

SERVICE MANUAL

W190D
W230D
Tier2
Wheel Loader

Part number 48083745

English
July 2018





SERVICE MANUAL

**W190D ZBAR - EH, NEW CAB TIER2
W230D ZBAR - EH, NEW CAB TIER2**

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INTRODUCTION

Safety rules


Personal safety





This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

Machine safety

NOTICE: Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

Information

NOTE: Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

Personal safety

Carefully read this Manual before proceeding with maintenance, repairs, refuelling or other machine operations.

Repairs have to be carried out only by authorized and instructed staff; specific precautions have to be taken when grinding, welding or when using mallets or heavy hammers.

Non-authorized persons are not allowed to repair or carry out maintenance on this machine. Do not carry out any work on the equipment without prior authorization.

Ask your employer about the safety instructions in force and safety equipment.

Nobody should be allowed in the cab during machine maintenance unless he is a qualified operator helping with the maintenance work.

If it is necessary to move the equipment to carry out repairs or maintenance, do not lift or lower the equipment from any other position than the operator's seat.

Never carry out any operation on the machine when the engine is running, except when specifically indicated.

Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.

All repair and maintenance operations should be carried out with the greatest care and attention.

Service stairs and platforms used in a workshop or in the field should be built in compliance with the safety rules in force.

Any functional disorders, especially those affecting the safety of the machine, should therefore be rectified immediately.

⚠ DANGER

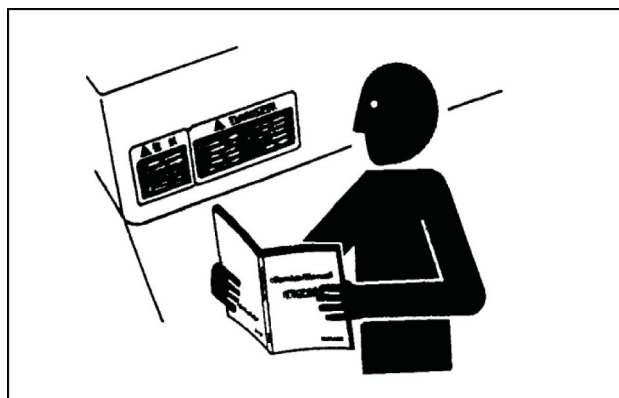
Unexpected movement!

Make sure parking brake is applied. Secure machine with wheel chocks.

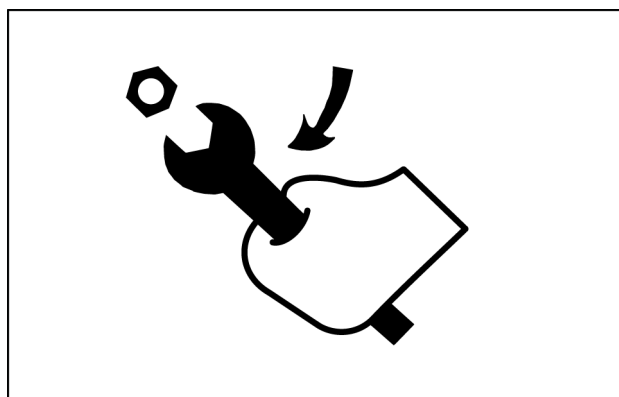
Failure to comply will result in death or serious injury.

D0013A

Before performing any work on the machine, attach a maintenance in progress tag. This tag can be applied on the left-hand control lever, safety lever or cab door.



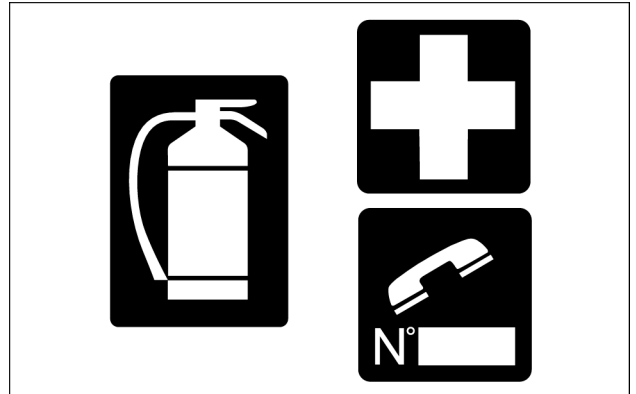
TULI12WEX2004AA 1



TULI12WEX2005AA 2

Emergency

Be prepared for emergencies. Always keep a fire extinguisher and first aid kit readily available. Ensure that the fire extinguisher is serviced in accordance with the manufacturer's instructions.



