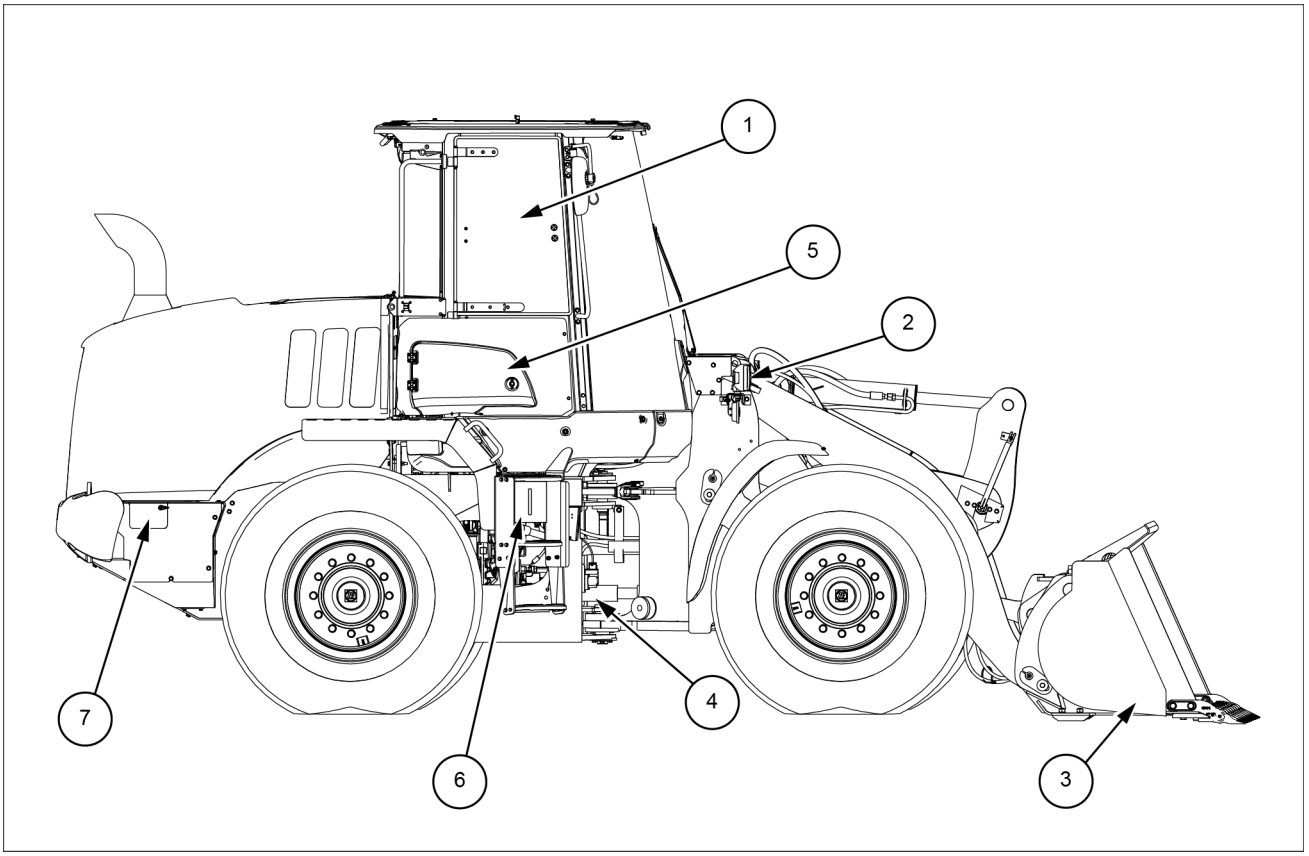
521G
Tier 4B (final)
Wheel Loader

SERVICE MANUAL

Part number 51428262
2nd edition English
December 2017

CASE

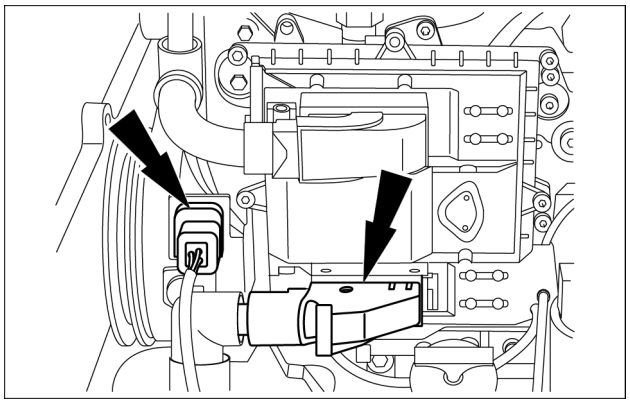


LEIL16WHL1255FB 2

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

84. Disconnect the wiring harnesses from the EDC17 controller.

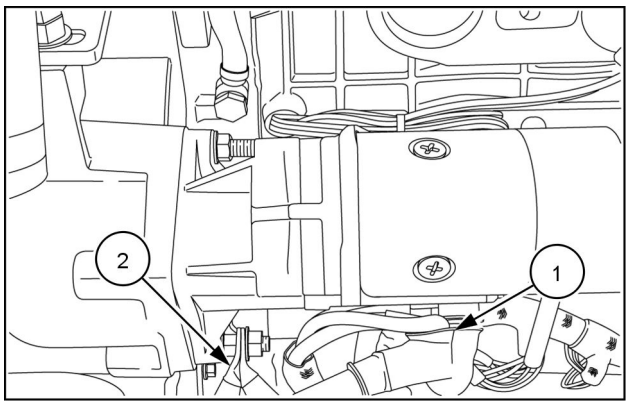
NOTE: *lifting up on the lever will release the connector from the controller.*



LEIL15WHL0302AA 77

85. Mark and tag the positive cables **(1)** to aid in reassembly. Remove the positive cables from the starter. Tag and disconnect the ground cable and ground strap **(2)** from the starter.

