. However, any harmful damage to the rubber can cause the following serious problems to the entire track assembly:

- Early wear of iron core.
- Early wear of track grousers.
- Fracture of iron core.
- Fracture of track grousers.

- Cuts of steel cords
- Rubber flaking off
- Disengagement of sprocket

Such a failed track assembly needs to be replaced as a unit. To minimize the replacement of the track, observe the following items. To maximize the performance of the track, observe the following items:

- Avoid operation under salty conditions.
- Avoid combined operation of travel and turning with excessive load on rough terrain.
- Avoid operation at rocky or demolition sites.
- Use the rubber belt tracks at temperatures within $-15\text{ }^{\circ}\text{C}$ ($5\text{ }^{\circ}\text{F}$) to $38\text{ }^{\circ}\text{C}$ ($100.4\text{ }^{\circ}\text{F}$). Avoid operation on hot surfaces.
- If the sprockets are badly worn, use a new sprocket for replacement.
- Be sure that the tracks are free of oily materials such as fuel, hydraulic oil, or grease.
- Avoid going over sharp obstacles. Decreased life of the track, fracture of the track grousers and cut steel cords can occur.
- Track tension must be correctly maintained and checked regularly.
- Disengagement of the track could occur if the track gets clear of the track roller. This condition could occur while the machine travels over an obstacle.

Parking

i05757869

Stopping the Engine

i07330974

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 turbo-charger housing (if equipped) which could cause oil coking problems.

1. Operate the engine for 5 minutes at low idle with no load.

Note: This operation allows hot areas in the engine to cool gradually. This operation will extend the engine life.

2. Move the joysticks to the NEUTRAL position.
3. Turn the engine start switch key to the OFF position.

Stopping the Engine if an Electrical Malfunction Occurs

SMCS Code: 1000; 7000

Inside Cab

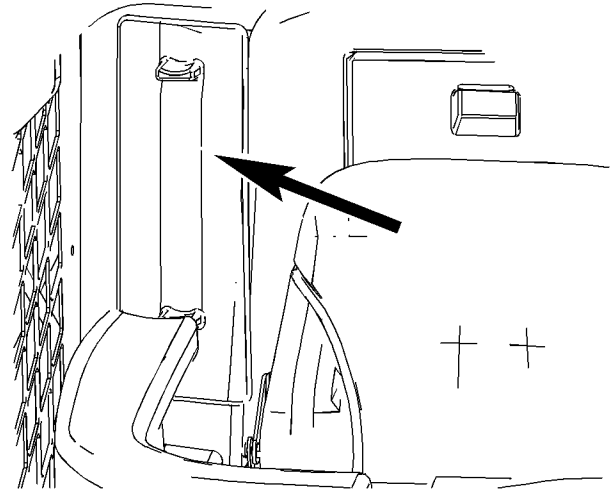


Illustration 183

g01287527

The fuse panel is located behind the seat on the right side.

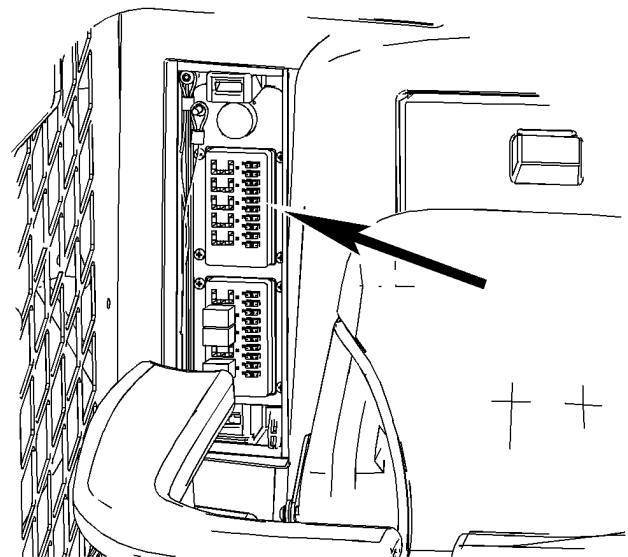


Illustration 184

g01210555

Remove the cover in order to access the fuse panel.

If there is no electrical power the loader arms must be lowered by using the procedure that is explained next.

Alternate Lowering the Equipment

WARNING

Personal injury can result from oil under high pressure.

DO NOT allow high pressure oil to contact skin.

Wear appropriate protective equipment while working with high pressure oil systems.

The loader arms must be lowered manually if the accumulator is not charged or if there is no electrical power.

Do not go under the raised lift arm without the brace for the loader lift arm in the LOCKED position.

Note: Make sure that there are no people near the front or sides of the machine.

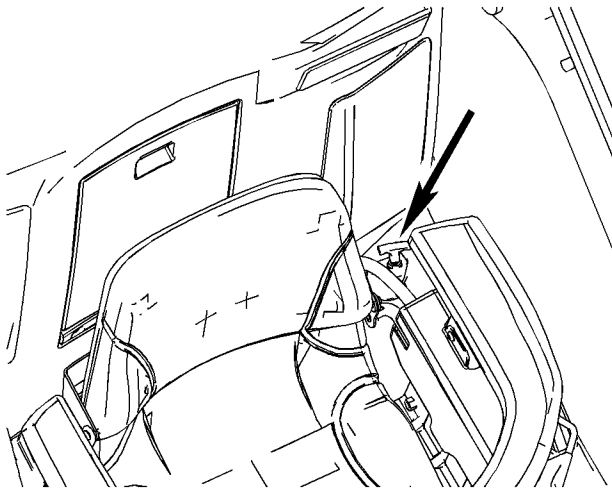


Illustration 186

g01400888

Type 1 Pull Handle near Seat.

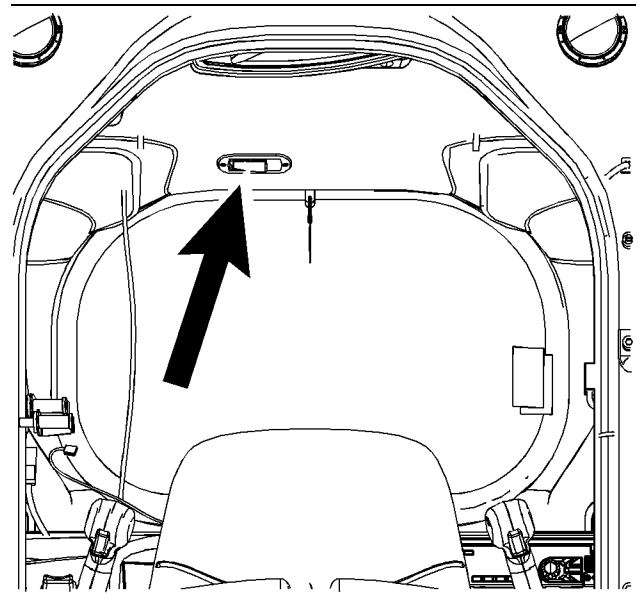


Illustration 187

g03821246

Type 2 Roof-mounted Finger Latch

The bypass valve (Dead Engine Lower) may be located either on the left side next to the seat in the cab (Type 1) or overhead on the underside of the cab roof (Type 2).

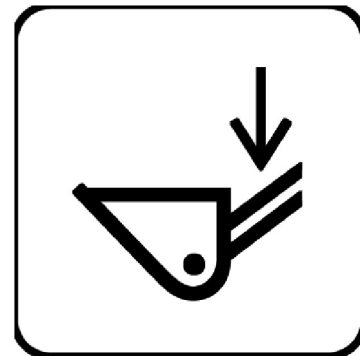


Illustration 188

g01332374

Film located next to the red handle (Type 1) or icon molded into the finger latch (Type 2).

Type 1 Actuation

1. Slide the seat forward. Slide the left-hand armrest forward.
2. Pull up on the red handle. Push the handle to stop the loader arms, if necessary.
3. Allow the loader arms to lower until the work tool is on the ground.
4. Push the red handle to the original position.

5. Make the necessary repairs before you operate the machine.

Type 2 Actuation

1. Pull down on the finger latch. Release the finger latch to stop the loader arms, if necessary.
2. Allow the loader arms to lower until the work tool is on the ground.
3. Release the finger latch.
4. Make the necessary repair before you operate the machine.

i07331337

Leaving the Machine

SMCS Code: 7000

Refer to Operation and Maintenance Manual, "Parking" for details about stopping the engine and lowering the equipment.

i07735116

Machine Storage and Specified Storage Period

SMCS Code: 7000

Machine Storage

The Safety Section of this Operation and Maintenance Manual contains storage information for fuels, lubricants, and ether (if equipped).

The Operation Section of this Operation and Maintenance Manual contains information for short-term storage of this machine, including engine shutdown, parking, and instructions for leaving the machine.

For detailed steps on long-term storage refer to Special Instruction, SEHS9031, "Storage Procedure for Caterpillar Products".

Specified Storage Period

The specified storage period of this machine is 1 year.

After the specified storage period has expired, consult your Cat dealer for inspect, repair, rebuild, install remanufactured, or install new components, and disposal options, and to establish a new specified storage period.

If a decision is made to remove the machine from service, refer to Decommissioning and Disposal for further information.

Transportation Information

i07331340

Shipping the Machine

SMCS Code: 7000

Investigate the travel route for overpass clearances. Make sure that there will be adequate clearance.

Before you load the machine and before you unload the machine remove ice, snow, or other slippery material from the loading dock and from the trailering surface. Removal of ice, snow, or other slippery material will help prevent the slipping of the machine as you load the machine. Removing ice, snow, or other slippery material will help prevent the machine from 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.

Do not use a fork lift to lift the machine. Using a fork lift to move your machine can result in property damage.

Choose the flattest ground when you load the machine or when you unload the machine.

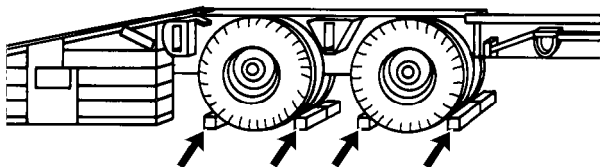


Illustration 189

g00040011

1. Before you load the machine, chock the trailer wheels or the rail car wheels. Before you unload the machine, chock the trailer wheels or the rail car wheels.

2. When you use loading ramps, make sure that the loading ramps have adequate length, adequate width, and adequate strength. In addition, make sure that the surface of the loading ramps is clean. This will help prevent the machine from sliding in all types of weather conditions. This will allow the machine to move on the ramps smoothly.
3. Maintain the slope of the loading ramps within 15 degrees of the ground.
4. Minimize any step between the base of the loading ramps and the ground.
5. Clean the tracks or tires on the machine to prevent any slippage.

Loading the Machine

1. Position the machine so that the heaviest end of the machine is going up the ramps first.
2. Use caution when you travel over the areas around the loading ramp joints. Maintain the balance point of the machine. Keep the work tool low.
3. After you load the machine onto the trailer be sure that the machine is properly positioned on the trailer bed.
4. Lower the work tool to the floor of the transport vehicle.
5. Turn the engine start switch key to the OFF position to stop the engine.
6. Turn the engine start switch key to the ON position. Push the parking brake switch.
7. Move all joystick controls while you are pressing several times on each side of the auxiliary hydraulic control (if equipped) to relieve hydraulic pressure.
8. Move all hydraulic controls to the NEUTRAL position.
9. Turn the engine start switch key to the OFF position. Remove the engine start switch key.
10. Move the armrests to the RAISED position. Unfasten the seat belt.
11. Attach any vandalism protection.
12. Refer to the Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for information on tying down the machine.

13. Cover the exhaust opening when the machine has cooled down.

Unloading the Machine

1. Position the machine so that the machine can drive straight down the loading ramps. Position the machine so that the heaviest end of the machine goes down the ramps last.
2. Use caution when you travel over the areas around the loading ramp joints to maintain the balance point of the machine. Keep the work tool low.

i07331349

Before Roothing the Machine

SMCS Code: 7000

Ensure that your machine has a work tool that is approved for rooding. Refer to Operation and Maintenance Manual, "Caterpillar Approved Work Tools and Work Tool Attachments" for the approved work tools for rooding.

Complete all the following operations that are applicable to your machine before you rood the machine.

Rear Lights

1. Verify that all lights are in proper working order.
2. Turn on the rooding lights when you are rooding the machine.

Headlights

Refer to Operation and Maintenance Manual, "Headlights - Adjust" for the proper procedure to adjust the headlights.

Hydraulic Shutoff

Disable the work tool control, the auxiliary hydraulic control (if equipped), and the high flow control (if equipped) when you are rooding the machine. Refer to Operation and Maintenance Manual, "Hydraulic Lockout and Interlock Override" for the procedure.

Lift Arm

Where required by local regulations, place the lift arm and the work tool in the rooding position and activate ride control if equipped.

1. Enter the machine. Fasten the seat belt. Lower the armrests. Start the engine.
2. Disengage the parking brake.

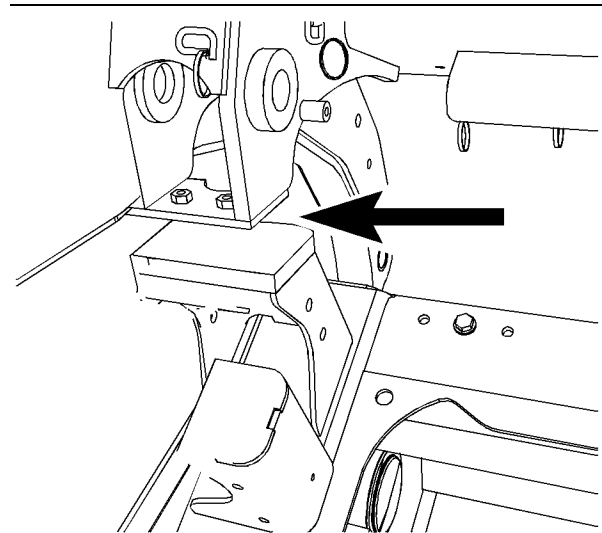


Illustration 190

g01378640

Type 1: All except 226D, 232D, 239D, and 249D

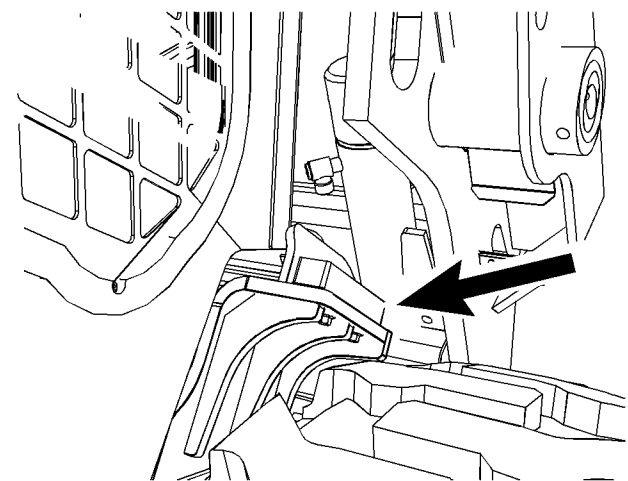


Illustration 191

g03821779

Type 2: 226D, 232D, 239D, and 249D

3. Raise off the lift arms of the lower stop approximately 30 mm (1.2 inch) for Type 1 models and 180 mm (7.1 inch) for Type 2 models.
4. Stop the engine.

Operation Section
Before Rooding the Machine

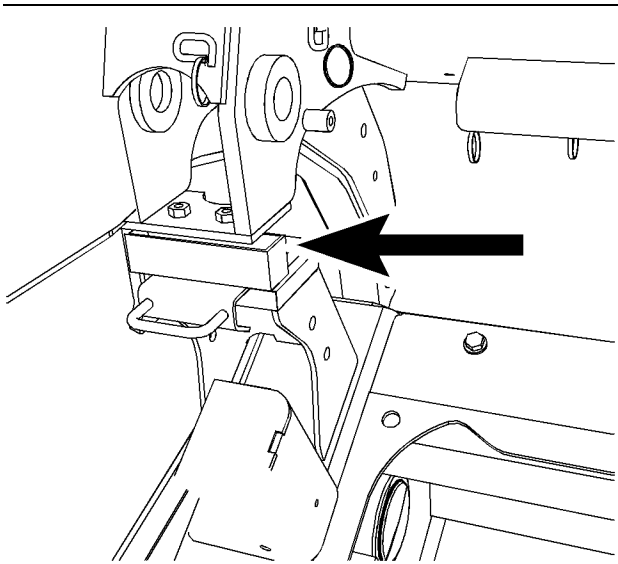


Illustration 192 g01378642
Type 1: All except 226D, 232D, 239D, and 249D

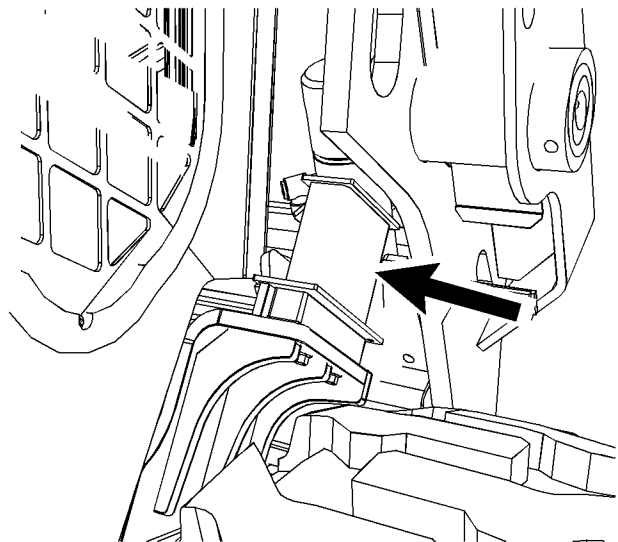


Illustration 193 g03821791
Type 2: 226D, 232D, 239D, and 249D

5. Insert the block for the lift arms between the frame and the lift arm. For Type 1 models, place the lip of the block over the left hand lower stop. For Type 2 models, thread the guide plate of the right hand lower stop through the slot in the block.
6. Start the engine. Disengage the parking brake.
7. Slowly lower the lift arm onto the block.
8. Fully tilt back the coupler. Stop the engine.

9. Raise the armrests. Unfasten the seat belt. Exit the machine.

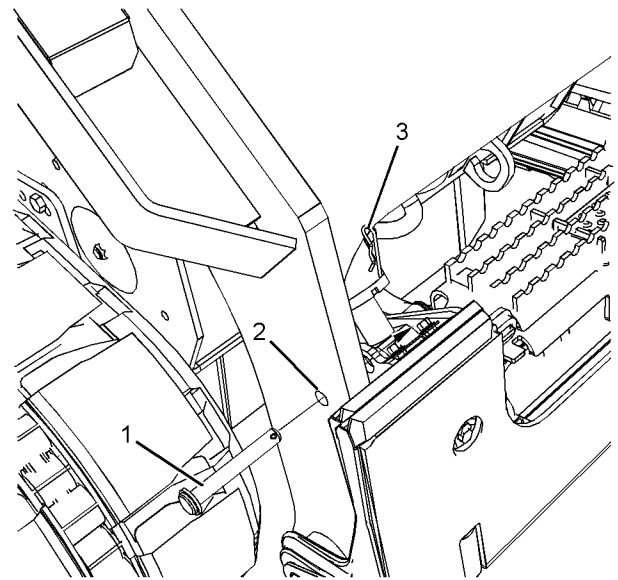


Illustration 194 g03380225

10. Insert the locking pin (1) for the coupler through the tab on the coupler and through the hole (2) in the lift arm.
11. Secure the locking pin (3) for the coupler with a cotter pin.

NOTICE

Do not tilt the coupler forward while the locking pin for the coupler is installed. Damage to the coupler may result.

12. Disable the hydraulics for the linkage while the locking pin for the coupler is installed. Disable the hydraulics for the linkage with the hydraulic shutoff control. Refer to Operation and Maintenance Manual, "Hydraulic Lockout and Interlock Override" for the procedure.

Mirrors

If necessary, adjust the mirrors.

Rotating Beacon Light

Where required by local regulations, install the rotating beacon light on top of the cab. Insert the plug into the receptacle which is on the right rear of the cab.

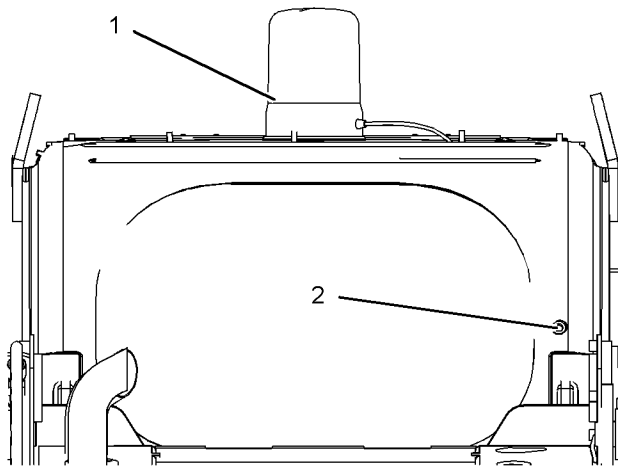


Illustration 195

g03821271

- (1) Rotating Beacon Light
(2) Receptacle

Slow Moving Vehicle Sign

Where required by local regulations, install the slow moving vehicle sign on the rear of the machine.

Tires

Ensure that your machine has tires that are approved for rooding. Ensure that the tires have the proper pressure. Refer to Operation and Maintenance Manual, "Tire Inflation - Check".

Traffic Regulations

Learn and obey all the traffic regulations when you are rooding the machine.

Work Lights

Turn off all work lights.

Prepare the Work Tool

Angle Blade

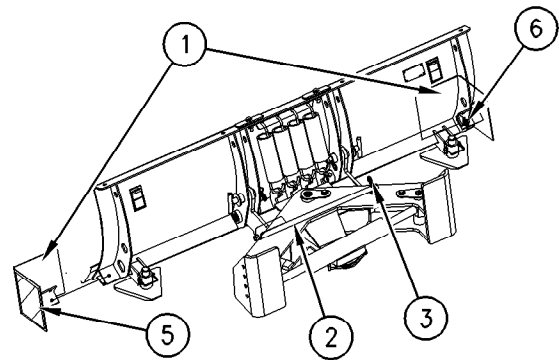


Illustration 196

g00718258

1. Ensure that all rooding decals (5) are properly attached to the front and side of each of the guards (1) for the Angle Blade. There are a total of four decals for the Angle Blade.
2. Place the guard (1) on the lower corner of the blade so that the hole in the blade is aligned with the hole in the guard.
3. Install the bolt, two washers and the wing nut (6).
4. Repeat steps 2 and step 3 on the other end of the Angle Blade.
5. Install the articulation lock (2) for the angle blade. Install cotter pin (3) in the end of the articulation lock.

Buckets

The guard for the buckets is used on both simple buckets and hydromechanical buckets.

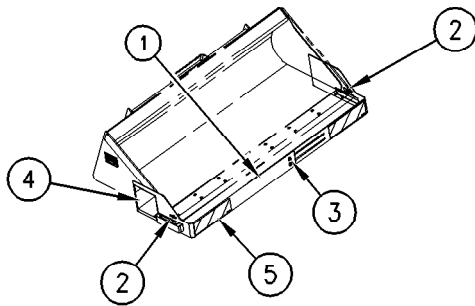


Illustration 197

g00715871

1. Make sure that the two front roading decals (5) are properly attached to the guard (1) for the bucket. Make sure that the side roading decals (4) are properly attached to the guard for the bucket. There are a total of four decals on the guard for the bucket.
2. Loosen the wing nuts (3) and move the guard for the bucket so that the guard fits over the outside edge of the bucket. Tighten the wing nuts.
3. Install the bolts, three washers, plates, and wing nuts (2) on both side plates of the bucket.

Cold Planer

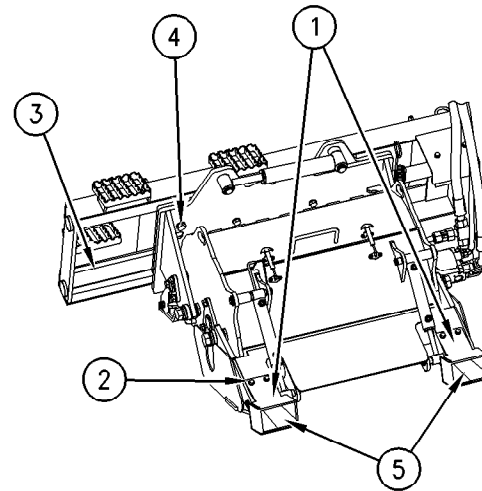


Illustration 198

g00715874

1. Ensure that all roading decals (5) are properly attached to both of the guards (1) for the Cold Planer. There are a total of two decals for the Cold Planer.
2. Place the guards (1) on the front skid pads so that the holes in the guards align with the holes in the Cold Planer. Install the bolts, washers, and nuts (2).
3. Install the side shift lock (3) for the Cold Planer.
4. Install the pivot lock (4) for the Cold Planer.

Landscape Rake

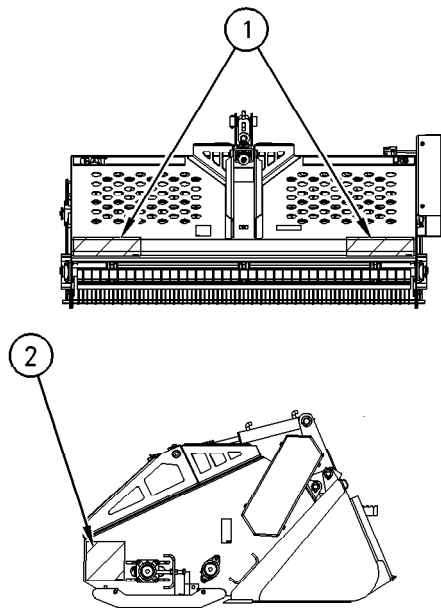


Illustration 199

g00715895

Ensure that the two front decals (1) are attached to the Landscape Rake. Ensure that the two side decals (2) are attached to the Landscape Rake.

Pickup Broom

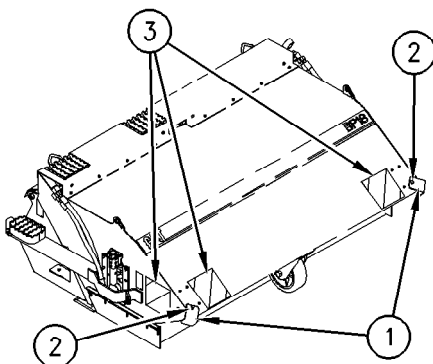


Illustration 200

g00715886

1. Ensure that all roading decals (3) are properly attached to the work tool. There are a total of four decals for the Pickup Broom.

2. Place the guards (1) on the front corners of the broom so that the holes in the guard align with the holes in the broom. Install the bolts and locknuts (2).

Note: The guards for the broom can be permanently installed. The broom can be operated with the guards on the broom.

Vibratory Compactor

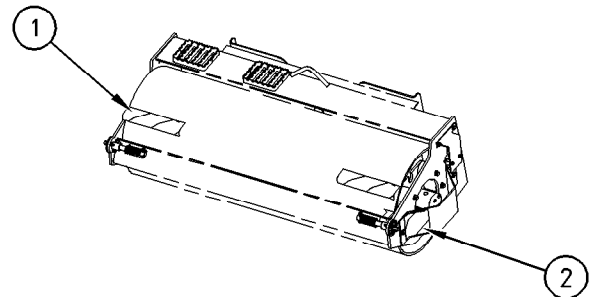


Illustration 201

g00716894

Ensure that the two front decals (1) are attached to the Vibratory Compactor. Make sure that the two side decals (2) are attached to the Vibratory Compactor.

i06598952

After Roothing the Machine

SMCS Code: 7000

When you are finished roading, perform the following procedure in order to prepare the machine for work operation.

NOTICE

Do not tilt the coupler forward while the locking pin for the coupler is installed. Damage to the coupler may result.

1. Use the following steps to remove the block for the lift arms:
 - a. Enter the machine. Fasten the seat belt. Lower the armrest. Start the engine.
 - b. Disengage the parking brake.
 - c. Raise the lift arms slightly.
 - d. Stop the engine.
 - e. Reverse the installation steps to remove the block for the lift arms. Refer to "Before Roothing the Machine".

Operation Section Rooding the Machine

- f. Start the engine. Disengage the parking brake.
 - g. Lower the lift arms all the way.
2. Turn off the rooding lights.
 3. Turn off the engine. Remove the locking pin for the coupler.

Note: In order to remove the locking pin for the coupler, the coupler may need to be tilted back.

4. Remove all guards and locks for the work tools.
5. Remove beacon light

i07331362

Rooding the Machine

SMCS Code: 7000

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.

Ensure that you have the required licenses and other similar items with you while you road the machine.

Ensure that your machine is equipped to comply with rooding regulations.

Learn and obey all traffic regulations when you are rooding the machine. Travel at a moderate speed. Observe all speed limitations when you road the machine. Ensure that all work tools remain securely attached to the work tool coupler. Ensure that appropriate locking pins remain in position.

i07690425

Lifting and Tying Down the Machine

SMCS Code: 7000

NOTICE

Improper lifting or tiedowns can allow load to shift and can cause injury and damage.

Lifting the Machine

There are two lifting attachment options available for the machine:

- The single point lifting assembly.
- The four-point lifting group.

Use one of the lifting attachments to lift the machine. Do not attach both lifting devices to the machine at the same time.

For lifting the machine, use properly rated cables and properly rated slings. Position the crane for a level machine lift. Do not drag the machine with a crane.

All work tools must be removed from the machine before the machine is lifted.

Note: Do not exceed the weight limit . This film is on the outside of the right-hand side of the cab.

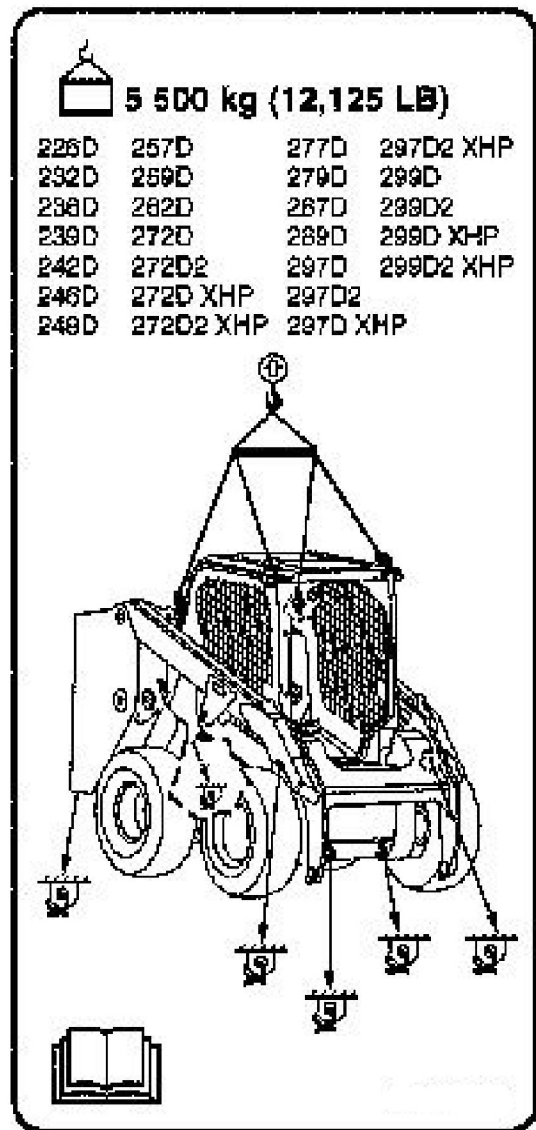


Illustration 202

g06369106

The lifting devices will be mounted on the top of the cab. If any accessory is mounted to the cab roof, the attachment must be removed before lifting the machine.

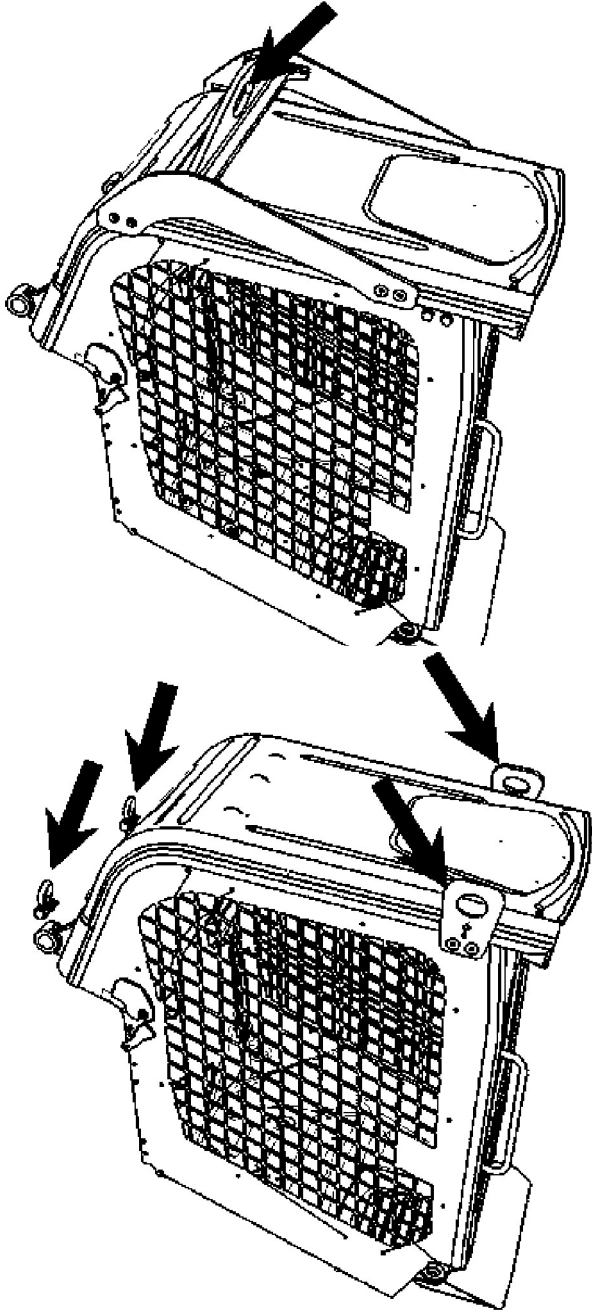


Illustration 203

g06140685

When the four-point lifting group is used, the chain for each leg should be a minimum of 1 m (3.3 ft) in length. Keep the machine level during the lift.

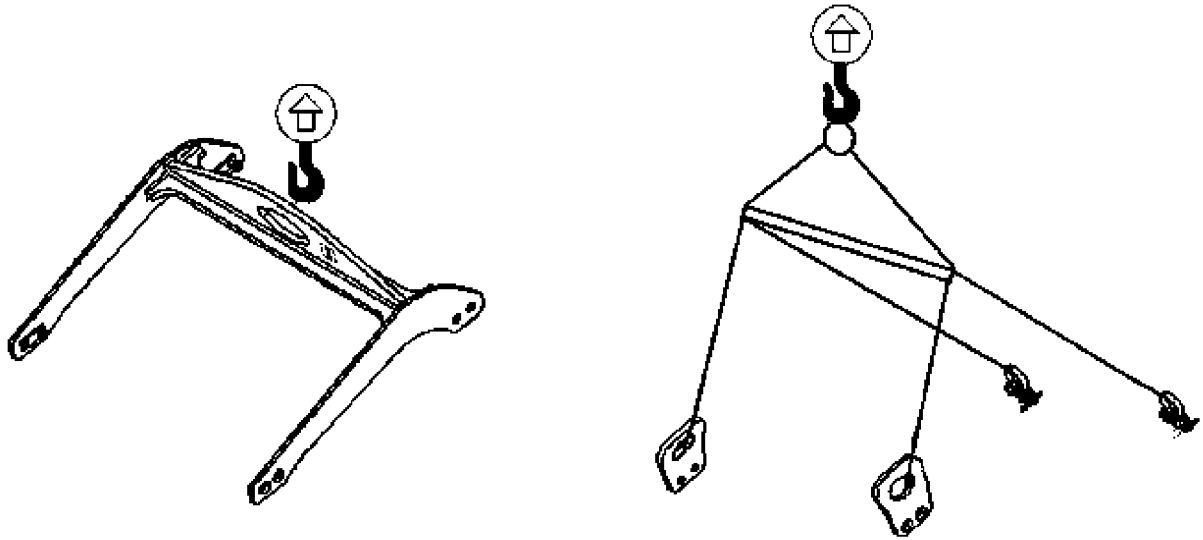


Illustration 204

g06140687

Refer to the Cat Parts Manual for the current part numbers for the lifting devices for your machine. The parts manuals are listed in the Operation and Maintenance Manual, "Reference Information Section".



Lifting Point – Lifting points are designated by this symbol.

The weight and the instructions that are given describe the machine as manufactured by Caterpillar. Refer to the Operation and Maintenance Manual, "Specifications" for weight information about your machine.

Do not allow any personnel in the area around the machine.

1. Remove the work tool. If necessary, cover any hydraulic lines and quick disconnect coupler on the machine.
2. Lower the lift arms completely.
3. Turn off the machine.
4. Attach the single point lifting device or the four point lifting device to the machine.

5. Use properly rated cables and slings for lifting. The crane should be in a position that the machine is lifted without swinging.

Lifting the Grapple Rake

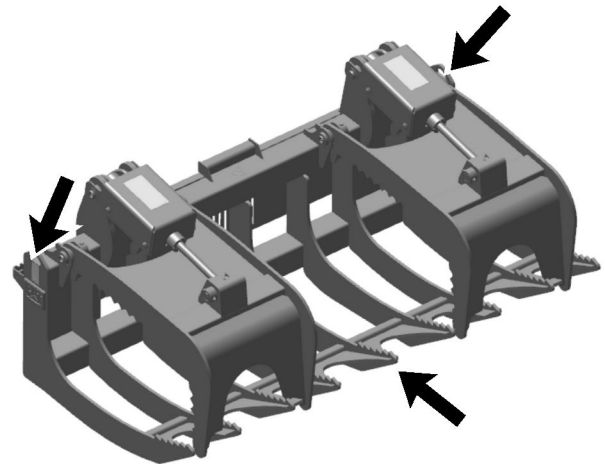


Illustration 205

g06393830

Use properly rated cables and properly rated slings for lifting work tools. Position the crane for a level lift. Do not drag the work tool with a crane.

Note: The approximate weight of the 1829 mm (72 inch) Grapple Rake is 458 kg (1010 lb). The approximate weight of the 2134 mm (84 inch) Grapple Rake is 506 kg (1116 lb).

Use two hooks in the lifting eyes on the frame. Use a sling around the front torque tube at the center rake tine.

Tying Down the Machine

There may be more than one way to tie down the machine. Local regulations should be used to determine the best method. Obey all local and regional governmental regulations.

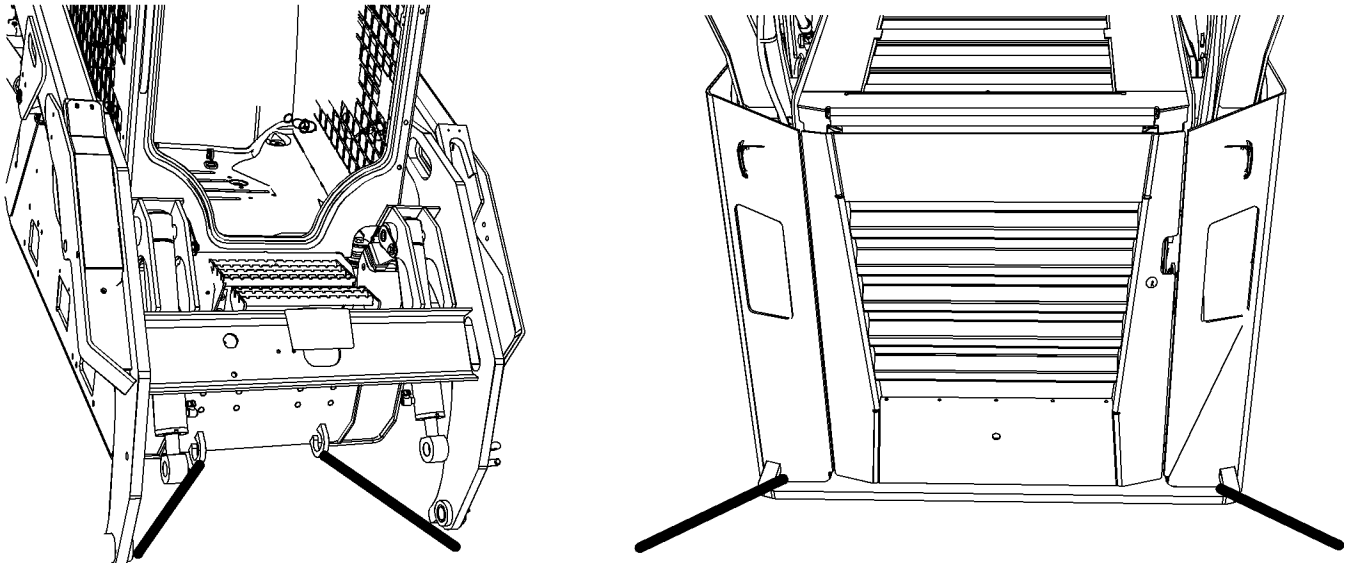


Illustration 206

g03358979

Two eyes are on the front of the machine frame and two eyes are on the rear of the machine frame.

Use the tie-downs shown in illustration 206 .

Note: Use only the specified locations for tying down the machine. Do not use any other locations to tie down the machine.

Install tie-downs at all four locations. Place chocks in front of the machine and behind the machine.



Tie-Down Point – Tie-down points are designated by this symbol.

The weight and the instructions that are given describe the machine as manufactured by Caterpillar. Refer to the Operation and Maintenance Manual, “Specifications” for weight information about your machine.

1. Turn off the machine.
2. Use the properly rated cables and shackles for tying down the machine.
3. Use the front eyes and the rear eyes that are provided on the lower frame of your machine. Use corner protection when necessary.

Note: Where possible, avoid routing cables over tires or tracks. Avoid contact with the work tool to prevent false tension.

Alternate Method

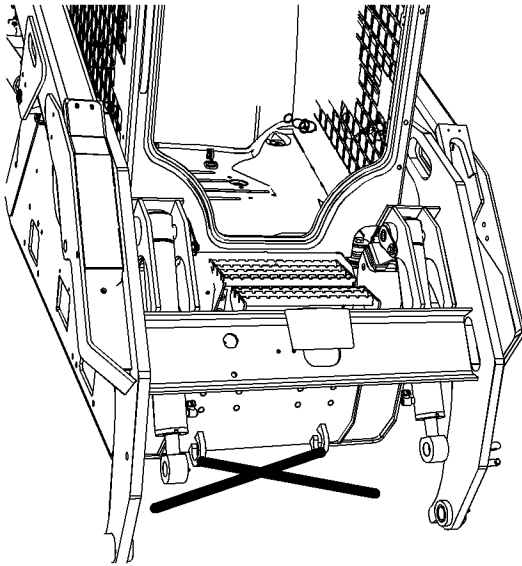
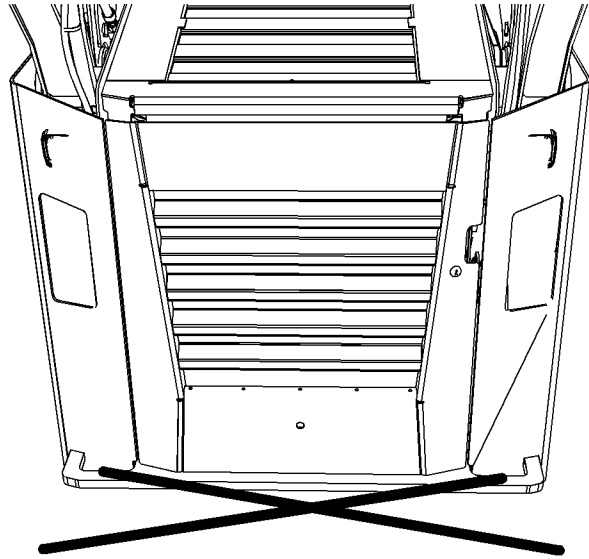


Illustration 207



g03359025

If the alternate method is used, the cable angle should be between 30 degrees and 50 degrees.

Note: If the front two tie down locations on front of machine are not applicable or desired. Use the alternate tie down location on each side of the lift arm.

Note: Use only the specified locations for tying down the machine. Do not use any other locations to tie down the machine.

Install tie-downs at four out of the six locations. Place chocks in front of the machine and behind the machine.

Consult your Cat dealer for shipping instructions for your machine.

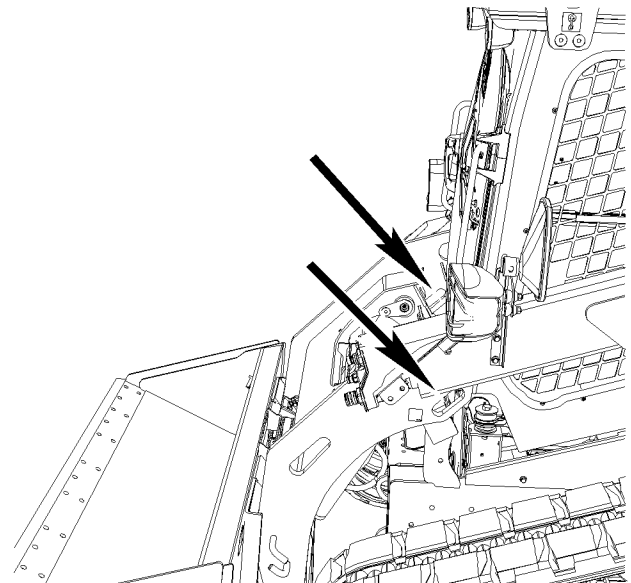


Illustration 208

g03395213

Towing Information

i07331388

Machine Retrieval

SMCS Code: 7000

If the machine is disabled, the machine should be lifted onto a trailer to be transported. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for the lifting procedure.

If the machine cannot be lifted, use the following guidelines to retrieve the machine.

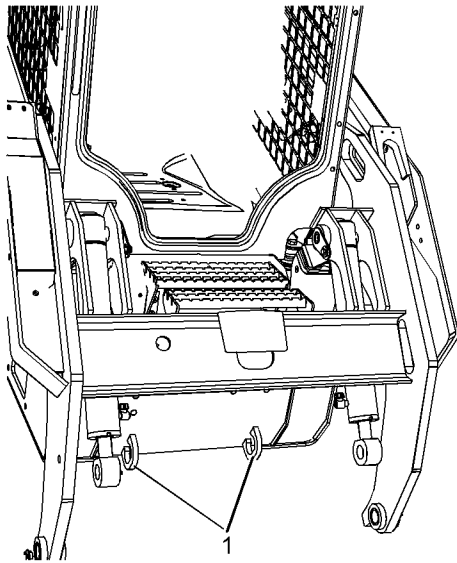


Illustration 209

g03359096

Two retrieval eyes (1) are on the front of the machine.

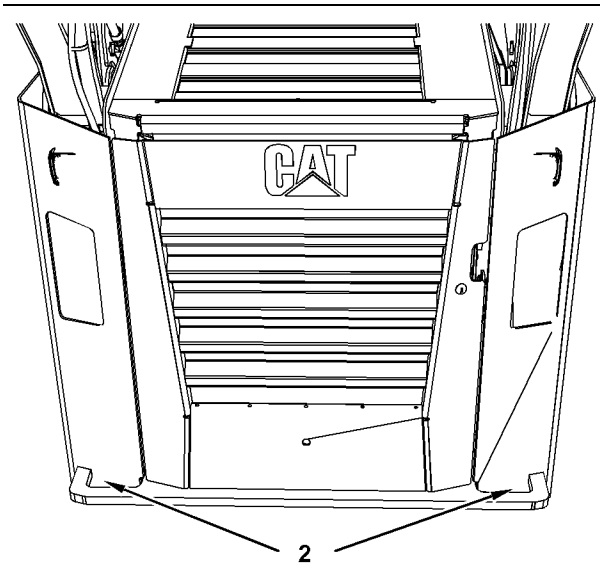


Illustration 210

g02623120

Two retrieval eyes (2) are on the rear of the machine.

- The strength of the line should be at least 1.5 times the gross weight of the machine.
- Provide shielding to protect the operator if the line breaks.
- If a single line is used to pull the machine, then the line must be a minimum of 3 m (10 ft). If two lines are used to pull the machine, then each line must be a minimum of 1.5 m (5.0 ft).
- Do not exceed a maximum pull angle of 20 degrees in any direction.
- Attach the line to the retrieval eyes. Two retrieval eyes (1) are on the front of the machine and two retrieval eyes (2) are on the rear of the machine. Do not attach the line to any other point on the machine.

NOTICE

Do not attach the line to only one retrieval eye when you are retrieving the machine. Use both retrieval eyes. Damage to the machine may occur.

Operation Section
Machine Retrieval

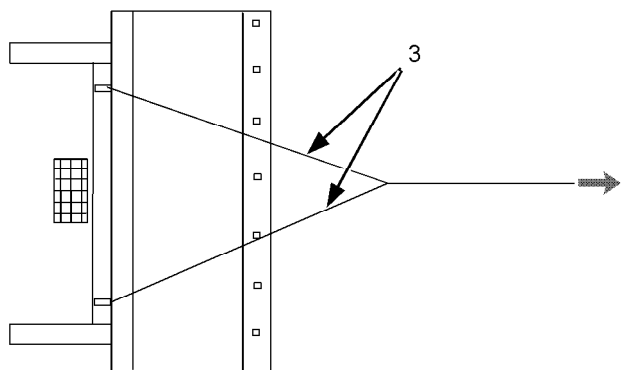


Illustration 211

g01019066

Each of the lines (3) must be a minimum of 1.5 m (5.0 ft).

NOTICE

Do not drag the machine for long distances. Damage to the tracks or the tires may occur.

Engine Starting (Alternate Methods)

i07331404

Engine Starting with Jump Start Cables

SMCS Code: 1000; 1401; 7000

WARNING

Batteries give off flammable fumes that can explode resulting in 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 positive (+) to positive (+) and the negative (-) to negative (-).

Jump start only with an energy source with the same voltage as the stalled machine.

Turn off all lights and accessories on the stalled machine. Otherwise, they will operate when the energy source is connected.

NOTICE

To prevent damage to engine bearings and to electrical circuits when you jump start a machine, do not allow the stalled machine to touch the machine that is used as the electrical source.

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.

Use only equal voltage for starting. Check the battery and starter voltage rating of your machine. Use only the same voltage for jump starting. Use of a welder or higher voltage damages the electrical system. This machine has a 12 volt starting system. Use only the same voltage for jump starting.

Refer to Special Instruction, SEHS7633, "Battery Test Procedure" available from your Caterpillar dealer, for complete testing and charging information.

1. Engage the parking brake. Lower the work tools to the ground.

Reference: Refer to Operation and Maintenance Manual, "Equipment Lowering with Engine Stopped".

2. Move all hydraulic controls to the NEUTRAL position.

3. Turn the engine start switch key to the OFF position and turn all accessory switches to the OFF position. Set the engine speed control knob to the low idle position.

4. Move the machine that is being used as an electrical source near the stalled machine so that the jump-start cables reach the stalled machine.
Do not allow the machines to contact each other.

5. Stop the engine of the machine that is being used as an electrical source. If you are using an auxiliary power source, turn off the charging system.

6. Ensure that the battery in the stalled machine is not frozen.

Operation Section
Engine Starting with Jump Start Cables

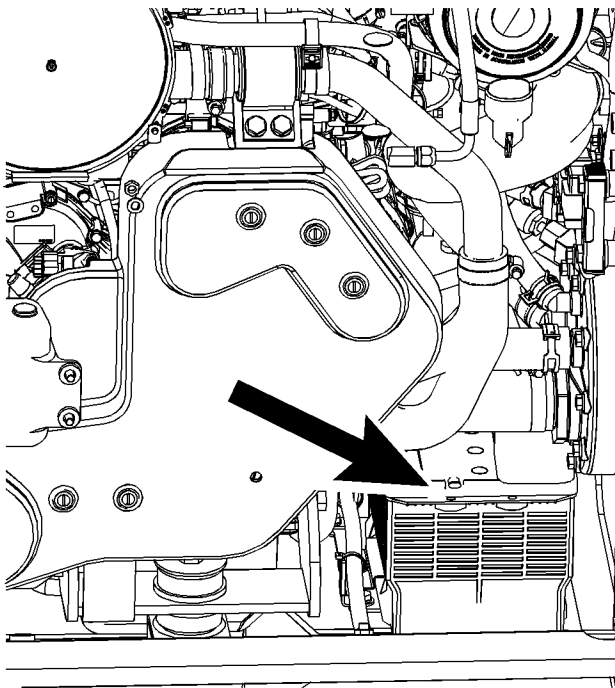


Illustration 212
C2.2 Battery Location

g03820697

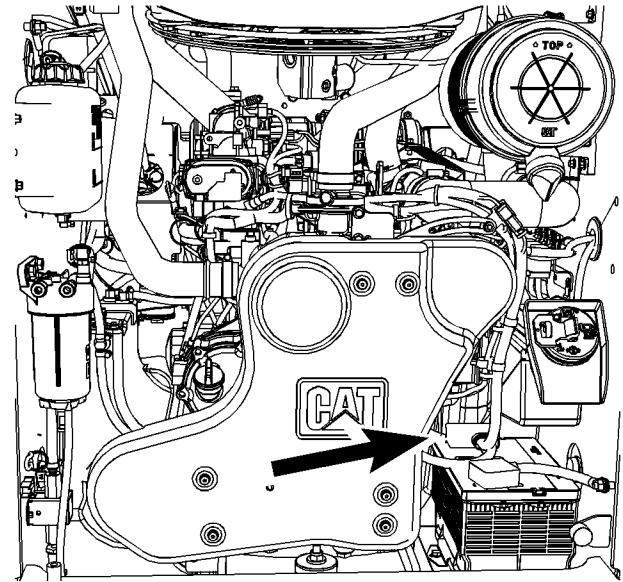


Illustration 214
C3.8 Battery Location

g02641616

7. Connect the positive jump-start cable to the positive terminal on the battery of the stalled machine.

Do not allow the positive cable clamps to contact any metal except for the terminals.

8. Connect the other positive end of the jump-start cable to the positive cable terminal of the electrical source.
9. Connect one negative end of the jump-start cable to the negative cable terminal of the electrical source.

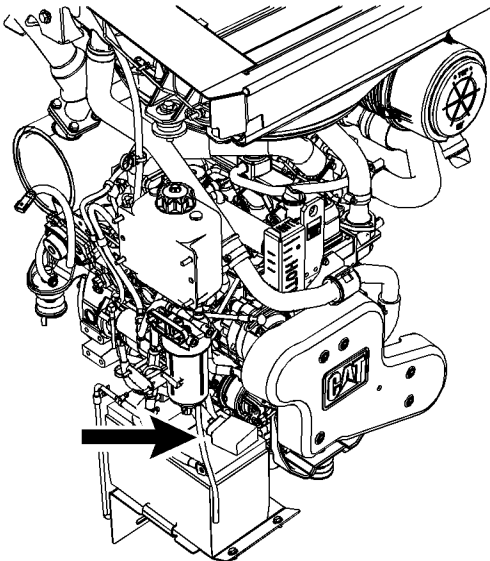


Illustration 213
C3.3B Battery Location

g03589232

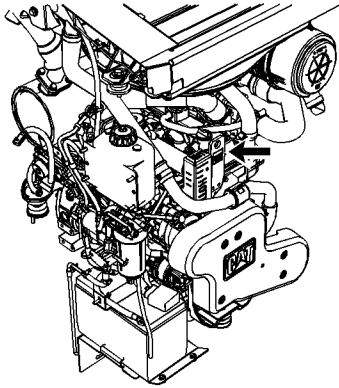


Illustration 215

g03318050

- 10.** Connect the other negative end of the jump-start cable to the lifting eye on the engine of the stalled machine. **Do not connect the jump-start cable to the battery post. Do not allow the jump-start cables to contact the battery cables, the fuel lines, the hydraulic lines, or any moving parts.**
 - 11.** Start the engine of the machine that is being used as an electrical source or energize the charging system on the auxiliary power source.
 - 12.** Wait at least 2 minutes before you attempt to start the stalled machine. The battery in the stalled machine will partially charge.
 - 13.** Attempt to start the stalled engine.
- Reference:** For the correct starting procedure, refer to Operation and Maintenance Manual, “Engine Starting”.
- 14.** After the stalled engine starts, disconnect the negative jump-start cable from the stalled machine.
 - 15.** Disconnect the negative jump-start cable from the negative terminal of the electrical source.
 - 16.** Disconnect the positive jump-start cable from the positive terminal of the electrical source.
 - 17.** Disconnect the positive jump-start cable from the positive terminal of the stalled machine.

Maintenance Section

Maintenance Access

i04429328

Access Doors and Covers

SMCS Code: 7273-572; 7273-573**S/N:** BL21-Up**S/N:** DX21-Up**S/N:** FD21-Up**S/N:** HP21-Up**S/N:** MD21-Up**S/N:** BY41-Up**S/N:** CD41-Up**S/N:** AJ71-Up**S/N:** BE71-Up**S/N:** BL71-Up**S/N:** HP71-Up**S/N:** AH91-Up**S/N:** BL91-Up**S/N:** DX91-Up**S/N:** KB91-Up**S/N:** DTB1-Up**S/N:** GTC1-Up**S/N:** KXC1-Up**S/N:** HRD1-Up**S/N:** BYF1-Up**S/N:** FTK1-Up**S/N:** GTK1-Up**S/N:** STK1-Up**S/N:** TLK1-Up**S/N:** DML1-Up**S/N:** EML1-Up**S/N:** ETL1-Up**S/N:** FTL1-Up**S/N:** GTL1-Up**S/N:** JSL1-Up**S/N:** NTL1-Up**S/N:** SEN1-Up**S/N:** DPR1-Up**S/N:** FMR1-Up**S/N:** GWR1-Up**S/N:** HMR1-Up**S/N:** KTS1-Up**S/N:** DZT1-Up**S/N:** FMT1-Up**S/N:** HMT1-Up**S/N:** JST1-Up**S/N:** LST1-Up**S/N:** MKT1-Up**S/N:** MLT1-Up**S/N:** PPT1-Up**S/N:** WCT1-Up**S/N:** A9W1-Up**S/N:** B5W1-Up**S/N:** EZW1-Up**S/N:** MPW1-Up**S/N:** TAW1-Up**S/N:** RCX1-Up**S/N:** A9Z1-Up**S/N:** BGZ1-Up

Engine Access Door

Note: A pinch point exists between the top of the engine access door and the radiator guard. Keep hands away from this area when you close the engine access door.

The engine access door is located on the back of the machine.

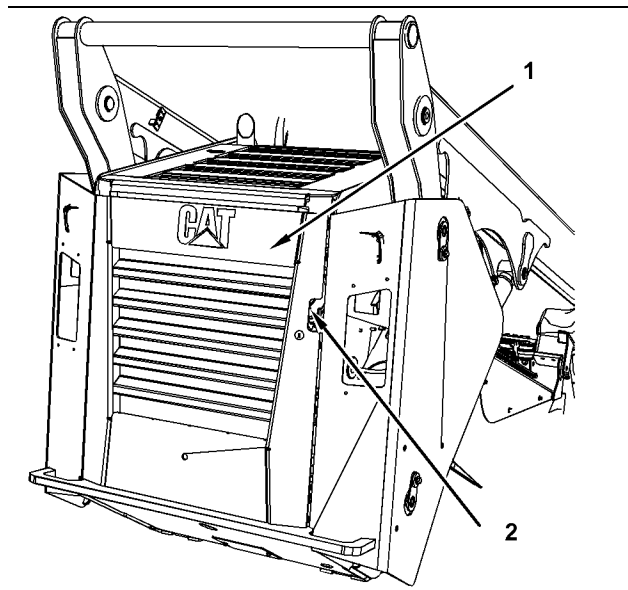


Illustration 216

g02623519

- (1) Engine Access Door
(2) Release Lever Access

1. Pull the release lever in order to open the engine access door.

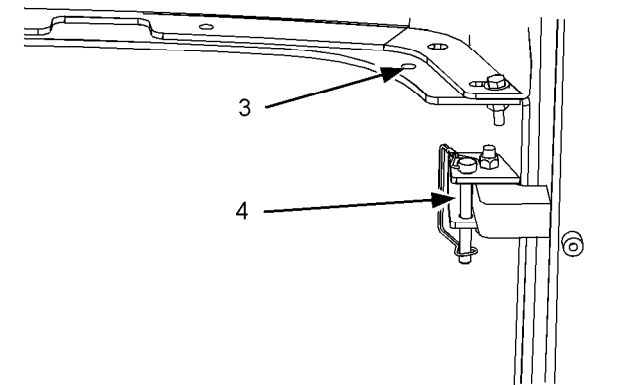


Illustration 217

g01019162

2. Move the retaining pin from the stored position (3) and put the retaining pin in the LOCKED position (4). The engine access door is locked in the open position.
3. In order to close the engine access door, put the retaining pin in the STORED position.

