

Product: SKID STEER LOADER

Model: 228 SKID STEER LOADER 6BZ

Configuration: 216 226 228 Skid Steer Loader 6BZ00001-00699 (MACHINE) POWERED BY 3034 Engine

Operation and Maintenance Manual 216, 226, 228, 232, 236, 242, 246, 248, 252 and 262 Skid Steer Loaders

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s00037320

Foreword

SMCS - 7606

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 they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely 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.

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.

Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

Certified Engine Maintenance

Proper maintenance and repair is 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 render inoperative any emission related device or element of design installed on or in an engine or machine that is in compliance with the

regulations (40 CFR Part 89). 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.

Cat Product Identification Number

Effective First Quarter 2001 the Cat Product Identification Number (PIN) has changed from 8 to 17 characters. In an effort to provide uniform equipment identification, Caterpillar and other 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 Cat 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

g00751314

Where:

1. Caterpillar's 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, etc. and work tools will continue to use an 8 character Serial Number (S/N).

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Safety Messages

SMCS - 7000; 7405

There are several specific safety signs on this machine. The exact location of the hazards and the description of the hazards are reviewed in this section. Please become familiarized with all safety signs.

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

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

Do Not Operate



Illustration 1

g00536638

This warning label is positioned inside the cab.



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 armrest.

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 in injury or death.

Stay Inside Operator Station



Illustration 2

g00540797

This danger sign (1) is located below the operator seat.



Keep your body inside operator station while operating loader.

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

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

Loader Crushing



Illustration 3

g00540792

This danger sign is located below the operator seat.



Keep out of this area

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

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

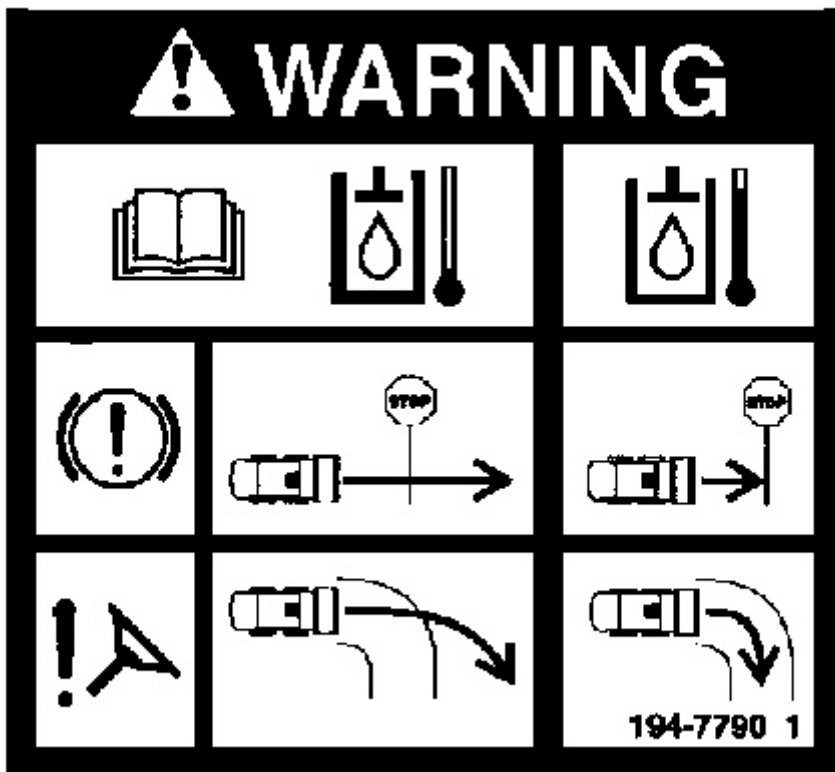
Machine Operation in Cold Weather



Illustration 4

g00791713

This warning label is located inside the cab.



g00757507



The braking and steering system of this machine react differently when the hydraulic oil is cold. Operating the machine with cold hydraulic oil

requires extra stopping and turning clearances. Failure to follow the instructions or heed the warnings could result in injury or death.

Refer to Operation and Maintenance Manual, "Engine Starting With Glow Plugs" for information on machine preparation for cold weather.

Pressurized System



Illustration 5

g00536624

This warning is positioned below the radiator cap.



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.

Batteries



Illustration 6

g00536625

This warning is positioned on the inside of the engine access door.

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.

Battery



Illustration 7

g00536640

This label is located on the battery.

WARNING

DANGER/POISON

Shield eyes, Explosive gases. Can cause blindness or injury.

No sparks, flames or smoking.

Sulfuric Acid can cause blindness or severe burns.

FLUSH EYES IMMEDIATELY WITH WATER. Get medical help fast.

Keep out of reach of children. Contains sulfuric acid. For medical emergency in USA or Canada contact: 800-458-5924, other countries contact: , 303-893-1322.

Lift Arm Brace for the 216, 226, 228, 236, 246 and 248 Machines



Illustration 8

g00589497

This warning is positioned on the lift arm brace.



