

521G
Tier 4B (final)
Wheel Loader

SERVICE MANUAL

Part number 51428262
2nd edition English
December 2017





SERVICE MANUAL

**521G WHEEL LOADER XR-EH, NEW CAB TIER4B NA
521G WHEEL LOADER XT-EH, NEW CAB TIER4B NA
521G WHEEL LOADER ZBAR-EH, NEW CAB TIER4B NA**

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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

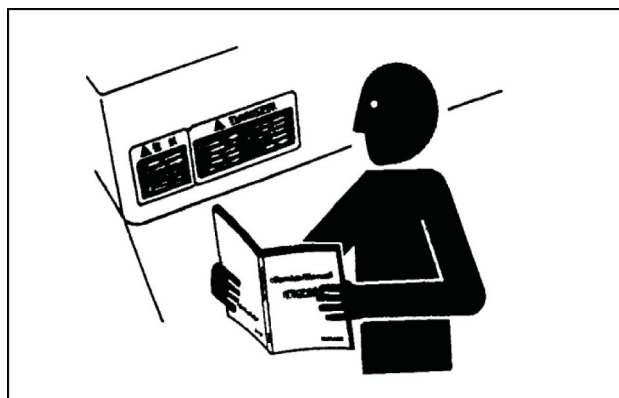
Unexpected movement!

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

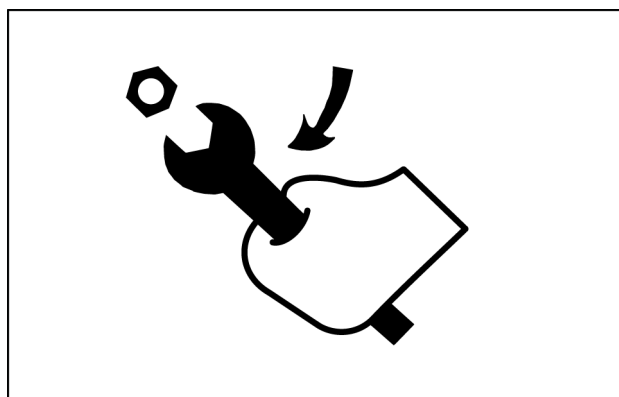
Failure to comply will result in death or serious injury.

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.



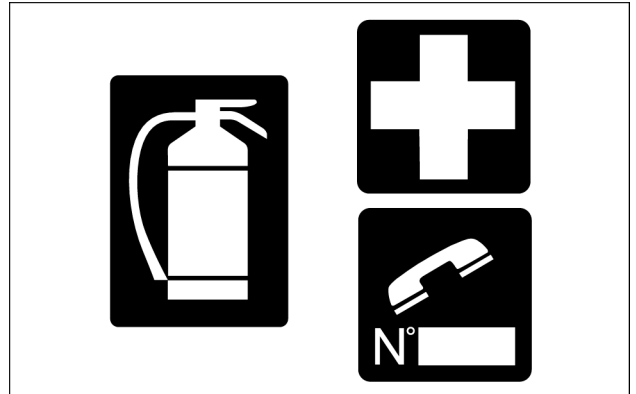
TULI12WEX2004AA 1



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

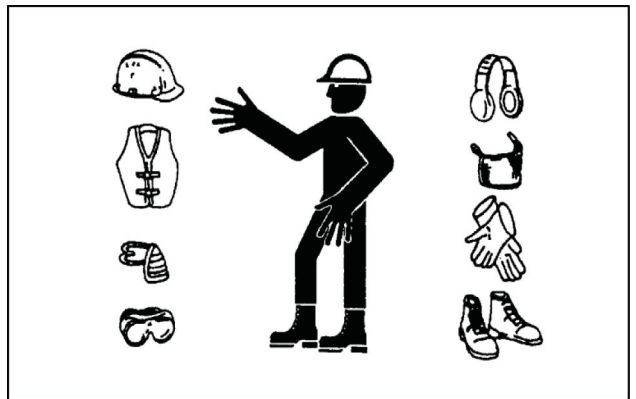
Wear close fitting clothing and safety equipment appropriate for the job:

- 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

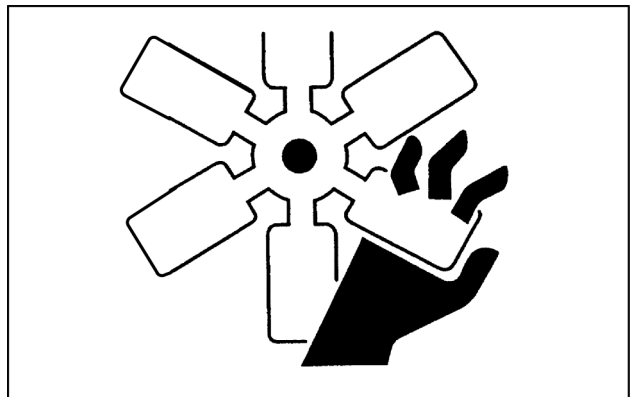
Engine - Radiator

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.

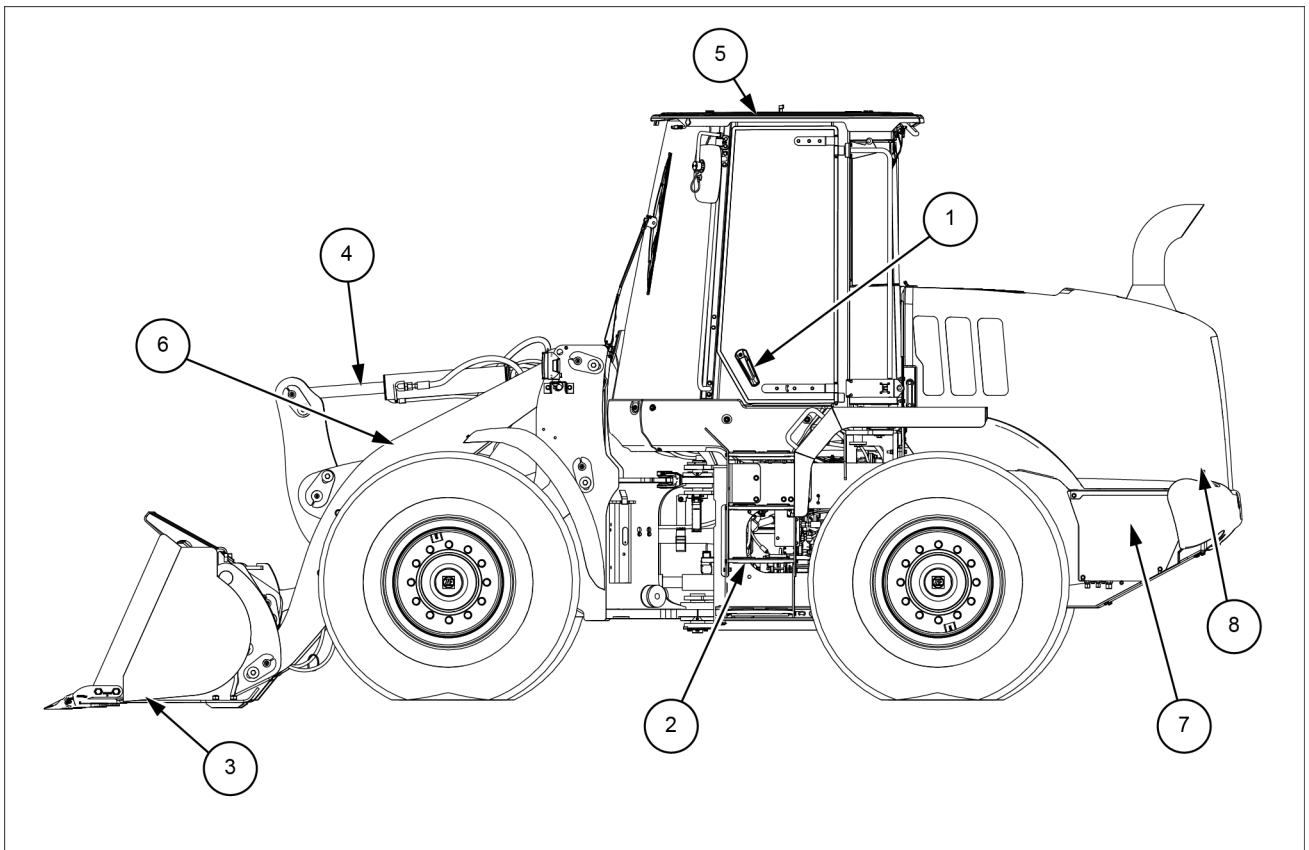
Never attempt to check or adjust the belts when the engine is running.

Never lubricate the machine with the engine running.



TULI12WEX2009AA 5

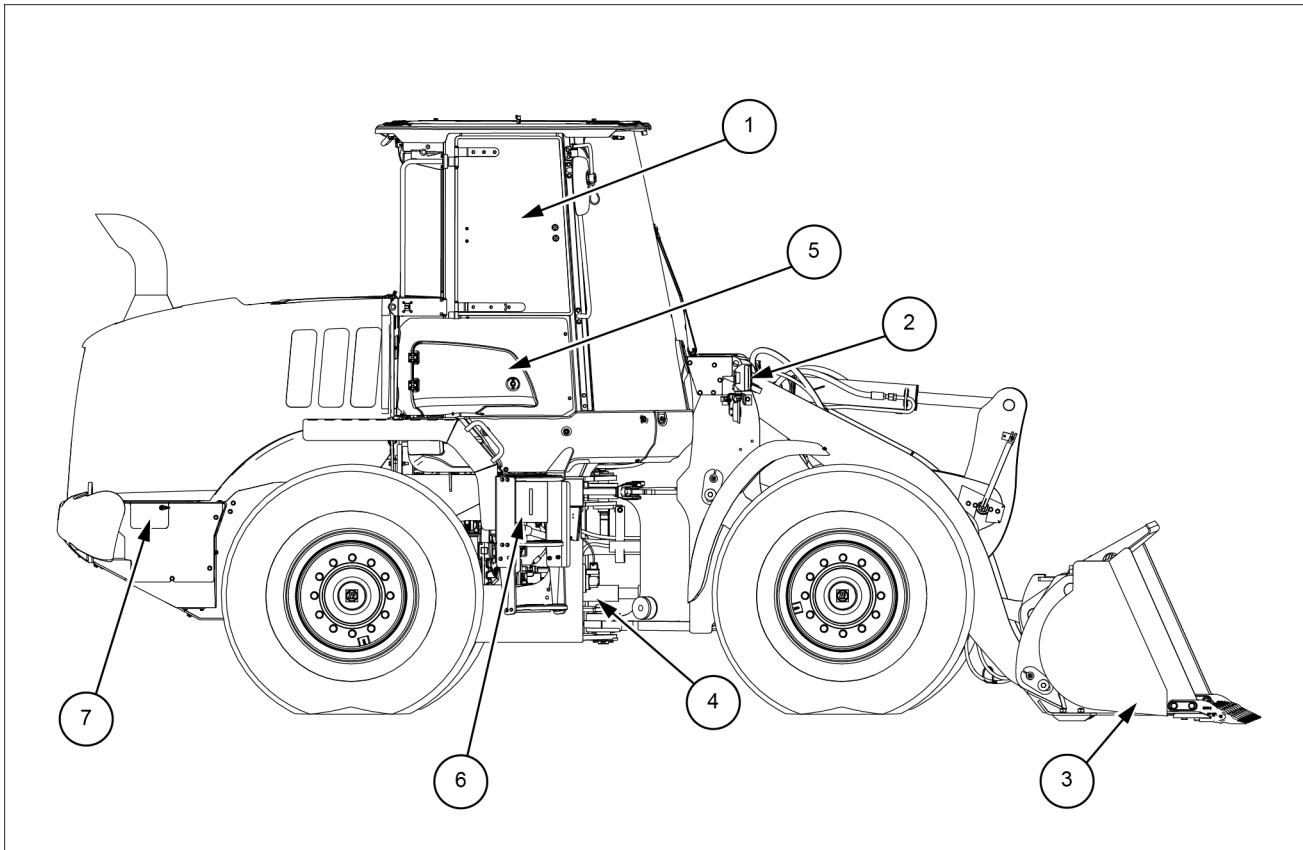
Product identification - Identification of machine components