SMIL12WEX0174AA 3

Equipment

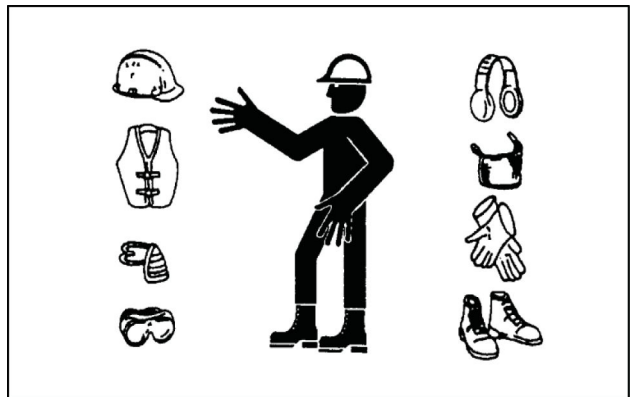
Wear close fitting clothing and safety equipment appropriate for the job:

- Safety helmet
- Safety shoes
- Heavy gloves
- Reflective clothing
- Wet weather clothing

If working conditions require, the following personal safety equipment should be on hand:

- Respirators (or dust proof masks)
- Ear plugs or acoustic ears protections
- Goggles with lateral shield or masks for eye protection

Do not wear rings, wristwatches, jewelry, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught into moving parts.



TULI12WEX2008AA 4

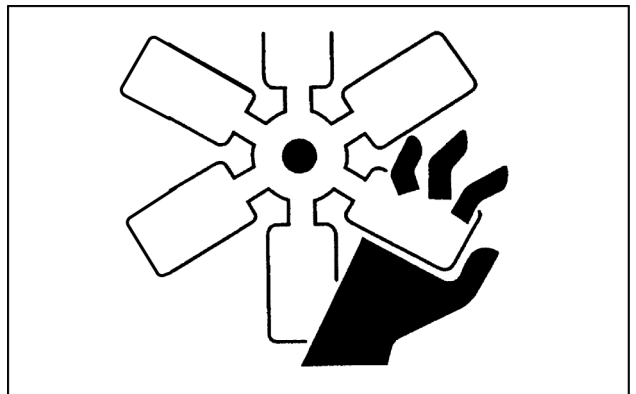
Engine - Radiator

Never leave the engine running in enclosed spaces without proper ventilation which is able to evacuate toxic exhaust gases- Keep the exhaust manifold and tube free from combustible materials.

Do not refuel with the engine running, especially if hot, as this increases fire hazard in case of fuel spillage.

Never attempt to check or adjust the belts when the engine is running.

Never lubricate the machine with the engine running.



TULI12WEX2009AA 5

Pay attention to rotating components and do not allow anyone to approach these areas to avoid becoming entangled.

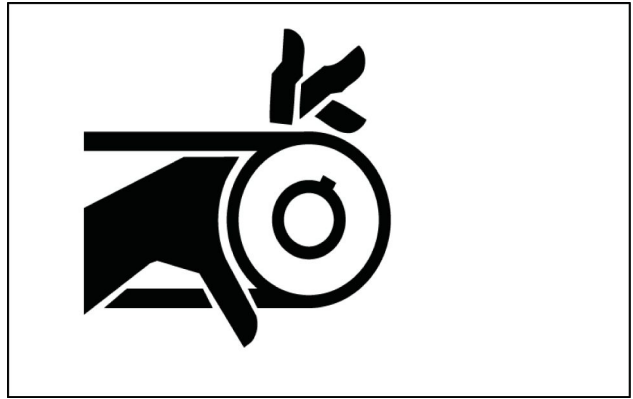
Hands, clothing or tools getting caught in the fan blades or engine belts, can cause amputations, violent hemorrhages and generate conditions of grave danger. For this reason avoid touching or approaching all rotating or moving parts.

