CATERPILLAR®

31200243
July 14, 2006

Operation and Maintenance Manual

TH360B Telehandler

S/N TBH00100 & After

Keep this manual with machine at all times.

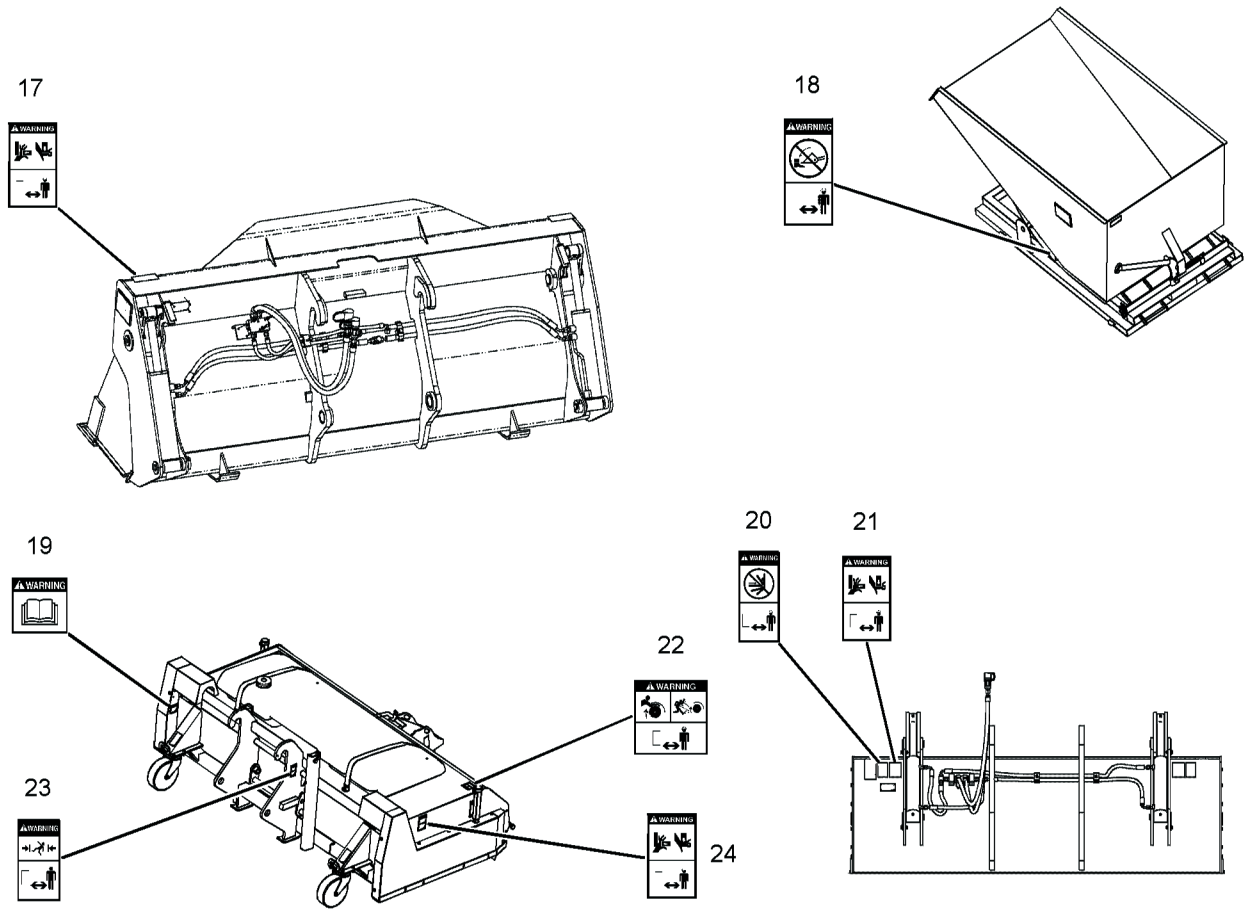


Illustration g01213316

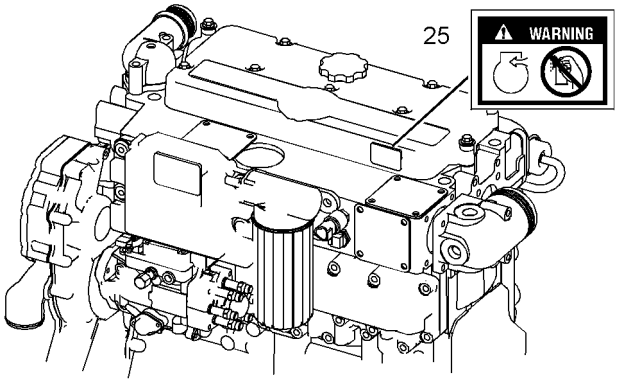


Illustration 5 g01213318

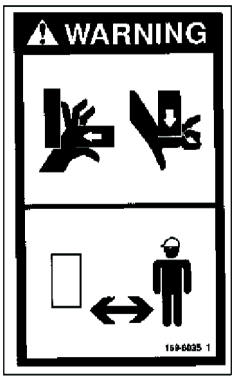
There are several specific safety messages on these machines. The exact location of the messages and the description of the messages are reviewed in this section. Please become familiarized with all safety messages.

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

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

Crushing Hazard (21)

This message is located on both sides of the grapple bucket.



g00943172

WARNING

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

Entanglement and Flying Objects (22)

This message is located on each side of the top cover for the broom.

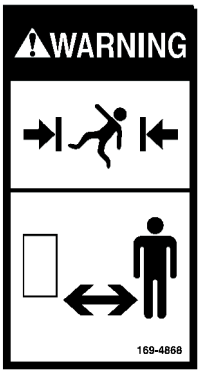
g00984064

WARNING

Stay clear of this work tool during operation. Entanglement could result in personal injury or death. Flying objects from this work tool could result in personal injury or death.

Trap Point (23)

This message is located on both sides of the hitch on the broom.



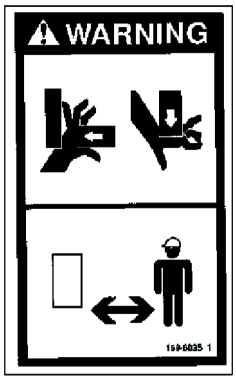
g00984061

WARNING

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

Crushing Hazard (24)

This message is located on each side of the top cover for the broom.



g00943172

WARNING

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

Before Starting Engine

Operators must have had the proper training and operators must be capable in all aspects of machine operation. To comply with some local requirements, an operator must attain an operators license or a certificate.