LEIL16WHL1254FB 1

- | | |
|----------------------------|---|
| 1. Cab door and hand holds | 5. Roll Over Protection System (ROPS) cab |
| 2. Steps | 6. Loader lift arm |
| 3. Bucket (Z-bar version) | 7. Battery compartment |
| 4. Bucket cylinder | 8. Timed disconnect switch and optional battery jump post |

INTRODUCTION



LEIL16WHL1255FB 2

1. Cab side window
2. Driving lights
3. Bucket (Z-bar version)
4. Drive shaft
5. Cab air filter door
6. Windshield washer reservoir
7. **DIESEL EXHAUST FLUID (DEF)/AdBlue®** fill tank



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Engine

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Engine - 10

Engine and crankcase - 001

**521G WHEEL LOADER XR-EH, NEW CAB TIER4B NA
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Engine - General specification

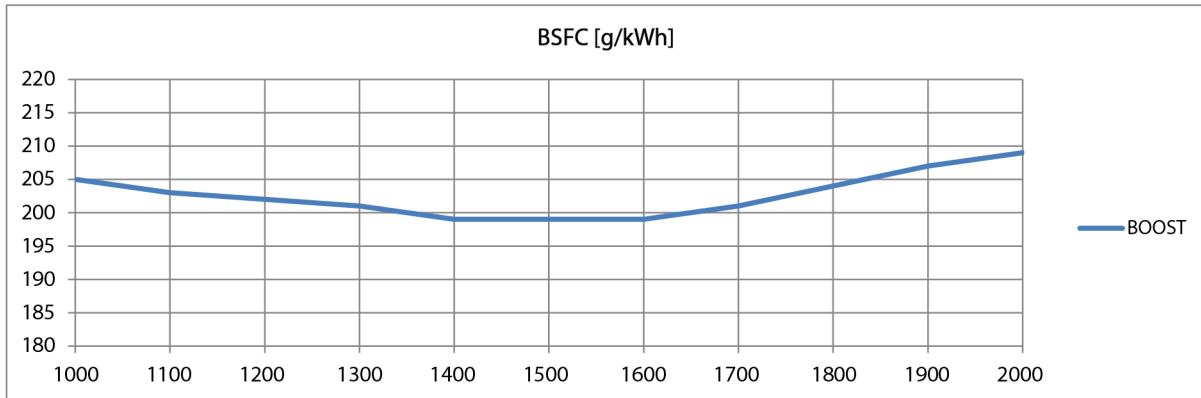
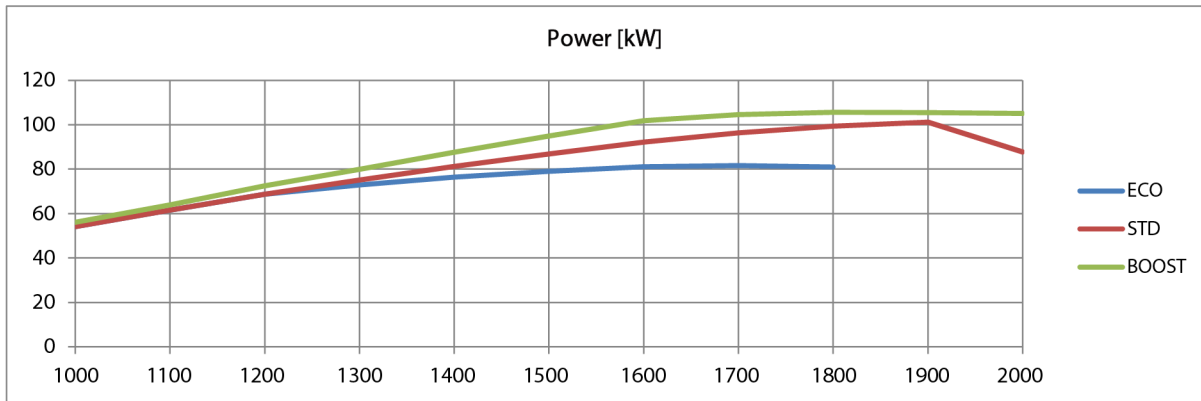
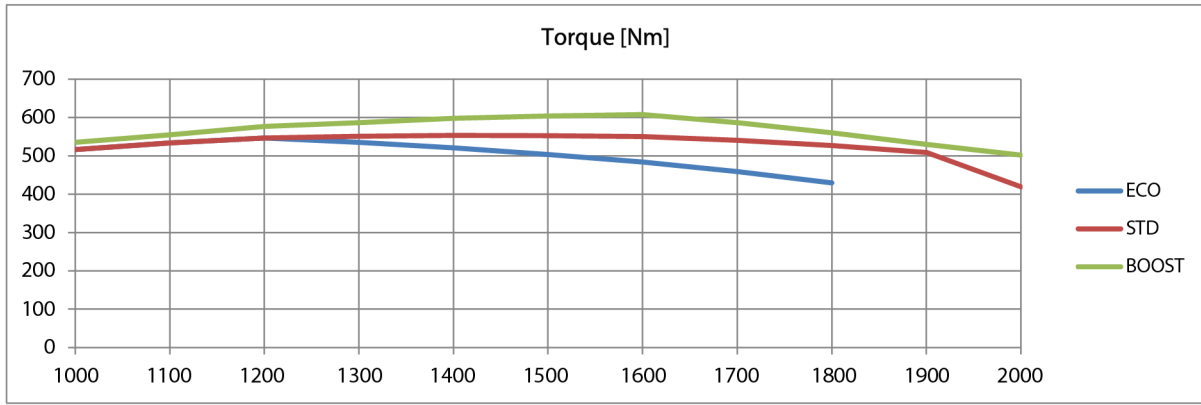
Engine with 4 Speed Transmission	
A. Low idle	1020 – 1080 RPM
Alternate low idle	870 – 930 RPM
Alternate Accelerated Idle	1270 – 1330 RPM
B. Maximum No Load RPM	2074 – 2244 RPM
C. Converter Stall	1950 – 2030 RPM
D. Hydraulic Stall	2020 – 2220 RPM
E. Converter and Hydraulic Stall	1400 – 1600 RPM
Temperature 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 with the lift arms raised, the bucket held in rolled back position, and the engine at Wide Open Throttle (WOT) in maximum power mode with the transmission in manual mode and in third gear.

Engine - Engine horse power

Design characteristics	
Displacement	4485 cm³ (273.7 in³)
Engine Configuration	4 cylinder in line, 4 stroke
Intake Air	Turbocharged, 4 valves/cyl
Fuel injection	High pressure common rail
EGR:	No

Performance	
Altitude Capability	3000 m (9842.5 ft)
High Idle Speed	2170 RPM
Low Idle Speed	700 RPM
Rated Power	105 kW at 2000 RPM
Peak Torque	608 N·m at 1600 RPM



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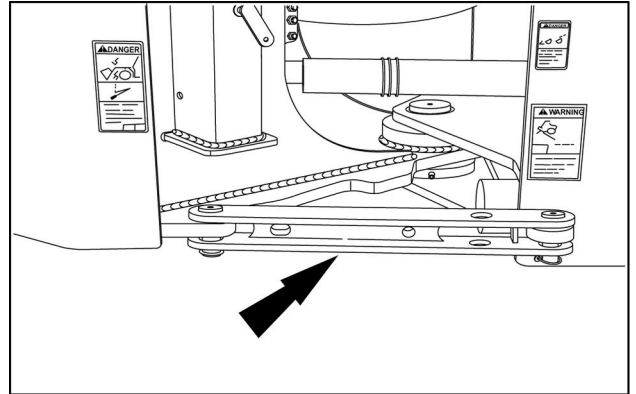
NOTE: performances detected at engine test bench.

NOTE: BSFC indicates the (Brake Specific Fuel Consumption).

Engine - Remove

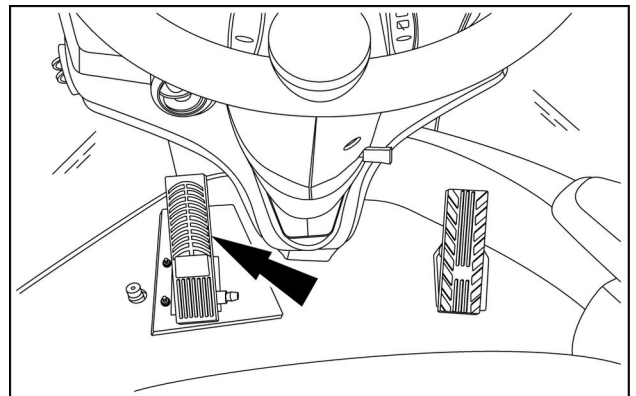
NOTE: emissions sensors mounted in the exhaust stream are sensitive to extreme vibrations. Use of tools that generate extreme vibrations, such as impact wrenches and hammers, will result in damage to emission sensors. Avoid using these tools during any service procedure in close proximity of emission sensors. If the use of these tools cannot be avoided, remove the sensors using extreme caution prior to performing any service procedure.

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



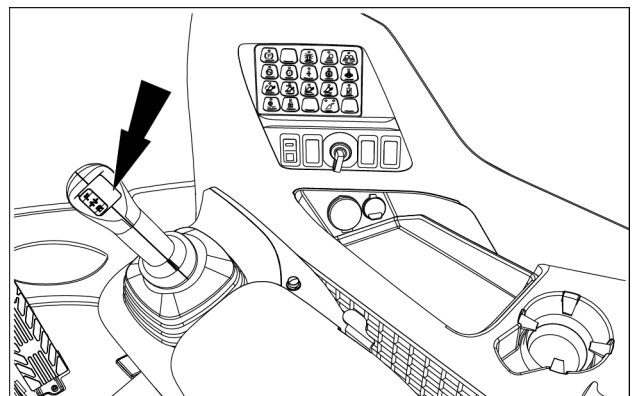
RAPH12WEL1412AA 1

2. Turn the engine OFF. Actuate the brake pedal several times to discharge the brake accumulators.



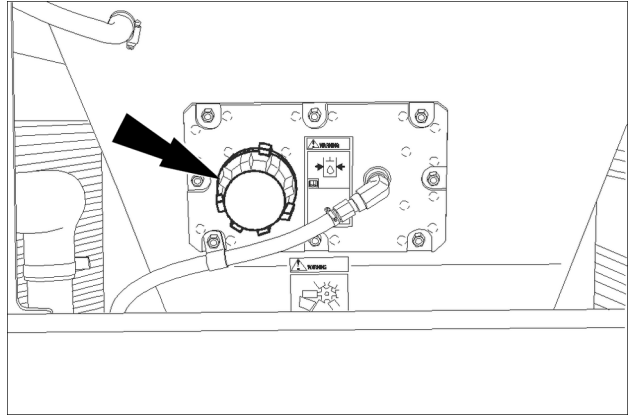
LEIL15WHL0564AA 2

3. Turn the key switch to the ON position. Move the control lever(s) back and forth minimally 30 times to release pressure from the hydraulic circuit. Put the key switch to the OFF position.