A surging spray of the coolant from the radiator can cause serious burns and scalds.

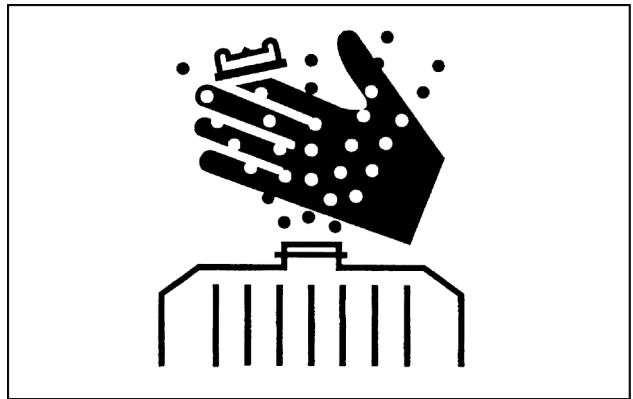
Before checking the coolant level, shut-off the engine and allow machine to cool down the radiator and hoses. Slowly unscrew the cap to release any residual pressure.

If it is necessary to remove the cap while engine is hot, wear safety clothes and equipment, then loosen the cap slowly to relieve the pressure gradually.

When checking the fuel, oil and coolant levels, use lights and lamps explicitly designated as explosion proof. If these types of lamps are not used, fires or explosions may occur.



TUL12WEX2010AA 6



TUL12WEX2011AA 7

Hydraulic systems

Jets of fluids under pressure can penetrate the skin causing serious injuries.

Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.

Relieve the residual pressure by moving the hydraulic control levers several times.

Tighten all connections before applying pressure.

To protect the eyes wear a facial shield or safety goggles.

Protect your hands and body from possible jets of fluids under pressure.

Swallowing hydraulic oil is a severe health hazard.



TUL12WEX2012AA 8

When hydraulic oil has been swallowed, avoid vomiting, but consult a doctor or go to a hospital.

If an accident occurs, see a doctor familiar with this type of injury immediately.

Any fluid penetrating the skin must be removed within a few hours to avoid serious infections.

Flammable splashes may originate because of heating near lines with fluids under pressure, resulting in serious burns. Do not weld or use torches near lines containing fluids or other flammable materials.

Lines under pressure can accidentally be pierced when the heat expands beyond the area immediately heated.

Arrange for temporary fire resistant shields to protect hoses or other components during welding or torch use.

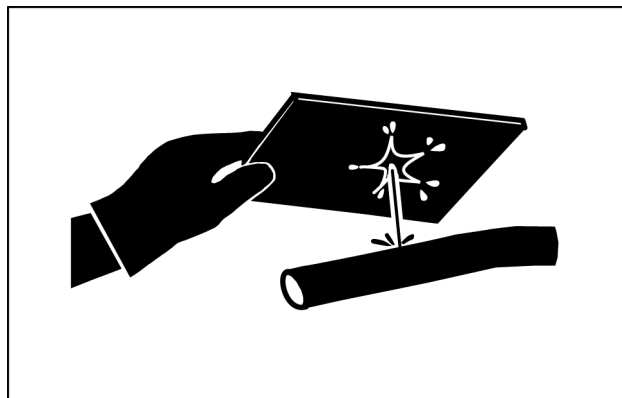
Have any visible leakage repaired immediately.

Discharged oil pollutes the environment. Soak up any oil that has spilled with a proper binding agent. Sweep up binding agent and dispose of it separately from other waste.

Never search for leakages with fingers; instead, use a piece of cardboard and always wear goggles.

Never repair a damaged line; always replace it. Replace hydraulic hoses immediately on detecting any damaged or moist areas.

Always store hydraulic oil in the original containers.



