CATERPILLAR®

SEBU5498-02
February 1980

Operation Manual

235 & 245 Excavator

32K1301-Up
94L255-Up
64R596-Up
95V471-Up
62X1-Up
81X1-Up
82X1-Up
83X1-Up
84X1-Up

⚠ IMPORTANT SAFETY NOTICE

Most accidents involving machine operation 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.

Improper operation is dangerous and could result in injury or death.

READ AND UNDERSTAND ALL SAFETY PRECAUTIONS AND WARNINGS BEFORE OPERATING THIS MACHINE.

Basic safety precautions are outlined in the **SAFETY** section of this Guide and in the description of operations where hazards exist. Warning labels have also been put on the machine to provide instructions and to identify specific hazards which, if not heeded, could cause bodily injury or death to you or other persons. These warnings in the Guide and on the machine labels are identified by the symbol **⚠ WARNING**

Operations that may result only in machine damage are identified by **CAUTION** labels on the machine and in the Guide.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this Guide and on the machine are therefore not all inclusive. If an operation is not performed as specifically recommended by Caterpillar, you must satisfy yourself that it is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation you choose.

⚠ WARNING

The proper and safe lubrication and maintenance procedures for this machine, recommended by Caterpillar, are outlined in the LUBRICATION & MAINTENANCE GUIDE for this machine.

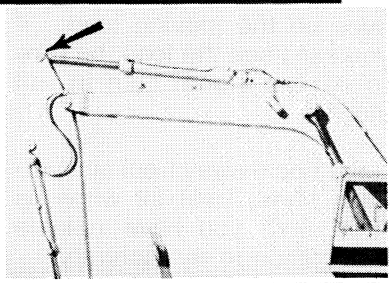
Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the LUBRICATION & MAINTENANCE GUIDE before performing any lubrication or maintenance.

TABLE OF CONTENTS

SAFETY ⚠ **THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY**

⚠ WARNING

Do not operate this machine unless you have read and understand the instructions in the Operator's Guide. Improper machine operation is dangerous and could result in injury or death.



⚠ WARNING

Watch boom clearance when traveling. Uneven ground may cause the boom to move side to side or up and down.

⚠ WARNING

KNOW THE MAXIMUM HEIGHT AND REACH OF YOUR MACHINE

Serious injury or death by electrocution may occur if machine or attachments are not kept a safe distance from electrical power lines. Keep distance at least 3.05 M (10 feet) plus additional 10 mm (.4 inch) for each 1,000 volts over 50,000 volts. Local and state codes or job site operating directives may require greater distance for safety.

General

Read and understand all safety precautions and warnings before operating the machine.

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

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

Keep machine, especially deck and steps free of foreign material. Secure all loose items such as lunch boxes, tools, etc.

Know the hand signals and who gives them. Accept signals from one person only.

Do not smoke while refueling or when near batteries.

SAFETY

Be alert... always keep your eyes on the moving load... if you can't see the load, be sure to have a signal man in full view.

Keep boom away from all overhead lines. Treat all wires as "hot" until you have reliable information to the contrary.

If power line is hit, stay on machine until line is clear or power is disconnected.

Warn people to stay away if machine is in contact with power lines.

Mounting and Dismounting

Climb on or off the machine only where steps and/or grab irons are provided.

Use both hands when mounting and dismounting and face machine.

Never get on or off a moving machine... and never jump.

Learn location of emergency exits and use when necessary.

Preparing to Start

Inspect condition of seat belt. Replace if damaged or worn.

Make certain all protective guards and covers are secured in place.

Inspect machine for potential fire hazards.

Make sure machine is equipped with proper lighting system as required by job conditions.

Always have a fire extinguisher on hand and know how to use it. Inspect as recommended.

Starting

Do not start the machine or move any of the controls if there is a warning tag hanging on the controls.

Make sure no one is working on, underneath, or close to the machine before starting engine or beginning to move.

Move all implement controls to hold or neutral before starting engine.

Start and run engine only in well ventilated area.

Preparing to Operate

Fasten seat belt securely.

Check for proper operation of all controls and protective devices while moving slowly in an open area. See L & M Guide for adjustments.

- Right and left steering.
- All brakes.
- Engine governor control lever.
- Other devices such as lights, backup alarm, horn, etc.

Operating

Operate controls only while seated.

Do not allow riders on the vehicle or implements unless additional seat, seat belt, and rollover protection is provided.

The operator must satisfy himself that no one will be endangered before moving the machine.

Be careful to avoid tipping when working on hills, banks or slopes and when crossing ditches, ridges or other obstructions.

Stay a safe distance from the edge of cliffs overhangs and slide areas.

If your machine begins to side slip on a grade, immediately dispose of the load and turn the machine downhill.

Check for adequate tail swing clearance before operating.

Connect trailing equipment to drawbar or hitch only.

Personnel should not be between machine and trailing equipment while maneuvering to connect. Block tongue or hitch of trailing equipment to align it with drawbar or hitch.

Be sure hitch points and tow cable are adequate.

Never straddle cable nor allow others to do so.

Wear gloves when handling cable.

Do not operate if cable is tangled, kinked, frayed or damaged.

Keep other machines back away from edge of excavation when you are digging.

Get help for jobs such as spooling cable. Unspool and respool properly.

Swing boom to upper side of hill to avoid tipping except when using as a crutch.

For long moves, position boom in direction of travel.

SAFETY

Know the exact location of buried pipes and cables — mark them clearly.

Back machine away from excavation before leaving machine.

Avoid fast swings, hoists or sudden stops.

Use caution on slopes...tipping can occur if you travel with load beyond safe operating radius.

Beware of reduced stability when swinging over side of track.

When working in pit or near high banks, keep check on pit men ...be quick to alert them if a cave in appears imminent.

When loading trucks, never swing over the truck cab. Make sure the driver remains out of the truck during loading.

Parking Machine

Lower equipment to the ground with slight down pressure. Engage hydraulic lock lever, stop engine, turn off disconnect switch and remove key.

If machine must be parked on a slope always block track.

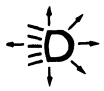
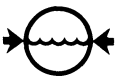
SYMBOL IDENTIFICATION

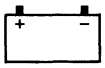
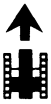
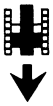
THESE PAGES EXPLAIN THE MEANING OF SYMBOLS THAT MAY APPEAR ON YOUR MACHINE.

THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY

PRESSURIZED-COMPARTMENT	DISENGAGE	EMPTY	ENGINE OIL-LEVEL
HANDS-NO 	ENGAGE	FULL	ENGINE OIL-TEMPERATURE
SLOW	HOURS	ONE HALF FULL	ENGINE OIL-PRESSURE
FAST	COOLER-CONTROL	CONTINUOUSLY VARIABLE	ENGINE-REVOLUTIONS PER MINUTE OR RUNNING
LOCK	HEATER-CONTROL	LUBRICATE-GREASE	ENGINE-NOT RUNNING
UNLOCK	LEVER-MOVEMENT	LUBRICATE-OIL	ENGINE-ETHER AID START
ON	LEVER-MOVEMENT	ENGINE-OIL	ENGINE-HEAT
OFF	NEUTRAL	ENGINE OIL-FILTER	ENGINE-HOURS

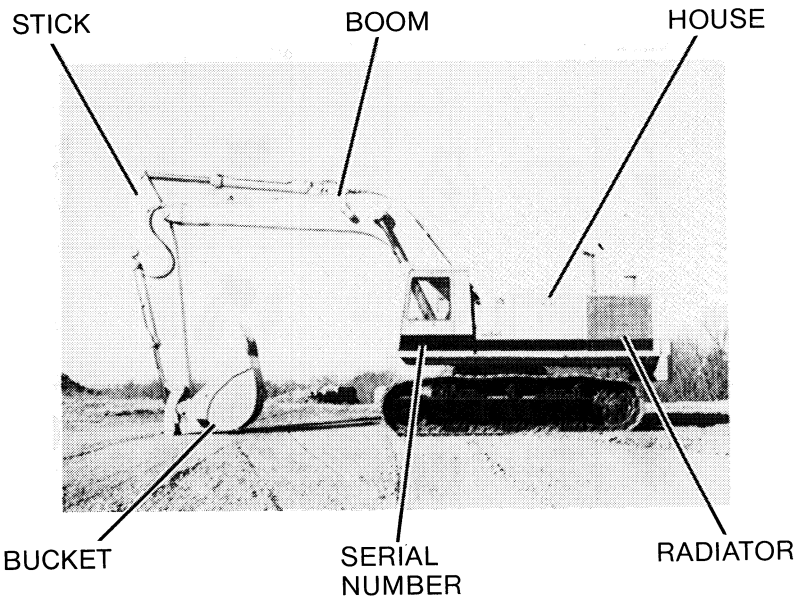
SYMBOL IDENTIFICATION

STEERING 	LIGHT-ALL 	DIESEL 	COOLANT-TEMPERATURE 
TURN-LEFT 	LIGHT-BRIGHT 	FUEL-FILTER 	HYDRAULIC-OIL 
TURN-RIGHT 	LIGHT-DIM 	FUEL-LEVEL 	HYDRAULIC-OIL-FILTER 
AIR-CIRCULATION-INSIDE 	LIGHT-FLOOD OR WORK 	FUEL-PRESSURE 	HYDRAULIC-LEVEL 
AIR-CIRCULATION-OUTSIDE 	LIGHT-INSTRUMENT OR PANEL 	FUEL-SHUTOFF 	HYDRAULIC-PRESSURE 
AIR-FILTER 	LIGHT-PARK 	COOLANT-FLOW 	HYDRAULIC-TEMPERATURE 
AIR-PRESSURE 	LIGHT-TAIL 	COOLANT-FLOW-NO 	DEFROSTER-CONTROL 
AIR-EMERGENCY 	LIGHT-INTERIOR 	COOLANT-LEVEL 	WASHER-CONTROL 
FAN 	LIGHTER 	COOLANT-PRESSURE 	WIPER-CONTROL 

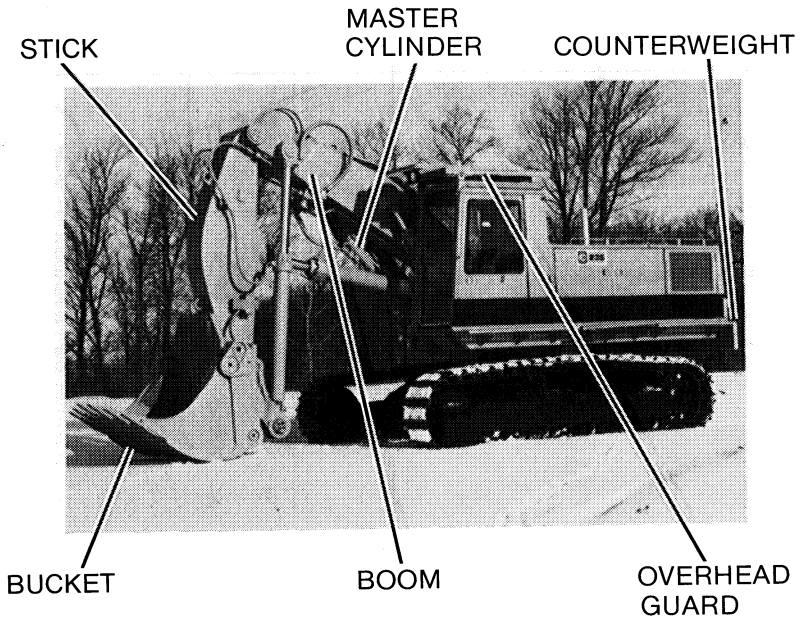
HORN-CONTROL 	FUSE 	BACKHOE BOOM-RAISE 	SHOVEL BOOM-RAISE 
AMMETER OR ALTERNATOR 	DISCONNECT SWITCH ON 	BACKHOE-DIG 	SHOVEL STICK-IN 
BATTERY 	DISCONNECT SWITCH OFF 	BACKHOE-DUMP 	SHOVEL STICK-OUT 
VOLTAGE-HIGH 	FORWARD 	BACKHOE STICK-IN 	LIFT-POINT 
VOLTAGE-LOW 	REVERSE 	BACKHOE STICK-OUT 	LIFT-DO NOT 
SWITCH-EMERGENCY 	BACKHOE-SWING RIGHT 	BACKHOE BOOM-LOWER 	EMERGENCY EXIT 
CIRCUIT BREAKER	BACKHOE-SWING LEFT 	SHOVEL BOOM-LOWER 	TEST 
SERVICE 	BOTTOM DUMP-OPEN 	BOTTOM DUMP-CLOSE 	MONITORING SYSTEM 

MODEL VIEWS

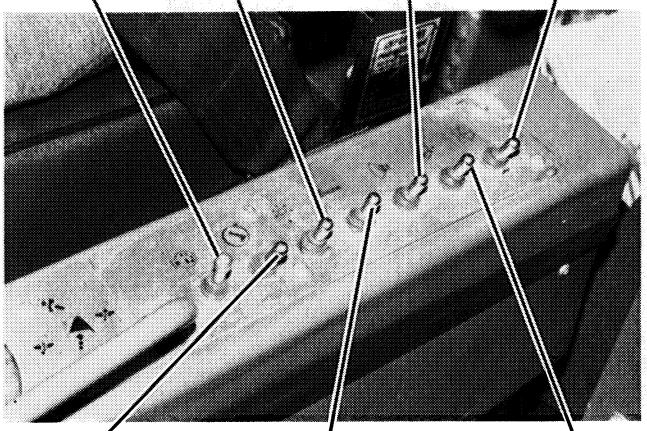
Backhoe Equipped — 245



Front Shovel Equipped — 235



OPERATOR'S COMPARTMENT



NOTE

All switches except HEAT-START are OFF when in the far left position. HEAT-START switch is OFF when centered.

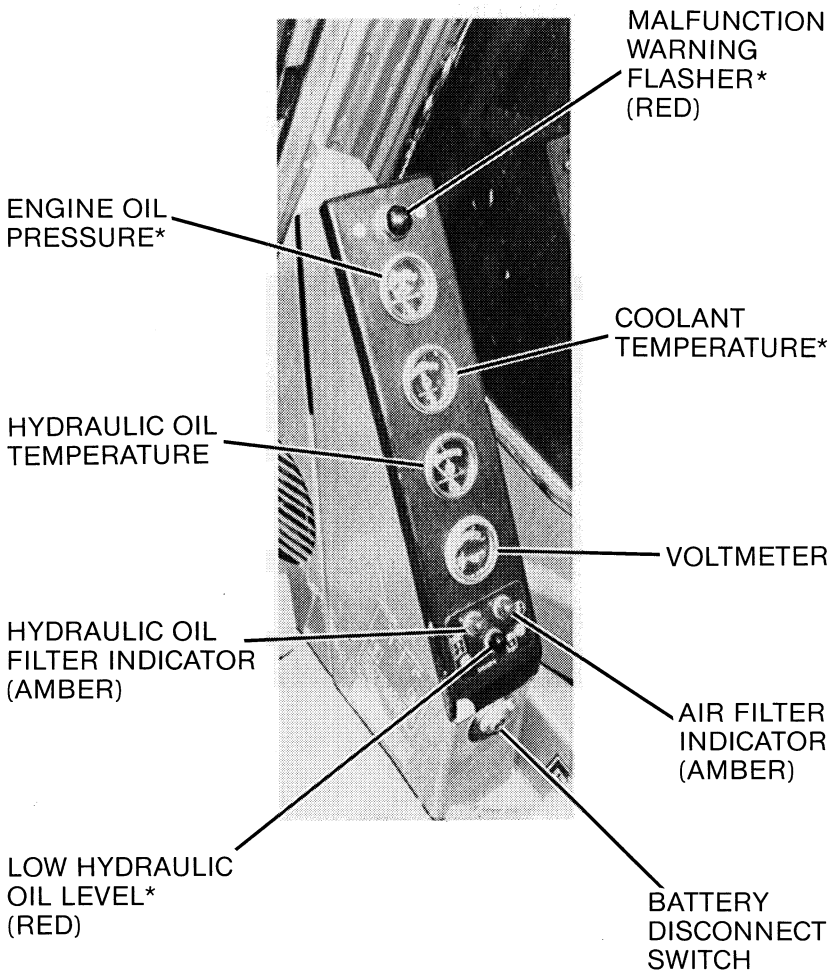
***On later machines the switch must be pulled up to move it to HEAT or START position.**

****For testing the warning flasher and indicators mounted at lower right hand side of cab.**

*****Machines with direct injection engines. Pull the switch up to move it to START.**

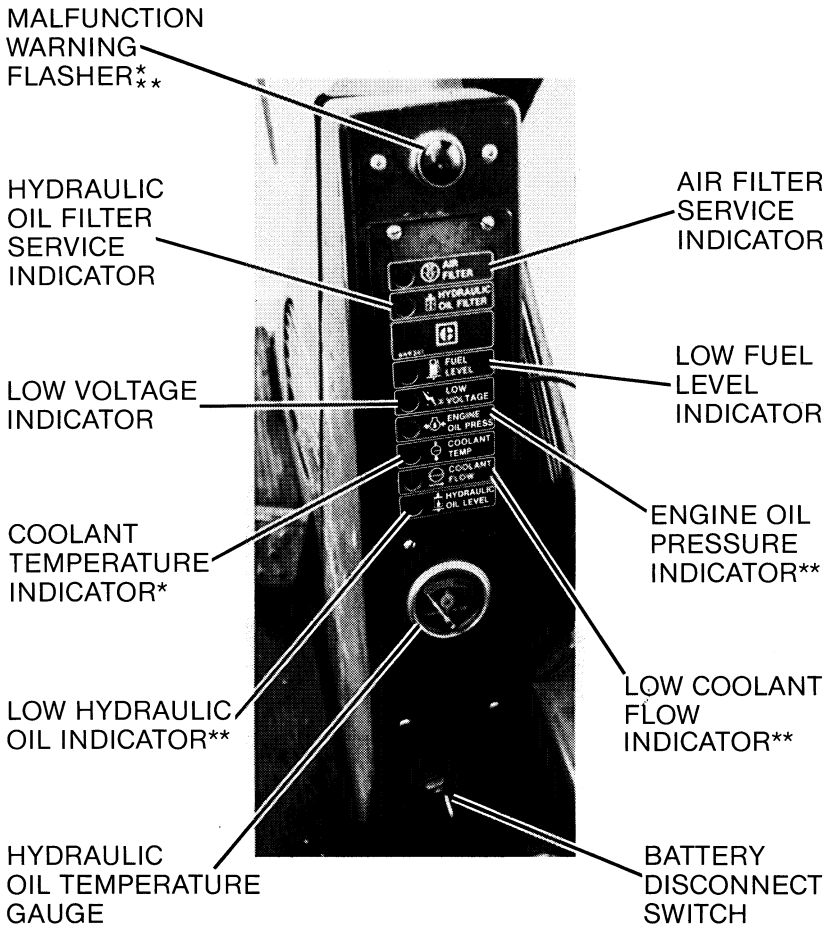
OPERATOR'S COMPARTMENT

235 Indicator Panel



***MALFUNCTION WARNING FLASHER operates because of HIGH COOLANT TEMPERATURE, LOW HYDRAULIC OIL LEVEL or LOW ENGINE OIL PRESSURE.**

245 Indicator Panel

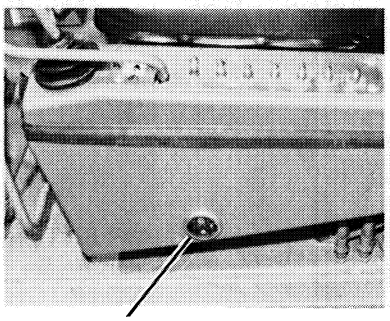


All indicators are red and will flash on and off.