You must be familiar with your machine in order to understand the machine's capabilities. Also, before you operate your machine you must become familiar with the job site. If necessary, walk around the area and take note of the following items.

- Check the area for clearance. Check for both vertical clearance and for horizontal clearance.
- Check for the presence of overhead obstructions.
- Check for electrical power lines. Keep the machine and the attachments away from electrical power lines at least 8 m (25 ft).
- Check for steam lines. Check for compressed air lines.
- Check for changes in the stability of the surface of the job site. Check trenches that have been backfilled. Check deteriorated roofs of basements and of tunnels.
- Check sewers and service ducts.

When a load is picked up or when the boom is extended, ensure that the surface on the job site offers even resistance for the tires. Also, when a load is picked up or when the boom is extended, ensure that the surface on the job site offers even penetration for the stabilizers.

Make sure that the load charts and the instruction plates are in place and that the load charts and the instructions can be read. Do not operate the machine until you understand the correct method of using the load charts.

On machines that are equipped with a cab, secure the door in the shut position. Secure the windows in either the open position or in the shut position. Ensure that all windows are clean for the best visibility.

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

Make sure that all protective guards and covers are secured on the machine.

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

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

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

Clear all obstacles from the path of the machine.

Before you attempt to start the engine and before you move the machine, ensure that no one is underneath the machine, around the machine, or on the machine. Make sure that the area is free of personnel. Fasten the seat belt.

Engine Starting

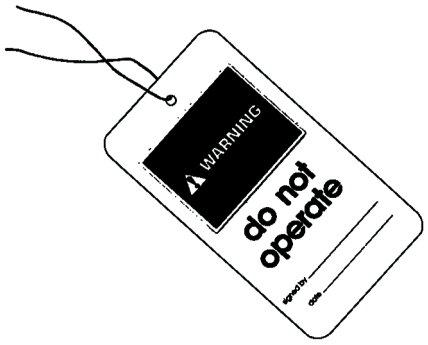


Illustration 28 g00100846

Before you service the machine or before you repair the machine, attach a "DO NOT OPERATE" warning tag or a similar warning tag to the engine start switch or to the controls. This warning tag is available from your Caterpillar dealer.

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

Ensure that the transmission control is in the NEUTRAL position (N). The engine will not start unless the transmission control is in the NEUTRAL position.

Ensure that the parking brake is engaged.

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

Start the engine only when you are properly seated in the operator's compartment. Do not short across the battery terminals and do not short across the batteries. A short could cause a bypass of the engine neutral start system and this could cause the machine to move if the machine was left in gear.

Serial Number

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

For quick reference, record the serial numbers in the spaces that are provided below the illustrations.

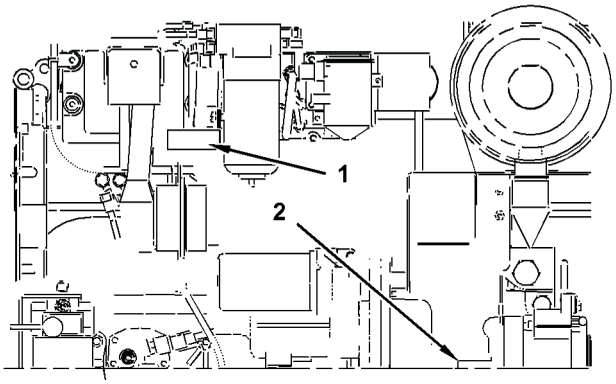
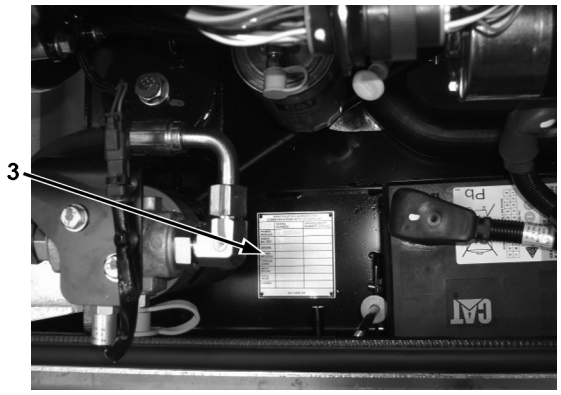


Illustration 39 g01042684

(1) Engine Serial Number_____

(2) Transmission Serial Number_____



(3) Engine Pod Serial Number_____

Certification

European Union

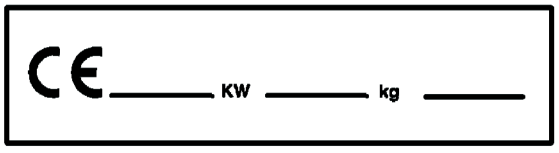


Illustration 41 g00853367

If the machine is equipped with the plate for the European Union, this plate will be attached to the PIN plate. Several pieces of information are stamped onto the CE plate. For quick reference, record this information in the spaces that are provided below.

- Engine Power (kW)_____
- Machine Weight (kg)_____
- Year of Manufacture_____

Sound

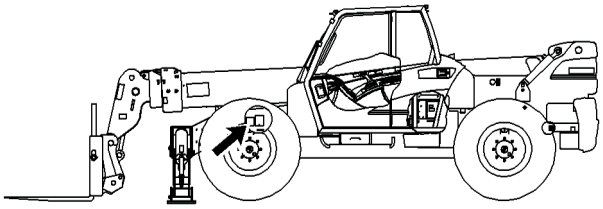


Illustration 41 g00937584

This message is located on the left side of the main frame.

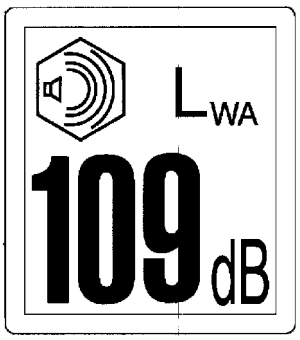


Illustration 42 g00933634
A typical example of this film is shown. Your machine may have a different value.