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SERVICE MANUAL

Engine

**W190D ZBAR - EH, NEW CAB TIER2
W230D ZBAR - EH, NEW CAB TIER2**

Engine - General specification

W190D ZBAR - EH, NEW CAB TIER2 | ANZ --- APAC --- LA --- MEA

| | |
|---|-----------------------------------|
| Engine with 4 Speed Transmission | |
| A. Low idle | 870 RPM to 930 RPM |
| Alternate low idle | 670 RPM to 730 RPM |
| Alternate accelerated idle | 1270 RPM to 1330 RPM |
| Working idle (setting from factory) | 920 RPM to 980 RPM |
| B. Maximum No Load RPM | 2065 RPM to 2185 RPM |
| C. Converter Stall | 1775 RPM to 1975 RPM |
| D. Hydraulic Stall | 1915 RPM to 2115 RPM |
| E. Converter & Hydraulic Stall | 1410 RPM to 1610 RPM |
| Temperature of the torque converter oil | 82 – 104 °C (180 – 219 °F) |
| Temperature of the hydraulic oil | 54 – 57 °C (129 – 135 °F) |

| | |
|---|-----------------------------------|
| Engine with 5 Speed Transmission | |
| A. Low idle | 870 RPM to 930 RPM |
| Alternate low idle | 670 RPM to 730 RPM |
| Alternate accelerated idle | 1270 RPM to 1330 RPM |
| Working idle (setting from factory) | 920 RPM to 980 RPM |
| B. Maximum No Load RPM | 2065 RPM to 2185 RPM |
| C. Converter Stall | 1832 RPM to 2032 RPM |
| D. Hydraulic Stall | 1920 RPM to 2120 RPM |
| E. Converter & Hydraulic Stall | 1450 RPM to 1650 RPM |
| Temperature of the torque converter oil | 82 – 104 °C (180 – 219 °F) |
| Temperature of the hydraulic oil | 54 – 57 °C (129 – 135 °F) |

NOTE: hydraulic Stall and Converter and Hydraulic Stall RPM values are read while the lift arms are rising with the bucket held rolled back and the engine at Wide Open Throttle (WOT) in max power mode with transmission in manual mode and in 3rd gear.

Engine - General specification

W230D ZBAR - EH, NEW CAB TIER2 | ANZ --- APAC --- LA --- MEA

| | |
|---|-----------------------------------|
| Engine with 4 Speed Transmission | |
| A. Low idle | 870 RPM to 930 RPM |
| Alternate low idle | 670 RPM to 730 RPM |
| Alternate accelerated idle | 1270 RPM to 1330 RPM |
| Working idle (setting from factory) | 970 RPM to 1030 RPM |
| B. Maximum No Load RPM | 2115 RPM to 2200 RPM |
| C. Converter Stall | 1865 RPM to 2065 RPM |
| D. Hydraulic Stall | 1905 RPM to 2105 RPM |
| E. Converter & Hydraulic Stall | 1450 RPM to 1650 RPM |
| Temperature of the torque converter oil | 82 – 104 °C (180 – 219 °F) |
| Temperature of the hydraulic oil | 54 – 57 °C (129 – 135 °F) |

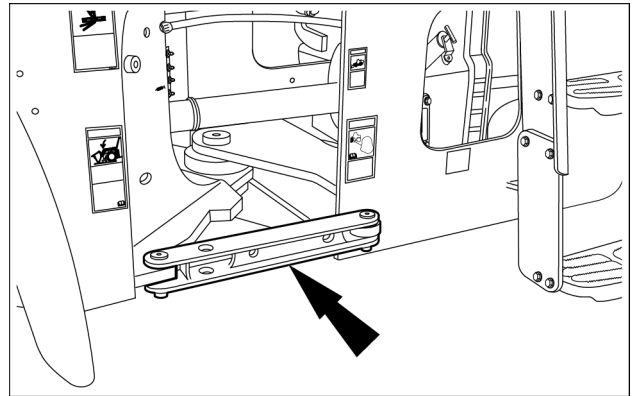
| | |
|---|-----------------------------------|
| Engine with 5 Speed Transmission | |
| A. Low idle | 870 RPM to 930 RPM |
| Alternate low idle | 670 RPM to 730 RPM |
| Alternate accelerated idle | 1270 RPM to 1330 RPM |
| Working idle (setting from factory) | 970 RPM to 1030 RPM |
| B. Maximum No Load RPM | 2115 RPM to 2200 RPM |
| C. Converter Stall | 1867 RPM to 2067 RPM |
| D. Hydraulic Stall | 1957 RPM to 2157 RPM |
| E. Converter & Hydraulic Stall | 1450 RPM to 1650 RPM |
| Temperature of the torque converter oil | 82 – 104 °C (180 – 219 °F) |

| | |
|----------------------------------|---------------------------|
| Temperature of the hydraulic oil | 54 – 57 °C (129 – 135 °F) |
|----------------------------------|---------------------------|