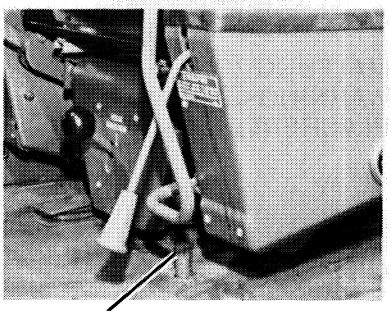
***MALFUNCTION WARNING FLASHER only: operates in conjunction with the COOLANT TEMPERATURE INDICATOR.**

****MALFUNCTION WARNING FLASHER and AUDIBLE HORN operate in conjunction with the LOW HYDRAULIC OIL, LOW ENGINE OIL PRESSURE and LOW COOLANT FLOW INDICATORS.**

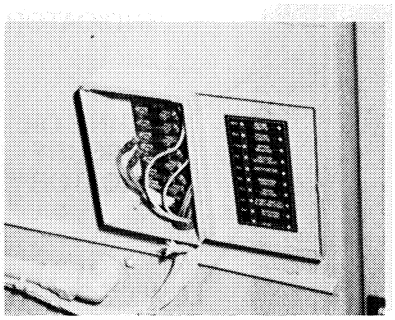
OPERATOR'S COMPARTMENT



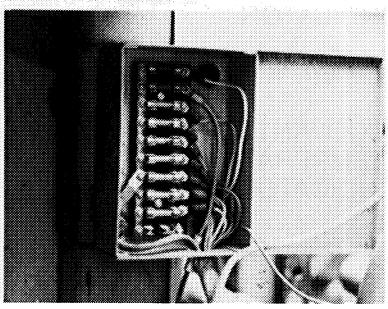
HOUR METER



HORN BUTTON

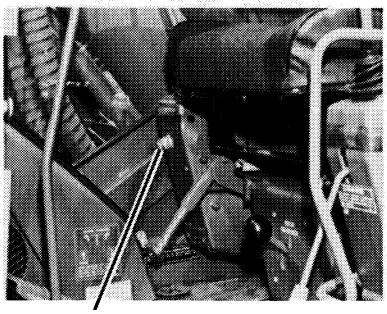


235 FUSE BOX*

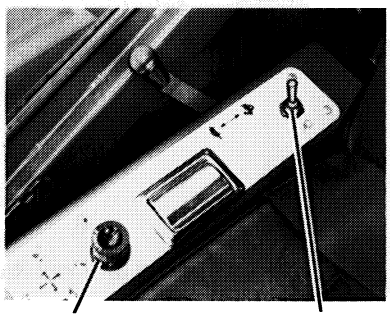


245 FUSE BOX*

***Fuse box is located inside left side front access door.**



PANEL LIGHT



LIGHTER

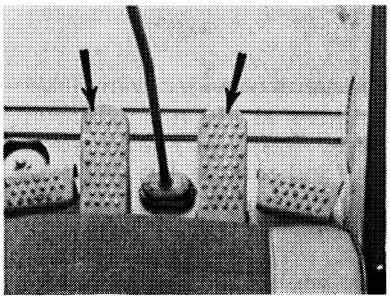
ETHER STARTING AID**

****Machines with direct injection engines only.**

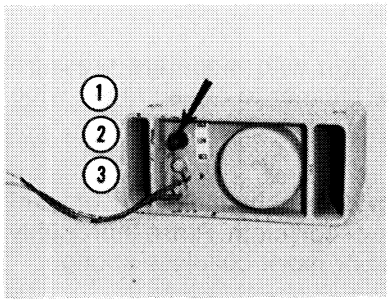
TRAVEL ALARM

The alarm operates when the machine travels in forward or reverse direction to warn nearby personnel.

The alarm is located under the rear of the house.



Alarm will sound any time a travel pedal is engaged.



A switch at the rear of the unit adjusts the sound level to meet the job requirements.

① HIGH
② LOW
③ MEDIUM

NOTE
The alarm is set at the HIGH sound level when shipped from the factory.

A button at the top of the steering control lever can be depressed to stop the alarm when it is not required.

Depress the button, then release it. The alarm will sound for 10 seconds, then turn off.

It will remain off until the machine is stopped, and travel is resumed in either direction.

OPERATOR'S COMPARTMENT

Plastic Cab Windows

The cab is provided with plastic windows at the rear and both sides. They are shatter resistant and reduce the need for vandalism protection.

NOTE
Care must be used when cleaning, to prevent damage to the plastic.

Cleaning Plastic Windows

With Aircraft Windshield Cleaner:

Apply cleaner with a soft cloth. Rub with moderate pressure until all dirt is removed. Allow the cleaner to dry and then wipe off with a clean soft cloth.

With Soap and Water:

Wash windows with a mild soap or detergent and plenty of lukewarm water, using a clean sponge or soft cloth. Rinse thoroughly and dry with a moist chamois skin or moist cellulose sponge.

Stubborn Dirt and Grease:

Wash with a good grade of naptha, isopropyl alcohol or Butyl Cellosolve. Follow by washing thoroughly with soap and water.

CAUTION

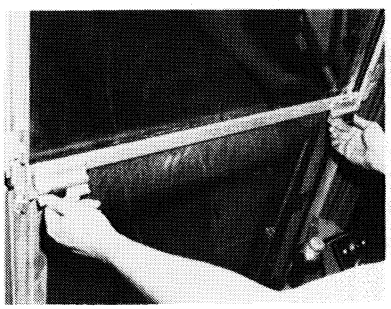
Never use gasoline, benzine, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, lacquer thinner, acids, alkali, or glass cleaner to clean the plastic. These materials will attack the plastic and may cause it to craze. Do not use abrasive cleaners. Do not use scraper blades or other sharp instruments. Do not rub plastic with dry cloth since this builds up a static charge that attracts dust.

NOTE

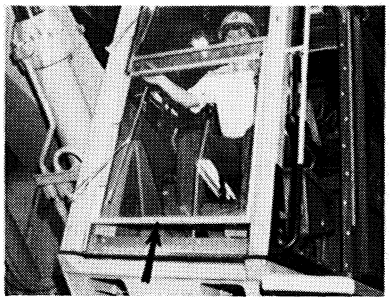
Hairline scratches and minor abrasions can be removed, or minimized, by using a mild automotive or commercial wax. A thin even coat of wax, polished by hand with a clean cloth, will help prevent further scratching.

Windshield — Lower Window

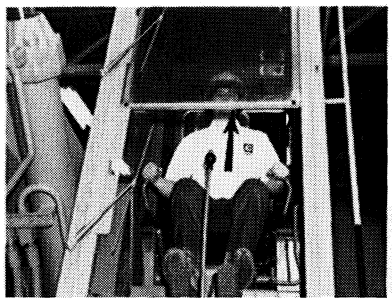
1. To provide ventilation, lower window can be opened.



2. Unlatch window on each side.

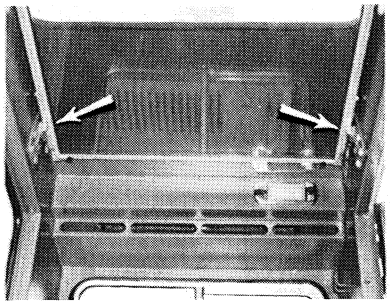


3a. Raise lower window until it catches or . . .



3b. to the level of the upper window.

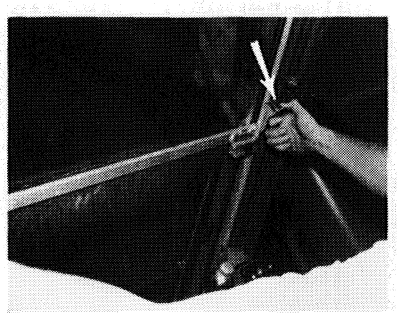
Upper and Lower Windows



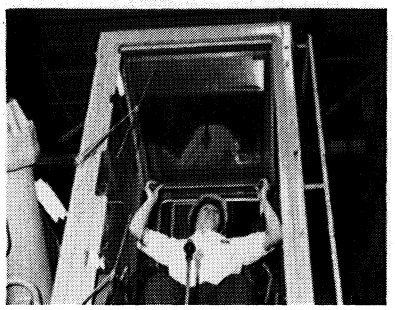
1. Lift lower window, to the level of the upper window, until it engages the two catches.

⚠ WARNING

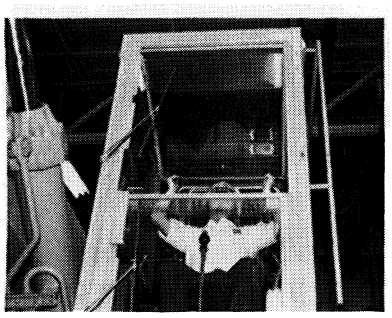
To prevent windows from falling on operator, be sure catches at top of cab hold windows securely.



2. Unlatch the upper window on each side.



3. Swing upper and lower windows to the roof of the cab until they engage catches at top of cab.

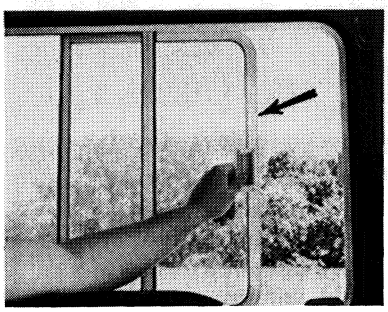


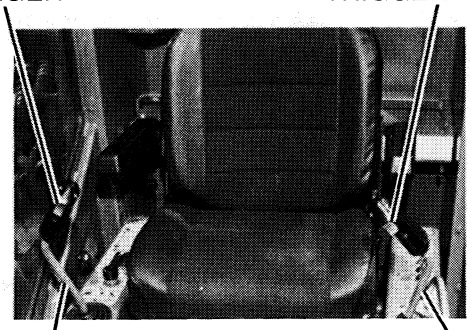
4. Upper window may be removed, while lower window remains in place.

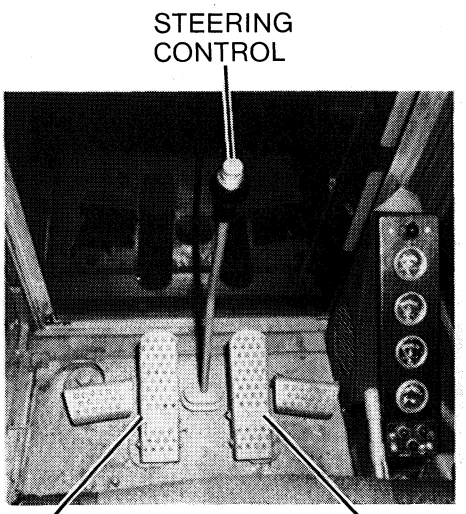
A 3 piece protective cover is available from your Caterpillar dealer. It provides protection against windshield glass damage or vandalism.

Rear Window

Unlock the rear window and slide it toward the right side of the cab for increased ventilation.

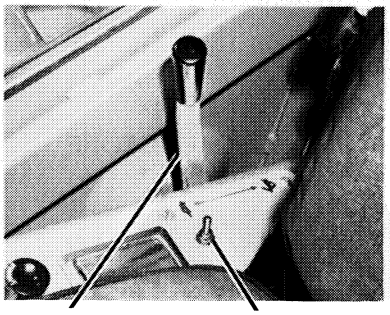






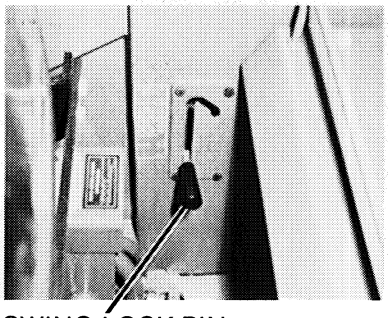
*Attachment — For Bottom Dump Bucket Only

CONTROLS

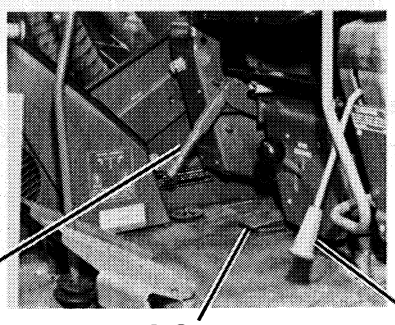


ENGINE GOVERNOR CONTROL

INCREASED PRESSURE CONTROL



SWING LOCK PIN CONTROL

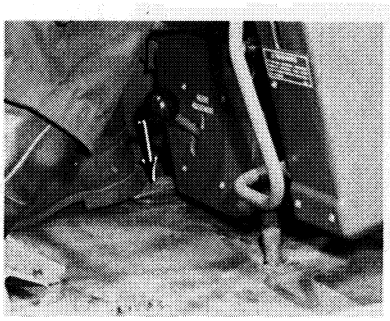


SWING BRAKE CONTROL

TWO SPEED CONTROL

HYDRAULIC AND ANTI-TRAVEL LOCK LEVER

Two Speed Control

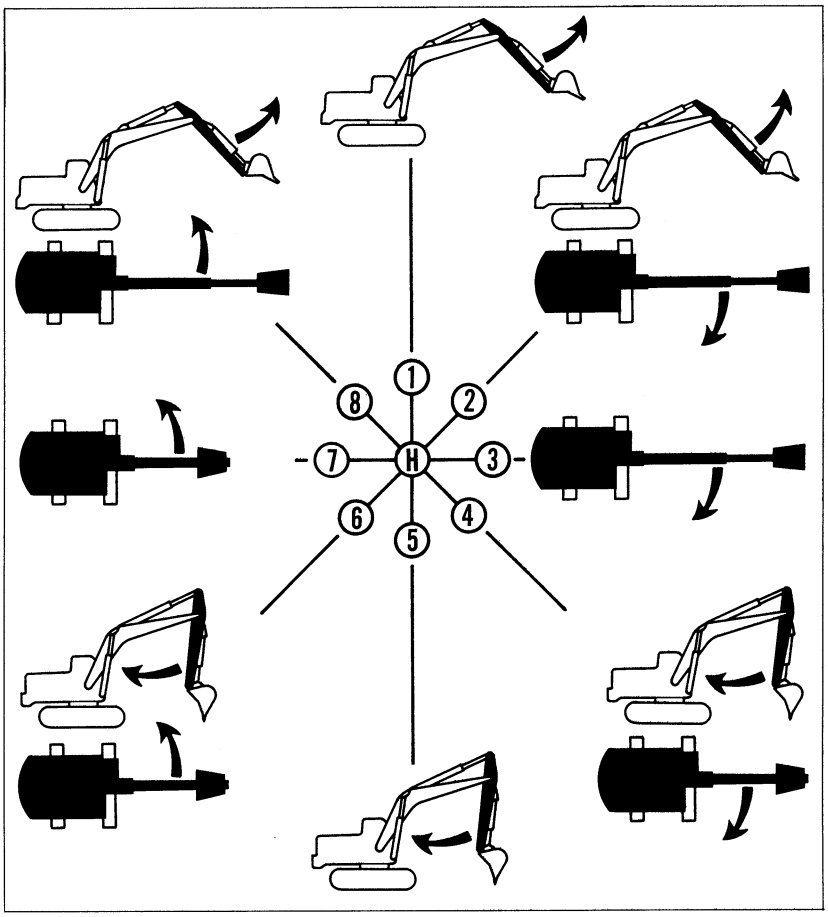


Depress the TWO SPEED CONTROL pedal to increase boom raise speed.

The pedal can be used to increase the 235 STICK OUT speed.

Release the pedal to resume normal speed.

Swing and Stick Control — Backhoe



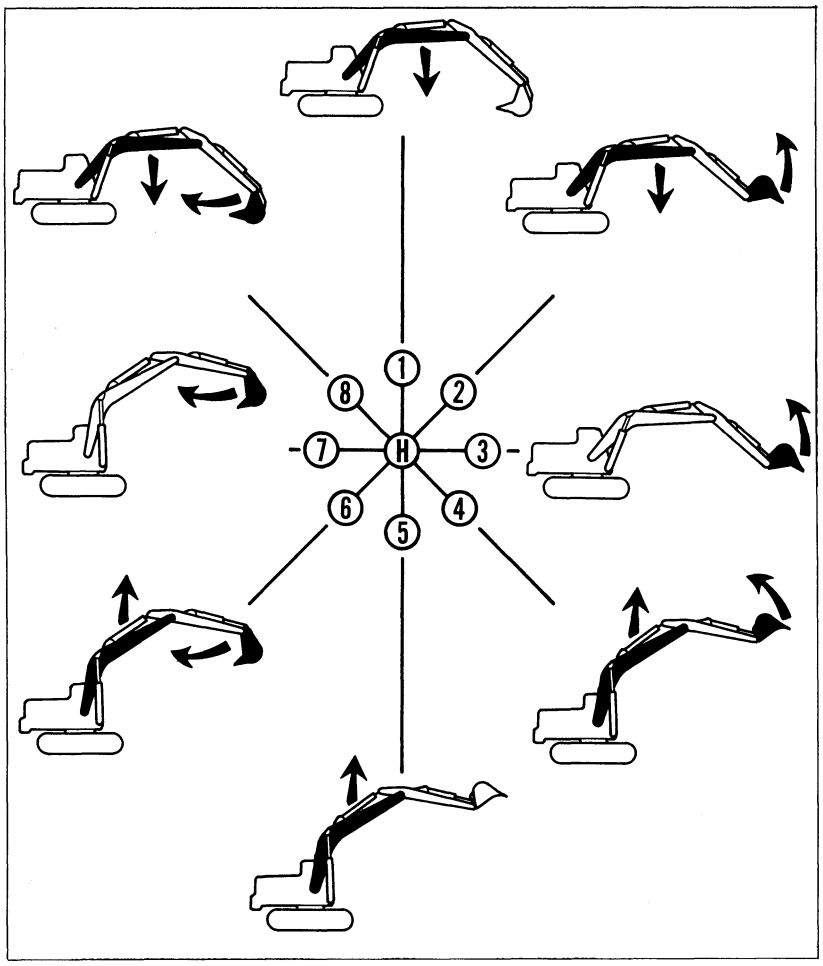
Ⓗ HOLD
① Stick moves out.
② Stick moves out and house swings to the right.
③ House swings to the right.
④ Stick moves in and house swings to the right.
⑤ Stick moves in.
⑥ Stick moves in and house swings to the left.
⑦ House swings to the left.
⑧ Stick moves out and house swings to the left.