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

Operator Controls (Side Console)

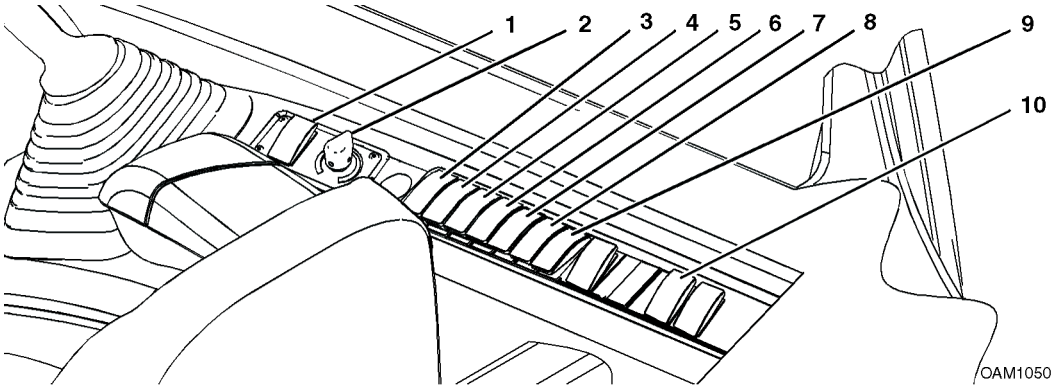


Illustration 61 g01212209

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

Fan Control (1)

Fan Control - Push the bottom of the switch in order to operate the fan at low speed. Set the switch in the MIDDLE position to operate the fan at medium speed. Push the top of the switch in order to operate the fan at high speed.

Temperature Control (2)

Temperature Control - Turning the temperature control clockwise provides warmed air. Turning the temperature control counterclockwise provides cooler air.

Heating and Air Conditioning Control (3)

Heating and Air Conditioning Switch - Push the top of the switch in order to operate the heater. Set the switch in the MIDDLE position in order to return the switch to the OFF position. Push the bottom of the switch in order to operate the air conditioning compressor.

Note: Use the air conditioning in conjunction with the temperature control and the fan control in order to reduce the temperature of the cab. The air conditioning compressor may be operated intermittently during heater operation in order to remove excess humidity from the cab.

Front Window Wiper (4)

Front Window Wiper - When the bottom of switch is pressed, the switch is in the OFF position. Press the top of the switch one click in order to operate the wiper motor at slow speed. In order to operate the motor at high speed, press the top of switch to the next detent.

Front Window Washer (5)

Front Window Washer - Push the top of switch and hold the top of switch in order to activate the washer motor. Release the switch. The switch will return to the OFF position.

Roof Wiper/Washer (6)

Roof Wiper/Washer - Push the top of switch in order to operate the window wiper for the roof. Push the switch and hold the top of switch in order to activate the pump for the washer and the window wiper for the roof. Release the top of the switch. The switch will return to the OFF position.

Rear Window Wiper and Washer (7)

Rear Window Wiper and Washer - Push the top of the switch in order to operate the rear window wiper. Push the switch and hold the top of switch in order to activate the pump for the washer and the rear window wiper. Release the top of the switch. The switch will return to the OFF position.

Cab Floodlights (8)

Cab Floodlights - Push the top of switch in order to turn on the cab floodlights. Push the bottom of the switch in order to turn off the cab floodlights.

Boom Floodlights (9)

Boom Floodlights - Push the top of switch in order to turn on the boom floodlights. Push the bottom of the switch in order to turn off the boom floodlights.

Hydraulic Lockout Control (10)

When the top of the switch is pressed, all the machine functions are operational.

When the bottom of the switch is pressed, the switch locks in this position. In this position, only the following machine functions are operational:

- Transmission control
- Steering control

When the bottom of the switch is pressed, the following machine functions are locked out:

- Boom raise
- Boom lower
- Boom extend

joystick control (13) is released, the joystick control will return to the HOLD position.

Boom Lower - Push joystick control (13) forward in order to lower the boom. When joystick control (13) is released, the joystick control will return to the HOLD position.

Boom Extend - Push joystick control (13) to the right in order to extend the boom. When joystick control (13) is released, the joystick control will return to the HOLD position.

Note: The boom will not extend when the transmission control is in the REVERSE position. The function for extending the boom will resume if the transmission is neutralized by the service brake, the parking brake, or the transmission neutralizer button.

Boom Retract - Pull joystick control (13) to the left in order to retract the boom. When joystick control (13) is released, the joystick control will return to the HOLD position.

Quick Coupler (Tilt Forward) - Push thumb wheel (13B) forward in order to tilt the quick coupler forward. When the thumb wheel is released, the thumb wheel will return to the HOLD position.

Quick Coupler (Tilt Backward) - Pull thumbwheel (13B) rearward in order to tilt the quick coupler backward. When the thumb wheel is released, the thumb wheel will return to the HOLD position.

Auxiliary Controls - Press switch (13E) in order to toggle between the hydraulic circuits for the auxiliary 1 and auxiliary 2. Press switch (13C) in order to operate an actuator for a work tool in the positive direction. Press switch (13D) in order to operate an actuator for a work tool in the negative direction. Switches (13E), (13C) and (13D) are not operated proportionally.

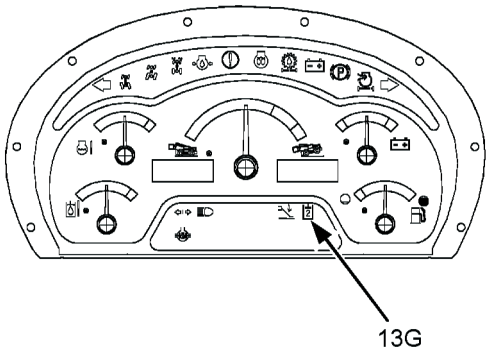


Illustration 78 g01017263

When auxiliary 2 is selected, indicator light (13G) will be illuminated.

The speed of the following functions is governed by the amount of movement of the joystick control and engine speed:

- Boom raise
- Boom lower
- Boom extend
- Boom retract

For smooth operation, first increase the engine speed from low idle. Then, move joystick control (13) slowly until the attachment is moving at the required speed.

The speed of the quick coupler (tilt forward) and quick coupler (tilt backward) is governed by the amount of movement of thumb wheel (13B).

Move joystick control (13) diagonally in order to simultaneously extend the boom or retract the boom while the boom is being raised or lowered.

Move joystick control (13) diagonally. At the same time operate thumb wheel (13B) in order to simultaneously tilt the quick coupler while the boom is being operated in two directions.