NOTE: hydraulic Stall and Converter and Hydraulic Stall RPM values are read while the lift arms are rising with the bucket held rolled back and the engine at Wide Open Throttle (WOT) in max power mode with transmission in manual mode and in 3rd gear.

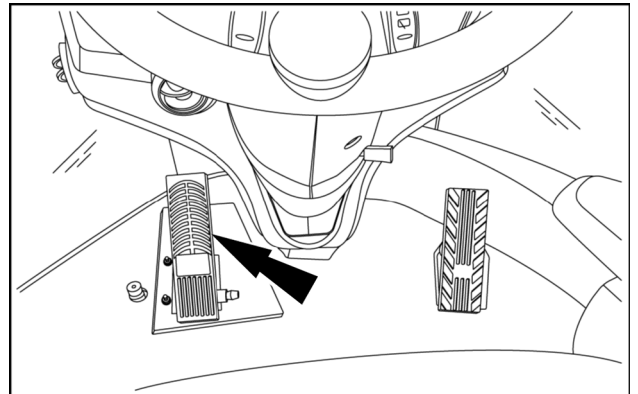
Engine - Remove

1. Park the machine on a level surface and lower the bucket to the ground. Put the articulation lock in LOCKED position and stop the engine.



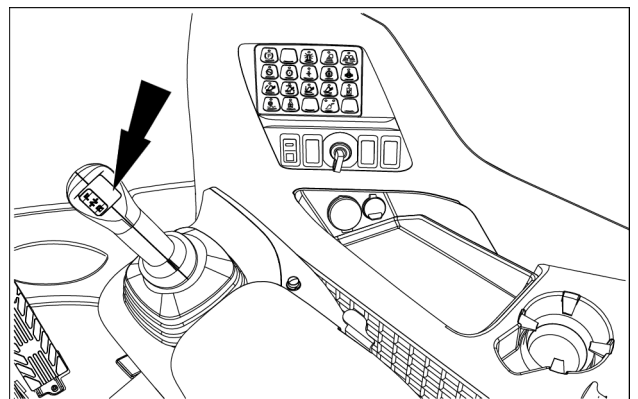
LEIL16WHL0048AB 1

2. Actuate the brake pedal several times to discharge the brake accumulators.



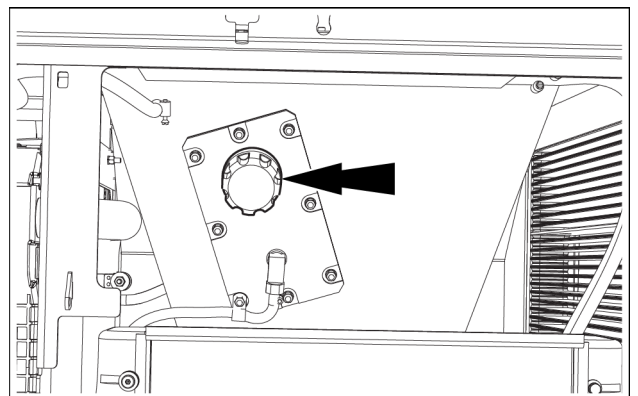
LEIL15WHL0564AA 2

3. Put the key switch to ON position. Press the hydraulic functions lock-out button to unlock all hydraulic functions. Move the control lever(s) back and forth at least 30 times to release any pressure from the hydraulic circuit. Put the key switch to OFF position.