4. Close the engine access door. Ensure that the latch is engaged.

i07331500

Cab Tilting

SMCS Code: 7301-506; 7301-509

WARNING

Do not go beneath cab unless cab is empty and support lever is engaged.

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

WARNING

Do not tilt the cab using an open door. The door must be closed and latched when lifting the cab. The door may become dislodged from its hinges and may cause serious personal injury or death.

Tilting the Cab Upward

1. Park the machine on level ground.

Note: Empty the roof-mounted water tank (if equipped) before you tilt the cab.

Note: If the machine is equipped with the optional HVAC breather kit, disconnect the ductwork between the cab snorkel, and fresh air filter cover before tilting the cab upward.

2. Lower the loader arms fully. If you tilt the cab upward with the loader lift arms in the RAISED position, engage the brace for the loader lift arms. See Operation and Maintenance Manual, "Loader Lift Arm Brace Operation" for the process for engaging the brace for the loader lift arms.
3. Turn the engine start switch key to the OFF position.
4. Remove the two front bolts for the ROPS. There is one bolt on each side of the cab under the lift arms.
5. Close the cab door and ensure that the door is latched.
6. Tilt the cab upward. Stand on the ground when you tilt the cab.

Note: More than one person may be needed to tilt the cab.

Maintenance Section

Cab Tilting

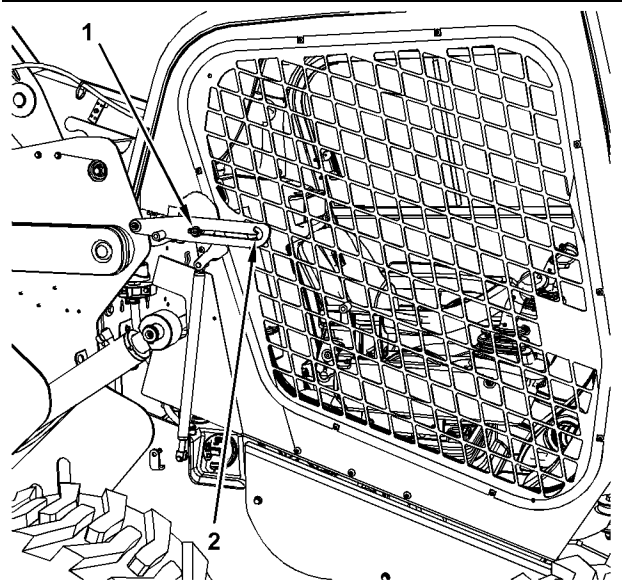


Illustration 218

g02625112

Cab support lever. For clarity the lift arm is not shown.

- (1) Unlocked
- (2) Locked

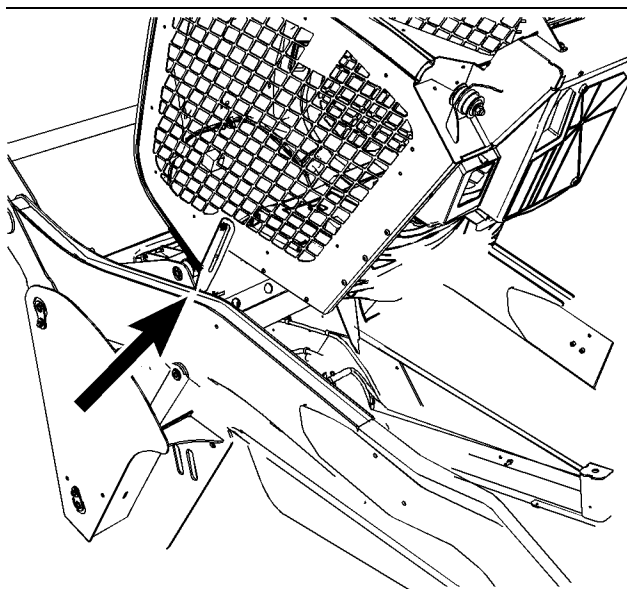


Illustration 219

g02641677

- 7. The cab support lever is on the right side of the machine. As the cab raises, the locking lever will slide into the LOCKED position. Ensure that the cab support lever is in the LOCKED position.

Tilting the Cab Downward

Note: More than one person may be needed to tilt the cab.

1. Ensure that no person is under the cab. Remove all the tools and unsecured items that are underneath the cab.
2. Tilt the cab upward. Move the cab support lever to the UNLOCKED position.
3. Tilt the cab downward.
4. Install the bolts for the ROPS. Torque the bolts to $125 \pm 10 \text{ N}\cdot\text{m}$ ($92 \pm 7 \text{ lb ft}$).

Note: If the machine is equipped with the optional HVAC breather kit, reconnect the ductwork between the cab snorkel and fresh air filter cover.

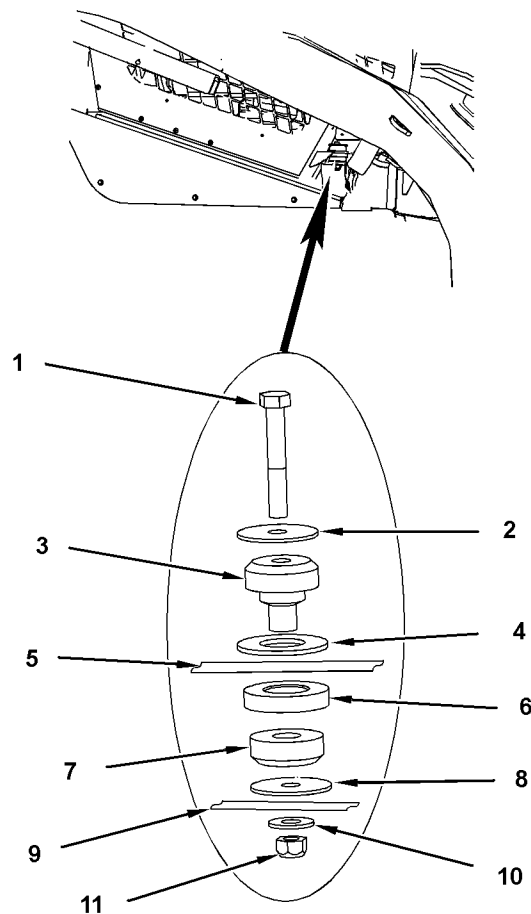


Illustration 220

g01271548

Type 1 Cab Mount

- (1) Bolt
- (2) Washer
- (3) Rubber mount - top half
- (4) Washer
- (5) ROPS structure
- (6) Spacer
- (7) Rubber mount - bottom half
- (8) Washer
- (9) Frame
- (10) Spacer
- (11) Locknut

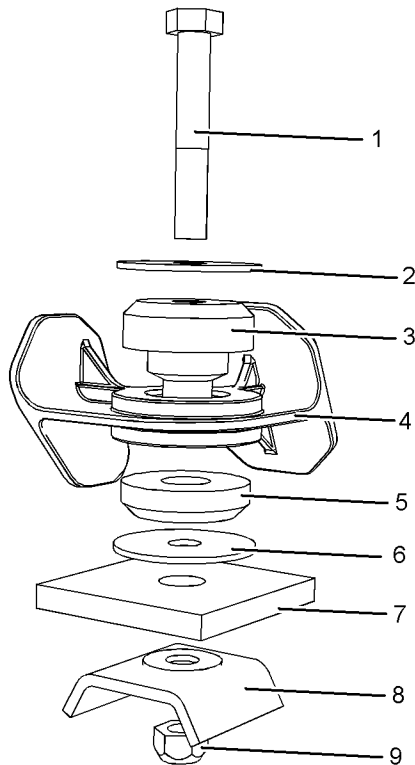


Illustration 221

g03823772

Type 2 Cab Mount

- (1) Bolt
- (2) Washer
- (3) Rubber Mount - Top Half
- (4) ROPS Structure
- (5) Rubber Mount - Bottom Half
- (6) Washer
- (7) Frame
- (8) Spacer
- (9) Locknut

i07331526

Loader Lift Arm Brace Operation

SMCS Code: 6119-011-AB; 6119-012-AB

WARNING

Loader lift arm brace must be in place when working under raised lift arms.

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

Engage the Lift Arm Brace

1. Empty the work tool. Remove the work tool. Park the machine on level ground. Lower lift arms to the ground.

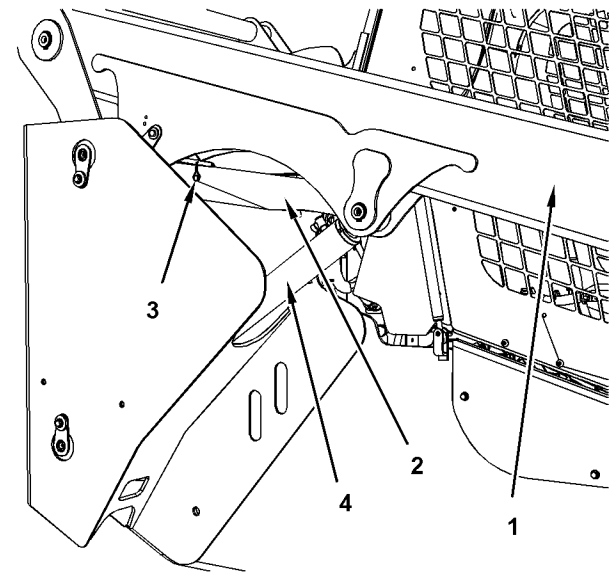


Illustration 222

g02830722

- (1) Lift arm
- (2) Lift arm brace
- (3) Retaining pin
- (4) Lift cylinder

2. Stop the engine and exit the machine.
3. Remove arm brace retaining pin and lower brace down to lift cylinder.
4. Enter the machine, fasten the seat belt, and lower the armrests. Start the engine.
5. Release parking brake. Raise the lift arms slowly until the lift arm brace just drops down to the lift cylinder rod.
6. Lower the lift arms against the brace.
7. Stop the engine and exit the machine.

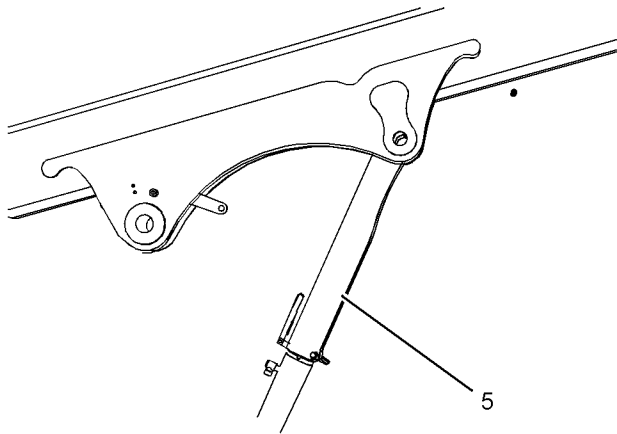


Illustration 223

g03676094

(5) Lift arm brace in the locked position

8. Secure the brace with the retaining pin.

Disengage the Lift Arm Brace

1. Remove the retaining pin.
2. Rotate the brace lift pin onto the cylinder.
3. Enter the machine. Fasten the seat belt. Lower the armrests.
4. Start the engine.

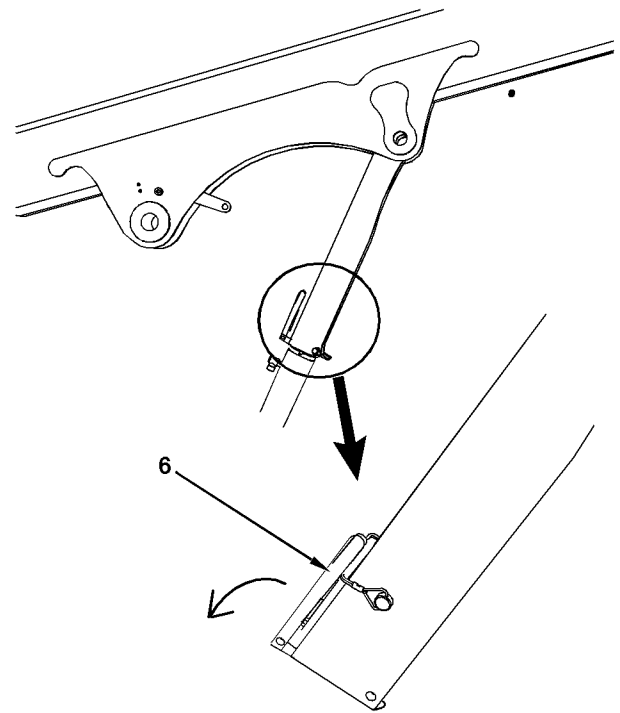


Illustration 224

g06287498

5. Slowly raise the lift arms until the brace lift pin (6) drops into position on the cylinder rod.
6. Slowly lower the lift arms. Ensure that the lift pin (6) lifts the arm brace over the cylinder.
7. Slowly lower the lift arms to the ground.
8. Stop the engine and exit the machine.
9. Secure the brace in the storage position with the retaining pin.

i07569254

Radiator Tilting

SMCS Code: 1353-506; 1353-509

Note: All models except for 226D, 232D, 239D, and 249D.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

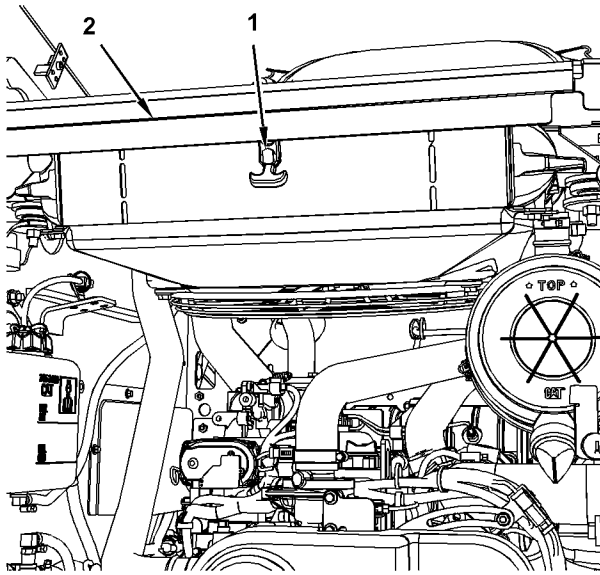


Illustration 225

g02835776

- (1) Latch
(2) Radiator guard

2. The release latch for the guard is located on the rear of the radiator. Pull the rubber T-handle down to release the guard. Tilt the guard upward.

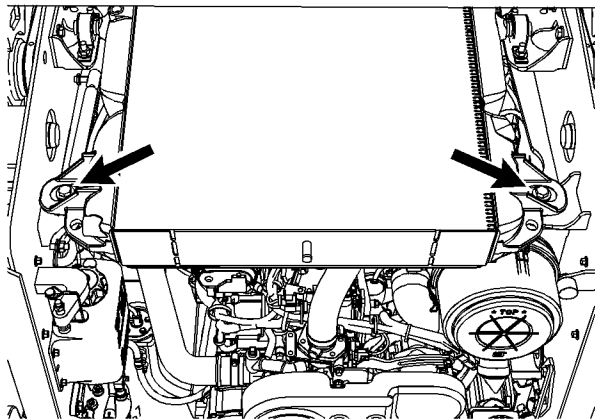


Illustration 226

g02623716

3. To raise the radiator, remove the two bolts.

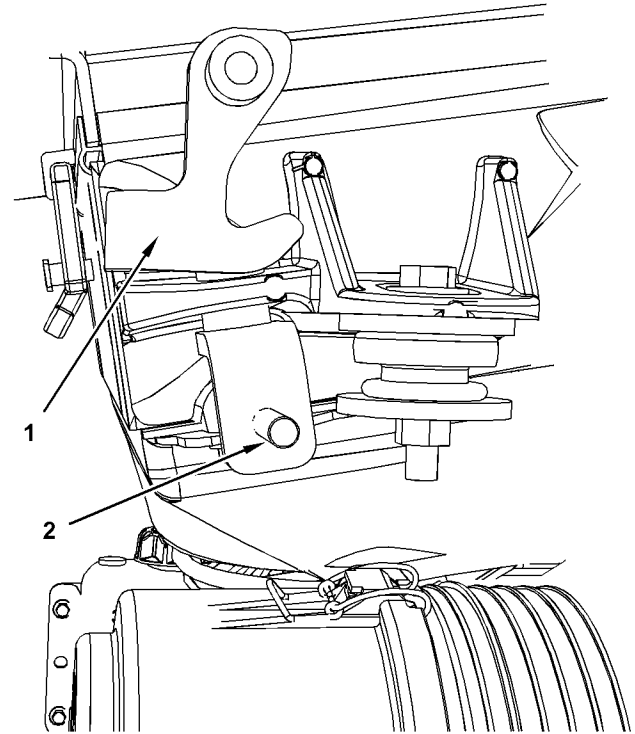


Illustration 227

g02817796

4. Raise the radiator. As the radiator raises, the latch will move (1).
5. Raise the radiator until the latch moves over the catch pin (2).
6. To lower the radiator downward, push up on the radiator. Move the latch to unlatch the lock. Lower the radiator.
7. Install the two bolts to secure the radiator.
8. To lower the radiator guard, move the support rod to the storage position and lower the guard.
9. Fasten the rubber T-handle latch.
10. Close the engine access door.

Alternate Release Latch Location

Only for 226D, 232D, 239D, and 249D.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

Maintenance Section
Radiator Tilting

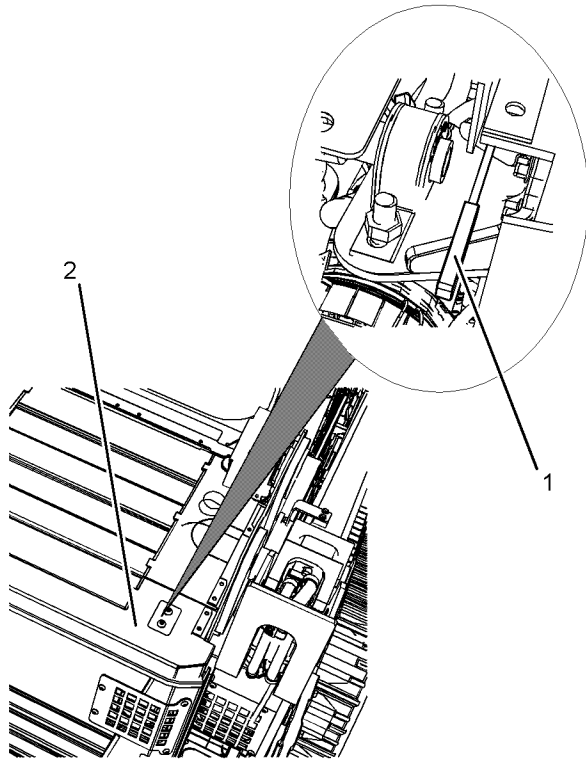


Illustration 228

g03822121

- (1) Release Latch (Both Sides)
- (2) Radiator Guard

2. Release latches for the guard are located on either side of the radiator near the rear of the radiator. Press both release latches upwards simultaneously and tilt the guard upwards.

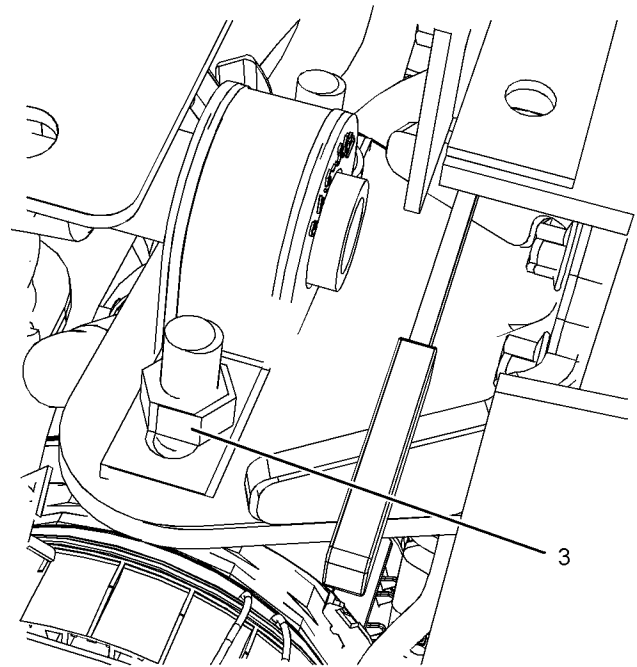


Illustration 229

g03826737

3. To raise the radiator, remove the two nuts (3) from the radiator mount on each side.

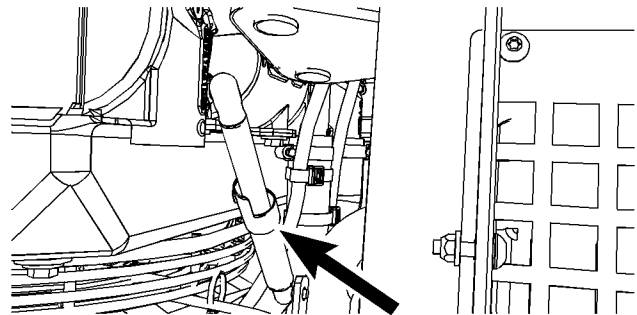


Illustration 230

g03822126

- 4.** The strut lock is on the right side of the engine compartment. Make sure that the strut lock is in the LOCKED position with the radiator tilted up.
- 5.** To lower the radiator downward, lift slightly on the radiator and push the strut lock to the left and lower the radiator carefully.
- 6.** Install the two nuts to the radiator mount on each side.

7. Tilt the guard downward until both the release latches lock onto the catch pins.
8. Close the engine access door.

Lubricant Viscosities and Refill Capacities

i08466263

Lubricant Viscosities (Fluids Recommendations)

SMCS Code: 7581

General Information for Lubricants

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

For cold-weather applications where transmission oil SAE 0W-20 is recommended, Cat Cold-Weather TDTO is recommended.

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

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

Selecting the Viscosity

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

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

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

NOTICE

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

Engine Oil

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

Cat DEO-ULS or oils that meet the Cat ECF-3 specification and the API CJ-4 are required for use in the applications listed below. Cat DEO-ULS and oils meeting Cat ECF-3 specification and the API CJ-4 and ACEA E9 oil categories have been developed with limited sulfated ash, phosphorus, and sulfur. These chemical limits are designed to maintain the expected aftertreatment devices life, performance, and service interval. If oils meeting the Cat ECF-3 specification and the API CJ-4 specifications are not available, oils meeting ACEA E9 may be used. ACEA E9 oils meet the chemical limits designed to maintain aftertreatment device life. ACEA E9 oils are validated using some but not all ECF-3 and API CJ-4 standard engine performance tests. Consult your oil supplier when considering use of an oil that is not Cat ECF-3 or API CJ-4 qualified.

Failure to meet the listed requirements will damage aftertreatment - equipped engines and can negatively impact the performance of the aftertreatment devices. The Diesel Particulate Filter (DPF) will plug sooner and require more frequent DPF ash service intervals.

Typical aftertreatment systems include the following:

- Diesel Particulate Filters (DPF)
- Diesel Oxidation Catalysts (DOC)

Other systems may apply.

Note: For territories where high sulfur diesel fuel is available and allowed by law, these engines will not have aftertreatment. For the areas that have diesel fuel sulfur levels greater than .2% (2,000 ppm), refer to Special Publications, SEBU6250, "Caterpillar Machine Fluids Recommendations" "Total Base Number (TBN) and Fuel Sulfur Levels for Direct Injection (DI) Diesel Engines" for recommendations.

Table 97

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

Note: For engines with NO aftertreatment, Cat DEO can also be used. Refer to Special Publications, SEBU6250, "Caterpillar Machine Fluids Recommendations" "Cat Diesel Engine Oils Recommendations".

Hydraulic Systems

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

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

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

Cat HYDO Advanced fluids have a 50% increase in the standard oil drain interval for machine hydraulic systems (3000 hours versus 2000 hours) over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual for your particular machine. 6000-hour oil drain intervals are possible when using S·O·S Services oil analysis. Consult your Cat dealer for details. When switching to Cat HYDO Advanced fluids, cross contamination with the previous oil should be kept to less than 10%.

Second choice oils are listed below.

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

Table 98

Lubricant Viscosities for Ambient Temperatures						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Hydraulic System	Cat HYDO Advanced 10 Cat TDTO	SAE 10W	-20	40	-4	104
	Cat HYDO Advanced 30 Cat TDTO	SAE 30	0	50	32	122
	Cat BIO HYDO Advanced	"ISO 46" Multi-Grade	-30	45	-22	113
	Cat MTO Cat DEO-ULS Cat DEO	SAE10W-30	-20	40	-4	104
	Cat DEO-ULS Cat DEO	SAE15W-40	-15	50	5	122
	Cat TDTO-TMS	Multi-Grade	-15	50	5	122
	Cat DEO-ULS Cold Weather	SAE0W-40	-40	40	-40	104
	Cat TDTO Cold Weather	SAE 0W-20	-40	40	-40	104

Drive Train Components

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

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

Table 99

Drive Train Components						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
MTL Track Idlers and Track Rollers SSL Drive Chain Case	Cat DEO-ULS Cold Weather	SAE 0W-40	-40	40	-40	104
	Cat DEO-ULS	SAE 10W-30	-18	40	0	104
	Cat DEO	SAE 15W-40	-9.5	50	15	122
CTL Track Idlers and Track Rollers	Extreme Pressure GO	ISO 220 ⁽¹⁾	-40	50	-40	122
	Cat GO	SAE 80W90	-40	50	-40	122
MTL/CTL Final Drive	Cat Synthetic GO ⁽¹⁾⁽²⁾	SAE 75W-140	-30	45	-22	113
Steel Track Idlers and Steel Track Rollers	Cat Deo EMA LRG-1 API CH-4 API CG-4 API CF-4 API CF	SAE 30	-20	25	-4	77
		SAE 40	-10	40	14	104
		SAE 5W40	-35	40	-31	104

(continued)

(Table 99, contd)

Drive Train Components						
Compartment or System	Oil Type and Performance Requirements	Oil Viscosities	°C		°F	
			Min	Max	Min	Max
Track Pins	Cat GO API GL-5	SAE 75W90	-30	40	-22	104
		SAE 80W90	-20	40	-4	104
		SAE 85W140	-10	50	14	122
		SAE 90	0	40	32	104

(1) Cat Synthetic GO is the preferred oil for the final drive. If Cat Synthetic GO is not available, Cat GO, or API GL-5 grade oil may be substituted

(2) Cat GO (Gear Oil) is available in SAE 80W-90 and SAE 85W-140 viscosity grades

Special Lubricants

Grease

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

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

Table 100

Recommended Grease						
Compartment or System	Grease Type	NLGI Grade	°C		°F	
			Min	Max	Min	Max
External Lubrication Points	Cat Prime Application	NLGI Grade 2	-20	40	-4	104
	Cat Extreme Application	NLGI Grade 2	-30	50	-22	122
		NLGI Grade 1	-35	40	-31	104
	NLGI Grade 0	-40	35	-40	95	
	Cat Extreme Application-Arctic	NLGI Grade 0	-50	20	-58	68
Cat Extreme Application-Desert	NLGI Grade 2	-20	60	-4	140	
Steering Column ⁽¹⁾ Drive Shaft Universal Joints ⁽²⁾ Drive Shaft Support Bearing	Cat Utility	NLGI Grade 2	-30	40	-22	104

(1) HMU Steering

(2) 980 Drive Shaft is maintenance free.

Diesel Fuel Recommendations

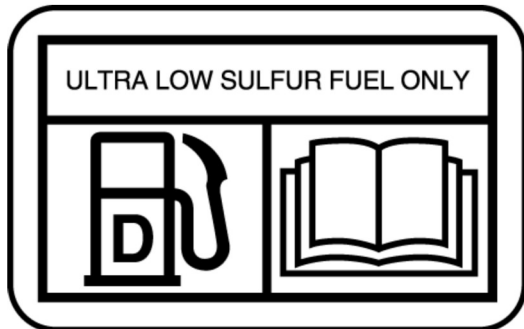


Illustration 231

g02157153

United States and Canada

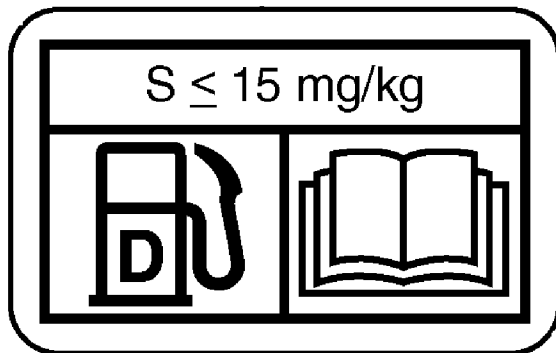


Illustration 232

g02052934

Rest of World Film

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

NOTICE

Ultra Low Sulfur Diesel (ULSD) fuel 0.0015 percent (≤ 15 ppm (mg/kg)) sulfur is required by regulation for use in engines certified to nonroad Tier 4 standards (U.S. EPA Tier 4 certified) and that are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤ 10 ppm (mg/kg)) sulfur fuel is required by regulation for use in engines certified to European nonroad Stage IIIB and newer standards and are equipped with exhaust aftertreatment systems.

European ULSD 0.0010 percent (≤ 10 ppm (mg/kg) at origin, or 0.0020 percent (≤ 20 ppm (mg/kg) at point of final distribution, sulfur fuel having a cetane number ≥ 45 and an FAME (bio-diesel) content $\leq 7\%$ (v/v) is required by regulation for use in engines certified to European nonroad Stage V and newer standards and are equipped with exhaust aftertreatment systems.

Misfueling with fuels of higher sulfur level may void the warranty or affect warranty claims coverage and have the following negative effects:

- **Shorten the time interval between aftertreatment device service intervals (cause the need for more frequent service intervals)**
- **Adversely impact the performance and life of aftertreatment devices (cause loss of performance)**
- **Reduce regeneration intervals of aftertreatment devices**
- Reduce engine efficiency and durability.
- Increase the wear.
- Increase the corrosion.
- Increase the deposits.
- Lower fuel economy
- Shorten the time period between oil drain intervals (more frequent oil drain intervals).
- Increase overall operating costs.

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

For Tier 4/Stage IIIB/Stage IV/Stage V certified engines always follow operating instructions. Fuel tank inlet labels are installed to ensure that the correct fuels are used.

Refer to Special Publication, SEBU6250, “Caterpillar Machine Fluids Recommendations” for more details about fuels, lubricants, and Tier 4 requirements.

Note: The maximum allowable fuel sulfur level is controlled by various emissions laws, regulations and mandates consult federal, state and local authorities for guidance on fuel requirements for your area.

Diesel fuel containing greater than .0015% (15 ppm) sulfur is acceptable for areas of the world where allowed by law. The engines in these territories are not equipped with aftertreatment. For these lesser regulated countries, refer to the following for allowable diesel fuel sulfur content.

For engines that do not use aftertreatment but do use Exhaust Gas Recirculation (EGR), diesel fuel containing more than 0.05% (500 ppm) sulfur is not approved.

For engines that DO NOT use aftertreatment nor use Exhaust Gas Recirculation (EGR), use of diesel fuel containing more than 1.0% (10,000 ppm) sulfur is not approved. Diesel fuel containing less than 0.1% (1,000 ppm) sulfur is highly recommended. Fuel sulfur levels between 0.5% (5,000 ppm) and up to 1.0% (10,000 ppm) may significantly shorten the oil change interval. Cat S.O.S. Service oil analysis is very strongly recommended. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" "Total Base Number (TBN) and Fuel Sulfur Levels for Direct Injection (DI) Diesel Engines" for more information.

Diesel Exhaust Fluid (If Equipped)

General Information

Diesel Exhaust Fluid (DEF) is a liquid that is injected into the exhaust system of engines equipped with Selective Catalytic Reduction (SCR) systems. SCR reduces emissions of nitrogen oxides (NOx) in diesel engine exhaust.

Diesel Exhaust Fluid (DEF) is also known under other names including Aqueous Urea Solution (AUS) 32, AdBlue, or generically referred to as urea.

In engines equipped with SCR emissions reduction system, DEF is injected in controlled amounts into the engine exhaust stream. At the elevated exhaust temperature, urea in DEF is converted to ammonia. The ammonia chemically reacts with NOx in diesel exhaust in the presence of the SCR catalyst. The reaction converts NOx into harmless nitrogen (N₂) and water (H₂O).

DEF Recommendations

For use in Cat engines, DEF must meet all the requirements defined by "ISO 22241-1" Requirements.

Caterpillar recommends the use of DEF available through the Cat parts ordering system for use in Cat engines equipped with SCR systems.

In North America, commercial DEF that is API approved and meets all the requirements defined in "ISO 22241-1" may be used in Cat engines that are equipped with SCR systems.

Outside of North America, commercial DEF that meets all requirements defined in "ISO 22241-1" may be used in Cat engines that are equipped with SCR systems.

The supplier should provide documentation to prove that the DEF is compliant with the requirements of "ISO 22241-1".

NOTICE

Cat does not warrant the quality or performance of non-Cat fluids.

NOTICE

Do not use agriculture grade urea solutions. Do not use any fluids that do not meet "ISO 22241-1" Requirements in SCR emissions reduction systems. Use of these fluids can result in numerous problems including damage to SCR equipment and a reduction in NOx conversion efficiency.

DEF is a solution of solid urea that is dissolved in demineralized water to produce a final concentration of 32.5% urea. DEF concentration of 32.5% is optimal for use in SCR systems. DEF solution of 32.5% urea has the lowest attainable freeze point of -11.5° C (11.3° F). DEF concentrations that are higher or lower than 32.5% have higher freeze points. DEF dosing systems and "ISO 22241-1" specifications are designed for a solution that is approximately 32.5%.

Caterpillar offers a refractometer, Cat part number 360-0774, that can be used to measure DEF concentration. Follow the instructions provided with the instrument. Appropriate commercial portable refractometers can be used to determine urea concentration. Follow the instructions from the manufacturer.

DEF Guidelines

DEF solution is typically colorless and clear. Changes to color or clarity are indicators of quality issues. Quality of DEF can degrade when stored and handled inappropriately or if DEF is not protected from contamination. Details are provided below.

If quality issues are suspected, testing of DEF should focus on urea percentage, alkalinity as NH₃ and biuret content. DEF that does not pass all these tests or that is no longer clear should not be used.

Materials compatibility

DEF is corrosive. Due to the corrosion caused, DEF must be stored in tanks constructed of approved materials. Recommended storage materials:

Maintenance Section
Fluids Recommendations

Stainless Steels:

- 304 (S30400)
- 304L (S30403)
- 316 (S31600)
- 316L (S31603)

Alloys and metals:

- Chromium Nickel (CrNi)
- Chromium Nickel Molybdenum (CrNiMo)
- Titanium

Non-metallic materials:

- Polyethylene
- Polypropylene
- Polyisobutylene
- Teflon (PFA)
- Polyfluoroethylene (PFE)
- Polyvinylidene fluoride (PVDF)
- Polytetrafluoroethylene (PTFE)

Materials NOT compatible with DEF solutions include Aluminum, Magnesium, Zinc, Nickel coatings, Silver, and Carbon steel and Solders containing any of the above. Unexpected reactions may occur if DEF solutions come in contact with any non-compatible material or unknown materials.

Bulk storage

Follow all local regulations covering bulk storage tanks. Follow proper tank construction guidelines. Tank volume typically should be 110% of planned capacity. Appropriately vent indoor tanks. Plan for control of overflow of the tank. Heat tanks that dispense DEF in cold climates.

Bulk tank breathers should be fitted with filtration to keep airborne debris from entering the tank. Desiccant breathers should not be used because water will be absorbed, which potentially can alter DEF concentration.

Handling

Follow all local regulations covering transport and handling. DEF transport temperature is recommended to be -5°C (23°F) to 25°C (77°F). All transfer equipment and intermediate containers should be used exclusively for DEF. Containers should not be reused for any other fluids. Ensure that transfer equipment is made from DEF-compatible materials. Recommended material for hoses and other non-metallic transfer equipment includes:

- Nitrile Rubber (NBR)
- Fluoroelastomer (FKM)
- Ethylene Propylene Diene Monomer (EPDM)

The condition of hoses and other nonmetallics that are used with DEF should be monitored for signs of degradation. DEF leaks are easily recognizable by white urea crystals that accumulate at the site of the leak. Solid urea can be corrosive to galvanized or unalloyed steel, aluminum, copper, and brass. Leaks should be repaired immediately to avoid damage to surrounding hardware.

Cleanliness

Contaminants can degrade the quality and life of DEF. Filtering DEF is recommended when dispensed into the DEF tank. Filters should be compatible with DEF and should be used exclusively with DEF. Check with the filter supplier to confirm compatibility with DEF before using. Mesh-type filters using compatible metals, such as stainless steel, are recommended. Paper (cellulose) media and some synthetic filter media are not recommended because of degradation during use.

Care should be taken when dispensing DEF. Spills should be cleaned immediately. Machine or engine surfaces should be wiped clean and rinsed with water. Caution should be used when dispensing DEF near an engine that has recently been running. Spilling DEF onto hot components will cause harmful vapors.

Stability

DEF fluid is stable when stored and handled properly. The quality of DEF rapidly degrades when stored at high temperatures. The ideal storage temperature for DEF is between -9°C (15.8°F) and 25°C (77°F). DEF that is stored above 35°C (95°F) for longer than 1 month must be tested before use. Testing should evaluate Urea Percentage, Alkalinity as NH_3 and Biuret content.

The length of storage of DEF is listed in the following table:

Table 101

Storage Temperature	Expected DEF Life
Below 25°C (77°F)	18 months
25°C (77°F) to 30°C (86°F)	12 months
30°C (86°F) to 35°C (95°F)	6 months
Above 35°C (95°F)	test quality before use

Refer to "ISO 22241" document series for more information about DEF quality control.

Note: Dispose of all fluids according to applicable regulations and mandates.

Fuel Additives

Cat Diesel Fuel Conditioner and Cat Diesel Fuel System Cleaner are available for use when needed. These products are applicable to diesel and biodiesel fuels. Caterpillar recommends the addition of Cat Diesel Fuel System Cleaner every 3000 hours of engine operation on particular models. Refer to "Diesel Fuel System Cleaner - Add" for model information. Contact your Cat dealer for availability.

Biodiesel

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

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

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

Note: The diesel portion used in the biodiesel blend must be Ultra Low Sulfur Diesel (15 ppm sulfur or less, per "ASTM D975"). In Europe the diesel fuel portion used in the biodiesel blend must be sulfur free diesel (10 ppm sulfur or less, per "EN 590"). The final blend must have 15 ppm sulfur or less.

Note: Up to B7 biodiesel blend level is acceptable for use in SSL, MTL, and CTL engines.

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

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

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

Coolant Information

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

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

Preferred – Cat ELC (Extended Life Coolant)

Acceptable – Cat DEAC (Diesel Engine Antifreeze/Coolant)

NOTICE

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

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Capacities (Refill)

SMCS Code: 7560

Note: All values are approximate refill capacities.

Table 102

272D, 272D XHP, 297D, 297D XHP, 299D, and 299D XHP			
Compartment or System	Liters	US Gallons	Imperial Gallons
Engine Crankcase	13.2 ⁽¹⁾	3.5 ⁽²⁾	2.9 ⁽³⁾
Hydraulic Tank	39	10.3	8.6
Cooling System	15.5	4.1	3.4
Fuel Tank	122	32.2	26.8
Window Washer Fluid	2	0.53	0.44

(1) The amount includes 1L in the filter.

(2) The amount includes 0.26G in the filter.

(3) The amount includes 0.22G in the filter.

Table 103

272D2, 272D2 XHP, 297D2, 297D2 XHP, 299D2, and 299D2 XHP			
Compartment or System	Liters	US Gallons	Imperial Gallons

(continued)

Maintenance Section
Capacities (Refill)

(Table 103, contd)

Engine Crankcase	13.2 ⁽¹⁾	3.5 ⁽²⁾	2.9 ⁽³⁾
Hydraulic Tank	39	10.3	8.6
Cooling System	15.5	4.1	3.4
Fuel Tank	122	32.2	26.8
Fuel Tank (299D XHP Land Management)	110 ⁽⁴⁾	29 ⁽⁴⁾	24.1 ⁽⁴⁾
Diesel Engine Fluid (DEF) Tank	18.9	5.0	4.2
Window Washer Fluid	2	0.53	0.44

- (1) The amount includes 1L in the filter.
- (2) The amount includes 0.26G in the filter.
- (3) The amount includes 0.22G in the filter.
- (4) Each Tank

Table 104

226D, 232D, 239D, and 249D			
Compartment or System	Liters	US Gallons	Imperial Gallons
Engine Crankcase	8.2 ⁽¹⁾	2.2 ⁽²⁾	1.8 ⁽³⁾
Hydraulic Tank	35	9.2	7.7
Cooling System	14.0	3.7	3.1
Fuel Tank	57	15.1	12.5
Window Washer Fluid	2	0.53	0.44

- (1) The amount includes 1L in the filter.
- (2) The amount includes 0.26G in the filter.
- (3) The amount includes 0.22G in the filter.

Table 105

236D, 242D, 246D, 257D, 259D, 262D, 277D, 279D, 287D and 289D			
Compartment or System	Liters	US Gallons	Imperial Gallons
Engine Crankcase	11.2 ⁽¹⁾	3.0 ⁽²⁾	2.5 ⁽³⁾
Hydraulic Tank	39	10.3	8.6
Cooling System	14	3.7	3.1
Fuel Tank (236D, 242D, 257D, 259D)	105	27.7	23.1

(continued)

(Table 105, contd)

Fuel Tank (246D, 262D, 277D, 279D, 287D, 289D)	94	24.8	20.7
Window Washer Fluid	2	0.53	0.44

- (1) The amount includes 1L in the filter.
- (2) The amount includes 0.28G in the filter.
- (3) The amount includes 0.22G in the filter.

Table 106

Wheeled Machines (SSL)			
Compartment or System	Liters	US Gallons	Imperial Gallons
Each Drive Chain Case (226D, 232D)	7.0	1.8	1.5
Each Drive Chain Case (236D, 242D)	8.8	2.3	1.9
Each Drive Chain Case (246D, 262D)	12.7	3.3	2.8
Each Drive Chain Case (272D, 272D XHP, 272D2, 272D2 XHP)	10.2	2.7	2.2

Table 107

Tracked Machines (MTL & CTL)			
Compartment or System	Liters	US Gallons	Imperial Gallons
Final Drive	1.0	0.26	0.22

Table 108

Multi Terrain Loaders (MTL)		
Compartment or System	Milliliters	Grams
Roller and Idler Axle Spindle - 257D (CAT DEO 10W-30)	33 ± 3 ml	N/A
Roller and Idler Axle Spindle - 277D, 287D, 297D (Cat DEO 10W-30)	60 ± 5 ml	N/A
Roller and Idler External Bearing - All Models (Cat Arctic Platinum, NLGI Grade 00)	N/A	30 ± 5 g
Roller and Idler Axle Tube - All Models (Cat Advanced 3Moly, NLGI Grade 02)	N/A	30 ± 5 g

Table 109

Compact Track Loaders (CTL)	
Compartment or System	Milliliters

(continued)

(Table 109, contd)

Track Roller (239D, 249D)	165 ± 12 ml
Idler - Single Flange (239D, 249D)	230 ± 15 ml
Idler - Dual Flange (239D, 249D)	200 ± 15 ml
Idler - Triple Flange (239D, 249D)	230 ± 15 ml
Track Roller (All Other Models)	240 ± 12 ml
Idler - Single Flange (All Other Models)	349 ± 12 ml
Idler - Dual Flange (All Other Models)	354 ± 15 ml
Idler - Triple Flange (All Other Models)	354 ± 15 ml

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.

Table 110

Steel Track Loaders	
Compartment or System	Milliliters
Steel Track Idler	250 ± 12 ml
Steel Track Roller	100 ± 5 ml
Steel Track Carry Roller	90 ± 5 ml
Steel Track Pin	11 ± 0.5 ml

Table 111

HVAC R-134a Refrigerant (If Equipped)			PAG 46
Models	kg	lbs	cc
226D, 232D, 236D, 239D, 242D, 249D, 257D, 259D	0.81	1.8	150
246D, 262D, 277D, 279D, 287D, 289D	1.00	2.2	150
272D, 272D XHP, 272D2, 272D2 XHP, 297D, 297D XHP, 297D2, 297D2 XHP, 299D, 299D XHP, 299D2, 299D2 XHP	0.81	1.8	150

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S·O·S Information

SMCS Code: 1000; 7000; 7542-008

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

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

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

Maintenance Support

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Prepare the Machine for Maintenance

SMCS Code: 1000; 7000

Refer to the following procedure before you perform any maintenance to the machine.

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered, oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

WARNING

Sudden movement of the machine or release of oil under pressure can cause injury to persons on or near the machine.

To prevent possible injury, perform the procedure that follows before testing and adjusting the power train.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

Note: Permit only one operator on the machine. Keep all other personnel away from the machine or in view of the operator.

1. Move the machine to a smooth, level location that is away from operating machines and away from personnel.
2. Engage the parking brake. Place wheel blocks in front and behind the wheels or tracks.
3. Lower the work tool to the ground.
4. Stop the engine.
5. Make sure that all hydraulic oil pressure is released before performing any maintenance on the machine. Refer to Operation and Maintenance Manual, "System Pressure Release" for more information.

Perform a visual inspection first. If the visual checks are completed but the problem has not been identified, perform operational checks. If the problem has not been identified, perform instrument tests. This procedure will help to identify system problems.

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System Pressure Release

SMCS Code: 1250-553-PX; 1300-553-PX; 1350-553-PX; 3000-553-PX; 5050-553-PX; 5612-553-PX; 6700-553-PX

WARNING

Personal injury can result from hydraulic oil pressure and hot oil.

Hydraulic oil pressure can remain in the hydraulic system after the engine has been stopped. Serious injury can be caused if this pressure is not released before any service is done on the hydraulic system.

Make sure all of the attachments have been lowered, oil is cool before removing any components or lines. Remove the oil filler cap only when the engine is stopped, and the filler cap is cool enough to touch with your bare hand.

Use the following procedure to release the pressure in the hydraulic system. Perform this procedure before any work is done to the hydraulic system.

1. Start the engine and allow the engine to run for at least 15 seconds to recharge the accumulator.
2. Stop the engine. Keep the armrests in the LOWERED position. Turn the engine start switch to the ON position. Push the parking brake switch.
3. Move the electrohydraulic controls through all the positions.
4. Toggle the auxiliary switch multiple times.
5. Turn the engine start switch to the OFF position.



Cab Air Filter – Clean the filter element as needed based on the working conditions. Replace the filter every 500 service hours at a minimum.



Closed Circuit Breather Element – Change the breather element after every 1500 service hours.



Coolant level (radiator) – Check the coolant level in the radiator at the sight gauge after every 10 service hours or daily.



Coolant level (reservoir) – Check the coolant level in the coolant reservoir after every 10 service hours or daily.



Coolant additive – Add the extender to the extended life coolant after every 6000 service hours or every 3 years.



Cooling system coolant – Change the ELC (Extended Life Coolant) after every 12,000 hours or every 6 years.



Diesel Exhaust Fluid Filter – The DEF filter must be replaced every 3000 hours.



Diesel Particulate Filter Clean – The DPF should be cleaned or replaced by your Cat dealer as When Required.



Drive Chain Case Oil (Wheeled Machines Only) – Check the oil level every 500 service hours. Change the Drive Chain Case oil after every 1000 service hours.



Final Drive Oil (Tracked Machines Only) – Change the final drive oil after the initial 250hrs. Check the final drive oil level after every 250 hrs. Change the final drive oil after every 500 hrs.



Engine air filter primary element – Clean the primary air filter element as needed based on the working conditions. The alert indicator for the air filter indicates when servicing is necessary. Replace the primary air filter element after every 500 service hours.



Engine air filter secondary element – Replace the secondary air filter element with every third cleaning of the primary air filter element, or replace the secondary air filter element if the alert indicator for the air filter stays lit after a clean primary air filter element is installed. Never attempt to reuse the secondary air filter element by cleaning it.



Engine oil level check – Check the engine oil level after every 10 service hours or daily.



Engine oil – Change the engine oil after every 500 service hours.



Engine oil filter – Change the filter after every 500 service hours.



Fuel system water separator – Drain the water separator after every 10 service hours or daily.



Fuel Pump Filter – Replace the filter after every 500 service hours.



Fuel System Filter/Water Separator Element – Drain the water from the bowl after every 10 service hours or daily. Replace the filter after every 500 service hours.



Diesel Fuel System Cleaner (C2.2 Only) – Add Cat Diesel Fuel System Cleaner to a full tank of diesel every 3000 hours.



Grease zerk – Lubricate the designated locations after every 10 service hours or daily.



Hydraulic oil filter – Change the filter after every 1000 hrs.



Hydraulic oil level check – Check the hydraulic oil level at the sight gauge after every 10 service hours or daily.



Hydraulic oil – Change the hydraulic oil after every 2000 service hours.



Hydraulic Tank Breather – Replace the breather after every 500 service hours.

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Welding on Machines and Engines with Electronic Controls

SMCS Code: 1000; 7000

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

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

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

NOTICE

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

3. Clamp the ground cable from the welder to the component that will be welded. Place the clamp as close as possible to the weld. Make sure that the electrical path from the ground cable to the component does not go through any bearing. Use this procedure to reduce the possibility of damage to the following components:
 - Bearings of the drive train
 - Hydraulic components
 - Electrical components
 - Other components of the machine
4. Protect any wiring harnesses and components from the debris and the spatter which is created from welding.
5. Use standard welding procedures to weld the materials together.

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Maintenance Interval Schedule

SMCS Code: 7000

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Products that operate in severe operating conditions or that experience abnormally high fuel consumption, may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

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

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

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

When Required

“ Air Conditioner Condenser - Clean“	287
“ Battery or Battery Cable - Inspect/Replace“	290
“ Blade Frame - Adjust“	296
“ Bucket Cutting Edges - Inspect/Replace“	303
“ Bucket Tips - Inspect/Replace“	303
“ Cab Air Filter - Clean/Replace“	304
“ Cab Interior - Clean“	305
“ Diesel Exhaust Fluid - Fill“	313

“ Diesel Particulate Filter - Clean/Replace“	315
“ Diesel Particulate Filter - Clean/Replace“	315
“ Drive Line Wear Sleeve - Inspect/Replace“	320
“ Engine Air Filter Primary Element - Clean/Replace“	321
“ Engine Air Filter Secondary Element - Replace“	323
“ Fuel System Priming Pump - Operate“	340
“ Fuel Tank Cap - Clean“	341
“ Fuel Tank Water and Sediment - Drain“	342
“ Fuses - Replace“	343
“ Headlights - Adjust“	346
“ Lower Machine Frame - Clean“	364
“ Radiator Core - Clean“	366
“ Sprocket - Inspect“	369
“ Sprocket - Inspect“	370
“ Track (Rubber) - Remove/Replace“	380
“ Track - Remove/Replace“	385
“ Track - Remove/Replace“	387
“ Window Washer Reservoir - Fill“	391
“ Window Wiper - Inspect/Replace“	392
“ Windows - Clean“	392
“ Work Tool Guard and Reflector - Inspect/Replace“	395

Every 10 Service Hours or Daily

“ Air Cleaner Dust Valve - Clean/Inspect“	287
“ Axle Bearings - Lubricate“	289
“ Axle Bearings - Lubricate“	287
“ Backup Alarm - Test“	290
“ Bogie and Idler - Inspect/Replace“	301
“ Bogie and Idler - Inspect/Replace“	297
“ Cooling System Level - Check“	313
“ Engine Compartment - Inspect/Clean“	324
“ Engine Oil Level - Check“	327
“ Equipment Lowering Control Valve - Check“	332
“ Fuel System Primary Filter (Water Separator) - Drain“	338

“ Hydraulic System Oil Level - Check“ 362
 “ Lift Arm and Cylinder Linkage - Lubricate“ 363
 “ Quick Coupler - Clean/Inspect“ 366
 “ Seat Belt - Inspect“ 368
 “ Sprocket Retaining Nuts - Check“ 375
 “ Tilt Cylinder Bearings and Bucket Linkage Bearings - Lubricate“ 377
 “ Tire Inflation - Check“ 377
 “ Track (Rubber) - Inspect/Adjust“ 379
 “ Track - Inspect/Adjust“ 383
 “ Track Roller and Idler - Inspect/Replace“ 390
 “ Wheel Nuts - Tighten“ 391
 “ Work Tool - Lubricate“ 393
 “ Work Tool Mounting Bracket - Inspect“ 396

Initial 50 Service Hours

“ Track (Steel) - Inspect/Adjust“ 381

Every 50 Service Hours

“ Track Pins - Inspect“ 390

Initial 100 Service Hours

“ Track (Steel) - Inspect/Adjust“ 381

Initial 250 Service Hours

“ Final Drive Oil - Change“ 334

Every 250 Service Hours

“ Belts - Inspect/Adjust“ 291
 “ Final Drive Oil Level - Check“ 336
 “ Track (Steel) - Inspect/Adjust“ 381

Every 500 Service Hours

“ Cab Air Filter - Replace“ 304
 “ Cooling System Coolant Sample (Level 1) - Obtain“ 310
 “ Drive Chain Case Oil - Check“ 317
 “ Drive Chain Tension - Check/Adjust“ 318
 “ Engine Air Filter Primary Element - Clean/Replace“ 321

“ Engine Air Filter Secondary Element - Replace“ 323
 “ Engine Oil and Filter - Change“ 329
 “ Engine Oil Sample - Obtain“ 329
 “ Final Drive Oil - Change“ 334
 “ Fuel System Filter (In-Line) - Replace“ 337
 “ Fuel System Primary Filter (Water Separator) Element - Replace“ 339
 “ Hoses and Clamps - Inspect/Replace“ 347
 “ Hydraulic System Oil Sample - Obtain“ 362
 “ Hydraulic Tank Breather - Replace“ 363
 “ Sprocket Sleeve - Inspect“ 376

Every 1000 Service Hours

“ Belts - Replace“ 295
 “ Drive Chain Case Oil - Change“ 316
 “ Engine Valve Lash - Check“ 332
 “ Hydraulic System Oil Filter - Replace“ 361
 “ Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect“ 368

Every 1500 Service Hours

“ Engine Crankcase Breather - Replace“ 324

Every 2000 Service Hours

“ Cooling System Coolant Sample (Level 2) - Obtain“ 312
 “ Hydraulic System Oil - Change“ 356
 “ Hydraulic System Oil - Change“ 359
 “ Refrigerant Dryer - Replace“ 367

Every 3000 Service Hours

“ Diesel Exhaust Fluid Filter - Replace“ 314
 “ Diesel Fuel System Cleaner - Add“ 315

“ Exhaust Gas Recirculation Valve - Clean“ 333

Every 3 Years

“ Seat Belt - Replace“ 369

Every 6000 Service Hours

“ Cooling System Coolant Extender (ELC) -
Add“ 308

Every 12 000 Service Hours

“ Cooling System Coolant (ELC) - Change“ 306

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Air Cleaner Dust Valve - Clean/Inspect

SMCS Code: 1051-571-VL

Service the air filter elements when the alert indicator for air filter restriction lights. Refer to Operation and Maintenance Manual, "Alert Indicators" for information about the indicator.

1. Open the engine access door.
2. The air filter housing is located on the right side of the engine compartment.

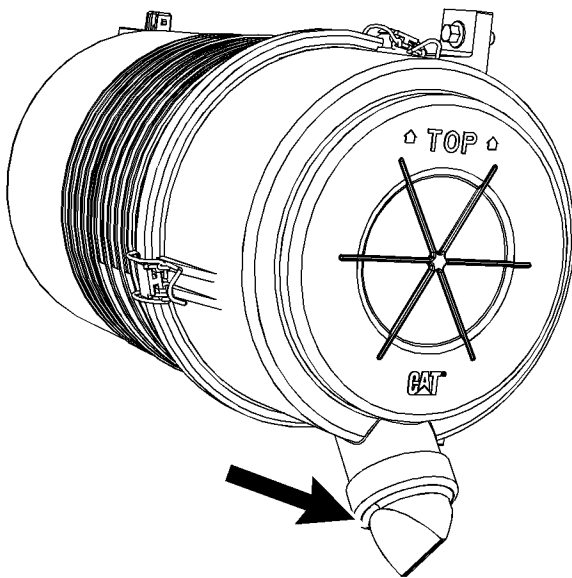


Illustration 234

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3. Check the dust valve after every 10 service hours or at the end of each day. Actuate the valve by squeezing the lips of the valve to remove any accumulated debris.

Axle Bearings - Lubricate

SMCS Code: 3282-086-BD

S/N: HP21-Up

S/N: BE71-Up

S/N: BL71-Up

S/N: HP71-Up

S/N: STK1-Up

S/N: TLK1-Up

S/N: EML1-Up

S/N: NTL1-Up

Air Conditioner Condenser - Clean (If Equipped)

SMCS Code: 1805-070

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

The air conditioner condenser is attached to the engine access door.

Note: Blow compressed air through the core in the opposite direction of air flow to clean condenser.