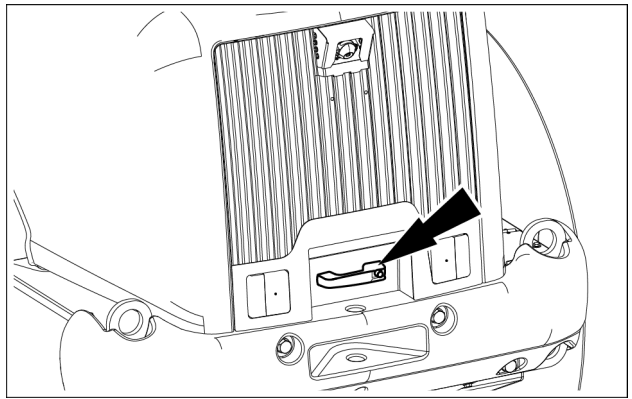
LEIL16WHL1286AA 3

4. Slowly loosen the hydraulic reservoir filler cap to release air pressure in the hydraulic reservoir.



RCPH10WHL099BAL 4

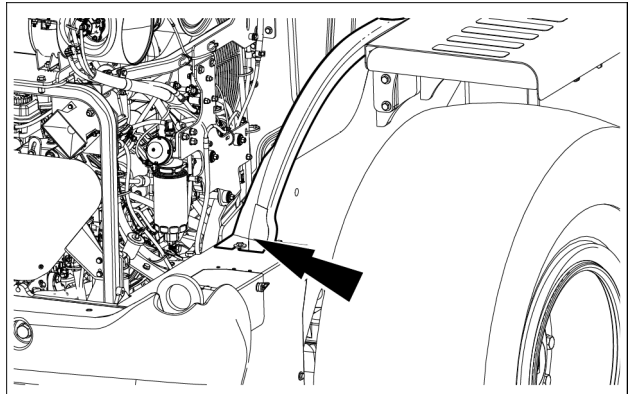
5. Raise the engine hood using the handle hood under the rear grill.



LEIL16WHL2000AB 5

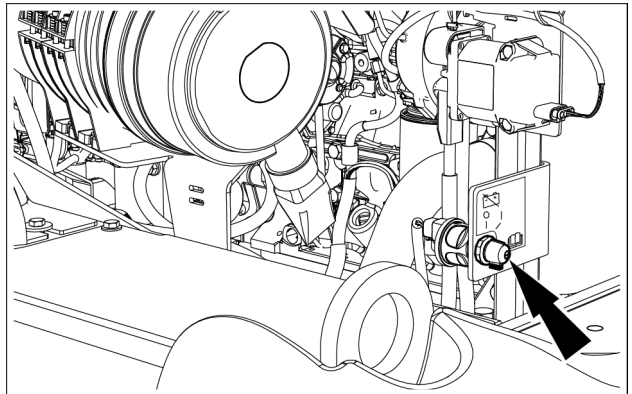
6. Remove the retaining bolts of the inner fender panels.

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



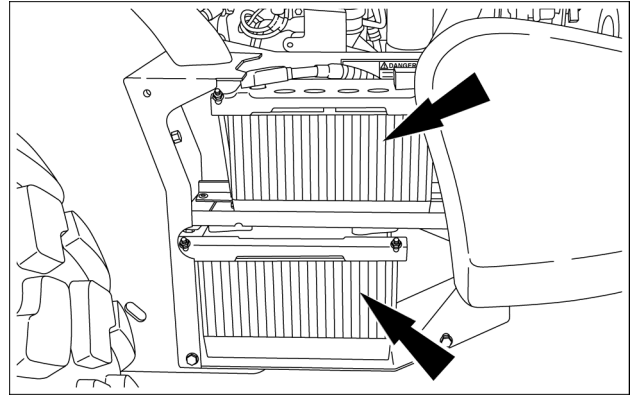
LEIL16WHL1378AB 6

7. Locate the timed disconnect switch under the engine hood, on the left-hand side of the machine. Turn the timed disconnect switch to the OFF position.



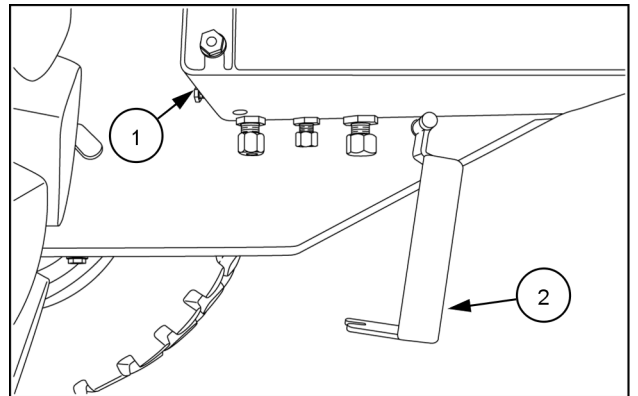
LEIL16WHL1382AB 7

8. Remove the two battery covers. Disconnect the batteries from the machine.



LEIL16WHL1225AA 8

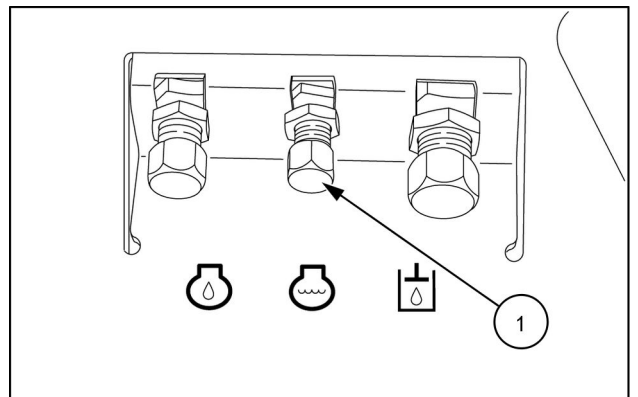
9. Loosen the screw (1) and open the access cover (2) under the battery.



RAPH12WEL1494AA 9

10. Place a suitable container below the radiator drain. Remove the drain plug (1) and radiator cap to drain the engine coolant into the container. then reinstall the radiator cap after the coolant has drained.

NOTE: see machine specifications for cooling system volume.

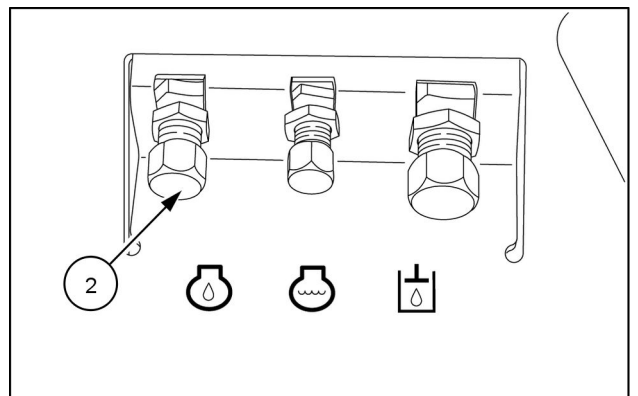


RAPH12WEL1411AA 10

11. Place a suitable container below the engine oil drain. Remove the engine oil cap (2) to drain the engine oil into the container. Then reinstall the engine oil cap after the engine oil has drained.

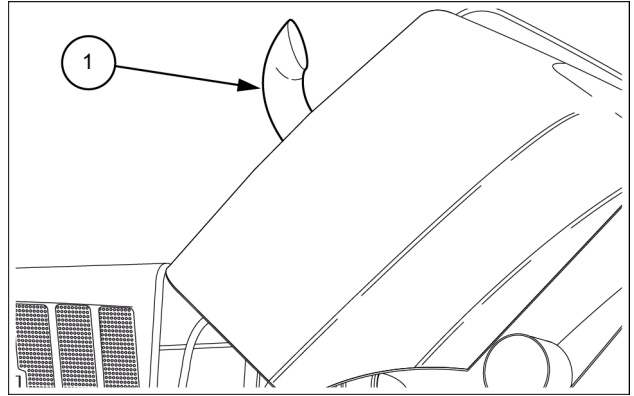
NOTE: see machine specifications for cooling system volume.

NOTE: after draining the engine oil, disconnect the drain hose from the frame to aid in removal of engine.



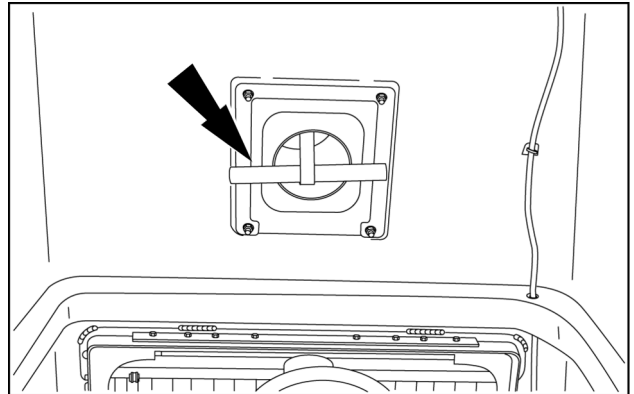
RAPH12WEL1411AA 11

12. Double up a nylon lifting strap and slide the strap through the exhaust stack (1), located on the engine hood.



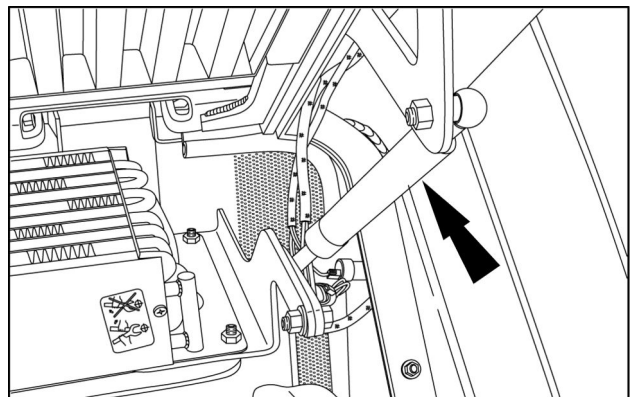
LEIL14WHL0400AB 12

13. Place a solid steel bar through the nylon strap. Raise the engine hood and release the tension on the lifting motor.



RAPH12WEL1458AA 13

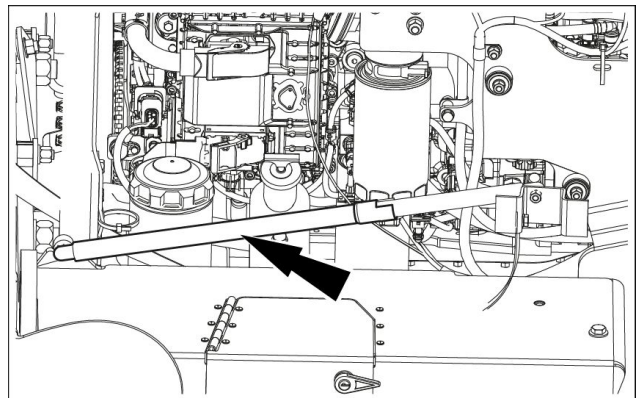
14. Remove the right-hand gas strut from the engine hood.
Remove the left-hand gas strut from the engine hood.



RAPH12WEL1489AA 14

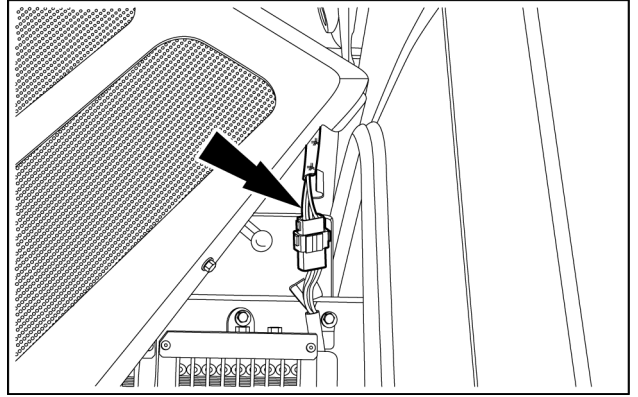
15. Remove the gas spring to separate the engine hood from the rear chassis.

NOTE: engine hood is NOT shown.