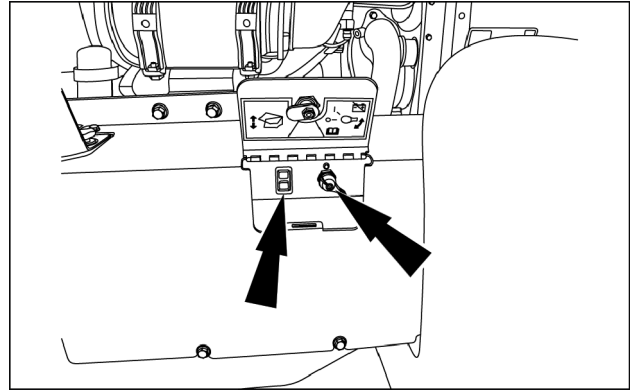
LEIL16WHL1286AA 3

4. Raise the grill located above the cooler box just behind the cab. Then slowly loosen the hydraulic reservoir filler cap to release pressure in the reservoir.



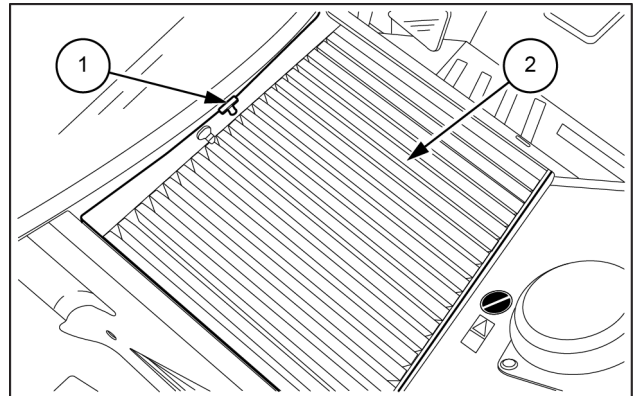
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5. Locate the timed disconnect switch and hood raise switch in the battery box. Raise the engine hood and put the timed disconnect switch to OFF position.



RCPH10WHL106AAH 5

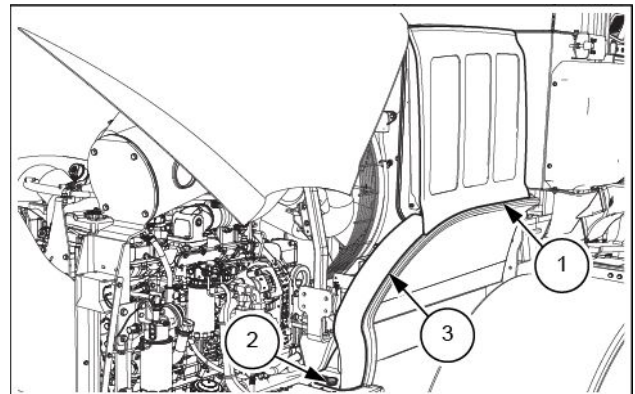
6. Unhook the rubber T-handle (1) and raise the upper panel (2). Make sure that the security levers are blocked.



LEIL13WHL0137AB 6

7. Raise the right-hand and left-hand side panels (1). Then remove the thumb screws (2) and inner fender panels (3).

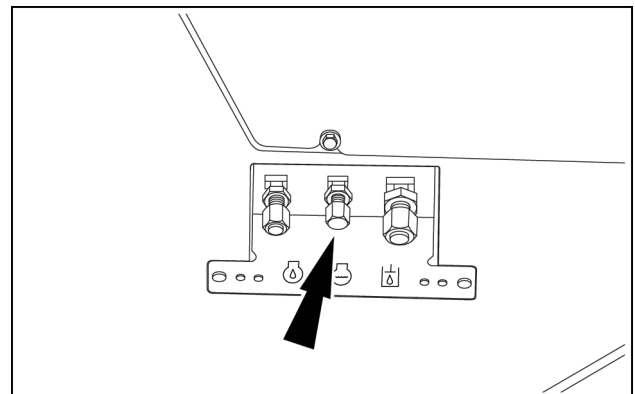
NOTE: right-hand side of the machine is shown. The operation is similar for the left-hand side.



LEIL17WHL0027AB 7

8. Place a suitable container below the radiator drain plug, remove the radiator cap and the radiator drain plug to drain the engine coolant. Then reinstall the radiator drain plug and the radiator cap after coolant has drained.

NOTE: see machine specifications for cooling system volume.