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S/N: FMR1-Up

S/N: D5T1-Up

S/N: FMT1-Up

S/N: HMT1-Up

S/N: MLT1-Up

S/N: EZW1-Up

Maintenance Section
Axle Bearings - Lubricate

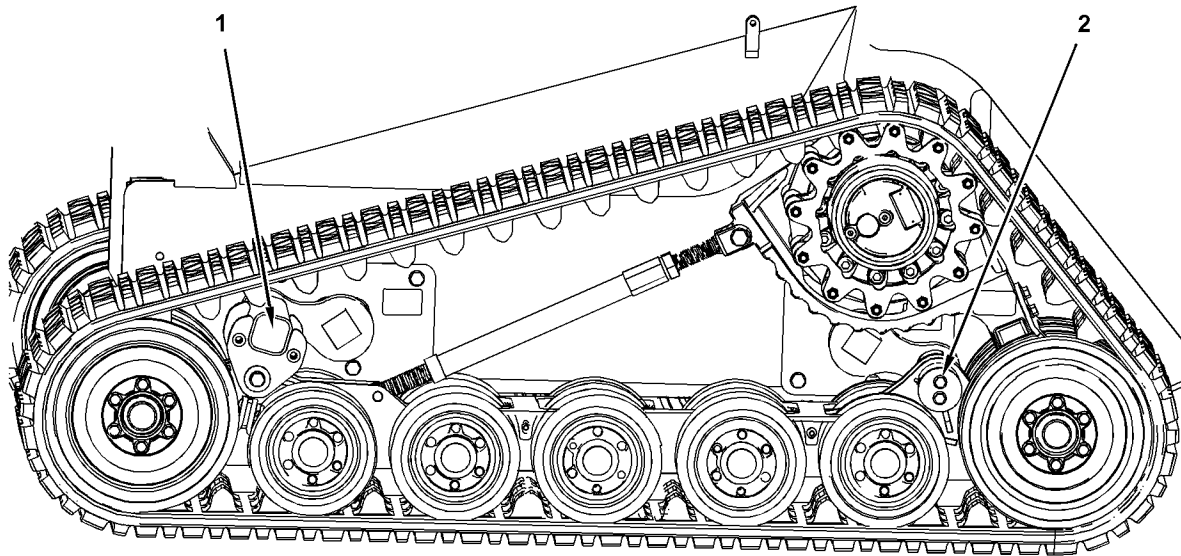


Illustration 235

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Single Level Suspension (SLS) undercarriage

(1) Front pivot

(2) Rear pivot

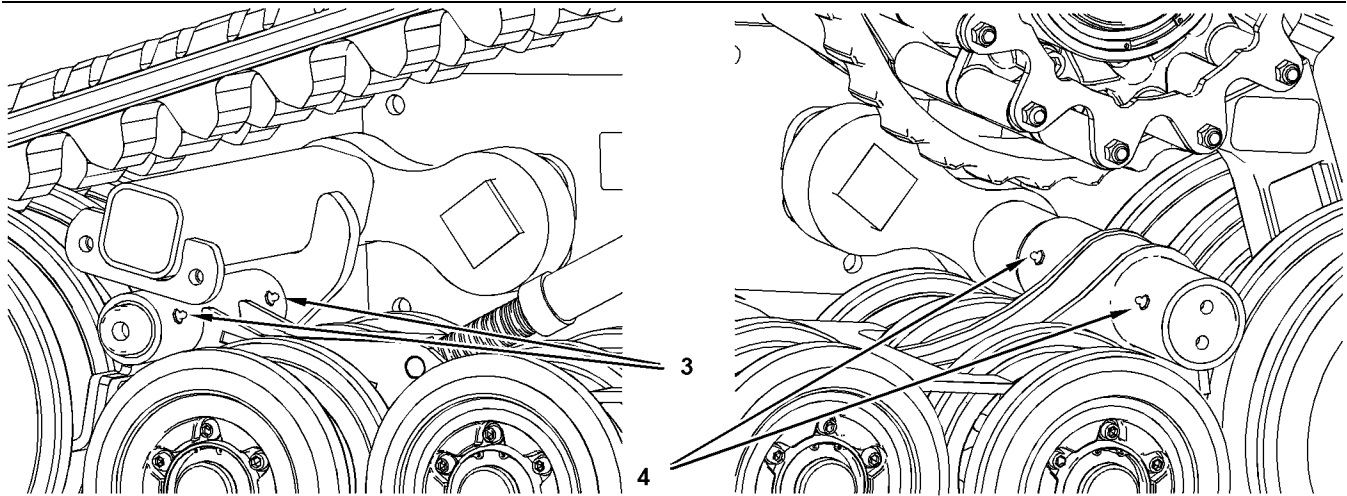


Illustration 236

g01284542

(3) Front grease zerks

(4) Rear grease zerks

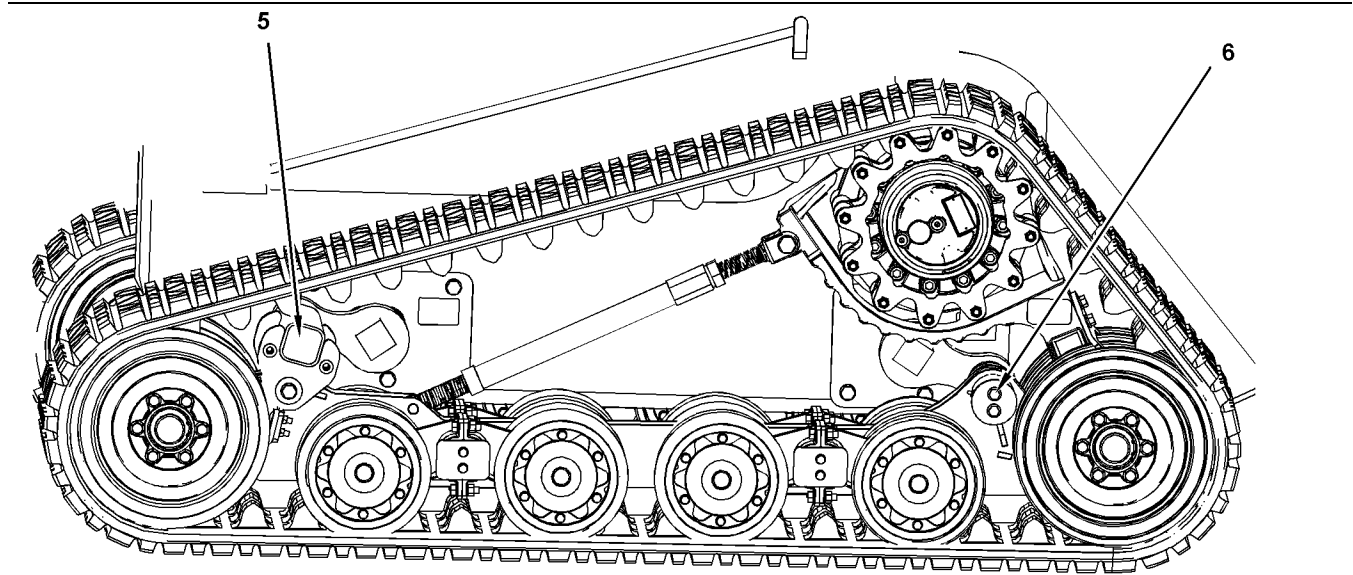


Illustration 237

g01282149

Dual Level Suspension (DLS) undercarriage

(5) Front pivot

(6) Rear pivot

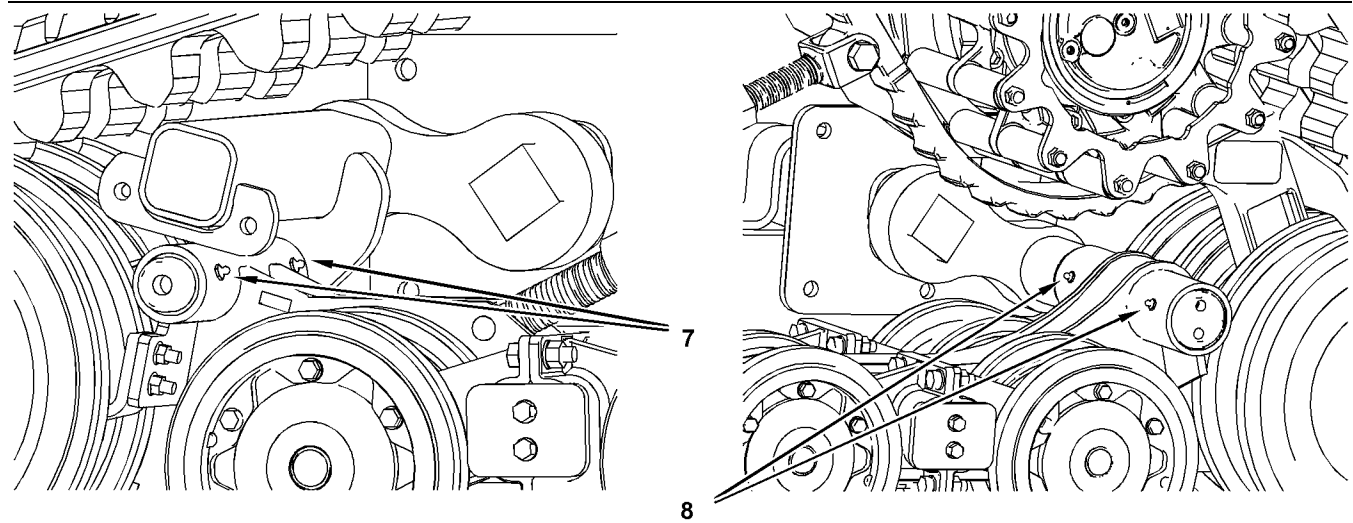


Illustration 238

g01284545

(7) Front grease zerks

(8) Rear grease zerks

Apply lubricant to all grease fittings.

Repeat the process for the opposite side of the machine.

i07676757

Axle Bearings - Lubricate

SMCS Code: 3282-086-BD

S/N: DX21-Up

S/N: FD21-Up

S/N: BY41-Up

S/N: CD41–Up
S/N: LW51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: AH91–Up
S/N: BL91–Up
S/N: KB91–Up
S/N: GTC1–Up
S/N: D9E1–Up
S/N: FTK1–Up
S/N: GTK1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: HLM1–Up
S/N: GWR1–Up
S/N: T9S1–Up
S/N: JST1–Up
S/N: PPT1–Up
S/N: WCT1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up

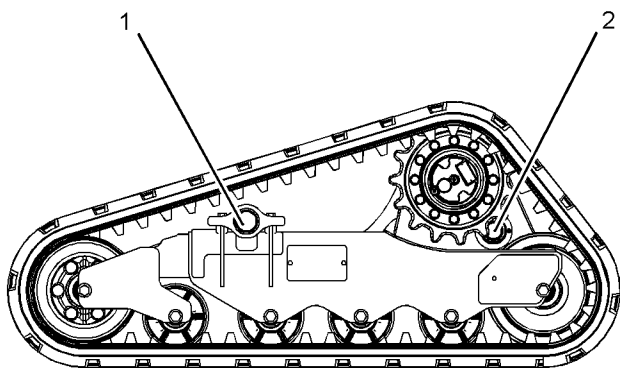


Illustration 239

g02142341

Apply lubricant to all grease fittings.

- (1) Front pivot
- (2) Rear pivot

Repeat the process for the opposite side of the machine.

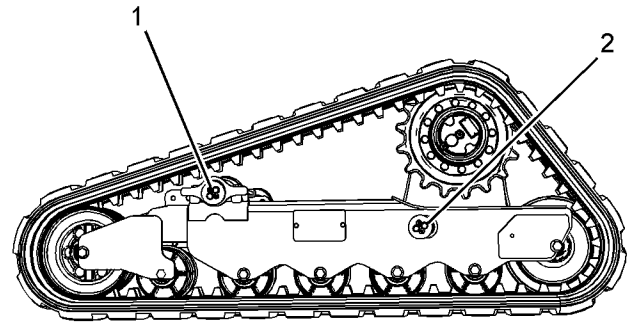


Illustration 240

g03384140

- (1) Front Pivot
- (2) Rear Pivot

i02580453

Backup Alarm - Test

SMCS Code: 7406-081

To prevent injury, make sure that no people are working on the machine or near the machine. To prevent injury, keep the machine under control at all times.

1. Get into the operator's seat. Fasten the seat belt and pull the armrests downward.
2. Start the engine.
3. Disengage the parking brake.
4. Move the joystick control to the REVERSE position.

The backup alarm should sound immediately. The backup alarm should continue to sound until the joystick control is returned to the NEUTRAL position or to the FORWARD position.

i06607826

Battery or Battery Cable - Inspect/Replace

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

Battery Life and Recommended Practices

Battery life is very difficult to predict and can vary greatly based on a number of factors including:

- Battery age
- Machine configuration

- Engine starting frequency
- Ambient conditions
- Storage practices

There are a number of components that draw small amounts of electrical current even when the key switch is OFF. Some of these include:

- Electronic control modules for the machine, engine, emissions system, etc
- Radios or displays with memory features
- Product Link or other GPS-based systems

It is recommended to start and operate your machine normally for at least 15 minutes every few weeks to prevent battery discharge which may damage the battery beyond simple recharge. This time should be extended during the winter as the load on the battery increase with extended heater usage, heated seat usage, and typically increased usage of the work lights.

The use of a battery disconnect switch or disconnection of the battery cables is recommended if the machine will sit longer than a few weeks under normal conditions. The use of a battery disconnect switch may be advisable at the end of each working day in extreme ambient conditions.

Additional references:

- “Operation and Maintenance Manual” Machine Storage Procedure
- “Operation and Maintenance Manual” DEF Guidelines
- “Operation and Maintenance Manual” Battery Disconnect Switch
- “Operation and Maintenance Manual” Engine Starting

Inspect / Replace

1. Turn the engine start switch to the OFF position. Turn all switches to the OFF position.
2. The battery is located in the engine compartment and may either be on the left-hand side or right-hand side. Open the engine access door.
3. Disconnect the negative battery cable at the battery.

Note: Do not allow the disconnected battery cable to contact the negative battery post.

4. Disconnect the negative battery cable from the frame in order to inspect the cable.

5. Disconnect the positive battery cable at the battery.
6. Perform the necessary repairs. Replace the cables or the battery, as needed.
7. Connect the positive battery cable at the battery.
8. Connect the negative battery cable to the frame of the machine.
9. Connect the negative battery cable at the battery.
10. Close the engine access door.

Recycle the Battery

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i07432176

Belts - Inspect/Adjust

SMCS Code: 1357-040; 1357-025; 1397-040; 1397-025

If a new belt is installed, check the belt adjustment after 30 minutes of operation. A belt is considered used after 30 minutes of operation.

Belts

1. Stop the engine in order to inspect the belt.
2. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.

Maintenance Section
Belts - Inspect/Adjust

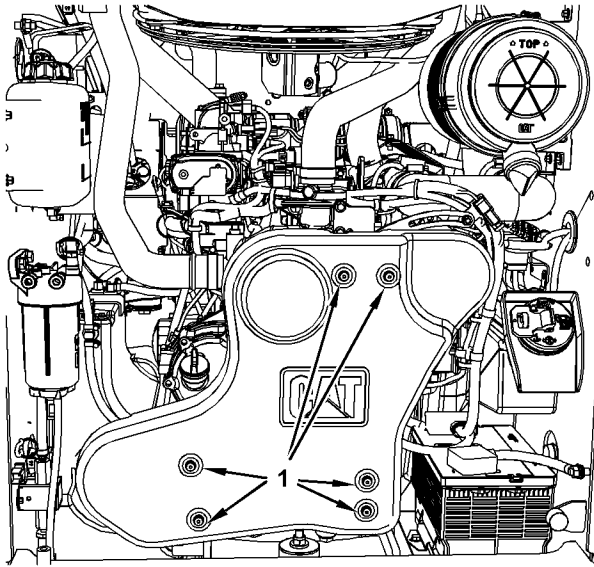


Illustration 241

g02625627

Typical Example

3. Loosen the quarter-turn fasteners (1) on the front of the guard.
4. Remove the guard for the V-belt.

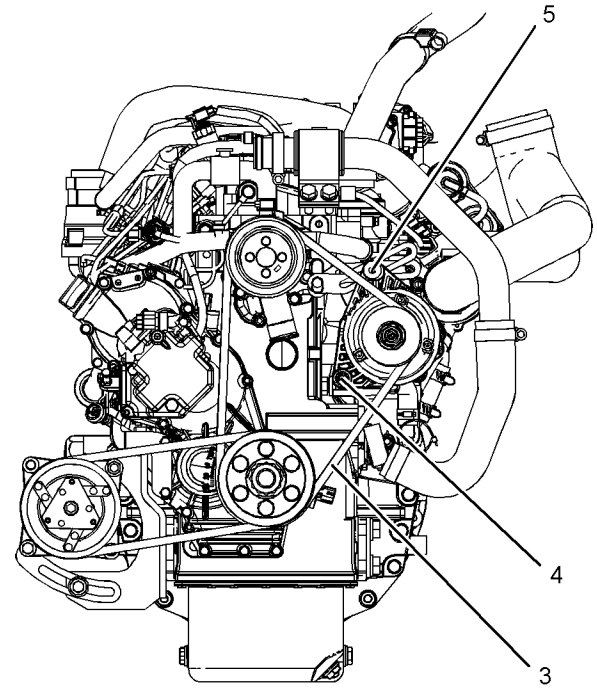


Illustration 242

g03820567

C2.2

- (3) V-belt
- (4) Alternator mounting bolt
- (5) Adjusting bolt

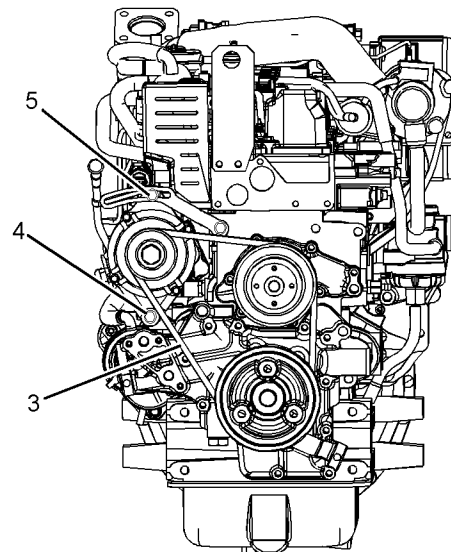


Illustration 243

g0384275

C3.3B

- (3) V-belt
- (4) Alternator mounting bolt
- (5) Adjusting bolt

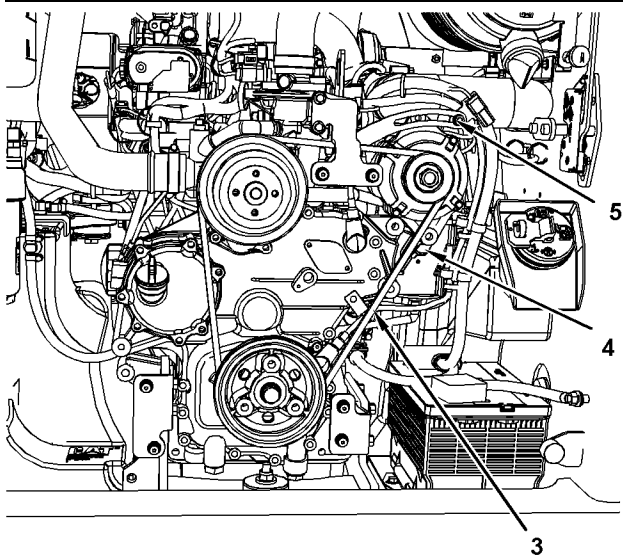


Illustration 244

g02625628

C3.8

- (3) V-belt
- (4) Alternator mounting bolt
- (5) Adjusting bolt

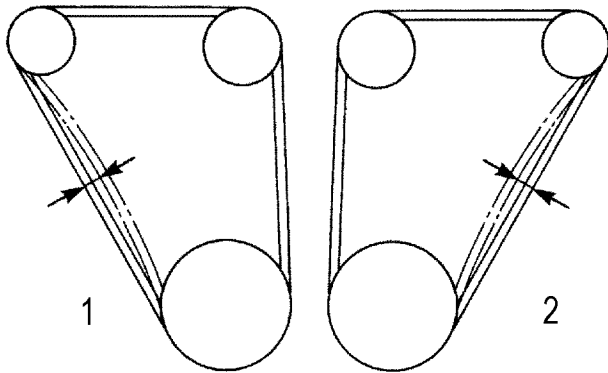


Illustration 245

g03821106

- (1) C3.3B
- (2) C2.2 and C3.8

5. Inspect the condition of the belt and the adjustment of the belt. The belt should deflect 10 mm (0.39 inch) to 12 mm (0.47 inch) under a straight pull of 10 kg (22 lb). This measurement should be taken between the alternator pulley and the crankshaft pulley.

Note: A 144-0235 Borroughs Belt Tension Gauge may be used to measure belt tension. This measurement should be taken between the alternator pulley and the crankshaft pulley. Refer to the following table for belt tension.

Table 112

Belt Tension Initial	Belt Tension Used
534 ± 22 N (120 ± 5 lb)	400 ± 44 N (90 ± 10 lb)

6. Loosen the mounting bolt (4). Loosen the adjusting bolt (5).
7. Move the alternator until the correct tension is reached.
8. Tighten the adjusting bolt. Tighten the mounting bolt.
9. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 5 to step 8.

Air Conditioner (if equipped)

Note: If your machine is equipped with an air conditioner, use the same procedure and the same measurements for the belt tension.

1. Inspect the condition of the belt and the adjustment of the belt. The belt should deflect 10 mm (0.39 inch) to 12 mm (0.47 inch) under a straight pull of 10 kg (22 lb). This measurement should be taken between the air conditioner compressor pulley and the crankshaft pulley.

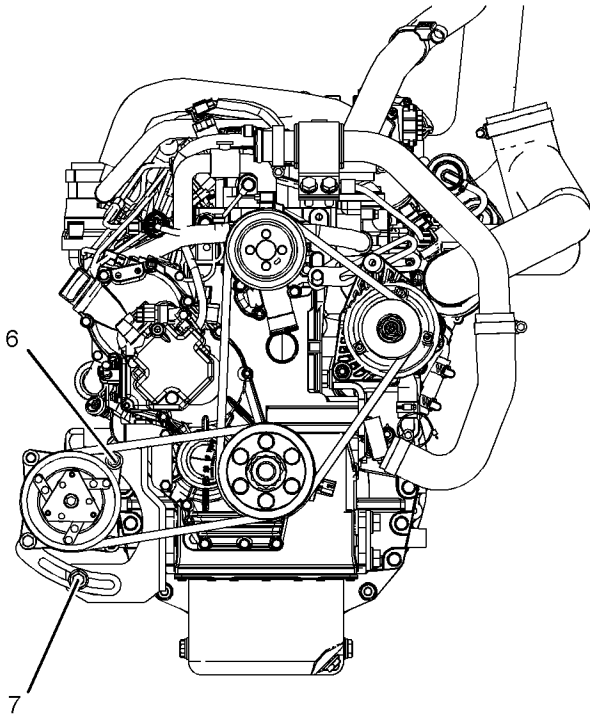


Illustration 246

g03820548

C2.2

- (6) Mounting bolt
- (7) Adjusting bolt

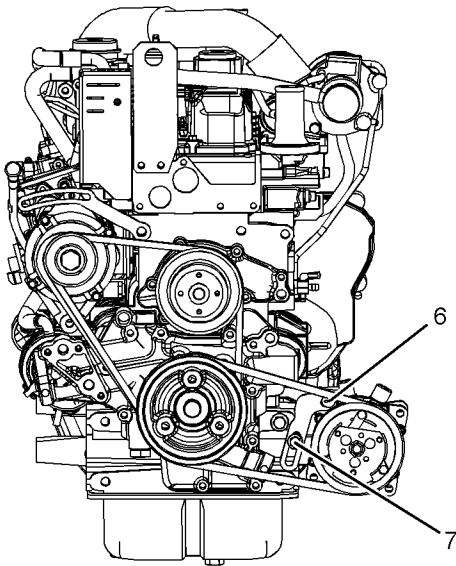


Illustration 247

g03384295

C3.3B

- (6) Mounting bolt
- (7) Adjusting bolt

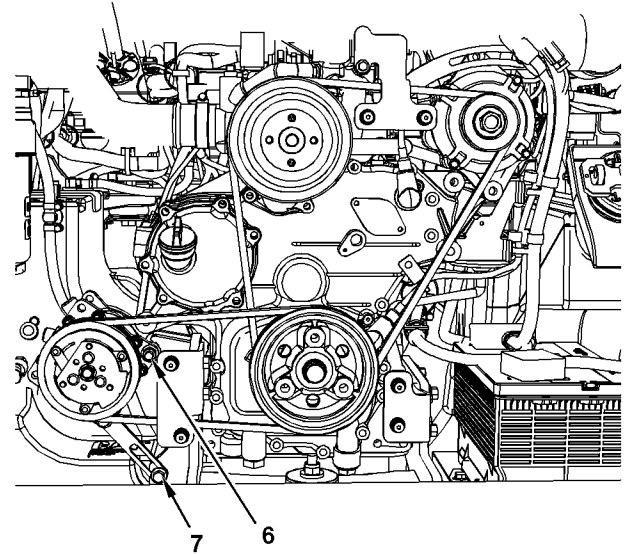


Illustration 248

g02625629

C3.8

- (6) Mounting bolt
- (7) Adjusting bolt

2. Loosen the mounting bolt (6) for the air conditioner compressor. Loosen the adjusting bolt (7) for the air conditioner compressor.
3. Move the air conditioner compressor until the correct tension is reached.
4. Tighten the adjusting locknut. Tighten the mounting bolt.
5. Recheck the belt deflection. If the amount of deflection is incorrect, repeat step 2 to step 4.

Finish

1. Install the guard for the V-belt.

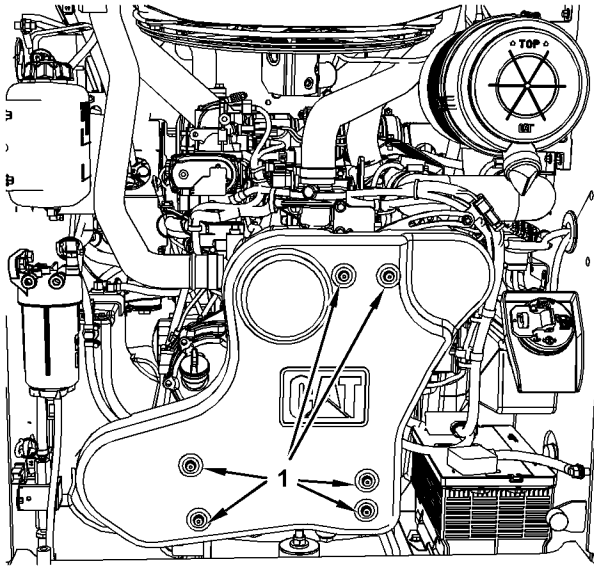


Illustration 249

g02625627

2. Tighten the quarter-turn fasteners (1)
3. Close the engine access door.

i07432896

Belts - Replace

SMCS Code: 1357-510; 1397-510

1. Stop the engine to replace belt.
2. Open the engine access door. Refer to Operation and Maintenance Manual, Access Doors and Covers.

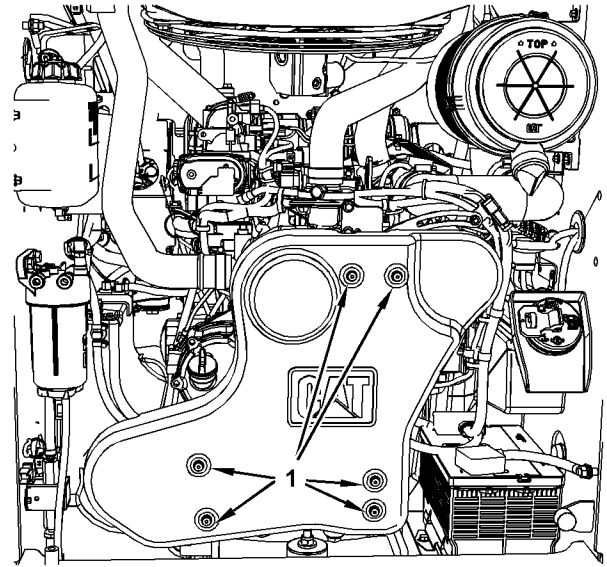


Illustration 250

g02625627

3. Loosen the quarter-turn fasteners (1) on the front of the belt protection guard, and remove guard to access belt.
4. Loosen the mounting bolt and adjusting bolt, decrease tension in belt.
5. Remove belt.
6. Install new belt. Be sure that the belt is fully seated on the pulleys.
7. Move the alternator until the correct tension $534 \pm 22 \text{ N}\cdot\text{m}$ ($120 \pm 5 \text{ lb}$) is reached.

Note: A 144-0235 Borroughs Belt Tension Gauge may be used to measure belt tension. This measurement should be taken between the alternator pulley and the crankshaft pulley.

8. Tighten the adjusting bolt. Tighten the mounting bolt.
9. Install belt protection guard.

Air Conditioner (if equipped)

Note: If your machine is equipped with an air conditioner, use the same procedure and the same measurements for the belt tension.

i07690426

Blade Frame - Adjust

SMCS Code: 6060-025-BG

Height Adjustment

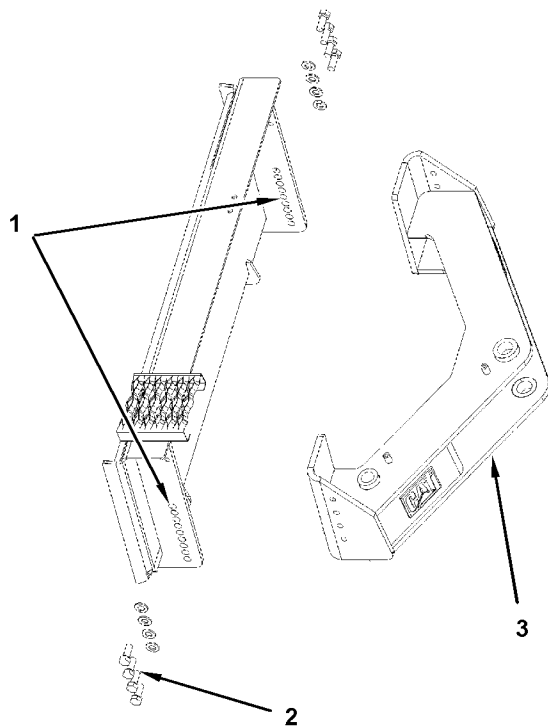


Illustration 251

g01161532

- (1) Height Adjustment for the Frame
- (2) Adjusting Bolts
- (3) Frame

The height of the frame may be adjusted in order to compensate for the wear on the cutting edge. The front portion of the frame needs to be lowered as the cutting edge wears. Remove the bolts (2) and lower the frame (3). Install the bolts. This will keep the blade level with the ground and this will prevent the blade from digging into the ground.

Note: In order to properly adjust the blade, the work tool coupler needs to be vertical. The position of the pivot point of the blade is perpendicular to the ground. Follow this procedure in order to ensure that the cutting edge will remain flat on the ground during operation.

Trunnion Joint

Note: The trunnion is a dry joint. Adding grease to the trunnion simply attracts abrasive particles. The tightness of the joint should be monitored. Shims should be removed when the joint becomes too loose. This may be indicated by excessive movement in the blade.

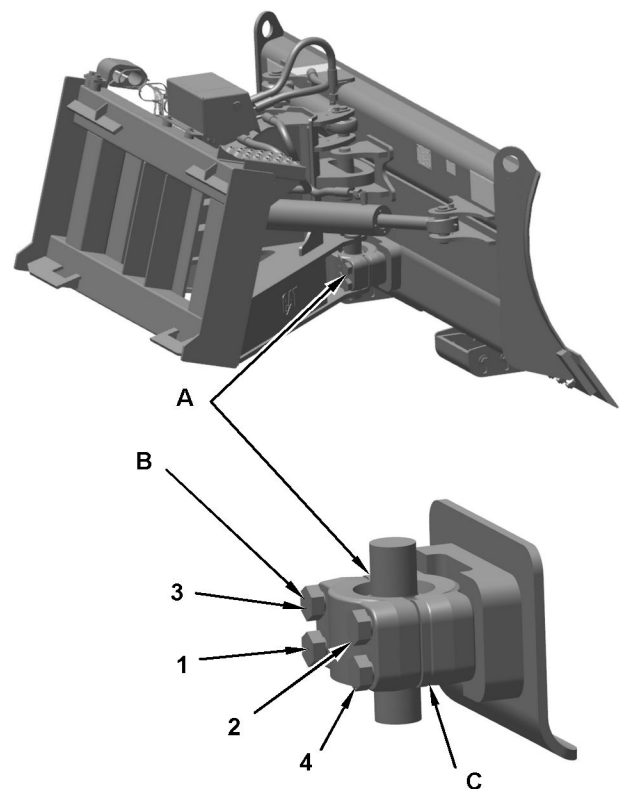


Illustration 252

g06393817

- (A) Trunnion Joint
- (B) Bolts
- (C) Shims

- Remove the four retaining bolts (B) and the cap.
- Remove the necessary shims.
- Replace the cap and bolts.

- The tightening sequence is shown in illustration 252 .
- Torque the bolts to 530 ± 70 N·m (391 ± 52 lb ft).

Note: Some noise is typical and the noise does not indicate a problem.

i05366267

Bogie and Idler - Inspect/ Replace

SMCS Code: 4159-040; 4159-510; 4192-510; 4192-040

S/N: EH21–Up
S/N: HP21–Up
S/N: LW51–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: HR61–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: HFB1–Up
S/N: K2D1–Up
S/N: D9E1–Up
S/N: STK1–Up
S/N: TLK1–Up
S/N: NTL1–Up
S/N: T9S1–Up
S/N: D5T1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: MLT1–Up

Inspect

Clean the undercarriage before inspecting the bogies and the idlers.

Inspect the bogies and idlers for damage and wear.

Note: Minor damage to the rubber on the bogies and idlers is acceptable. Minor damage includes nicks, cuts, small pieces that are missing, and small grooves. This minor damage is normal and acceptable. Minor damage will not adversely affect machine performance.

The bogies and the idlers should be replaced when the damage to the rubber wheels adversely affects machine performance. Replace the bogies and the idlers when the rubber is worn beyond the minimum specifications that are listed below.

Note: The hubs for the bogies and the hubs for the idlers contain oil. Periodically, inspect the hubs for leaks or for excessive end play. Contact your Caterpillar dealer if either leaks or excessive end play is found.

Table 113

Bogie Wheels and Idler Wheels Wear Limits		
	Minimum Width	Minimum Thickness
254 mm (10 inch)	15 mm (0.59 inch)	1 mm (0.04 inch)
381 mm (15 inch)	15 mm (0.59 inch)	1 mm (0.04 inch)

Loosen the Track

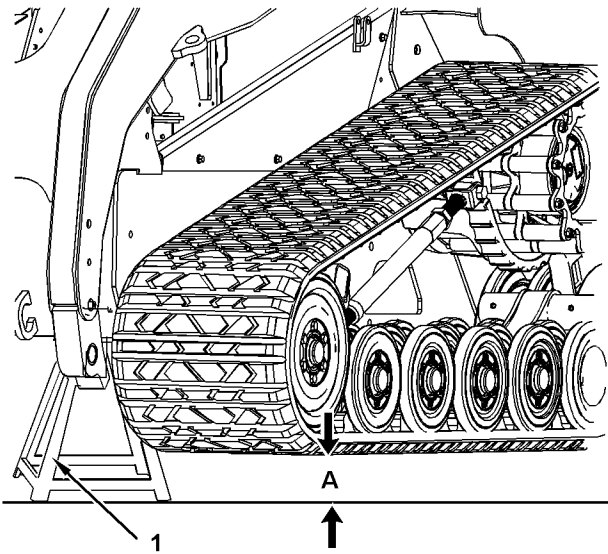


Illustration 253

g01286300

Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands (1) in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inch) (A) off the ground.

Loosen the track in order to work on the bogies and idlers. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

Note: The track may be removed in the illustrations for clarity.

Dual Level Suspension

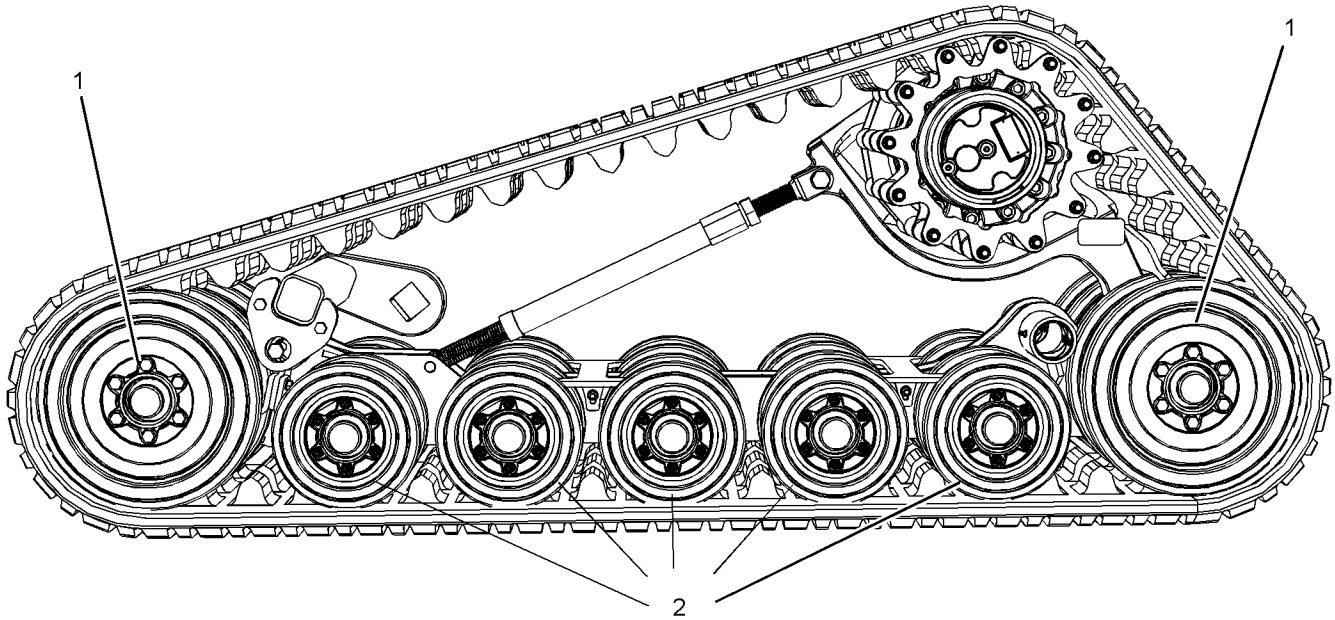


Illustration 254

g03396839

(1) Idler wheels

(2) Bogie wheels

Idler wheels

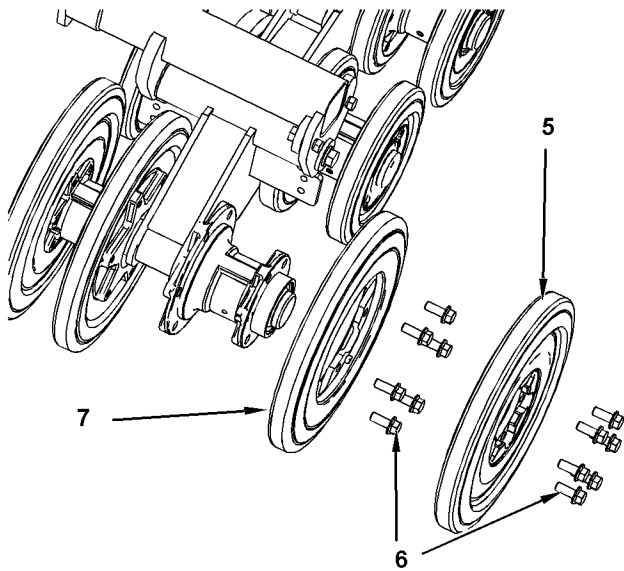


Illustration 255

g01285489

- (5) Outer idler wheel
- (6) Bolts and washers for the wheels
- (7) Inner idler wheel

1. Remove the bolts (6) and the washers for the outer idler wheel.
2. Remove the outer idler wheel.

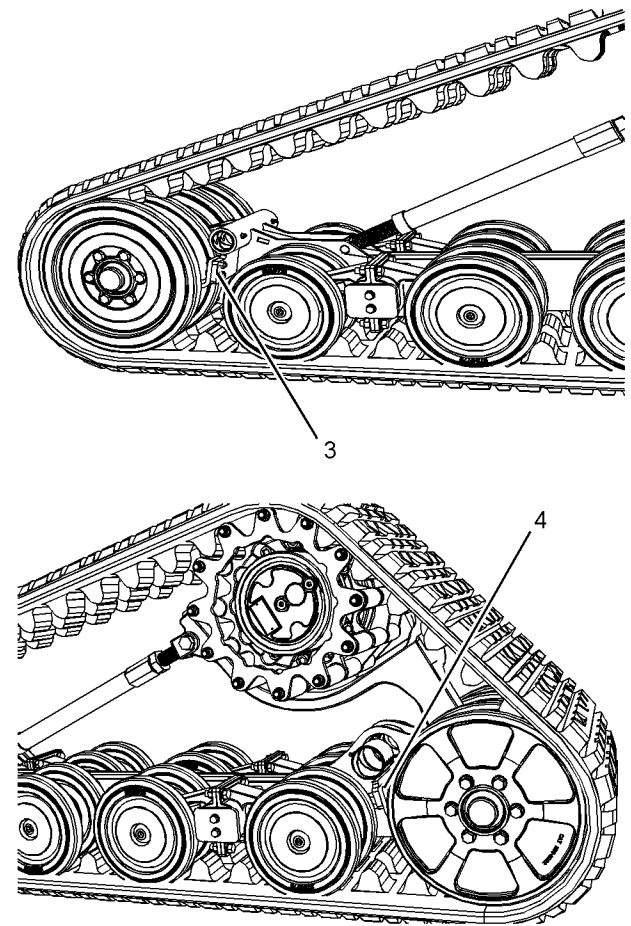


Illustration 256

g03397228

- (3) Front scraper plate
- (4) Rear scraper plate

3. If the inner idler wheel needs to be removed, you will need to remove the scraper plate. Remove the bolts that hold each scraper plate.
4. If necessary, remove the bolts and the washers for the inner idler wheel and remove the wheel.
5. Install the wheels in reverse order. Tighten the bolts in a star pattern to a torque of $50 \pm 5 \text{ N}\cdot\text{m}$ ($37 \pm 3.7 \text{ lb ft}$). Tighten the bolts an additional $45 \text{ degrees} \pm 5 \text{ degrees}$ in the same star pattern.
6. If necessary, install the scraper plates and torque the bolts to standard torque value for the fastener size.

Bogie wheels

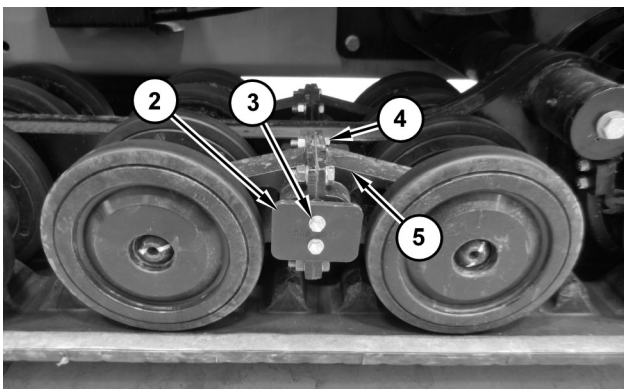


Illustration 257

g03344312

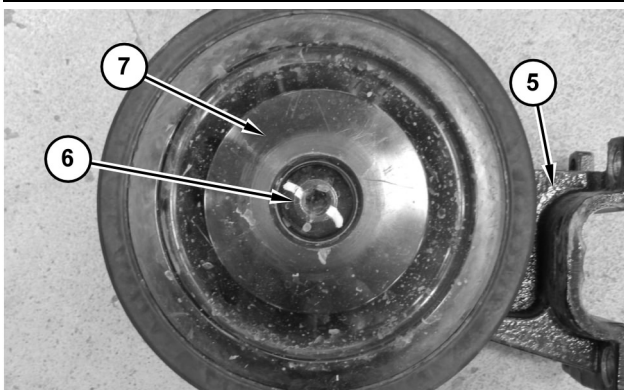


Illustration 258

g03344328

1. Remove the bolts (3) and plate (2). Remove bolts (4) and suspension group halves (5).

Note: There are four rubber inserts between the two suspension group halves. Retain these inserts for installation later.

2. Remove bolt (6) and bogie wheel ((7)) from suspension group (5).

Note: Repeat for opposite side

Note: Use caution not to damage the duo-cone seal and rubber seals under wheel. Retain these seals for the installation later.

Note: The duo cone sealing faces must be kept clean

3. Install the new bogie wheel (7) to suspension group (5) and tighten bolt (6) to a torque of $240 \pm 40 \text{ N}\cdot\text{m}$ ($177 \pm 30 \text{ lb ft}$).

Note: Note: Repeat for opposite side

4. Install the suspension group halves (5) together and loosely install the bolts (4) and associated washers and nuts.
5. Slide the suspension group pair onto the frame.
6. Lubricate the rubber inserts and slide the rubber inserts into the suspension group.
7. Tighten the bolts (4) to a torque of $120 \pm 20 \text{ N}\cdot\text{m}$ ($87 \pm 15 \text{ lb ft}$)
8. Install the cover plate (2) & tighten the bolts (3) to a torque of $50 \pm 10 \text{ N}\cdot\text{m}$ ($37 \pm 7 \text{ lb ft}$)
9. Fill the axle with 60 mL (2.3 oz) of 10w-30 oil through the access plug.
10. Slide the suspension group onto the frame.
11. Tighten the track to the proper tension. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

i07676761

Bogie and Idler - Inspect/Replace

SMCS Code: 4159-040; 4159-510; 4192-510; 4192-040

S/N: EML1-Up

S/N: FMR1-Up

S/N: D5T1-Up

S/N: EZW1-Up

Inspect

Clean the undercarriage before inspecting the bogies and the idlers.

Inspect the bogies and idlers for damage and wear.

Note: Minor damage to the rubber on the bogies and idlers is acceptable. Minor damage includes nicks, cuts, small pieces that are missing, and small grooves. This minor damage is normal and acceptable. Minor damage will not adversely affect machine performance.

The bogies and the idlers should be replaced when the damage to the rubber wheels adversely affects machine performance. Replace the bogies and the idlers when the rubber is worn beyond the minimum specifications that are listed below.

Table 114

Bogie Wheels and Idler Wheels Wear Limits		
	Minimum Width	Minimum Thickness
254 mm (10 inch)	48 mm (1.9 inch)	3 mm (0.12 inch)
358 mm (14 inch)	48 mm (1.9 inch)	3 mm (0.12 inch)

Loosen the Track

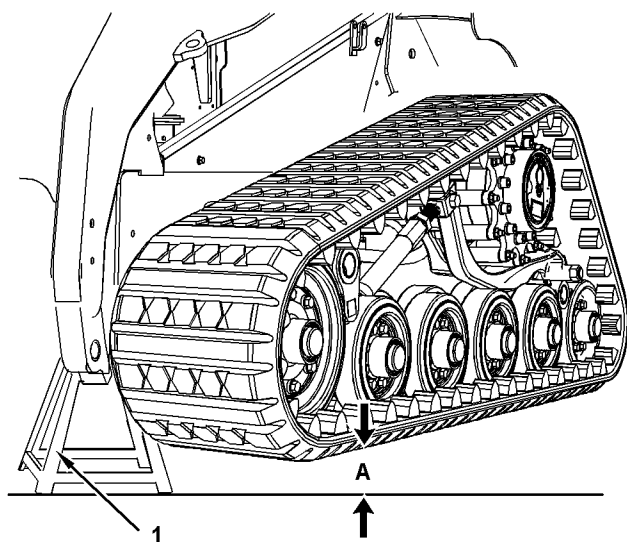


Illustration 259

g01393193

Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands (1) in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inches) (A) off the ground.

Loosen the track in order to work on the bogies and idlers. Refer to Operation and Maintenance Manual, "Track - Inspect/Adjust" for the procedure.

Note: The track may be removed in the illustrations for clarity.

Idler wheels

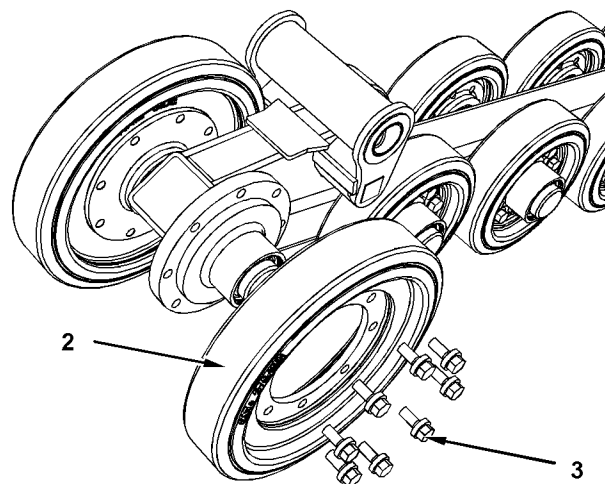


Illustration 260

g01393325

- (2) Outer idler wheel
(3) Bolts and washers for the wheels

1. Remove the bolts (3) and the washers for the outer idler wheel (2).
2. Remove the outer idler wheel.
3. If necessary, remove the bolts and the washers for the inner idler wheel and remove the wheel.

4. Install the wheels. Tighten the bolts to a torque of $50 \pm 5 \text{ N}\cdot\text{m}$ ($37 \pm 3.7 \text{ lb ft}$). Turn the bolts an additional 45 degrees ± 5 degrees in the same star pattern.

Bogie wheels

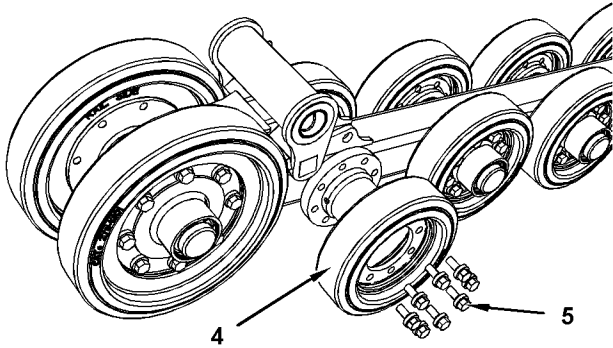


Illustration 261

g01393304

- (4) Bogie Wheel
(5) Bolts and washers for the wheels

1. Remove the bolts (5) and the washers for the outer bogie wheel (4).
2. Remove the outer bogie wheel.
3. If necessary, remove the bolts and the washers for the inner bogie wheel and remove the wheel.
4. Install the wheels. Tighten the bolts to a torque of $150 \pm 20 \text{ N}\cdot\text{m}$ ($110 \pm 15 \text{ lb ft}$).

i07331615

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

Note: Check for bolts that are loose, damaged, or missing. Tighten loose bolts, and replace and tighten damage or missing bolts. Use caution with damage bolts. There is a chance of the bolts having sharp edges leading to an injury or laceration.

Note: The cutting edge may weigh as much as 50 kg (110 lb). Use assistance as needed.

1. Remove all combustible material from the bucket.
2. Lower the lift arms fully. Tilt back the bucket so the bucket cutting edge is accessible.
3. Place blocks under the raised edge of the bucket.
4. Clamp the cutting edge to the bucket.
5. Use a torch or cut-off wheel to remove the nuts.
6. Remove the bolts.
7. Carefully remove the clamps and cutting edge.
8. Clean the contact surfaces.
9. Use the opposite side of the cutting edge, if this side is not worn.
10. Install a new cutting edge, if both edges are worn.
11. Install the bolts.
12. Remove the blocks that are under the bucket.
13. After a few hours of operation, check the bolts for proper torque.

i01764331

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

1. Lower the lift arms fully. Tilt back the bucket so that the bucket tips are accessible.
2. Place blocks under the raised edge of the bucket.
3. Remove the mounting bolts. Remove the bucket tips.
4. Clean the mounting surface.
5. Replace the bucket tips.
6. Install the bolts.
7. Remove the blocks that are under the bucket.
8. After a few hours of operation, check the bolts for proper torque.

i07676766

Cab Air Filter - Replace

SMCS Code: 7311-510; 7342-510

Fresh Air Filter

Note: The cover for the cab air filter is on the left-hand side of the machine behind the cab.

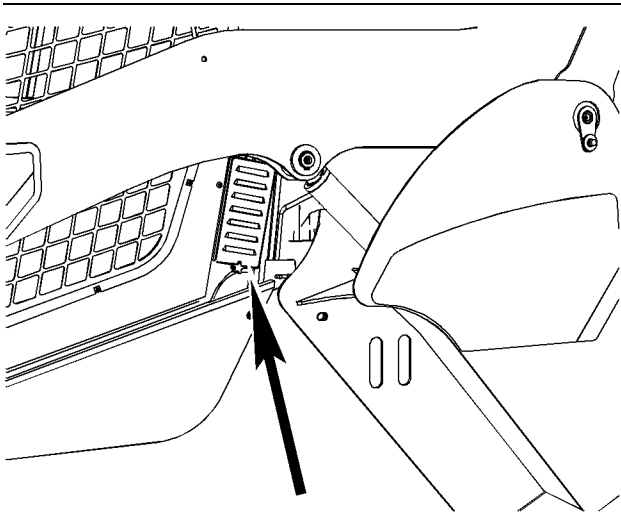


Illustration 262

g01287414

1. Rotate the latch to free the cover from the ductwork. Do NOT use excessive force. Lift on the cover and remove the cover.
2. Replace the element.

3. Reinstall the cover.

Recirculation Filter

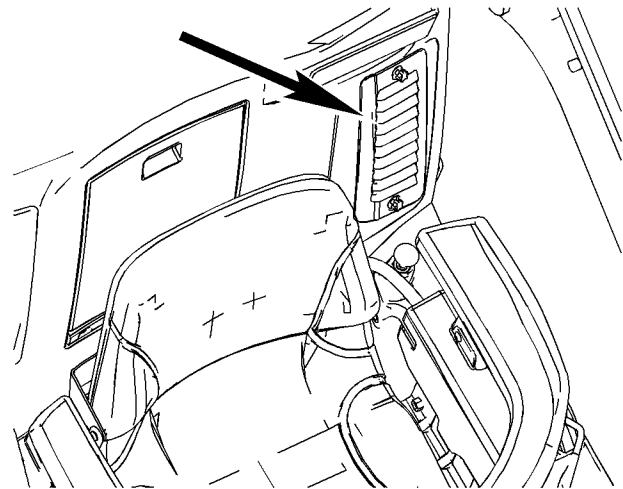


Illustration 263

g01209486

1. Turn the thumb screws until the thumb screws are free from the duct. Remove the cover.
2. Replace the element if the element is damaged or if the element seal is damaged. Replace the element if the air conditioner performance is low.

Note: Do not use water for cleaning the filter.

3. Install the element. Replace the cover and tighten the thumb screws.

i07676770

Cab Air Filter - Clean/Replace (If Equipped)

SMCS Code: 7342-070; 7342-510

Fresh Air Filter

Note: The cover for the cab air filter is located on the left-hand side of the machine behind the cab.

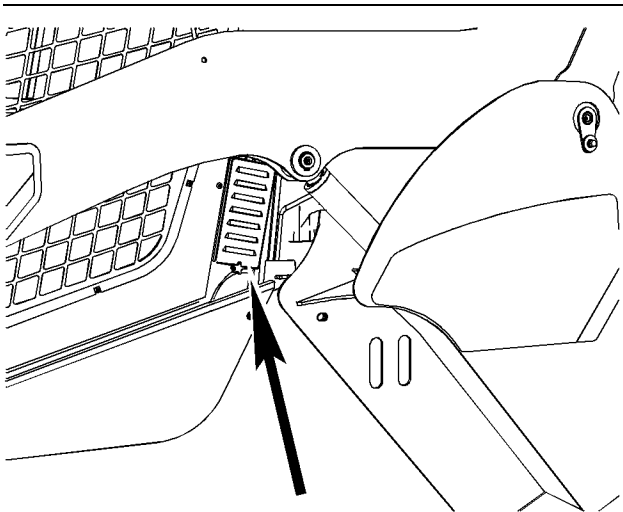


Illustration 264

g01287414

1. Rotate the latch to free the cover from the ductwork. Do NOT use excessive force. Lift up on the cover and remove the cover.
2. Remove the air filter element from the duct and clean the filter element with low-pressure air (maximum 207 kPa (30 psi)). Direct the air flow up the pleats and down the pleats from the side of the filter opposite of the air flow. Replace the element if the element is damaged or if the element seal is damaged. Replace the element if the air conditioner performance is low.

Note: Do not use water for cleaning the filter.

3. Install the element. Replace the cover and tighten the thumb screw.

Recirculation Filter

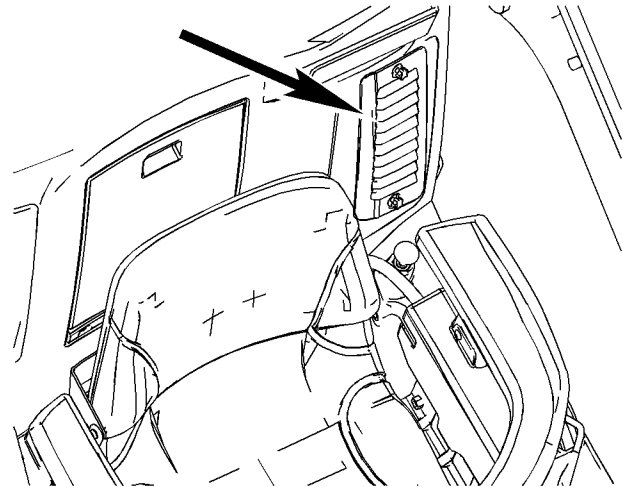


Illustration 265

g01209486

1. Turn the thumb screws until the thumb screws are free from the duct. Remove the cover.
2. Remove the air filter element from the duct and clean the filter element with low-pressure air (maximum 207 kPa (30 psi)). Direct the air flow up the pleats and down the pleats from the side of the filter opposite of the air flow. Replace the element if the element is damaged or if the element seal is damaged. Replace the element if the air conditioner performance is low.

Note: Do not use water for cleaning the filter.

3. Install the element. Replace the cover and tighten the thumb screws.

i05290820

Cab Interior - Clean

SMCS Code: 7301-070

The floor mat is removable. The floor mat has sides in order to help retain the material.

i06134931

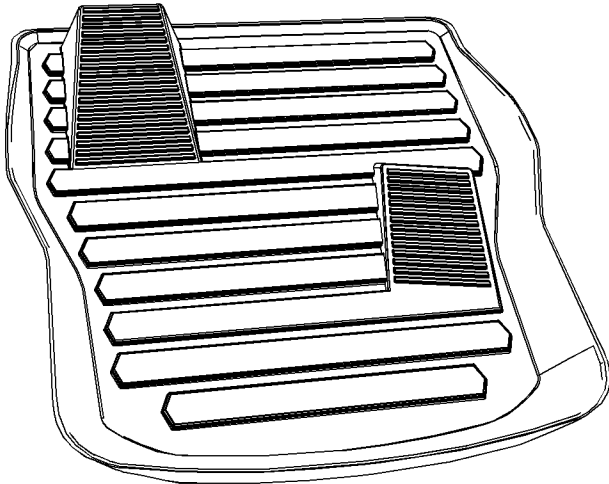


Illustration 266

g03359663

Floor mat in the cab

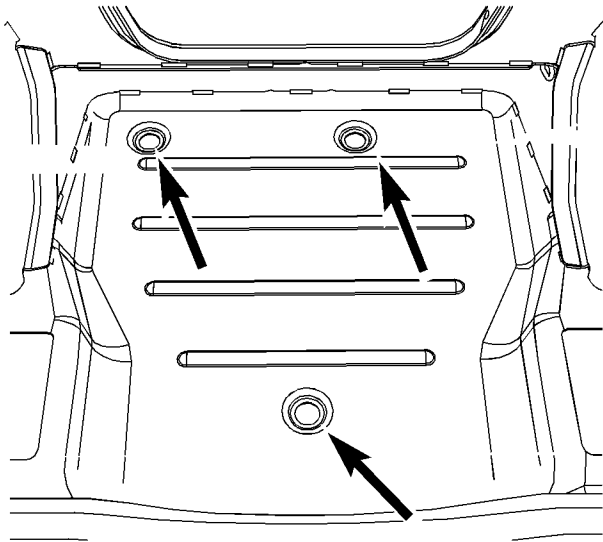


Illustration 267

g03359669

The drain on the rear and two drains on the front of the cab.

You can wash the floor of the cab with water. There are drains in front and one in the back of the floor of the cab

Cooling System Coolant (ELC) - Change

SMCS Code: 1395-044-NL

! WARNING

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

NOTICE

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: The machine was shipped from the factory with Extended Life Coolant (ELC) in the cooling system.

For information about the addition of Extender to your cooling system, see the Operation and Maintenance Manual, "Cooling System Coolant (ELC) Extender - Add" or consult your Cat dealer.

Drain the coolant whenever the coolant is dirty or whenever the coolant is foaming.

The radiator cap is located under the radiator guard on the top of the engine compartment.

Allow the machine to cool before you change the coolant.

1. Open the engine access door and raise the radiator guard. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

Note: The radiator cap may be located either on the left side of the radiator (C3.3B and C3.8 engines) or the right side of the radiator (C2.2 engine).