Type B Control Arrangement (Double Thumb Wheel)

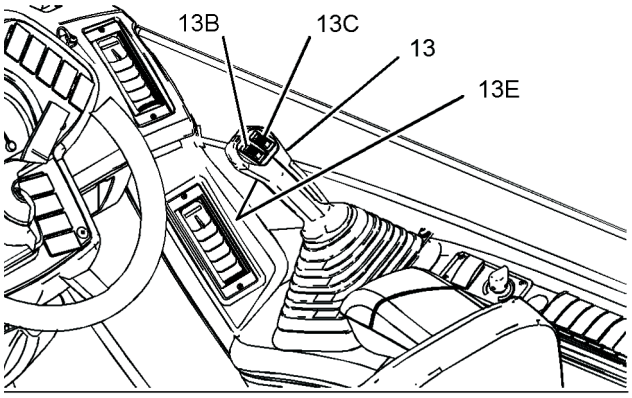


Illustration 79 g01051075
Film for joystick with double thumb wheel

Machines that have the Type B control arrangement are equipped with decal (13F) that is shown above. The joystick control operates in the following way:

Changing Speed and Direction

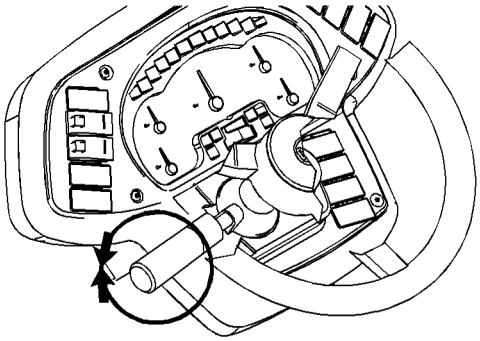


Illustration 93 g01042565
Transmission control

Start moving the machine with the machine in first gear or in second gear. To upshift, rotate the transmission control to the next highest gear. It is not necessary to release the accelerator control. To downshift, rotate the transmission control to the next lowest gear. Do not skip gears when you downshift. Continue to shift through the gears in this way as the conditions are required. To prevent engine overspeed, do not downshift if the engine speed is high. Refer to the topic "Transmission Control" in Operation and Maintenance Manual, "Operator Controls" for additional information.

Control the speed of the machine in order to suit conditions. Make an allowance for surface conditions, weather conditions and load.

NOTICE

Damage to the transmission could occur if the machine is allowed to coast in neutral. Damage to the transmission could also occur if a change of direction is selected at an excessive speed. Do not allow the machine to coast. Only select a transmission direction change if the machine is in first gear and moving at less than 4 km/h (2.5 mph).

Note: These machines are not equipped with speedometers. Before you change the direction of the machine from forward to reverse or from reverse to forward stop the machine completely.

Select the correct gear before you travel downhill. Select the necessary travel speed before you start downhill. Do not change gears while you are going downhill. When you go downhill, use the same speed that would be used to go uphill. Do not allow the engine to overspeed when you go downhill. Use the service brake to prevent engine overspeed when you go downhill. Select a lower gear before you go down the same hill again.

When you are travelling uphill, select a lower gear when the engine speed starts to fall. Drive the machine in the gear that will allow the required speed to be maintained. Do not allow the torque converter to slip and do not allow the engine to lug.

Hydraulic Quick Coupler

Your machine may be equipped with a hydraulic quick coupler.

Illustrations in the following procedure show a carriage which is equipped with forks. The procedure is applicable to all work tools with the same types of mounting points.

Installation Procedure

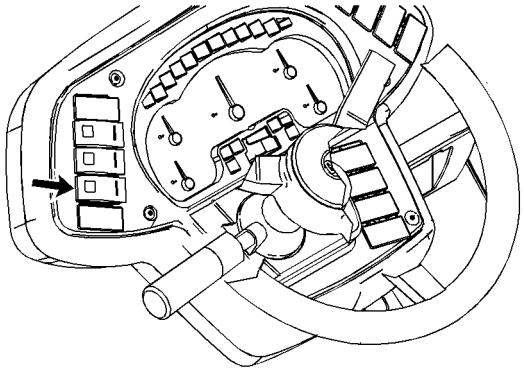


Illustration 94 g01060075

1. Move the red portion of the switch for the quick coupler downward and press the top of the switch. Hold the top of the switch until the quick coupler pins are fully disengaged. Release the switch.
2. Lower and extend the boom approximately 2 m (6.6 ft) so that the quick coupler can be seen from the cab. Position the quick coupler in line with the carriage.

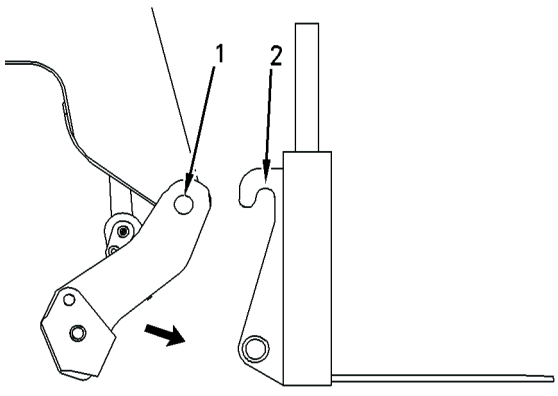


Illustration 95 g00975380

3. Tilt the quick coupler forward until the quick coupler tubes (1) are below the level of hooks (2).

damage to surrounding structures and materials could result.

Extremely cold temperatures could cause a load to be frozen to the ground. Free the load before you attempt to raise the load. Failure to comply could affect the stability of the machine when a lift is attempted.

Use tag lines to assist in the control of loads that require accurate placement.

When a load is lifted and the boom is extended and raised, the boom will deflect under the load. This has the effect of moving the load away from the machine as the load is raised. Make an allowance for this deflection.

Maneuver the load into position by operating the boom functions. Do not use the quick coupler to position the load when the boom extension is installed.

The operator must remain at the controls of the machine when a load is suspended from the boom extension.

Lifting Hook

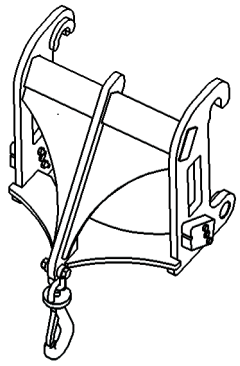


Illustration 130 g00974785

Before you raise the load, position the lifting point on the lifting hook directly above the lifting point on the load. Failure to follow this procedure could cause the load to swing when the load is lifted. Personal injury or damage to surrounding structures and materials could result.