NOTE
The control will function in any position of the house.

Swing speed is not decreased by using other hydraulic controls.

CONTROLS

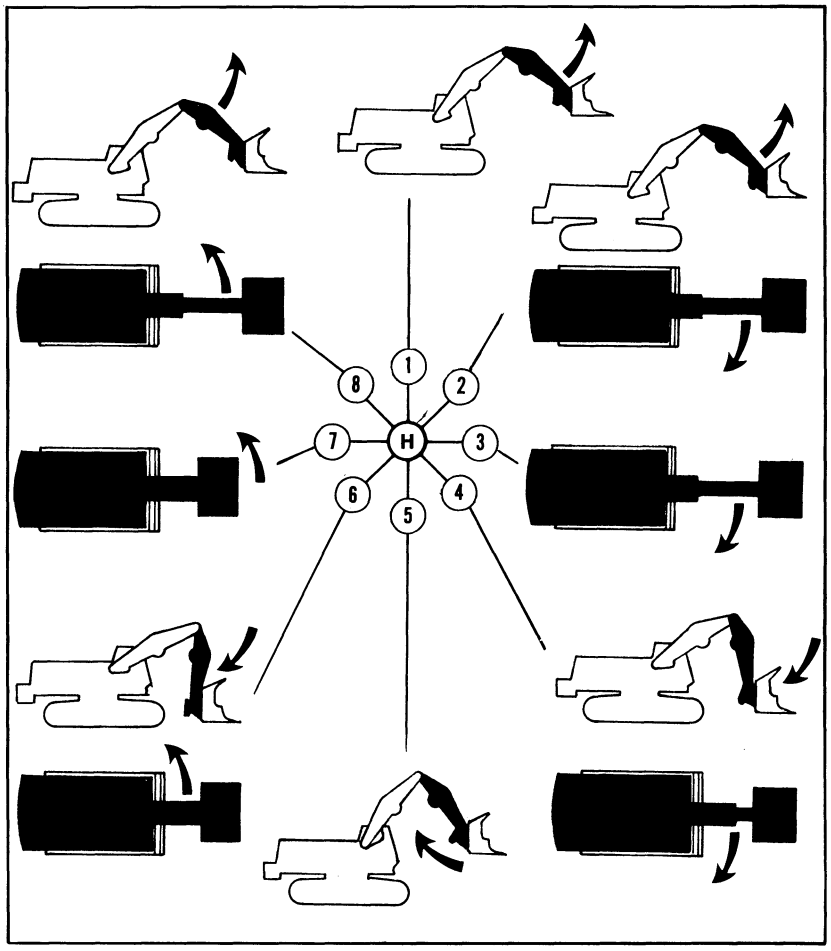
Bucket and Boom Control — Backhoe



Ⓗ HOLD.
① Boom lowers.
② Boom lowers and bucket opens.
③ Bucket opens.
④ Boom raises and bucket opens.
⑤ Boom raises.
⑥ Boom raises and bucket closes.
⑦ Bucket closes.
⑧ Boom lowers and bucket closes.

NOTE
The control will function in any position of the house.

Swing and Stick Control — Front Shovel



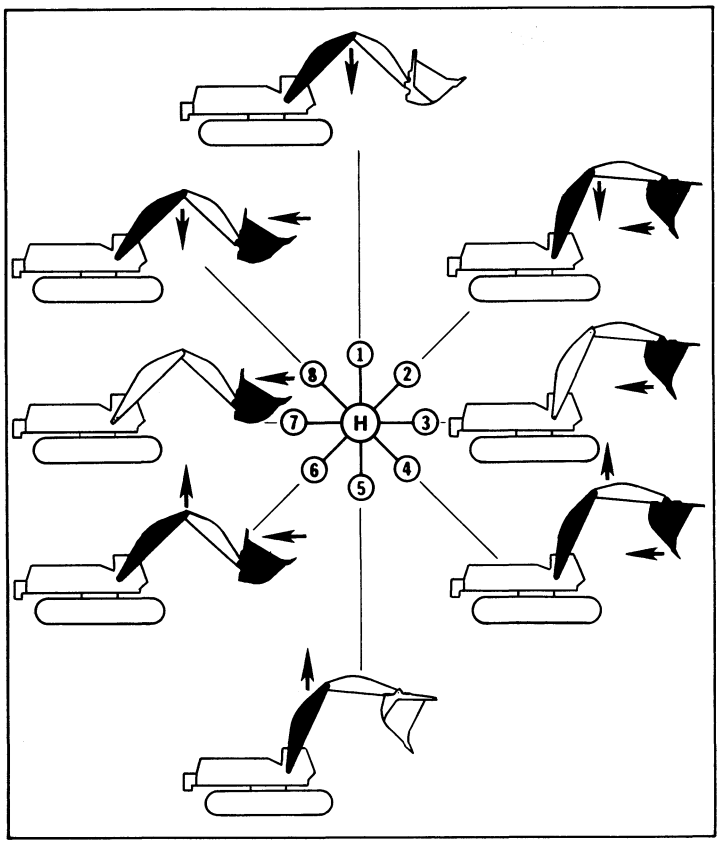
Ⓗ HOLD
① Stick moves out.
② Stick moves out and upper house swings to the right.
③ Upper house swings to the right.
④ Upper house swings to right and stick moves in.
⑤ Stick moves in.
⑥ Stick moves in and upper house swings to left.
⑦ Upper house swings to the left.
⑧ Upper house swings to the left and stick moves out.

NOTE
The control will function with the house in any position.

Swing Speed is not decreased by using swing and stick control and other hydraulic controls simultaneously.

CONTROLS

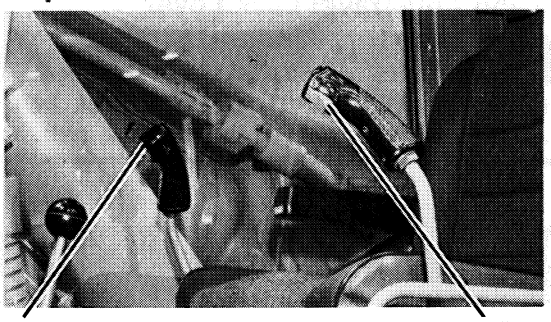
Bucket and Boom Control — Front Shovel



Ⓗ HOLD
① Boom lowers.
② Boom lowers and bucket dumps.
③ Bucket dumps.
④ Bucket dumps and boom raises.
⑤ Boom raises.
⑥ Boom raises and bucket racks back.
⑦ Bucket racks back.
⑧ Bucket racks back and boom lowers.

NOTE
The control will function with the house in any position.

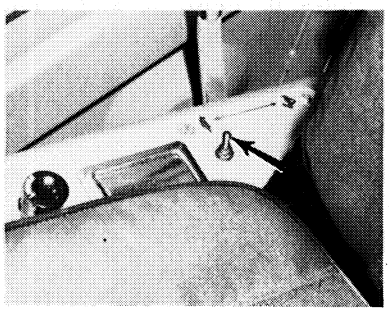
Bottom Dump Shovel Bucket Controls



Press RIGHT HAND trigger to open bottom of bucket.

Press LEFT HAND trigger to close bottom of bucket.

Increased Pressure Switch Attachment
(245 back-hoe machines only)



Move the switch to the right (ON) to allow hydraulic pressure in the boom raise circuit to increase from 31000 kPa (4500 psi) to 34500 kPa (5000 psi).

This increases the lift capacity of the machine to permit lifting of extra heavy loads, like large sections of concrete pipe.

With the switch on all hydraulic functions will operate at a slow speed.

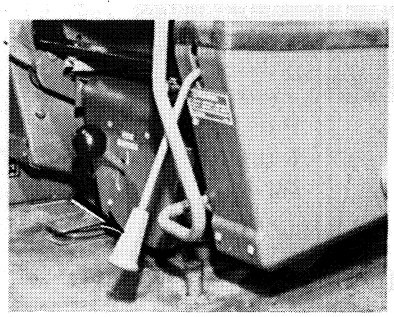
For maximum efficiency and to prevent stresses on components, move the switch to the left (OFF) for normal operation. Use the control only to lift extra heavy loads.

CONTROLS

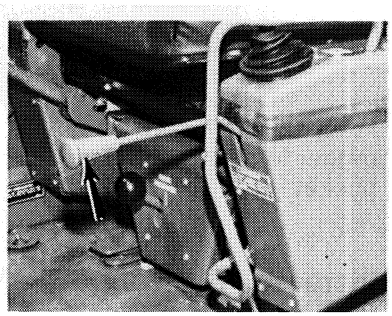
Hydraulic and Anti-Travel Lock Lever

⚠ WARNING

Place the HYDRAULIC AND ANTI-TRAVEL LOCK LEVER in the LOWER position before leaving the cab.

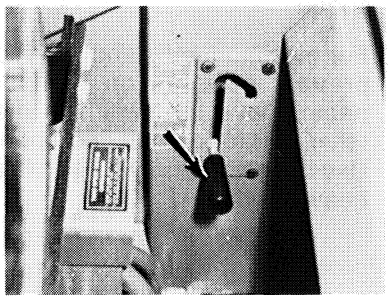


With the lock lever down, all hydraulic controls and travel pedals are INOPERABLE.

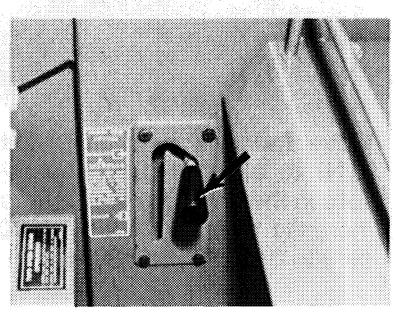


With the lock lever up, all hydraulic controls and travel pedals are OPERABLE.

Swing Lock Pin



ENGAGED — With the control lever forward the house will not swing.



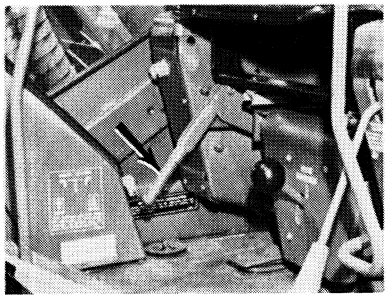
DISENGAGED — House will swing when the swing lever is in the rear position.

CAUTION

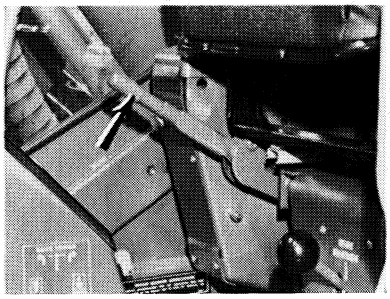
Engage pin only when house is aligned with track. Do not attempt to engage pin when house is rotating.

Swing lock pin must be in ENGAGED position during transportation of machine.

Swing Brake Control



Brake RELEASED



Brake APPLIED

Swing brake is used to prevent the house from any movement that could result from swing motion caused by loads.

CAUTION

Swing brake is not a service brake. Do not use brake when roading the machine.

NOTE

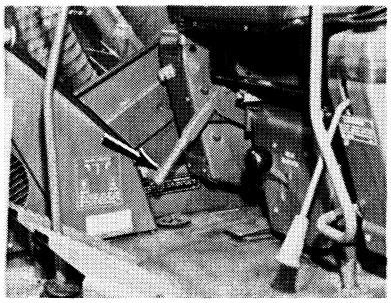
Swing brake is used while digging or working on a side slope, or as a parking brake.

SWING BRAKE CONTROL ADJUSTMENT

It should require a firm pull to snap handle over center.

Brake is properly adjusted when it keeps boom from swinging when applied, and lining is free when released.

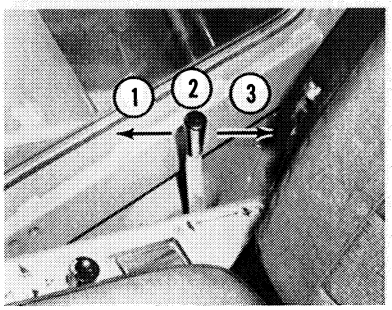
Turn knob clockwise to tighten, counterclockwise to loosen.



Consult your Caterpillar dealer if the swing brake cannot be adjusted.

CONTROLS

Engine Governor Control



① ENGINE STOPPED — Push lever forward all the way to stop engine.

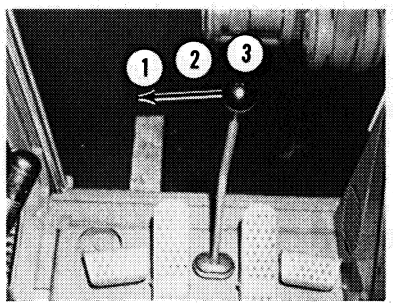
② LOW IDLE — Center lever for low engine rpm during starting and warm-up.

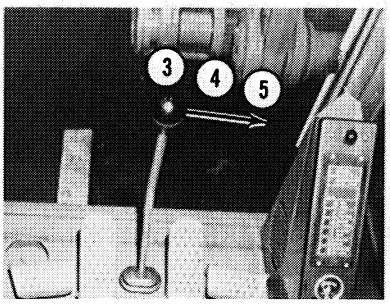
③ HIGH IDLE — Move lever to the rear for high engine rpm to operate machine, after warm-up.

Steering Control

NOTE

Steering control will not function unless operated in conjunction with travel pedals.





① SPOT LEFT TURN — When FORWARD travel pedal is engaged, the right track moves toward the idler and the left track moves toward the sprocket.

② PIVOT ON LEFT TRACK — The left track is disengaged. Depress FORWARD travel pedal for forward turn or REVERSE travel pedal for reverse turn.

③ STRAIGHT — Depress FORWARD travel pedal to move straight toward idlers, or REVERSE travel pedal to move straight toward sprockets.

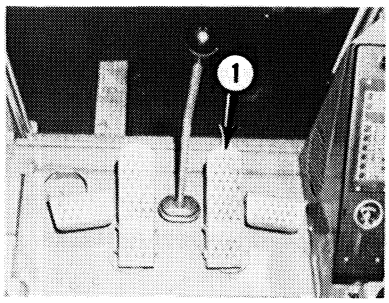
④ PIVOT ON RIGHT TRACK — The right track is disengaged. Depress FORWARD travel pedal for forward turn, or REVERSE travel pedal for reverse turn.

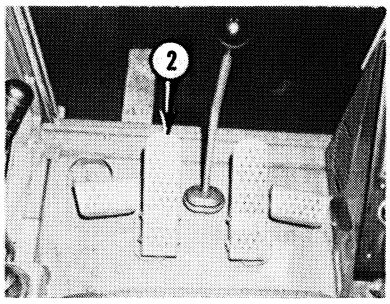
⑤ SPOT RIGHT TURN — When the FORWARD travel pedal is engaged, the left track moves toward the idler and the right track moves toward the sprocket.

Travel Pedals

NOTE

With either travel pedal fully depressed; BOOM RAISE, STICK and BUCKET controls will not function. With either track control pedal partially depressed; BOOM RAISE, STICK and BUCKET CONTROLS will function at reduced speed.





① FORWARD — Depress right track pedal ①. Undercarriage will move in the direction of the idlers.

② REVERSE — Depress left track pedal ②. Undercarriage will move in the direction of the sprockets.

NOTE

The farther the pedals are depressed the faster the speed.

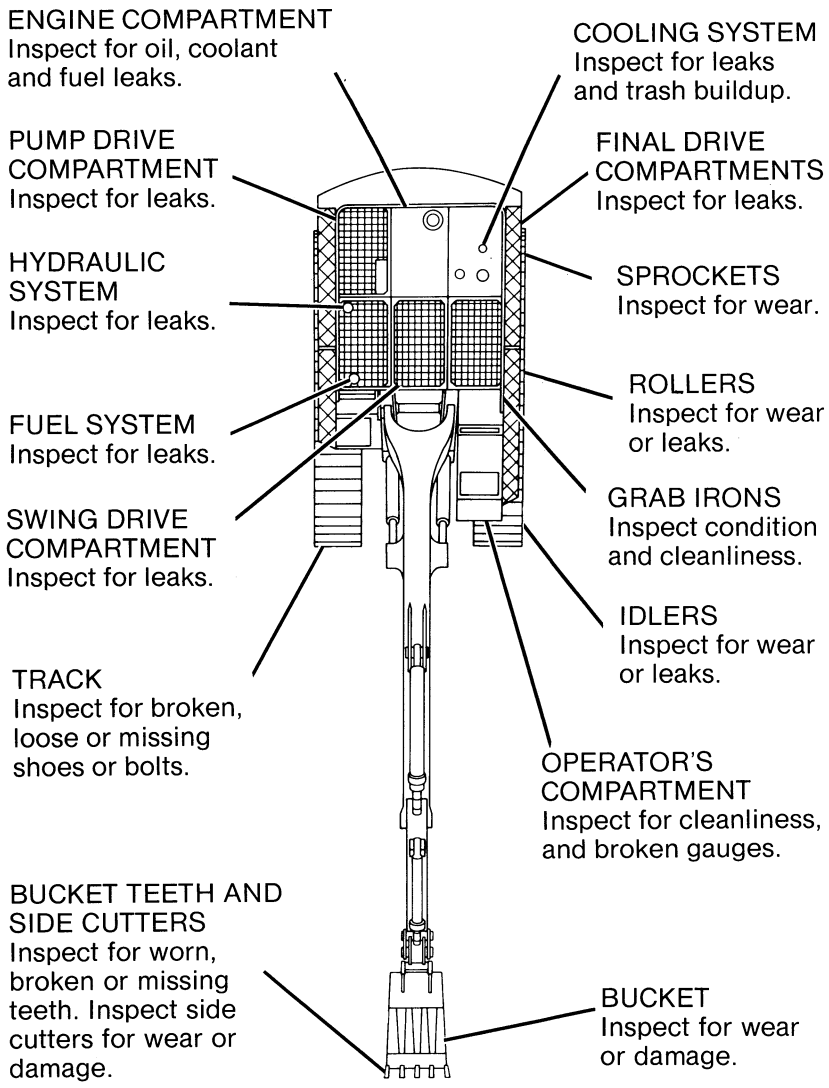
Service brakes are applied automatically when travel pedals are released.

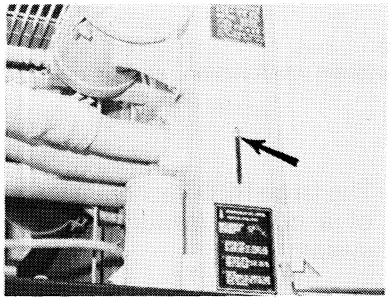
SWING and BOOM LOWER functions are not effected by travel pedals.