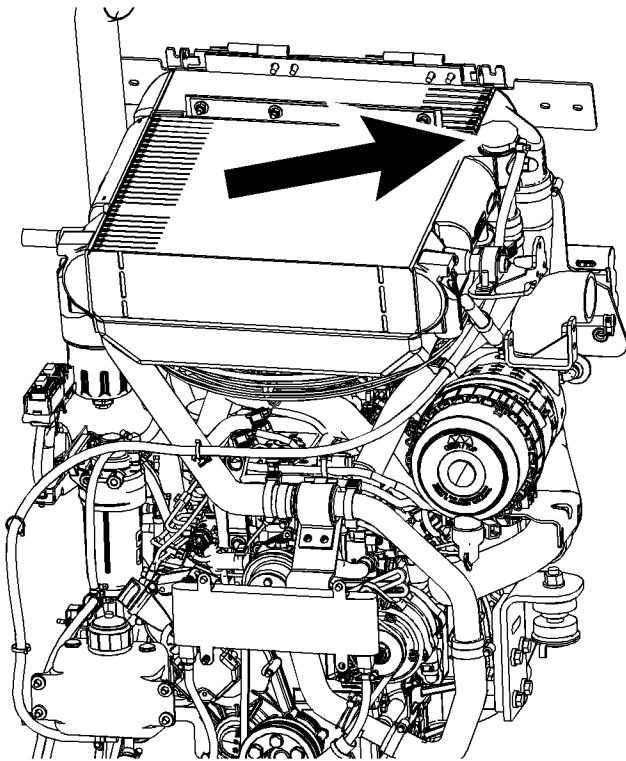


Illustration 268
C2.2

g03821056

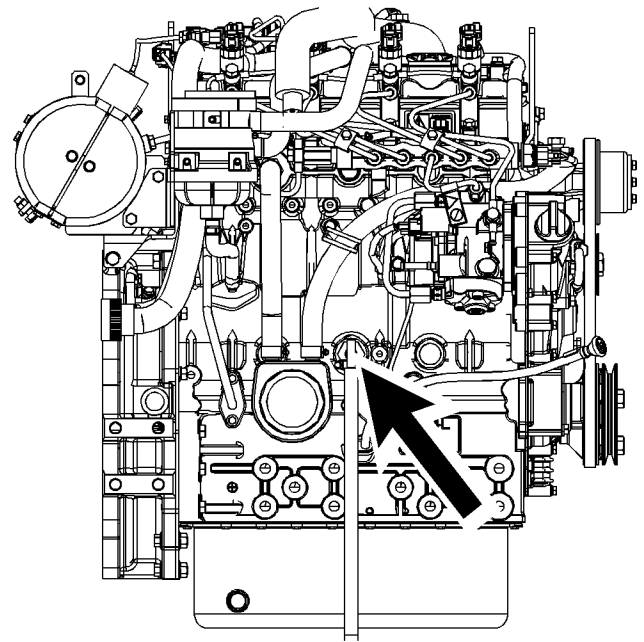


Illustration 270
Coolant Drain (C2.2)

g03822259

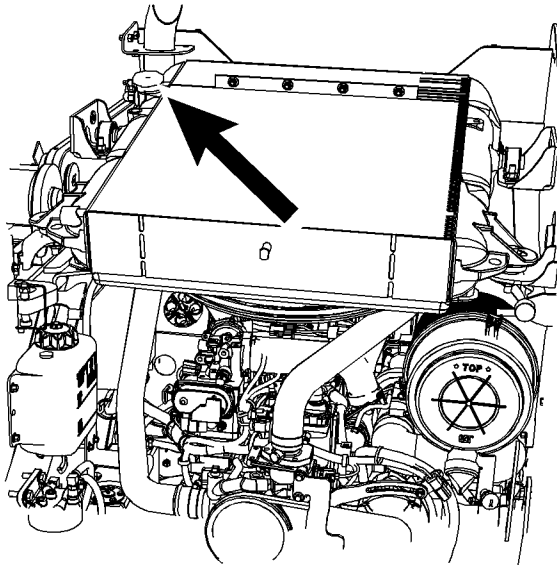


Illustration 269
C3.3B and C3.8

g02625799

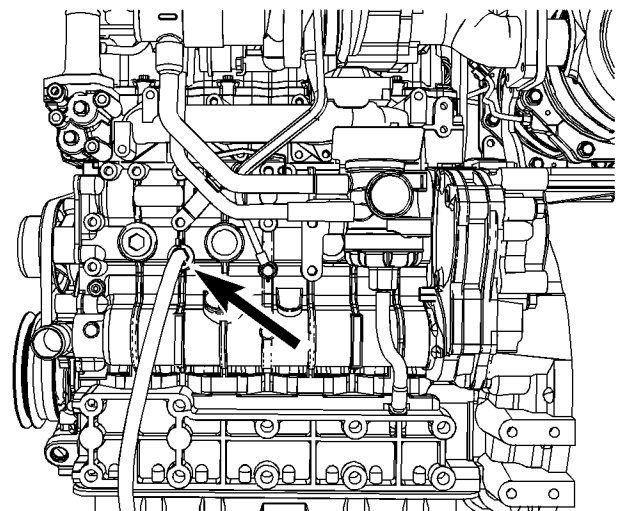


Illustration 271
Coolant drain (C3.3B)

g03361695

2. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.

Maintenance Section
Cooling System Coolant Extender (ELC) - Add

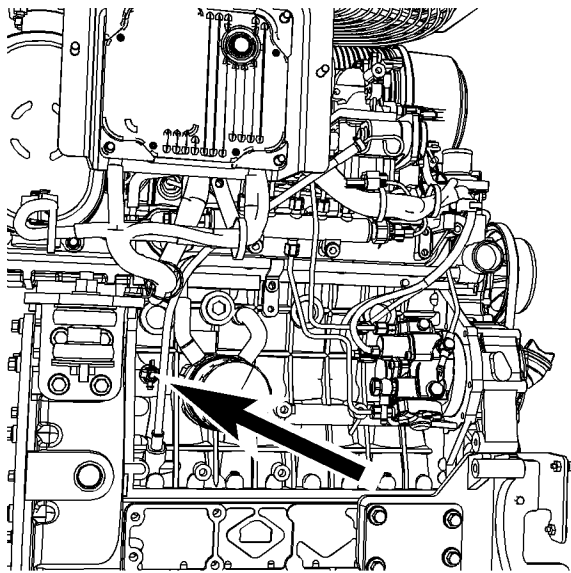


Illustration 272

g02625827

Coolant drain (C3.8)

3. Locate the drain for the coolant system on the left side of the C3.8 engine by the oil filter. Locate the drain for the coolant on the right side for the C3.3B engine. Use the attached drain hose on the valve.

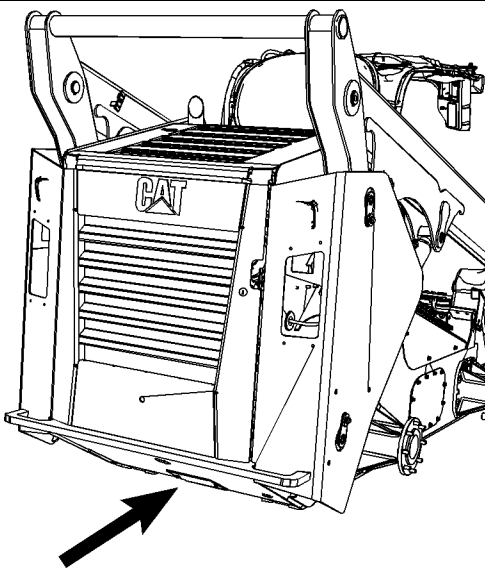


Illustration 273

g02625826

4. Remove the access panel under the rear of the machine. Pull the drain hose through the access hole.
5. Open the drain and allow the coolant to drain into a suitable container.
6. Close the drain.

7. Push the hose back into the engine compartment. Replace the access panel.
8. Replace the thermostat. See Operation and Maintenance Manual, "Cooling System Water Temperature Regulator - Replace" for the process for replacing the thermostat.
9. Add the coolant solution directly to the radiator. Do not use the coolant overflow reservoir as a filler for the coolant. Refer to Operation and Maintenance Manual, "Capacities - (Refill)". Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

Note: Premix the coolant solution before filling the cooling system. The coolant solution should contain 50 percent coolant and 50 percent distilled water.

Note: Add the coolant solution at a maximum rate of 5 liters per minute. The chance of trapping air inside the engine block will be reduced. A large amount of trapped air can cause localized heating to occur upon start-up. Localized heating may result in engine damage, which may lead to failure of the engine.

10. Start the engine. Run the engine without the radiator cap until the thermostat opens and the coolant level stabilizes. If necessary, add coolant.

Note: The sight gauge for the coolant level is located near the radiator cap.

11. Check the coolant level in the sight gauge on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position.
12. Stop the engine. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.
13. Pull the radiator guard downward.
14. Close the engine access door.

i06134984

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

WARNING

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

When a Cat Extended Life Coolant is used, an extender must be added to the cooling system periodically.

1. Open the engine access door and raise the radiator guard. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

Note: The radiator cap may be located either on the left side of the radiator (C3.3B and C3.8 engines) or the right side of the radiator (C2.2 engine).

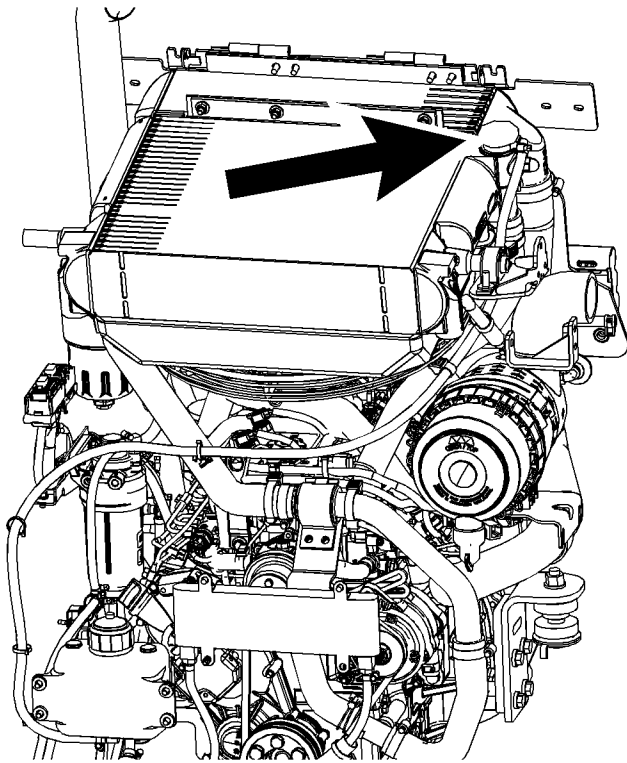


Illustration 274
C2.2

g03821056

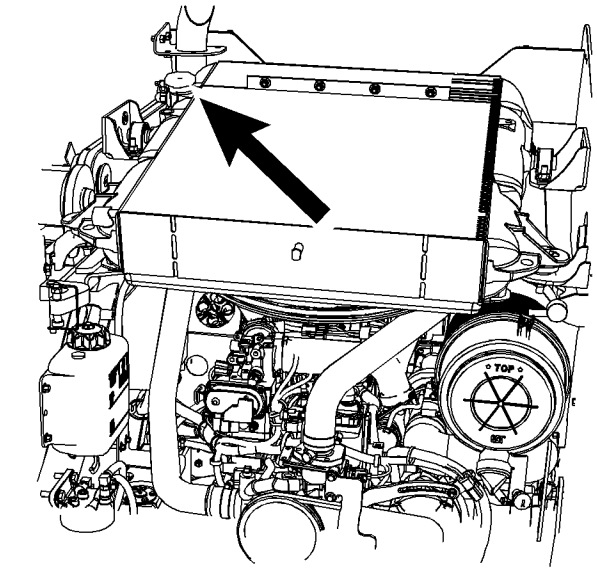


Illustration 275
C3.3B and C3.8

g02625799

2. Slowly loosen the radiator cap in order to relieve system pressure. Remove the radiator cap.

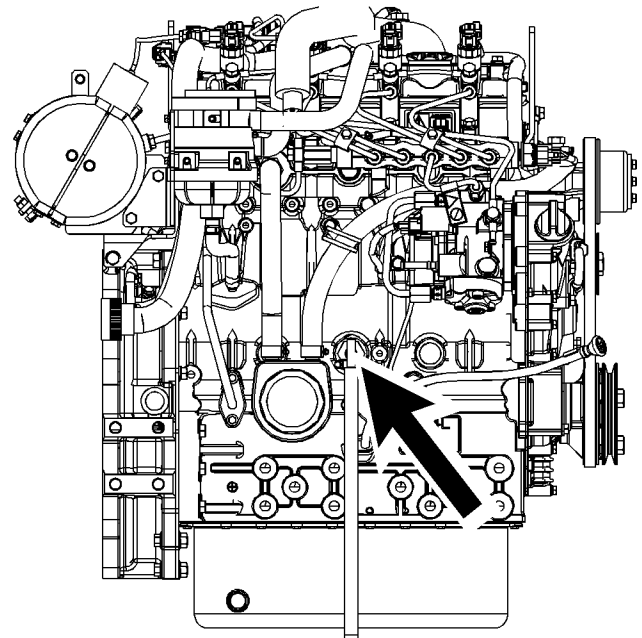


Illustration 276
Coolant Drain (C2.2)

g03822259

Maintenance Section
Cooling System Coolant Sample (Level 1) - Obtain

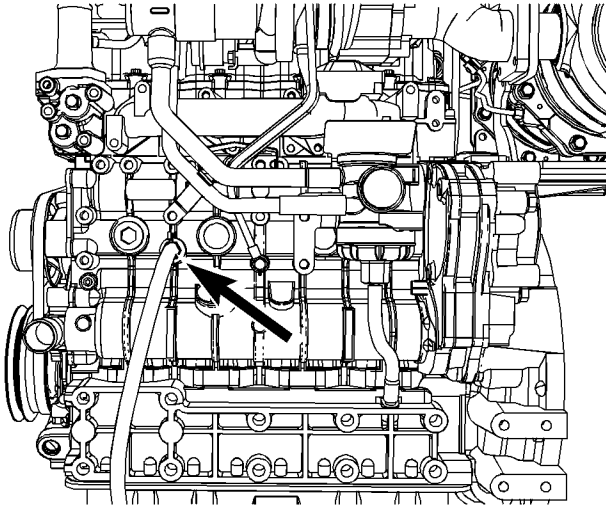


Illustration 277

g03361695

Coolant drain (C3.3B)

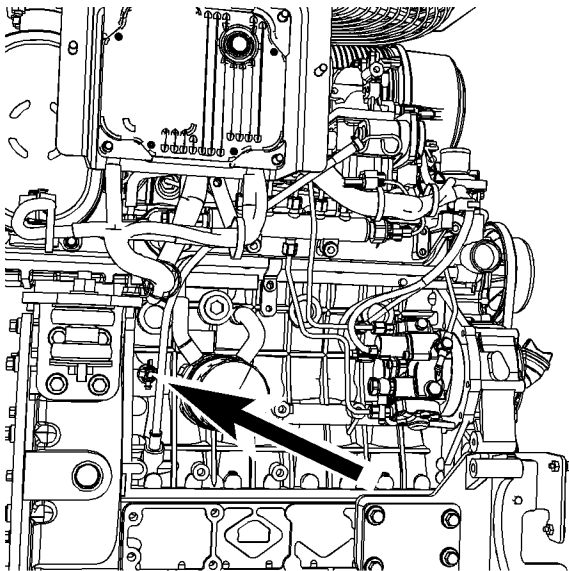


Illustration 278

g02625827

Coolant drain (C3.8)

3. If necessary, drain enough coolant from the radiator in order to allow the addition of the coolant additive.
4. Add 0.17 L (0.18 qt) of cooling system additive.
5. Inspect the radiator cap and the gasket. If the cap or the gasket is damaged, replace the cap. Install the radiator cap.

6. Check the coolant level in the sight gauge on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position.
7. Add the extender directly to the radiator. Do not use the coolant overflow reservoir as a filler for the extender.
8. Tilt the radiator guard downward.
9. Close the engine access door.

For additional information on the addition of extender, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations".

i06134962

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

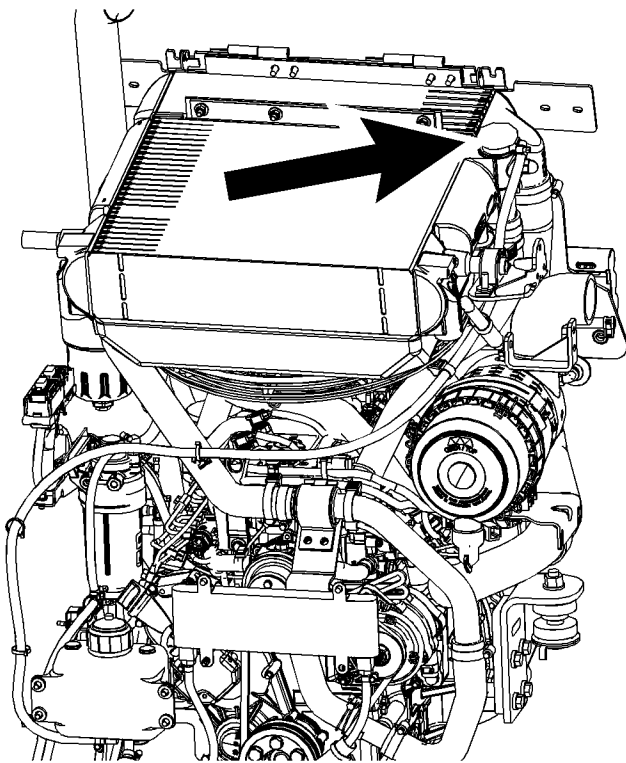


Illustration 279

g03821056

C2.2

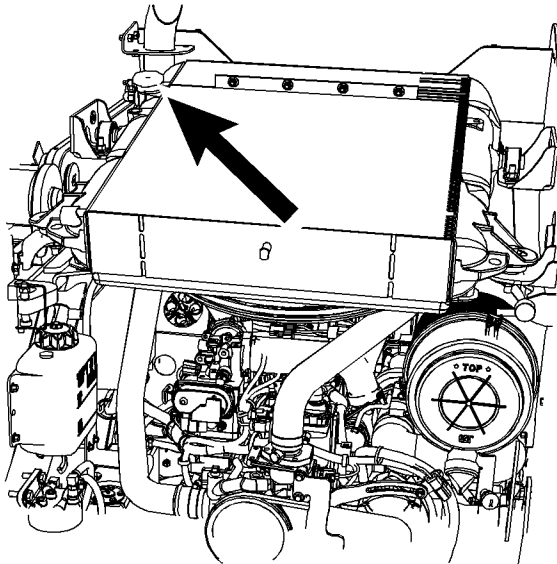


Illustration 280

g02625799

C3.3B and C3.8

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

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.

Obtain the sample of the coolant from the radiator. When the system is cool, slowly remove the radiator cap (2).

Note: Do not take the sample from the Coolant Overflow Reservoir.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Cat dealer.

Use the following guidelines for proper sampling of the coolant:

- Keep the unused sampling bottles stored in plastic bags.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Use a designated pump to collect the sample in order to avoid contamination.
- Obtain coolant samples directly from the coolant tank. You should not obtain the samples from any other location.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Cat dealer.

i07676782

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

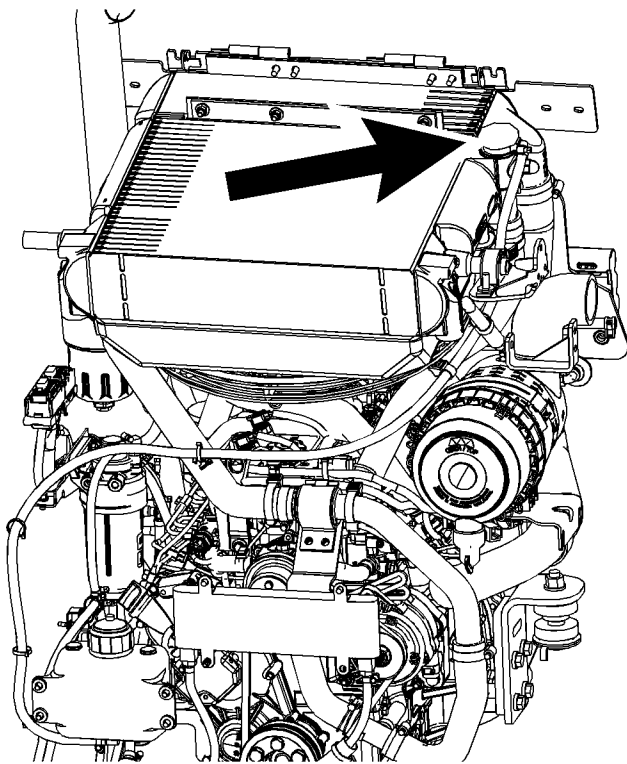


Illustration 281

g03821056

C2.2

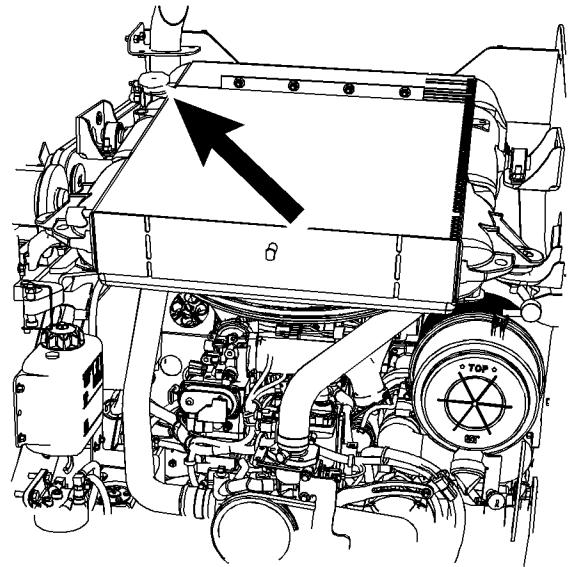


Illustration 282

g02625799

C3.3B and C3.8

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

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.

Obtain the sample of the coolant from the radiator. When the system is cool, slowly remove the radiator cap (2).

Note: Do not take the sample from the Coolant Overflow Reservoir.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Cat dealer.

Refer to Operation and Maintenance Manual, "Cooling System Coolant Sample (Level 1) - Obtain" for the guidelines for proper sampling of the coolant.

Submit the sample for Level 2 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Cat dealer.

i06134839

Cooling System Level - Check

SMCS Code: 1350-040-HX; 1350-535-FLV; 1382-510; 1382-070

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.

1. Open the engine access door and raise the radiator guard. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

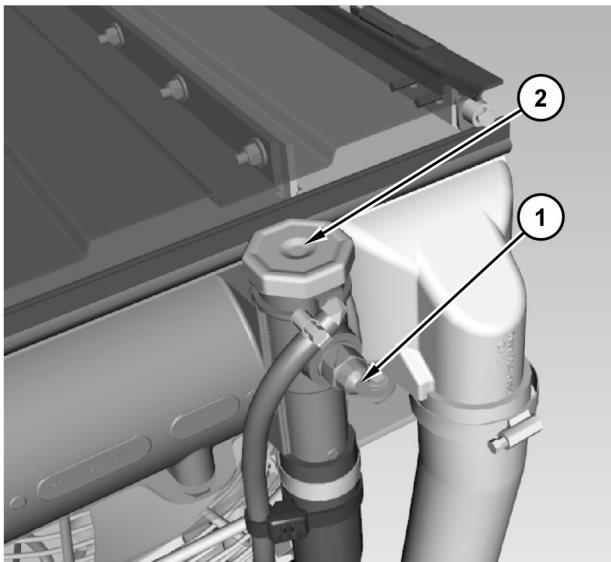


Illustration 283

g03821017

- (1) Sight Gauge
(2) Radiator Cap

2. Check the coolant level in the sight gauge (1) on the radiator. Maintain the coolant level to the top of the sight gauge with the radiator in the LOWERED position. If you need to add coolant, add the coolant directly to the radiator. Remove the radiator cap (2) slowly in order to relieve system pressure.

Note: The radiator cap may be located either on the left side of the radiator (C3.3B and C3.8 engines) or the right side of the radiator (C2.2 engine).

3. Inspect the radiator cap and the gasket. Replace the cap if the cap or the gasket is damaged. Install the radiator cap.
4. Tilt the radiator guard downward.

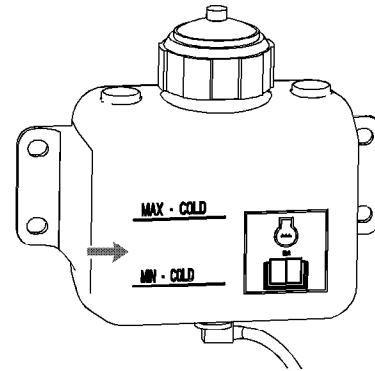


Illustration 284

g01018341

5. The coolant reservoir is located on the left-hand side of the engine bay or on the back of the engine compartment door. Maintain the coolant level in the coolant overflow reservoir between the "MIN" and "MAX" lines. "MIN" and "MAX" lines.
6. Close the engine access door.

i06136000

Diesel Exhaust Fluid - Fill

SMCS Code: 108K-544

- S/N:** BL21-Up
S/N: DX21-Up
S/N: FD21-Up
S/N: HP21-Up
S/N: MD21-Up
S/N: BY41-Up
S/N: BL71-Up
S/N: DX91-Up
S/N: HLM1-Up

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the machine. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

Reference: See Operation and Maintenance Manual, "Capacities (Refill)" for the capacity of the DEF tank for your machine.

i08247436

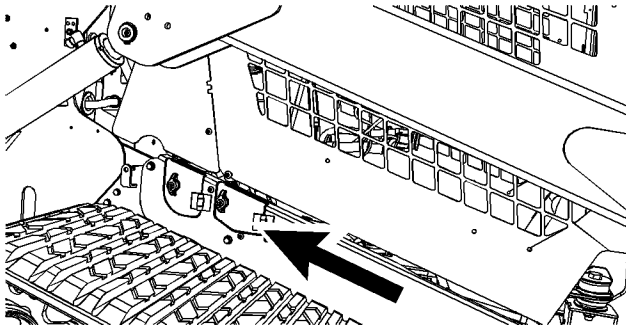


Illustration 285

g03821455

DEF Filler Cap Location

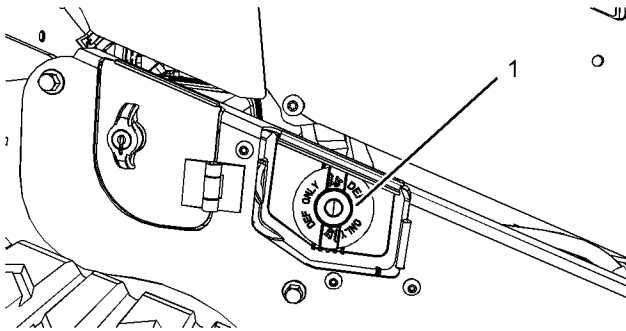


Illustration 286

g03821456

(1) DEF Tank Filler Cap

1. Clean blue DEF tank filler cap (1) and the surrounding area.
2. Remove the blue DEF tank filler cap (1).
3. Fill the tank with diesel exhaust fluid (DEF).

Note: Do not fill the DEF tank from a contaminated container or funnel.

Note: Do not over fill the tank. DEF can freeze and needs room for expansion.

4. Install the blue DEF tank filler cap (1).

Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for more information on diesel exhaust fluid (DEF) guidelines.

Diesel Exhaust Fluid Filter - Replace

SMCS Code: 108K-510-FI; 108K-544

S/N: BL21-Up

S/N: DX21-Up

S/N: FD21-Up

S/N: HP21-Up

S/N: MD21-Up

S/N: BY41-Up

S/N: BL71-Up

S/N: DX91-Up

S/N: HLM1-Up

NOTICE

Ensure that the engine is stopped before any servicing or repair is performed.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Cat Dealer Service Tool Catalog" or refer to Special Publication, PECJ0003, "Cat Shop Supplies and Tools Catalog" for tools and supplies suitable to collect and contain fluids on Cat products.

Dispose of all fluids according to local regulations and mandates.

1. The DEF filter is located on the left side of the machine under the cab. Tilt the cab upward. Refer to the Maintenance Section, "Cab Tilting" for the procedure.

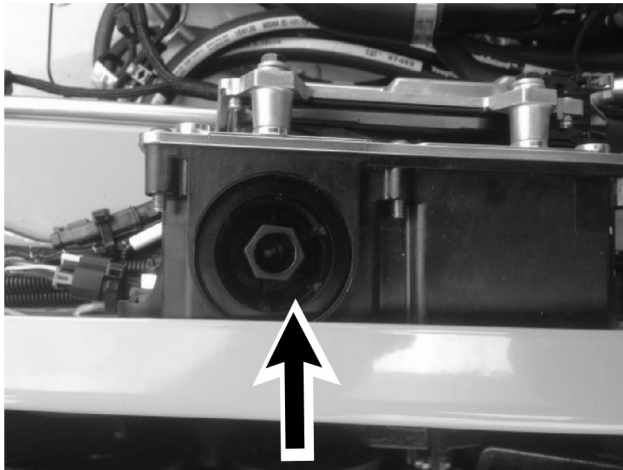


Illustration 287

g03821620

2. Remove the black plastic cover and then diesel exhaust fluid (DEF) filter assembly, which is shown.
3. Install new DEF filter. Replace DEF filter cap.
4. Tilt the cab downward. Refer to Maintenance Section, "Cab Tilting" for the procedure.

i06155020

Diesel Fuel System Cleaner - Add

SMCS Code: 1250-538-ADD; 1280-538-ADD

S/N: EH21–Up
S/N: CD41–Up
S/N: HR61–Up
S/N: AH91–Up
S/N: BL91–Up
S/N: KXC1–Up
S/N: HRD1–Up
S/N: D9E1–Up
S/N: HLM1–Up
S/N: DPR1–Up
S/N: GWR1–Up
S/N: T9S1–Up

Add Cat Diesel Fuel System Cleaner every 3000 hours of engine operation. This operation is to remove built up deposits and maintain engine power output. Pour 0.95L (32 oz.) of the cleaner into a full tank of diesel fuel and operate the machine normally.

Due to regional fuel variations and different usage cycles, deposits may build up in shorter periods. Caterpillar recommends using the cleaner as required, if a power reduction is observed. Contact your Cat dealer for availability.

i07569363

Diesel Particulate Filter - Clean/Replace

SMCS Code: 108F-070; 108F-510; 1091-510; 1091-070

S/N: EH21–Up
S/N: LW51–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: HR61–Up
S/N: HFB1–Up
S/N: K2D1–Up
S/N: D9E1–Up
S/N: HLM1–Up
S/N: T9S1–Up
S/N: D5T1–Up

The service interval for these models is governed by standards unique to EU Stage V requirements. Refer to this Operation and Maintenance Manual, "EU Stage V Emissions Control System" for additional information.

i07942300

Diesel Particulate Filter - Clean/Replace

SMCS Code: 108F-070; 108F-510; 1091-510; 1091-070

S/N: BL21–Up
S/N: DX21–Up
S/N: FD21–Up
S/N: HP21–Up

S/N: MD21–Up
S/N: BY41–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: DX91–Up
S/N: DTB1–Up
S/N: GTC1–Up
S/N: BYF1–Up
S/N: ETL1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: HLM1–Up
S/N: DZT1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: B5W1–Up
S/N: EZW1–Up
S/N: TAW1–Up
S/N: BGZ1–Up

Consult your Cat dealer when the Diesel Particulate Filter (DPF) needs to be cleaned. An Aftertreatment Regeneration Frequency code will occur when the DPF requires servicing.

The approved Caterpillar DPF maintenance procedure requires that one of the following actions be taken when the DPF needs to be cleaned:

- The DPF from your machine can be replaced with a new DPF
- The DPF from your machine can be replaced with a remanufactured DPF
- The DPF from your machine can be cleaned by your local authorized Cat dealer, or a Caterpillar approved DPF cleaning machine, and reinstalled

Note: A manual regeneration via Cat Electronic Technician must be performed before removing a DPF that will be cleaned. All three scenarios listed above require an ash reset via Cat Electronic Technician after installation of the clean DPF.

i02417847

Drive Chain Case Oil - Change

SMCS Code: 3261-544-OC; 3261-543-OC

S/N: BL21–Up
S/N: EH21–Up
S/N: MD21–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: HR61–Up
S/N: AJ71–Up
S/N: DTB1–Up
S/N: HFB1–Up
S/N: KXC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: BYF1–Up
S/N: DML1–Up
S/N: ETL1–Up
S/N: JSL1–Up
S/N: SEN1–Up
S/N: DPR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: MPW1–Up
S/N: BGZ1–Up

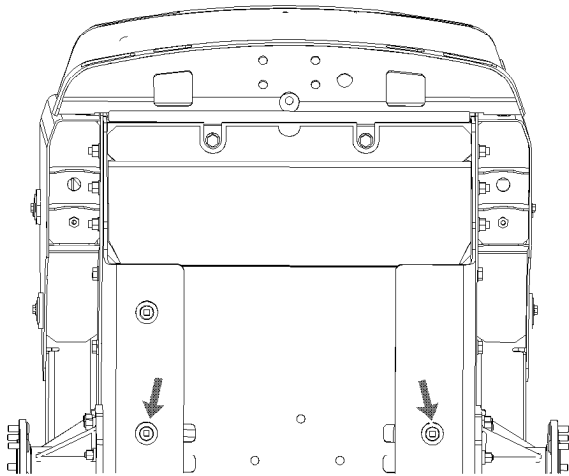


Illustration 288

g01025459

The plugs for the drive chain cases as the plugs are viewed from the underside of the machine.

1. Remove the drain plug for the left drive chain case and the right drive chain case. Allow the oil to drain into a suitable container.
2. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the drain plugs. Install the drain plugs.

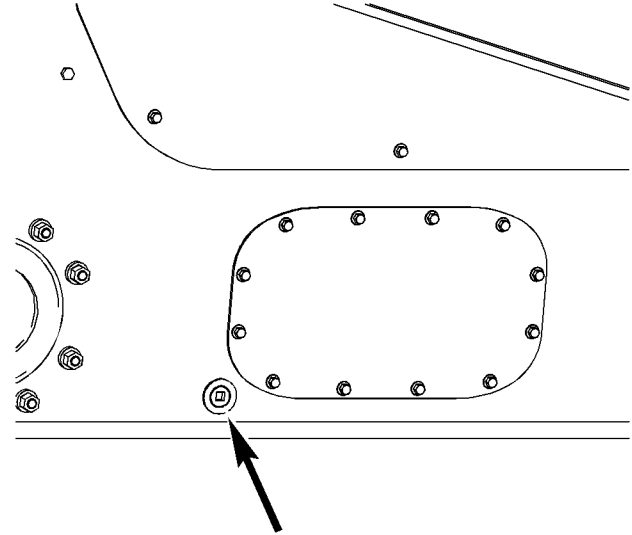


Illustration 289

g01210036

3. Remove the filler plug for the right side drive chain case. Fill the drive chain case with oil to the bottom of the threads on the fill port. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Refill Capacities".
4. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the filler plug. Install the filler plug.
5. Repeat the process for the left side drive chain case.

i02422873

Drive Chain Case Oil - Check

SMCS Code: 3261-535

S/N: BL21-Up

S/N: EH21-Up

S/N: MD21-Up

S/N: PN51-Up

S/N: RE51-Up

S/N: HR61-Up

S/N: AJ71-Up

S/N: DTB1-Up

S/N: HFB1-Up

S/N: KXC1-Up

S/N: HRD1-Up

S/N: K2D1–Up
S/N: BYF1–Up
S/N: DML1–Up
S/N: ETL1–Up
S/N: JSL1–Up
S/N: SEN1–Up
S/N: DPR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: MPW1–Up
S/N: BGZ1–Up

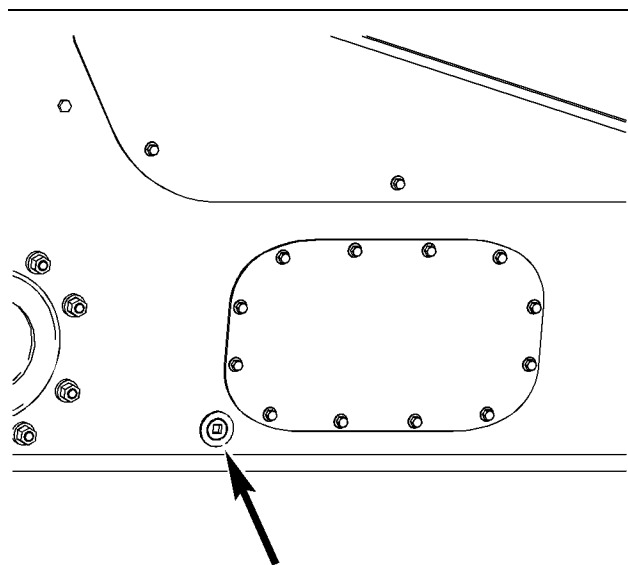


Illustration 290

g01210036

1. Remove the filler plug for the right side drive chain case. The oil level should be at the bottom of the threads on the fill port. If necessary, refer to Operation and Maintenance Manual, “Drive Chain Case Oil - Change” for the proper procedure to add oil.
2. Apply 169-5464 Quick Cure Primer and 5P-3413 Pipe Sealant to the threads on the filler plug. Install the filler plug.

3. Repeat the process for the left side drive chain case.

i02710828

Drive Chain Tension - Check/Adjust

SMCS Code: 3261-025; 3261-535

S/N: BL21–Up
S/N: EH21–Up
S/N: MD21–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: HR61–Up
S/N: AJ71–Up
S/N: DTB1–Up
S/N: HFB1–Up
S/N: KXC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: BYF1–Up
S/N: DML1–Up
S/N: ETL1–Up
S/N: JSL1–Up
S/N: SEN1–Up
S/N: DPR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: MPW1–Up
S/N: BGZ1–Up

Note: Steel tracks that go over the tires should only be used with pneumatic tires. When you use steel tracks that go over tires or any drive train device except tires, the interval for checking the drive chains should be reduced to every 100 Service Hours. The use of rubber tracks that go over the tires is not recommended.

Note: There are four drive chains on the skid steer loader that must be checked and adjusted.

1. Park the machine on level ground and stable ground.
2. Use appropriate floor jacks in order to lift the machine off the ground.

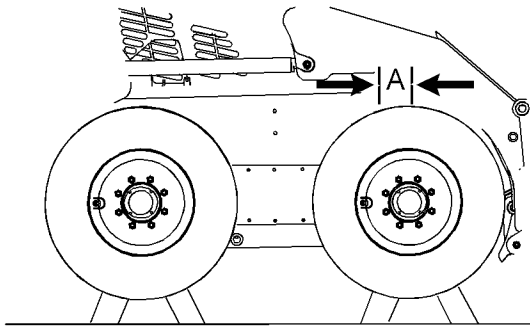


Illustration 291

g01360620

3. Rotate the front wheel forward and backward. Measure the total free play (A). Repeat the process for the rear wheel.

Note: If the total free play (A) does not exceed 15 mm (0.6 inch) the chain tension does not need further inspection. If the total free play exceeds 15 mm (0.6 inch), you should continue with the inspection.

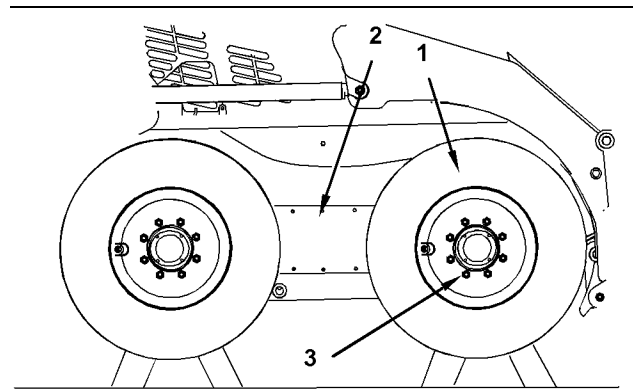


Illustration 292

g01360622

4. Remove the wheel nuts (3). Use an appropriate nylon lifting strap and a hoist in order to remove the tire and rim (1). The weight of the standard tire and rim is 51 kg (113 lb).
5. Remove bolts and the cover (2) for the drive chain case.

Note: Remove the sealant from the cover and from the machine.

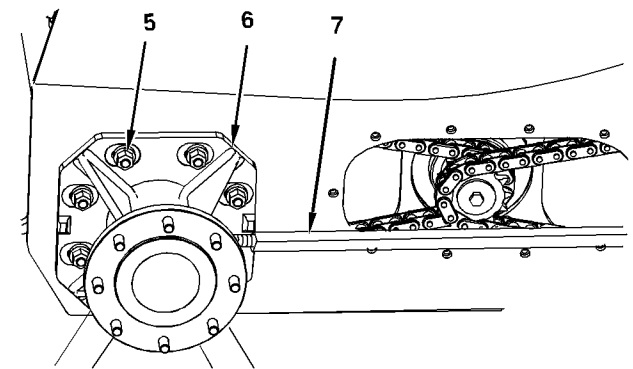


Illustration 293

g01210016

6. Loosen the eight bolts (5) for the axle housing. Place the chain tension adjuster (7) between the axle housings (6).

Maintenance Section
Drive Line Wear Sleeve - Inspect/Replace

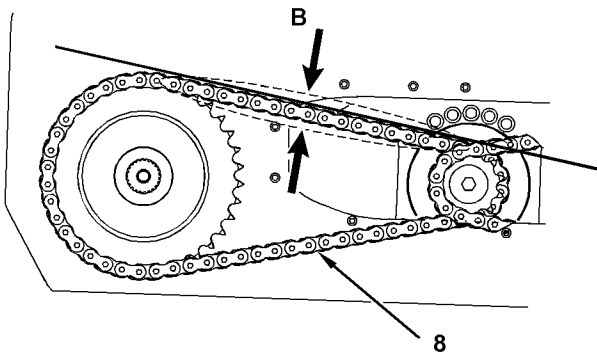


Illustration 294

g01210018

7. Rotate the axle in order to ensure that the chain (8) is taut below the sprockets. Place a straight edge across the top of the sprockets. Measure the total amount of movement in the chain (B). Set the chain tension so that there is a total of 15 mm (0.6 inch) movement in the chain. This is equal to 7.5 mm (0.3 inch) of movement above the straight edge and 7.5 mm (0.3 inch) of movement below the straight edge.

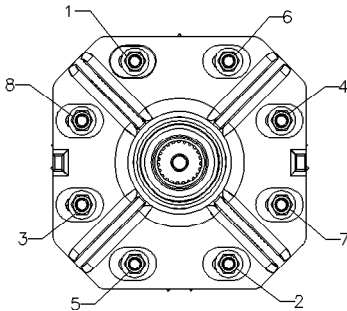


Illustration 295

g00554036

8. Torque the nuts for the axle housing in the order that is shown above to $160 \pm 15 \text{ N}\cdot\text{m}$ ($118 \pm 11 \text{ lb}\cdot\text{ft}$) and turn an additional $60^\circ \pm 5^\circ$ in the same order.
9. Remove the chain tension adjuster.
10. Install the bolts and the cover for the drive chain case.
- Note:** Use 8T-9022 Silicone Gasket in order to seal the cover to the machine.

11. Use an appropriate nylon lifting strap and a hoist in order to position the tire and rim to the axle. The weight of the tire and rim is 51 kg (113 lb). Refer to Operation and Maintenance Manual, "Wheel Nuts - Tighten" for the procedure to tighten the wheel nuts.
12. Repeat the procedure on the opposite side of the machine if it is necessary.
13. Lower the machine to the ground.

i06601450

Drive Line Wear Sleeve - Inspect/Replace

SMCS Code: 3154-510; 3154-040

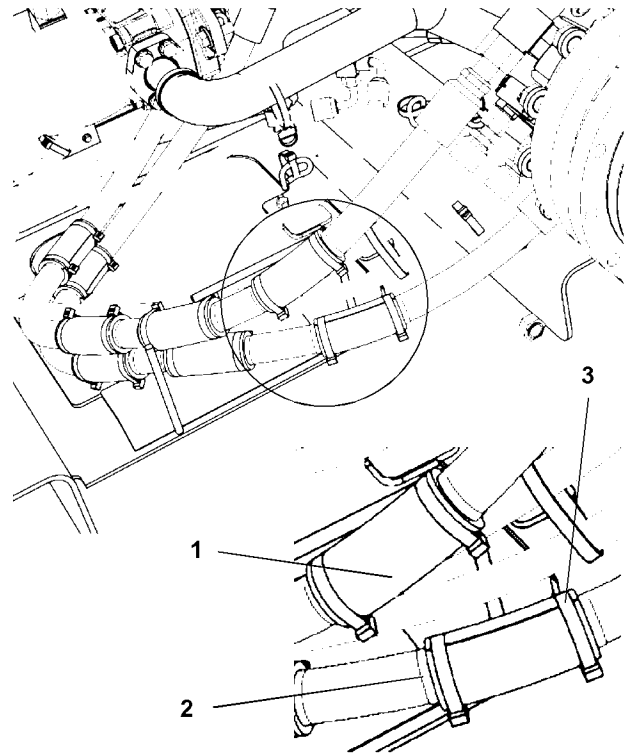


Illustration 296

g06040640

- (1) Wear Sleeve
(2) Friction Tape
(3) Tie Strap

1. Cut both tie straps and remove the worn wear sleeve.
2. Install a new wear sleeve onto the hose in the same location. Use the grip tape on the hose as a guide. Replace the grip tape as needed. The sleeve should fall where the hose assembly makes contact with metal frame members or other hoses.

- Secure the wear sleeve using two tie straps.

i05366418

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-510-PY; 1054-070-PY

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

NOTICE

Never service the air cleaner when the engine is running, to avoid engine damage.

NOTICE

Caterpillar recommends certified air filter cleaning services that are available at Cat dealers. The Cat cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

Service the air filter elements when the alert indicator for air filter restriction lights. Refer to Operation and Maintenance Manual, "Alert Indicators" for information about the indicator.

Clean

The primary filter element can be used up to three times if the element is properly cleaned and if the element is properly inspected. When the primary filter element is cleaned, check for rips or tears in the filter material. The primary filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

- Open the engine access door.
- The air filter housing is located on the right side of the engine compartment.

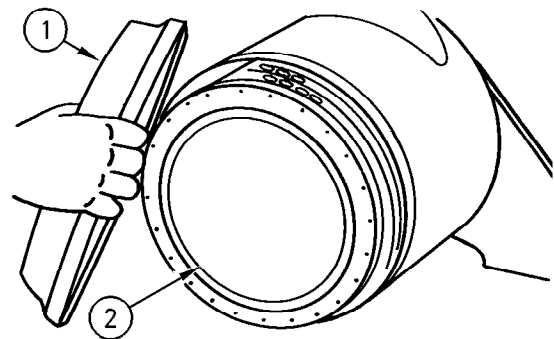


Illustration 297

g00101864

- Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.
- Remove the primary filter element (2).
- If appropriate, clean the primary filter element. Use air pressure to clean the primary filter elements. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

Note: When the primary filter elements are cleaned, always begin with the inside in order to force dirt particles toward the outside. Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary filter element.

Maintenance Section
Engine Air Filter Primary Element - Clean/Replace

6. Inspect the cleaned, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Note: Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets, or seals. Discard damaged primary air filter elements.

7. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.
8. Install the primary filter element into the filter housing.
9. Install the cover for the filter housing.

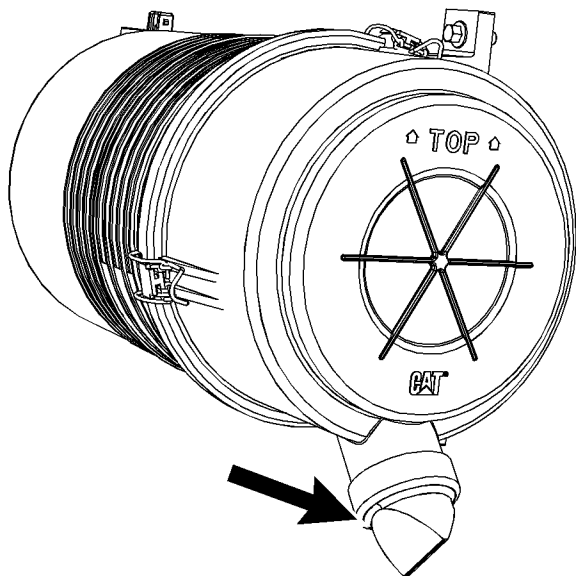


Illustration 298

g02828636

10. Rotate the cover clockwise and latch the cover.

Note: Make sure that the cover is properly positioned.

11. Close the engine access door.

12. Start the engine. The alert indicator for air filter restriction should turn off. If the alert indicator continues to light, replace the secondary air filter. Refer to Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace".

Replace

The primary filter element should be replaced at least one time per year. **You can clean the primary filter up to three times.**

1. Open the engine access door.
2. The air filter housing is located on the right side of the engine compartment.

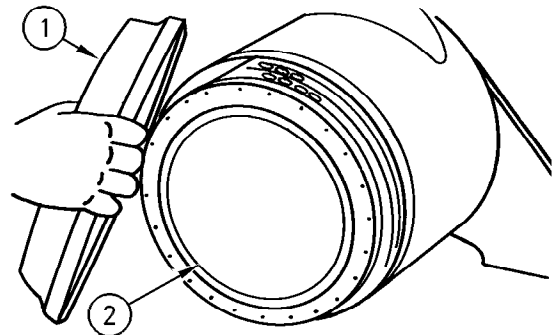


Illustration 299

g00101864

3. Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.
4. Remove the primary filter element (2).
5. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.
6. Install a new primary filter element into the filter housing.
7. Install the cover for the filter housing.

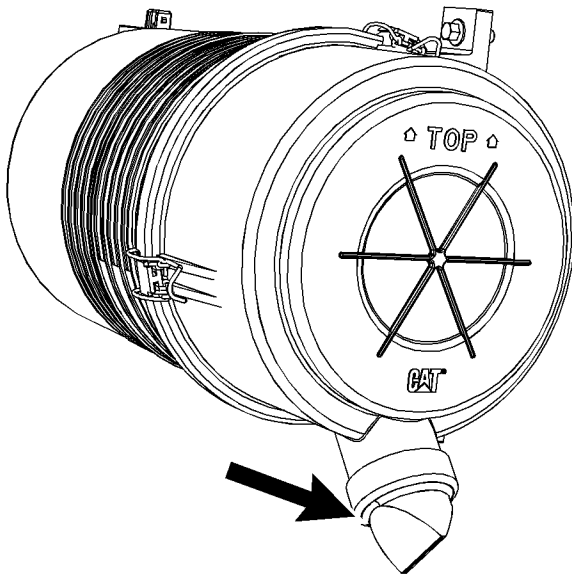


Illustration 300

g02828636

8. Rotate the cover clockwise and latch the cover.

Note: Make sure that the cover is properly positioned.

9. Close the engine access door.

10. Start the engine. The alert indicator for air filter restriction should turn off. If the alert indicator continues to light, replace the secondary air filter. Refer to Operation and Maintenance Manual, "Engine Air Filter Secondary Element - Replace".

i05355849

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Always replace the secondary filter element. Never attempt to reuse the secondary filter element by cleaning the element.

When the primary filter element is cleaned for the third time, the secondary filter element should be replaced.

The secondary filter element should also be replaced if the restricted Air Filter indicator comes on after the installation of a clean primary filter element or if the exhaust smoke is still black.

NOTICE

The filter should be kept in service for no longer than one year

1. Open the engine access door.
2. The air filter housing is located on the right side of the engine compartment.

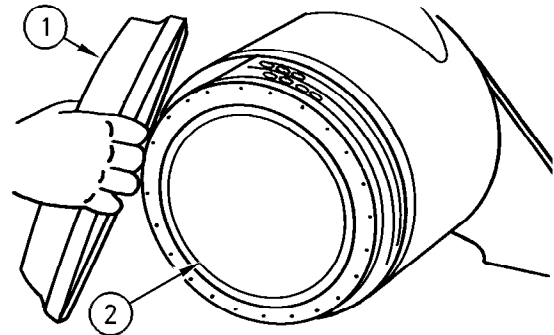


Illustration 301

g00101864

3. Unlatch the air cleaner housing cover (1). Rotate the cover counterclockwise and remove the cover.
4. Remove the primary filter element (2).

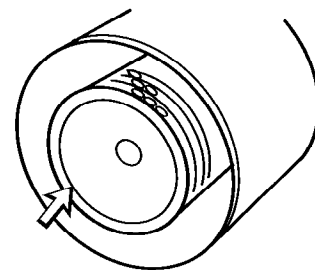


Illustration 302

g00038606

5. Clean the inside of the air cleaner housing with a damp cloth. Do not use compressed air to clean the housing.
6. Remove the secondary filter element.
7. Cover the air inlet opening.
8. Clean the inside of the air cleaner housing with a damp cloth, if necessary. Do not use compressed air to clean the housing.
9. Uncover the air inlet opening.

10. Install a new secondary element.
11. Install the primary element.
12. Install the cover for the filter housing.

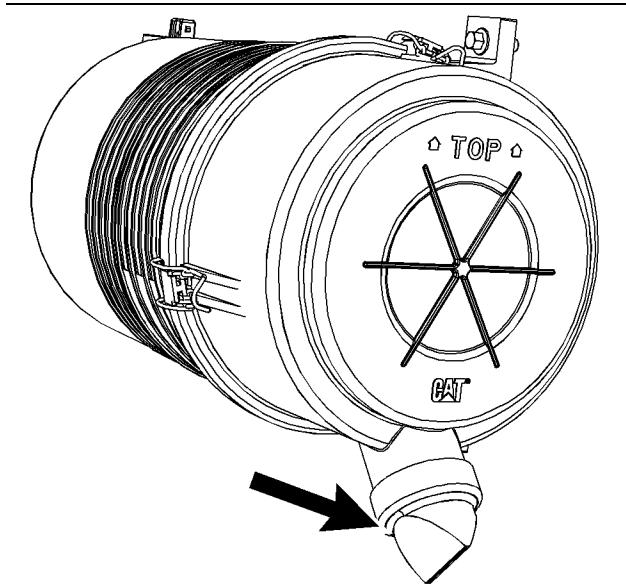


Illustration 303

g02828636

13. Rotate the cover clockwise and latch the cover.
- Note:** Ensure that the cover is properly positioned.
14. Close the engine access door.

i04434042

Engine Compartment - Inspect/Clean

SMCS Code: 1000-070-CPA; 1000-040-CPA

Inspect the engine compartment for dirt buildup or debris. Remove any dirt or debris from the engine compartment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

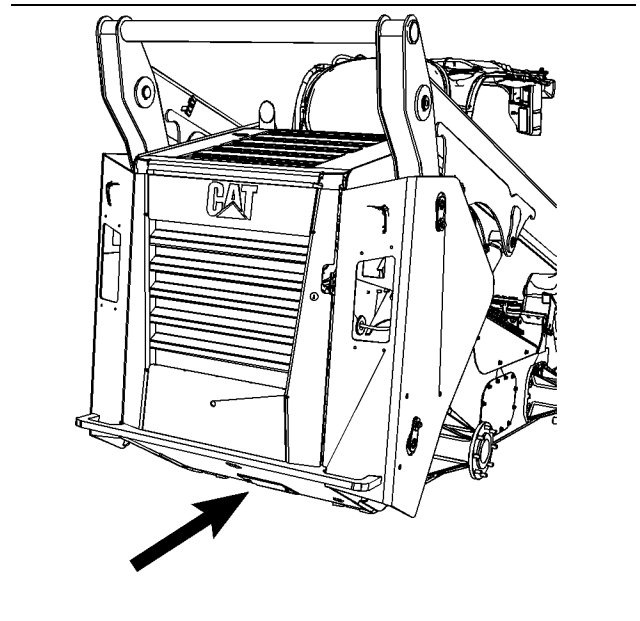


Illustration 304

g02625826

2. Remove any debris or dirt from the engine compartment. If necessary, remove the access panel in order to clean out the engine compartment.

Note: Use care when you clean the engine compartment. Damage to the machine may occur.

3. Close the engine access door.

Air Conditioning Condenser

The air conditioning condenser is located on the access door of the engine compartment. Cleaning the air conditioning condenser will maintain optimum performance of the air conditioning system.

Use low-pressure water in order to clean the condenser.

i06133897

Engine Crankcase Breather - Replace (and PCV Valve Check)

SMCS Code: 1317-510

S/N: BL21-Up

S/N: DX21-Up

S/N: EH21-Up

S/N: FD21-Up

S/N: HP21-Up

S/N: MD21–Up
S/N: BY41–Up
S/N: LW51–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: HR61–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: BL91–Up
S/N: DX91–Up
S/N: DTB1–Up
S/N: HFB1–Up
S/N: GTC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: D9E1–Up
S/N: BYF1–Up
S/N: ETL1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: HLM1–Up
S/N: DPR1–Up
S/N: GWR1–Up
S/N: T9S1–Up
S/N: D5T1–Up
S/N: DZT1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: B5W1–Up
S/N: EZW1–Up
S/N: TAW1–Up
S/N: BGZ1–Up

Note: Only applies to engines with aftertreatment.

1. Open the engine access door. Refer to Operation and Maintenance Manual, “Access Doors and Covers”.
2. Tilt the radiator upward. Refer to Operation and Maintenance Manual, “Radiator Tilting”.

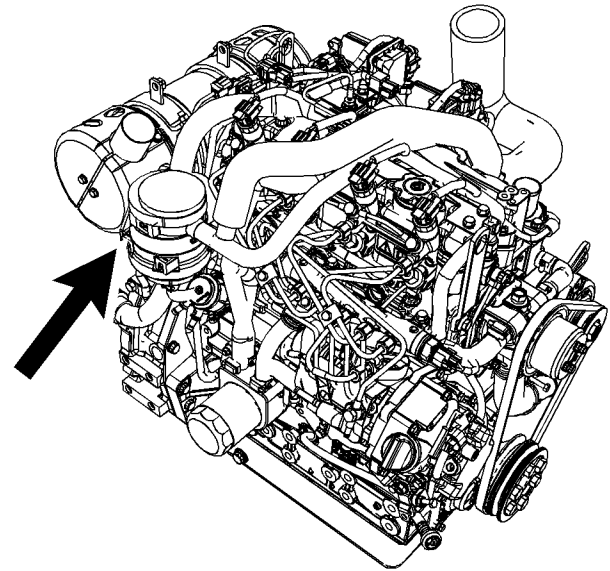


Illustration 305
C2.2

g03820407

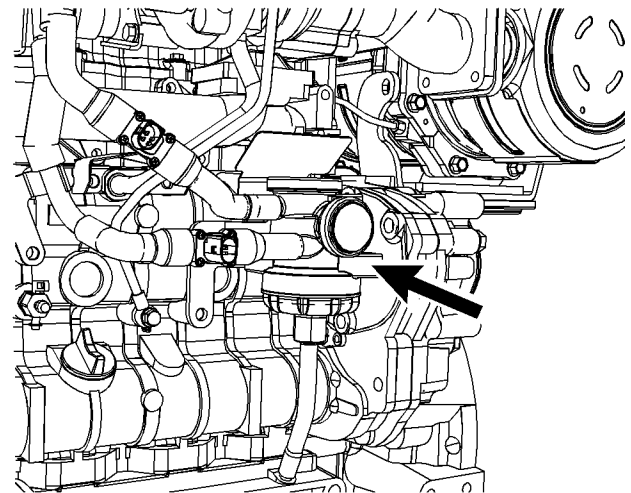


Illustration 306
C3.3B

g03823542

Maintenance Section
and PCV Valve Check



Illustration 307
C2.2 and C3.3B

g03392048



Illustration 309
C3.8

g02826940

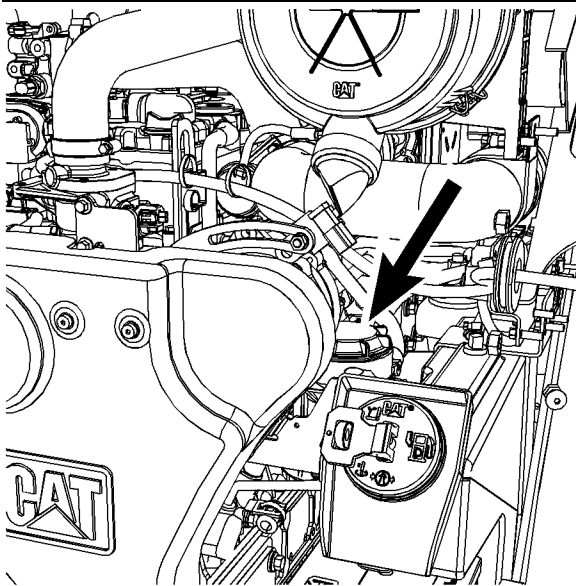


Illustration 308
C3.8

g02842096

3. The breather is located in the engine compartment on the right-hand side of engine. There is cap on the breather and a replaceable element inside.

Note: This service may be performed without removing the housing from the engine.

4. Remove the breather cap and remove the filter element.

Note: The C2.2 and C3.3B are equipped with cap on bottom portion of the canister. Use a wrench to remove the breather cap. The C3.8 is equipped with cap on top of canister, remove cap by applying downward pressure on the cap while turning.

5. Clean the housing and the cap for the breather.

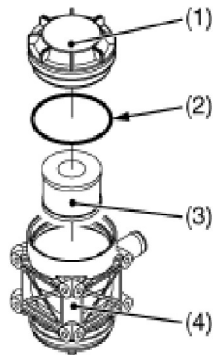


Illustration 310

g02827582

C3.8

- (1) Cover
- (2) O-ring
- (3) Filter Element
- (4) Housing

6. For the C3.8 only, press the PCV valve to ensure that the valve moves smoothly. If the valve does not move smoothly, replace the housing.

- a. Install the new filter element in the breather.
Install the breather cap.
- b. Tilt the radiator downward.
- c. Close the engine access door.

i06133893

Engine Oil Level - Check**SMCS Code:** 1348-535-FLV**NOTICE**

Do not overfill the crankcase. Engine damage can result.