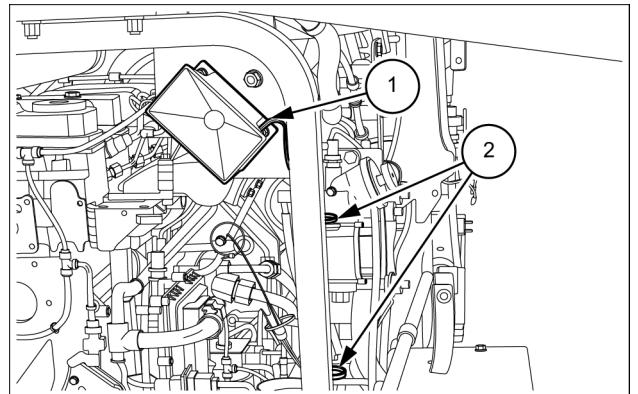
LEIL16WHL1432AB 15

16. Disconnect the hood wiring harness connector from the rear chassis wiring harness connector. Identify and tag the connectors to aid in reassembly.



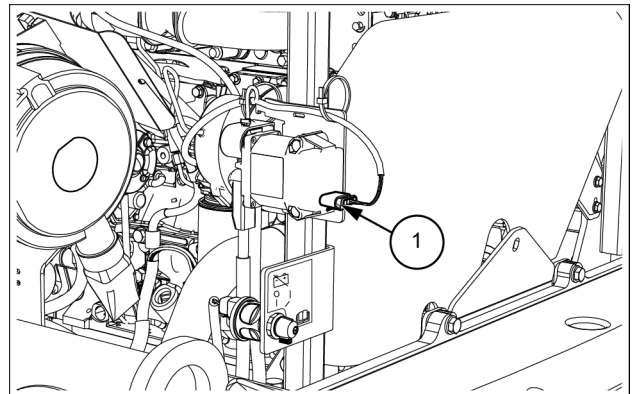
LEIL15WHL0142AB 16

17. Tag and disconnect the backup alarm connector (1). Remove the two straps cable tie (2).



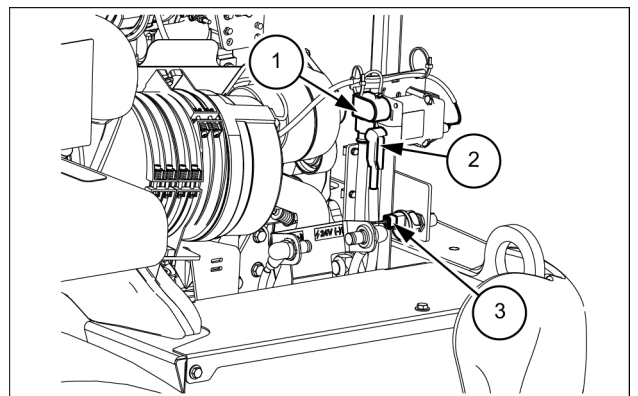
LEIL15WHL0143AB 17

18. Remove the connector (1) from the battery isolator.



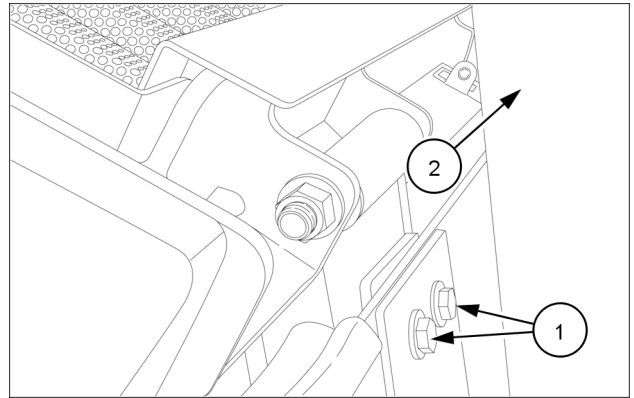
LEIL16WHL1381AB 18

19. Tag and disconnect the battery to isolator cable (1) and the isolator to starter cable (2) from the battery isolator. Disconnect the connector (3) from the timed disconnect switch.



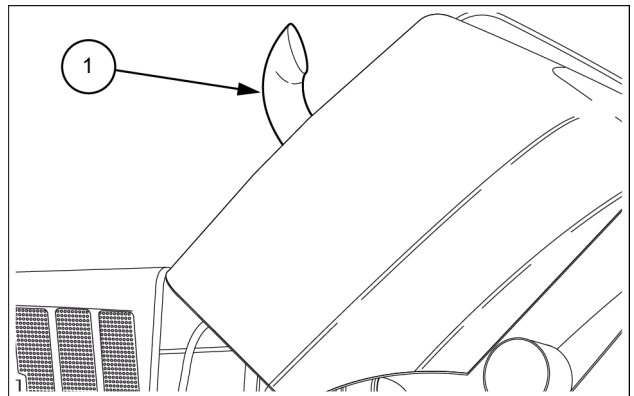
LEIL16WHL1342AB 19

20. With the assistance of another technician, balance the engine hood and remove the hood hinge mounting bolts (1) near the cab (2) from the cooler frame. Repeat the procedure for the other side.



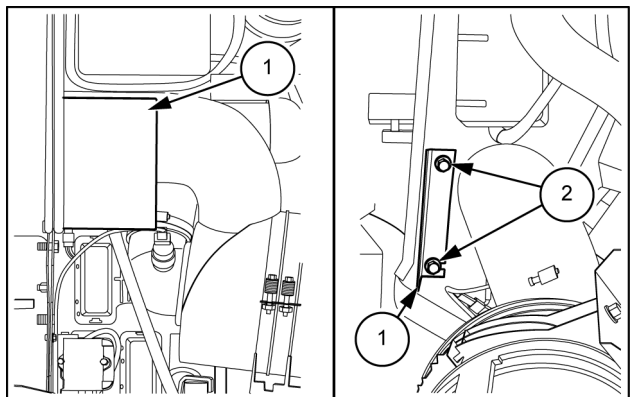
RAPH12WEL1461AA 20

21. Carefully raise and remove the engine hood from the machine. Lower the engine hood onto a suitable platform. Disconnect the lifting equipment from the exhaust stack (1).



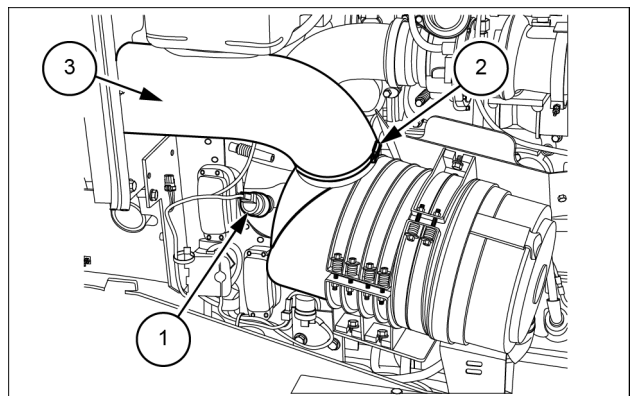
LEIL14WHL0400AB 21

22. Loosen the two bolts (2) and the related washers to remove the bracket (1) of the relay decal.



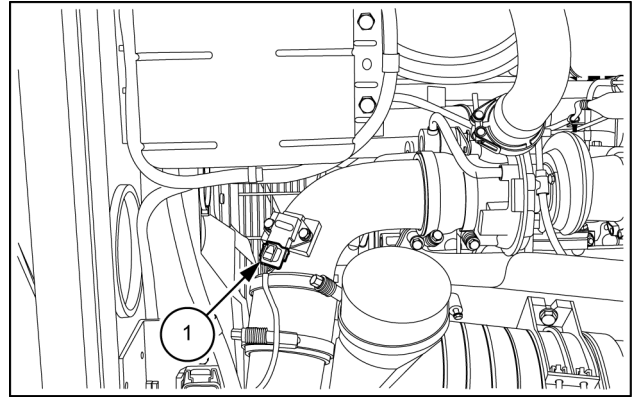
LEIL15WHL0195AB 22

23. Tag and disconnect the engine wiring harness connector from the air filter sensor (1). Loosen the clamp (2) on the air intake hose (3) and disconnect the hose.



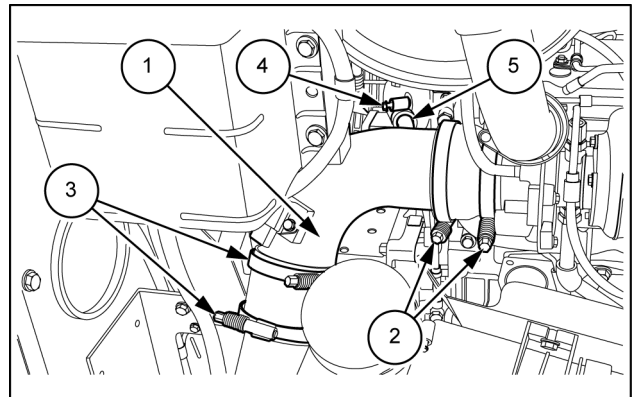
LEIL15WHL0196AB 23

24. Tag and disconnect the engine wiring harness connector from the air inlet humidity sensor (1).



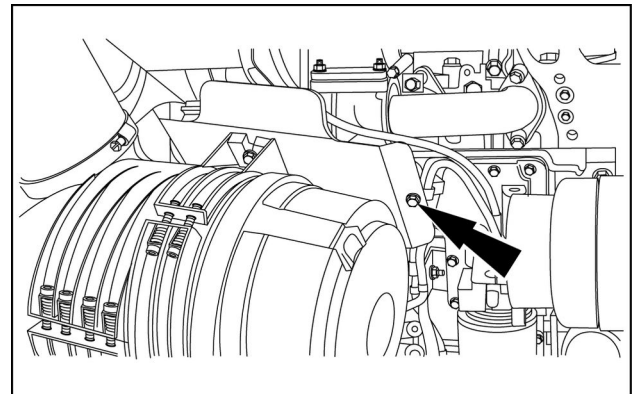
LEIL15WHL0197AB 24

25. Loosen the clamps (2) on the turbocharger.
26. Loosen the clamps (3) on the air filter housing.
27. Loosen the clamp (4) on the crankcase vent hose (5).
28. Remove the intake air hose (1). Cover the turbocharger inlet to prevent debris entry.



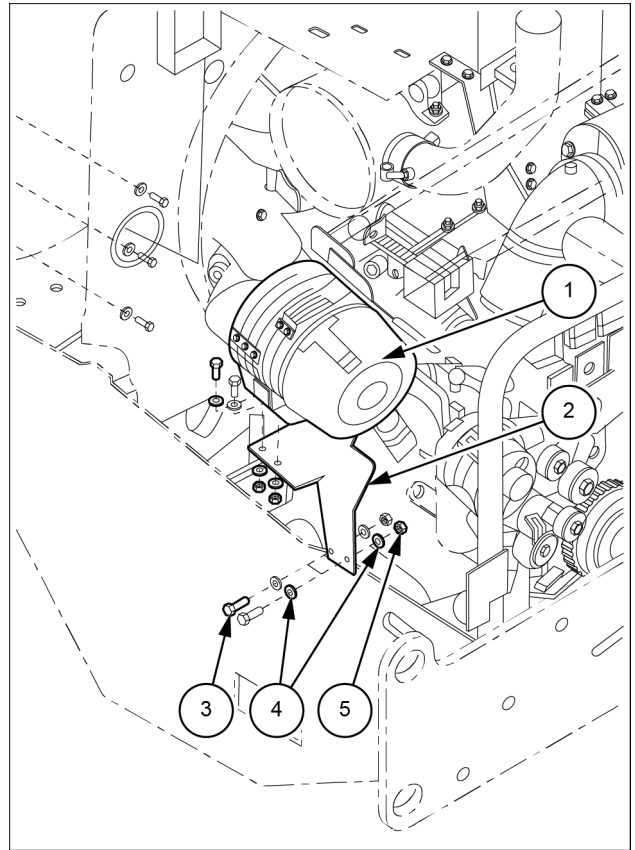
LEIL15WHL0198AB 25

29. Loosen the bolt to separate the P-clamp (of the alternate hose) on the engine side of the heat shield.



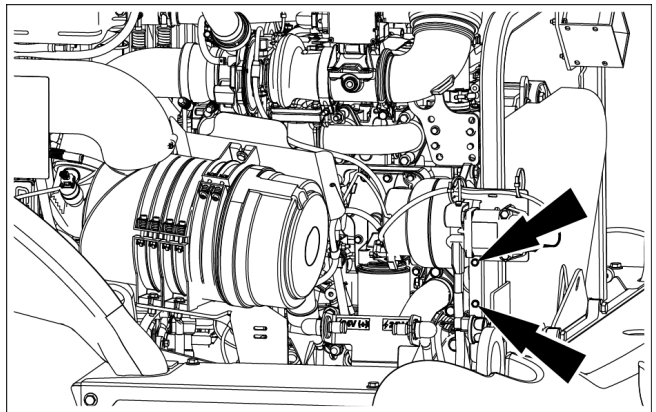
LEIL15WHL0148AA 26

30. Remove the two securing bolts (3), the four washers (4), and two nuts (5). Remove the bracket (2) with the air filter (1) as an assembly.