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.

Use the following steps to install the lift arm brace:

1. Remove the work tool. Park the machine on level ground. Lower lift arms to the ground. Stop the engine and exit the machine.

2. Remove the retaining pin and lower the brace onto the lift cylinder.
3. Mount the machine. Secure the seat belt and lower the armrest. Start the engine.
4. Raise the lift arms until the brace falls onto the cylinder rod. Slowly lower the lift arms until the brace stops movement.
5. Stop the engine. Exit the machine. Secure the retaining pin through the brace below the cylinder rod.

Use the following steps to remove the lift arm brace:

1. Remove the retaining pin from the brace and install the pin in the holding block.
2. Detach and swing the pivot lever clockwise onto the retaining pin.
3. Mount the machine. Secure the seat belt and lower the armrest. Start the engine.
4. Slowly raise the lift arms until the lever engages the retaining pin.
5. Slowly lower the lift arms to the ground. Stop the engine. Exit the machine.
6. Raise and secure the brace to the lift arm with the retaining pin.

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

Lift Arm Brace for the 232, 242, 252 and 262 Machines



Illustration 9

g00771460

This warning is positioned on the lift arm brace.



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.

Use the following steps to install the lift arm brace:

1. Remove the work tool. Park the machine on level ground. Raise the lift arms to maximum height.
2. Remain in the seat. The seat belt must be fastened and the armrest must be in the lowered position. Remain in the seat until the brace is installed.
3. A second person must remove the brace from the storage position by removing the retaining pins.
4. The second person should then install the brace over the rod of one of the lift cylinders.
5. Lower the loader lift arms slowly until the brace is held tightly between the rod and the cylinder.
6. Secure the two retaining pins through the brace below the rod.

Use the following steps to remove the lift arm brace:

1. Mount the machine. Fasten the seat belt. Lower the armrest and remain in the seat until the brace is removed.
2. Slowly raise the lift arms until the brace is free.
3. A second person must remove the retaining pins and the brace from the rod.
4. Slowly lower the lift arms to the ground.
5. The second person should return the brace to the storage location. Attach the brace with the retaining pins.

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

Aerosol Starting Aid



Illustration 10

g00580397

This warning is located on top of the fuel pump housing.



g00103679



Do not use aerosol types of starting aids such as ether. Such use could result in an explosion and personal injury.

Work Tool Coupler

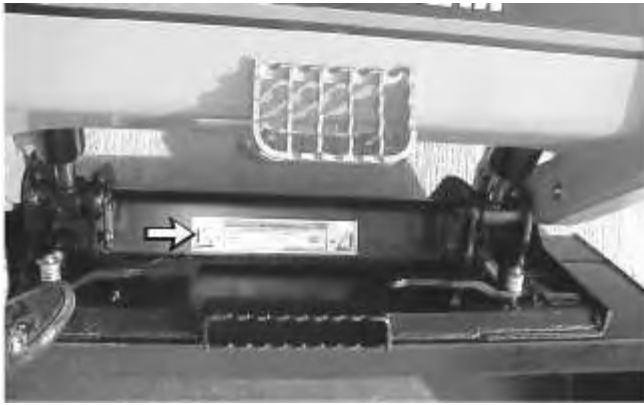


Illustration 11

g00586150

This warning is located on the coupler assembly.

WARNING

Do not operate machine without confirmation that coupler pins are fully engaged

Make certain all hydraulic connections are tight (if equipped)

Use only Caterpillar approved work tools

Improper attachment of work tool could result in injury or death

Tilt the work tool downward.

Put down pressure on the work tool.

Move the machine backward. Ensure that the work tool has not separated from the coupler assembly.

Work Tool Coupler



This warning is located inside the cab near the hydraulic quick coupler control.



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.

Tilt the work tool downward.

Put down pressure on the work tool.

Move the machine backward. Ensure that the work tool has not separated from the coupler assembly.

ROPS/FOPS STRUCTURE



This warning is located inside the cab on the upper left side.



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.

Cab Support



Illustration 14

g00540861

This warning is located inside the cab on the left side.



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.

Cab Support



This warning is located on the left side of the machine.



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.

Carrying a Load



This warning is located below the operator seat.



Carry load low.

Do not exceed rated load.

Load, unload, turn on level ground.

Travel up and down slope with heaviest end of loader uphill.

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

Never Permit Riders



Illustration 17

g00540825

This warning is located below the operator seat.



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.

Mounting and Dismounting



Illustration 18

g00540831

This warning is located below the operator seat.



Mounting and Dismounting

Maintain 3-point contact (2 feet and 1 hand or 1 foot and 2 hands) with steps and handholds

When Leaving Loader:

- 1. Park machine on level ground**
- 2. Lower work tool to ground**
- 3. Stop engine and remove ignition key**
- 4. Raise arm rest and remove seat belt**

Park Brake is applied automatically

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

Accumulator



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