1. Stop the engine and allow 10 to 20 minute for the oil to drain back into the oil pan.

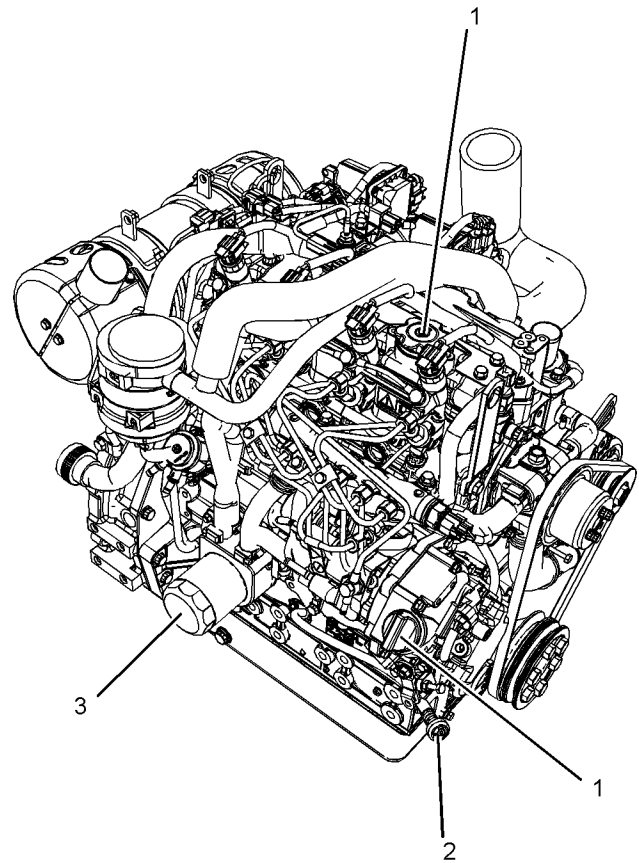


Illustration 311

g03820109

C2.2 Engine

Maintenance Section
Engine Oil Level - Check

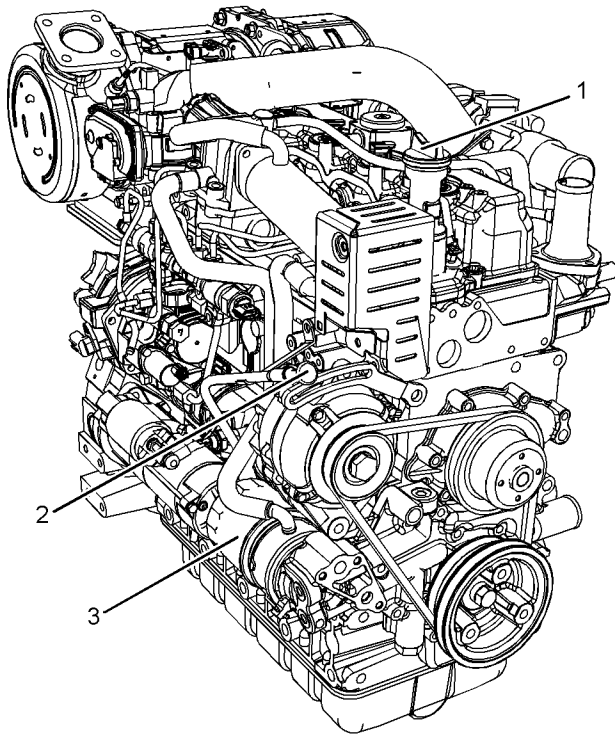


Illustration 312
C3.3B Engine

g03362778

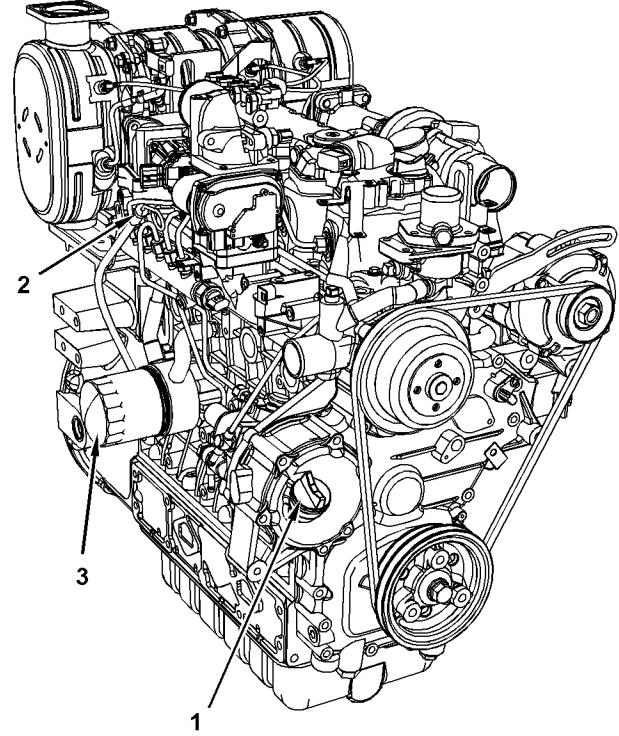


Illustration 313
C3.8 engine

g02629297

- (1) Oil Filler Cap
- (2) Dipstick
- (3) Oil Filter

2. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

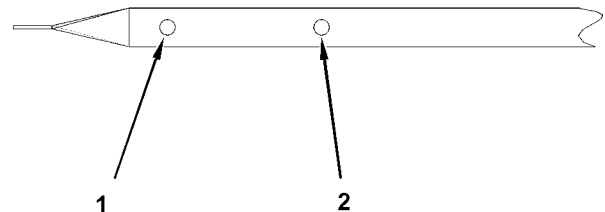


Illustration 314

g01277108

- (1) Oil level add mark
- (2) Full mark

3. Maintain the oil level between the "ADD" (1) mark and the "FULL" (2) mark on the dipstick.
4. Remove the oil filler cap (1) and add oil.

5. Clean the oil filler cap and install the oil filler cap.
6. Close the engine access door.

i05354546

Engine Oil Sample - Obtain

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

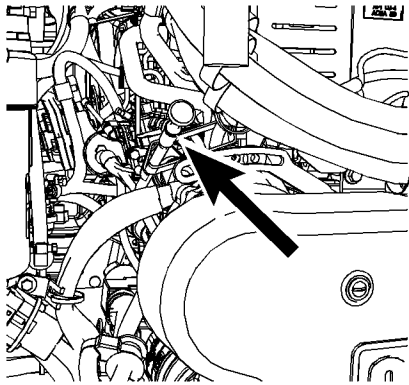


Illustration 315

g03392125

Obtain the oil sample of the engine oil through the opening for the dipstick.

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" "S·O·S Oil Analysis" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i08271983

Engine Oil and Filter - Change

SMCS Code: 1308-510; 1348-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

The normal oil change interval for the machine is Every 500 Service Hours or every year when the following conditions are met:

- Use an engine oil in the Operation and Maintenance Manual, "Lubricant Viscosities".

- Cat filters are used.
- The altitude does not exceed 2300 m (7545 ft).

An oil change interval of Every 250 Service Hours or every 6 months is required when the following conditions occur:

- Not using a recommended engine oil in the Operation and Maintenance Manual, "Lubricant Viscosities".
- Cat filters are not used.
- The altitude exceeds 2300 m (7545 ft).

Refer to the results of the S·O·S oil analysis to determine if the oil change interval should be decreased. Consult your Cat Dealer for detailed information regarding the optimum oil change interval.

Note: Diesel Fuel Specification Type and Sulfur Content % (ppm), must be compliant with all applicable emission regulations for the area in which the engine is operated.

Note: For engines that do not have aftertreatment and do not have EGR, use of ULSD is not required. If the diesel fuel contains sulfur greater than 0.5% (5,000ppm), reduce the oil change interval by one-half. Diesel fuel containing more than 1.0% (10,000 ppm) sulfur is not approved for the engine.

Engine Oil and Filter - Change Procedure

WARNING

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

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".

Note: The crankcase drain is on the right side of the oil pan.

Maintenance Section
Engine Oil and Filter - Change

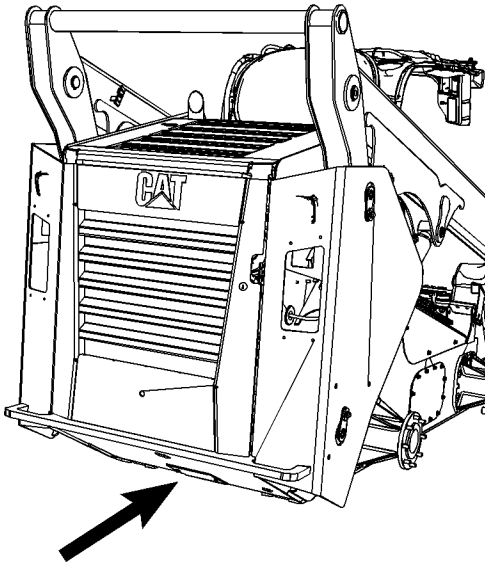


Illustration 316

g02625826

2. Remove the access panel that is located below the drain plug. Remove the drain plug and allow the oil to drain into a suitable container. Install the drain plug and install the access panel.

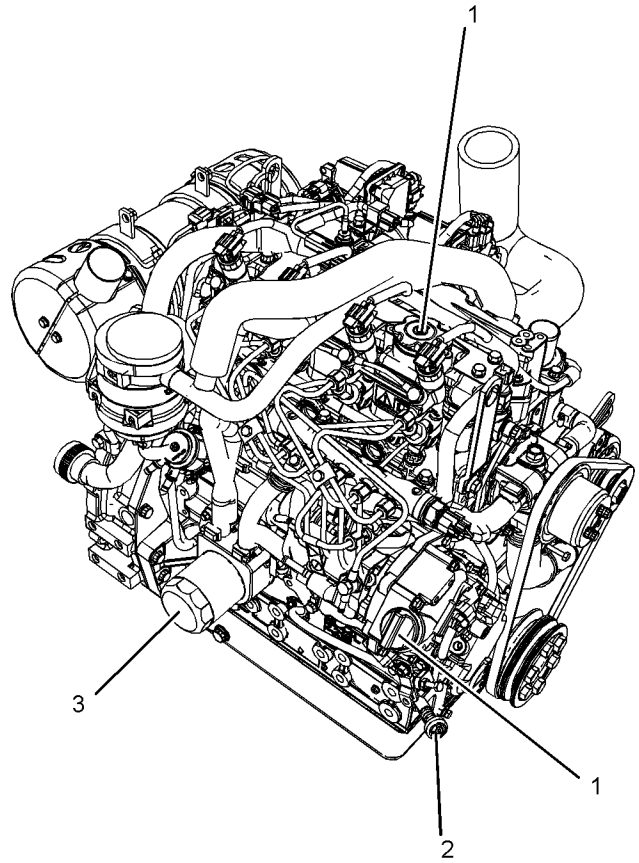


Illustration 317
C2.2 Engine

g03820109

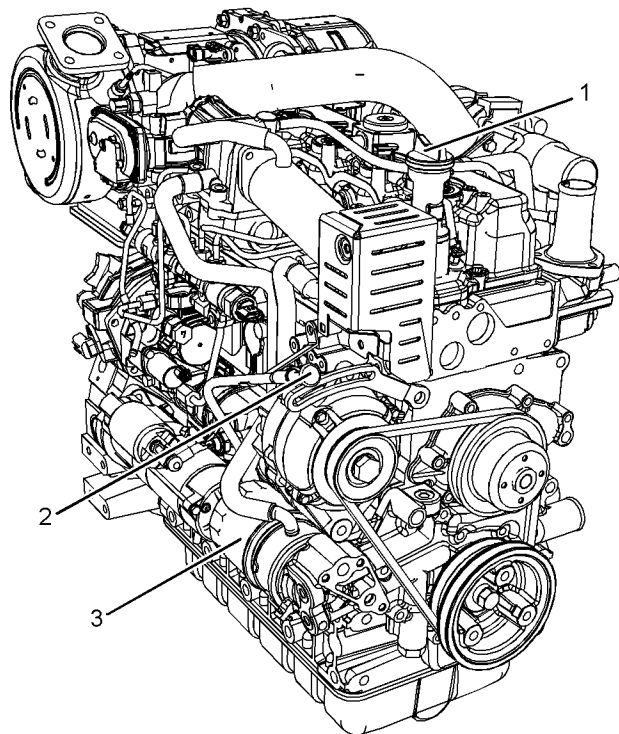


Illustration 318

g03362778

C3.3B Engine

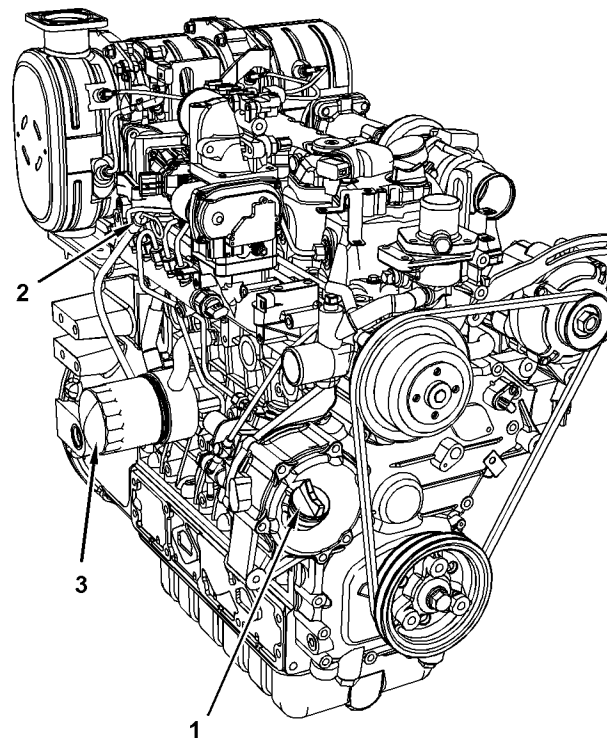


Illustration 319

g02629297

C3.8 Engine

- (1) Oil Filler Cap
- (2) Dipstick
- (3) Oil Filter

3. Remove the filter element with a 187 - 2718 Filter Wrench. Refer to "Inspect a Used Filter for Debris."

4. Apply a thin film of clean engine oil to the sealing surface of the new filter element.

5. Install a new engine oil filter hand tighten one turn after the seal first contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the engine oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the engine oil filter, use the rotation index marks as a guide.

6. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Cat filters, use the instructions that are provided with the filter.

Note: Use a Cat strap wrench, or another suitable tool, to turn the filter to the amount that is required for final installation. Ensure that the installation tool does not damage the filter.

Maintenance Section
Engine Valve Lash - Check

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, "Refill Capacities" for information about the oil. Clean the oil filler plug and install the oil filler plug.
8. Start the engine and allow the oil to warm. Check for leaks.

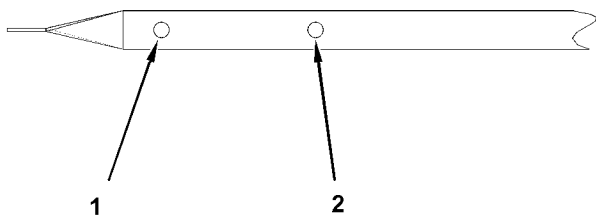


Illustration 320

g01277108

- (1) Oil level add mark
(2) Full mark

9. Stop the engine and allow the oil to drain back into the oil pan. Fill the crankcase to the "FULL" mark (2) on the dipstick. **Do not exceed the "FULL" mark on the dipstick.** Add oil or drain oil if necessary.
10. Close the engine access door.

Inspect a Used Filter for Debris

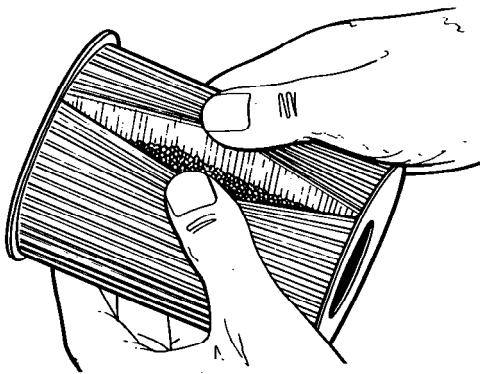


Illustration 321

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 normal wear. Consult your Caterpillar dealer to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i06849849

Engine Valve Lash - Check

SMCS Code: 1105-025

Refer to the Service Manual for the complete adjustment procedure for the engine valve lash.

A qualified mechanic should adjust the engine valve lash and the fuel injector timing because special tools and training are required.

See your Cat dealer for this service.

i07376968

Equipment Lowering Control Valve - Check

SMCS Code: 5147-MA

WARNING

Personal injury or death can result from a work tool falling.

Keep personnel away from the front of the machine when lowering the work tool.

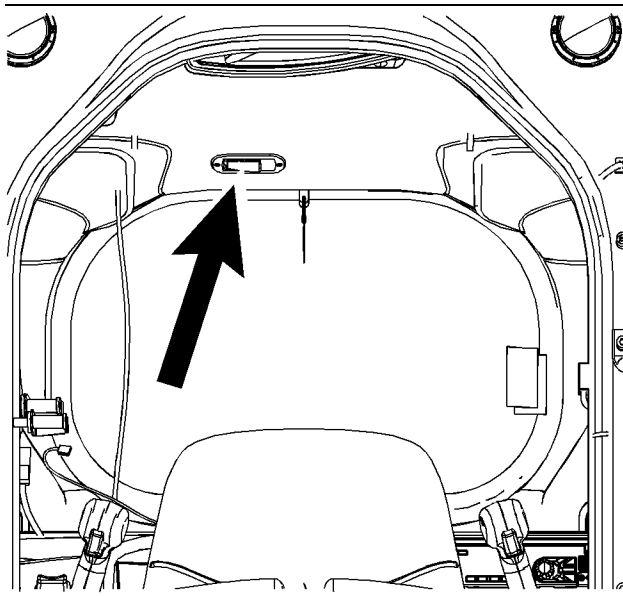


Illustration 322

g03821246

Roof-mounted Finger Latch

The bypass valve (Dead Engine Lower) is located overhead on the underside of the cab roof.

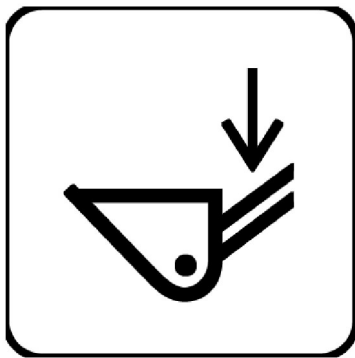


Illustration 323

g01332374

Icon molded into the finger latch.

Actuation

1. Pull down on the finger latch. Release the finger latch to stop the loader arms, if necessary.
2. Allow the loader arms to lower until the work tool is on the ground.
3. Release the finger latch.

4. Make the necessary repair before you operate the machine.

i07945451

Exhaust Gas Recirculation Valve - Clean

SMCS Code: 5137-070

S/N: EH21-Up

S/N: HR61-Up

S/N: BL91-Up

S/N: HRD1-Up

S/N: D9E1-Up

S/N: HLM1-Up

S/N: DPR1-Up

S/N: GWR1-Up

S/N: T9S1-Up

At 3000 hours the exhaust gas recirculation valve, connecting pipe and exhaust cooler will need to be cleaned. The exhaust gas recirculation maintenance timer will need to be reset for the engine to function correctly.

At 3000 hours a 5838-31 EGR Valve Malfunction diagnostic trouble code will become active and the amber warning lamp will become solid. This information is to inform the operator that cleaning and reset are required. The operator then has 100 hours to complete the cleaning and reset.

If at 3100 hours the cleaning and reset has not been performed, a 5838-14 EGR Valve Malfunction : Special Instruction diagnostic trouble code will become active. The amber warning lamp will start to flash and the engine will be derated.

WARNING

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

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

Maintenance Section
Final Drive Oil - Change

Note: Before using the cleaner and performing the cleaning procedure, ensure that you have read and understood the safety instructions that are detailed in Operation and Maintenance Manual, General Hazard Information.

The electronic service tool will need to be connected to reset the maintenance timer after the exhaust gas recirculation valve has been cleaned and installed. This reset will reset the hour counter for exhaust gas recirculation valve maintenance to zero and if necessary, clear the diagnostic codes.

i07328960

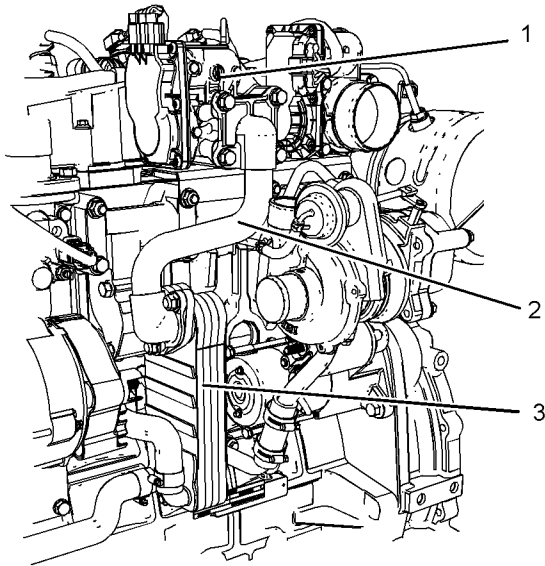


Illustration 324

g03890559

Typical example

- (1) Exhaust gas recirculation valve
- (2) Connecting pipe
- (3) Cooler

Remove the exhaust gas recirculation valve (1), remove the connecting pipe (2) and remove the exhaust cooler (3). For more information, refer to Disassembly and Assembly, Exhaust Gas Recirculation Valve - Remove and Install and Disassembly and Assembly, Exhaust Cooler (NRS) - Remove and Install.

The exhaust gas recirculation valve, connecting pipe and the exhaust cooler can be cleaned.

Spray Loctite 7070 ODC-Free Cleaner and Degreaser into the port of the exhaust gas recirculation valve (1). Wait for a few minutes. Use the soft lint free cloth to clean the exhaust gas recirculation valve to remove the carbon deposits from the gas recirculation valve.

The connecting pipe and the exhaust cooler can be cleaned using a soft lint free cloth and deionized water.

Note: Once the cleaning procedure is complete, all components must be dried before installation.

For more information on installation, refer to Disassembly and Assembly, Exhaust Gas Recirculation Valve - Remove and Install. Also, refer to Disassembly and Assembly, Exhaust Cooler (NRS) - Remove and Install.

Final Drive Oil - Change

SMCS Code: 4011-044-OC; 4050-044-OC; 4050-044-FLV; 4050; 4050-535-FLV; 4050-044; 4070-044; 7527

S/N: DX21-Up

S/N: FD21-Up

S/N: HP21-Up

S/N: BY41-Up

S/N: CD41-Up

S/N: LW51-Up

S/N: TP51-Up

S/N: WE51-Up

S/N: BE71-Up

S/N: BL71-Up

S/N: HP71-Up

S/N: AH91-Up

S/N: BL91-Up

S/N: DX91-Up

S/N: KB91-Up

S/N: GTC1-Up

S/N: D9E1-Up

S/N: FTK1-Up

S/N: GTK1-Up

S/N: STK1-Up

S/N: TLK1-Up

S/N: EML1-Up

S/N: FTL1-Up

S/N: GTL1-Up

S/N: NTL1-Up

S/N: HLM1-Up

S/N: FMR1-Up

S/N: GWR1-Up

S/N: T9S1-Up

S/N: D5T1-Up
S/N: FMT1-Up
S/N: HMT1-Up
S/N: JST1-Up
S/N: MLT1-Up
S/N: PPT1-Up
S/N: WCT1-Up
S/N: EZW1-Up
S/N: TAW1-Up
S/N: RCX1-Up
S/N: A9Z1-Up

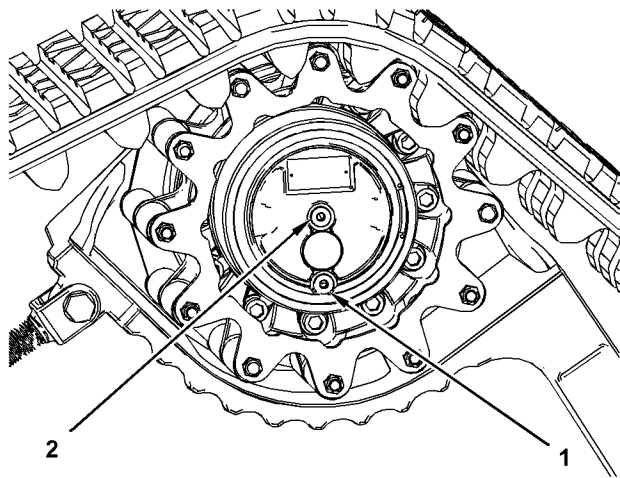


Illustration 325
Multi-Terrain Loader

g01291697

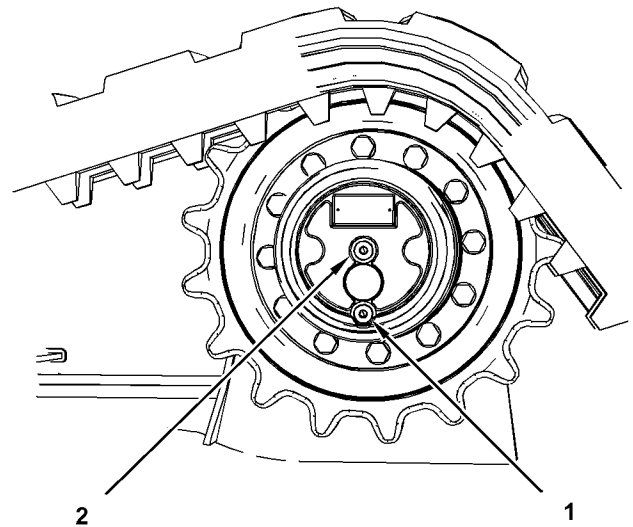


Illustration 326
Compact Track Loader

g01451295

(1) Oil fill/drain plug
 (2) Oil check plug

Final Drive Oil - Change Procedure

1. Position one final drive so that the oil fill/drain plug (1) is at the bottom.

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

2. Use an 8 mm (5/16 inch) allen wrench. Remove the oil plugs (1) and (2). Allow the oil to drain into a suitable container.
3. Check the drained oil for large metal chips or a significant number of metal particles.

Note: Some small amount of break-in debris is normal and should not cause alarm.

Note: Dispose of drained fluids according to local regulations.

4. Clean the plugs and inspect the plugs. Replace a worn plug or a damaged plug.
5. Position the final drive so that the oil fill/drain plug (1) is at the top.
6. Add oil through the opening of the oil fill/drain plug (1) that is now at the top.

Maintenance Section
Final Drive Oil Level - Check

7. Fill the final drive to the bottom of the opening for the oil check plug (2). Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)".
8. Install the two oil plugs. Tighten the oil plugs to a torque of 27 ± 1 N·m (20 ± 0.7 lb ft).
9. Perform Step 1 to Step 8 on the other final drive.
10. Completely remove any oil that has spilled.
11. Start the engine and allow the final drives to operate through several cycles.
12. Stop the engine.
13. Check the oil level.
14. Maintain the oil level to the bottom of the opening for the fill/drain plug (2).

i06600865

Final Drive Oil Level - Check

SMCS Code: 4011-535-FLV; 4050; 4050-535-FLV; 4070-535-FLV; 7524; 7527

S/N: DX21–Up
S/N: FD21–Up
S/N: HP21–Up
S/N: BY41–Up
S/N: CD41–Up
S/N: LW51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: AH91–Up
S/N: BL91–Up
S/N: DX91–Up
S/N: KB91–Up
S/N: GTC1–Up
S/N: D9E1–Up
S/N: FTK1–Up
S/N: GTK1–Up
S/N: STK1–Up

S/N: TLK1–Up
S/N: EML1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: NTL1–Up
S/N: HLM1–Up
S/N: FMR1–Up
S/N: GWR1–Up
S/N: T9S1–Up
S/N: D5T1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: MLT1–Up
S/N: PPT1–Up
S/N: WCT1–Up
S/N: EZW1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up

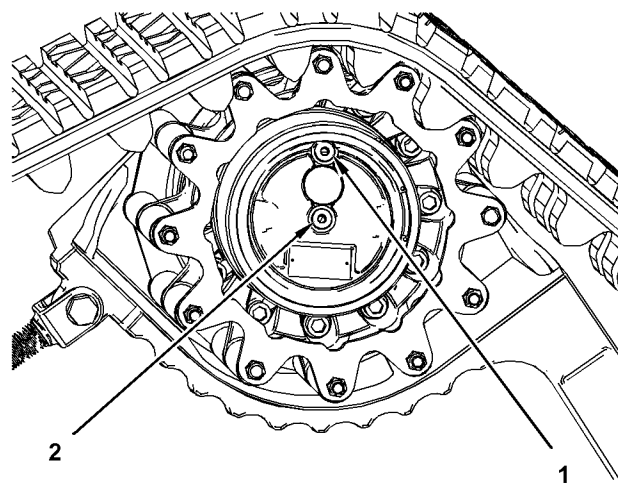


Illustration 327

g01457026

MTL model

- (1) Oil fill/drain plug
 (2) Oil check plug

i07569596

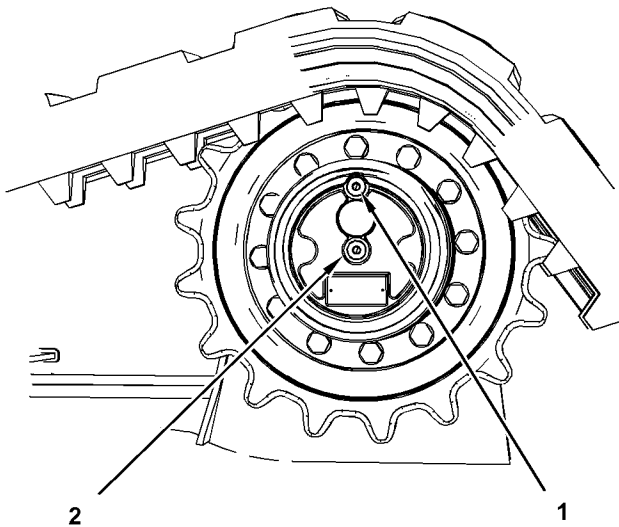


Illustration 328

g01457009

CTL model

- (1) Oil fill/drain plug
(2) Oil check plug

1. Position one final drive so that the oil fill/drain plug (1) is at the top.

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

2. Use an 8 mm (5/16 inch) allen wrench. Remove the oil check plug (2).
3. Check the oil level. The oil should be near the bottom of the opening for the oil check plug (2).
4. Add oil through the opening for the oil fill/drain plug (1), if necessary.

Note: Overfilling the final drive will cause the seals on the travel motor to allow hydraulic oil or water to enter the final drive and contaminate the oil.

5. Clean the oil plugs.

Note: Some small amount of break-in debris is normal and should not cause alarm.

6. Install the oil plugs. Tighten the oil plugs to a torque of $27 \pm 1 \text{ N}\cdot\text{m}$ ($20 \pm 0.7 \text{ lb ft}$).
7. Repeat the procedure for the other final drive.

Fuel System Filter (In-Line) - Replace (If Equipped)

SMCS Code: 1261-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

Note: Do not fill fuel filters before installation in any circumstance.

Note: Do not open any high-pressure lines to purge air from the fuel system.

Note: Replace the fuel filter before the scheduled interval if any of the following occur:

- Engine performance is poor.
- Hard Starting
- Engine dies under load.

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers". The filter is on the left side of the engine compartment. Most machines have the inline filter attached to the bottom of the fuel system priming pump (Type 1). Some machines are equipped with an inline filter that is not connected to the pump (Type2). Later machines may not have an inline filter.

Maintenance Section
Fuel System Primary Filter (Water Separator) - Drain

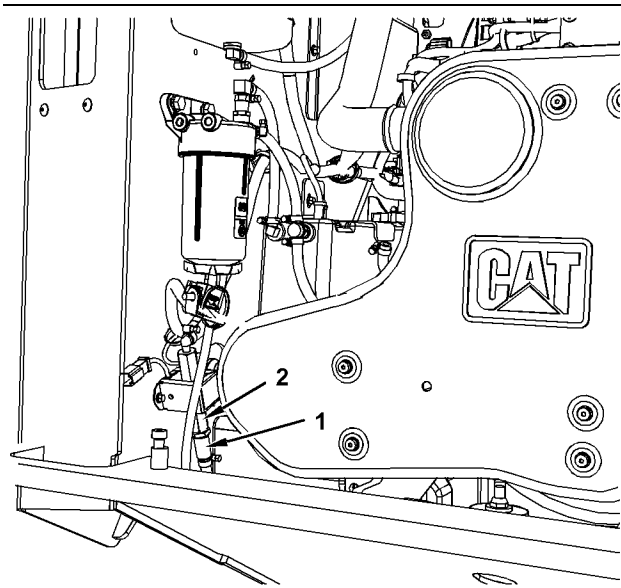


Illustration 329

g02841456

Type 1

- (1) Filter
- (2) Pump Hex Shaft

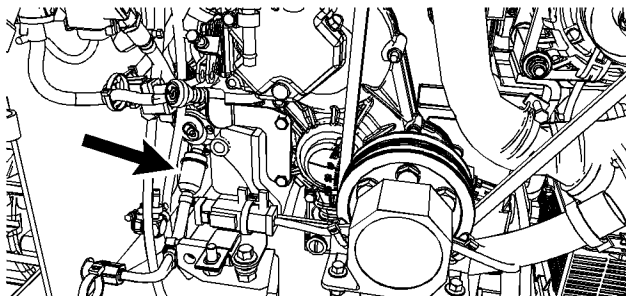


Illustration 330

g03819815

Type 2

2. Loosen the hose clamps.
3. Remove the fuel filter and discard the fuel filter.

Note: For Type 1 only, use a wrench on the hex shaft of the pump to hold the pump securely to avoid pump damage.

4. Replace the fuel filter. Ensure that the arrow on the filter points upwards or towards the fuel system priming pump.
5. For Type 1 only, tighten to a torque of $10 \pm 3 \text{ N}\cdot\text{m}$ ($7.5 \pm 2 \text{ lb}\cdot\text{ft}$).

Note: For Type 1 only, use a wrench on the hex shaft of the pump to hold the pump securely to avoid pump damage.

6. Tighten the hose clamps.
7. Start the engine.
8. Check for leaks.
9. Close the engine access door.

Note: For Type 1, the clear plastic in-line filter attached to the bottom of the lift pump will have air present when filter is new. As the filter accumulates with debris, the air will purge from the filter.

i07569619

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

The fuel system water separator is located in the left side of the engine compartment.

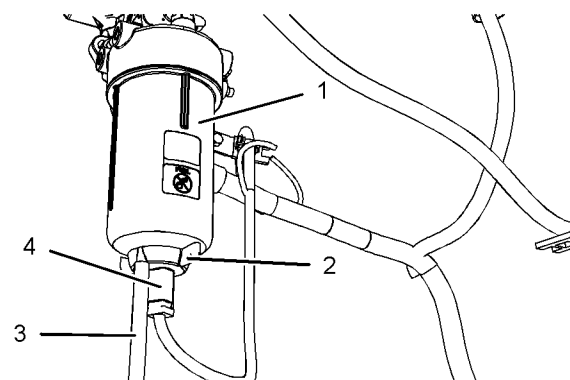


Illustration 331

g03820042

Type 1: Early Models

- (1) Filter Housing
- (2) Drain Valve
- (3) Drain Hose
- (4) Water-In-Fuel Sensor Plug

i07569669

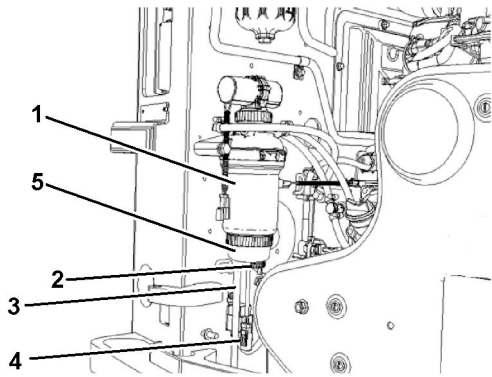


Illustration 332

g06361993

Type 2: Later Models

- (1) Fuel Filter
- (2) Drain Valve
- (3) Drain Hose
- (4) Water-In-Fuel Sensor Plug
- (5) Water Bowl

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
 2. Insert the drain hose (3) into a suitable container. Loosen the drain valve (2) on the bottom of the housing.
- Note:** One half turn to one full turn will fully open the valve.
3. Tighten the drain valve (2) by hand. Do not tighten the drain valve (2) with a tool. Damage to the valve or to the seals may occur.
 4. Close the engine access door.
 5. Dispose of the water and sediment according to local regulations.

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510-FQ; 1263-510-FQ

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

Note: This unit has a dual purpose. The element serves as a water separator and a fuel filter.

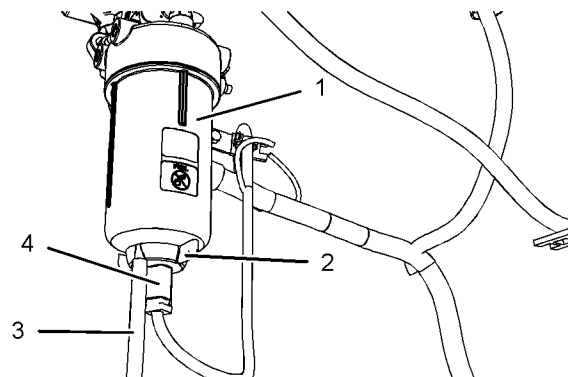


Illustration 333

g03820042

Type 1: Early Models

- (1) Filter Housing
- (2) Drain Valve
- (3) Drain Hose
- (4) Water-In-Fuel Sensor Plug

Maintenance Section
Fuel System Priming Pump - Operate

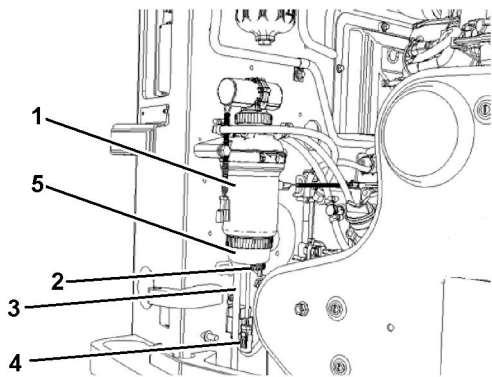


Illustration 334

g06361993

Type 2: Later Models

- (1) Fuel Filter
- (2) Drain Valve
- (3) Drain Hose
- (4) Water-In-Fuel Sensor Plug
- (5) Water Bowl

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
 2. Disconnect the water-in-fuel sensor plug (4).
 3. Open the drain valve (2). Allow the water and fuel to drain into a suitable container.
- Note:** One half to one full turn will fully open the valve (2).
4. Close the drain valve (2) by hand. Do not tighten the drain valve (2) with a tool. Damage to the valve or to the seals may occur.
 5. For Type 2 only, Rotate the water bowl (5) counterclockwise to remove it from the fuel filter (1).
 6. Rotate the fuel filter housing (1) for Type 1 or the fuel filter (1) for Type 2 counterclockwise to remove.
 7. Clean the mounting base for the fuel filter.
 8. For Type 1 only, clean the housing for the fuel filter.

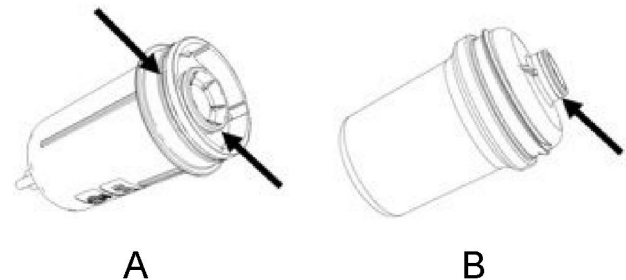


Illustration 335

g06362060

- (A) Type 1
- (B) Type 2

9. Lubricate the seal with clean fuel. Install the new fuel filter and housing onto the mounting base. Rotate clockwise to fasten the fuel filter to the mounting base. For Type 1 only, hand tighten until the lip of the housing is in contact with the mounting base. For Type 2 only, hand tighten approximately three-quarters of a turn until an audible "click" is heard indicating the housing is fully seated to the mounting base.

Note: Do not prefill the filter with fuel. Contamination of the fuel system will occur and damage to the injectors may occur.

10. For Type 2 only, reinstall the water bowl (5) to the fuel filter (1). Torque the bowl to $8.2 \pm 0.3 \text{ N}\cdot\text{m}$ ($6.0 \pm 0.2 \text{ lb ft}$).
11. Reconnect the water-in-fuel sensor plug (4).
12. Prime the fuel system to fill the fuel filter with fuel. Refer to Operation and Maintenance Manual, "Fuel System Priming Pump - Operate".
13. Close the engine access door.
14. Dispose of the water and sediment according to local regulations.

i06137435

Fuel System Priming Pump - Operate

SMCS Code: 1258-548

Most machines are equipped with a fuel transfer pump that is electric. See the following story if your machine is instead equipped with a manual-style transfer pump.

Two examples that may cause the fuel system to lose prime are listed here:

- The machine runs out of fuel.
- The Fuel System Filter/Water Separator Element is replaced.

Follow the steps below in order to prime the fuel system.

Electric Fuel Transfer

1. Ensure that the engine start switch is in the OFF position. Turn the engine start switch to the ON position.

Note: Do not start the engine. This operation only starts the fuel pump. The pump will run approximately 30 seconds.

2. The Primary Fuel Filter is located in the left side of the engine compartment.
3. Examine the clear bowl. The bowl must contain only fuel. If the bowl is not full of fuel, repeat Steps 1 and 2.
4. Attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate the engine at low idle until the engine runs smoothly.

Note: If the engine fails to start or if the engine continues to misfire or smoke, stop the engine and repeat the procedure. If the problem persists after repeating the procedure, consult your Cat dealer.

Note: Do not open any high-pressure lines in order to purge air from the fuel system.

Manual Fuel Transfer

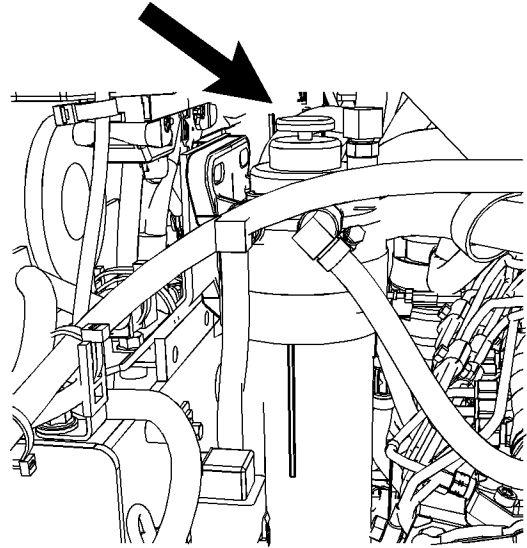


Illustration 336

g03822107

1. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Push down on the top of the fuel priming pump plunger and release the fuel priming pump plunger in order to operate the fuel priming pump. Operate the fuel priming pump plunger in order to fill the new filter element with fuel. Continue to pump until increased resistance is felt. This resistance will indicate that the filter element is full of fuel.
3. Attempt to start the engine. If the engine starts and the engine runs rough or the engine misfires, operate the engine at low idle until the engine runs smoothly. If the engine fails to start or if the engine continues to misfire or smoke repeat the priming procedure.
4. Close the engine access door.

i01819309

Fuel Tank Cap - Clean

SMCS Code: 1273-070-Z2

1. Remove the fuel cap.

Maintenance Section
Fuel Tank Water and Sediment - Drain

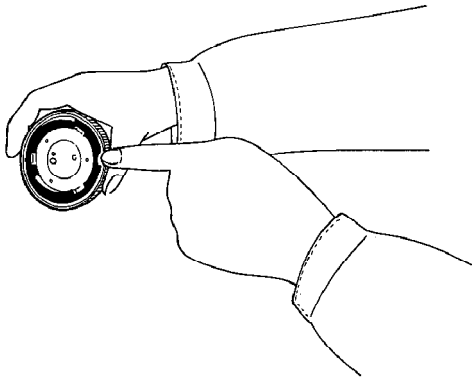


Illustration 337

g00104238

2. Inspect the cap. Replace the cap if the cap is damaged.
3. Wash the fuel cap in a clean, nonflammable solvent and dry the fuel cap.
4. Put a light coating of fuel on the cap gasket.
5. Install the fuel cap.

i07569799

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

Note: Drain the water and the sediment from the fuel tank when the tank is almost empty.

1. Slowly remove the fuel tank cap to allow the tank to vent while you drain the tank.

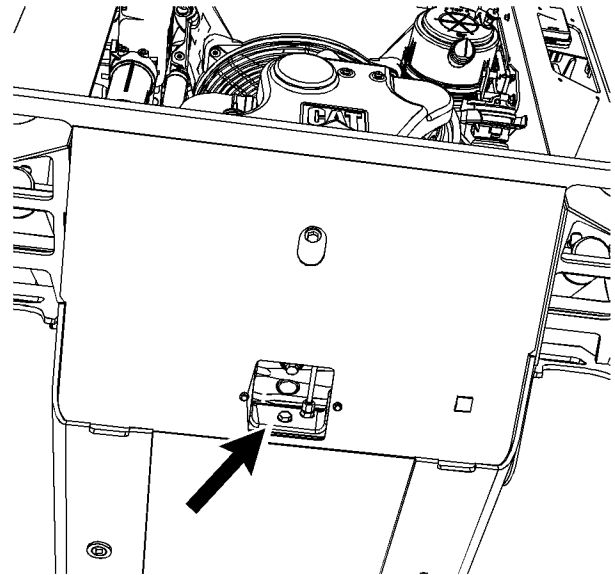


Illustration 338

g02625965

Type 1

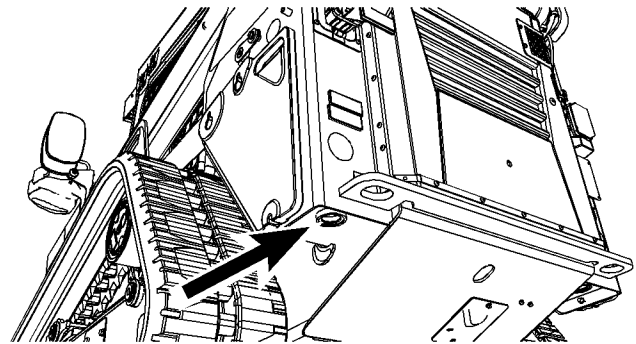


Illustration 339

g03819492

Type 2

2. If the machine is equipped with a plastic fuel tank inside the engine compartment (Type 1), remove the access plate on the bottom of the engine compartment.
3. Remove the fuel tank drain plug. Allow the water and the sediment to drain into a suitable container.
4. Install the fuel tank drain plug.

Note: For Type 1, torque the drain plug to 11 ± 1 N·m (8 ± 1 lb ft).

Note: For Type 2, torque the drain plug to 420 ± 63 N·m (310 ± 46 lb ft).

5. Install the fuel tank cap.
6. Dispose of the water and sediment according to local regulations.

i07332589

Fuses - Replace

SMCS Code: 1417-510; 1417; 7528

Fuses Inside the Cab

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

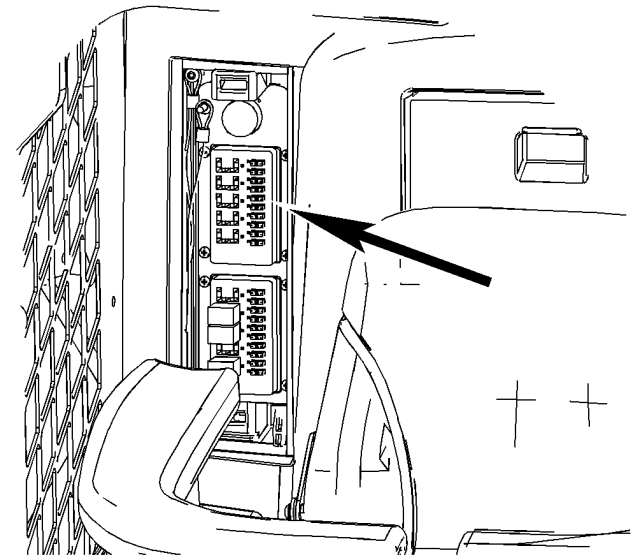


Illustration 341

g01210555

Remove the cover to access the fuse panel.

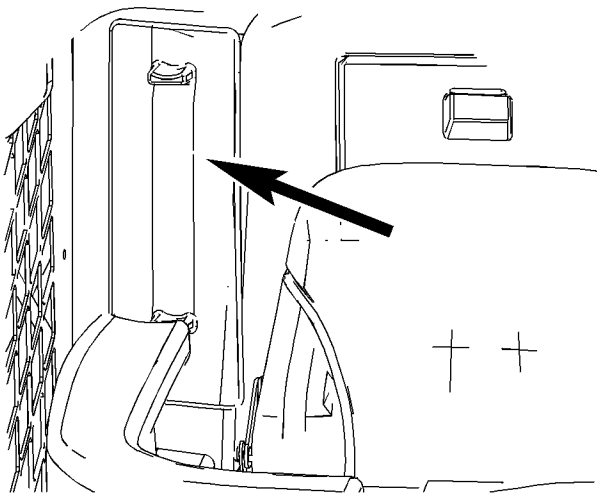


Illustration 340

g01287527

The fuse panel is located behind the seat on the right side.

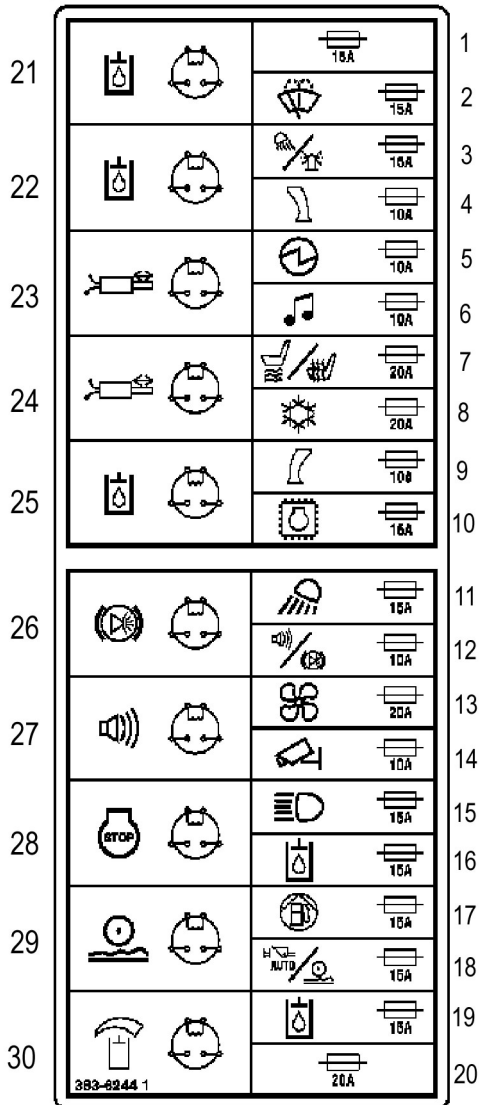






















Illustration 342

g03363275


The following is a list of the fuses in the panel:

-  **Spare (1) – 15 Amp**
-  **Wiper/Washer (2) – 15 Amp**
-  **Rear Work Lights/Beacon (3) – 15 Amp**
-  **Left Joystick (4) – 10 Amp**

-  **12V Power Socket (5) – 10 Amp**
-  **Radio (6) – 10 Amp**
-  **Air Ride/Heated Seat (7) – 20 Amp**
-  **Air Conditioner (8) – 20 Amp**
- Note: 226D, 232D, 239D & 249D use a 15 Amp Condenser Fan breaker instead. D2-Series models have a 10A Spare instead.**
-  **Right Joystick (9) – 10 Amp**
-  **Engine ECM Key Switch Input/LRC Throttle Actuator (10) – 15 Amp**
- Note: Secondary Engine Shut-Off. Refer to Stopping the Engine if an Electrical Malfunction Occurs.**
-  **Front Working Lights (11) – 15 Amp**
-  **Backup Alarm/Brake Lights (12) – 10 Amp**
-  **HVAC Blower/Compressor (13) – 20 Amp**
-  **Rear Camera (14) – 10 Amp**
-  **Roading Lights (15) – 15 Amp**
-  **Work Tool Switch - "Aux 8" (16) – 15 Amp**
-  **Fuel Pump Relay Power (17) – 15 Amp**
-  **ILEV/Ride Control (18) – 15 Amp**
-  **Work Tool Relays/High Flow Relay (19) – 15 Amp**

 Spare (20) – 20 Amp


Relays


 21 – Auxiliary electrical control “AUX6 (C1)”


 22 – Auxiliary electrical control “AUX5 (C2)”

 23 – Solenoid for secondary auxiliary electrical control “AUX4 (C+)”

 24 – Solenoid for secondary auxiliary electrical control “AUX3 (C-)”

 25 – Auxiliary electrical control “AUX7 (Trigger)”

 26 – Stop lamp

 27 – Backup alarm

 28 – Fuel Pump Relay

 29 – ILEV/Ride Control

 30 – High Flow/Auxiliary Hydraulic Cooler Enable

Fuses Behind the Cab

If an optional Auxiliary Hydraulic Cooler is installed, a 60A fuse will be located in an in-line fuse holder near the power relay modules.

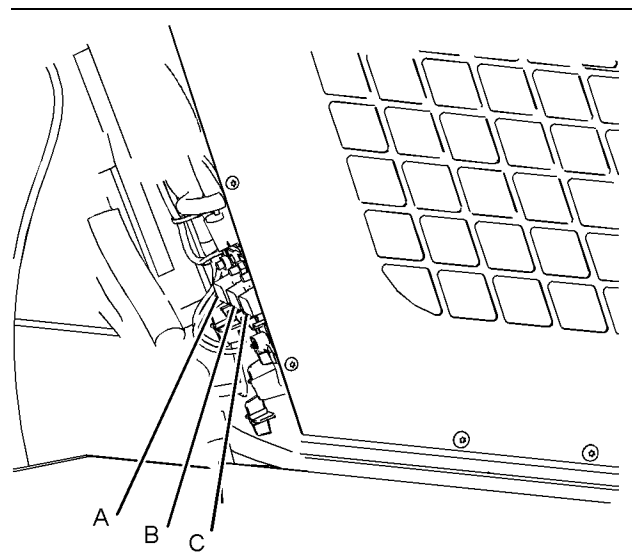


Illustration 343

g03317143

(A) First pair
(B) Second pair
(C) Third pair

This panel may have as many as eight fuses depending on how the machine is equipped. To change these fuses, push up on the locking tab on the fuse cover. Pull the cover away from the back of the cab.

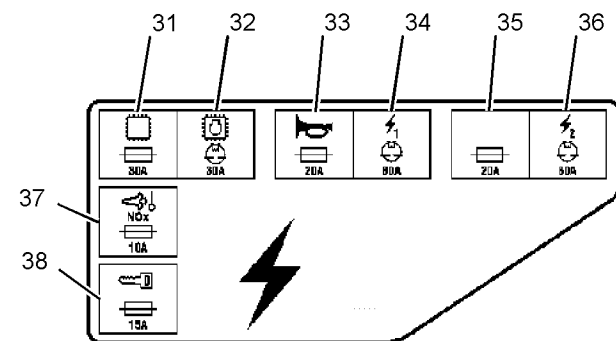



Illustration 344

g03818489

 **Machine ECM (31) – 30 Amp**

 **Engine Control Module Power Relay (32) – 30 Amp**

Note: 236D, 242D, 257D, 259D, 272D, 272D2 XHP, 277D, 279D, 287D, 289D, 297D, 297D XHP, 299D, 299D XHP use a 20 Amp fuse

 **Horn (33) – 20 Amp**



Main power relay 1 (34) – 60 Amp



Miscellaneous cab accessories (35) – 20 Amp



Main power relay 2 (36) – 60 Amp



NOx Sensors (37) – 10A

Note: D2-Series only.



Ignition Switch (38) – 15A

Note: Located above the fuse panel as an in-line fuse.

Fuses Inside Engine Compartment

Main Fuse

The main fuse is a 100 Amp buss bar style fuse. The fuse is mounted to the engine bay wall and is located near the battery. Disconnect the negative battery cable at the battery connection before you replace this fuse.

Quick Coupler Fuse

If equipped with the optional work tool electric quick coupler, a 35A fuse will be located along the right-hand wall of the engine compartment.

i05297485

Headlights - Adjust

SMCS Code: 1429-025

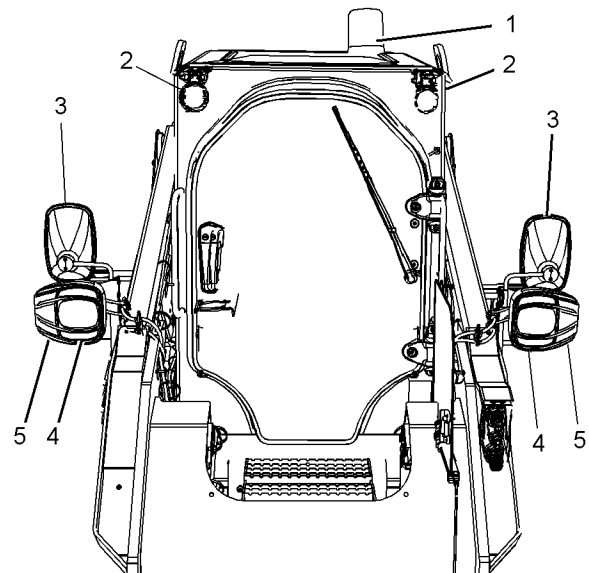


Illustration 345

g03356686

- (1) Rotating Beacon
- (2) Work Lights
- (3) Rear View Mirror
- (4) Headlights
- (5) Turn Signals

Perform the following procedure in order to align the headlights:

1. Verify that the tires are inflated properly.
2. Position the machine in the following manner when you adjust the headlights:
 - a. Park the machine in a dark area.
 - b. Park the machine on level ground.
 - c. Face the machine toward a wall with 10 m (32.8 ft) between the wall and the face of the headlights.
3. Place a second person or 75 kg (165 lb) in the operator seat.
4. Turn on the headlights.
5. Cover one headlight.
6. Loosen the other headlight clamp.

7. Move the headlight so that the headlight is pointing straight ahead. Measure the height from the ground to the center of the headlight.
8. Twist the headlight so that the upper edge of the light that is shown on the wall is two-thirds of the height from the ground to the center of the headlight. Ensure that the line of the light that is shown on the wall is horizontal.
9. Tighten the headlight clamp.
10. Repeat the process for the other headlight.

i07569826

Hoses and Clamps - Inspect/Replace

SMCS Code: 1000; 7554-040; 7554-510

S/N: BL21–Up
S/N: DX21–Up
S/N: EH21–Up
S/N: FD21–Up
S/N: HP21–Up
S/N: MD21–Up
S/N: BY41–Up
S/N: LW51–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: HR61–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: BL91–Up
S/N: DX91–Up
S/N: DTB1–Up
S/N: HFB1–Up
S/N: GTC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: D9E1–Up
S/N: BYF1–Up

S/N: ETL1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: HLM1–Up
S/N: DPR1–Up
S/N: GWR1–Up
S/N: T9S1–Up
S/N: D5T1–Up
S/N: DZT1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: B5W1–Up
S/N: EZW1–Up
S/N: TAW1–Up
S/N: BGZ1–Up

Note: Only applies to engines with aftertreatment.