NOTE: *move the starter cables away from the engine.*

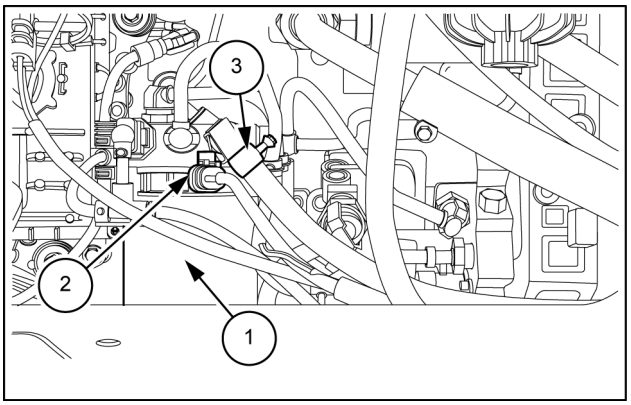


RAPH12WEL1474AA 78

86. Tag and disconnect wire harness **(2)** from the primary fuel filter **(1)**.

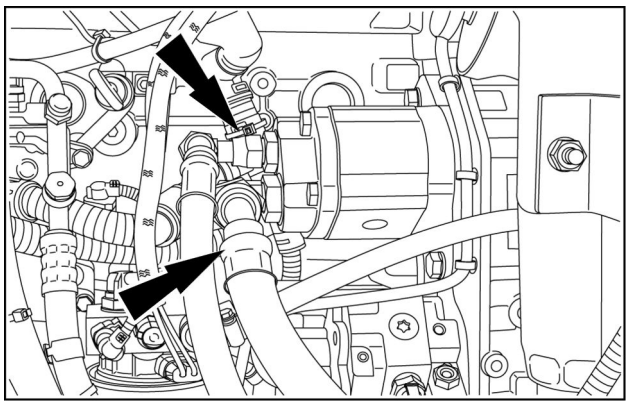
87. Remove the fuel line **(3)** from the top of the primary fuel filter **(1)**. Plug the line and cap the fitting.

NOTE: *make note on how fuel lines are routed.*



LEIL15WHL0298AB 79

88. Connect a vacuum pump to the hydraulic reservoir. Turn the vacuum on. Tag and remove the hydraulic lines from the brake system pump. Plug the lines and cap the fitting.