BEFORE STARTING

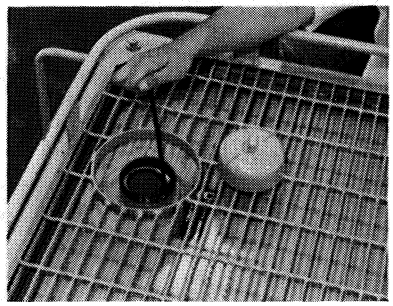
Walk-Around Inspection

For your own safety, and maximum service life of the machine make a thorough walk-around inspection before mounting the machine or starting the engine. Inspect under and around the machine for such items as loose or missing bolts, trash buildup, oil, fuel or coolant leaks.

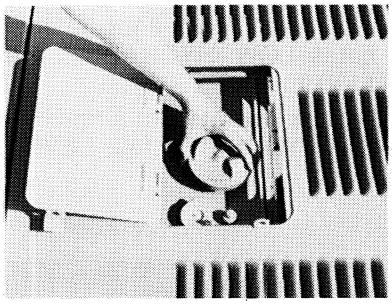




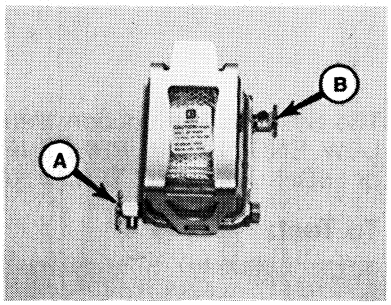
Observe hydraulic system oil level. Maintain oil level at FULL mark in sight gauge.



Measure fuel level.

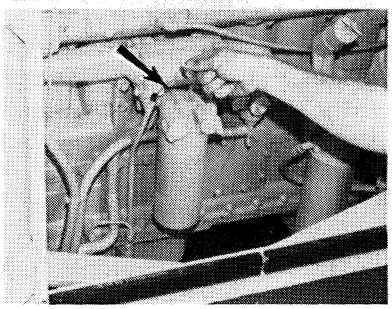


Check coolant level. Maintain level 1/2 inch (1 cm) below bottom of fill pipe.



If equipped with water separator, open drain valve Ⓐ and vent valve Ⓑ. Close valves when water has been drained and fuel flows free of water.

235



245

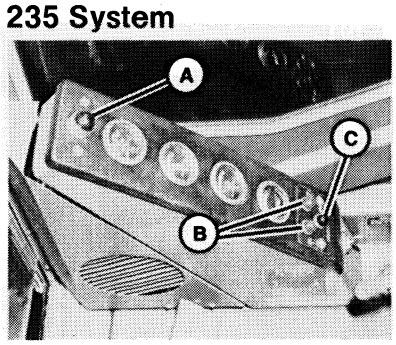
Measure crankcase oil level. Oil must be in SAFE STARTING RANGE on ENGINE STOPPED side of dipstick.

BEFORE STARTING

Warning Systems

NOTE
These systems warn the operator of a system malfunction, and/or need of maintenance of machines systems.

235 System



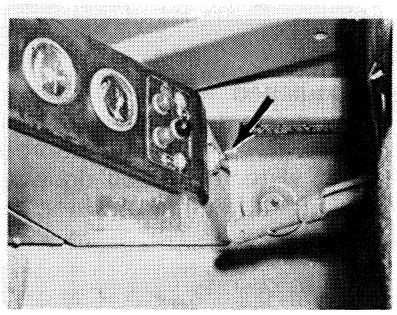
The large RED flasher Ⓐ warns of a critical malfunction of a system.

The small AMBER LIGHTS Ⓑ indicate maintenance of the HYDRAULIC OIL FILTER or AIR FILTER is required.

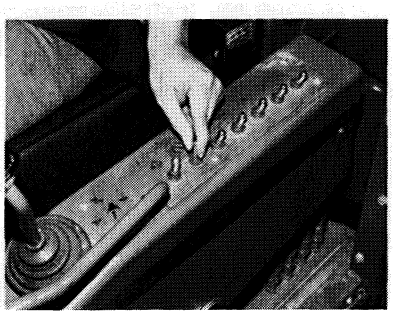
The small RED light Ⓒ indicates LOW HYDRAULIC OIL LEVEL.

The Systems Malfunction Warning Flasher operates as a result of LOW ENGINE OIL PRESSURE, LOW HYDRAULIC OIL LEVEL, or HIGH COOLANT TEMPERATURE.

To Test:



1. Test the warning flasher and the panel indicators with the engine stopped. Turn the disconnect switch ON. The red warning flasher should light.

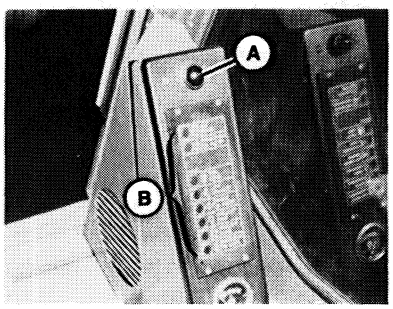


2. Move the systems test switch to the CHECK position. All warning and indicator lights should operate.

3. Release systems test switch. The two amber filter indicators should remain on. Turn OFF the disconnect switch.

NOTE
Contact your Caterpillar dealer if malfunction is indicated.

245 System



The large red flasher Ⓐ warns of a critical malfunction of a system.

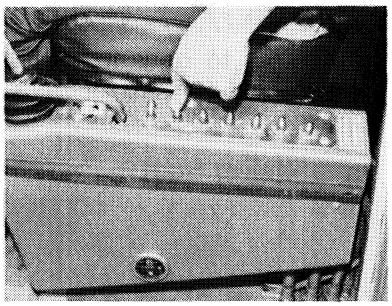
The small red flashing lights Ⓑ indicate need of maintenance and/or locate malfunctions.

The Systems Malfunction warning flasher Ⓐ operates as a result of LOW COOLANT FLOW, LOW ENGINE OIL PRESSURE, LOW HYDRAULIC OIL LEVEL, or HIGH COOLANT TEMPERATURE.

When the engine is running, a horn sounds in the event of LOW COOLANT FLOW, LOW ENGINE OIL PRESSURE or LOW HYDRAULIC OIL LEVEL.

To Test:

1. Test the indicators and warning flasher with engine stopped. Turn the disconnect switch ON. LOW ENGINE OIL PRESSURE, LOW COOLANT FLOW and WARNING FLASHER should flash.



2. Move systems test switch to TEST. All warning and indicator lights should light.

3. Release systems test switch and turn disconnect switch OFF.

NOTE
Contact your Caterpillar dealer if a malfunction is indicated.

BEFORE STARTING

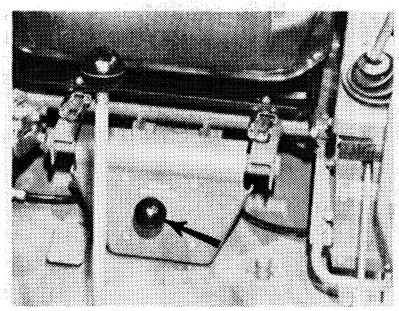
Positioning Seat

⚠ WARNING

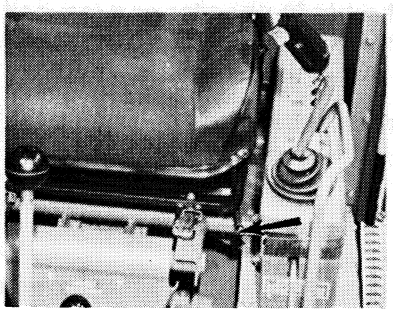
Adjust seat at the beginning of each shift or when changing operators.

Inspect condition of seat belt.

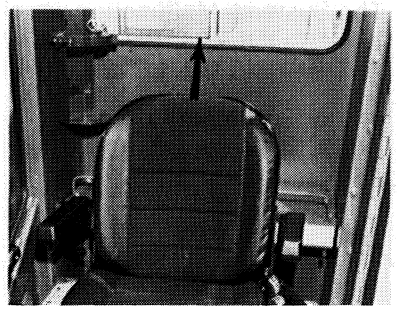
Always fasten seat belt securely.



Push lever down to permit raising or lowering of seat.

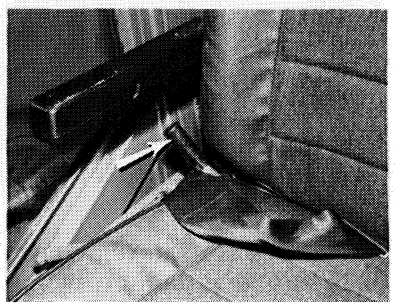


Push lever to right to permit moving seat forward or backward.

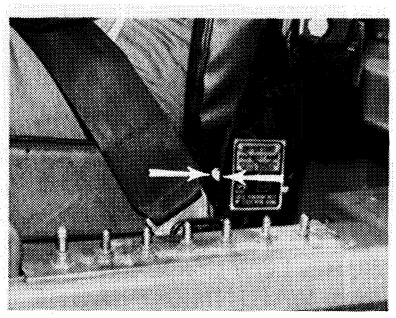


To adjust seat back, lift and tilt to one of 3 positions. Release back.

Suspension Seat



Optional suspension seat has ride adjustment lever located at right rear corner of seat cushion. Adjust seat with operator seated.



Pull handle up and twist to the right (clockwise) for firmer ride or to the left (clockwise) for softer ride. Seat is correctly adjusted when indicator is even with seat frame upright.

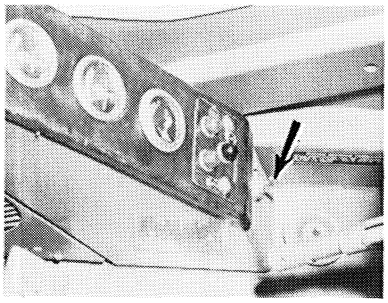
STARTING THE ENGINE

Precombustion Engine

⚠ WARNING

Make sure no one is working on, or close to the machine before starting the engine.

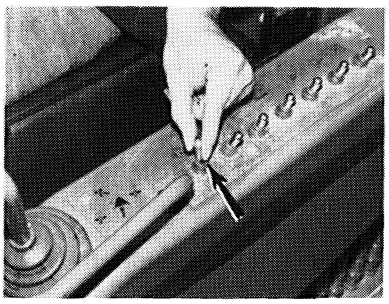
See page 38 for Machines with Direct Injection Engines.



2. Turn the disconnect switch ON.

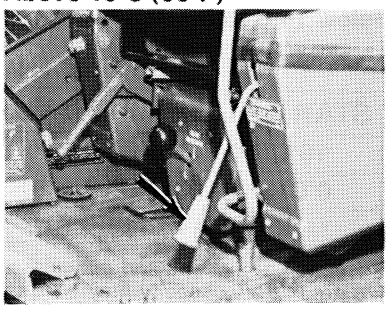
CAUTION

Never turn the disconnect switch OFF with the engine running.

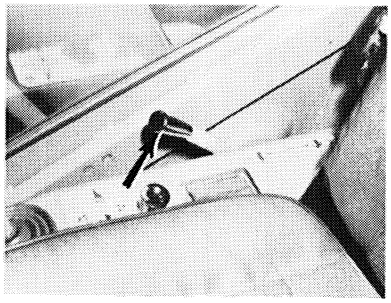


4. Move HEAT-START switch to START. Release the switch as soon as engine starts.

Above 16°C (60°F)



1. Move the HYDRAULIC AND ANTI-TRAVEL LOCK LEVER down (INOPERABLE).



3. Move governor control to LOW IDLE position.

NOTE

If the engine did not start, move the HEAT-START switch to HEAT for 30 seconds, then to START.

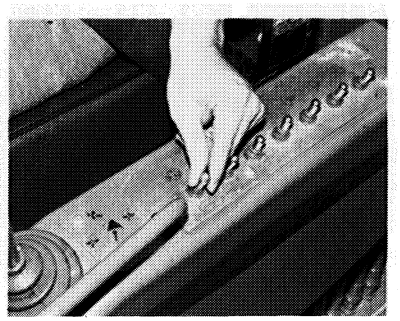
STARTING THE ENGINE

Below 16°C (60°F)

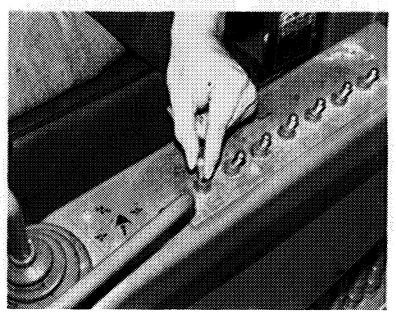
STARTING AID CHART	
STARTING TEMPERATURE	**GLOW PLUG HEAT TIME**
16°C (60°F) TO 0°C (32°F)	1 MINUTE
0°C (32°F) TO −18°C (0°F)	2 MINUTES
BELOW −18°C (0°F)[1]	3 MINUTES

[1] **Heating of coolant, and crankcase oil, use of starting fluid aid and/or use of extra battery capacity may be required at temperatures below −18°C (0°F). Consult your Caterpillar dealer for OPERATION, LUBRICATION and MAINTENANCE GUIDE for COLD WEATHER OPERATION form No. SEBU5338-01.**

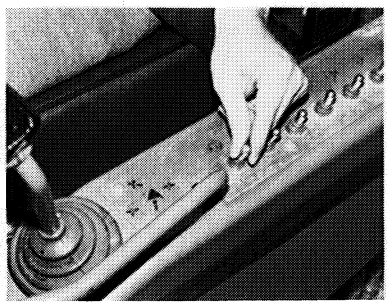
1. Follow steps 1 through 3 for above 16°C (60°F)



2. Move the HEAT-START switch to the HEAT position for the time indicated on the STARTING AID CHART.



3. Move the HEAT-START switch to START. Release the switch when the engine starts.



NOTE
If engine does not start after 10 seconds, move the HEAT-START switch to HEAT for 30 seconds, then to START.

4. When the engine starts it may be necessary to move the HEAT-START switch to HEAT until the engine runs smoothly.

CAUTION
If the engine does not start after two attempts, the use of starting fluid should be considered to prevent battery drain and overheating of the starting motor.

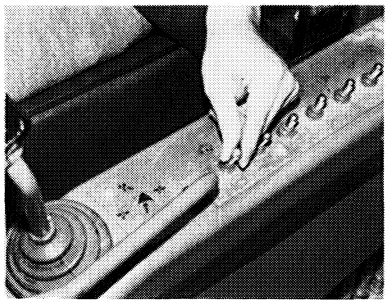
When Starting Fluid is Required

⚠ WARNING

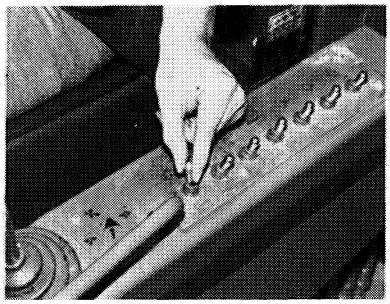
Use starting fluid sparingly. Follow manufacturers instructions carefully.

Do not store starting fluid container in the operator's compartment.

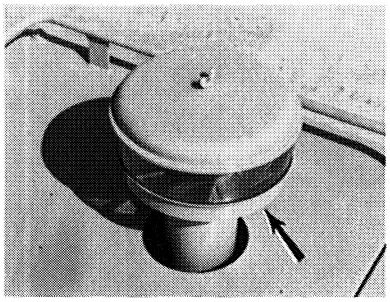
1. Follow steps 1 through 3 under Above 16°C (60°F).



2. Move the HEAT-START switch to HEAT for the time indicated on the STARTING AID CHART.



3. Move the HEAT-START switch to START.



4. Spray starting fluid into the precleaner for 1 second then wait for 2 seconds before spraying again.

5. When engine starts it may be necessary to turn heat start switch to HEAT until engine runs smoothly.

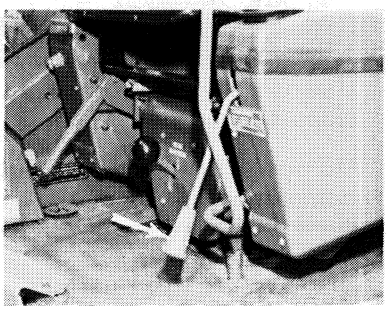
STARTING THE ENGINE

Direct Injection Engine

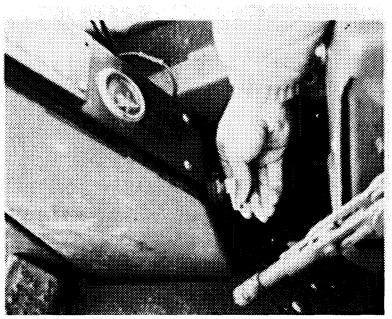
⚠ WARNING

Be sure no one is working on or close to the machine before starting. Fasten the seat belt.

Above 0°C (32°F)



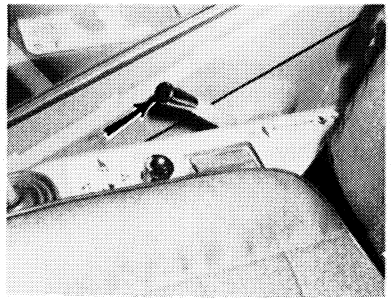
1. Move the hydraulic AND ANTI-TRAVEL LOCK LEVER to the lower (inoperable) position.



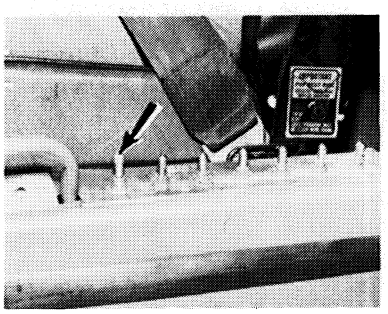
2. Insert the key in the DISCONNECT SWITCH and turn the switch on.

CAUTION

Never turn the disconnect switch OFF with the engine running.



3. Move the GOVERNOR CONTROL to the low idle position.

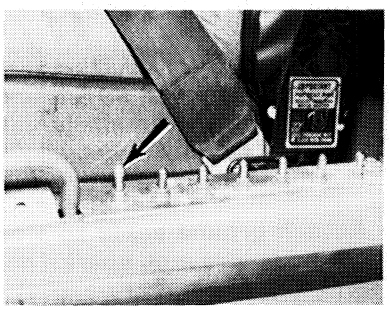


4. Pull up and move the START SWITCH to the (right) start position. Release the switch when the engine starts.

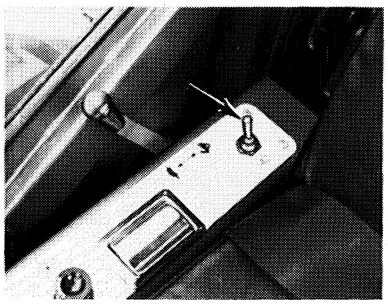
Below 0°C (32°F)

1. Follow steps 1 through 3 for Above 0°C (32°F).

A metered amount of starting fluid (ether) is released each time the STARTING AID SWITCH is operated.