For each hose use the following procedure:

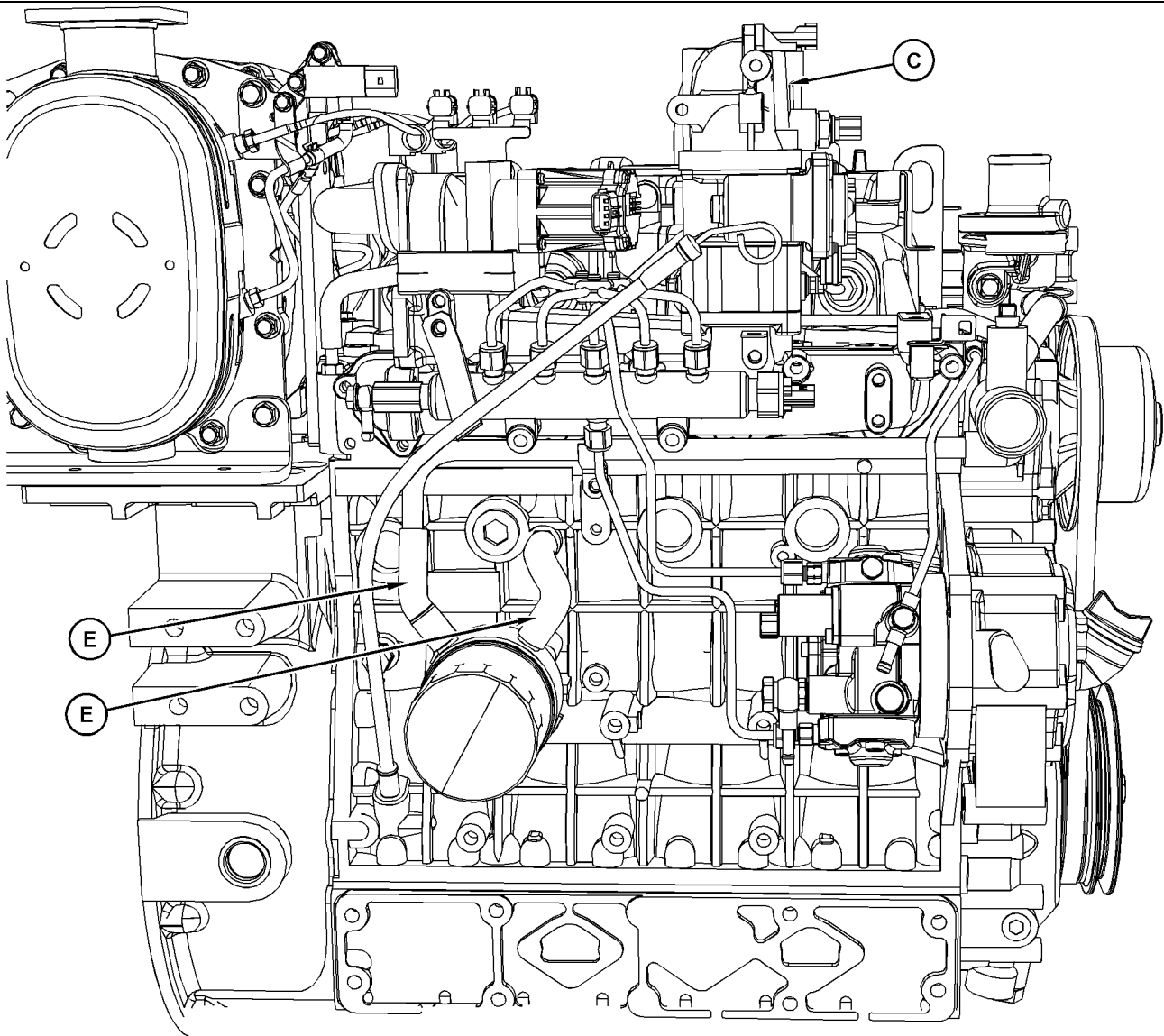
1. Inspect all hoses due to cracking, for softness next to the clamps, and for loose clamps.
2. Tighten any loose clamps.
3. Replace hoses that are cracked or soft. Use new clamps, when replacing hoses.

The following is a summary of all the hoses that require replacement.

Maintenance Section
Hoses and Clamps - Inspect/Replace

Table 115

C3.8 Hose Replacement		
Location	Hose	Quantity
A	Turbo Oil Return	1
B	Closed Crankcase Breather (CCB)	6
C	Boost Pressure	1
D	Air Intake (non-XHP models)	1
E	Oil Cooler	2
F	NOx Reduction System (NRS) Cooler	3
G	NOx Reduction System (NRS) Valve	3
H	Cooler Bypass	1



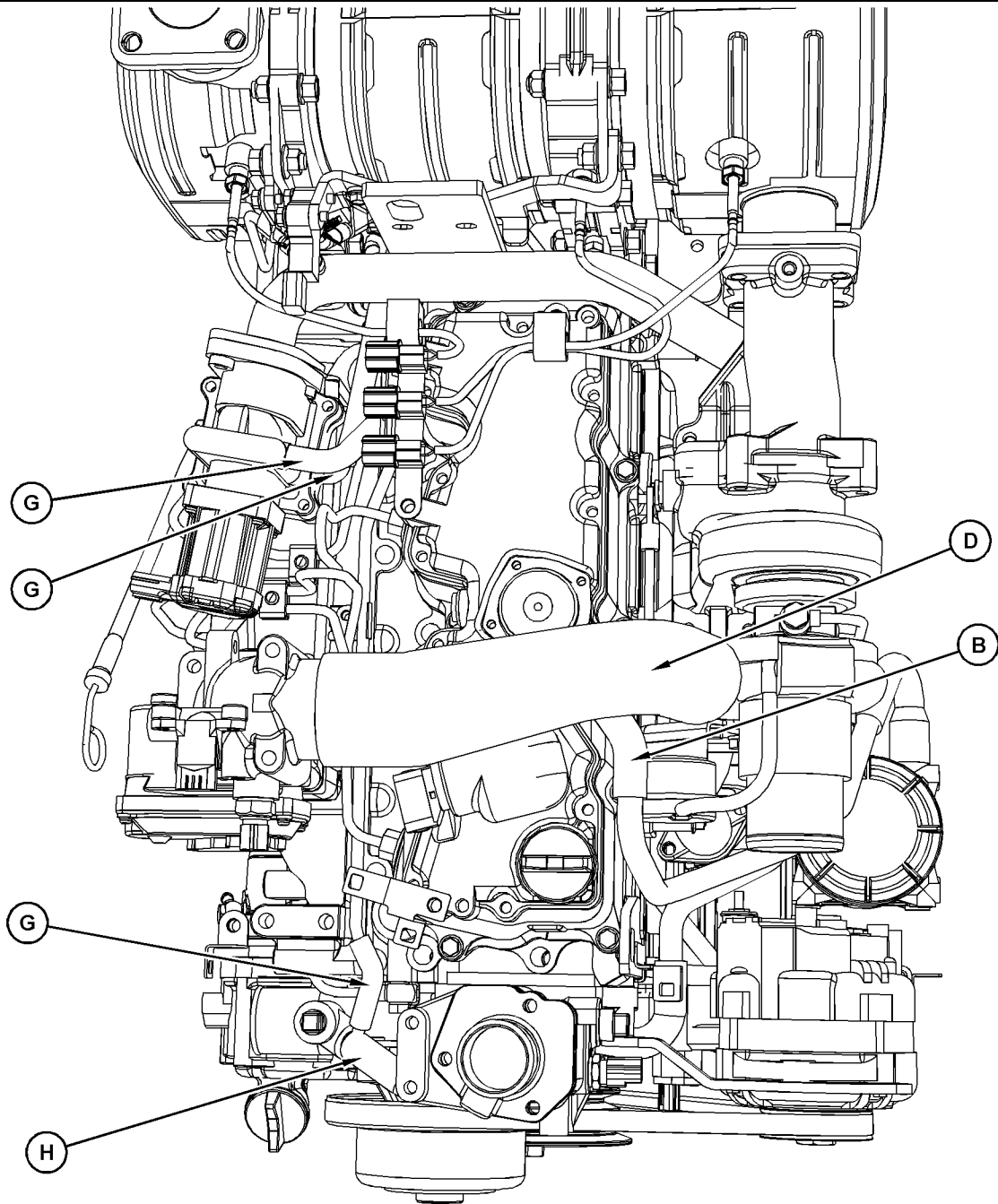


Illustration 347
C3.8 Top View

Maintenance Section
Hoses and Clamps - Inspect/Replace

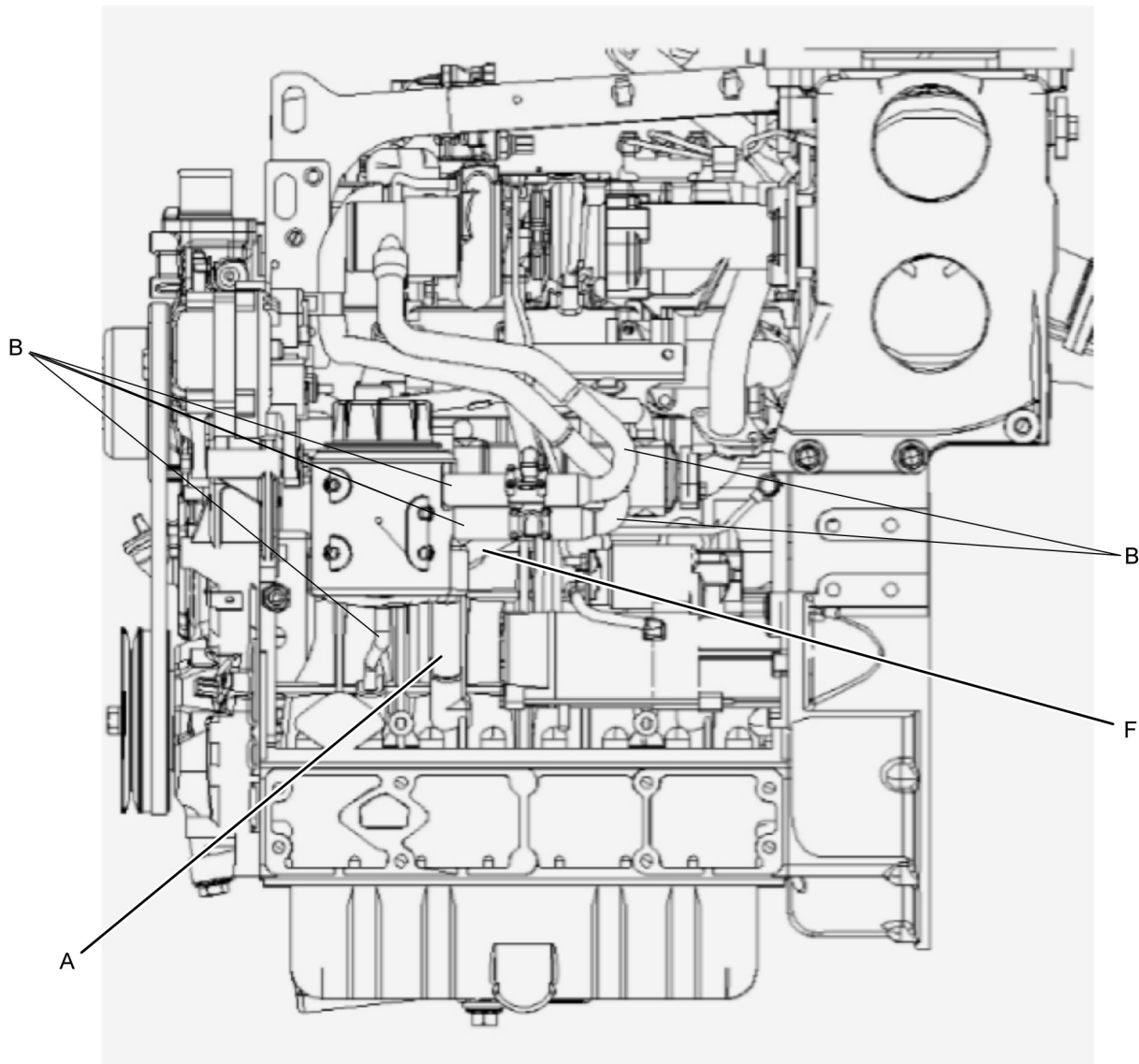


Illustration 348

g03831350

C3.8 Right Side

Table 116

C3.3B Hose Replacement		
Location	Hose	Quantity
A	Turbo Oil Return	1
B	Closed Crankcase Breather (CCB)	5
C	Boost Pressure	1
D	Air Intake	1
E	Oil Cooler	2
G	NOx Reduction System (NRS) Valve	3
F	NOx Reduction System (NRS) Cooler	1

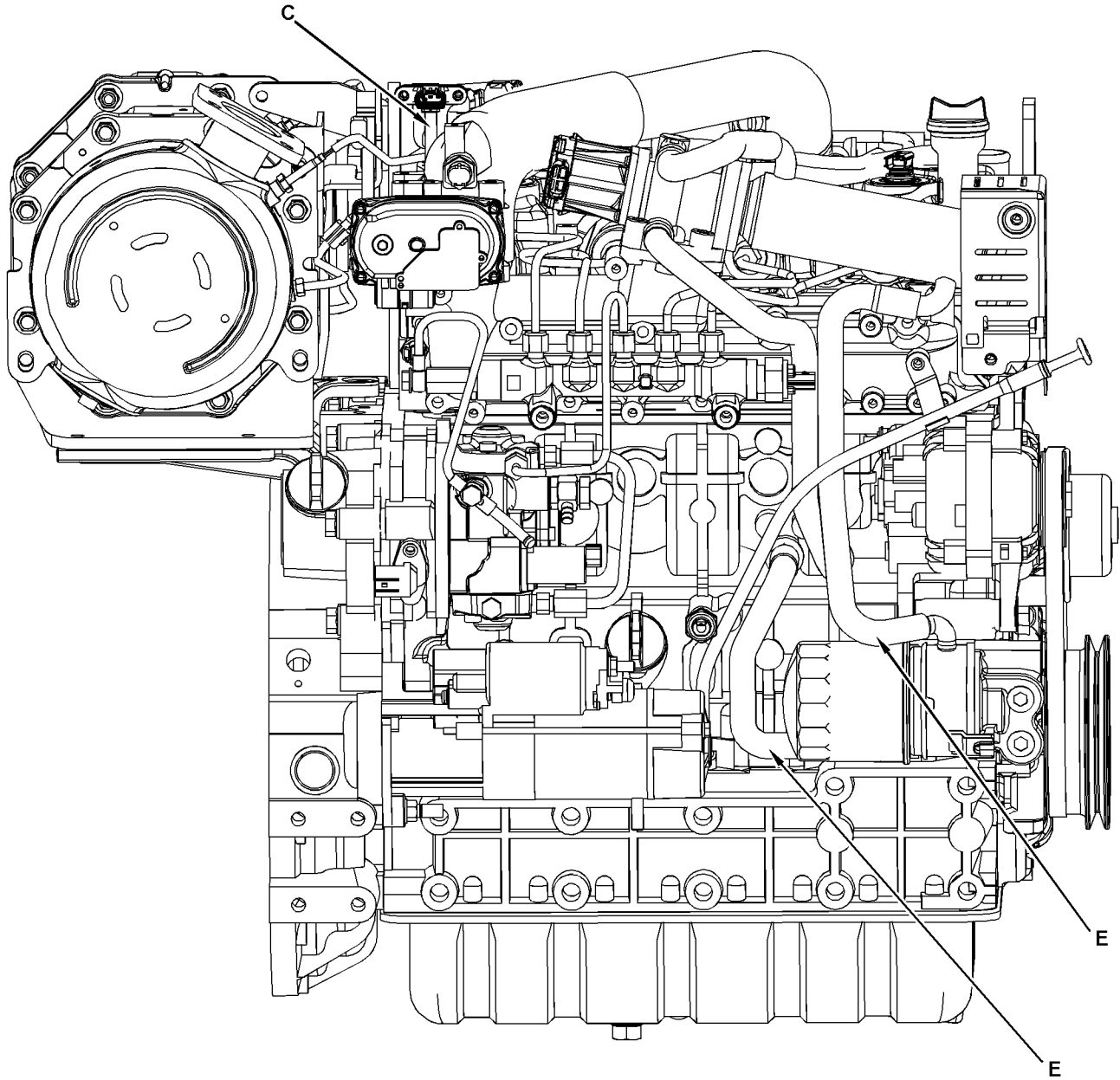


Illustration 349
C3.3B Left Side

Maintenance Section
Hoses and Clamps - Inspect/Replace

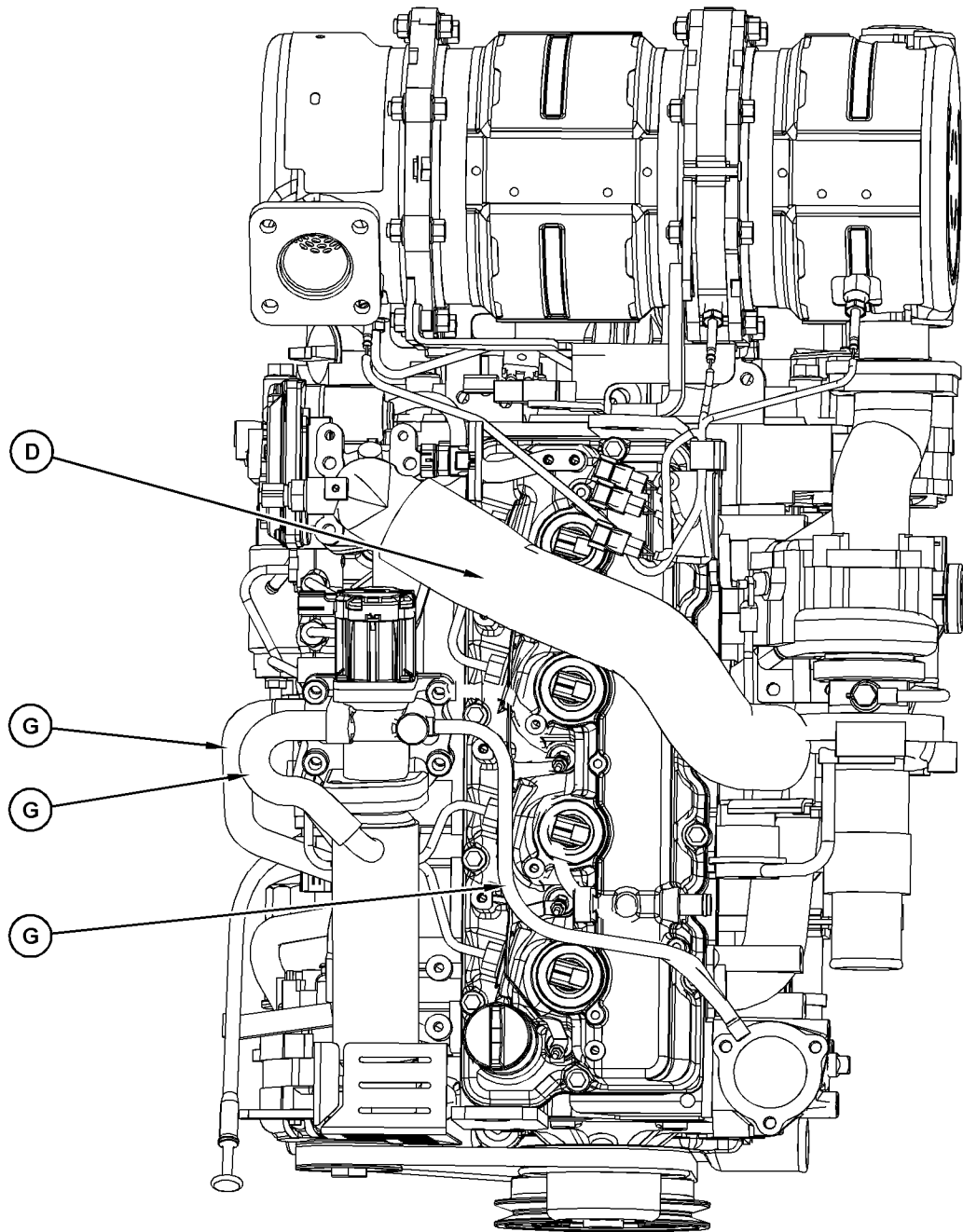


Illustration 350
C3.3B Top View

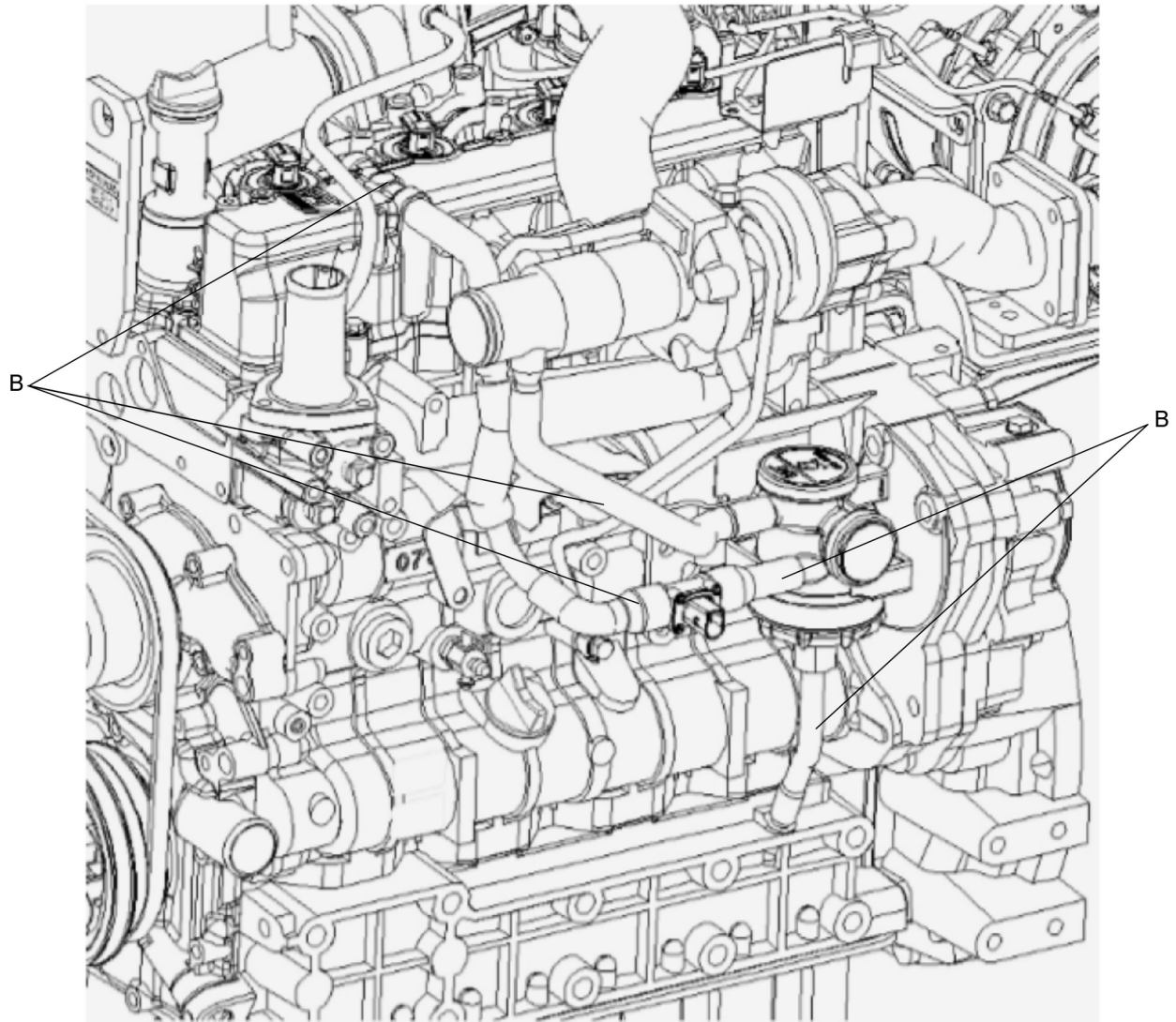


Illustration 351
C3.3B Right Side

g03831386

Table 117

C2.2 Hose Replacement		
Location	Hose	Quantity
A	Turbo Oil Return	1
B	Closed Crankcase Breather (CCB)	3
E	Oil Cooler	2
F	NOx Reduction System (NRS) Cooler	2
H	Cooler Bypass	1

Maintenance Section
Hoses and Clamps - Inspect/Replace

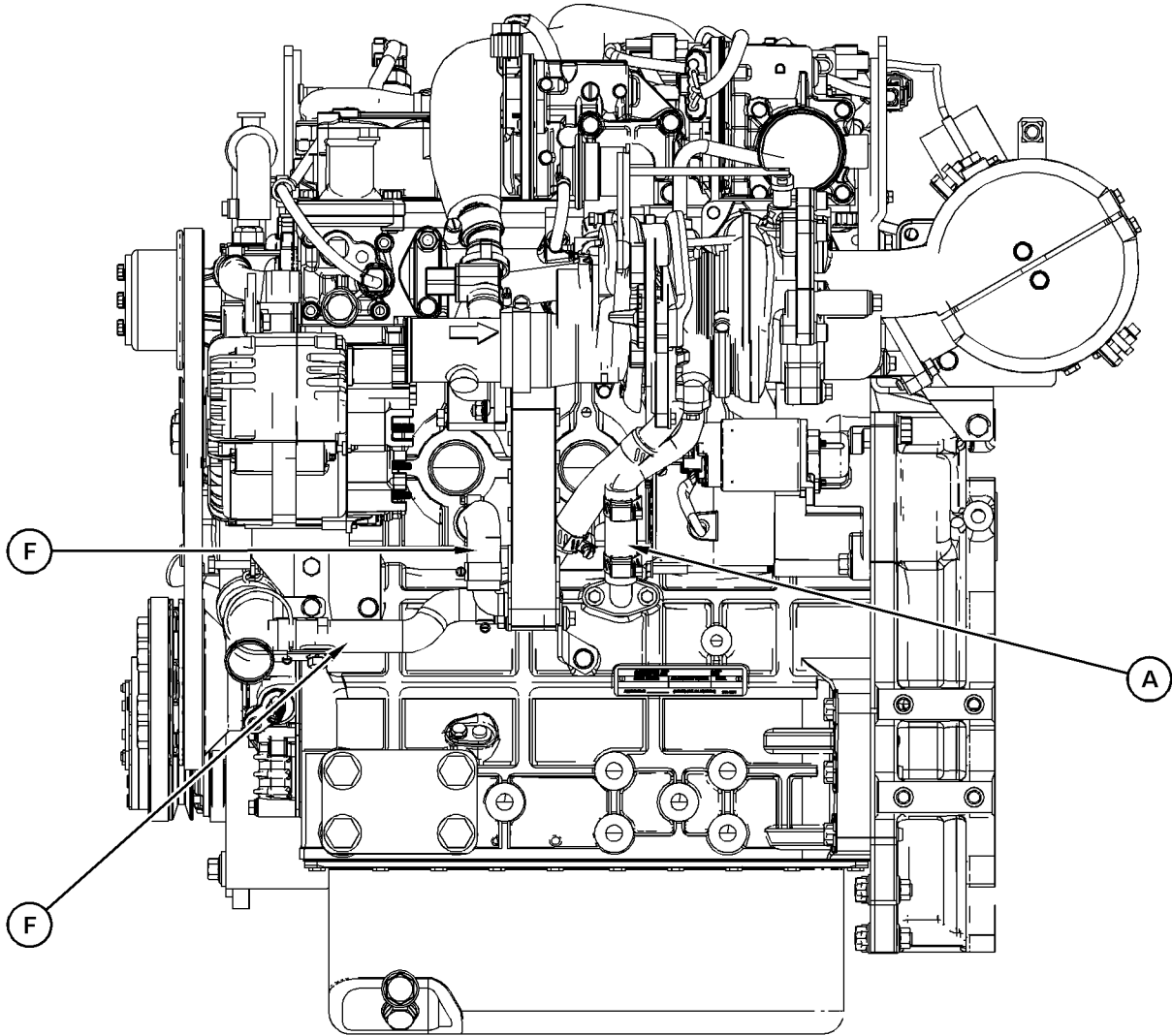


Illustration 352
C2.2 Right Side

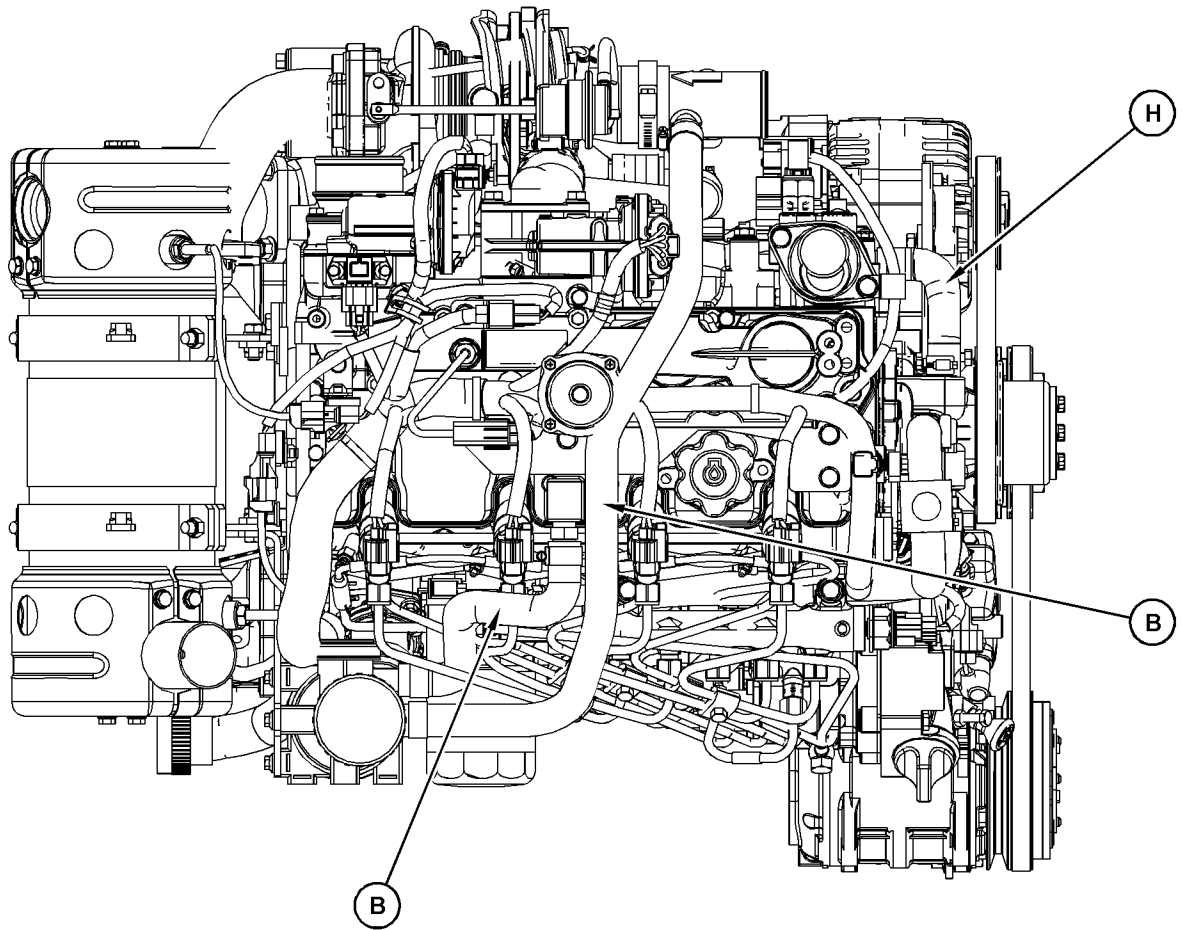


Illustration 353
C2.2 Top View

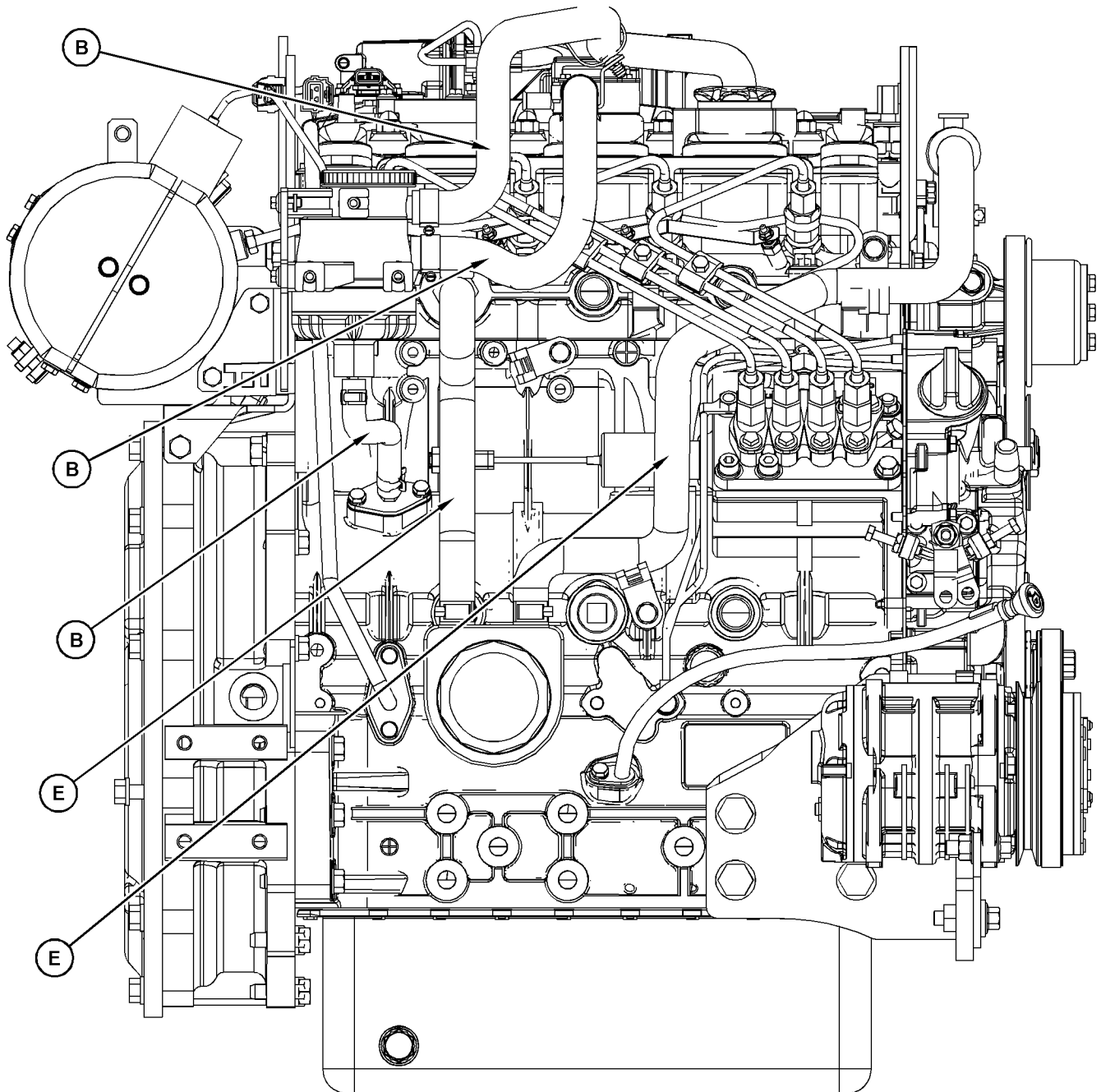


Illustration 354
C2.2 Left Side

g03826951

i06849868

Hydraulic System Oil - Change

SMCS Code: 5095-044

S/N: BL21-Up

S/N: DX21-Up

S/N: FD21-Up

S/N: HP21-Up

S/N: MD21-Up

S/N: BY41-Up

S/N: LW51-Up

S/N: PN51-Up

S/N: RE51-Up

S/N: TP51–Up
S/N: WE51–Up
S/N: AJ71–Up
S/N: BE71–Up
S/N: BL71–Up
S/N: HP71–Up
S/N: DX91–Up
S/N: KB91–Up
S/N: DTB1–Up
S/N: HFB1–Up
S/N: GTC1–Up
S/N: K2D1–Up
S/N: BYF1–Up
S/N: FTK1–Up
S/N: GTK1–Up
S/N: STK1–Up
S/N: TLK1–Up
S/N: DML1–Up
S/N: EML1–Up
S/N: ETL1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: JSL1–Up
S/N: NTL1–Up
S/N: HLM1–Up
S/N: SEN1–Up
S/N: FMR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: D5T1–Up
S/N: DZT1–Up
S/N: FMT1–Up
S/N: HMT1–Up
S/N: JST1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: MLT1–Up

S/N: PPT1–Up
S/N: WCT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: EZW1–Up
S/N: MPW1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up
S/N: BGZ1–Up

Selection of the Oil Change Interval

Your machine may be able to use an extended interval for the hydraulic oil. The standard change interval is listed in the Operation and Maintenance Manual, "Maintenance Interval Schedule". The oil should be monitored during intervals of 500 hours. The extended interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Cat machine hydraulic and hydrostatic transmission systems when ambient temperature is between –20 °C (–4 °F) and 40 °C (104 °F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Non HYDO Advanced 10

When using other oils, the hydraulic oil change interval is limited to every 2000 Service Hours. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 Service Hours. S·O·S oil analysis must be performed every 500 Service Hours 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. Refer to "Operations and Maintenance Manual" S·O·S Information.

Note: If HYDO Advanced 10 is used but contaminated by 10% or more with other oils, follow the maintenance interval requirements for Non HYDO Advanced 10.

Procedure for Changing the Hydraulic Oil

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

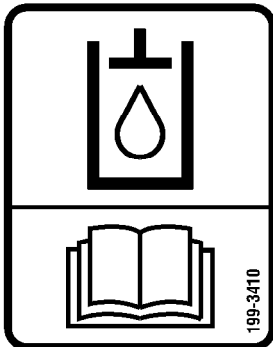


Illustration 355

g00956818

Note: This film is located near the hydraulic filler cap on machines that are filled with arctic oil.

Operate the machine for a few minutes in order to warm the hydraulic system oil.

⚠ WARNING

Personal injury or death can result without releasing all of the hydraulic pressure.

Release all the pressure from the hydraulic system before any lines are disconnected.

The machine should be on level ground. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine. Keep the armrests lowered. Turn the engine start switch key to the ON position. Push the parking brake switch. Move all of the hydraulic controls in order to relieve hydraulic pressure. Move the engine start switch key to the OFF position.

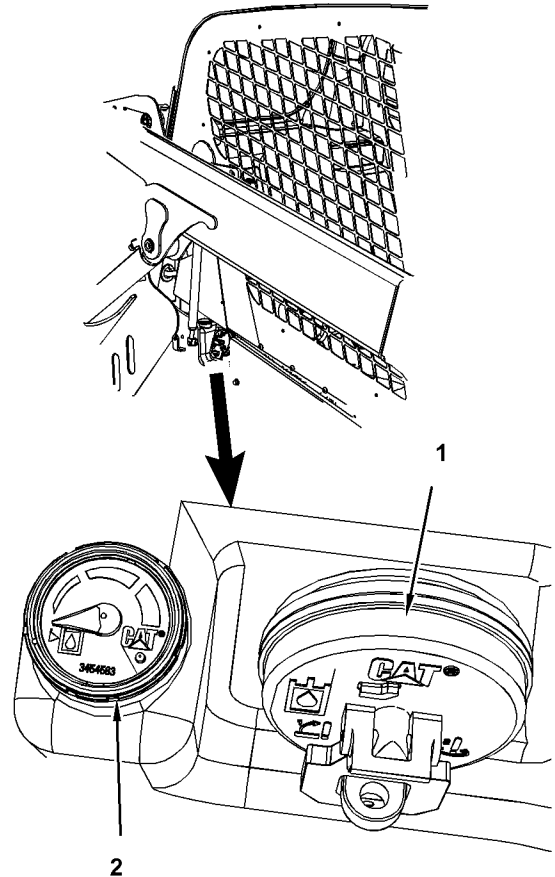


Illustration 356

g02626102

- (1) Hydraulic oil tank cap
- (2) Sight Gauge

Note: Most machines are equipped with a molded hydraulic tank represented here. See the following story if your machine is instead equipped steel tanks as part of the structural frame (226D, 232D, 239D and 249D).

1. Remove the hydraulic oil tank cap (1).

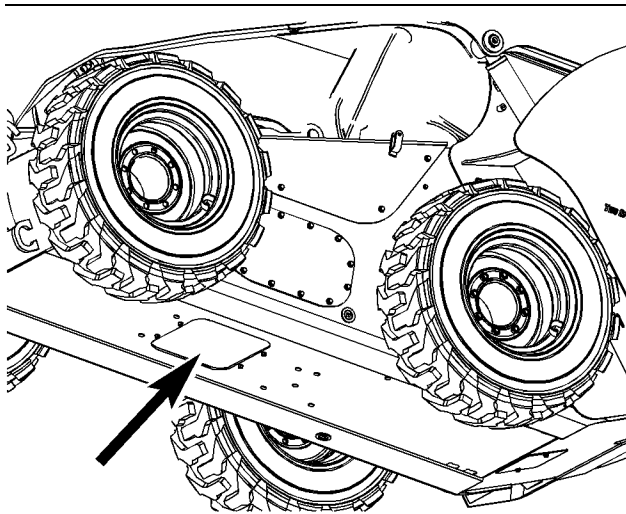


Illustration 357

g01333250

Access panel

2. Remove the access panel in the belly guard underneath the machine. Refer to "Lower Machine Frame - Clean".
3. The hose is located on the right side. Pull the drain hose through the access hole in the belly guard. Remove the plug from the end of the drain hose. Drain the oil into a suitable container.
4. Install the drain plug into the drain hose. Tighten to $22 \pm 3 \text{ N}\cdot\text{m}$ ($16 \pm 2 \text{ lb}\cdot\text{ft}$). Pull the drain hose back into the machine.
5. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Change".
6. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)" for the type of oil and the proper amount of oil.
7. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check". Maintain the hydraulic oil level approximately in the middle of the gauge (2).

Check the oil level with the loader arms in the fully lowered 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.

8. Install the hydraulic tank filler cap.

i07416253

Hydraulic System Oil - Change

SMCS Code: 5095-044

S/N: EH21–Up

S/N: CD41–Up

S/N: HR61–Up

S/N: AH91–Up

S/N: BL91–Up

S/N: KXC1–Up

S/N: HRD1–Up

S/N: D9E1–Up

S/N: HLM1–Up

S/N: DPR1–Up

S/N: GWR1–Up

S/N: T9S1–Up

Selection of the Oil Change Interval

Your machine may be able to use an extended interval for the hydraulic oil. The standard change interval is listed in the Operation and Maintenance Manual, "Maintenance Interval Schedule". The oil should be monitored during intervals of 500 hours. The extended interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Cat machine hydraulic and hydrostatic transmission systems when ambient temperature is between $-20 \text{ }^\circ\text{C}$ ($-4 \text{ }^\circ\text{F}$) and $40 \text{ }^\circ\text{C}$ ($104 \text{ }^\circ\text{F}$). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000-hour oil drain intervals are possible when using S·O·S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Non HYDO Advanced 10

When using other oils, the hydraulic oil change interval is limited to every 2000 Service Hours. By performing S·O·S oil analysis, the hydraulic oil change interval may be extended to 4000 Service Hours. S·O·S oil analysis must be performed every 500 Service Hours 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. Refer to "Operations and Maintenance Manual" S·O·S Information.

Note: If HYDO Advanced 10 is used but contaminated by 10% or more with other oils, follow the maintenance interval requirements for Non HYDO Advanced 10.

Procedure for Changing the Hydraulic Oil

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

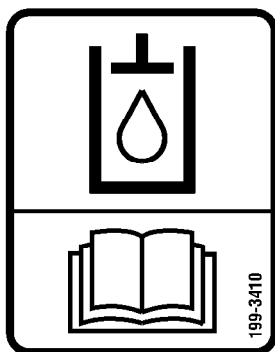


Illustration 358

g00956818

Note: This film is located near the hydraulic filler cap on machines that are filled with arctic oil.

Operate the machine for a few minutes to warm the hydraulic system oil.

WARNING

Personal injury or death can result without releasing all of the hydraulic pressure.

Release all the pressure from the hydraulic system before any lines are disconnected.

The machine should be on level ground. Lower the bucket to the ground and apply slight downward pressure. Engage the parking brake and stop the engine. Keep the armrests lowered. Turn the engine start switch key to the ON position. Push the parking brake switch. Move all the hydraulic controls to relieve hydraulic pressure. Move the engine start switch key to the OFF position.

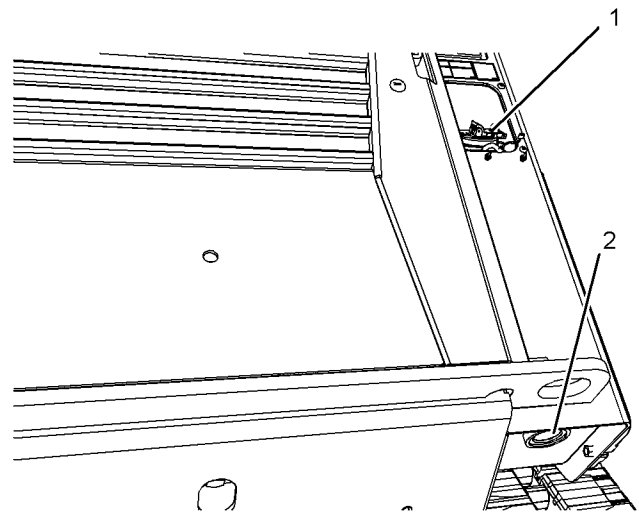


Illustration 359

g03818604

- (1) Hydraulic Fill Cap
- (2) Hydraulic Tank Drain Plug

1. Remove the hydraulic oil tank cap (1).
2. Remove the hydraulic oil tank drain plug (2).
3. Drain the oil into a suitable container.
4. Install the drain plug into the tank. Tighten to $420 \pm 63 \text{ N}\cdot\text{m}$ ($310 \pm 46 \text{ lb ft}$)
5. Change the hydraulic system filter. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Change".
6. Fill the hydraulic system oil tank. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" and Operation and Maintenance Manual, "Capacities (Refill)" for the type of oil and the proper amount of oil.

7. Refer to Operation and Maintenance Manual, "Hydraulic System Oil Level - Check". Maintain the hydraulic oil level approximately in the middle of the gauge (2).

Check the oil level with the loader arms in the fully lowered 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.

8. Install the hydraulic tank filler cap.

i06677184

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, PERJ1017, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat® products.

Dispose of all fluids according to local regulations and mandates.

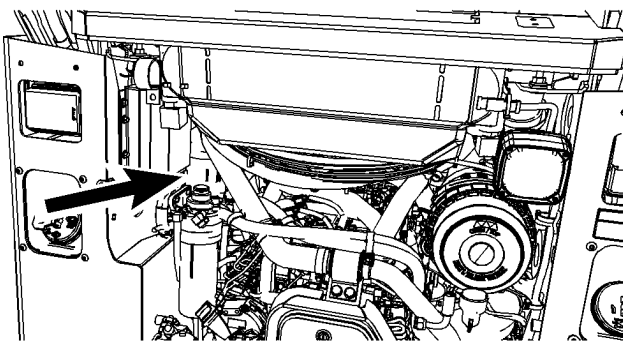


Illustration 360

g03819062

Location of Hydraulic Oil Filter

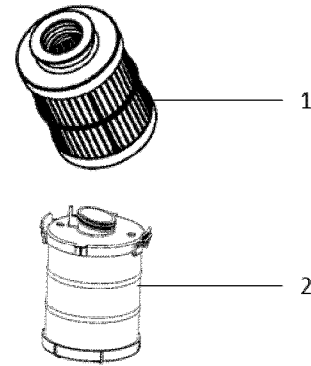


Illustration 361

g03819066

- (1) Type 1 Filter
(2) Type 2 Filter

1. Open the engine access door. Refer to "Access Doors and Covers".
2. Remove the Hydraulic tank filler cap. Refer to "Hydraulic System Oil Level - Check".
3. Remove drain plug from bottom of filter housing (canister) to drain oil from the housing. Drain into a suitable container.

Note: Use sockets or box end wrenches when servicing the hydraulic oil filter. Do not use an air wrench, open-end wrenches, or an adjustable wrench.

4. Unscrew canister from filter mounting base. Filter element will come out with housing. Discard the filter element.

Note: For Type 2 Filter (2) squeeze the two tabs on filter element to unlatch it from the canister.

5. Inspect the O-ring or O-rings on the canister or mounting base for damage and replace them if needed.
6. Clean the inside of the filter mounting base and clean the inside of the canister.
7. Apply a thin coat of oil to the O-ring on the new filter element and the O-ring or O-rings on the canister or mounting base.

8. Insert the new filter element in the canister.

Note: For Type 2 Filter (2), ensure that the two tabs are latched onto the side of the canister.

9. Install the canister onto the mounting base. Element will center on its own as the canister is turned in. Torque to $40 \pm 5 \text{ N}\cdot\text{m}$ ($30 \pm 4 \text{ lb}\cdot\text{ft}$)

Maintenance Section
Hydraulic System Oil Level - Check

10. Install the drain plug. Torque to $30 \pm 5 \text{ N}\cdot\text{m}$ ($22 \pm 4 \text{ lb ft}$)
11. Maintain the hydraulic oil level to the proper level. Refer to "Hydraulic System Oil Level - Check". **Do not overfill the hydraulic tank.**
12. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the hydraulic tank filler cap, if necessary. Install the hydraulic tank filler cap.
13. Close the engine access door.

i06128383

Hydraulic System Oil Level - Check

SMCS Code: 5095-535-FLV

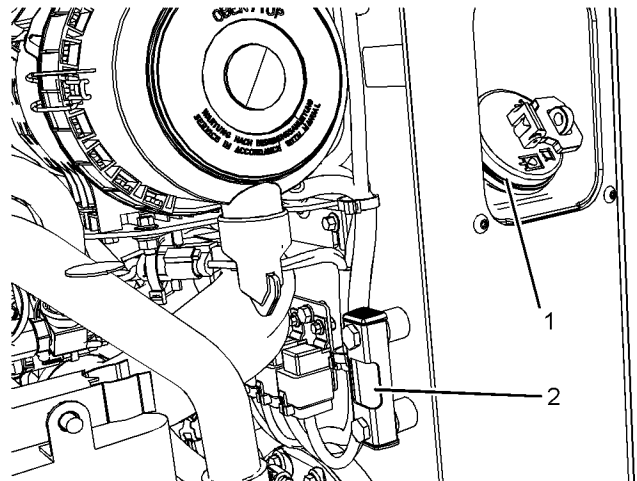


Illustration 363

g03818578

Type 2 Hydraulic Oil Level Gauge and Fill

- (1) Hydraulic Oil Fill
(2) Hydraulic Oil Sight Gauge

1. Park the machine on level ground.
2. Lower the work tool to the ground. Turn off the engine.
3. Wait for about 5 minutes before checking the level of the hydraulic oil.
4. Use the hydraulic oil filler (1) in order to top off the hydraulic oil.
5. Maintain the oil level to the green area of the gauge (Type 1) or midway between the upper and lower gauge lines (Type 2). If hydraulic work tools are used often, you may fill closer to the upper gauge limit to account for potential work tool leakage, but do not overfill the hydraulic tank. **Do not overfill the hydraulic tank.**

i06755609

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 7542-008

Open the rear access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers" for information about the rear door.

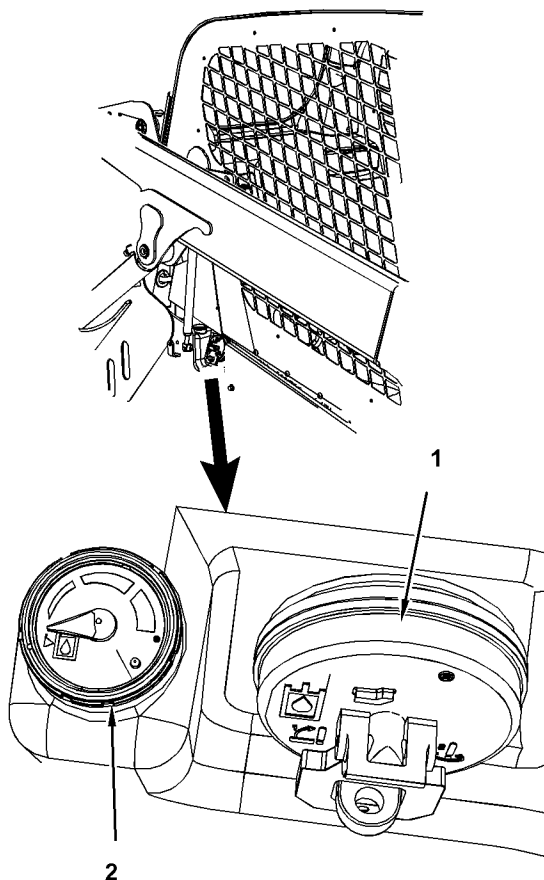


Illustration 362

g03818555

Type 1 Hydraulic Oil Level Gauge and Fill

- (1) Hydraulic Oil Fill
(2) Hydraulic Oil Level Needle Gauge

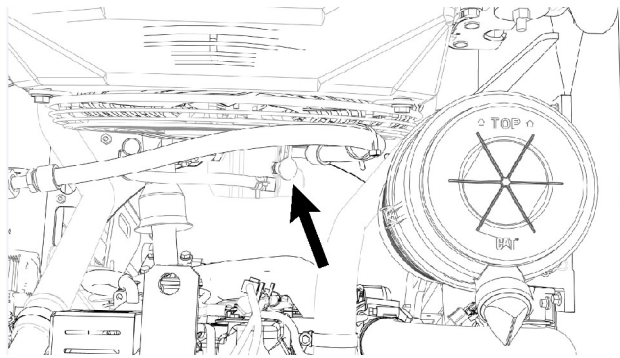


Illustration 364

g06107727

The location of the sampling port for the hydraulic oil is on the cooling fan.

i06127563

Hydraulic Tank Breather - Replace

SMCS Code: 5050-510-BRE; 5056-510-BRE

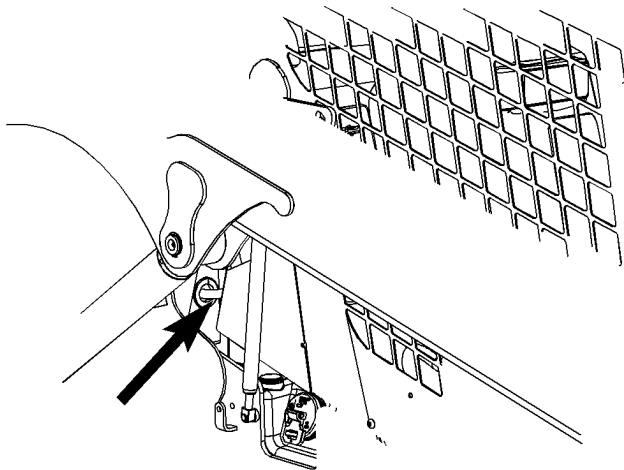


Illustration 365

g02626172

The breather for the hydraulic tank is located remotely behind the cab on the right side.

1. Tilt the cab upward. Refer to the Operation and Maintenance Manual, "Cab Tilting" for more information.
2. Remove the breather.
3. Install the new breather and tighten to 11 ± 1 N·m (8.1 ± 0.7 lb ft).

4. Tilt the cab downward.

i05864372

Lift Arm and Cylinder Linkage - Lubricate

SMCS Code: 5102-086-BD; 6107-086-BD

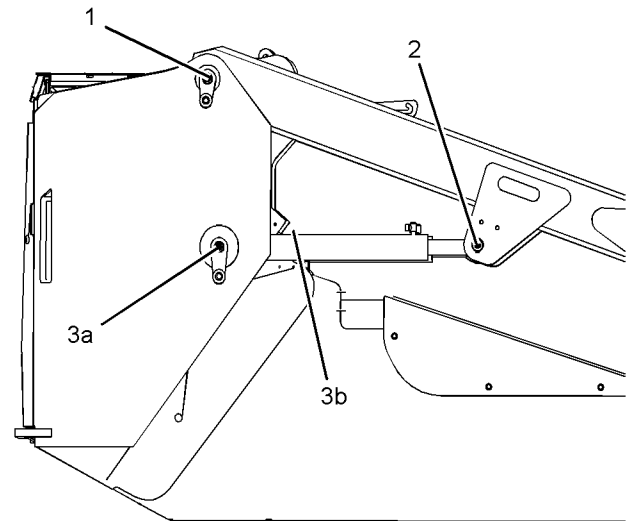


Illustration 366

g03701514

Radial Lift

- (1) Lift Arm Pivot
- (2) Lift Cylinder Rod End
- (3a) Head End Fitting
- (3b) Alternate Location Remote Head End Fitting

Maintenance Section
Lower Machine Frame - Clean

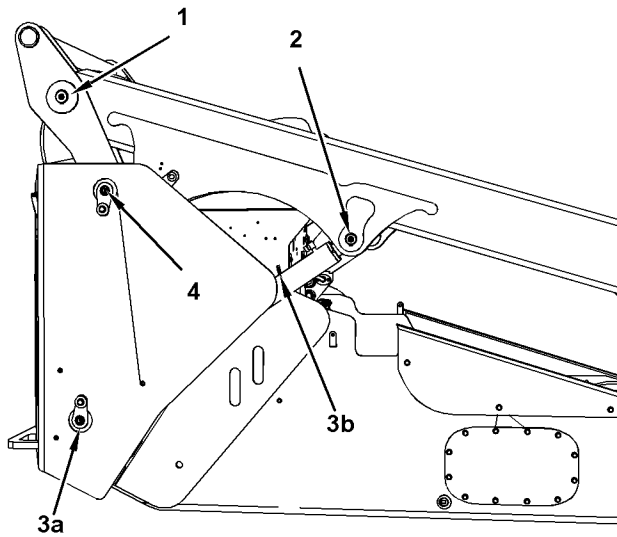


Illustration 367

g03701468

Vertical Lift

- (1) Lift Arm Pivot
- (2) Lift Cylinder Rod End
- (3a) Head End Fitting
- (3b) Alternate Location Remote Head End Fitting
- (4) Link Arm

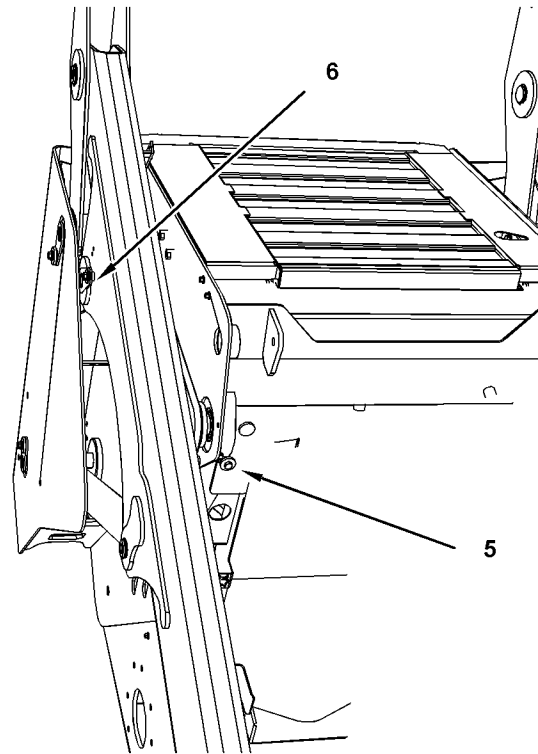


Illustration 368

g02626192

The Link Arm is located behind the loader arm.

- (5) Mounting for Link Pin
- (6) Rear of Link Arm

Apply lubricant to all the grease fittings on both sides.

Repeat the process for the opposite side of the machine.

i06836610

Lower Machine Frame - Clean

SMCS Code: 7050-070

1. Tilt the cab upward. Refer to Operation and Maintenance Manual, "Cab Tilting".

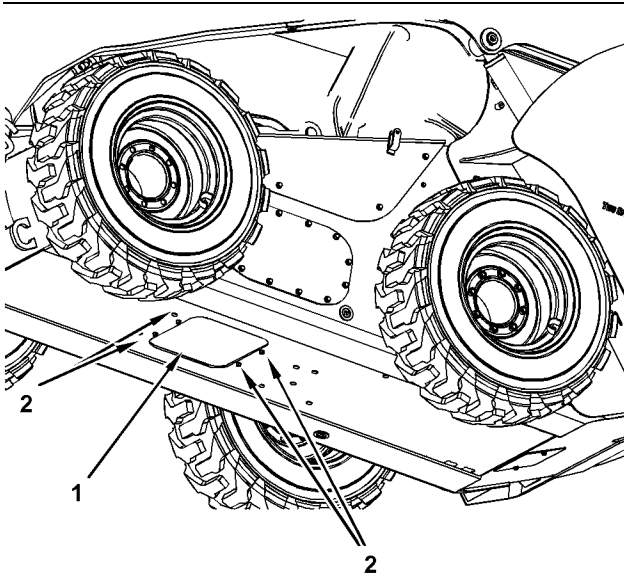


Illustration 369

g01271190

2. The access panel (1) is located in the frame underneath the machine.
3. Remove the four retaining bolts (2).
4. Slide the panel forward or slide the panel rearward. Some models allow the panel to drop down from the machine. Use caution while lowering the panel, as accumulated debris may make the panel substantially heavier.
5. Remove any debris or dirt from inside the frame.
6. Reinstall the access panel.
7. Tilt the cab downward.

Note: Some models may have secondary clean out plates (3) for localized debris removal.