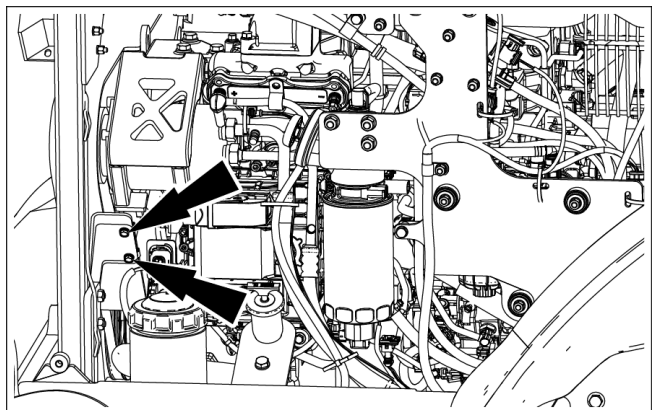


LEIL15WHL0171BB 27

31. Remove the four mounting bolts and the four washers from the belt cover. Remove the cover.

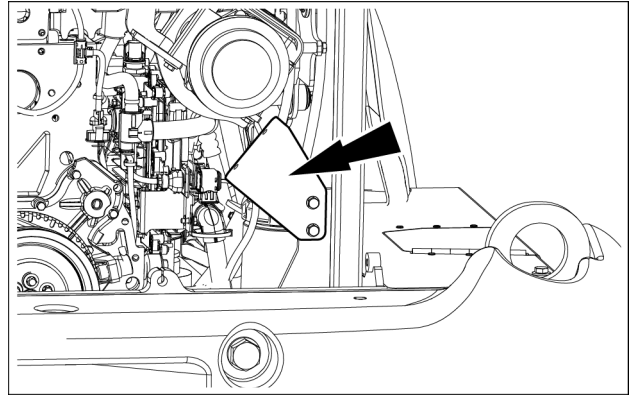


LEIL16WHL1311AB 28



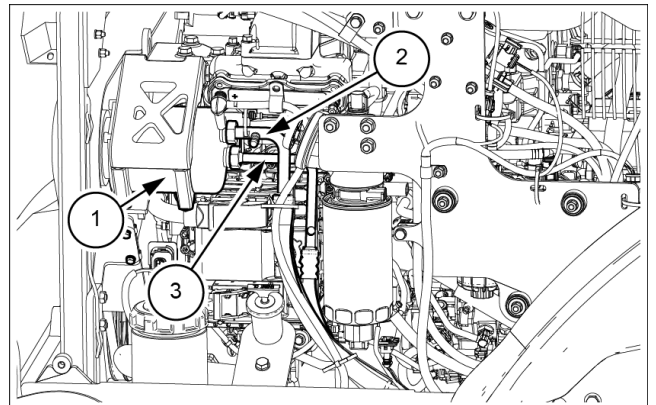
LEIL16WHL1362AB 29

32. After removing the belt cover, remove the cover mounting bracket from the right rear side of machine frame.



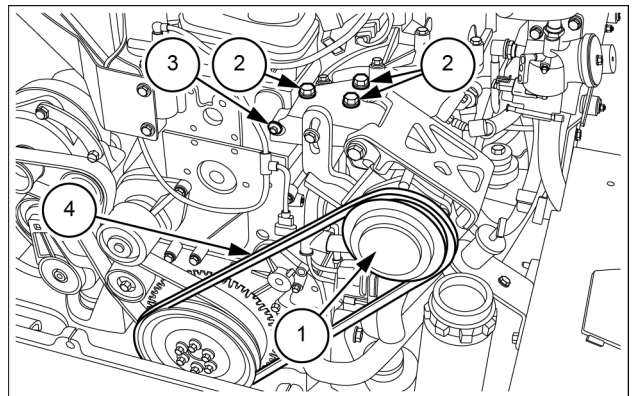
LEIL16WHL1343AB 30

33. If machine is equipped with the air conditioning system, identify, tag, and disconnect the engine wiring harness connectors from the air compressor clutch connector (1). Recover the refrigerant, as indicated in **Air conditioning - Service instruction (50.200)**. Disconnect the low-pressure line (2) from the suction port and the high-pressure line (3) from the discharge port, located on the compressor. Immediately install protective caps on the open ports and lines.



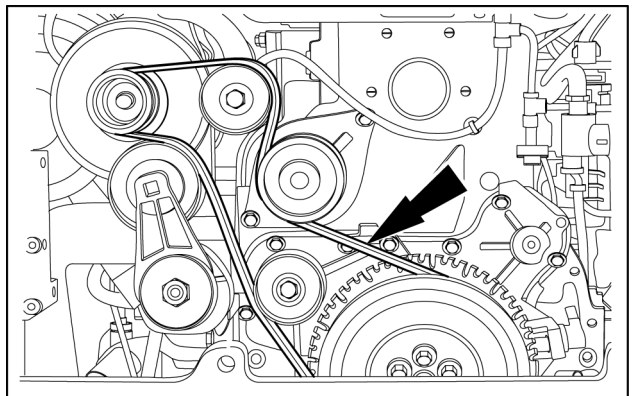
LEIL16WHL1349AB 31

34. Remove the belt (4). Remove the three mounting bolts (2). Remove the bolt (3) and carefully remove the compressor (1) with the support bracket.



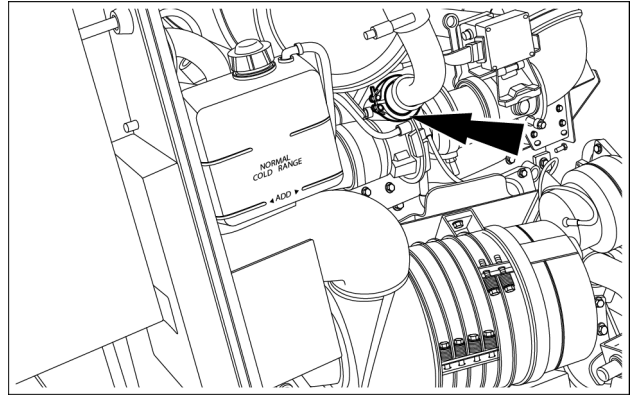
LEIL16WHL1380AB 32

35. Remove the drive belt from the engine.



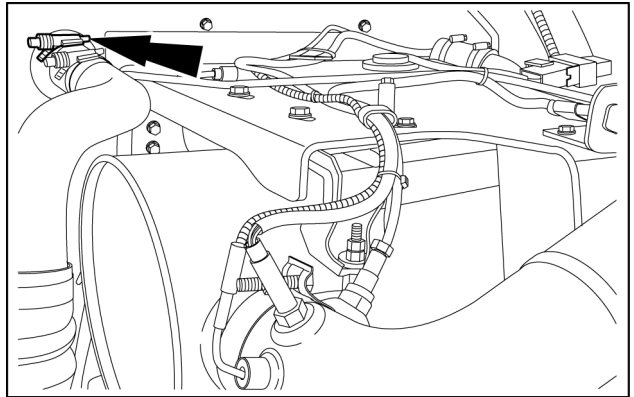
LEIL15WHL0192AB 33

36. Loosen the clamp. Remove and discard the O-ring and the air intake tube of the turbocharger.



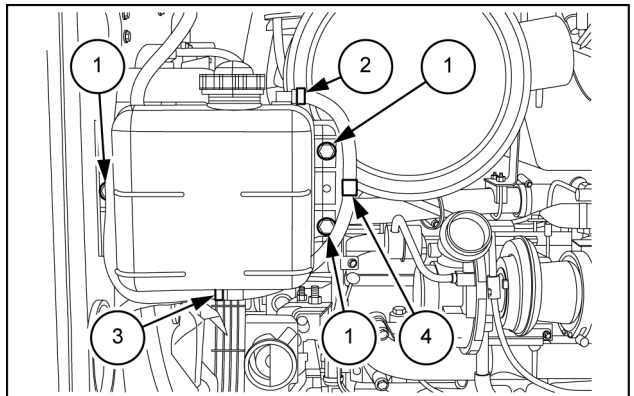
LEIL16WHL1346AB 34

37. Loosen the clamp of the hose of the after cooler inlet and remove the hose.



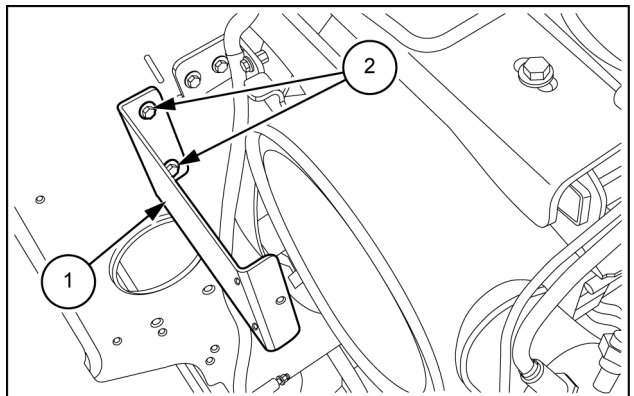
LEIL15WHL0263AB 35

38. Remove the clamp (2) and the clamp (3). Separate the clamp (4) from the bracket of the coolant overflow tank. Loosen the bolts (1) to remove the coolant tank.



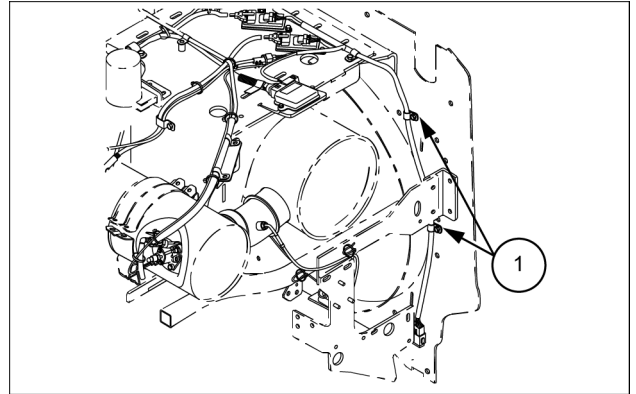
LEIL15WHL0264AB 36

39. Remove the bolts and the washers (2) to separate the bracket (1) of the overflow tank from the rear plate of the cooling system frame.