2. Pull up on the START SWITCH and move it to START.



3. Push the STARTING AID SWITCH to the left, then release it.

4. While cranking the engine, use additional starting fluid every 2 seconds by pushing the switch to the left, and then releasing it.

5. Release the start switch when the engine starts.

6. Continue use of starting fluid every 2 seconds, after the engine starts, until it is running smoothly.

CAUTION

After every 30 seconds of engine cranking, allow 2 minutes for the starting motor to cool.

NOTE

For starting below −18°C (0°F), use of optional cold weather starting aids is recommended. A coolant heater, jacket water heater or extra battery capacity may be required.

At temperatures below −23°C (−10°F), consult your Caterpillar dealer, or refer to the COLD WEATHER OPERATION GUIDE, Form No. SEBU5338, available from your Caterpillar dealer.

STARTING THE ENGINE

Starting With External Electric Source

⚠ WARNING

To prevent personal injury, use care when attaching or removing cables. Do not allow cables to touch each other or the machine.

Attach ground cable to a point below and away from batteries to prevent sparks near the batteries.

CAUTION

Be sure the main disconnect switch is in the OFF position, and key removed, before attaching jumper cables to machine to be started.

Connect batteries in parallel: POSITIVE (+) to POSITIVE (+) and NEGATIVE (−) to NEGATIVE (−).

1. Turn the disconnect switch OFF.

2. Attach one cable to ungrounded, POSITIVE (+), terminal of battery on machine to be started. Attach opposite end of cable to POSITIVE (+) terminal of external starting source.

3. Attach second cable to NEGATIVE (−) terminal of starting source. Attach remaining cable end to frame of machine to be started.

4. Turn the disconnect switch ON.

5. Start engine.

6. After engine starts, remove cable attached to frame first. Remove opposite end of cable from starting source.

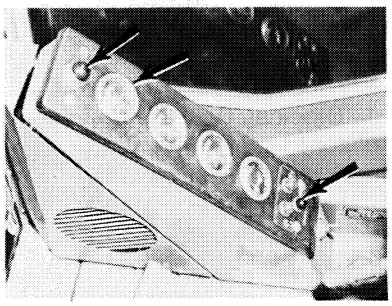
7. Remove cable from POSITIVE (+) terminal of battery on machine started. Remove opposite end of cable from starting source.

Operator Alert and Warning System

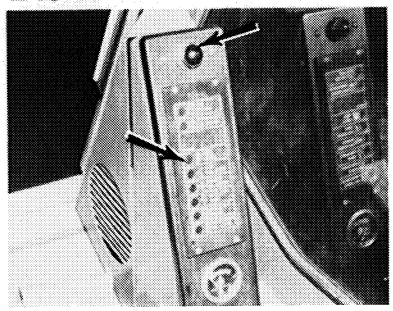
CAUTION

If warning flasher remains on after starting, check engine oil pressure gauge or indicator. Stop engine if oil pressure gauge on 235 does not register or oil pressure light on 245 is flashing.

235



245



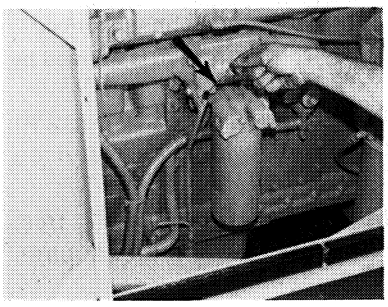
Be sure all indicators and warning horn are functioning properly before operating machine.

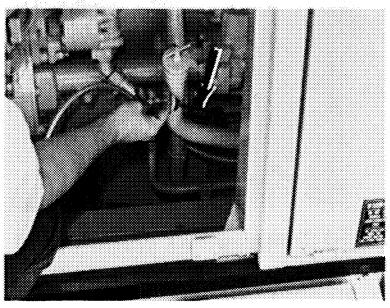
Stop machine operation, lower equipment and stop engine immediately if warning horn sounds or warning flasher on panel is activated.

If high coolant temperature causes a warning flasher to operate, and no coolant leaks are evident, operate the engine at high idle with reduced load to dissipate heat. If coolant is leaking, stop the engine immediately.

NOTE

Always check oil between shifts with engine running if the engine is not to be stopped.

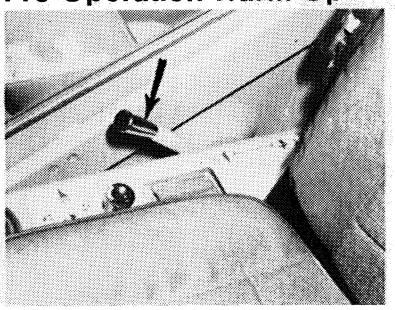




Maintain the level between ADD and FULL marks on the ENGINE RUNNING side of dipstick.

AFTER STARTING

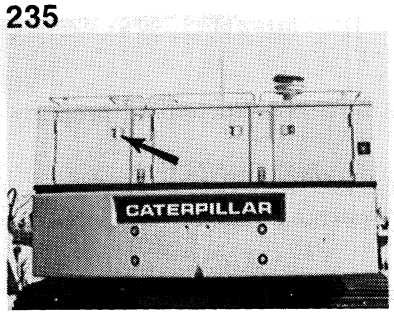
Pre-Operation Warm-Up



CAUTION

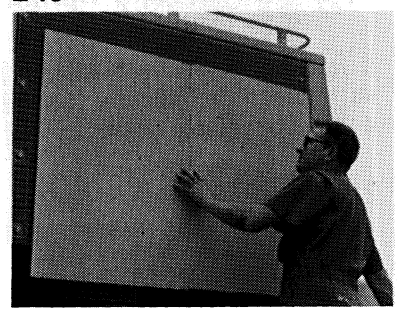
Keep engine operating at low idle until normal operating temperature is reached.

235

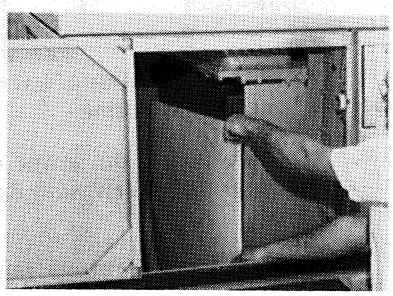


1. Open left rear access door.

245



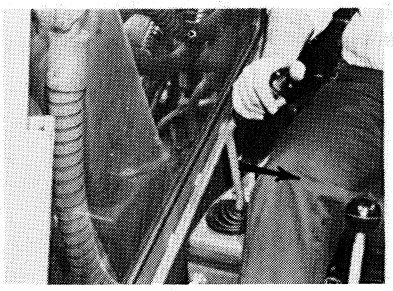
1. Block air flow through the radiator to speed engine warm-up.



1a. Block radiator air flow.

CAUTION

To prevent overheating, remove blocking when normal operating temperature is reached.



2. To help speed warm-up of hydraulic oil, hold the bucket control lever in the CLOSE position for short periods, not more than 10 seconds, to fully close the bucket. This will heat the oil.

NOTE

The warm-up time depends on the ambient temperature. The colder it is the longer the warm-up period.

If the hydraulic system is warmed by idling the engine a general rule is:

In temperatures of 0°C (32°F) or above, warm-up requires 15 minutes.

In temperatures of 0° to −18°C (32° to 0°F) warm-up requires 30 minutes.

In temperaturas below −18°C (0°F), or if hydraulic functions remain sluggish, a longer warm-up period may be required.

MOVING THE MACHINE

⚠ WARNING

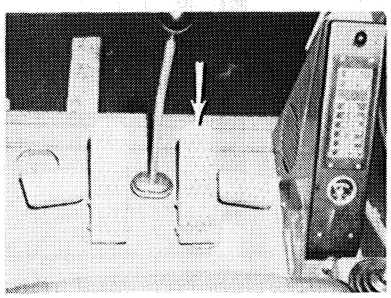
Be sure area is clear of personnel and obstructions. Observe for adequate swing clearance for rear of house.

1. Fasten seat belt.

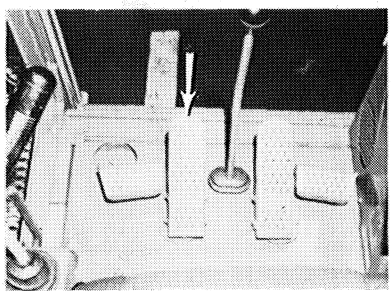
2. Move hydraulic lock lever to up (released) position.

3. Operate all controls to test for proper function.

4. Pull control to raise boom enough to provide sufficient ground clearance.



5. With cab over the idlers, depress the right travel pedal for forward travel.



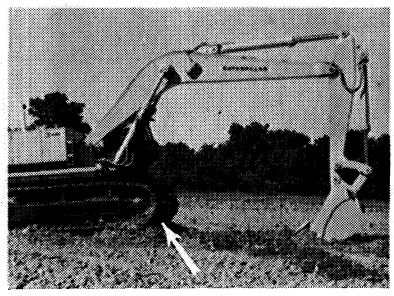
6. Depress left travel pedal for reverse travel.

NOTE

The further pedals are depressed, the faster the speed. Brakes apply automatically when pedals are released.

With travel pedal fully depressed: BOOM RAISE, STICK and BUCKET will not function. With pedals partially depressed; BOOM RAISE, STICK and BUCKET will function at reduced speed. Traveling will not effect SWING or BOOM LOWER functions.

Frozen Ground Conditions



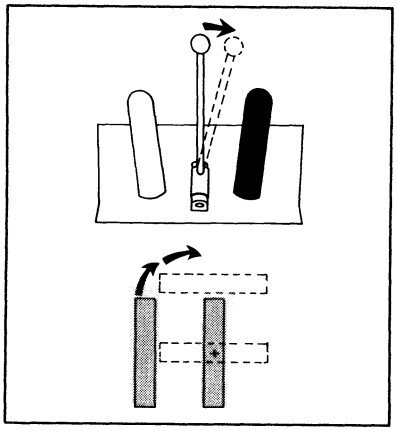
Use BOOM DOWN pressure to raise the front, and then the rear of the machine, to free the tracks from frozen ground.

TURNS

With the cab over the idlers, the machine can be turned in the following manner, in relation to the operator.

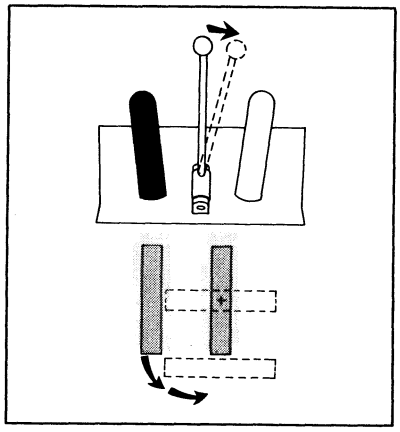
Pivoting on Right Track

forward turn



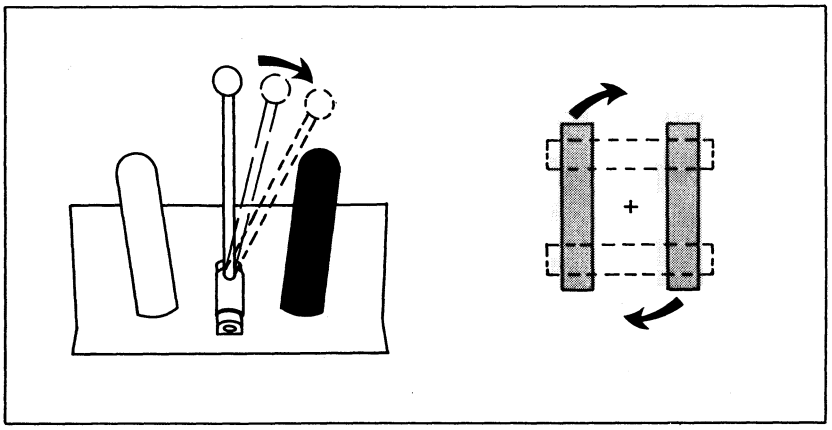
1. Move steering control to the right until increased resistance is felt, then depress the forward travel pedal. This will disengage the right track and the left track will move toward the idlers.

reverse turn



2. Move steering control to the right until increased resistance is felt, then depress the reverse travel pedal. This will disengage the right track and the left track will move toward the sprockets.

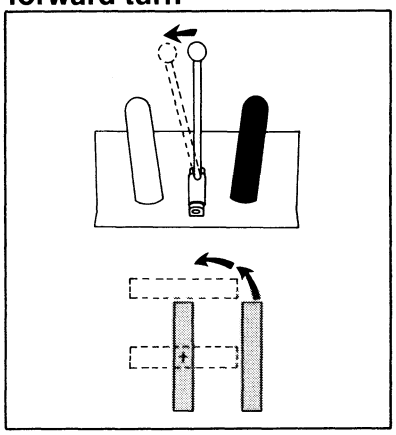
Spot Right Turn



Move steering control to the far right position, then depress the forward travel pedal. The left track will move toward the idlers and the right track will move toward the sprockets.

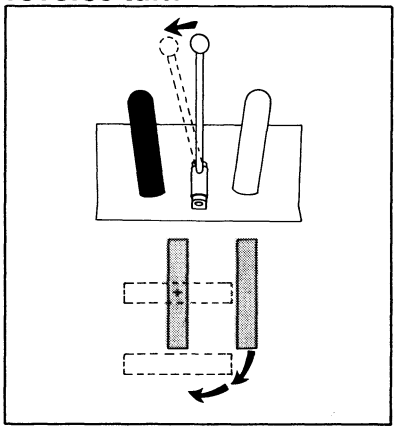
Pivoting on Left Track

forward turn



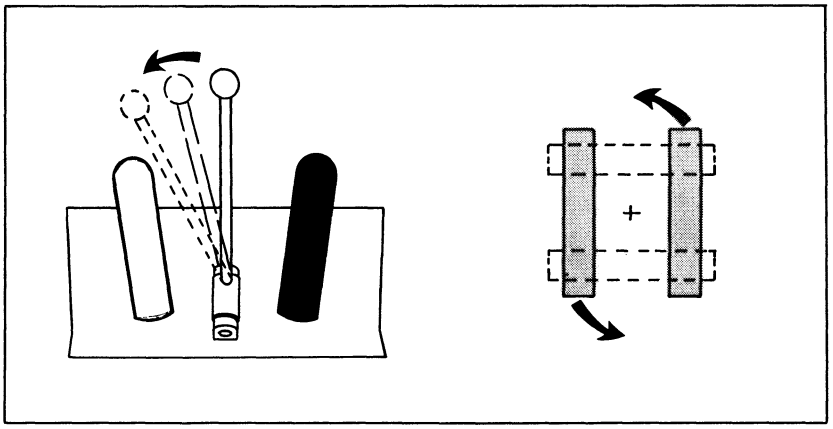
1. Move steering control to the left until increased lever resistance is felt, then depress forward travel pedal. This will engage the left track and the right track will move toward the idlers.

reverse turn



2. Move steering control to the left until increased lever resistance is felt, then depress reverse travel pedal. This will disengage the left track and the right track will move toward the sprockets.

Spot Left Turns



Move the steering control to the full left position, then depress the forward travel pedal. The right track will move toward the idlers and the left track will move toward the sprockets.

CAUTION

Regardless of the relationship of the house to the carbody steering control and travel pedal functions will cause the carbody to move relative to cab over the idlers.

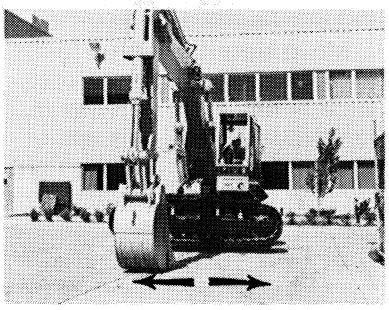
PARKING THE MACHINE

Before Parking

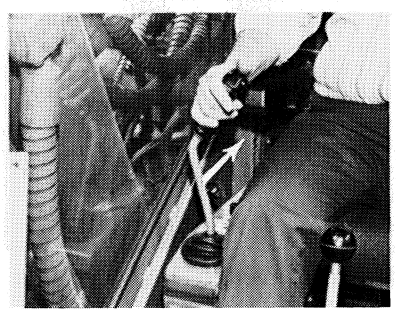
NOTE
When freezing temperatures are expected overnight, each track roller frame should be cleaned of accumulated mud and dirt and parked on planks overnight.

1. Position boom over side.

2. Apply down pressure on boom to raise track clear of ground.



3. Run the raised track in forward and reverse until the maximum amount of material is thrown clear.

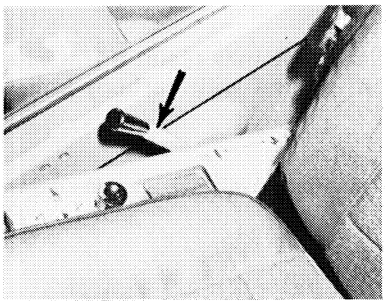


4. Relieve boom down pressure to lower track to ground.

5. Repeat steps 1 through 4 for other track.

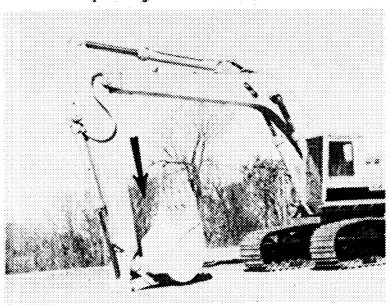
6. Clean in and around carrier rollers.

Stopping

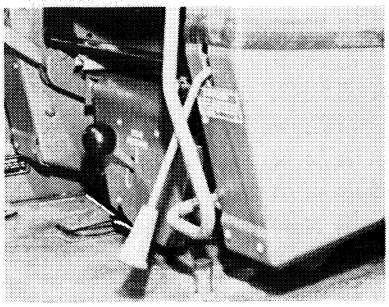


1. If engine is to be stopped, operate the engine at reduced load to allow engine parts to cool equally.

2. Move machine to a safe location, on level ground if possible.

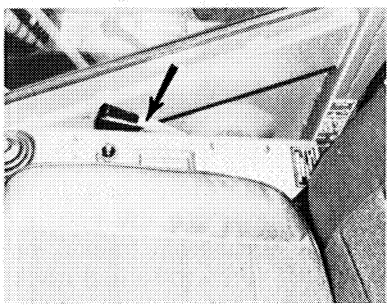


3. Lower all equipment.



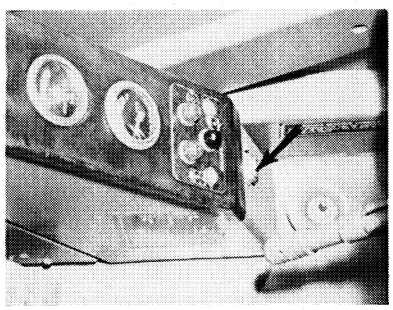
4. Move the HYDRAULIC AND ANTI-TRAVEL LOCK CONTROL to the lower (inoperable) position.