Material Handling Arm

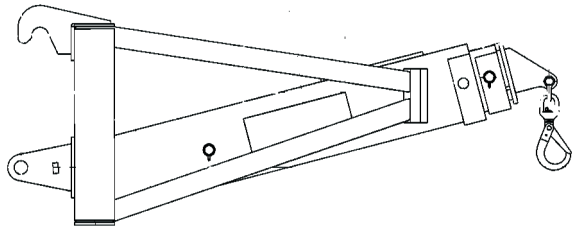


Illustration 131 g01037376

Reference the correct load chart and do not exceed the machine capacities.

Use only approved lifting equipment with a current certificate of serviceability when you attach a load to a material handling arm. Short slings will prevent excessive load swing.

Before you raise the load, position the lifting point on the material handling arm directly above the lifting point on the load. Failure to follow this procedure could cause the load to swing when the load is lifted. Personal injury or damage to surrounding structures and materials could result.

Extremely cold temperatures could cause a load to be frozen to the ground. Free the load before you attempt to raise the load. Failure to comply could affect the stability of the machine when a lift is attempted.

Use tag lines to assist in the control of loads that require accurate placement.

When a load is lifted and the boom is extended and raised, the boom will deflect under the load. This has the effect of moving the load away from the machine as the load is raised. Make an allowance for this deflection.

Maneuver the load into position by operating the boom functions. Do not use the quick coupler to position the load when the material handling arm is installed.

Hopper

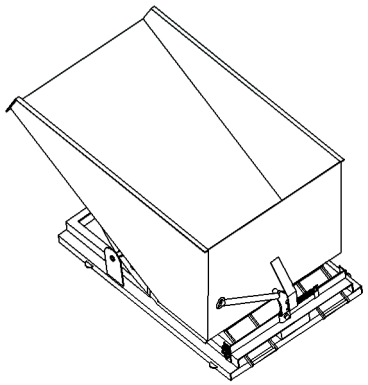


Illustration 132 g00974787

at least 150 percent of the gross weight of the towed machine. This pertains to towing a disabled machine from mud and to towing a machine on a grade.

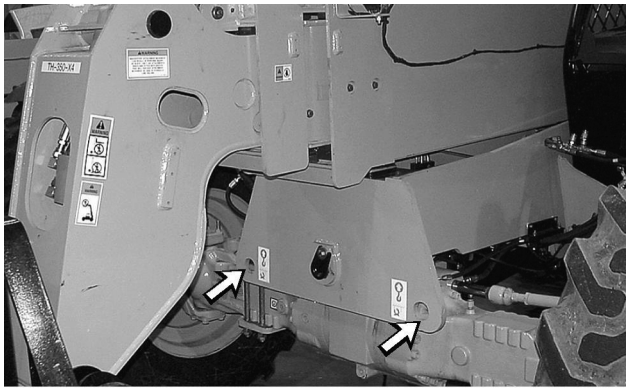


Illustration 166 g00837145
Lifting and tie-down points (front)

For towing or retrieving the machine from the front, attach towing equipment to the lifting points on the frame at the front of the machine.

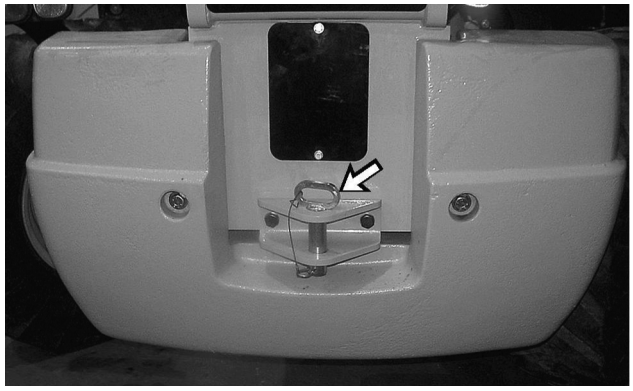


Illustration 167 g00837146
Typical retrieval hitch (rear)

If it is not possible to tow the machine from the front or if it is not possible to retrieve the machine from the front, attach the tow line or tow bar to the retrieval hitch at the rear of the machine. When the machine has been retrieved, attach towing equipment to the lifting points on the frame at the front of the machine for towing.

Normally, the towing machine should be at least the size of the disabled machine. Make sure that the towing machine has enough brake capacity, weight and power. The towing machine must be able to control both machines for the grade, distance and conditions that are involved.

A larger towing machine and a solid tow bar will be required in order to provide sufficient control and braking when a disabled machine is moved downhill.

Shields must be provided on both machines. This will protect the operator if the tow line breaks or the tow bar breaks.

Do not allow any person on the disabled machine except the operator. Only allow the operator on the disabled machine if the operator can control the steering and/or braking.

Use an observer in a safe position in order to watch the procedure. The observer can stop the procedure if the rope starts to break or the rope starts to unravel. Stop the procedure if the towing machine moves without moving the towed machine.

Do not disengage the parking brake or remove chocks from the wheels before the tow line or tow bar has taken the weight of the disabled machine.

Quick machine movement could overload the tow line or tow bar. This could cause the tow line or tow bar to break. Gradual, smooth machine movement will be more effective.

Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth level surfaces while maximum towing machine capacity is required on grades with poor ground conditions.

If you are in doubt, consult your Caterpillar dealer for advice before you attempt to tow a disabled machine.

Towing with the Machine

Note: TH360B machines are designed for use as towing machines when an approved towing hitch is installed.

⚠ WARNING

If the combined weight of the machine, the towed attachment and the attachment cargo exceed the brake capacity available from both the machine and the towed attachment, a loss of control may occur. The operator must verify that the combined weight does not exceed the combined braking capacity. Loss of control could cause injury or death.

Your machine may be equipped with a number of different types of towing hitch. Please refer to "Types of Towing Hitches" for more information.

Note: The maximum permissible weight of the attachment and freight may need to be reduced if the attachment will be towed on ground which is not level. The speed of the machine may also need to be reduced if the attachment will be towed on ground which is not level.

Tire Inflation Pressure Adjustment

The tire pressure in a warm shop area 18° to 21 °C (65° to 70°F) will significantly change when you move the machine into freezing temperatures. If you inflate the tire to the correct pressure in a warm shop, the tire will be underinflated in freezing temperatures. Low pressure shortens the life of a tire.

Tire Damage

For pneumatic tires, when any cut, rip or tear is discovered that exposes sidewall or tread area cords in the tire, measures be taken to remove the product from service immediately. Arrangements must be made for replacement of the tire or tire assembly.

For polyurethane foam filled tires, when any of the following are discovered, measures must be taken to remove the product from service immediately. Arrangements must be made for replacement of the tire or tire assembly.