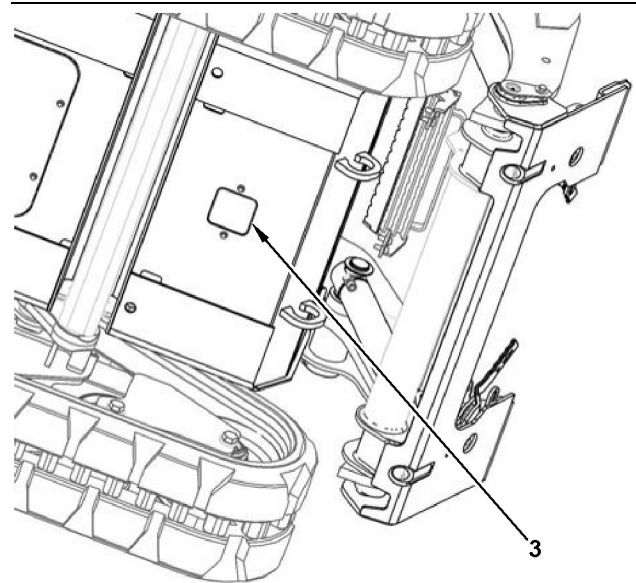


Illustration 370

g06136341

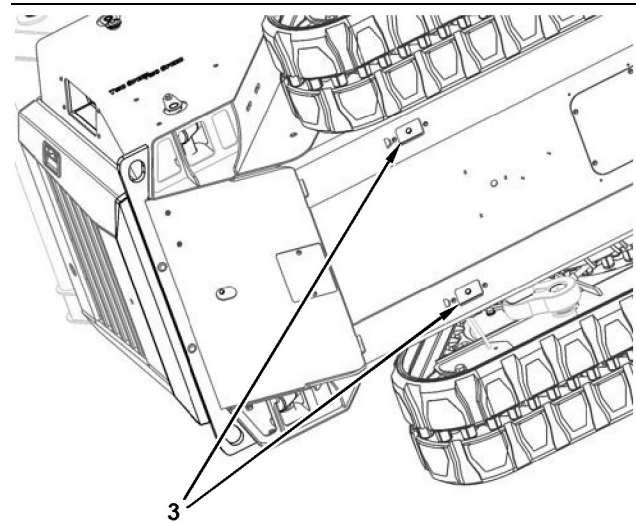


Illustration 371

g06136346

i04436199

Quick Coupler - Clean/Inspect

SMCS Code: 6129-040; 6129-070

WARNING

Personal injury or death can result from improperly checking for a leak.

Always use a board or cardboard when checking for a leak. Escaping air or fluid under pressure, even a pin-hole size leak, can penetrate body tissue causing serious injury, and possible death.

If fluid is injected into your skin, it must be treated immediately by a doctor familiar with this type of injury.

Note: Do not weld on the quick coupler without consulting your Cat dealer.

1. Clean the quick coupler prior to inspection in order to inspect the quick coupler properly.

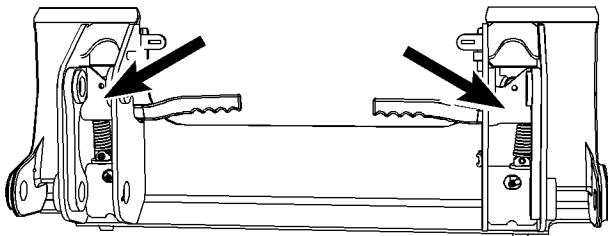


Illustration 372

g02626324

Back side of the manual quick coupler. The lift arm and the tilt cylinder are removed for clarity.

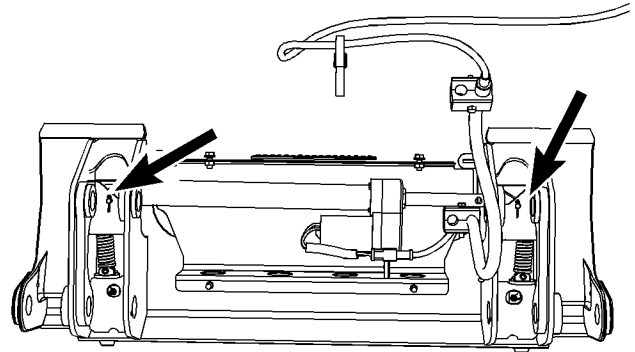


Illustration 373

g02626326

Back side of the electric quick coupler. The lift arm and the tilt cylinder are removed for clarity.

2. Tilt the quick coupler all the way forward in order to clean the debris away from the pins.
3. Move the quick coupler levers. Ensure that the levers are not bent or broken.
4. Make sure that the coupler pins extend through the bottom of the quick coupler assembly. Check the pins for wear and check the pins for damage.
5. Check the top edges of the quick coupler assembly for wear or for damage. Check the face of the quick coupler assembly for wear or for damage.
6. Inspect the components inside the quick coupler for the following problems: loose bolts, oil leaks, broken parts, missing parts and cracked components
7. Inspect the electric harness for damage or abrasion. Check for loose connections or broken wires. Repair any worn components or replace any worn components. Repair any leaking components.
8. Inspect the steel material of the quick coupler for cracks.

Note: Perform all repairs before placing the quick coupler back into operation.

i04456539

Radiator Core - Clean

SMCS Code: 1353-070-KO

The radiator is located at the rear of the machine above the engine compartment.

Note: Adjust the frequency of cleaning according to the effects of the operating environment. If equipped, clean the aftercooler core when you clean the radiator core.

1. Stop the engine. Open the engine access door. Refer to Operation and Maintenance Manual, "Access Doors and Covers".
2. Tilt the radiator guard upward. Refer to Operation and Maintenance Manual, "Radiator Tilting".

WARNING

Personal injury can result from air pressure.

Personal injury can result without following proper procedure. When using pressure air, wear a protective face shield and protective clothing.

Maximum air pressure at the nozzle must be less than 205 kPa (30 psi) for cleaning purposes.

NOTICE

When you are using compressed air or high pressure water to clean the radiator fins, ensure that the air or water is directed parallel to the fins. If the compressed air or high pressure water is not directed parallel to the radiator fins, the radiator fins could be bent or damaged.

Note: Pressurized air is the preferred method for removing loose debris. Hold the nozzle approximately 6 mm (0.25 inch) away from the fins. Slowly move the air nozzle in a direction that is parallel with the tubes. The air nozzle should point in the opposite direction of the flow of the fan to remove debris between the tubes. Pressurized water may also be used for cleaning. The maximum water pressure for cleaning purposes must be less than 275 kPa (40 psi). Use pressurized water in order to soften mud. Use a degreaser and steam for removal of oil and grease. Wash the core with detergent and hot water. Thoroughly rinse the core with clean water.

3. Clean the radiator core from the top toward the fan.

Note: If parts of the cooling system appear to be damaged or if parts of the cooling system are repaired, a leak test is highly recommended. Consult your Caterpillar dealer for the most current information about the cooling system.

4. After cleaning, start the engine and accelerate the engine to high idle rpm. The fan will help in the removal of debris and drying of the core. Stop the engine. Use a light bulb behind the core in order to inspect the core for cleanliness. Repeat the cleaning, if necessary.

5. Inspect the fins and tubes of the radiator core for damage. Some fins and tubes may be worn from abrasive material that has passed through the radiator core. Bent fins may be opened with a "comb".

NOTICE

Do not clean a rotating fan with high pressure water. Fan blade failure can result.

6. Remove any dirt or debris from the fan, the fan hub, the oil cooler, the radiator guard, and the fan guard.

Note: Dirt or debris on the cooling fan can cause an imbalance.

7. Tilt the radiator guard downward.
8. Close the engine access door.

i06849898

Refrigerant Dryer - Replace (If Equipped)

SMCS Code: 7322-510

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

Maintenance Section

Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect

NOTICE

If the refrigerant system has been open to the outside air (without being plugged) for more than 30 minutes, the receiver-dryer must be replaced. Moisture will enter an open refrigerant system and cause corrosion which will lead to component failure.

Refer to Service Manual, UENR4125, "Air Conditioning and Heating R-134a For All Caterpillar Machines" for the proper procedure to change the receiver-dryer assembly and for the procedure to reclaim the refrigerant gas.

A qualified mechanic should perform this service because special refrigerant handling tools and training are required.

See your Cat dealer for this service.

i06127550

Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) - Inspect

SMCS Code: 7323-040; 7325-040

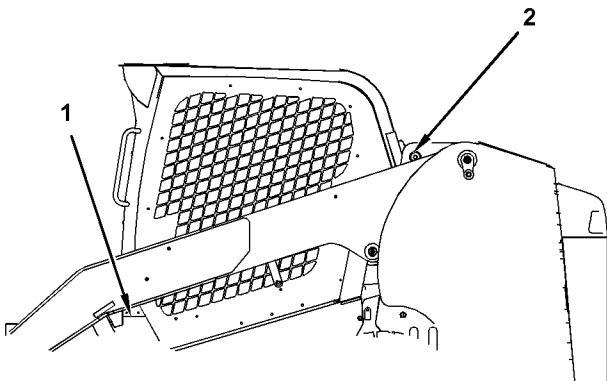


Illustration 374

g01280181

1. Inspect the ROPS for loose bolts. Tighten the bolts (1) to the following torque $125 \pm 10 \text{ N}\cdot\text{m}$ ($92 \pm 7.5 \text{ lb ft}$). Check the hinge on the cab (2). Check the ROPS and the FOPS for damaged bolts or missing bolts. Replace any damaged bolts or missing bolts with original equipment parts only.

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. Refer to Operation and Maintenance Manual, "Cab Tilting" for a description of the mounting support.

Consult your Caterpillar dealer for inspection of any potential damage or repair of any damage to any Operator Protective structure, including ROPS, FOPS, TOPS, OPS, and OPG. Refer to Special Instruction SEHS6929 Inspection, "Maintenance, and Repair of Operator Protective Structures (OPS) and Attachment Installation Guidelines for All Earthmoving Machinery", for more information.

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.

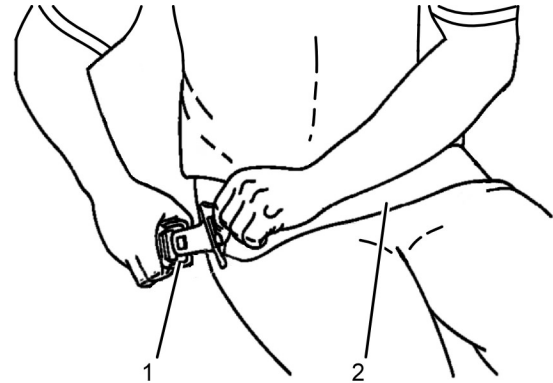


Illustration 375

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.

i05750770

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).

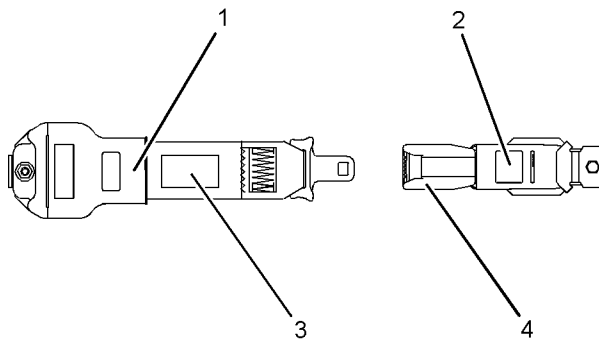


Illustration 376

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.

Sprocket - Inspect

SMCS Code: 4164-040

S/N: DX21-Up

S/N: FD21-Up

S/N: BY41-Up

S/N: CD41-Up

S/N: LW51-Up

S/N: TP51-Up

S/N: WE51-Up

S/N: AH91-Up

S/N: BL91-Up

S/N: DX91-Up

S/N: KB91-Up

S/N: GTC1-Up

S/N: D9E1-Up

S/N: FTK1-Up

S/N: GTK1-Up

S/N: FTL1-Up

S/N: GTL1-Up

S/N: HLM1-Up

S/N: GWR1-Up

S/N: T9S1-Up

S/N: D5T1-Up

S/N: JST1-Up

S/N: PPT1-Up

S/N: WCT1-Up

S/N: TAW1-Up

S/N: RCX1-Up

S/N: A9Z1-Up

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. Clean the undercarriage of the machine daily in order to maximize component life.

Inspect

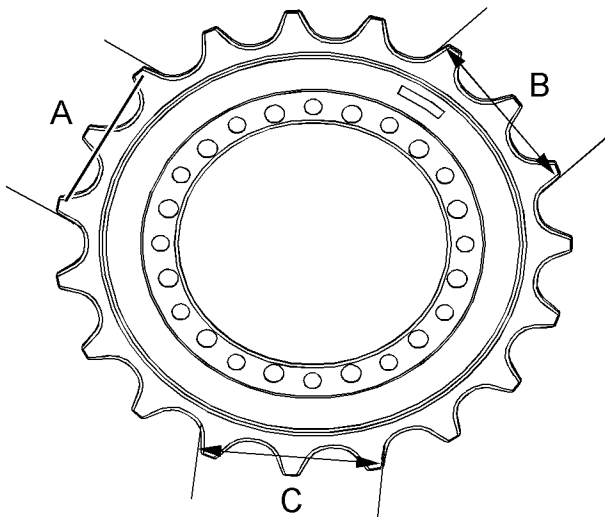


Illustration 377

g03650609

CTL steel track sprocket

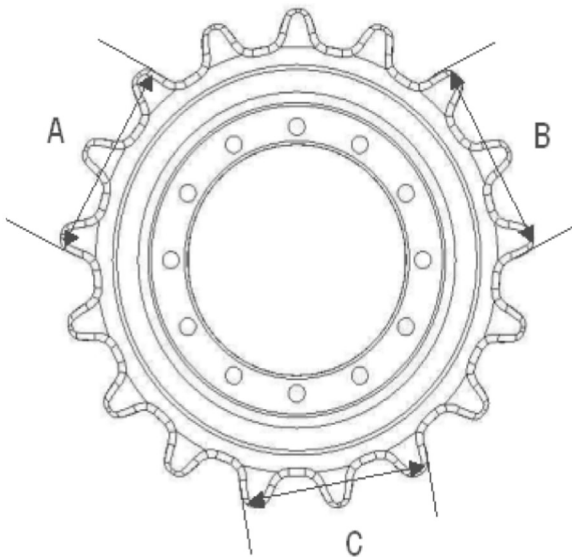


Illustration 378

g02789983

CTL rubber track sprocket

1. Measure the sprocket teeth in three places as shown in illustration 378 .
2. Calculate the average of the 3 measurements.

3. If the average of the 3 measurements is less than the 50% wear limit listed below, relocate the sprocket to the opposite side of the machine. Follow the steps in the "Relocate" section. If the average of the 3 measurements is less than the 75% wear limit listed below, replace the sprocket. Follow the steps in the "Replace" section.

Table 118

	CTL Rubber	CTL Steel
Action	Track	Track
50% Wear Relocate Limit	178mm (7.0 inch)	144mm (5.7 inch)
75% Wear Replace Limit	165mm (6.5 inch)	140mm (5.51 inch)

Relocate

1. Remove the track on both sides of the machine.
2. Remove the sprocket on the left side of the machine. Move the sprocket to the right side.
3. Remove the sprocket on the right side of the machine. Move the sprocket to the left side.
4. Install the sprockets. Tighten the bolts to the proper torque.
5. Install the track on both sides of the machine.

Replace

1. Remove the track on both sides of the machine.
2. Remove the sprocket on the left side of the machine. Install the new sprocket.
3. Tighten the bolts to the proper torque.
4. Remove the sprocket on the right side of the machine. Install the new sprocket.
5. Tighten the bolts to the proper torque.
6. Install the track on both sides of the machine.

i06600763

Sprocket - Inspect

SMCS Code: 4164-040

S/N: HP21-Up

S/N: BE71-Up

S/N: BL71-Up

S/N: HP71-Up

S/N: STK1–Up

S/N: TLK1–Up

S/N: EML1–Up

S/N: NTL1–Up

S/N: FMR1–Up

S/N: D5T1–Up

S/N: FMT1–Up

S/N: HMT1–Up

S/N: MLT1–Up

S/N: EZW1–Up

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. Clean the undercarriage of the machine daily in order to maximize component life.

Sprocket Inspection for Models with Single Lug Drive System

Note: Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.

Remove the Sprocket

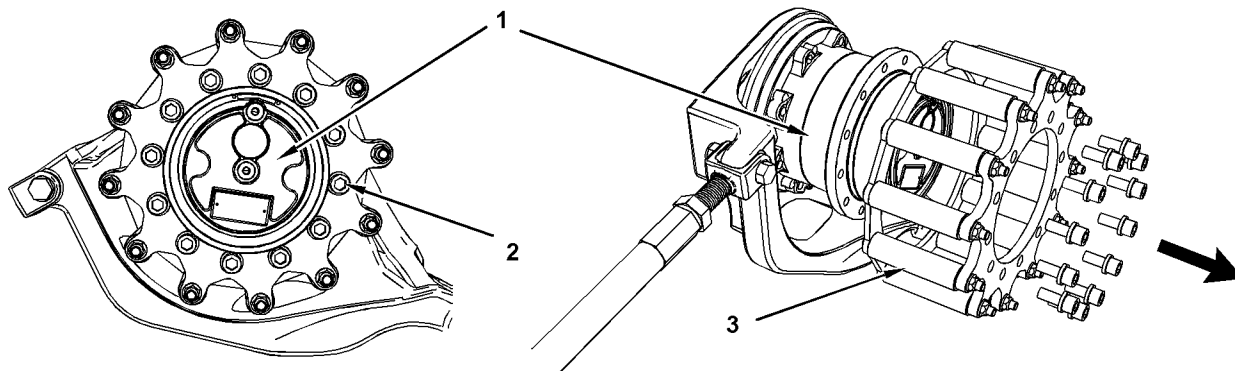


Illustration 379

g01394413

(1) Drive motor

(2) Bolts and washers

(3) Sprocket assembly

Note: In order to service the sprocket, the tracks must be loosened. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

1. Remove the 12 bolts and the 12 washers that hold the sprocket assembly to the drive motor.
2. Slide the sprocket assembly off the drive motor.

Sleeves and Rings

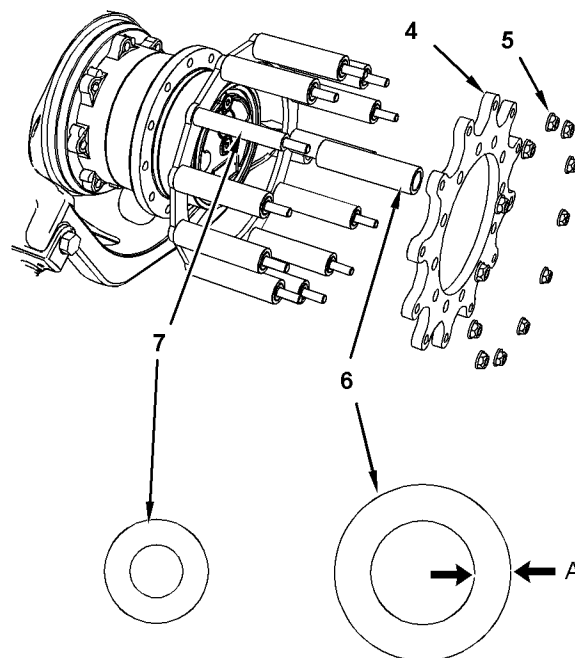


Illustration 380

g01394415

(4) Sprocket mounting ring

(5) Washers and Locknuts

(6) Outer sleeve

(7) Inner sleeve

The sprocket is equipped with two types of sleeves.

- Inner Sleeves (6)

- Outer sleeves (5)

The outer sleeves are free to rotate on the inner sleeves. The sleeves are held in position by the sprocket mounting ring.

Note: There are many parts in the sprocket assembly. Remove the sprocket completely from the machine in order to work on the sprocket. Use a clean, flat surface in order to disassemble the sprocket and assemble the sprocket.

1. Remove the 12 locknuts and washers that hold the sprocket mounting ring in place.
2. Remove the ring.
3. Remove the outer sleeves and the inner sleeves.
4. Measure thickness (A) for the outer sleeves. If the thickness of the outer sleeves measures less than 3 mm (0.12 inch), replace the sleeves. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.
5. When you replace the outer sleeves, rotate the inner sleeves for 180°. If the inner sleeves have already been rotated, replace the inner sleeves.
6. Repeat steps 2 through 5 for each set of sleeves.
7. The sprocket mounting rings of the drive sprocket will wear from the rotation of the outer sleeves. Measure the thickness of the inner rings and outer rings. If the thickness of the inner ring or outer ring measures less than 4.75 mm (0.19 inch), replace the ring.
8. Install the sleeves and the rings.
9. Install the new locknuts. **Do not reuse the locknuts.** Tighten the locknuts to a torque of $70 \pm 5 \text{ N}\cdot\text{m}$ ($51.6 \pm 3.7 \text{ lb ft}$) in a star pattern. Turn the nuts an additional 120 degrees and plusmn; 5 degrees in the same star pattern.
10. Install the sprocket on the drive motor. Tighten the bolts to a torque of $270 \pm 40 \text{ N}\cdot\text{m}$ ($199 \pm 30 \text{ lb ft}$).

Track

Tighten the track to the proper tension. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

Sprocket Inspection for Models with Triple Lug Drive System

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. Clean the undercarriage of the machine daily in order to maximize component life. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.

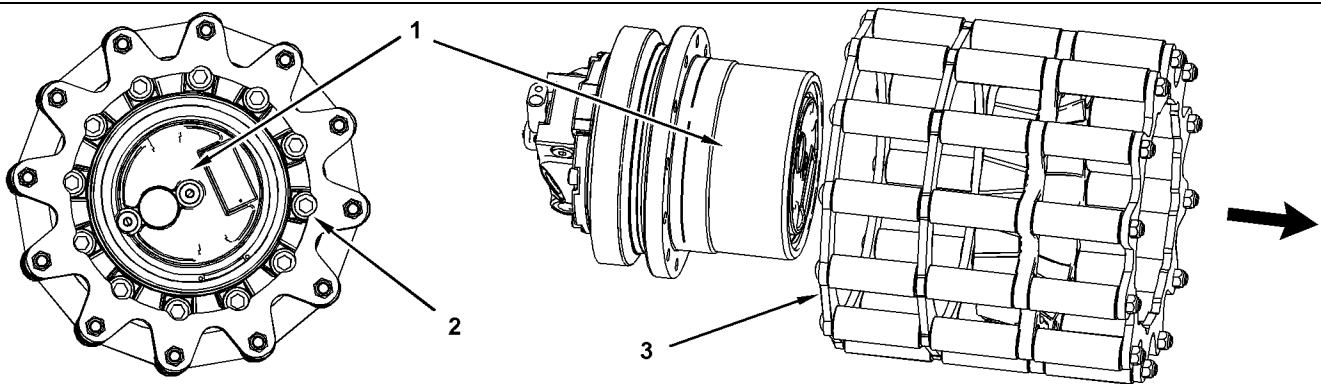
Remove the Sprocket

Illustration 381

g01284748

(1) Drive motor

(2) Bolts and washers

(3) Sprocket assembly

Note: In order to service the sprocket, the tracks must be loosened. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

1. Remove the 12 bolts (2) and the 12 washers that hold the sprocket assembly (3) to the drive motor (1).
2. Slide the sprocket assembly off the drive motor.

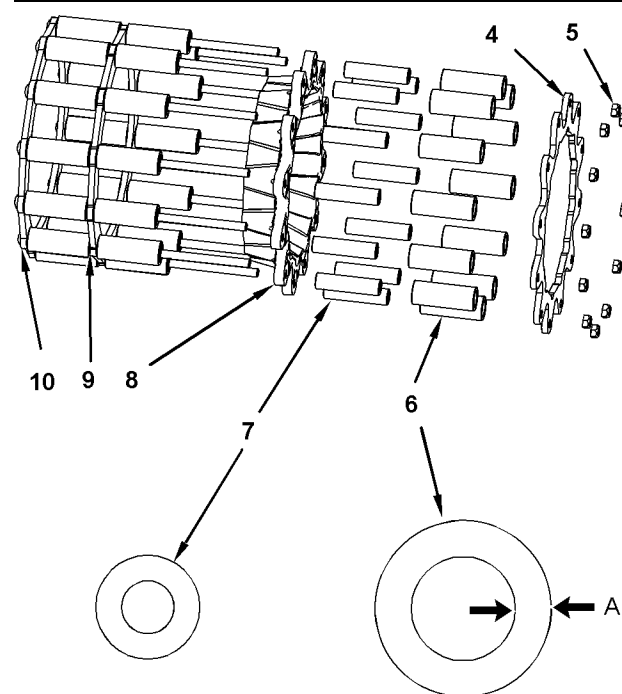
Sleeves and Rings

Illustration 382

g01282450

- (4) Outer ring
- (5) Washers and Locknuts
- (6) Outer sleeve
- (7) Inner sleeve
- (8) Sprocket mounting ring
- (9) Middle ring
- (10) Inner ring

The sprocket is equipped with two types of sleeves.

- Inner Sleeves (7)
- Outer sleeves (6)

The outer sleeves (6) are free to rotate on the inner sleeves (7). The sleeves are held in position by the outer ring (4), the sprocket mounting ring (8), the middle ring (9), and inner ring (10).

Note: There are many parts in the sprocket assembly. Remove the sprocket completely from the machine in order to work on the sprocket. Use a clean, flat surface in order to disassemble the sprocket and assemble the sprocket.

1. Remove the 12 locknuts and washers that hold the outer ring (4) in place.
2. Remove the ring.
3. Remove the outer sleeves and the inner sleeves.
4. Measure thickness (A) for the outer sleeves. If the thickness of the outer sleeves measures less than 3 mm (0.12 inch), replace the sleeves. Sleeves that do not meet the minimum thickness or sleeves that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.
5. When you replace the outer sleeves, rotate the inner sleeves for 180°. If the inner sleeves have already been rotated, replace the inner sleeves.
6. Repeat steps 2 through 5 for each set of sleeves.
7. Install the sleeves and the rings.
8. Install the new locknuts. **Do not reuse the locknuts.** Tighten the locknuts to a torque of $55 \pm 5 \text{ N}\cdot\text{m}$ ($40.6 \pm 3.7 \text{ lb ft}$) in a star pattern. Turn the locknuts an additional $180^\circ \pm 5^\circ$ in the star pattern.
9. Install the sprocket on the drive motor. Tighten the bolts to a torque of $270 \pm 40 \text{ N}\cdot\text{m}$ ($199 \pm 30 \text{ lb ft}$).

Rings

The inner ring (10), the middle ring (9), the outer ring (4), and the sprocket mounting ring (8) will wear from the rotation of the outer sleeves. Measure the thickness of the inner ring, the middle ring, and outer ring. If the thickness of the rings measures less than 4.75 mm (0.19 inch), replace the ring. If the thickness of the sprocket mounting ring measures less than 8 mm (0.32 inch), replace the sprocket mounting ring.

Track

Tighten the track to the proper tension. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust" for the procedure.

i02418761

Sprocket Retaining Nuts - Check

SMCS Code: 4164-535-NT

S/N: HP21-Up

S/N: BE71-Up

S/N: BL71-Up

S/N: HP71-Up

S/N: STK1-Up

S/N: TLK1-Up

S/N: EML1-Up

S/N: NTL1-Up

S/N: FMR1-Up

S/N: D5T1-Up

S/N: FMT1-Up

S/N: HMT1-Up

S/N: MLT1-Up

S/N: EZW1-Up

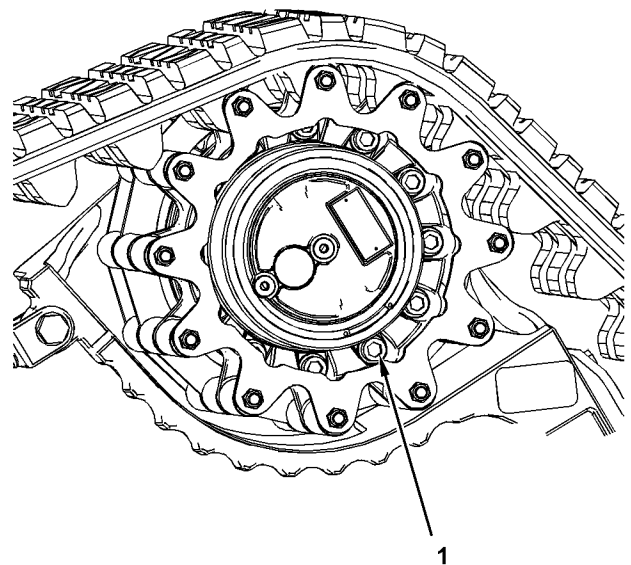


Illustration 383

g01282784

(1) Sprocket retaining nut

Check the torque on the nuts for new sprockets or for sprockets that have been reinstalled after every ten service hours until the specified torque is maintained.

Check the nuts on both sprockets. Use a star pattern when you tighten the nuts.

Tighten the nuts to a torque of $270 \pm 40 \text{ N}\cdot\text{m}$
($199 \pm 30 \text{ lb ft}$).

i06600421

Sprocket Sleeve - Inspect

SMCS Code: 4164-040-ZV

S/N: HP21–Up

S/N: BE71–Up

S/N: BL71–Up

S/N: HP71–Up

S/N: STK1–Up

S/N: TLK1–Up

S/N: EML1–Up

S/N: NTL1–Up

S/N: FMR1–Up

S/N: D5T1–Up

S/N: FMT1–Up

S/N: HMT1–Up

S/N: MLT1–Up

S/N: EZW1–Up

Note: Operating the machine in conditions that are muddy or sandy will cause accelerated wear on the sprocket and other undercarriage components. Clean the undercarriage of the machine daily in order to maximize component life. Sleeves that do not meet the minimum thickness or that do not turn freely may cause unnecessary wear on the drive lugs on the rubber track.

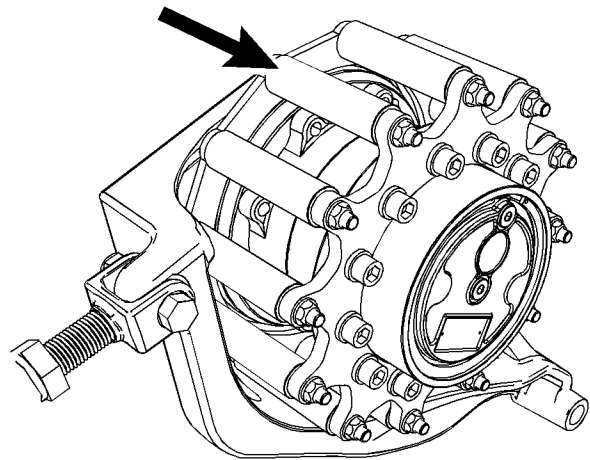


Illustration 384

g01394383

Models with Single Lug Drive System

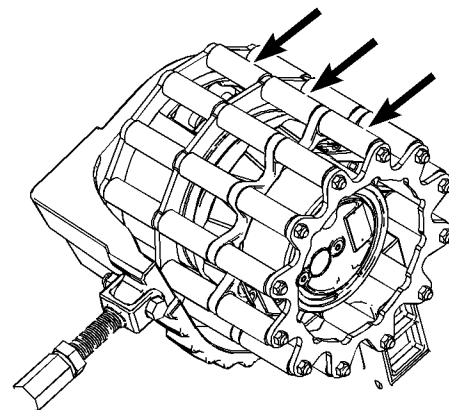


Illustration 385

g01285052

Models with Triple Lug Drive System

Check the outer sleeves in order to ensure that the sleeves rotate freely. If the sleeves do not rotate freely, refer to Operation and Maintenance Manual, "Sprocket - Inspect" for information about the inspection of the sprocket assembly.

i01878236

Tilt Cylinder Bearings and Bucket Linkage Bearings - Lubricate

SMCS Code: 5104-086-BD; 6107-086-BD

Wipe all of the grease fittings before you apply lubricant.

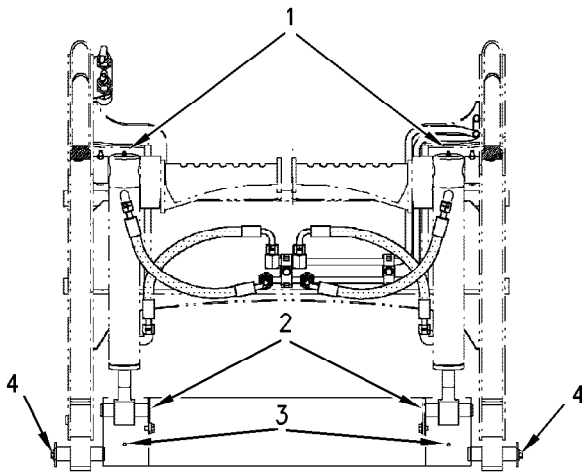


Illustration 386

g00955895

Note: Lubricate the fittings with the loader lift arms in the fully lowered position.

Apply lubricant to the grease fittings (1) for the upper bearings for the tilt cylinders.

Apply lubricant to the grease fittings (2) for the lower bearings for the tilt cylinders.

Apply lubricant to the grease fittings (3) for the coupler engagement pins.

Apply lubricant to the grease fitting (4) for the pivot pin of the quick coupler assembly.

There are a total of 8 grease fittings.

i04439604

Tire Inflation - Check

SMCS Code: 4203-535-AI

S/N: BL21-Up

S/N: EH21-Up

S/N: MD21-Up

S/N: PN51-Up

S/N: RE51-Up

S/N: HR61-Up

S/N: AJ71-Up

S/N: DTB1-Up

S/N: HFB1-Up

Maintenance Section
Tire Inflation - Check

S/N: KXC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: BYF1–Up
S/N: DML1–Up
S/N: ETL1–Up
S/N: JSL1–Up
S/N: SEN1–Up
S/N: DPR1–Up
S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: MPW1–Up
S/N: BGZ1–Up

Table 119

Tire size and recommended inflation pressure (cold) for Cat Skid Steer Loader D-Series Models					
	Size	Ply Rating	Pressure		
Cat Premium Conventional	12x16.5	10	310 kPa	45 psi	3.10 bar
	14x17.5	14	414 kPa	60 psi	4.14 bar
Cat Low Side Wall	305-546	10	310 kPa	45 psi	3.10 bar
Cat Extreme Duty	12x16.5	14	345 kPa	50 psi	3.45 bar
	14x17.5	14	414 kPa	60 psi	4.14 bar
Cat Premium Conventional Floatation	33x15.5x16.5	12	240 kPa	35 psi	2.41 bar
Galaxy Beefy Baby	12x16.5	10	310 kPa	45 psi	3.10 bar

The above recommended tire inflation pressure is based on a standard machine with the following conditions:

- 75 kg operator
- Typical operating conditions
- Full fluid levels
- The machine weight and the weight of the work tool must not exceed the weight limit on the "ROPS" certification.

Note: Consult your Cat dealer if your machine is experiencing excessive tire slippage. Slippage may be the result of tire wear.

Inflate the tires, if necessary.

Tire Inflation with Air

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.

i02418763

Track (Rubber) - Inspect/Adjust

SMCS Code: 4197; 4198-040; 4198-025

S/N: HP21–Up

S/N: BE71–Up

S/N: BL71–Up

S/N: HP71–Up

S/N: STK1–Up

S/N: TLK1–Up

S/N: EML1–Up

S/N: NTL1–Up

S/N: FMR1–Up

S/N: D5T1–Up

S/N: FMT1–Up

S/N: HMT1–Up

S/N: MLT1–Up

S/N: EZW1–Up

Periodic adjustment of the track tension is necessary in order to avoid damage to the tracks. Maintaining the tracks at the proper tension will maximize the service life of the undercarriage components. The undercarriage components include the sleeves of the drive sprocket, the rings of the drive sprocket, the wheels, and the track.

NOTICE

Do not overtighten the tracks. Tracks that are too tight can cause premature failure of the tracks. Tracks that are too tight can cause power loss and bearing failures.

Tracks that are too loose increase the possibility of the track derailing or the drive lugs mis-feeding on the drive sprocket. In aggressive operating conditions, occasional mis-feeding is normal. If consistent mis-feeding is observed, ensure that the track tension is set to the recommended specification. If the track tension is set to the recommended specification and mis-feeding is still observed, then your application may require a tighter track tension. Increase the track tension until consistent mis-feeding is no longer observed.

The intervals for track tension vary depending on the following conditions: the machine application, the operator, the soil conditions, the climate and the condition of the undercarriage components. Operators are responsible for basic visual inspections of the track tension on a daily basis.

Inspect

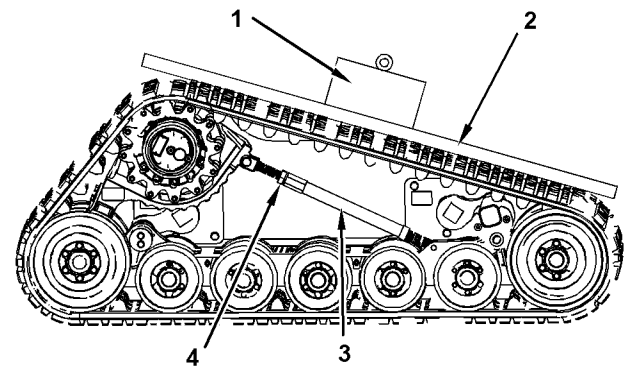


Illustration 387

g01283123

- (1) Weight
- (2) Straight edge
- (3) Adjuster
- (4) Jam nut

Place approximately 45 kg (100 lb) (1) between the drive sprocket and the front idler wheel. Place a straight edge (2) across the drive sprocket and idlers. Measure the track sag between the bottom of the straight edge and the top of the track. **The track sag should be set at 12 mm (0.5 inch).** If the track needs adjustment proceed with the following steps.

Track Adjustment

1. Loosen the jam nut (4). A 48 mm (1.875 inch) wrench is recommended.

Maintenance Section
Track (Rubber) - Remove/Replace

2. Turn the adjuster (3) in order to raise or lower the drive sprocket. A 44 mm (1.75 inch) wrench is recommended.
3. Tighten the jam nut to the following torque
270 ± 40 N·m (199 ± 30 lb ft).
4. Recheck the track tension.

Detension the track

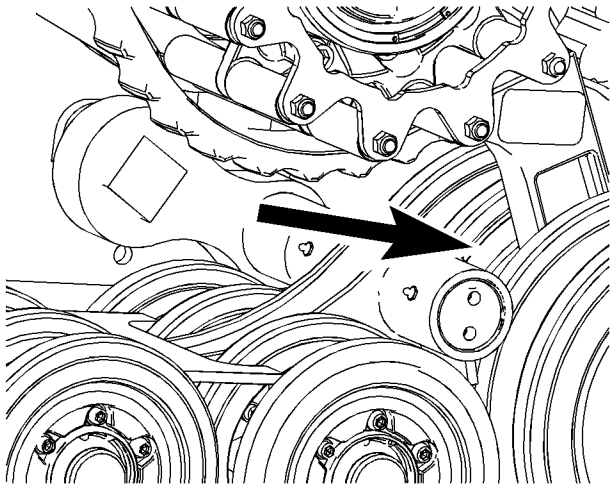


Illustration 388

g01286098

Clean the area under the sprocket.

Note: Many operations for maintenance of the undercarriage require the track to be loosened.

1. Remove any debris from the area under the sprocket before you loosen the track. Trapped material in this area may prevent the drive sprocket from lowering fully.
2. Loosen the jam nut (4). A 48 mm (1.875 inch) wrench is recommended.
3. Turn the adjuster (3) in order to lower the drive sprocket. A 44 mm (1.75 inch) wrench is recommended.

4. Lower the drive sprocket completely in order to provide the necessary clearance for maintenance or for removal of the track.

i06127510

Track (Rubber) - Remove/Replace (MTL)

SMCS Code: 4197; 4198-510; 4198-011

S/N: HP21–Up

S/N: BE71–Up

S/N: BL71–Up

S/N: HP71–Up

S/N: STK1–Up

S/N: TLK1–Up

S/N: EML1–Up

S/N: NTL1–Up

S/N: FMR1–Up

S/N: D5T1–Up

S/N: FMT1–Up

S/N: HMT1–Up

S/N: MLT1–Up

S/N: EZW1–Up

Removing the Track

Note: The track may weigh as much as approximately 136 kg (300 lb) clean depending on model and track style.

1. Position the machine on firm, level ground.
2. Remove any work tool that is attached to the quick coupler.
3. Raise the loader arms and install the brace for the loader lift arm. Refer to Operation and Maintenance Manual, “Loader Lift Arm Brace Operation”.

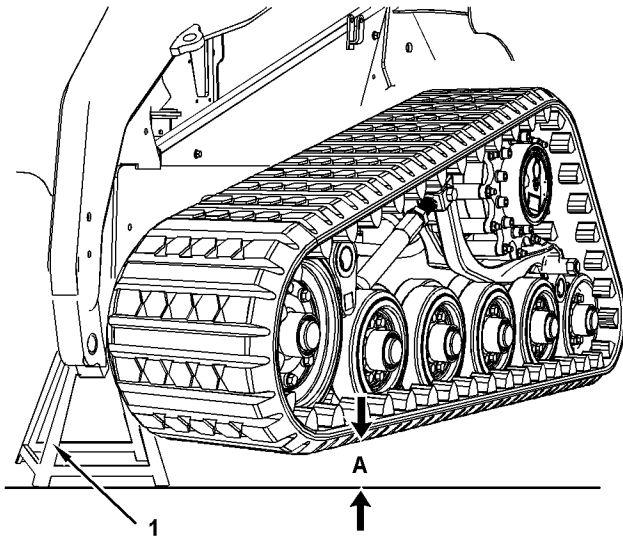


Illustration 389

g01393193

4. Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands (1) in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inch) (A) off the ground.
5. Detension the track. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust".

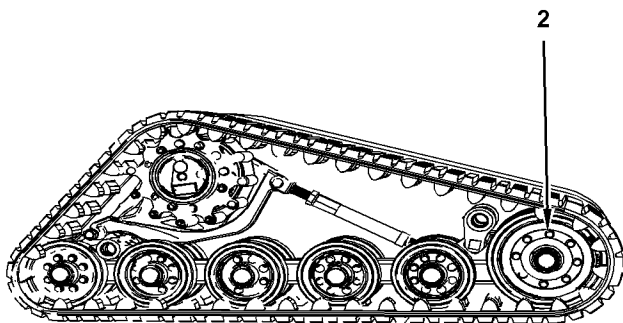


Illustration 390

g01393194

6. Remove the front idler wheel. Refer to Operation and Maintenance Manual, "Bogie and Idler - Inspect/Replace" for the procedure to remove the idler wheels.
7. If necessary, lubricate the remaining front idler wheel and the inside of the track in order to ease the removal of the track.

8. Grasp the track on top of the front idler. Pull the track forward and pull the track away from the frame. Slide the drive lugs past the inside front idler wheels.
9. Lift the track off the drive sprocket and pull the track away from the rear idler wheels.

Installing the Track

Note: The track may weigh as much as approximately 136 kg (300 lb) clean depending on model and track style.

1. Slide the track onto the drive sprocket.
2. Position the rear of the track so that the drive lugs are aligned between the rear idler wheels.
3. Pull all of the slack forward and make sure that the drive lugs are properly meshed with the drive sprocket. This will provide the maximum amount of slack to aid with installation across the front idler.
4. Lubricate the idler wheels and the inside of the track in order to ease the installation of the track.
5. Pull the track over the front idler wheel.
6. Install the front idler wheel. Refer to Operation and Maintenance Manual, "Bogie and Idler - Inspect/Replace" for the procedure to install the idler wheel.
7. Tension the track. Refer to Operation and Maintenance Manual, "Track (Rubber) - Inspect/Adjust".

i08299293

Track (Steel) - Inspect/Adjust

SMCS Code: 4170-025; 4170-040; 4197

S/N: DX21-Up

S/N: FD21-Up

S/N: BY41-Up

S/N: DX91-Up

S/N: GTC1-Up

S/N: JST1-Up

Track Inspect

Inspect the track visually for damage or missing fasteners. Replace any grousers that are damaged and replace any fasteners that are missing.

Track Measurement

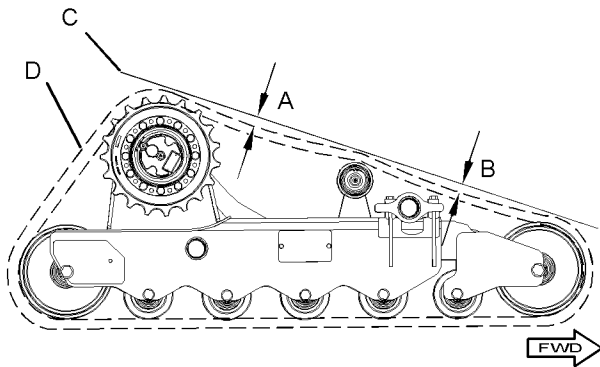


Illustration 391

g03023836

- (A) First point of measure
- (B) Second point of measure
- (C) Reference string
- (D) Track Profile

With a long string (C) and two weights, lay the string over the track making sure that the string extends past the rear idler and front idler and does NOT touch the ground. Attach a weight to both ends of the string so the weights pull the string taut. Measure from the two lowest points (A & B) in the track to the string. Average these two measurements. The distance between the string and the track should be between 6.35 mm (0.25 inch) and 12.7 mm (0.50 inch).

New tracks should meet this condition and should periodically be checked. Check after the first 50 hours and then again at 100 hours. Check every 250 hours after the first two checks.

Track Adjustment

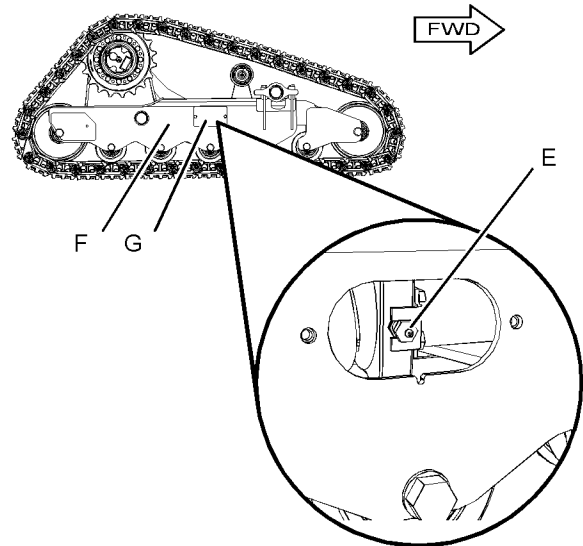


Illustration 392

g03023837

- (E) Greaser Valve - Recoil Gp
- (F) Right-Hand undercarriage assembly
- (G) Cover Plate for Recoil Gp Greaser Valve

To adjust the tension, there is a greaser on the recoil group. To relax the tension on the track, loosen the greaser with an appropriate wrench or socket. To tighten the tension on the track, make sure that the greaser is tight. Apply grease to the greaser until the proper tension is achieved.

Note: Turn the greaser a maximum of one full turn when releasing track tension.

Track Bolts - Check

Check the torque for the track grouser bolts and the master link bolts. Torque to the required value of $280 \pm 15 \text{ N}\cdot\text{m}$ ($206 \pm 11 \text{ lb ft}$).

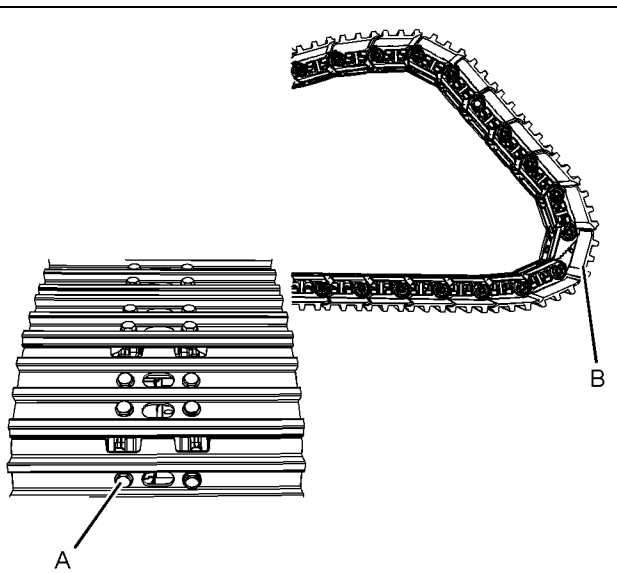


Illustration 393

g03653135

- (A) Track Grouser bolts
(B) Master Link bolts

i07542127

Track - Inspect/Adjust

SMCS Code: 4170-025; 4170-040

- S/N:** DX21–Up
S/N: FD21–Up
S/N: CD41–Up
S/N: LW51–Up
S/N: TP51–Up
S/N: WE51–Up
S/N: AH91–Up
S/N: BL91–Up
S/N: KB91–Up
S/N: GTC1–Up
S/N: D9E1–Up
S/N: FTK1–Up
S/N: GTK1–Up
S/N: FTL1–Up
S/N: GTL1–Up
S/N: HLM1–Up
S/N: GWR1–Up
S/N: T9S1–Up

- S/N:** JST1–Up
S/N: PPT1–Up
S/N: WCT1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up

Periodic adjustment of the track tension is necessary to avoid damage to the tracks. Maintaining the tracks at the proper tension will maximize the service life of the undercarriage components. The undercarriage components include the final drive sprocket, idlers, rollers, and the track.

NOTICE

Do not overtighten the tracks. Tracks that are too tight can cause premature failure of the tracks. Tracks that are too tight can cause power loss and bearing failures.

Tracks that are too loose increase the possibility of the track derailing or the drive lugs mis-feeding on the drive sprocket. In aggressive operating conditions, occasional mis-feeding is normal. If consistent mis-feeding is observed, ensure that the track tension is set to the recommended specification. If the track tension is set to the recommended specification and mis-feeding is still observed, then your application may require a tighter track tension. Increase the track tension until consistent mis-feeding is no longer observed.

The intervals for track tension vary depending on the following conditions: the machine application, the operator, the soil conditions, the climate and the condition of the undercarriage components. Operators are responsible for basic visual inspections of the track tension on a daily basis.

Inspect

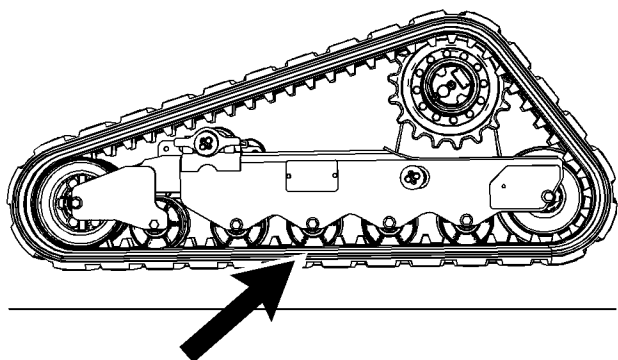


Illustration 394

g01450469

Support the machine so that the track is a minimum of 51 mm (2 inch) above the ground.

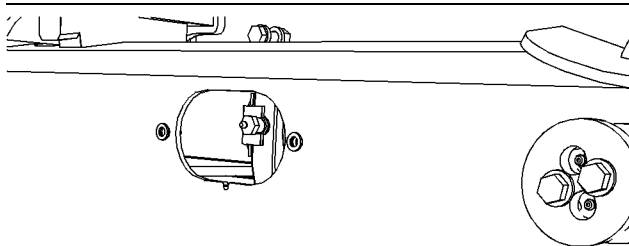


Illustration 395

g01450565

Measure the track sag at the middle track roller. Measure the distance from the bottom surface of the flange on the roller to the inside top surface of the track. Refer to the table for the proper specifications for your model.

Note: Machines equipped with four track rollers, measure the track sag at the second or third track roller.

Table 120

Track Sag Specifications				
	239D and 249D	259D	279D and 289D	299D/D2 and 299D/D2 XHP
Minimum Sag	15 mm (0.59 inch)	15 mm (0.59 inch)	25 mm (0.98 inch)	25 mm (0.98 inch)
Maximum Sag	25 mm (0.98 inch)	25 mm (0.98 inch)	35 mm (1.378 inch)	35 mm (1.378 inch)

Track Adjustment

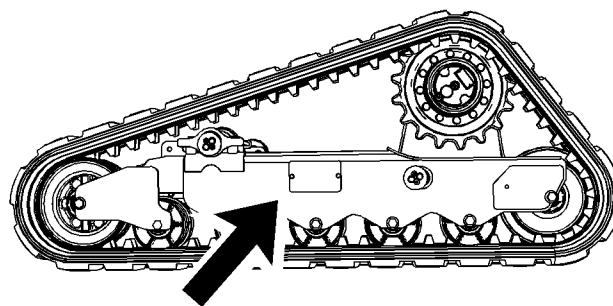


Illustration 396

g01450599

1. To adjust the track, remove the access panel on the side of the undercarriage.

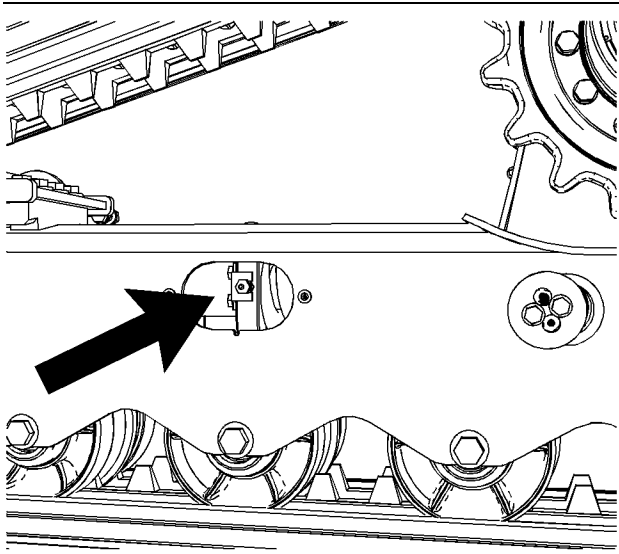


Illustration 397

g01450604

2. Pressurized grease in a cylinder is used to provide tension on the track. Use a grease gun in order to apply grease to the grease fitting on the cylinder. The track will be tightened.
3. Recheck the track tension.
4. Replace the access panel when the desired sag is achieved.

Detension the track

WARNING

Personal injury or death can result from grease under pressure.

Grease coming out of the relief valve under pressure can penetrate the body causing injury or death.

Do not stand directly in front of the relief valve to see if grease is escaping. Watch the track or track adjustment cylinder to see if the track is being loosened.

If track does not loosen, close the relief valve and consult your Cat dealer.

Note: Many operations for maintenance of the undercarriage require the track to be loosened.

1. To detension the track, remove the access panel on the side of the undercarriage.
2. Loosen the grease fitting with a suitable device. Loosen the grease fitting carefully until the track begins to loosen.

Note: Catch the grease in a suitable container. Dispose of the grease in accordance with all applicable regulations.

Note: One turn should be sufficient. If grease does not flow as expected, the lock plate can be temporarily removed. The relief valve can be turned further to allow for increased flow. Do not turn the relief valve more than eight turns.

3. Tighten the grease fitting to a torque of $74 \pm 14 \text{ N}\cdot\text{m}$ ($55 \pm 10 \text{ lb ft}$) when the desired track tension is reached.
4. Replace the access panel.

i06127473

Track - Remove/Replace

SMCS Code: 4170-011; 4170-510; 4170

S/N: DX21-Up

S/N: FD21-Up

S/N: CD41-Up

S/N: LW51-Up

S/N: TP51-Up

S/N: WE51-Up

S/N: AH91-Up

S/N: BL91-Up

S/N: KB91-Up

S/N: GTC1-Up

S/N: D9E1-Up

S/N: FTK1-Up

S/N: GTK1-Up

S/N: FTL1-Up

S/N: GTL1-Up

S/N: HLM1-Up

S/N: GWR1-Up

S/N: T9S1-Up

S/N: JST1-Up

S/N: PPT1-Up

S/N: WCT1-Up

S/N: TAW1-Up

S/N: RCX1-Up

S/N: A9Z1-Up

Removing the Track

1. Position the machine on firm, level ground.
2. Remove any work tool that is attached to the quick coupler.
3. Raise the loader arms and install the brace for the loader lift arm. Refer to Operation and Maintenance Manual, "Loader Lift Arm Brace Operation".

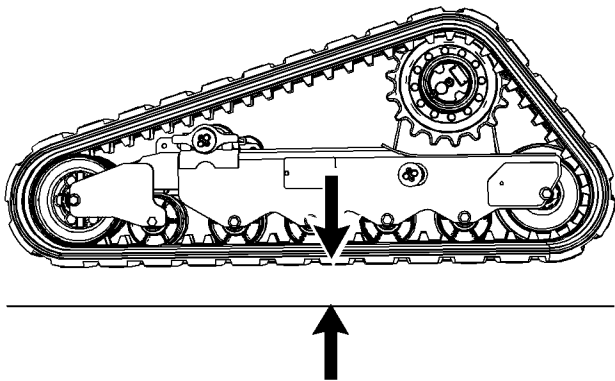


Illustration 398

g01451611

4. Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inch) (A) off the ground.
5. Detension the track. Refer to Operation and Maintenance Manual, "Track - Inspect/Adjust".

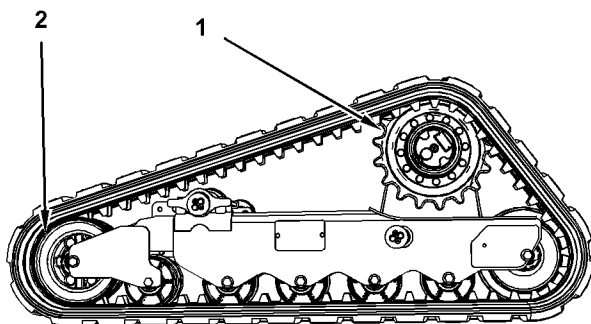


Illustration 399

g01450665

- (1) Final Drive Sprocket
(2) Front idler wheel

Note: The track may weigh as much as approximately 262 kg (578 lb) clean depending on model and track style.

6. Use a suitable lifting device. Lift the track at MIDDLE position between the front idler and the final drive sprocket until the front idler collapses fully.

Note: It is helpful to support the bottom of the track in order to maximize the slack between the front idler and the drive sprocket.

7. Keep the track supported with a hoist. Lift the track over the flange of the front idler so that the inner track guides clear flanges.
8. Lift the track over the sprocket with a suitable lifting device. The inner guides need to clear the sprocket teeth.
9. Lift the track over the rear idler. The inner track guides need to clear the rear idler.

Installing the Track

Note: The track may weigh as much as approximately 262 kg (578 lb) clean depending on model and track style.

1. Use a suitable lifting device. Slide the track onto the rear idler so that the inner track guides straddle the rear idler. If your machine is equipped with an idler with dual flanges, the inner track guides must seat between the flanges.
2. Pull the track forward in order to ensure that the track guides are fully seated on the rear idler.
3. Lift the track over the final drive sprocket so that the inner track guides straddle the sprocket teeth. The sprocket teeth should seat in the openings in the middle of the track.
4. Pull all of the slack forward. This will provide the maximum amount of slack to aid with installation across the front idlers.

Note: It is helpful to support the bottom of the track in order to maximize the slack. This will help with installation.

5. Position the track so that the inner track guides seat between the flanges on the front idler.

6. Tension the track. Refer to Operation and Maintenance Manual, "Track - Inspect/Adjust" for the procedure.

i06625263

Track - Remove/Replace (Steel)

SMCS Code: 4170-011; 4170-510; 4170

S/N: DX21–Up

S/N: FD21–Up

S/N: BY41–Up

S/N: DX91–Up

S/N: GTC1–Up

S/N: JST1–Up

Removing the Track

1. Position the machine on firm, level ground.
2. Remove any work tool that is attached to the quick coupler.
3. Raise the loader arms and install the brace for the loader lift arm. Refer to Operation and Maintenance Manual, "Loader Lift Arm Brace Operation".

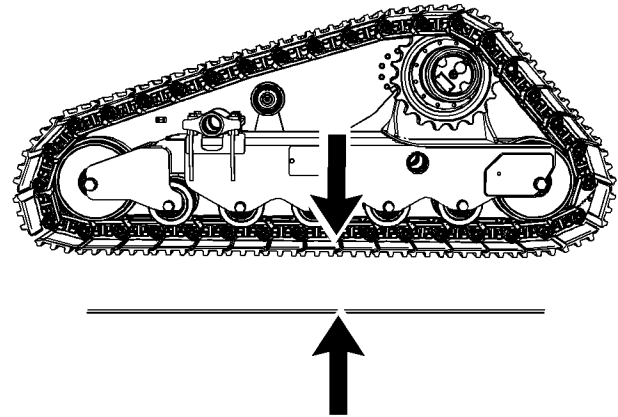


Illustration 400

g03653183

4. Use an appropriate floor jack in order to lift the machine off the ground. Use appropriate jack stands in order to block up the machine. Raise the machine until tracks are approximately 50 mm (2.0 inch) (A) off the ground.
5. Detension the track. Refer to Operation and Maintenance Manual, "Track (Steel) - Inspect/Adjust".

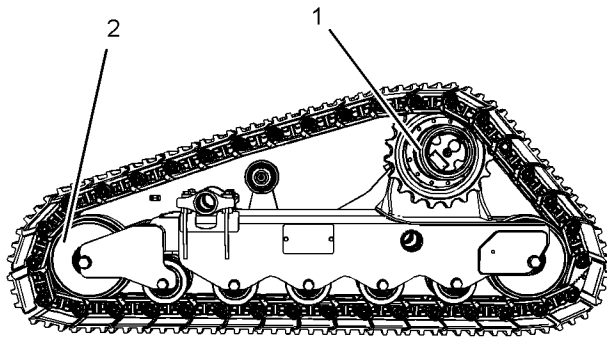


Illustration 401

g03653221

- (1) Final Drive Sprocket
- (2) Front idler wheel

Note: The approximate weight of the track is 400 kg (882 lb).