Stopping the Engine



1. Reduce engine speed to low idle for 5 minutes.

2. Move governor all the way forward to stop engine.



NOTE
It will require a few seconds for the engine to stop.

3. Turn off the BATTERY DISCONNECT switch and remove the key.

OPERATING ADJUSTMENTS

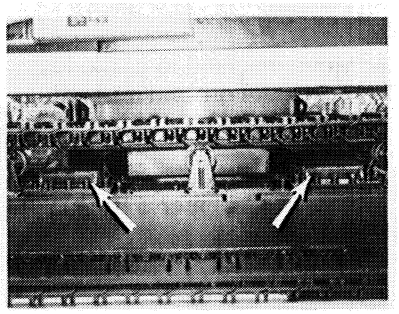
245 Track Gauge

CAUTION

Damage to carbody guide on track roller frame may result if track is raised more than 76 mm (3 inches) off ground with carbody bolts removed.

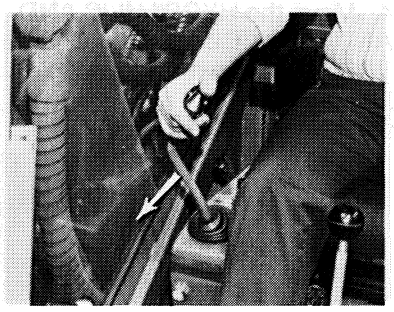
NOTE

Extension of track roller frame to widest practical gauge will give machine more stability during operation.



1. Position machine on level. Remove 11 bolts from each carbody leg on one side. Total 22 bolts.

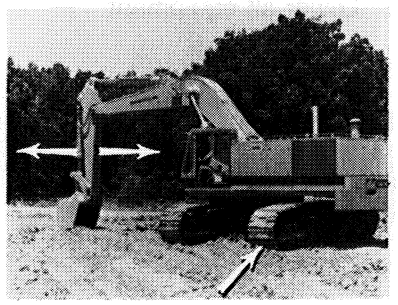
2. Position boom over opposite roller frame. Put bucket teeth into ground.



3. Apply boom down pressure to raise track slightly.

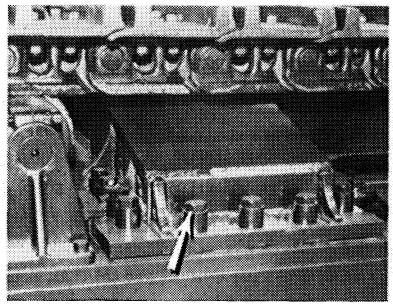
CAUTION

Do not raise track over 76 mm (3 inches).



4. Use stick IN force to extend track roller frame (by moving carbody away from tracks), or stick OUT force to retract track roller frame (by moving carbody toward tracks).

5. Apply Anti-Seize Compound, Caterpillar Part No. 9M3710, or equivalant, to the underside of the head and to the threads of the 22 carbody bolts that were removed.



6. Install bolts in both carbody legs on the side that was moved.

7. Tighten bolts evenly alternating from one carbody leg to the other until the torque readings stabilize at 680 ± 70 N·m (500 ± 50 lb. ft.).

8. Then turn each bolt an additional 1/6 of a complete circle.

9. Repeat steps 1 through 8 for the opposite roller frame.

235 Two Piece Backhoe Boom

Foreboom may be lengthened or shortened by using different pin holes at stub boom connection. The 3 different lengths can increase, or decrease, machine reach and digging depth for specialized applications.

Contact your Caterpillar dealer for correct procedures for boom adjustment.

CAUTION

With certain boom-stick-bucket combinations, the bucket can hit the cab, or front of the machine.

Always check for interference when first operating a new attachment.

OPERATING TECHNIQUES

General

⚠ WARNING

KNOW THE MAXIMUM HEIGHT AND REACH OF YOUR MACHINE

Serious injury or death by electrocution may occur if machine or attachments are not kept a safe distance from electrical power lines. Keep distance at least 10 feet (3.05 M) plus additional .4 inch (10 mm) for each 1,000 volts over 50,000 volts. Local and state codes or job site operating directives may require greater distance for safety.

Load trucks from the rear if possible. Never swing the load over the truck cab.

CAUTION

Whenever the tracks of the machine raise off the ground while digging, lower the machine back to the ground smoothly. DO NOT DROP OR CATCH WITH THE HYDRAULICS. Damage to machine can result.

An oversize bucket, or one equipped with blade type side cutters, should not be used in rocky material. It slows down the cycle and damage to the bucket and other machine components could result.

Use smooth comfortable speeds while operating.

For efficient operation, use more than one control at a time when possible.

Spot truck so machine can be loaded from the rear or side. Load trucks evenly to avoid overloading rear axles.

Moving

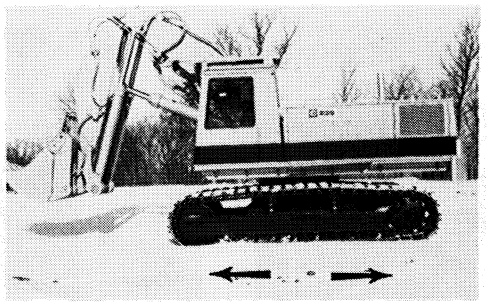
⚠ WARNING

Reduce governor speed when maneuvering in tight quarters or when breaking over a rise.

When traveling any distance, engage the swing lock pin while the house is in line (parallel) with the tracks. Retract stick and carry boom in a low position.

When starting up a steep grade or breaking over a rise, keep the boom lowered as close to the ground as possible.

When traveling uphill, or on a slope, keep the boom on the uphill side of the machine.



Move the machine whenever the digging position is not efficient. The machine can be moved forward or backward anytime during the operating cycle.

Utilize the bucket or other attachment to push or pull the machine, or lift up the tracks, in order to work in and out of close places.

When making turns in soft material, travel in a straight direction occasionally to clear the tracks.

Digging — Backhoe

CAUTION

With certain boom-stick-bucket combinations, the bucket can hit the cab, or front of the machine.

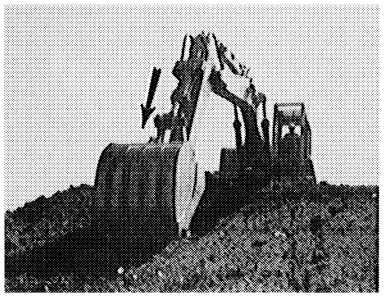
Always check for interference when first operating a new attachment.

Know the location of buried cables. Mark them clearly before digging.

When swinging into a ditch, do not use the ditch to stop the swinging motion. Inspect machine for damage if boom is swung into a bank or an object.

Repeated chopping can cause structural damage. Use a digging, scratching or peeling motion when trying to penetrate rock, frozen ground, or hard surfaces. Contact your Caterpillar dealer for special teeth and side cutters available for use in severe applications.

OPERATING TECHNIQUES

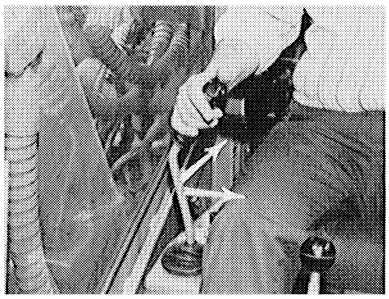


1. Position stick at about a 70° angle to the ground.

2. Set bucket cutting edge at about a 120° angle to the ground.

NOTE
Maximum break-out force can now be exerted with the bucket.

3. Move stick in and keep bucket parallel with the ground.

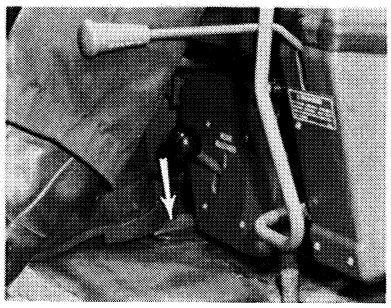


4. If stick travel stops due to load, adjust depth of cut by raising boom and/or curling bucket.

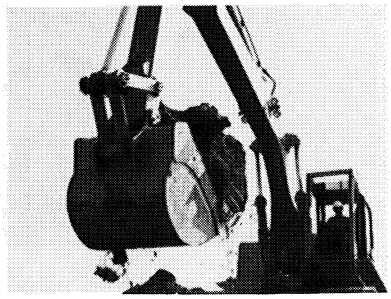
NOTE
Down pressure on the bucket must be relieved, as stick travels, to apply greater force to the cutting edge.

Maintain bucket attitude to assure a continuous flow of material into the bucket.

5. Continue the pass with the cutting edge traveling in a horizontal direction, peeling material into the bucket.



6. Lift out bucket at pass completion. (Engage two speed control pedal for additional hoisting speed.)



7. Engage swing control as soon as bucket is clear of excavation.

NOTE
To provide a working surface, dump spoil away from the edge of a trench.

8. When dumping, open bucket and move stick out in one smooth motion.

Lifting — Backhoe

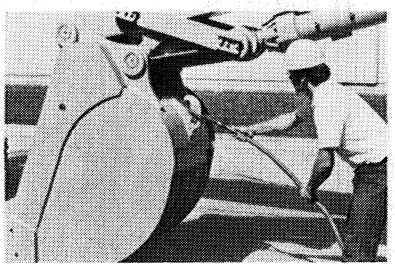
⚠ WARNING

Do not exceed rated capacity of machine. If machine is not on level ground, capacities will vary.

Use short slings to prevent excessive load swing.

CAUTION
Damage to bucket cylinder, bucket or linkage could result if slings are placed incorrectly.

OPERATING TECHNIQUES

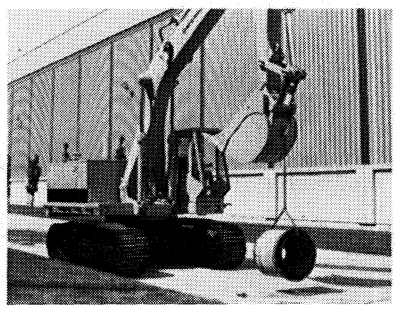


1. Sling items are lifted using the hook on the back of bucket.

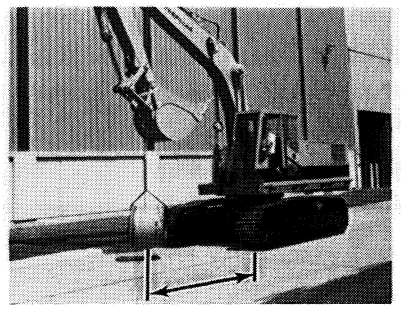
NOTE
Lifting capacities are calculated from this point.

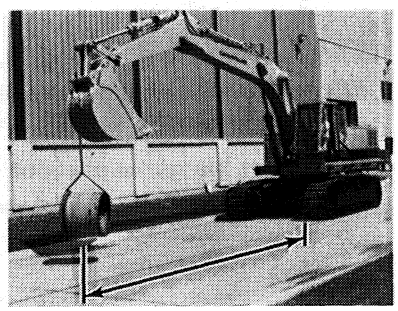
2. Picking up a load with linkage over a corner is the most stable lifting position.

3. An unstable condition can result if load is swung over end or side, and exceeds the machine load rating.



4. For best stability, carry load close to the machine, and as close to the ground as possible.

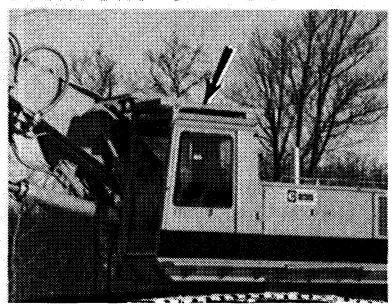




5. Lifting capacity decreases as the radius of load from swing centerline increases.

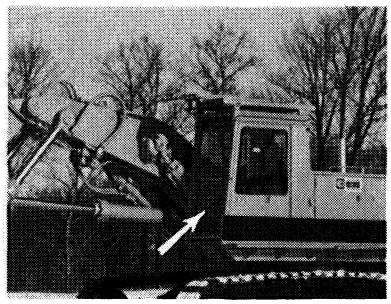
Use the INCREASED PRESSURE SWITCH (if equipped) on the 245 to lift extra heavy loads. See INCREASED PRESSURE SWITCH in the **Controls** section.

Front Shovel — General



⚠ WARNING

Do not operate the front shovel machine without the Falling Object Protective Structure (FOPS) in place.



⚠ WARNING

Rocks can fly into cab causing personal injury. Keep windshield closed when working a rocky face.

⚠ WARNING

Do not rack the bucket back with the boom raised. Operating the machine in this manner can cause material to dump backward over the spillguard onto the operator's station.

This usually occurs with boom in highest raise position, but can occur when boom is less than fully raised.

Remove overhangs and watch for sliding material.

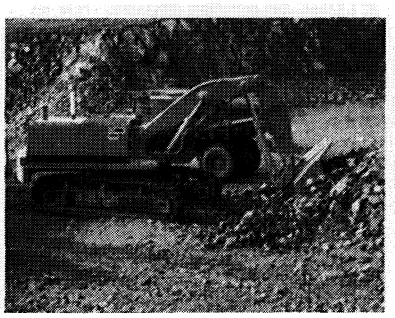
CAUTION

After dumping the bottom dump bucket, the bucket should be tipped forward before pulling in the stick. Otherwise, the linkage will force the bucket against its rack stops. This will force oil through the bucket cylinder relief valve, causing high stress in the linkage and heating of hydraulic oil.

Never use the bottom dump bucket with the bottom open for dozing or raking hard material. This will damage bucket hinge pin and shorten shell life.

OPERATING TECHNIQUES

Use controls smoothly to avoid spilling material. Dump with wind to back to keep dust from obscuring vision.



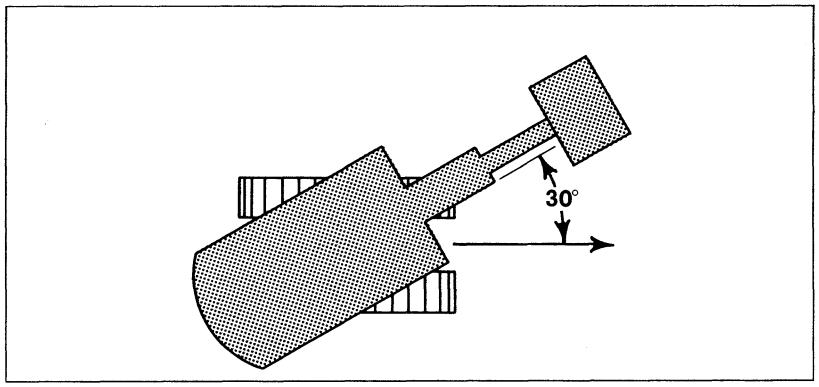
To help prevent slides when loading from a bank, start at the top and work to the toe of the bank.

Use short bucket teeth when strength is required. Use long teeth if penetration is required.

To maintain maximum stability, use the widest track gauge possible when digging.

To better position the machine to dislodge stubborn rocks, travel pedals can be used anytime during the cycle.

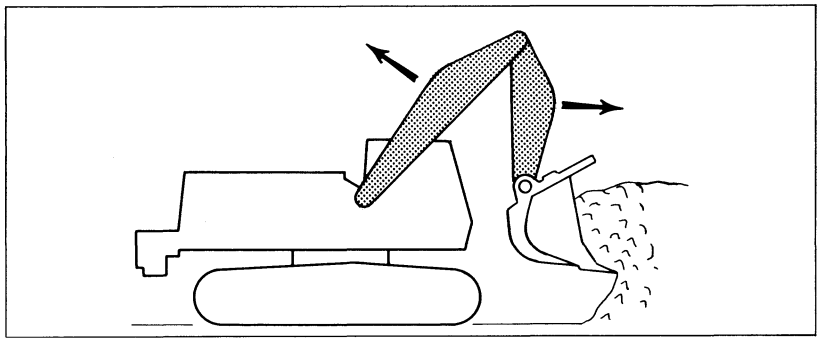
Using travel pedals, to better position load for dumping, will not slow swing speed.



CAUTION

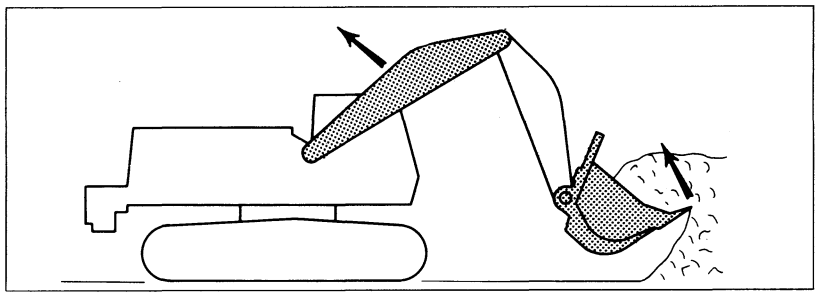
Do not load bucket at an angle greater than 30° of the travel direction of the track.

At greater than 30° machine becomes unstable. Also, side thrust on track rollers will decrease roller life.

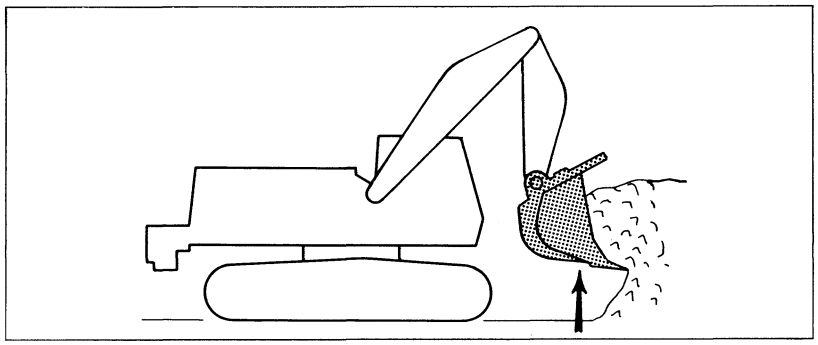


The front shovel develops highest digging forces when:

1. the boom is raised while crowding with the stick. As stick moves away from the machine, raising the boom positions stick linkage for better penetration.

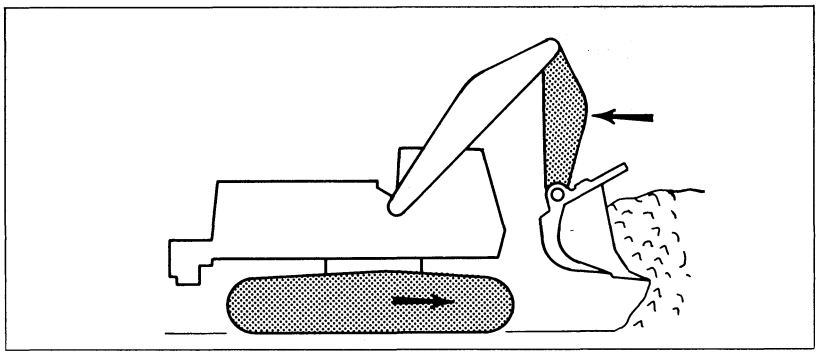


2. raising boom while racking back the bucket. This increases pressure to the cutting edge for greater breakout force.