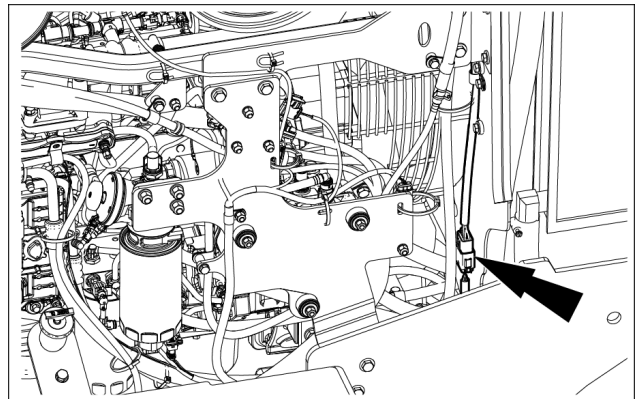
LEIL15WHL0265AB 37

40. Loosen the bolts **(1)** and remove the two clamps to separate the SCR sensor wiring harness from the rear chassis.



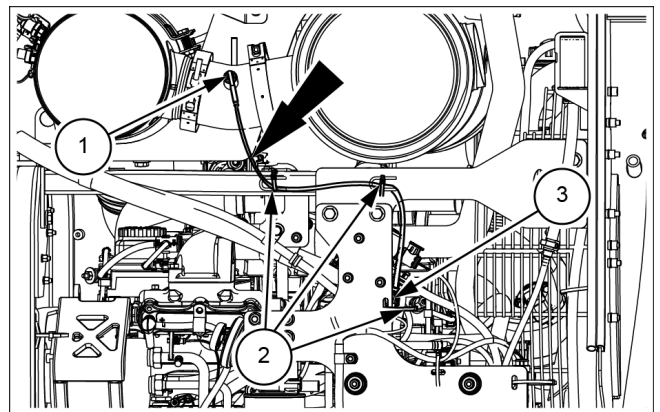
LEIL15WHL0272AB 38

41. Tag and disconnect the SCR sensor connector from the rear chassis harness connector.



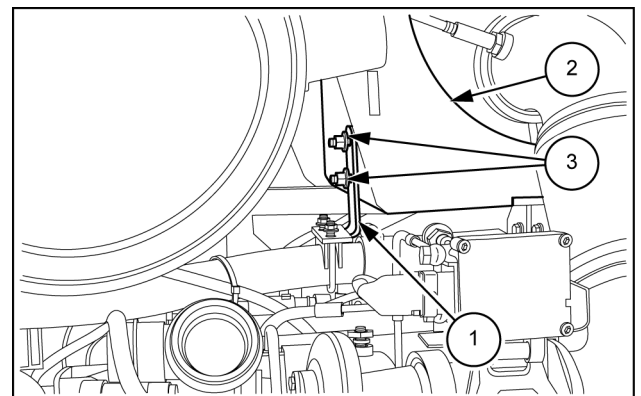
LEIL16WHL1347AB 39

42. Loosen the hexagonal nut of the temperature sensor **(1)**. Disconnect the temperature sensor **(1)** on the exhaust pipe (DOC to SCR).
43. Tag and disconnect the wire harness **(3)** of the rear chassis wiring harness of the temperature sensor **(1)**. Cut the straps **(2)** that hold the sensor lead.



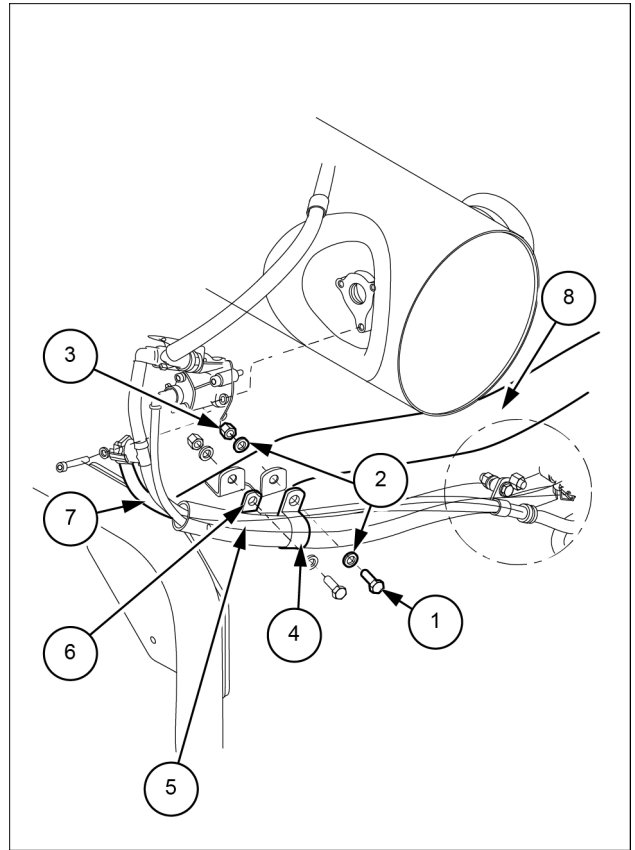
LEIL16WHL1348AB 40

44. Remove the bolts, the washers, and the nuts **(3)** to separate the bracket **(2)** of the tube radiator from the muffler support **(1)**.



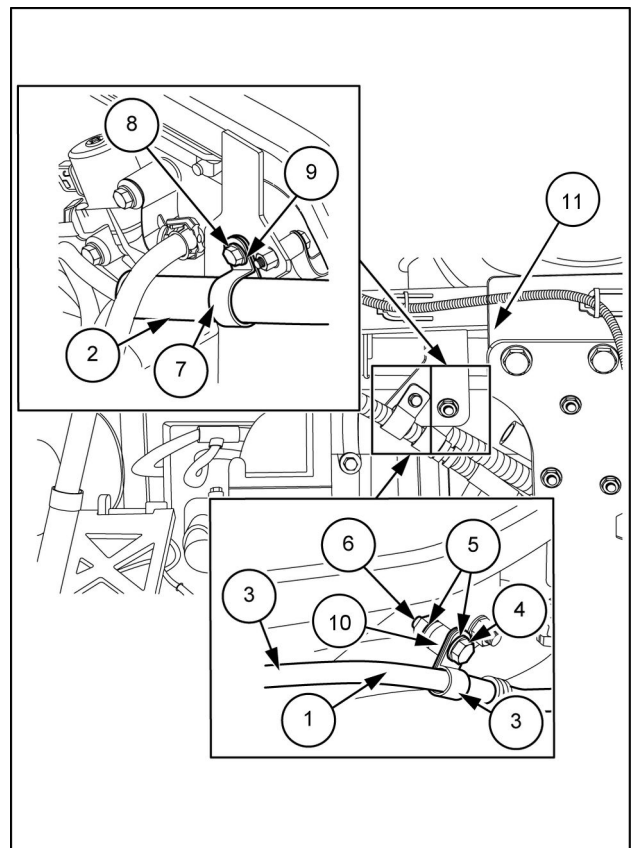
LEIL15WHL0267AB 41

45. Remove the two bolts (1), the four washers (2), and the two nuts (3) to separate the clamps (4) and (6) from the bracket (8).
Remove the clamp (4) from the DEF bundle (5). Remove the clamp (6) from the hose coolant assembly (7).



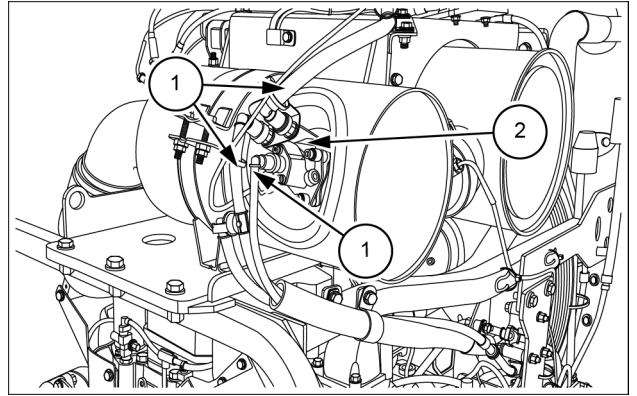
LEIL15WHL0193BB 42

46. Remove the two bolts (4), the washers (5), the spacer (10), and the nut (6) to separate the clamp (3) from the bracket (11). Remove the clamp (3) from the hose coolant assembly (1).
47. Remove the two bolts (8), the washers (9), and the nut (6) to separate the clamp (7) from the bracket (11). Remove the clamp (7) from the DEF bundle (2).



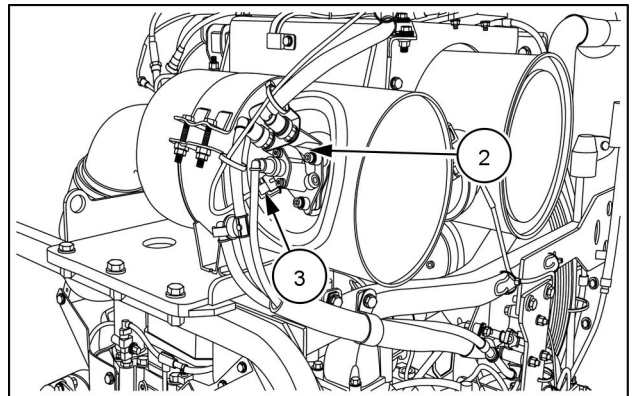
LEIL15WHL0261BB 43

48. Drain the engine coolant.
Disconnect the hoses (1) from the Dosing Module (2).



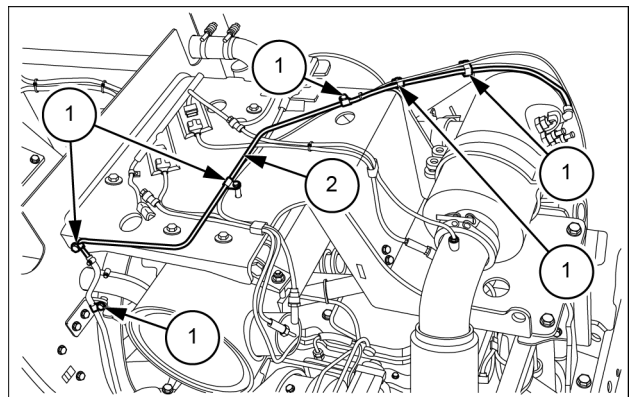
LEIL15WHL0323AB 44

49. Disconnect the electrical connector (3) from the Dosing Module (2).



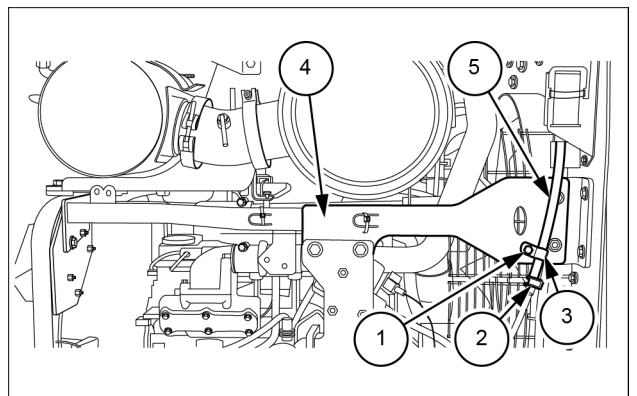
LEIL15WHL0176AA 45

50. Loosen the bolt to remove the P-clamps (1). Disconnect the return coolant hose (2) and remove it from the machine.



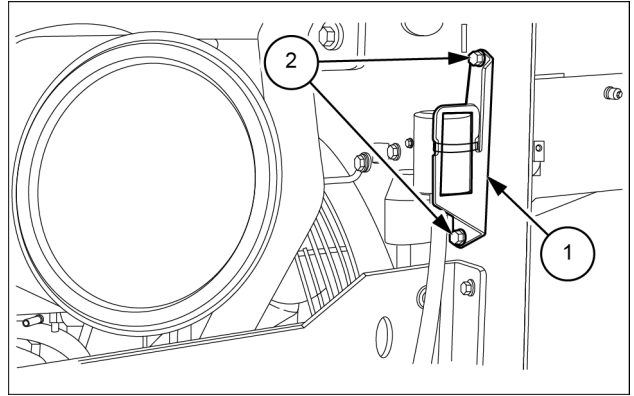
LEIL15WHL0270AB 46

51. Loosen the bolt (1) and remove the P-clamp (3) from the supply module support (4). Remove the P-clamp (2). Tag and disconnect the hose (5) from the DEF/ AdBLUE® tank vent filter.