RAPH12WEL1480AA 80

Contents

Engine - 10

Fuel tanks - 216

SERVICE

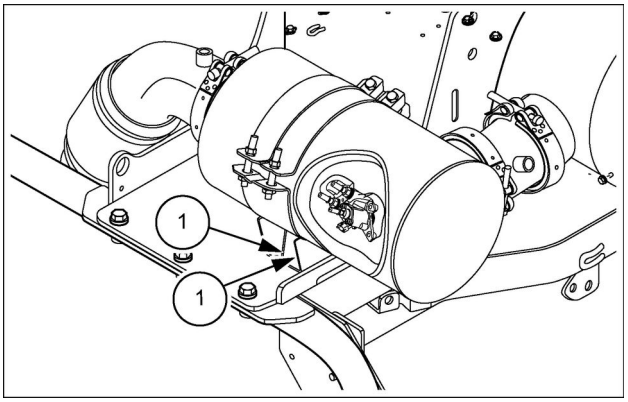
Heaters

- **DEF/ADBLUE®** freezes at **-11 °C** (**12 °F**). Many times these units operate in climates colder than this.
  - A heating device incorporated within the **DEF/ADBLUE®** tank level sensor thaws the **DEF/ADBLUE®**. Engine coolant is circulate through this heater to warm the fluid. The flow of coolant to this heater passes through a solenoid controlled on-off valve. This prevents heating the **DEF/ADBLUE®** fluid once thawed.
  - The plumbing between the tank and the supply module can also freeze. The coolant required to thaw the tank is routed through a plumbing bundle to thaw the hoses.
  - There are **DEF/ADBLUE®** passages within the supply module that can freeze. A coolant passage incorporated in the module thaws this fluid as required.

Diesel Oxidation Catalyst (DOC) - Install

NOTICE: *emissions sensors in the exhaust system and on the vehicle may be damaged by vibrations from use of impact wrenches or hammers during service work. Avoid using these tools when servicing components close to the sensors. Remove the sensors with care if use of these tools cannot be avoided.*

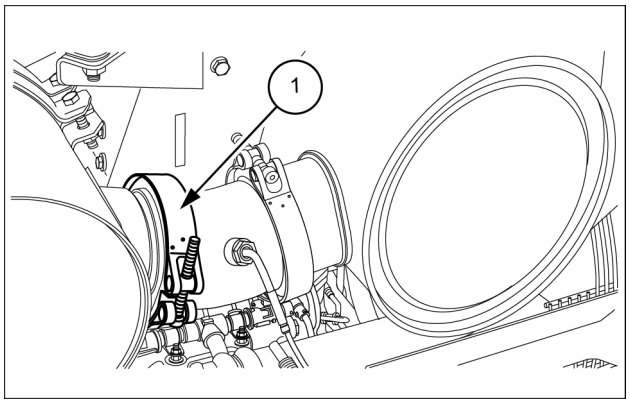
1. Attach a suitable lifting device and a lift strap to the Diesel Oxidation Catalyst (DOC). Move the Diesel Oxidation Catalyst (DOC) into position on the machine. Install the DOC on the muffler support tightening the four bolts **(1)** and the washers.



LEIL15WHL0324AB 1

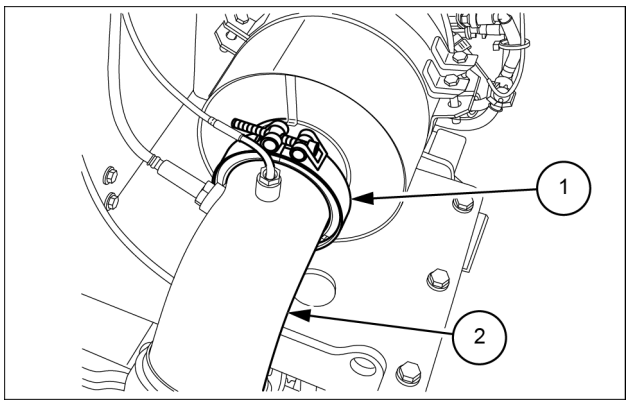
2. Install a new gasket on the DOC outlet flange and align the DOC outlet pipe with the inlet of the DOC-to-SCR pipe. Install a new clamp at the DOC outlet and tighten to **11 – 13 N·m** (**8.1 – 9.6 lb ft**).