- A smooth even cut through the cord piles which exceeds 7.5 cm (3 in) in total length.
- Any tears or rips (ragged edges) in the cord piles which exceeds 2.5 cm (1 in) in any direction.
- Any punctures which exceed 2.5 cm (1 in) in diameter.

If a tire is damaged but within the above noted criteria, the tire must be inspected daily to ensure the damage has not propagated beyond the allowable criteria.

Tire Replacement

It is recommended that a replacement tire be the same size, ply and brand as originally installed. Refer to the appropriate parts manual for ordering information. If not using an approved replacement tire, the replacement tires must have the following characteristics:

- Equal or greater ply/load rating and size of original.
- Tire tread contact width equal or greater than original.
- Wheel diameter, width and offset dimensions equal to the original.
- Approved for the application by the tire manufacturer (including inflation pressure and maximum tire load).

Wheel Replacement

The rims installed have been designed for stability requirements which consist of track width, tire pressure and load capacity. Size changes such as rim width, center piece location, larger or smaller diameter, etc., without written factory recommendations, may result in unsafe condition regarding stability.

Wheel and Tire Installation

Torque lug nuts before first use and after each wheel removal.

Note: If machine is equipped with directional tire assemblies, the wheel and tire assemblies must be installed with the directional tread pattern “arrows” facing in the direction of forward travel.

1. Start all nuts by hand to prevent cross threading. DO NOT use a lubricant on threads or nuts.
2. Tighten lug nuts in an alternating pattern. Torque to 400-520 Nm (295-384 lb-ft).

⚠ WARNING

TIP OVER HAZARD. Lug nuts must be installed and maintained at the proper torque to prevent loose wheels, broken studs and possible separation of wheel from axle. Failure to comply could result in death or serious injury.

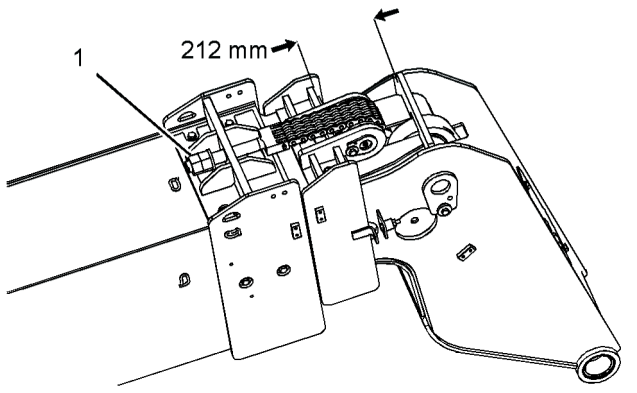


Illustration 180 g01109371

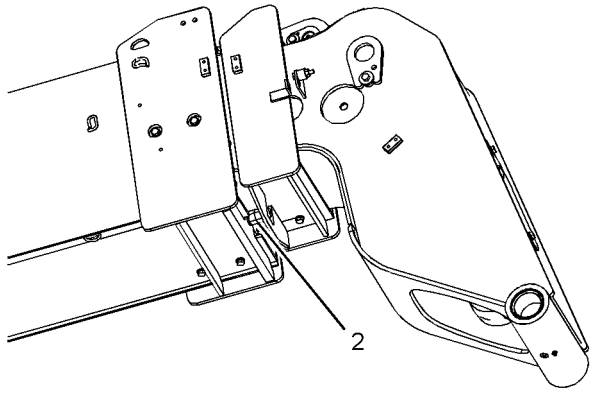


Illustration 181 g01109372

4. Set the minimum distance to 224 mm (8.8 inch) between boom section 2 and boom section 3. The maximum allowable distance is 234 mm (9.2 inch). Tighten extension chain (1) in order to move section 3 outward. Tighten retraction chain (2) in order to move section 3 inward. If the distance is significantly more than 224 mm (8.8 inch), slacken both chains and refer to Step 1.
5. After setting the distance to the required tolerance, tighten the extension chain to 20 N-m (15 lb ft).
6. Tighten the retraction chain to 18 N-m (13 lb ft).
7. Tighten the extension chain to 105 ± 5 Nm (77 ± 4 lb ft).
8. Tighten the retraction chain to 70 ± 5 Nm (52 ± 4 lb ft).
9. Extend the boom and retract the boom several times. Check the torque for the extension chain. Check the torque for the retraction chain.
10. Install the locknut for the extension chain. Torque the locknut for the extension chain to 105 ± 5 Nm (77 ± 4 lb ft).
11. Install the locknut for the retraction chain. Torque the locknut for the retraction chain to 70 ± 5 Nm (52 ± 4 lb ft).
12. Check the shackles on both chains. If necessary, adjust the shackles in order to set the shackles horizontally.
13. Remove the stand and lower the boom.

Measure the Chain for Wear

Nominal pitch of the link equals 25.4 mm (1 inch).

Nominal height of the plate equals 24.1 mm (0.95 inch).

1. Fully retract the boom. Position the boom horizontally.
2. Extend the boom by 2 m (6 ft 7 inch) or extend the boom to the section of chain that most frequently passes over the boom extension chain pulley.

Do not retract the boom sections before you begin to measure the chains.

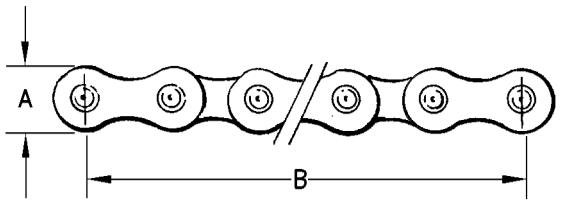


Illustration 182 g00747739

3. Use a caliper in order to measure the height of inner plate (A) and the height of outer plate (A) over 15 pitches of the selected worn section of chain. If any inner plate or any outer plate shows a reduction in height of more than 5% wear, all chains must be replaced. Also, if the measurement is less than 22.89 mm (0.901 inch), all chains must be replaced.
4. Use a 6V- 0028 Wear Gauge As (CHAIN) in order to measure the chain between the 16 pin centers of the selected worn section (B). The nominal length of 16 pin centers is 381 mm (15 inch).If the measurement shows an elongation of more that 2%, all chains must be replaced. Also, if the measurement is greater than 388.6 mm (15.30 inch), all chains must be replaced.