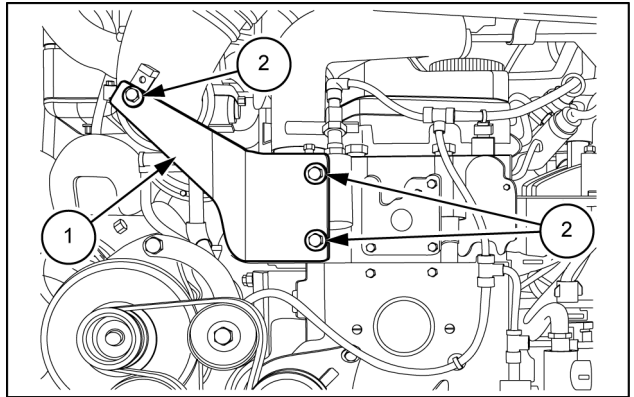
LEIL15WHL0269AB 47

52. Remove the bolts (2) to remove the DEF/AdBLUE® tank vent filter (1) from the rear plate of the cooling system frame.



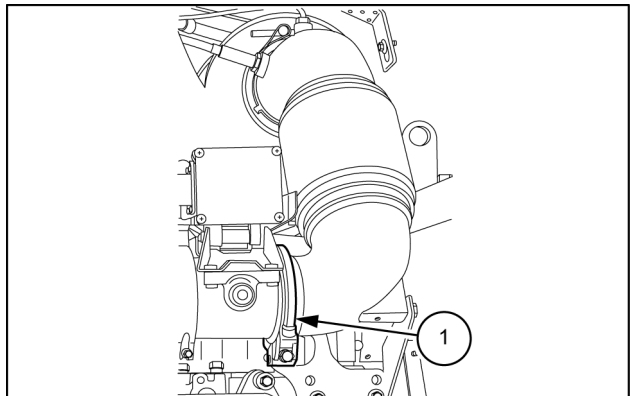
LEIL15WHL0268AB 48

53. Remove the bolts (2) and washers to remove the bracket (1) from the engine.



LEIL15WHL0191AB 49

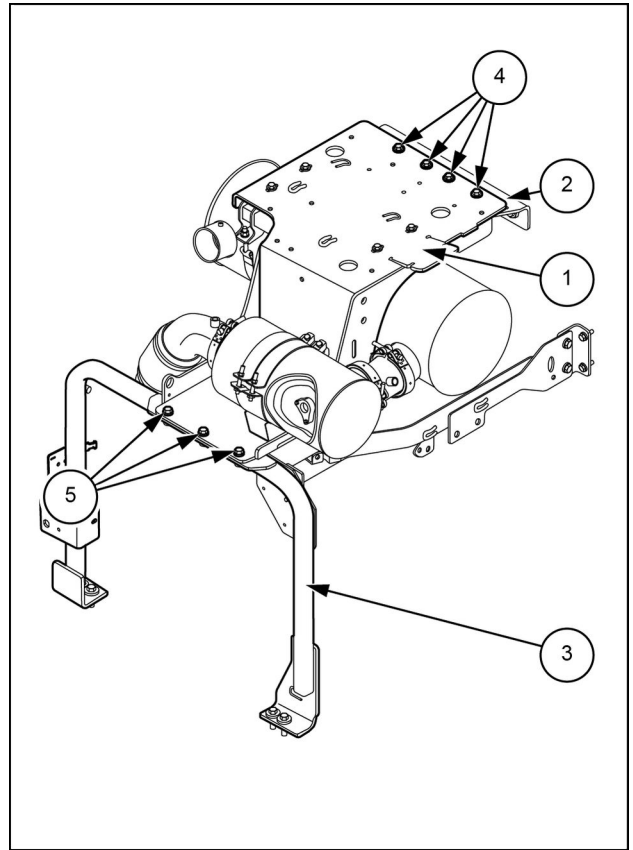
54. Loosen the clamp (1) to separate the exhaust flap from the inlet DOC pipe.



LEIL15WHL0172AB 50

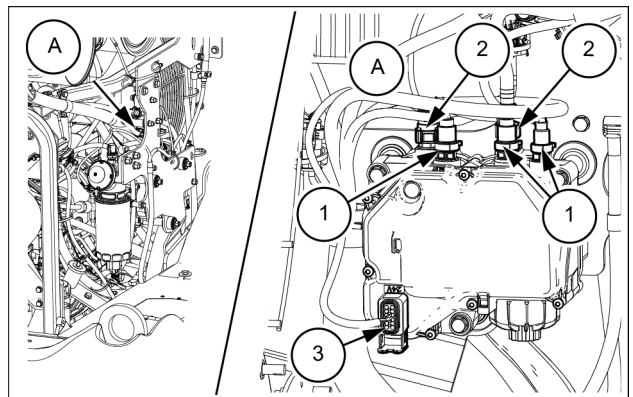
55. Attach a suitable lifting straps to support the muffler support (1) with the Diesel Oxidation Catalyst (DOC) (6) and the Selective Catalytic Reduction muffler (SCR) (7).
56. Remove the bolts (4) and (5) with their related washers to separate the muffler support (1) from the support structures (2) and (3).
57. Remove the muffler support (1), the SCR and the SCR sensor harness as an assembly.

NOTE: do not damage the muffler support during removal.



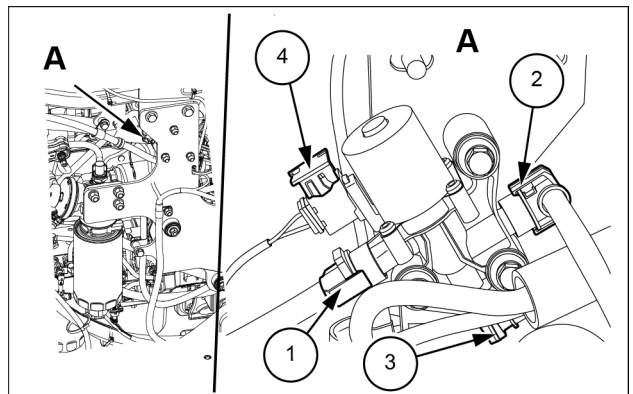
LEIL16WHL1345BB 51

58. Tag and disconnect the DEF/AdBLUE® supply and return lines (1) from the supply module. Tag and disconnect the coolant water supply and return lines (2) from the supply module. Tag and disconnect the wiring harness (3) from the supply module.



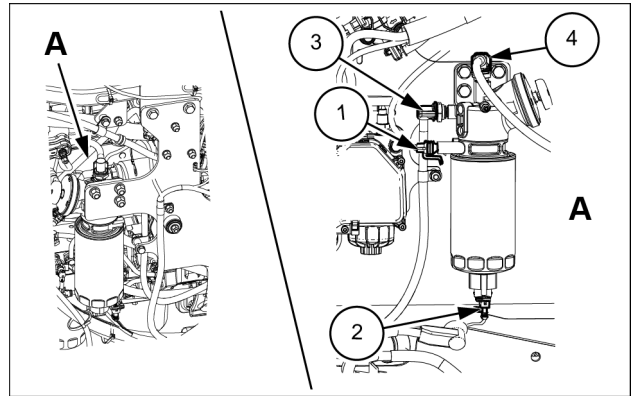
LEIL16WHL1497AB 52

59. Push inward on the fitting retaining clip and disconnect the coolant outlet (2), the coolant inlet (1) and by-pass (3) lines from the heater control valve. Tag and disconnect the machine wiring harness (4) from the heater control valve.



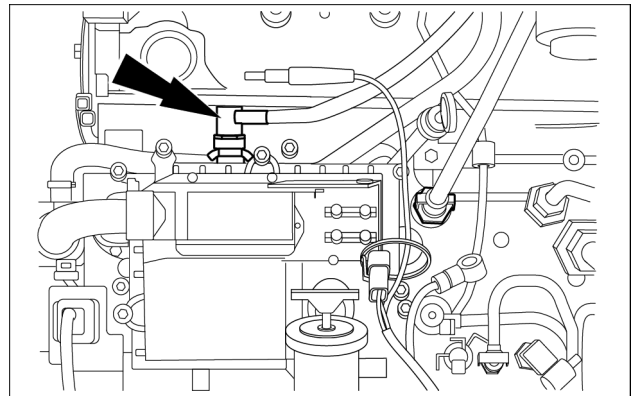
LEIL16WHL1375AB 53

60. Tag and disconnect the fuel filter heater wire (1) and the water sensor (2). Drain the fuel filter and disconnect the inlet fuel line (3) and outlet fuel line (4) from the fuel filter head. Plug the lines and cap the fittings.



LEIL16WHL1374AB 54

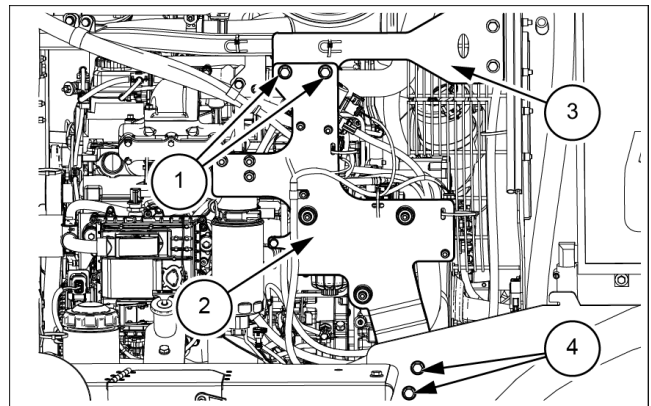
61. Remove the fuel line from the top of the ECU (Engine Control Unit). Plug the line and cap the fitting.



LEIL15WHL0306AB 55

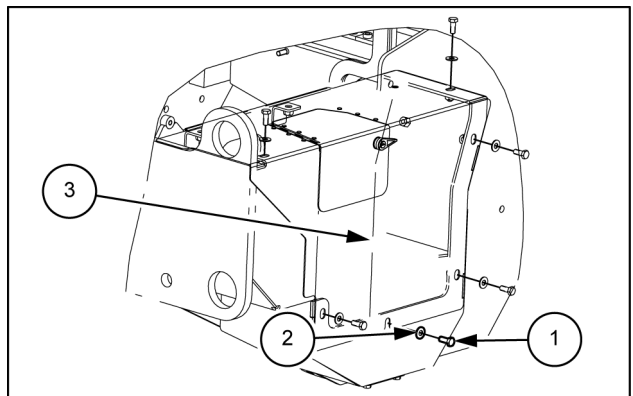
62. Remove the two bolts (1), the washers, and the nuts to separate the bracket (2) of the supply module from the support (3). Remove the two bolts (4), the washers, and the nuts to separate the bracket (2) of the supply module from the rear chassis. Remove the bracket (2) of the supply module, with the supply module, the DEF/AdBLUE® Heater Control valve and the fuel pre-filter as an assembly.

NOTE: pay attention to supply module and heater valve.



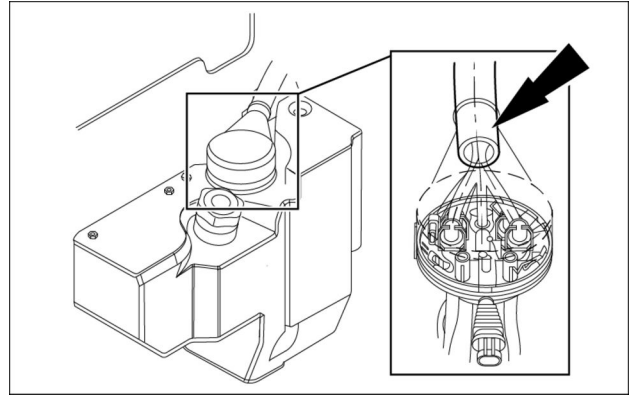
LEIL16WHL1373AB 56

63. Remove the six bolts (1) and the six washer (2). Remove the DEF/AdBLUE® storage tank cover (3) located on the right-hand side of the machine.