NOTE: *replace the gasket and the clamp every time connection is disassembled.*



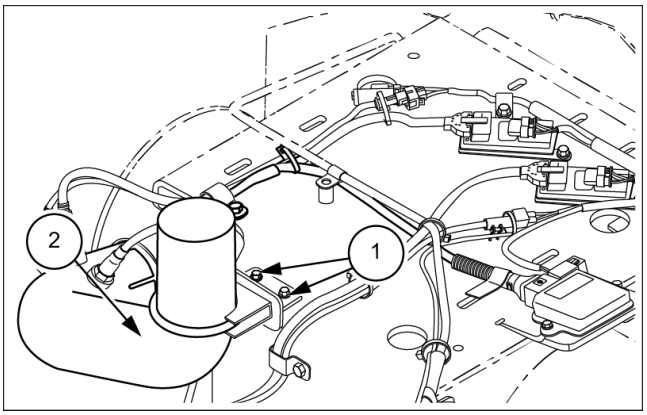
LEIL15WHL0321AB 2

3. Install a new gasket and new clamp, and connect the exhaust pipe **(2)** on the Diesel Oxidation Catalyst (DOC) and tighten the clamp **(1)**. Torque the clamp to **11 – 13 N·m** (**8.1 – 9.6 lb ft**).



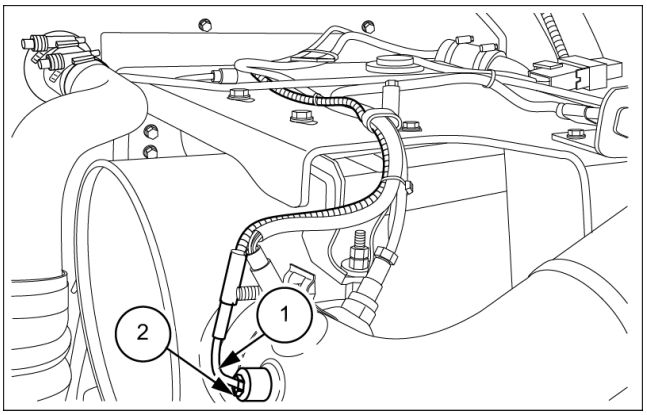
LEIL15WHL0322AB 3

18. Remove the bolts **(1)** and related washers to separate the outlet pipe **(2)** from the catalyst mounting support bracket.



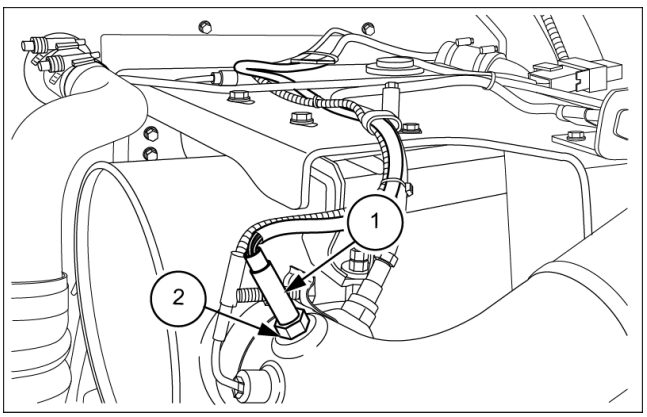
LEIL15WHL0229AB 16

19. Locate the NOx sensor, the NH3 sensor and the outlet temperature sensor of the Selective Catalytic Reduction(SCR).
20. Loosen the hexagonal nut **(2)** and remove the outlet temperature sensor **(1)** of the Selective Catalytic Reduction (SCR).