LEIL16WHL0198AA 8



Suggest:

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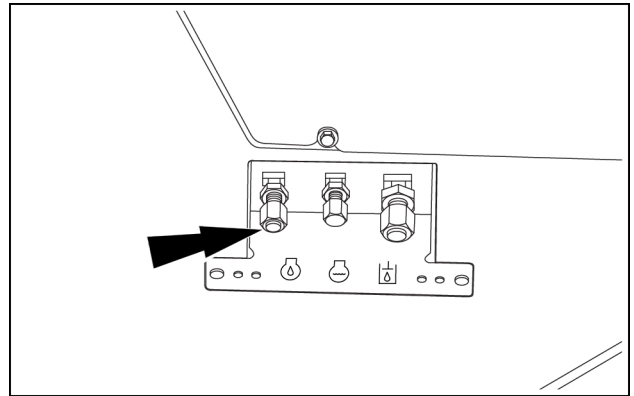
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to download the complete manual.

Thank you so much for reading

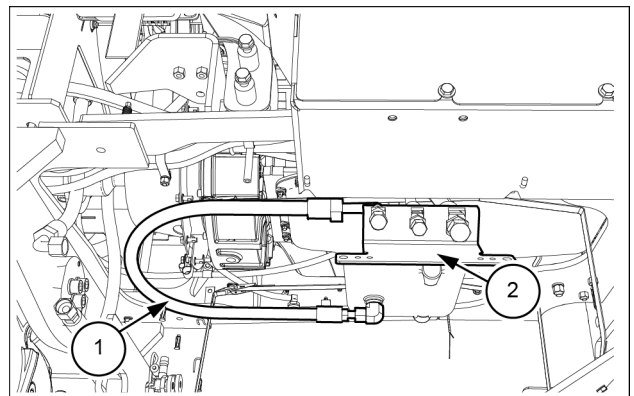
9. Place a suitable container below the engine oil drain plug. Remove the engine oil drain plug and drain oil into container. Then reinstall the engine oil drain plug.

NOTE: see machine specifications for engine oil sump volume.



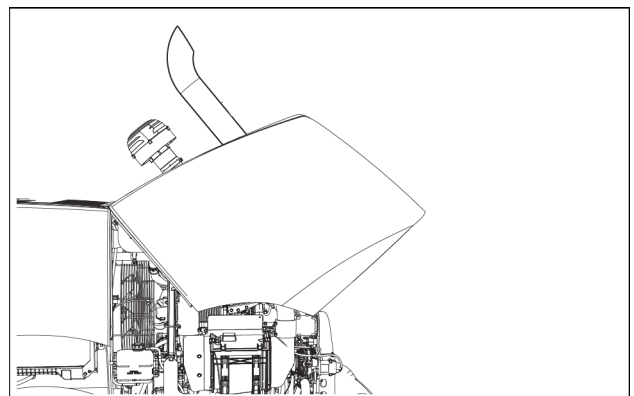
LEIL16WHL0198AA 9

10. Remove the drain hose (1) from the frame bracket (2).



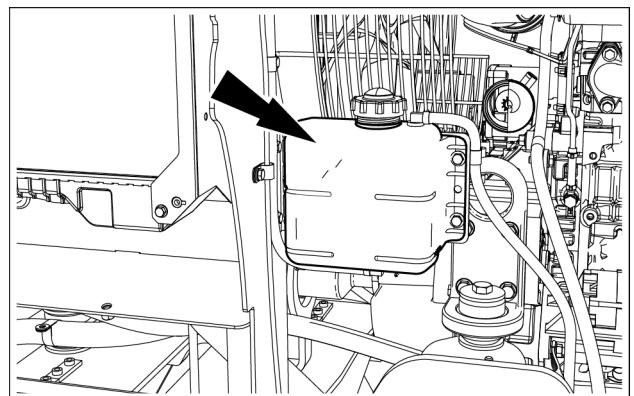
LEIL16WHL1250AB 10

11. Remove the engine hood (refer to **Engine hood - Remove (90.105)**).



LEIL17WHL0026AB 11

12. Remove the overflow tank of the engine coolant.



LEIL16WHL0574AB 12

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