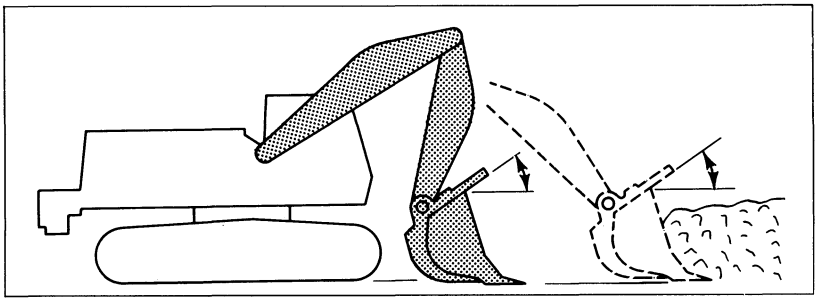


3. bucket is above grade and close to the machine. This takes best advantage of the linkage design to provide better penetration and higher breakout force.

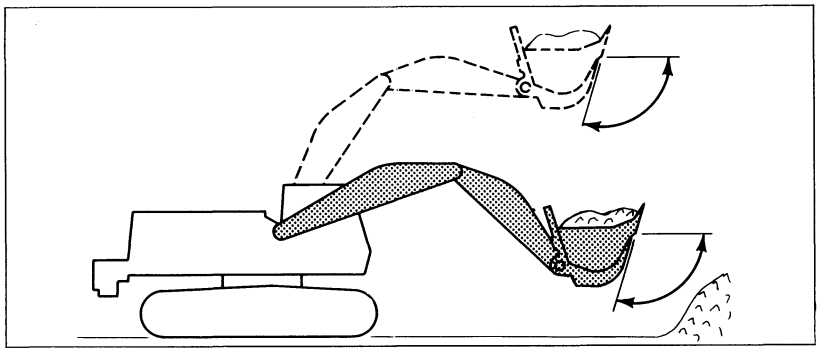
OPERATING TECHNIQUES



Follow the bucket into the pile with the machine, while STICKING IN, to keep the bucket close to the machine for best crowding.



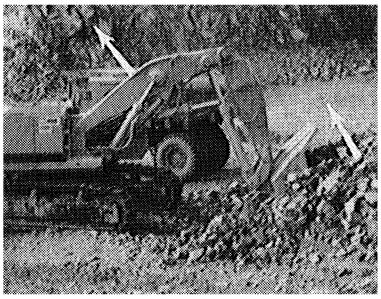
Linkage geometry maintains bucket attitude automatically, regardless of stick and boom movement. This permits parallel crowding into pile, or maintaining a level floor, without special attention to bucket angle.



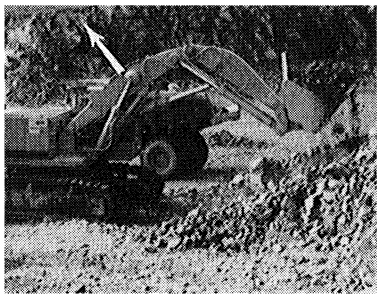
When positioning bucket for dumping, the bucket will maintain a constant angle if bucket control is not actuated. This prevents material from spilling from the bucket, and provides proper bucket positioning without special attention to bucket angle.

Loading — Front Shovel

1. Load the bucket as close to the travel direction of the tracks as possible. Following the bucket with the machine for efficient crowding.

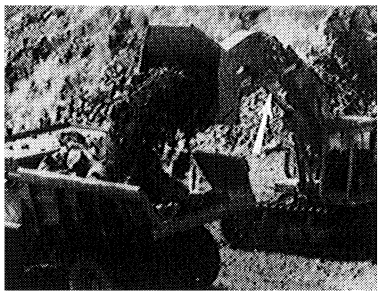


2. Use bucket curl, as well as boom raise, to assure a better flow of material into the bucket.



3. Engage boom raise control as soon as bucket is full. Engage swing control when bucket clears the pile.

4. To decrease cycle time, load over open tail section of a truck.



5. To minimize spillage over side of a truck, STICK IN while dumping the front dump bucket.

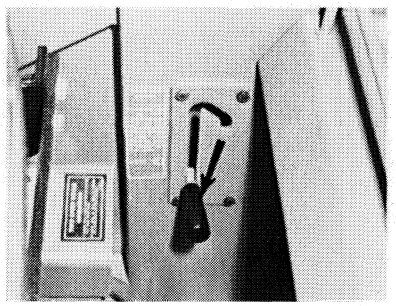
TRANSPORTING HINTS

Securing Machine

⚠ WARNING

Before machine is transported, make sure there will be adequate overpass clearances on travel route that is chosen.

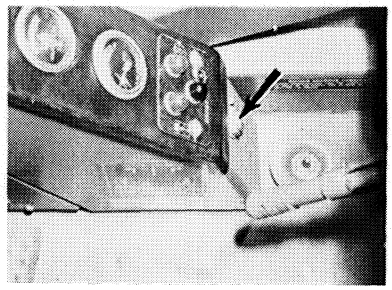
Remove ice, snow, mud and other slippery material from loading dock, flat car or trailer bed, and block hauling unit wheels before loading.



Engage the swing lock pin (forward position).

⚠ WARNING

Inspect to be sure lock pin is engaged.



Turn disconnect switch off and remove key.

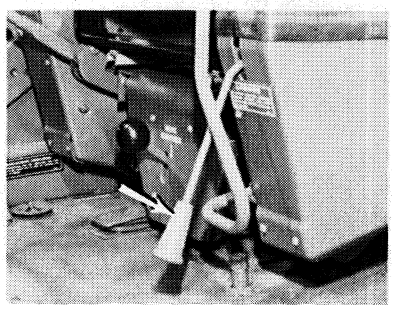
CAUTION

Before disassembly of 245 for shipping, refer to CATERPILLAR SPECIAL INSTRUCTIONS FORM NUMBER SMHS7157 for disassembly and loading instructions.

Comply with state and local laws governing weight, width and length of load.

NOTE

In freezing weather, make sure that the cooling system is protected to the lowest expected ambient temperature or drained completely.



Move the hydraulic lock lever to the lower position.

Cover engine exhaust opening.

Remove the ether bottle (if equipped) before shipping.

Fasten all loose or removed parts securely to the lowboy or flatcar bed.

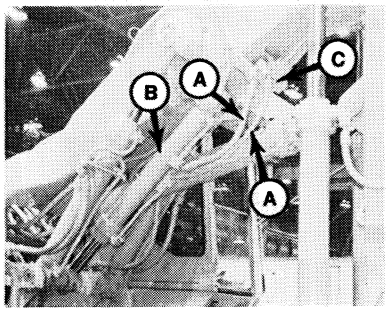
Shovel Machine Disassembly

⚠ WARNING

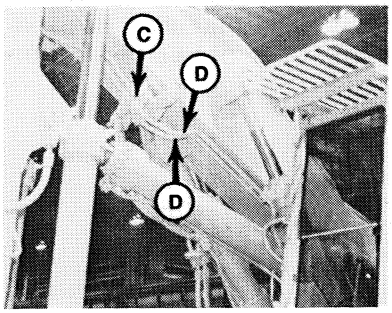
Personal injury or machine damage can result from high hydraulic pressure, created by the master cylinder, if the boom is raised or lowered with bucket or master cylinder lines blocked.

Before bucket or master cylinder lines are blocked, disconnect master cylinder lines and empty hydraulic oil from the master cylinder.

Removing Bucket Stick and Bucket Cylinders:

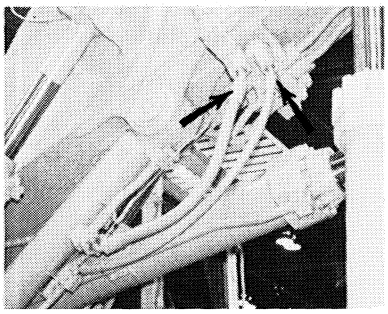


Before blocking lines Ⓐ from master cylinder Ⓑ to manifold Ⓒ (mounted on the boom)...



...or lines Ⓓ from control valve to manifold Ⓒ, empty hydraulic oil from master cylinder.

To Empty Master Cylinder



1. Disconnect the two master cylinder hoses at the manifold.

2. Use blocking plates, stored in the tool box, to cap all manifold ports. DO NOT block the master cylinder hoses.

3. To empty oil from both rod and head ends of the master cylinder, raise the boom to maximum height, and then lower to minimum height.

4. Raise the boom to a height that extends the master cylinder rod end 11 inches (28 cm) from the retracted position.

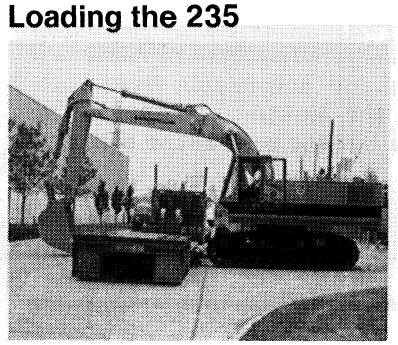
5. Connect the master cylinder head end hose to the rod end hose.

CAUTION

Lower or block the boom while required work is being performed.

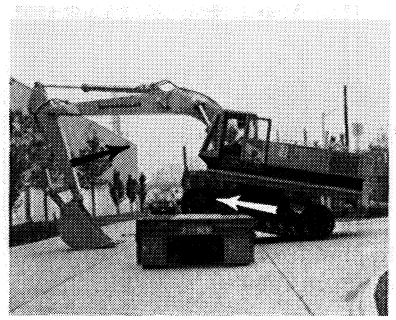
TRANSPORTING HINTS

Loading the 235

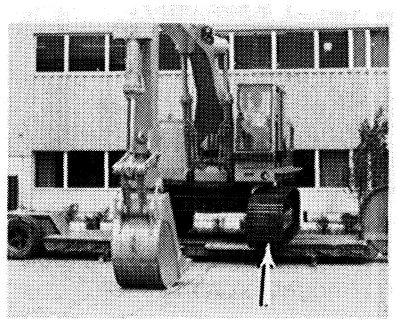


1. Position machine so front is facing side of trailer. Position boom over opposite side of trailer.

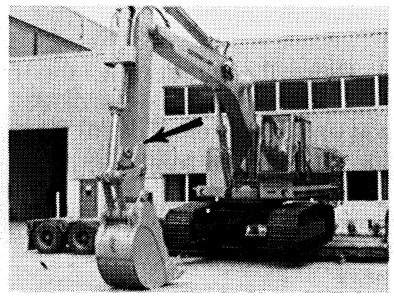
2. Apply down pressure on boom. Raise the front of track clear of trailer bed.



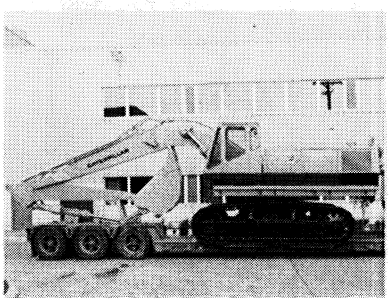
3. Move machine forward on to trailer bed by moving stick in, and moving machine forward.



4. Raise boom and swing house 180°. Apply down pressure and raise rear of machine.



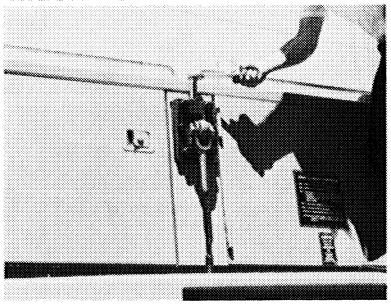
5. Move stick out and move rest of machine onto trailer.



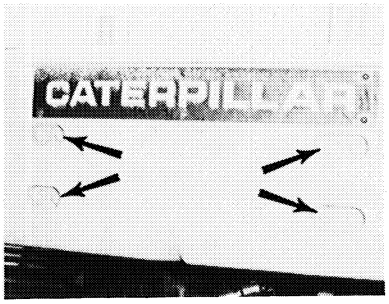
6. Position machine parallel to bed. Install tie downs.

235 Counterweight Removal Attachment

NOTE
Be sure center posts and extension rods are secure before removing counterweight.



1. Tighten adjusting bolts until cables are taut.

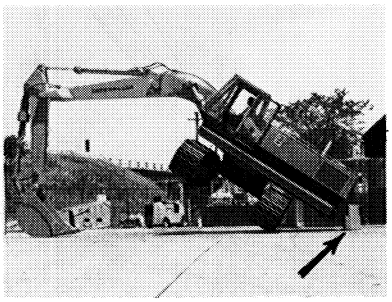


2. Remove eight counterweight mounting bolts.

3. Position machine with boom directly over the side of a track, with stick in a verticle position.

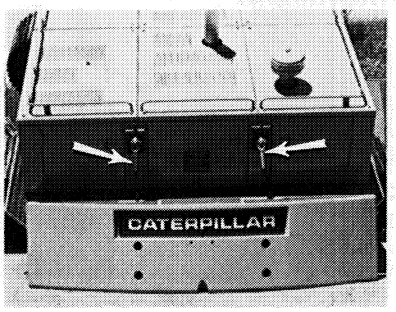
⚠ WARNING

Stay away from counterweight when it swings away from the machine.



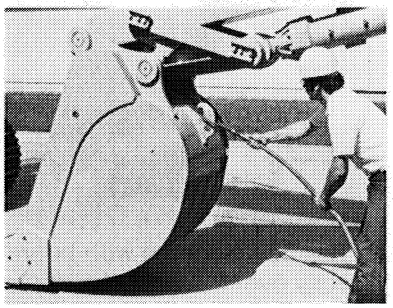
4. Lower boom slowly to raise front of carbody off of ground. Counterweight will swing away from machine and lower to ground as machine is raised.

TRANSPORTING HINTS

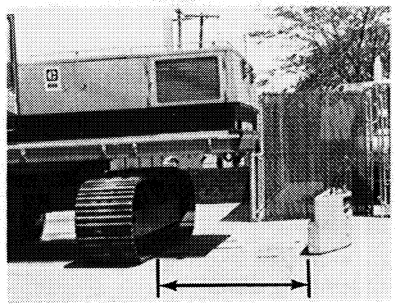


5. Disconnect cables from the counterweight.

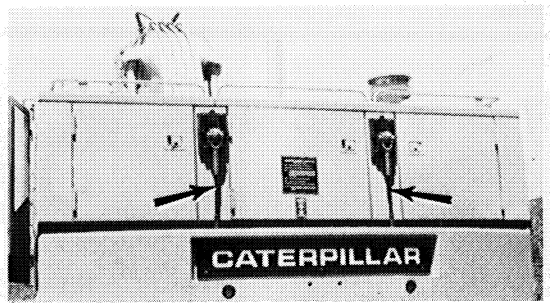
6. Lower front of carbody by slowly raising the boom.



Machine may be used to load or unload the counterweight. Attach sling to hook on back of bucket.



To install counterweight, position it 7 ft. (2.1 m) from side of the machine, and reverse removal procedure.

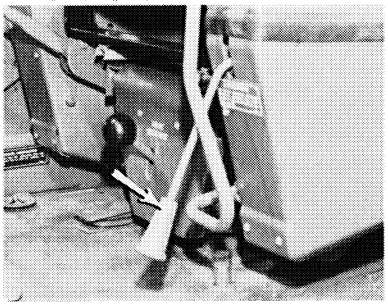


CAUTION

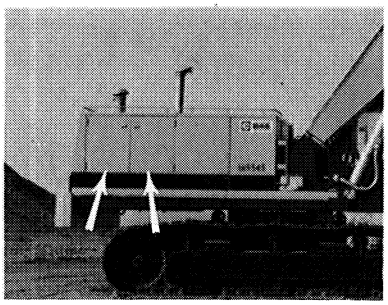
After counterweight is installed, and before machine is operated or roaded, relax cable tension.

245 Counterweight Removal Attachment

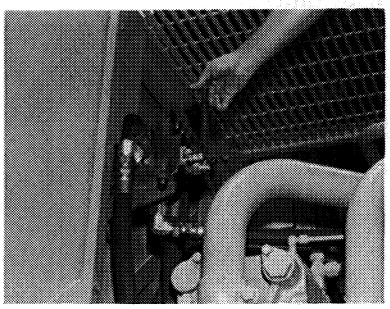
NOTE
Weight limitations may require removal of counterweight for shipping.



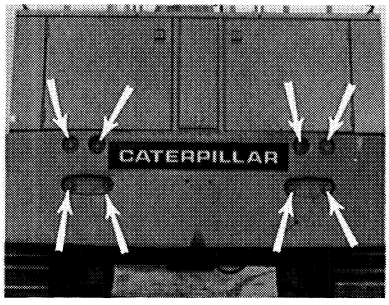
1. Start the engine. Move the HYDRAULIC AND ANTI-TRAVEL LOCK to the lower (inoperable) position.



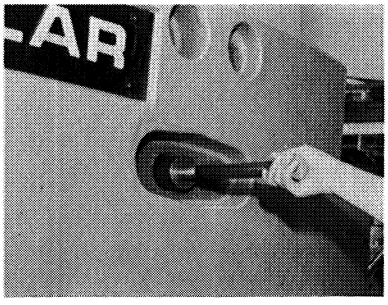
2. Open right side access doors.