Cooling System Coolant Sample (Level 1) - Obtain

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

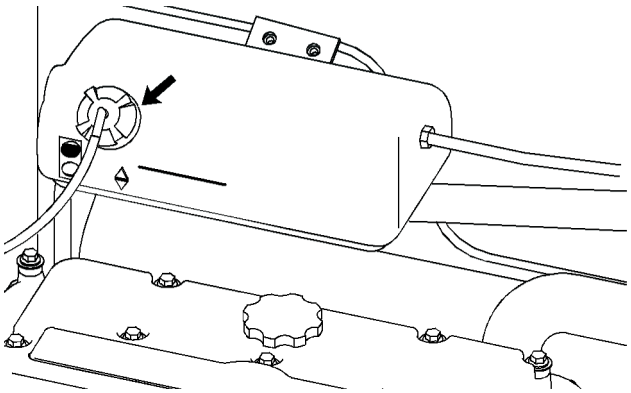


Illustration 221 g01081068

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of SOS analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Keep the unused sampling bottles stored in plastic bags.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Complete the information on the label for the sampling bottle before you begin to take the samples.
- Use a designated pump to collect the sample in order to avoid contamination.
- Obtain coolant samples directly from the coolant tank. You should not obtain the samples from any other location.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from the drain for a system. Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see the appropriate Service Manual or consult your Caterpillar dealer.

Cooling System Coolant Sample (Level 2) - Obtain

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

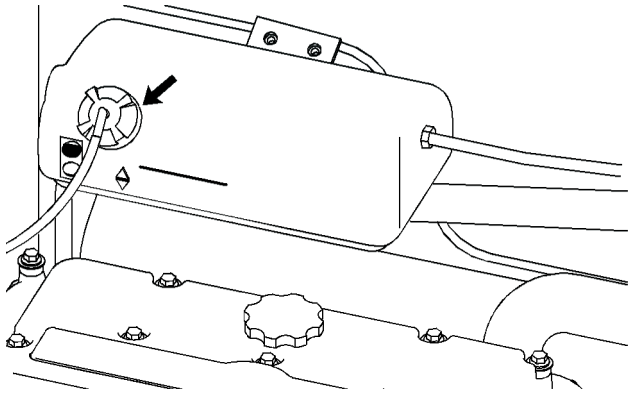


Illustration 222 g01081068

Refer to the Operation and Maintenance Manual, "Access Doors and Covers" for the location of the service points.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Refer to Operation and Maintenance Manual, "Cooling System Coolant Sample (Level 1) - Obtain" for the guidelines for proper sampling of the coolant.

Submit the sample for Level 2 analysis.

For additional information about coolant analysis, see the appropriate Service Manual or consult your Caterpillar dealer.

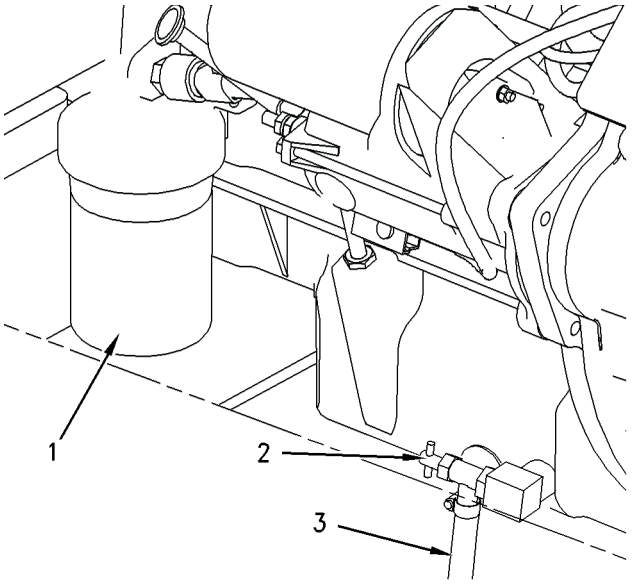


Illustration 246 g00975860

3. Position the end of hose (3) into a suitable container. Turn shutoff valve (2) counterclockwise in order to drain the engine oil from the crankcase. Turn the shutoff valve clockwise in order to close the shutoff valve. Allow the oil to drain from the hose.
4. Remove old engine oil filter (1) with a filterwrench.
5. Clean the filter housing base. Ensure that all of the old seal is removed.
6. Apply a thin film of clean engine oil to the seal of the new engine oil filter.
7. Install new engine oil filter (1) hand tight until the seal of engine oil filter (1) contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on engine oil filter (1) that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten engine oil filter (1), use the rotation index marks as a guide.

8. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, refer to the installation instructions that are provided by the supplier of the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

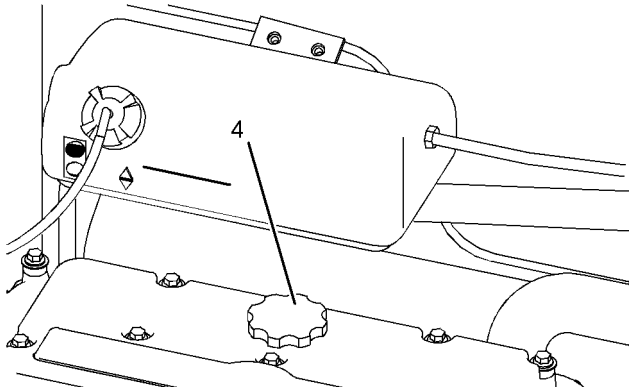


Illustration 249 g01081070

9. Remove filler cap (4) and fill the crankcase with new oil.
10. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for more information on the type of oil that is required. Refer to Operation and Maintenance Manual, "Capacities (Refill)" for more information on the quantity of oil that is required.
11. Check that the parking brake is engaged and that the transmission is in NEUTRAL and then start the engine. Operate the engine for five minutes at low idle. Inspect the engine for leaks and make any repairs that are necessary.
12. Stop the engine. Wait for two minutes after you stop the engine. Stopping the engine allows oil to drain back to the crankcase. Check the oil level. If necessary, add oil. Maintain the oil level between the "ADD" mark and the "FULL" mark on the dipstick. Install the filler cap.
13. Close the engine access door.

Engine Valve Lash - Check

Maintenance is recommended by Caterpillar for engine valve lash adjustments. The maintenance for the engine valve lash is part of the lubrication and preventive maintenance schedule in order to provide maximum engine life.

Note: The engine valve lash should be checked at every 2000 hours or 2 years.

NOTICE

Only qualified service personnel should perform this maintenance. Refer to the Service Manual or your Caterpillar Dealer for the complete engine valve lash adjustment procedure.