6. Use a suitable method to flag the track shoe over the master link so that the track location can be seen from the operator station.

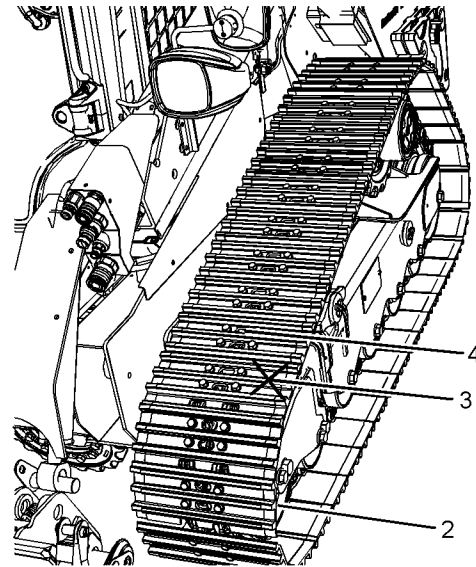


Illustration 402

g03653793

- (2) Front Idler Wheel
- (3) Flagged Track over Master Link
- (4) Lifting Device Location

7. Operate the machine drive control to position the flagged track shoe at the top of the front idler & shut the machine off.
8. Use a suitable lifting device. Strap the track just behind the flagged track shoe by routing a lifting sling through the debris openings of the track shoe next to the flagged track shoe per

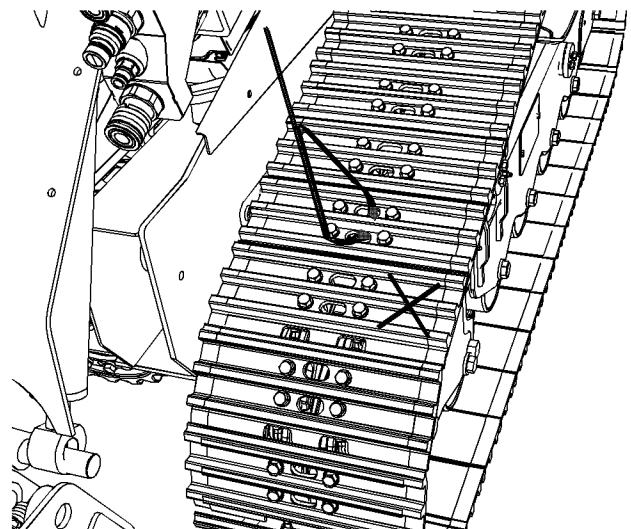


Illustration 403

g03653779

Route strap through debris openings.

9. Use suitable blocking material in front of the front idler to catch the forward portion of the track

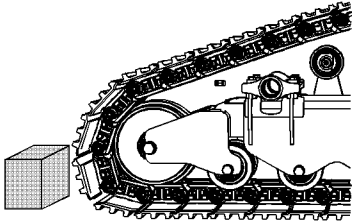


Illustration 404

g03653821

10. Remove the four master link bolts of the flagged track shoe over the master link and remove the track shoe.

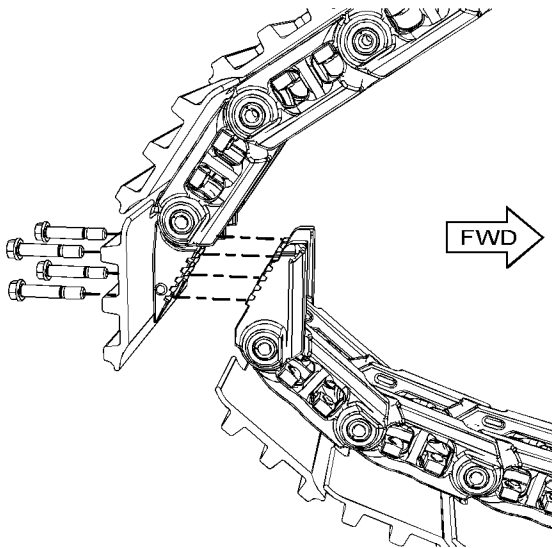


Illustration 405

g03653829

11. Lift up the strapped rear portion of the track and over the sprocket and lay this portion on the ground behind the machine.

12. Repeat steps 6 through 11 for the other side.

Installing the Track

Note: The approximate weight of the track is 400 kg (882 lb).

1. Unroll out the track assembly on a flat, level surface. Ensure that the two master links are free of any paint and primer. Orient the track assembly so the leading edge of the track shoes face forward when on the top of the undercarriage.

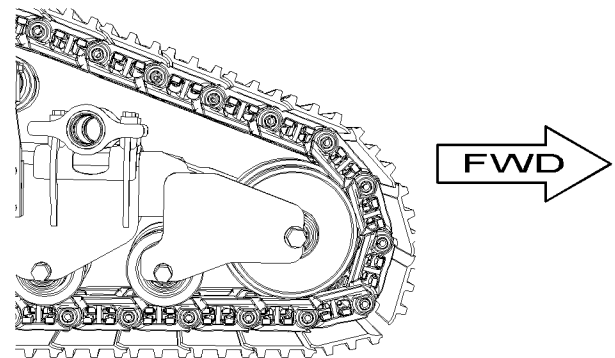
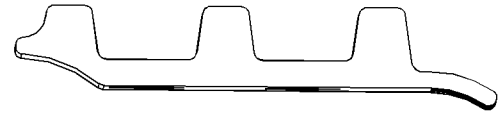


Illustration 406

g03653200

2. Use suitable lifting or moving equipment to lay out the track under the undercarriage. Ensure that placement of the track allows enough length behind the machine to wrap over the sprocket.
3. Use an appropriate lifting device. Strap the track by routing a lifting sling through the debris openings of the rear most track shoe
4. Lift the rear portion of the track over the sprocket, engaging enough teeth to retain the weight of the track.
5. Lift the front portion of the track over the carrier roller. Use suitable blocking material at the front idler to prevent the track from slipping off the undercarriage.
6. Connect the two master links insuring all of the teeth align. Secure the two links together with four master link bolts. Torque the master link bolts to $280 \pm 15 \text{ N}\cdot\text{m}$ ($206.5 \pm 11.1 \text{ lb ft}$).
7. Check and adjust the alignment of the carrier roller with respect to the center of the link assembly. Loosen the carrier roller alignment bolt and shift the roller assembly as needed. Torque the carrier alignment bolt to $186 \pm 10 \text{ N}\cdot\text{m}$ ($137.2 \pm 7.4 \text{ lb ft}$).

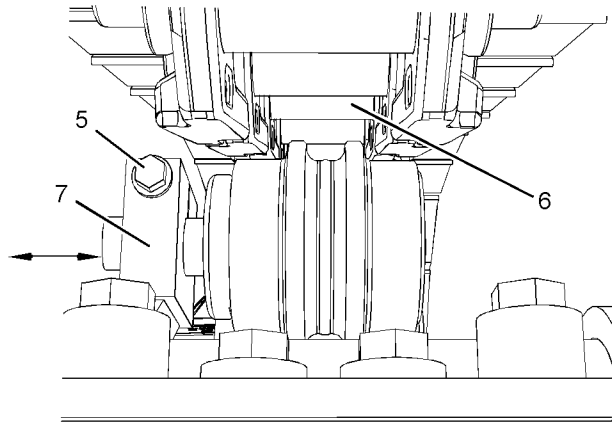


Illustration 407

g03653842

- (5) Carrier Roller Alignment bolt
(6) Center of Link Assembly
(7) Roller Assembly

8. Remove blocking and strapping.

i07719241

Track Pins - Inspect (Steel Track)

SMCS Code: 4175; 4175-040-PN; 4175-040; 7521

S/N: DX21-Up

S/N: FD21-Up

S/N: BY41-Up

S/N: DX91-Up

S/N: GTC1-Up

S/N: HLM1-Up

S/N: JST1-Up

WARNING

Fingers can be burned from hot pins and bushings.

The pins and bushings in a dry joint can become very hot. It is possible to burn the fingers if there is more than brief contact with these components.

Use the recommendations to extend the life of the undercarriage. Use the recommendations to avoid excessive downtime.

1. During the machine operation, listen for unusual squeaking and for unusual squealing. This noise can indicate a dry joint.
2. Check the machine for dry joints weekly. Check for dry joints immediately after machine operation. After machine operation, lightly touch the end of each track pin or bushing. Touch the track pin or the track bushing with the back of your hand. Make a mark on any dry track pin joint that is hot to the touch.

Consult the Custom Track Service expert at any Cat dealer if you detect dry joints or leaks. The Custom Track Service expert at the Cat dealer can perform track inspection.

i07719244

Track Roller and Idler - Inspect/Replace (CTL - Steel Track)

SMCS Code: 4159-510; 4159-040; 4180-040; 4180-510

S/N: DX21-Up

S/N: FD21-Up

S/N: BY41-Up

S/N: CD41-Up

S/N: LW51-Up

S/N: TP51-Up

S/N: WE51-Up

S/N: AH91-Up

S/N: BL91-Up

S/N: DX91-Up

S/N: KB91-Up

S/N: GTC1-Up

S/N: D9E1-Up

S/N: FTK1-Up

S/N: GTK1-Up

S/N: FTL1-Up

S/N: GTL1-Up

S/N: HLM1-Up

S/N: GWR1-Up

S/N: T9S1-Up

S/N: JST1-Up

S/N: PPT1–Up
S/N: WCT1–Up
S/N: TAW1–Up
S/N: RCX1–Up
S/N: A9Z1–Up

Inspect

Clean the undercarriage before inspecting the idlers and the rollers.

Inspect the idlers and the rollers for damage and wear.

The idlers and the rollers should be replaced when the damage to the wheels adversely affects machine performance.

Note: The idlers and the rollers contain oil. The idlers and the rollers are sealed for life. Periodically, inspect the idlers and the rollers for leaks or for excessive end play. Contact your Caterpillar dealer if either leaks or excessive end play is found.

i07719246

Wheel Nuts - Tighten (SSL Only)

SMCS Code: 4210-527

S/N: BL21–Up
S/N: EH21–Up
S/N: MD21–Up
S/N: PN51–Up
S/N: RE51–Up
S/N: HR61–Up
S/N: AJ71–Up
S/N: HFB1–Up
S/N: KXC1–Up
S/N: HRD1–Up
S/N: K2D1–Up
S/N: BYF1–Up
S/N: DML1–Up
S/N: ETL1–Up
S/N: JSL1–Up
S/N: SEN1–Up
S/N: DPR1–Up

S/N: HMR1–Up
S/N: KTS1–Up
S/N: DZT1–Up
S/N: LST1–Up
S/N: MKT1–Up
S/N: A9W1–Up
S/N: B5W1–Up
S/N: MPW1–Up
S/N: BGZ1–Up

When wheels are installed, check the torque after every one service hour until the specified torque is maintained. After the specified torque is maintained, check the torque on the nuts after every ten service hours or every day.

Check the nuts on all four wheels. Use a star pattern when you are tightening the nuts.

The torque specifications are given in the following table.

Table 121

Tightening Torque for Wheels	
Solid Tires	163 ± 7 N·m (120 ± 5 lb ft)
Pneumatic Tires	149 ± 7 N·m (110 ± 5 lb ft)

i02418610

Window Washer Reservoir - Fill (If Equipped)

SMCS Code: 7306-544-KE

NOTICE

When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

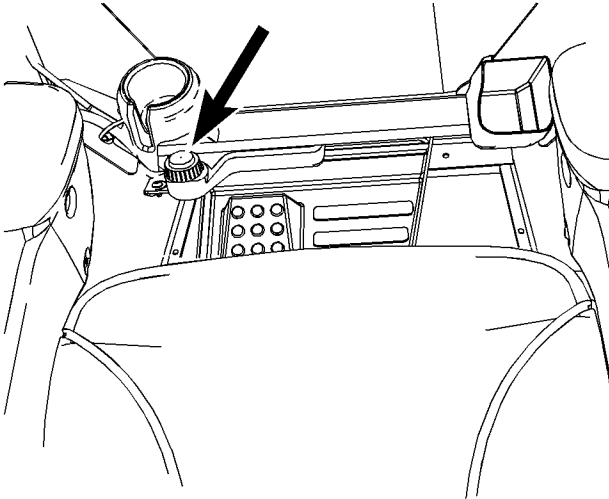


Illustration 408

g01209248

The reservoir for the window washer solvent is located inside the cab by the left footrest.

Fill the reservoir with window washer solvent. Window washer solvent with isopropyl alcohol is recommended.

i02810705

Window Wiper - Inspect/Replace (If Equipped)

SMCS Code: 7305-510; 7305-040

Inspect the condition of the front window wiper blade. Replace the window wiper blade if the window wiper blade is worn or damaged. If the window wiper blade streaks the window, replace the window wiper blade.

i06137269

Windows - Clean

SMCS Code: 7310-070

Rear Window and Glass Front Door

Use commercially available window cleaning solutions in order to clean the windows.

Apply the cleaning solution liberally. Wipe the surface.

Dry the surface in order to prevent spots.

Side Windows

Use commercially available window cleaning solutions in order to clean the windows.

The upper sliding side windows of the cab can be removed for cleaning. Refer to the following procedure in order to remove the side windows.

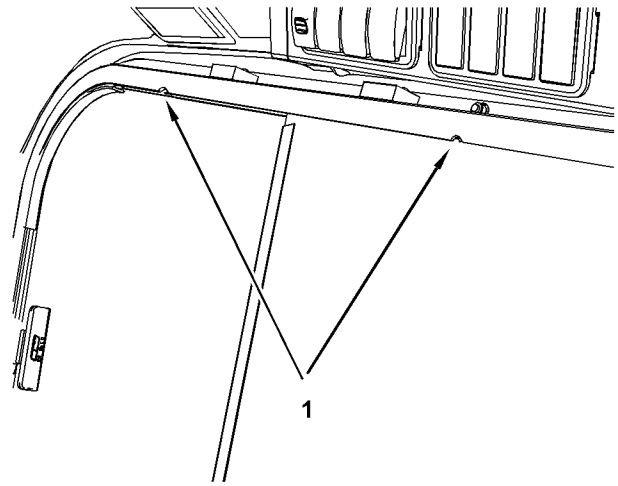


Illustration 409

g01209231

1. Release the latch. Slide the front window rearward between the circular marks (1) in the top of the window frame. Push the window upward in the track. Pull outward on the bottom of the window in order to remove the window.
2. Release the latch. Slide the rear window forward between the circular marks (1) in the top of the window frame. Push the window upward in the track. Pull outward on the bottom of the window in order to remove the window.
3. Reverse the process in order to install the windows. Install the rear window in the outer track. Install the front window in the inner track next.

Polycarbonate Front Door and Polycarbonate Top Window

Note: Do not wipe the window dry. Do not use paper towels. This may scratch the finish of the polycarbonate windows over time.

For cleaning your polycarbonate top window or polycarbonate front door, use a soft cloth, a sponge, or a chamois. Use any of the following cleaners:

- soap and water
- isopropyl alcohol
- kerosene
- denatured alcohol
- commercially available window cleaning solutions

Apply the cleaning solution liberally. Wipe the surface.

i07690427

Work Tool - Lubricate

SMCS Code: 6700-086

Multipurpose Bucket

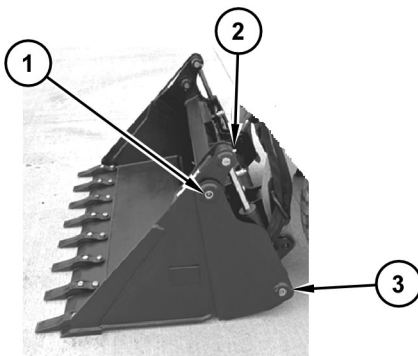


Illustration 410

g01280216

Apply lubricant to the grease fitting (1) for the pivot pin of the apron.

Apply lubricant to the grease fitting (2) for the rod end of the multipurpose bucket cylinder.

Apply lubricant to the grease fitting (3) for the head end of the multipurpose bucket cylinder.

Repeat for the other side of the bucket.

There are six grease fittings.

Utility Grapple Bucket and Utility Grapple Fork

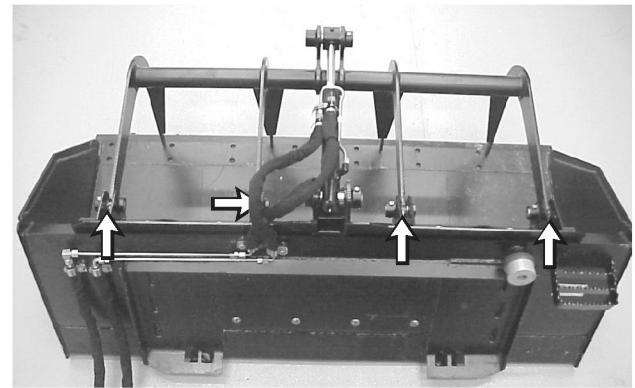


Illustration 411

g00647980

Apply lubricant to the four grease fittings for the grapples.

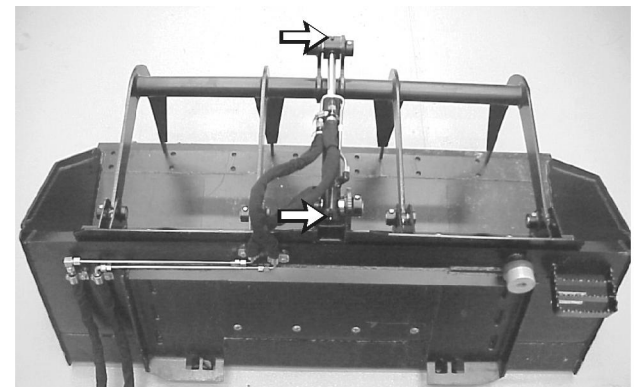


Illustration 412

g00647988

Apply lubricant to the two fittings for the grapple cylinder.

There are six grease fittings.

Industrial Grapple Bucket and Industrial Grapple Fork

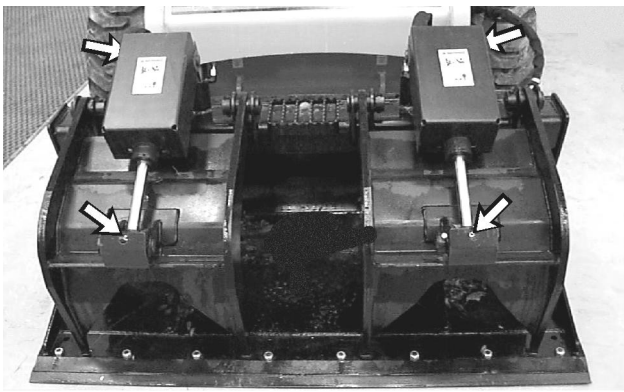


Illustration 413

g00645995

Apply lubricant to the four grease fittings for the fork cylinders.



Illustration 414

g00646004

Apply lubricant to the four grease fittings for the two forks.

There are eight grease fittings.

Grapple Rake

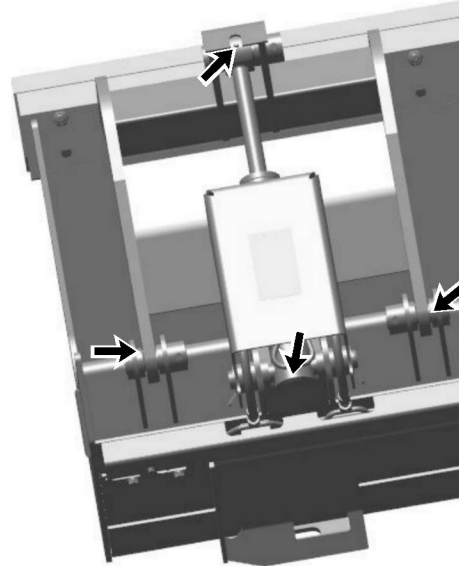


Illustration 415

g06393809

Apply lubricant to the four grease fittings for the grapple cylinders.

Apply lubricant to the four grease fittings for the two grapples.

There are eight grease fittings.

Angle Blade

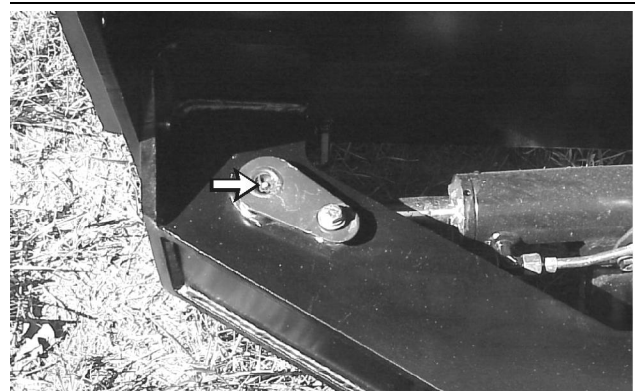


Illustration 416

g00648033

Apply lubricant to the grease fitting on the rod end of the angle cylinder.

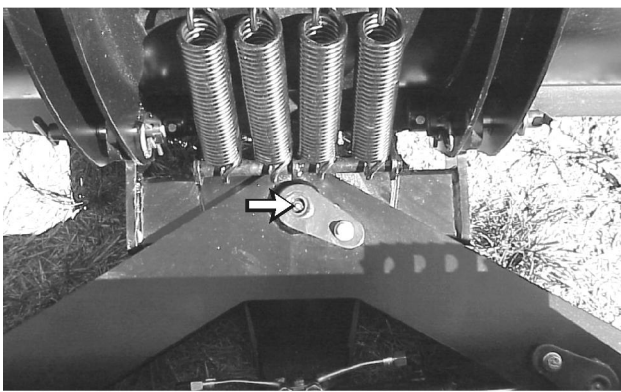


Illustration 417

g00648037

Apply lubricant to the grease fitting on the horizontal pivot point of the blade.

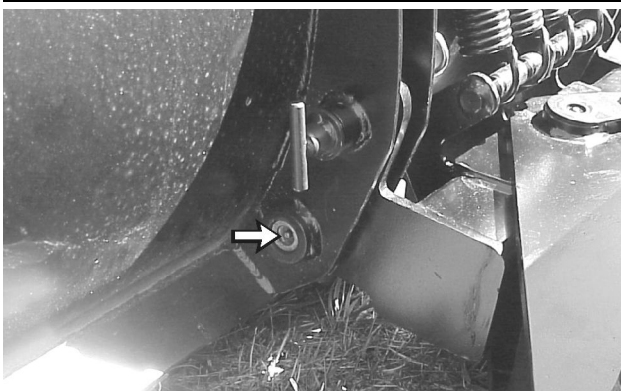


Illustration 418

g00648038

Apply lubricant to the grease fitting on the vertical pivot point of the blade. Repeat for opposite side of the blade.

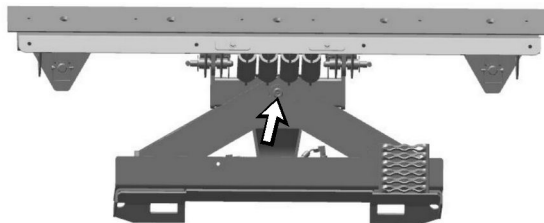


Illustration 419

g06393796

This is a bottom view of the angle blade.

Apply lubricant to the grease fitting on the pivot point of the cylinder.

There are five grease fittings.

Dozer Blade

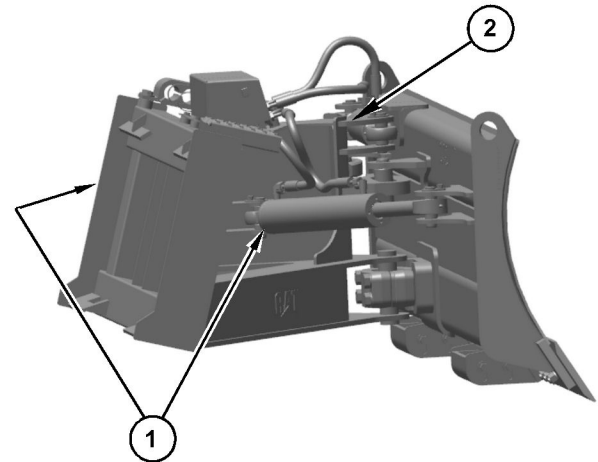


Illustration 420

g06394928

Apply lubricant to the grease fitting on both ends of the right hand angle cylinder (1). Repeat for opposite side of the blade.

Apply lubricant to the grease fitting on the pivot points on each end of the tilt cylinder (2).

There are six grease fittings.

i03881935

Work Tool Guard and Reflector - Inspect/Replace

SMCS Code: 6700

Ensure that all safety reflectors are clean. Ensure that all safety reflectors are not damaged. When you clean the safety reflectors, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety reflectors. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the safety reflectors. Loose adhesive will allow the safety reflectors to fall.

Replace any safety reflector or replace any guards that are damaged, or missing. If a safety reflector is attached to a part that is replaced, install a safety reflector on the replacement part. Any Caterpillar dealer can provide new safety reflectors.

i01809997

Work Tool Mounting Bracket - Inspect

SMCS Code: 6700-040-BK

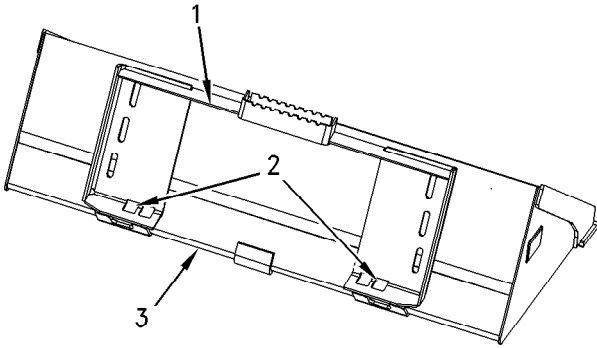


Illustration 421

g00925058

Inspect upper angled plate (1) and ensure that the plate is not bent or otherwise damaged. Inspect holes (2) for wear and for damage. Inspect lower angled plate (3) and ensure that the plate is not bent or otherwise damaged. If any wear is suspected or any damage is suspected, consult your Caterpillar dealer before you use the work tool.

Warranty Section

Warranty Information

i06112217

Emissions Warranty Information

SMCS Code: 1000

The certifying engine manufacturer warrants to the ultimate purchaser and each subsequent purchaser that:

1. New non-road diesel engines and stationary diesel engines less than 10 liters per cylinder (including Tier 1 and Tier 2 marine engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the United States and Canada, including all parts of their emission control systems (“emission related components”), are:
 - a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed by the United States Environmental Protection Agency (EPA) by way of regulation.
 - b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.
2. New non-road diesel engines (including Tier 1 and Tier 2 marine propulsion engines < 37 kW and Tier 1 through Tier 4 marine auxiliary engines < 37 kW, but excluding locomotive and other marine engines) operated and serviced in the state of California, including all parts of their emission control systems (“emission related components”), are:
 - a. Designed, built, and equipped so as to conform, at the time of sale, to all applicable regulations adopted by the California Air Resources Board (ARB).
 - b. Free from defects in materials and workmanship which cause the failure of an emission-related component to be identical in all material respects to the component as described in the engine manufacturer's application for certification for the warranty period.

3. New non-road diesel engines installed in construction machines conforming to the South Korean regulations for construction machines manufactured after January 1, 2015, and operated and serviced in South Korea, including all parts of their emission control systems (“emission related components”), are:
 - a. Designed, built, and equipped so as to conform, at the time of sale, with applicable emission standards prescribed in the Enforcement Rule of the Clean Air Conservation Act promulgated by South Korea MOE.
 - b. Free from defects in materials and workmanship in emission-related components that can cause the engine to fail to conform to applicable emission standards for the warranty period.

A detailed explanation of the Emission Control Warranty that is applicable to new non-road and stationary diesel engines, including the components covered and the warranty period, is found in a supplemental Special Publication. Consult your authorized Cat dealer to determine if your engine is subject to an Emission Control Warranty and to obtain a copy of the applicable Special Publication.

Reference Information Section

Reference Materials

i06746033

Reference Material

SMCS Code: 1000; 7000

Additional literature regarding your product may be purchased from your local Cat dealer or by visiting www.cat.com. Use the product name, sales model, and serial number to obtain the correct information for your product.

Regulatory Information (Japan)

Vehicle Inspection

Vehicle inspection certification is required to operate a machine on public roads. This includes driving on as well as crossing public roads. For details, consult your Cat dealer.

Qualifications for Machine Operation

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

Excavation and Loading

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

Demolition

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

Mining Jobs

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

Crane Slings for the Bucket with a Hook

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

Trailer Transportation

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

- In the event heavy items are to be transported, observe the related laws such as Road Traffic Law, Road Laws, Road Transportation Vehicle Laws, and Vehicle Restriction Laws.
- Conduct prior investigation of the road width, ground clearance of road/railway bridges, weight restrictions and so on, of the planned transportation route, to confirm the viability of the transportation execution.

Load

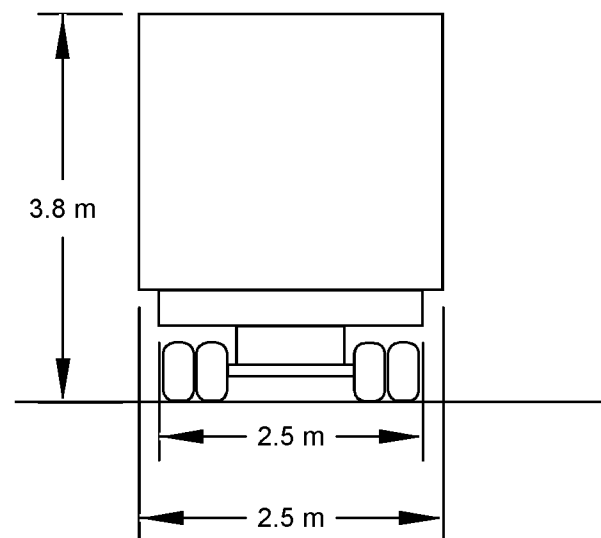


Illustration 422

g02698738

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

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

Table 122

Total Length	Not more than 12 m (39 ft 4 inch)
Total Width (A)	Not more than 2.5 m (8 ft 2 inch)
Total Height (B)	Not more than 3.8 m (12 ft 6 inch) when loaded on the trailer.
Total Weight	20 to 25 ton (depending on road, axle, and vehicle length)

Note: If the size or weight exceeds what is listed, an accommodation application is required. Contact your Cat dealer for more information.

Qualification of Operators

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

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

- One who completed an operating skill course for vehicle-type construction equipment at a registered training institution.
- One who passed the construction equipment and technologies license examination (Type 1-3) defined by the Construction Industry Law.
- One who completed an operating training course for construction equipment defined by the Vocational Training Law.
- One who took a special training (rules and skills) at a registered training institution to operate equipment weighing less than 3 tons.
- With an auto-drivers license which is conformed to each model, an operator does not need to complete an operating skill course for construction equipment to operate equipment on the roads that apply to the rules of the Road Traffic Act. However, the operator needs to complete the course to engage in snow clearing or excavating on the roads.
- Operator needs to be qualified under the Mine Safety Act to operate construction equipment in a mine.

Acquisition of the Qualifications

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

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

Operation of Construction Equipment and the Governing Laws and Regulations

NOTICE

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

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

Caterpillar Operating Training Center

Head Office:

Address: 3700 Tana, Sagamihara-City,
Kanagawa
Tel: (042) 763-7130
Fax: (042) 761-5540
Website: <http://cot.catjs.com>
e-mail: cot-honsha@cat.com

Training centers registered with the respective directors general of the regional labor bureaus and special training sites:

Locations

- Shizuoka Operating Training Center (Fujieda-City)
(Registered with Director General of Shizuoka Regional Labor Bureau) Tel: (054) 641-7010
- Tokai Operating Training Center (Toyohashi-City)
(Registered with Director General of Aichi Regional Labor Bureau) Tel: (053) 265-5151
- Chugoku Operating Training Center Okayama
Operating Training Center (Okayama-City)
(Registered with Director General of Okayama Regional Labor Bureau) Tel: (086) 272-0001

- Chugoku Operating Training Center Hiroshima Operating Training Center (Hiroshima-City) (Registered with Director General of Hiroshima Regional Labor Bureau) Tel: (082) 893-3011
- Caterpillar Kyushu Ltd. (Registered with the Director General of the Regional Labor Bureau) Fukuoka Operating Training Center Tel: (092) 924-1455 Nagasaki Operating Training Center Tel: (095) 725-3735 Kumamoto Operating Training Center Tel: (096) 359-0052 Miyazaki Operating Training Center Tel: (098) 530-2075 Oita Operating Training Center Tel: (097) 573-5955
- Hyogo Operating Training Center (Ono-City) (Registered with the Director General of Hyogo Regional Labor Bureau) Tel: (079) 467-2211
- Kinki Operating Training Center Osaka-Minami Operating Training Center (Izumi-City) (Registered with Director General of Osaka Regional Labor Bureau) Tel: (072) 556-6373
- Kinki Operating Training Center Wakayama Operating Training Center (Wakayama-City) (Registered with Director General of Wakayama Regional Labor Bureau) Tel: (073) 455-3377
- Hokuriku Operating Training Center (Kanazawa-City) (Registered with Director General of Ishikawa Regional Labor Bureau) Tel: (076) 258-2302
- Hokuriku Operating Training Center Niigata Operating Training Center (Niigata-City) Tel: (025) 266-6161
- Hokkaido Operating Training Center (Sapporo-City) (Registered with Director General of Hokkaido Regional Labor Bureau) Tel: (011) 795-7022
- Caterpillar Tohoku Ltd. Miyagi Operating Training Center (Iwanuma-City) (Registered with Director General of Miyagi Regional Labor Bureau) Tel: (022) 329-3911
- Saitama Operating Training Center Fukaya Operating Training Center (Fukaya-City) (Registered with Director General of Saitama Regional Labor Bureau) Tel: (048) 572-1177
- Saitama Operating Training Center Chichibu Operating Training Center (Chichibu-City) (Registered with Director General of Saitama Regional Labor Bureau) Tel: (049) 424-7319
- Higashi-Kanto Operating Training Center (Kashiwa-City) (Registered with Director General of Chiba Labor Bureau) Tel: (047) 133-2126
- Sagami Operating Training Center (Sagamihara-City) (Registered with Director General of Kanagawa Regional Labor Bureau) Tel: (042) 763-7103
- Kinki Operating Training Center Ibaraki Operating Training Center (Ibaraki-City) (Registered with Director General of Osaka Regional Labor Bureau) Tel: (072) 641-1121
- Kinki Operating Training Center Nara Operating Training Center (Yamato-Koriyama-City) (Registered with Director General of Nara Regional Labor Bureau) Tel: (074) 356-5445

Request for Periodical Self-Inspection

Self-inspection of Equipment

Laws require that users should regularly inspect equipment to operate it under good conditions at all times.

Inspections are classified into three types:

- before-work inspection
- monthly inspection
- annual inspection

The respective inspection items are specified by law. It is also required to retain the inspection record. Customers are recommended to conduct regular self-inspections as they are keys to increase the life of equipment and to use it efficiently.

Rules of Periodical Self-Inspection

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

Ordinance on Industrial Safety and Hygiene

Periodical self-inspections Article 167

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

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

Periodical self-inspections Article 168

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

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

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

Record of Periodical Self-Inspections Article 169

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

Specified Self-Inspection Article 169-2

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

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

Checkup before Commencing the Work Article 170

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

Other Rules

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

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

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

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

Information of Japan Construction Equipment Manufacturers Association

Dear Customers

Japan Construction Equipment Manufacturers Association

Standard Certificate of Transfer

Issued by the Japan Construction Equipment Manufacturers Association

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

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

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

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

1. About the standard certificate of transfer
 - a. Japan Construction Equipment Manufacturers Association (hereinafter referred to as CEMA) sets the rules and form of standard certificate of transfer (hereinafter referred to as certificate of transfer), and members of the CEMA issue the certificate of transfer. A certificate of transfer proves the ownership of equipment.
2. Purpose of issuance
 - a. A certificate of transfer will be issued for clarifying the ownership of equipment and preventing misconduct such as trades of stolen equipment or fraud.
3. Issuer
 - a. A certificate of transfer will be issued by a distributor (Primary transferor) who sells new construction equipment and is authorized by the CEMA.
4. Eligibility
 - a. A certificate of transfer will be issued for the equipment, which is sold by CEMA-member distributors and defined as construction equipment by the CEMA
5. Issuance
 - a. A certificate of transfer will be issued and directly given to a buyer upon the buyer's request when he/she buys eligible equipment from an issuer.
 - b. A certificate of transfer may not be issued for the equipment, which was sold as new merchandise more than 10 years ago.
 - c. A certificate of transfer is not permitted to substitute a vehicle inspection certificate.
6. Prohibition of reissuance
 - a. Certificate of transfer should be safely stored as it will not be reissued under any circumstances.
7. In case a certificate description runs out of space
 - a. Discretionary page/s to the certificate will be valid with a tally seal of the issuer at the joint of two pages.

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

Maintenance Interval Schedule for significant parts (Japan)

Caterpillar is asking periodic maintenance to secure safety and performance. To make safety better, Caterpillar recommend periodic replacement of significant parts especially.

The parts below are easy to wearing, changing of material properties, and deterioration. Furthermore, degree of damage is hard to be measured by visual inspection.

Please contact Cat dealer to ask inspection when each interval comes.

Table 123

Significant Parts	Required Interval
Fuel system hoses	Every 2 years
Brake system hoses	Every 4 years
Brake system components	Every 2 years
Steering system hoses	Every 2 years
Work Tool (Bucket i.e.) hoses	Every 2 years

i07835724

Caterpillar Approved Work Tools

SMCS Code: 6700

Only use Cat approved work tools on this machine.

Note: Do not use a Cat work tool on a machine that is not approved by Cat.

Note: A Debris Barrier Kit is required for use in applications which create airborne debris. Consult your Cat dealer for information about this kit.

Use of the following equipment or operation in the following applications may create airborne debris:

- mulching head
- brush cutter
- hammers
- recycling of paper products certain agriculture applications
- cold planing

Note: See your Cat dealer for work tools and for work tool attachments that are approved for roading.

Note: The combination of Water Tank, Backhoe Loader, and Hydraulic Hammer exceeds the recommended load rating.

Table 124

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
General Purpose Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C
General Purpose Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
General Purpose Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
General Purpose Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C
General Purpose Bucket 2133 mm (84 inch)	C	C	C	C	C	C	C	C
Multipurpose Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C
Multipurpose Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Multipurpose Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Multipurpose Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C
Multipurpose Bucket 2133 mm (84 inch)	C	C	C	C	C	C	C	C
Low Profile Bucket 1372 mm (54 inch)	C	C	C	C	C	C	C	C
Low Profile Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C
Low Profile Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Low Profile Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Low Profile Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C
Light Material Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Light Material Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C
Light Material Bucket 2134 mm (84 inch)	C	C	C	C	C	C	C	C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
Light Material Bucket 2438 mm (96 inch)	C	C	C	C	C	C	C	C
Utility Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C
Utility Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Utility Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Mixing Bucket MB200	C	C	C	C	C	C	C	C
Mixing Bucket MB250						C^	C	C
BD118 Side Discharge Bucket	C	C	C	C	C	C	C	C
BD121 Side Discharge Bucket	C	C	C	C	C	C	C	C
A14B Auger	C	C	C	C	C	C	C	C
A19B Auger	C	C	C	C	C	C	C	C
A26B Auger	C	C	C	C	C	C	C	C
BH27 Backhoe	C	C	C	C	C	C	C	C
BH30 Backhoe	C	C	C	C	C	C	C	C
BH30 w Backhoe								
BH150 Backhoe	C	C	C	C	C	C	C	C
BH160 Backhoe								
Angle Blade 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Angle Blade 2134 mm (84 inch)	C	C	C	C	C	C	C	C
Dozer Blade 2007 mm (79 inch)	C	C	C	C	C	C	C	C
Dozer Blade 2337 mm (92 inch)	C	C	C	C	C	C	C	C
BA18 Angle Broom	C	C	C	C	C	C	C	C
BU115 Utility Broom	C	C	C	C*	C	C	C	C
BU118 Utility Broom			C*	C*	C*	C*	C*	C*
BP15B Pickup Broom	C	C	C	C*	C	C	C	C
BP18B Pickup Broom			C		C*	C*	C*	C*
BA118C Angle Broom	C	C	C	C	C	C	C	C
BP115C Pickup Broom	C*	C*	C	C	C*	C	C	C
BP118C Pickup Broom			C*	C*	C*	C	C	C
PC203 Cold Planer	C	C	C	C	C	C	C	C

(continued)

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
PC204 Cold Planer	C	C	C	C	C	C	C	C
PC205 Cold Planer	C	C	C	C	C	C	C	C
PC206 Cold Planer	C	C	C	C	C	C	C	C
PC210 Cold Planer								
PC104B Cold Planer	C	C	C	C	C	C	C	C
PC205B Cold Planer	C	C	C	C	C	C	C	C
PC306B Cold Planer	C	C	C	C	C	C	C	C
PC306B XD Cold Planer								
PC310B Cold Planer								
PC310B XD Cold Planer								
PC408B Cold Planer								
PC412B Cold Planer								
Carriage and Fork Tines	C	C	C	C	C	C	C	C
Utility Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Utility Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Rake 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Industrial Grapple Rake 2134 mm (84 inch)	C	C	C	C	C	C	C	C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
Utility Grapple Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Utility Grapple Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Utility Grapple Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C
Utility Grapple Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C
Material Handling Arm	C	C	C	C	C	C	C	C
SR117 Snowblower	C	C	C	C				
SR118 Snowblower					C	C	C	C
SR121 Snowblower					C	C	C	C
SR318 Snowblower	C	C	C	C	C	C	C	C
SR321 Snowblower	C	C	C	C	C	C	C	C
Sectional Snow Push 2440 mm (8 ft)	C	C	C	C	C	C	C	C
Sectional Snow Push 3050 mm (10 ft)			C	C	C	C	C	C
Sectional Snow Push 3660 mm (12 ft)								
Sectional Snow Push 4270 mm (15 ft)								
LR15B Landscape Rake	C*	C*	C*	C*	C*	C*	C*	C*
LR18B Landscape Rake			C*	C*			C*	C*
PR172 Power Rake	C	C	C	C	C	C	C	C
PR184 Power Rake	C	C	C	C	C	C	C	C
PR190 Power Rake	C	C	C	C	C	C	C	C
LT13B Landscape Tiller	C	C	C	C	C	C	C	C
LT18B Landscape Tiller				C			C	C
SG16B Stump Grinder	C	C	C	C	C	C	C	C
SG18b Stump Grinder	C	C	C	C	C	C	C	C
T6B Trencher	C	C	C	C	C	C	C	C
T9B Trencher	C	C	C	C	C	C	C	C
T15B Trencher	C	C	C	C	C	C	C	C
CV16B Vibratory Compactor	C*	C*	C*	C*	C	C	C*	C*
CV18B Vibratory Compactor								

(continued)

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
SW45 Wheel Saw 3 inch			C*	C*			C*	C*
SW45 Wheel Saw 6 inch			C*	C*			C*	C*
SW45 Wheel Saw 8 inch			C*	C*			C*	C*
SW60 Wheel Saw 6 inch								
SW60 Wheel Saw 8 inch								
SW80 Wheel Saw								
SW345B Wheel Saw 3 inch			C^	C*			C*	C
SW345B Wheel Saw 5 inch			C*	C*			C*	C*
SW360B Wheel Saw 3 inch								
SW360B Wheel Saw 4 inch								
SW360B Wheel Saw 5 inch								
SW360B Wheel Saw 6 inch								
SW360B Wheel Saw 8 inch								
SW460B Wheel Saw 3 inch								
SW460B Wheel Saw 6 inch								
SW460B Wheel Saw 8 inch								
SW380B Wheel Saw								
SW480B Wheel Saw								
B4/B4s Hammer	CD	CD	CD	CD	CD	CD	CD	CD
H55Es Hammer	CD	CD	CD	CD	CD	CD	CD	CD
B6/B6s Hammer	CD	CD	CD	CD	CD	CD	CD	CD
H65Es Hammer	CD	CD	CD	CD	CD	CD	CD	CD
BR160 Brush Cutter	C	C	C	C				
BR166 Brush Cutter					C	C	C	C
BR172 Brush Cutter					C	C	C	C
BR272 Brush Cutter	C	C	C	C				
BR378 Brush Cutter								
BRX118							C^	C^
BRX318							C^	C^

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
BRX418								
S305 Shear			CD	CD	CD	CD	CD	CD
HM112C	C	C	C	C				
HM115C					C	C	C	C
HM215C	C	C	C	C	C	C	C	C
HM315C								
HM415C								
HM418C								
HM312 Mulcher								
HM315 Mulcher								
HM315B Mulcher								
HM415B Mulcher								
Single Bale Spear 39"	C	C	C	C	C	C	C	C
Double Bale Spear 39"	C	C	C	C	C	C	C	C
Single Bale Spear 49"	C	C	C	C	C	C	C	C
Double Bale Spear 49"	C	C	C	C	C	C	C	C
Bale Grapple	C	C	C	C	C	C	C	C
84" Material Handling Bucket	C	C	C	C	C	C	C	C
96" Material Handling Bucket	C	C	C	C	C	C	C	C
102" Material Handling Bucket	C	C	C	C	C	C	C	C
8' Snow Pusher	C	C	C	C	C	C	C	C
10' Snow Pusher	C	C	C	C	C	C	C	C
12' Snow Pusher	C	C	C	C	C	C	C	C
8' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C
10' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C
12' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C
6' Snow Blade	C	C	C	C	C	C	C	C
7' Snow Blade	C	C	C	C	C	C	C	C
8' Snow Blade	C	C	C	C	C	C	C	C
9' Snow Blade	C	C	C	C	C	C	C	C
10' Snow Blade	C	C	C	C	C	C	C	C
DFS118 Silage Defacer	C	C	C	C	C	C	C	C

(continued)

(Table 124, contd)

Work Tool	226D	232D	239D	249D	236D	242D	257D	259D
DFS121 Silage Defacer	C	C	C	C	C	C	C	C
DFS124 Silage Defacer	C	C	C	C	C	C	C	C
BB121 Box Blade	C	C	C	C	C	C	C	C
BB124 Box Blade	C	C	C	C	C	C	C	C
Snow Multi V Plow 1524 mm (60.0 inch)	C	C	C	C	C	C	C	C
Snow Multi V Plow 2133 mm (84.0 inch)	C	C	C	C	C	C	C	C
Skeleton Bucket 1956 mm (77.0 inch)	C	C	C	C	C	C	C	C
Skeleton Bucket 2133 mm (84.0 inch)	C	C	C	C	C	C	C	C
Skeleton Bucket 2336 mm (92.0 inch)	C	C	C	C	C	C	C	C
Industrial Bucket 1727 mm (68.0 inch)	C	C	C	C	C	C	C	C
Industrial Bucket 1880 mm (74.0 inch)	C	C	C	C	C	C	C	C
Industrial Bucket 2032 mm (80.0 inch)	C	C	C	C	C	C	C	C
Industrial Bucket 2184 mm (86.0 inch)	C	C	C	C	C	C	C	C
Industrial Bucket 2337 mm (92.0 inch)	C	C	C	C	C	C	C	C
Heavy Duty Carriage	C	C	C	C	C	C	C	C
Heavy Duty Tines 1219 mm (48.0 inch)	C	C	C	C	C	C	C	C
Heavy Duty Tines 1524 mm (60.0 inch)	C	C	C	C	C	C	C	C

Table 125

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
General Purpose Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C	C	C	C	C
General Purpose Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
General Purpose Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
General Purpose Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C	C	C	C	C
General Purpose Bucket 2133 mm (84 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Multipurpose Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Multipurpose Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Multipurpose Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Multipurpose Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Multipurpose Bucket 2133 mm (84 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Low Profile Bucket 1372 mm (54 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Low Profile Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Low Profile Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Low Profile Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Low Profile Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Light Material Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Light Material Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Light Material Bucket 2134 mm (84 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Light Material Bucket 2438 mm (96 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
Utility Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Mixing Bucket MB200	C	C	C	C	C	C	C	C	C	C	C	C
Mixing Bucket MB250	C	C	C	C	C	C	C	C	C	C	C	C
BD118 Side Discharge Bucket	C	C	C	C	C	C	C	C	C	C	C	C
BD121 Side Discharge Bucket	C	C	C	C	C	C	C	C	C	C	C	C
A14B Auger	C	C	C	C	C	C	C	C	C	C	C	C
A19B Auger	C	C	C	C	C	C	C	C	C	C	C	C
A26B Auger	C	C	C	C	C	C	C	C	C	C	C	C
BH27 Backhoe												
BH30 Backhoe												
BH30 w Backhoe	C	C	C	C	C	C	C	C	C	C	C	C
BH150 Backhoe	C	C	C	C	C	C	C	C	C	C	C	C
BH160 Backhoe	C	C	C	C	C	C	C	C	C	C	C	CR
Angle Blade 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Angle Blade 2134 mm (84 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Dozer Blade 2007 mm (79 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Dozer Blade 2337 mm (92 inch)	C	C	C	C	C	C	C	C	C	C	C	C
BA18 Angle Broom	C	C	C	C	C	C	C	C	C	C	C	C
BU115 Utility Broom	C	C	C	C	C	C	C	C	C	C	C	C
BU118 Utility Broom	C	C	C	C	C	C	C	C	C	C	C	C
BP15B Pickup Broom	C	C	C	C	C	C	C	C	C	C	C	C
BP18B Pickup Broom	C	C	C	C	C	C	C	C	C	C	C	C
BA118C Angle Broom	C	C	C	C	C	C	C	C	C	C	C	C
BP115C Pickup Broom	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
BP118C Pickup Broom	C	C	C	C	C	C	C	C	C	C	C	C
PC203 Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC204 Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC205 Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC206 Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC210 Cold Planer	C*	C	C	C	C	C	C	C	C	C	C	C
PC104B Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC205B Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC306B Cold Planer	C	C	C	C	C	C	C	C	C	C	C	C
PC306B XD Cold Planer			C*	C*	C*	C	C	C	C	C	C	CR
PC310B Cold Planer	C*	C	C	C	C	C	C	C	C	C	C	C
PC310B XD Cold Planer						C*		C*R	C*	C*	C*R	C*R
PC408B Cold Planer				C						C		C
PC412B Cold Planer				C						C		C
Carriage and Fork Tines	C	C	C	C	C	C	C	C	C	C	C	C
Utility Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1524 mm (60 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Bucket 1981 mm (78 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
Industrial Grapple Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Rake 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Grapple Rake 2134 mm (84 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Grapple Bucket 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Grapple Bucket 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Grapple Fork 1676 mm (66 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Utility Grapple Fork 1829 mm (72 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Material Handling Arm	C	C	C	C	C	C	C	C	C	C	C	C
SR117 Snowblower												
SR118 Snowblower	C	C	C	C	C	C	C	C	C	C	C	C
SR121 Snowblower	C	C	C	C	C	C	C	C	C	C	C	C
SR318 Snowblower	C	C	C	C	C	C	C	C	C	C	C	C
SR321 Snowblower	C	C	C	C	C	C	C	C	C	C	C	C
Sectional Snow Push 2440 mm (8 ft)	C	C	C	C	C	C	C	C	C	C	C	C
Sectional Snow Push 3050 mm (10 ft)	C	C	C	C	C	C	C	C	C	C	C	C
Sectional Snow Push 3660 mm (12 ft)		C	C	C	C	C	C	C	C	C	C	C
Sectional Snow Push 4270 mm (15 ft)			C	C					C	C	C	C
LR15B Landscape Rake	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
LR18B Landscape Rake	C	C	C	C	C	C	C	C	C	C	C	C
PR172 Power Rake	C	C	C	C	C	C	C	C	C	C	C	C
PR184 Power Rake	C	C	C	C	C	C	C	C	C	C	C	C
PR190 Power Rake	C	C	C	C	C	C	C	C	C	C	C	C
LT13B Landscape Tiller	C	C	C	C	C	C	C	C	C	C	C	C
LT18B Landscape Tiller	C	C	C	C	C	C	C	C	C	C	C	C
SG16B Stump Grinder	C	C	C	C	C	C	C	C	C	C	C	C
SG18b Stump Grinder	C	C	C	C	C	C	C	C	C	C	C	C
T6B Trencher	C	C	C	C	C	C	C	C	C	C	C	C
T9B Trencher	C	C	C	C	C	C	C	C	C	C	C	C
T15B Trencher	C	C	C	C	C	C	C	C	C	C	C	C
CV16B Vibratory Compactor	C	C	C	C	C	C	C	C	C	C	C	C
CV18B Vibratory Compactor	C	C	C	C	C	C	C	C	C	C	C	C
SW45 Wheel Saw 3 inch	C^	C^	C	C	C	C	C	C	C	C	C	C
SW45 Wheel Saw 6 inch	C^	C^	C	C	C	C	C	C	C	C	C	C
SW45 Wheel Saw 8 inch	C^	C^	C	C	C	C	C	C	C	C	C	C
SW60 Wheel Saw 6 inch		C^	C^	C^	C	C	C^	C	C	C	C	C
SW60 Wheel Saw 8 inch		C^	C^	C^	C	C	C^	C	C	C	C	C
SW80 Wheel Saw			C*	C*	C*	C*	C*	C	C	C	C	C
SW345B Wheel Saw 3 inch	C^	C^	C	C	C	C	C	C	C	C	C	C
SW345B Wheel Saw 5 inch	C^	C^	C	C	C	C	C	C	C	C	C	C
SW360B Wheel Saw 3 inch			C^	C^	C^	C^	C^	C^	C	C	C	CR
SW360B Wheel Saw 4 inch		C^	C^	C^	C^	C^	C^	C^	C	C	C	CR
SW360B Wheel Saw 5 inch		C^	C^	C^	C^	C^	C^	C^	C	C	C	CR
SW360B Wheel Saw 6 inch		C^	C^	C^	C^	C^	C^	C^	C	C	C	CR

(continued)

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
SW360B Wheel Saw 8 inch		C^	C^	C^	C^	C^	C^	C^	C	C	C	CR
SW460B Wheel Saw 3 inch				C^						C		CR
SW460B Wheel Saw 6 inch				C^						C		CR
SW460B Wheel Saw 8 inch				C^						C		CR
SW380B Wheel Saw			C^	C^	C^	C^	C^	C^	C	C	C	CR
SW480B Wheel Saw				C^						C		CR
B4/B4s Hammer	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
H55Es Hammer	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
B6/B6s Hammer	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
H65Es Hammer	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
BR160 Brush Cutter												
BR166 Brush Cutter	C	C	C	C	C	C	C	C	C	C	C	C
BR172 Brush Cutter	C	C	C	C	C	C	C	C	C	C	C	C
BR272 Brush Cutter												
BR378 Brush Cutter	C	C	C	C	C	C	C	C	C	C	C	C
BRX118		C^	C	C	C	C	C	C	C	C	C	C
BRX318		C^	C	C	C	C	C	C	C	C	C	C
BRX418				C						C		C
S305 Shear	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
HM112C												
HM115C	C	C	C	C	C	C	C	C	C	C	C	C
HM215C												
HM315C	C	C	C	C	C	C	C	C	C	C	C	C
HM415C				C						C		C
HM418C				C						C		C
HM312 Mulcher	C	C	C	C	C	C	C	C	C	C	C	C
HM315 Mulcher	C	C	C	C	C	C	C	C	C	C	C	C
HM315B Mulcher	C	C	C	C	C	C	C	C	C	C	C	C
HM415B Mulcher				C						C		C

(continued)

Reference Information Section
Caterpillar Approved Work Tools

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
Single Bale Spear 39"	C	C	C	C	C	C	C	C	C	C	C	C
Double Bale Spear 39"	C	C	C	C	C	C	C	C	C	C	C	C
Single Bale Spear 49"	C	C	C	C	C	C	C	C	C	C	C	C
Double Bale Spear 49"	C	C	C	C	C	C	C	C	C	C	C	C
Bale Grapple	C	C	C	C	C	C	C	C	C	C	C	C
84" Material Han- dling Bucket	C	C	C	C	C	C	C	C	C	C	C	C
96" Material Han- dling Bucket	C	C	C	C	C	C	C	C	C	C	C	C
102" Material Han- dling Bucket	C	C	C	C	C	C	C	C	C	C	C	C
8' Snow Pusher	C	C	C	C	C	C	C	C	C	C	C	C
10' Snow Pusher	C	C	C	C	C	C	C	C	C	C	C	C
12' Snow Pusher	C	C	C	C	C	C	C	C	C	C	C	C
8' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C	C	C	C	C
10' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C	C	C	C	C
12' Snow Pusher (Rubber Edge)	C	C	C	C	C	C	C	C	C	C	C	C
6' Snow Blade	C	C	C	C	C	C	C	C	C	C	C	C
7' Snow Blade	C	C	C	C	C	C	C	C	C	C	C	C
8' Snow Blade	C	C	C	C	C	C	C	C	C	C	C	C
9' Snow Blade	C	C	C	C	C	C	C	C	C	C	C	C
10' Snow Blade	C	C	C	C	C	C	C	C	C	C	C	C
DFS118 Silage Defacer	C	C	C	C	C	C	C	C	C	C	C	C
DFS121 Silage Defacer	C	C	C	C	C	C	C	C	C	C	C	C
DFS124 Silage Defacer	C	C	C	C	C	C	C	C	C	C	C	C
BB121 Box Blade	C	C	C	C	C	C	C	C	C	C	C	C
BB125 Box Blade	C	C	C	C	C	C	C	C	C	C	C	C
Snow Multi V Plow 1524 mm (60.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C

(continued)

(Table 125, contd)

Work Tool	246D	262D	272D/ D2	272D/ D2 XHP	277D	287D	279D	289D	297D/ D2	297D/ D2 XHP	299D/ D2	299D/ D2 XHP
Snow Multi V Plow 2133 mm (84.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Skeleton Bucket 1956 mm (77.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Skeleton Bucket 2133 mm (84.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Skeleton Bucket 2336 mm (92.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Bucket 1727 mm (68.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Bucket 1880 mm (74.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Bucket 2032 mm (80.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Bucket 2184 mm (86.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Industrial Bucket 2337 mm (92.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Heavy Duty Carriage	C	C	C	C	C	C	C	C	C	C	C	C
Heavy Duty Tines 1219 mm (48.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C
Heavy Duty Tines 1524 mm (60.0 inch)	C	C	C	C	C	C	C	C	C	C	C	C

Legend

C - Compatible

C* - Compatible But Lift Restriction Apply

C^ - Compatible But Lift Restrictions Apply and Max
Machine Counterweights RequiredD - European Union Restrictions Apply; Refer to
Operation Maintenance Manual, "Safety Section:
Worktools: Demolition"R - Machine must have limited options installed to
avoid exceeding the maximum total machine rated
capacity. Refer to the Operation and Maintenance
Manual for the specific Work Tool for details.

Many of the work tools in the table have an Operation and Maintenance Manual. Refer to the Operation and Maintenance Manual that is provided with the work tool for the proper use of the work tool.

Consult your Cat dealer concerning specific work tools that are approved by Cat for this machine. This list was complete at the time of publication. There may be more work tools that have been approved since that time. Consult your Cat dealer for an updated list of approved work tools.

INTENDED USE STATEMENT for the Material Handling Arm

This Work Tool has the intended functions of lifting and transporting suspended loads. Always select sufficiently sized lifting accessories. Always inspect the lifting accessories before use.

Do not use the work tool improperly.

Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.

INTENDED USE STATEMENT for the Multipurpose Bucket

This Work Tool has the intended functions of dozing, digging, loading, lifting, carrying, and moving material such as earth, crushed rock, or gravel.

Do not use the work tool improperly.

Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.

INTENDED USE STATEMENT for the Grapple Bucket

This Work Tool has the intended functions of digging, loading, lifting, carrying, and moving material such as earth, crushed rock, gravel, or debris.

Do not use the work tool improperly.

Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.

INTENDED USE STATEMENT for the Grapple Rake

This Work Tool has the intended functions of raking, loading, carrying, and moving bulky material. The material may be encountered in the following applications:

- Landscape cleanup
- Storm debris cleanup
- Demolition
- Industrial
- Construction

Do not use the work tool improperly.

- Do not pry with one rake tine. Use multiple rake tines to loosen material.
- Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.
- Do not place the weight of the host machine on the grapples in the open position.

INTENDED USE STATEMENT for the Grapple Forks

This Work Tool has the intended functions of loading, carrying, and moving bulky materials.

Do not use the work tool improperly.

Remove the work tool from the machine before you lift the host machine. Refer to Operation and Maintenance Manual, "Lifting and Tying Down the Machine" for details.

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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: _____

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