3. Move hydraulic counterweight control forward to relieve weight on counterweight mounting bolts and retaining pins.

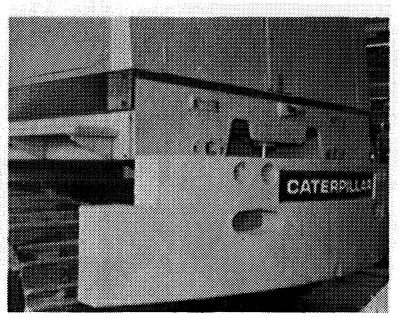


4. Remove 8 counterweight mounting bolts.

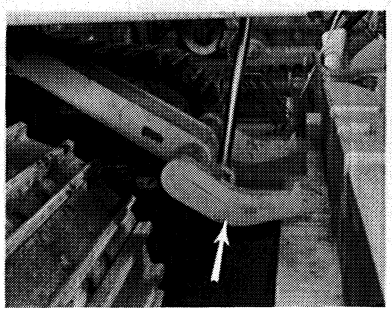


5. Remove 2 retaining pins.

TRANSPORTING HINTS

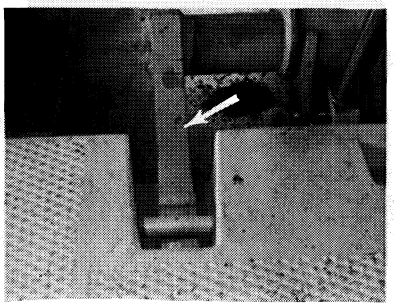


6. Move counterweight control back and lower counterweight onto blocks on ground.

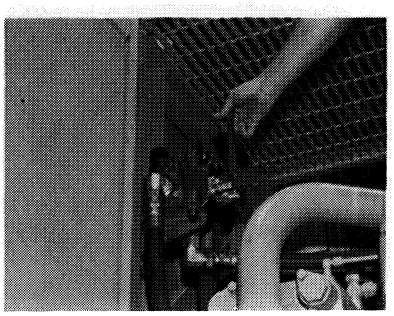


7. Move machine away from counterweight and raise counterweight frame to normal position.

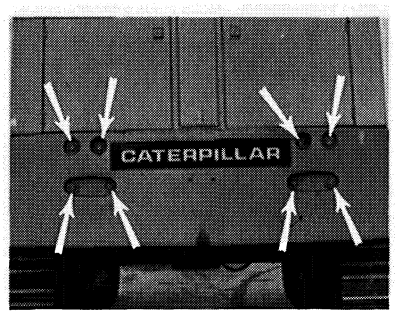
Installation



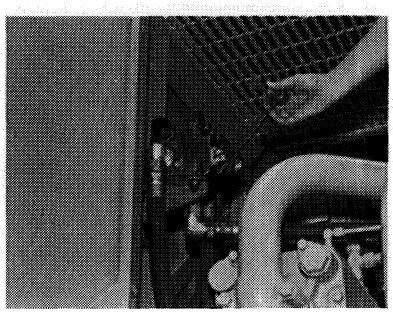
1. Lower frame and back machine towards counterweight until frame is in position.



2. Move counterweight control forward to raise counterweight into position.



3. Install both pins and 8 mounting bolts.



4. Move counterweight control back to relieve weight on frame and to transfer weight to pins.

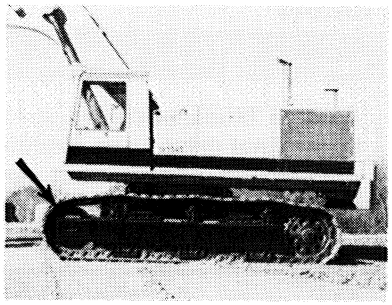
Lifting Machine

⚠ WARNING

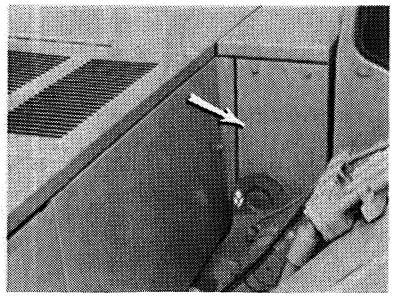
Make sure lifting cables and other lifting devices are strong enough to support machine.

Consult your Caterpillar dealer for proper size and type cables and lifting devices.

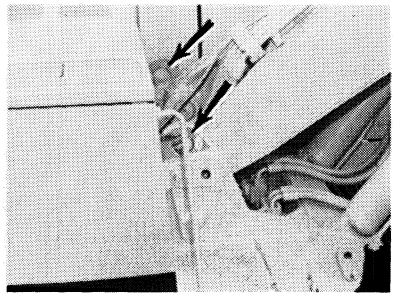
Use guide or tag lines to prevent machine from swinging or turning.



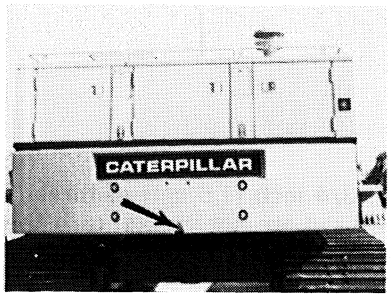
1. Position cab over idlers...



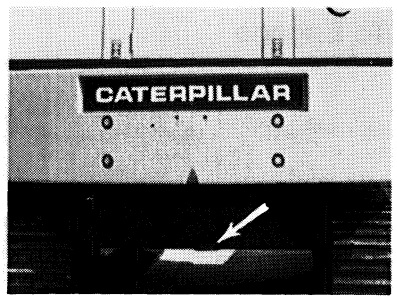
...Remove plate (on 235) for hook clearance.



2. Attach cables to two lifting eyes in frame, behind boom.



3. Thread proper size cable through slot in counterweight and...



4. ...attach it to the towing eye on the carbody frame.

5. Position boom, stick and bucket close to the machine as possible.

ABNORMAL CONDITIONS

Towing

⚠ WARNING

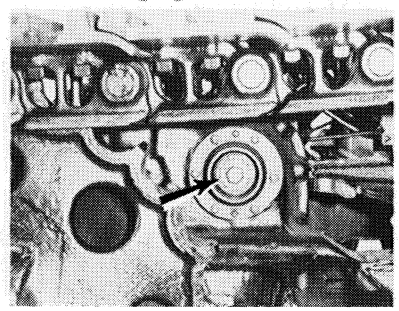
Always block both tracks before disengaging final drives. When final drives are disconnected, brakes are also disconnected and machine can move. Use precautions to maintain control of machine when using another vehicle to move it. Block tracks when parking, if final drives are disconnected.

CAUTION

To tow the machine, both final drives must be disengaged.

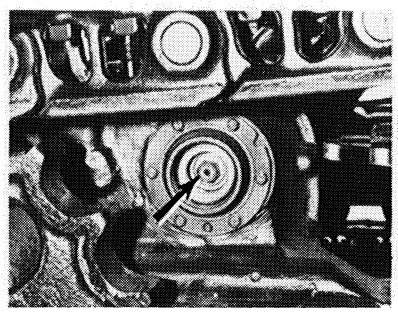
Do not operate track motors with final drives disengaged. Damage could result.

To Disengage 235 Final Drive



1. Block both tracks.

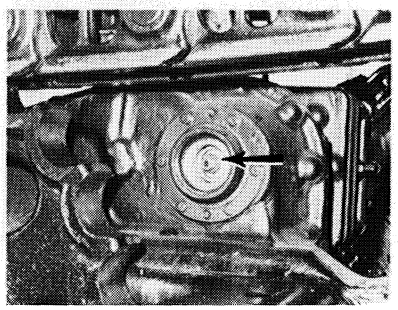
2. Remove the plug in each final drive.



3. Back nut off until it is flush with end of rod.

4. Install plugs.

To Engage



1. Remove access plugs.

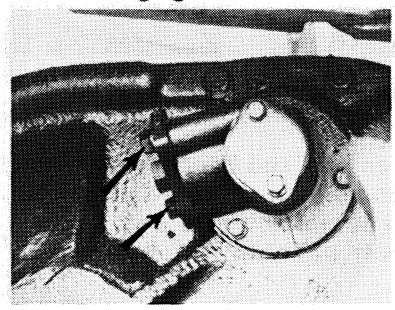
2. Tighten nut to 282 ± 17 lb. ft. (383 ± 18 N·m) torque.

CAUTION

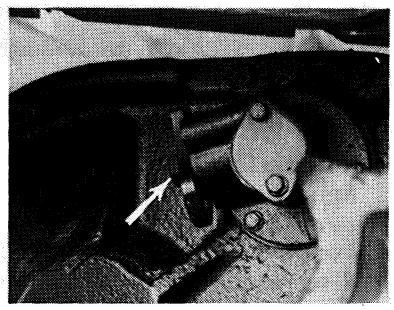
If 3/4 inch (1.5 cm) of threads on rod are not visible, turn the sprocket slightly. Torque nut.

3. Install the 2 plugs.

To Disengage 245 Final Drives:



1. Block both tracks.
2. Remove 2 bolts.

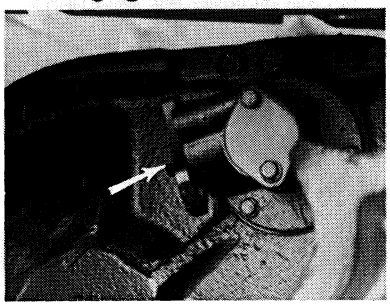


3. Rotate the disconnect pinion counterclockwise 1/2 turn (180°), DO NOT REMOVE DISCONNECT PINION.

NOTE
Torque lockup in the drive train may require forcing a partial turn of the sprocket for ease of rotation of the disconnect pinion.

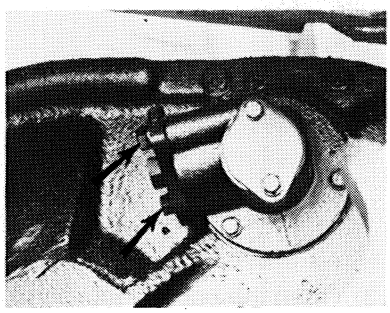
4. Install the two bolts.

To Engage:



1. Block both tracks.
2. Remove 2 bolts and rotate the disconnect pinion clockwise 1/2 turn (180°).

NOTE
Forcing a partial revolution of the sprocket may be required for ease of rotation of the disconnect pinion.



3. Install the two bolts.

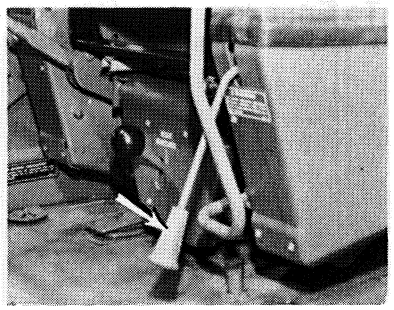
ABNORMAL CONDITIONS

Lowering Boom With a Dead Engine

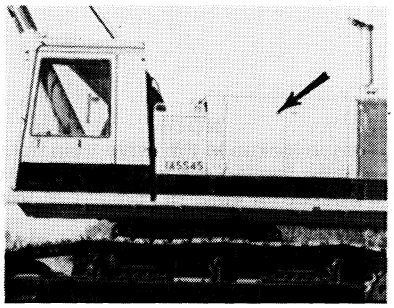
⚠ WARNING

When lowering boom with a dead engine, keep all personnel away from boom area.

If boom is lowered with a dead engine, the boom vent valve must be closed before the machine is operated. The boom can be raised normally with the valve open, but if the boom control is put in the lower position, the boom can drop suddenly out of control.

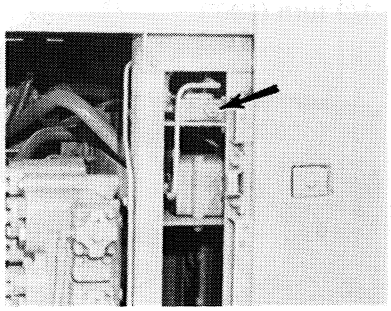


1. Move the HYDRAULIC AND ANTI-TRAVEL LOCK LEVER to the lower (inoperable) position.

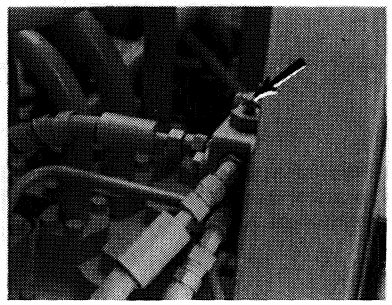


2. Unlatch and open left side front access door.

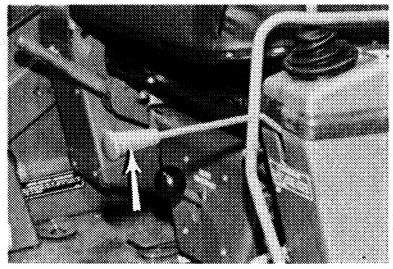
235 Valve



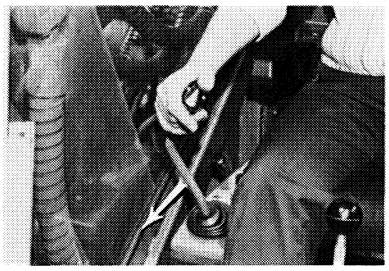
245 Valve



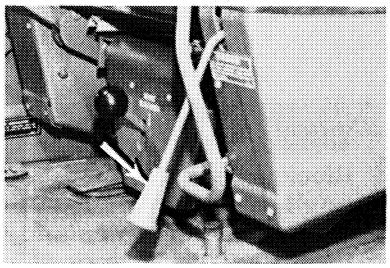
3. Open the boom vent valve completely.



4. Move the HYDRAULIC AND ANTI-TRAVEL LOCK LEVER to the upper (operable) position.



5. Cautiously move boom control to the DOWN position to slowly lower boom.



6. Engage the hydraulic lock control lever (lower position).

7. Close the boom vent valve.

8. Close and secure access door.

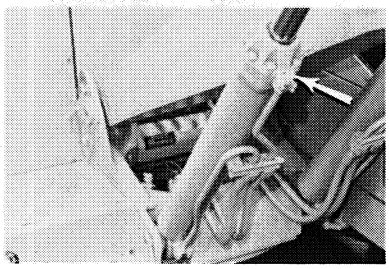
Raising Boom With A Dead Engine

⚠ WARNING

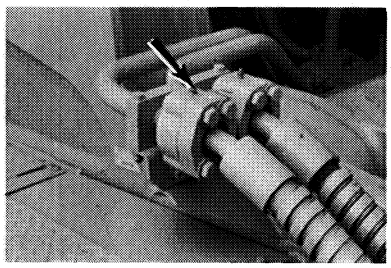
Block or secure boom in position when working around or under raised boom.

Be sure to reconnect all lines before attempting to operate machine.

235 Bleed Screw



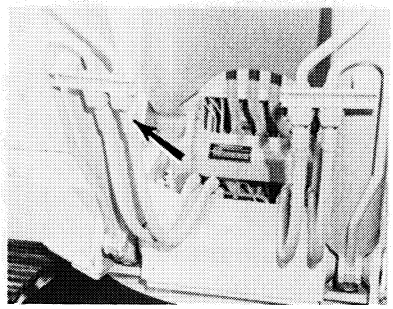
245 Bleed Screw



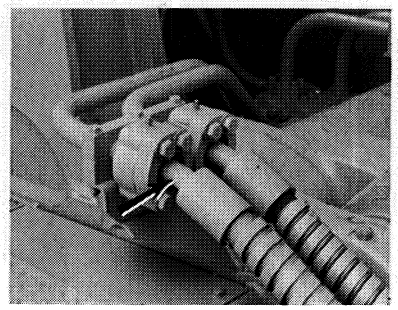
1. Open bleed screw for the rod end of the right hand boom cylinder to relieve residual pressure in the hydraulic lines.

ABNORMAL CONDITIONS

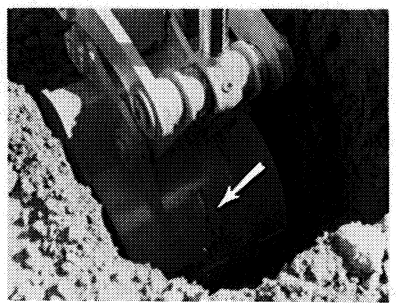
235 Hose



245 Hose



2. Disconnect the hose at the rod end of the right hand boom cylinder.



3. Attach an external lifting device to the bucket lifting eye and raise the bucket to ground level.

⚠ WARNING

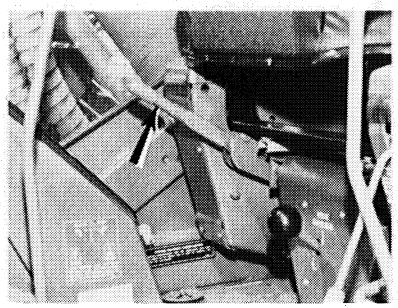
Block or secure boom in position when working around or under raised boom.

NOTE

If machine must be towed away from the excavation, final drives must be disconnected. Refer to Towing.

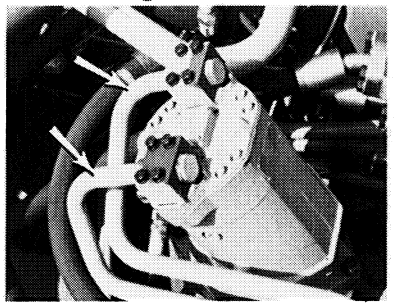
To Swing Machine:

If machine cannot be skidded or towed away from excavation, disconnect swing lines and swing upper structure, if necessary.

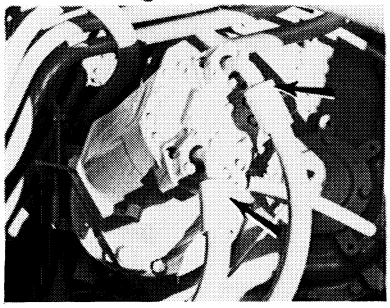


1. Apply swing brake.

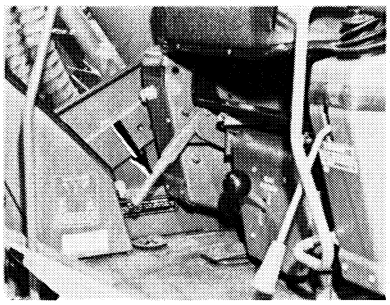
235 Swing Lines



245 Swing Lines



2. Disconnect swing lines at swing motor. Use external device to move the boom.



3. Release swing brake.

4. Use swing brake to stop swinging motion of the boom.

5. Set the swing brake.

6. Block or lower the boom.

Broken or Ruptured Line

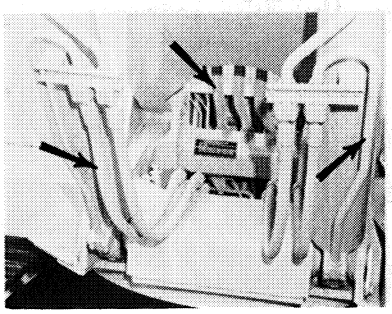
⚠ WARNING

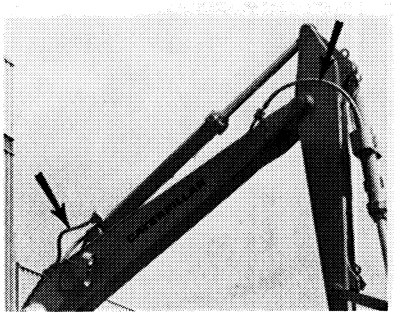
On shovel machines, personal injury or machine damage can result from high hydraulic pressure created by the master cylinder, if the boom is raised or lowered with bucket or master cylinder lines blocked.

NOTE

For safe blocking of bucket cylinder and master cylinder lines on shovel machines, refer to Shovel Machine Disassembly in the TRANSPORTING HINTS section.

ABNORMAL CONDITIONS





If a machine is to be moved with a broken or ruptured line in any circuit other than the track circuit, (OR THE BUCKET AND MASTER CYLINDER CIRCUIT ON SHOVEL MACHINES) install the proper size blocking plate, found in the machine tool box, in the line between the break and the oil supply. This will stop the leak and allow the machine to move under its own power.

CAUTION

Do not activate the controls for any circuit that has been blocked out.

Do not use a blocking plate in the line that connects the pump to the control valve.

To assure a replacement line has sufficient burst capacity, use the correct Caterpillar Part Number Part as a replacement.

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