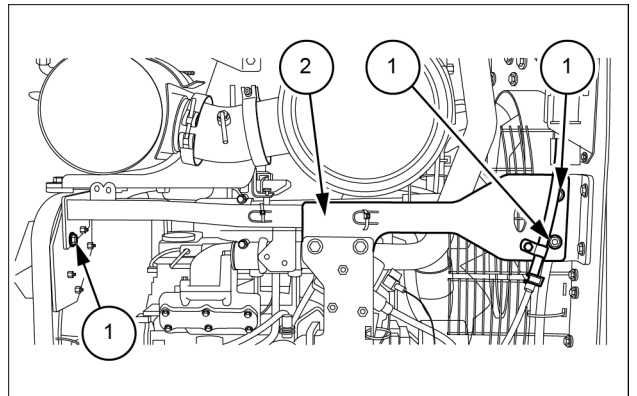
LEIL15WHL0303AB 57

64. Tag and disconnect the wire harness and **DEF/ AdBLUE®** supply and return lines from the **DEF/AdBLUE®** storage tank. Cap the supply lines.



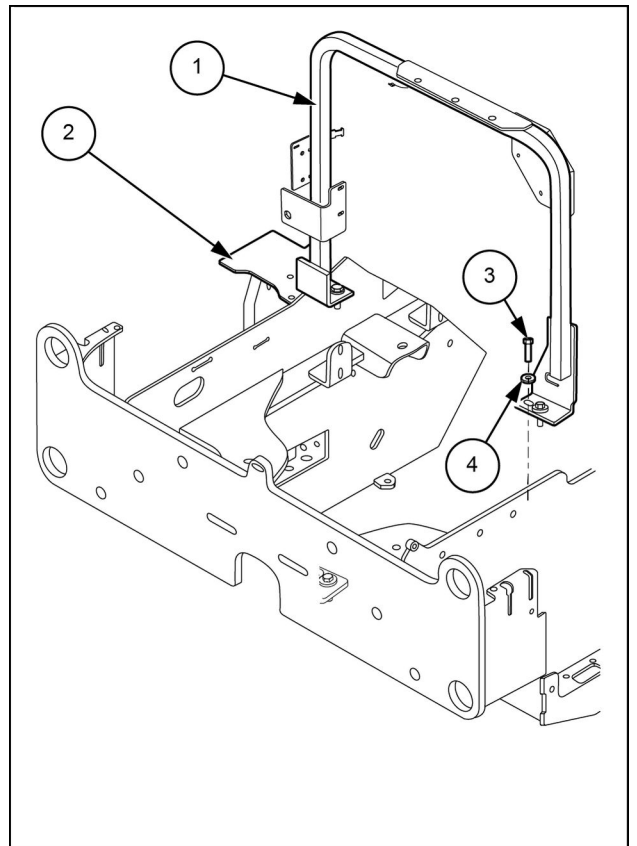
LEIL15WHL0304AA 58

65. Remove the bolts **(1)**, the washers, and the nuts to remove the supply module support **(2)**.



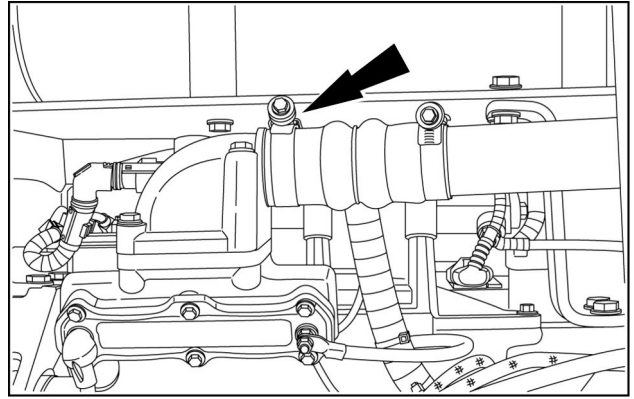
LEIL15WHL0276AB 59

66. Remove the four bolts **(3)** and the four washers **(4)** to remove the support structures **(1)** from the rear chassis **(2)**.



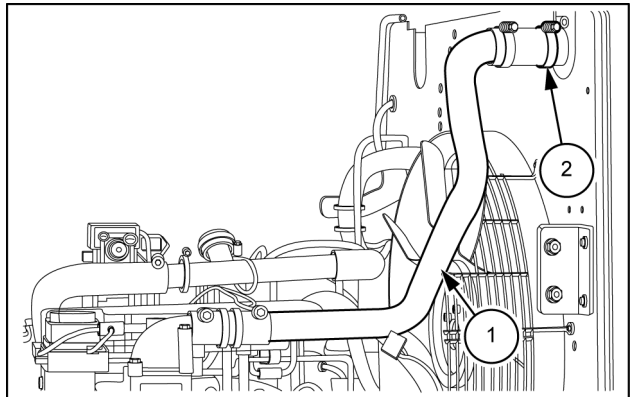
LEIL16WHL1344BB 60

67. Loosen the clamp on the intake manifold that secures the after cooler output hose.



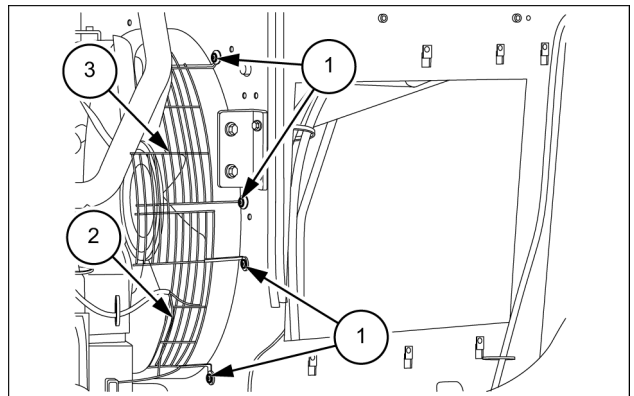
RAPH12WEL1464AA 61

68. Loosen the clamp (2) on the after cooler and remove the output hose (1) of the after cooler from the inter-cooler.



LEIL15WHL0277AB 62

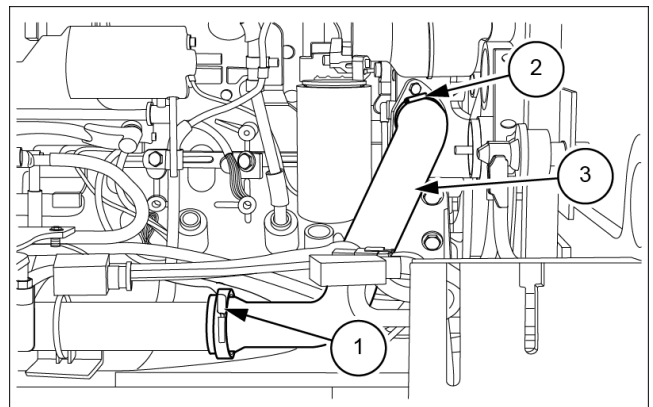
69. Remove the cooling fan screen (3) and the bottom cooling fan screen (2) removing the four bolts (1) and the related nuts.



LEIL15WHL0301AB 63

70. Loosen the clamps (1) and (2) to remove the bottom hose coolant (3) from the engine.

NOTE: the battery cover plate has been hidden for clarify.



LEIL15WHL0278AB 64



Suggest:

If the above button click is invalid.

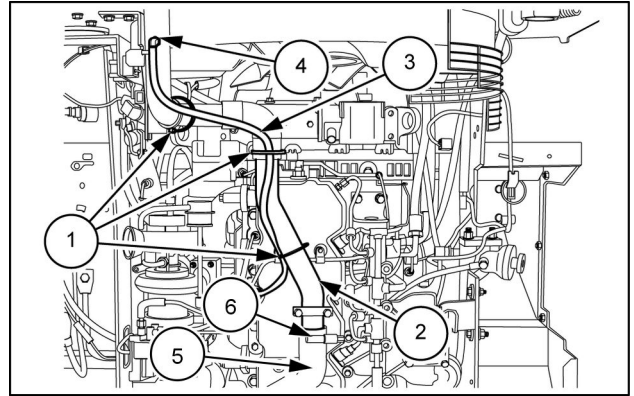
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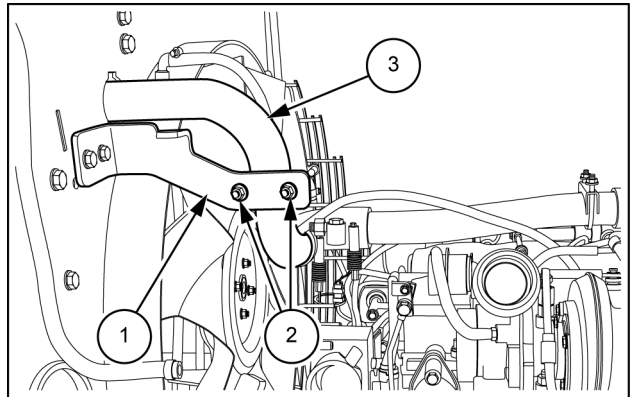
Thank you so much for reading

71. Cut the tie straps (1) and remove the clamp (4). Separate the breather hose (3) from the radiator hose (2). Loosen clamp (6) from the hose (5). Loosen clamp on the engine then remove the hose (5).



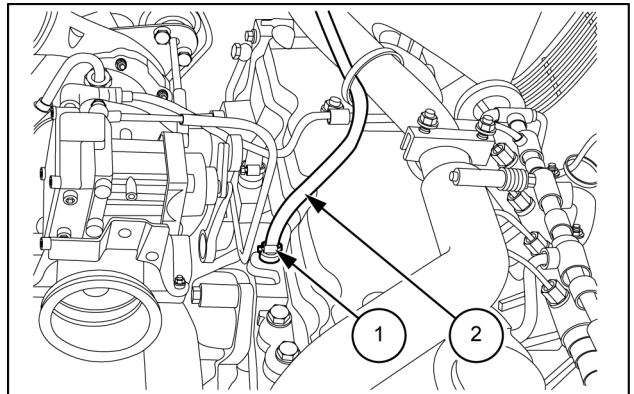
LEIL15WHL0279AB 65

72. Remove the nuts (2) from the U-bolt clamp, to separate the radiator hose (3) from the bracket (1).



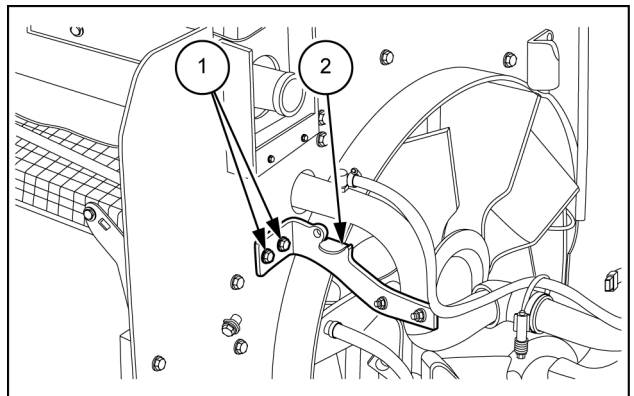
LEIL15WHL0280AB 66

73. Remove the clamp (1) to disconnect the breather hose (2) from the engine.



LEIL15WHL0291AB 67

74. Remove the bolts (1), the washers, and the nuts to remove the bracket (2) from the rear plate of the cooling system frame.



LEIL15WHL0292AB 68

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