Longitudinal Stability Indicator - Calibrate

⚠ WARNING

The use of a defective longitudinal stability indicator (LSI) could lead to the instability of the machine. Do not operate the machine if the LSI is not fully serviceable. The instability of the machine could cause personal injury or death.

Refer to the appropriate Service Manual for information on this procedure.

Longitudinal Stability Indicator -Test

The following procedure must be followed when you test the operation of the longitudinal stability indicator system.

Initial Test

1. Perform the following procedures to the machine:
   a. Remove any work tool from the machine. Remove any load that is applied to the rear hitch.
   b. Position the machine on level ground. If necessary, level the frame of the machine.
   c. If the machine is equipped with stabilizers, ensure that the stabilizers are raised fully.
   d. Ensure that all the wheels are facing straight ahead. Drive the machine forward and drive the machine in reverse for 3 m (10 ft).
   e. Tilt the coupler fully forward.
   f. Fully lower and retract the boom.
   g. Engage the parking brake and move the transmission control to the NEUTRAL position.
2. Turn the ignition to the OFF position. Wait for 30 seconds.
3. Turn the ignition to the ON position, but do not crank the engine.

Note: The machine will perform the self test. Refer to "Engine Start Switch" topic in Operation and Maintenance Manual, "Operator Controls" for more information.

4. After the self tests are completed, the machine will test the longitudinal stability indicator system.
   a. If the test is successful, the gauge will function in the manner that was described in Operation and Maintenance Manual, "Monitoring System". This indicates that the system is operating correctly.
   b. The needle of the longitudinal stability indicator will move into the red zone of the gauge if the test is failed. An intermittent audible alarm will sound. The warning light will be activated. Turn the ignition to the OFF position in order to stop the alarm.

Note: This test is performed automatically. The test will be conducted when the ignition is switched from the OFF position to the ON position.

Second Test

Perform the following test if the machine fails the system test of the longitudinal stability indicator.

1. Completely perform Step 1 of "Initial Test".
2. Repeat the test of the longitudinal stability indicator system.

Note: If the machine continues to fail system tests of the longitudinal stability indicator, the machine must not be operated. Call your Caterpillar dealer for recalibration of the longitudinal stability indicator system.

Oil Filter - Inspect

Inspect a Used Filter for Debris

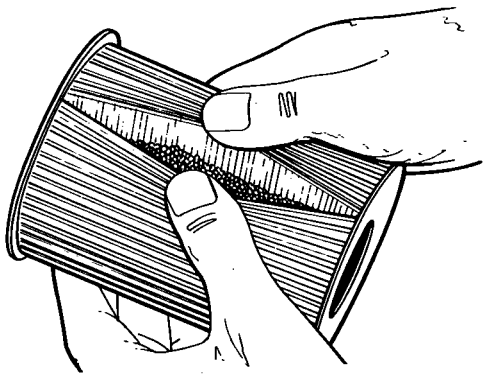


Illustration 272 g00100013
The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

To perform a proper inspection, the forks must be thoroughly cleaned. It is impossible to inspect the forks properly if the work tool is dirty.

Inspect the forks before the forks are attached to the machine.

Perform the yearly inspection for the forks prior to the start of each contract for all machines that are operating in a rental fleet.

Inspect the forks for deformation. Check that the upright of the fork is at 90 degrees to the blade of the fork. Check the fork for cracks in the metal. Closely inspect the area around the heel of the fork. This is the area of the fork that is subject to the greatest stresses. If a crack is visible, take the fork out of service immediately until the fork can be thoroughly examined.

Keep a record of each fork in order to establish a routine of regular inspection. Include the following initial information in the record:

- Manufacturer of the fork
- Type of fork
- Original size of fork section
- Original length of the fork

Record the date of each inspection and the results of each inspection. Ensure that the following information is included:

- Amount of wear on the blade
- Any damage, failure or deformation which might impair the use of the forks
- Any repairs or maintenance to the forks

An ongoing record of this information will help in identifying appropriate inspection intervals for each operation and in identifying and solving problem areas and in anticipating time for replacement of the forks.

Daily Inspection

1. Visually inspect the forks for cracks. Look particularly for cracks in the heel of the forks and for cracks around areas of weld. Look for tips of forks that are broken or bent. Look for twisted blades and shanks. Forks which are twisted should be removed from service. Also, forks which are cracked should be removed from service.
2. Make sure that the bolt for locking the fork is in place and that the bolt is working. Lock the forks in position before you use the forks.
3. Remove all worn forks or damaged forks from service.

Yearly Inspection

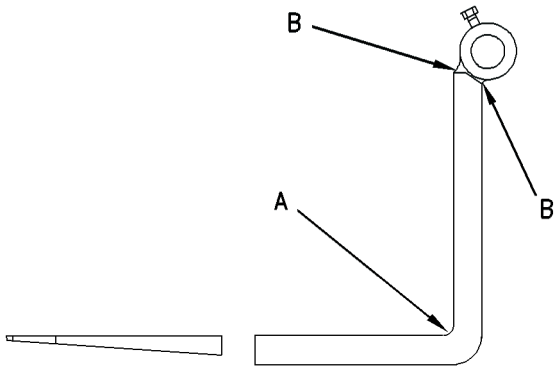


Illustration 305 g01001950

1. Inspect forks carefully for cracks. Pay special attention to heel (A) and mounting brackets (B). Look for cracks around all areas of weld. Inspect the tubes on forks that are mounted on shafts.

Forks with cracks should be removed from service.

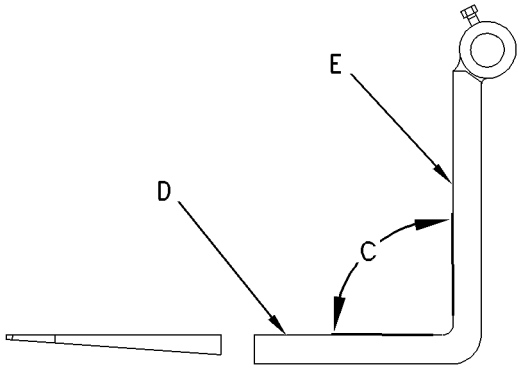


Illustration 306 g01001964

2. Check the angle between the upper face of blade (D) and the front face of shank (E). Remove the fork from service if angle (C) exceeds 93 degrees.

3. Check the straightness of the upper face of blade (D) and the front face of shank (E) with a straight edge.

Remove the fork from service if the deviation from straightness exceeds 0.5 percent of the length of the blade. Remove the fork from service if the deviation from height exceeds 0.5 percent of the height of the shank.