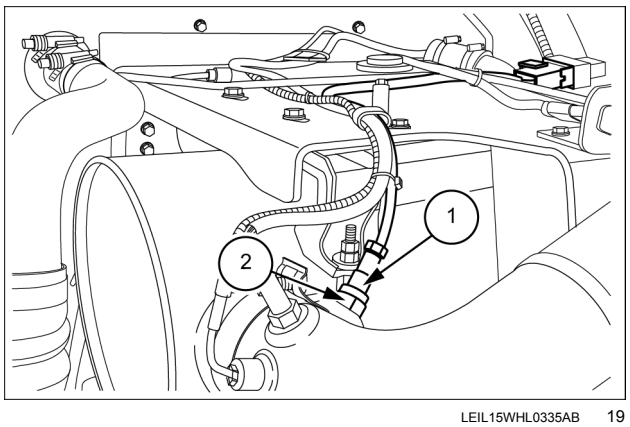
LEIL15WHL0333AB 17

21. Loosen the hexagonal nut **(2)** on NOx sensor **(1)** and remove NOx sensor from Selective Catalytic Reduction (SCR).



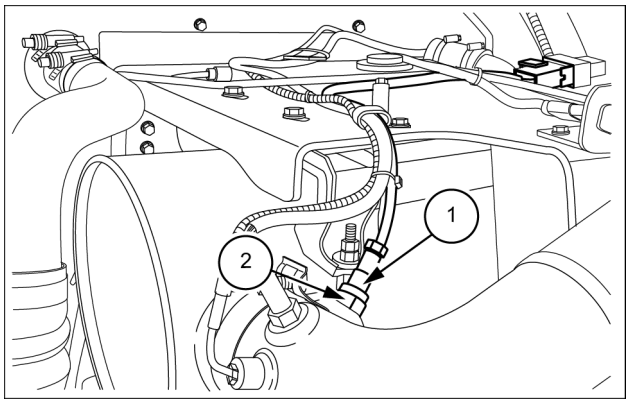
LEIL15WHL0334AB 18

22. Loosen the hexagonal nut **(2)** on NH3 sensor **(1)** and remove the sensor from Selective Catalytic Reduction (SCR).



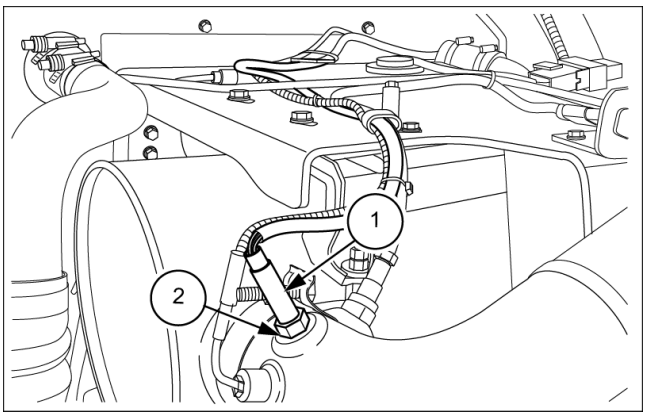
LEIL15WHL0335AB 19

8. Install the NH3 sensor **(1)** into the exhaust pipe on the Selective Catalytic Reduction (SCR) tightening the nut **(2)**. Tighten the nut of the sensor to **40 – 60 N·m** (**30 – 44 lb ft**).



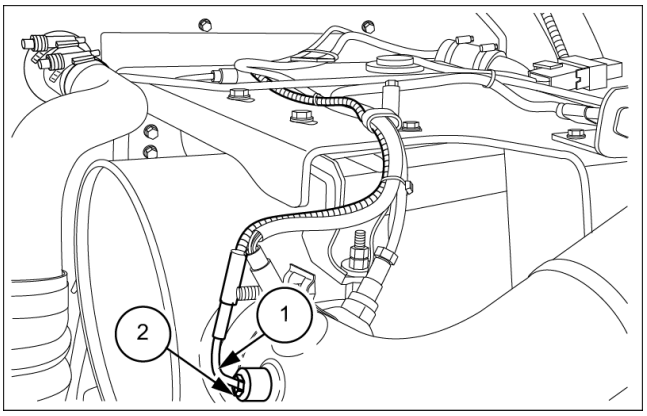
LEIL15WHL0335AB 6

9. Install the NOx sensor **(1)** into the exhaust pipe on the Selective Catalytic Reduction (SCR) tightening the nut **(2)**. Tighten the nut of the sensor to **40 – 60 N·m** (**30 – 44 lb ft**).



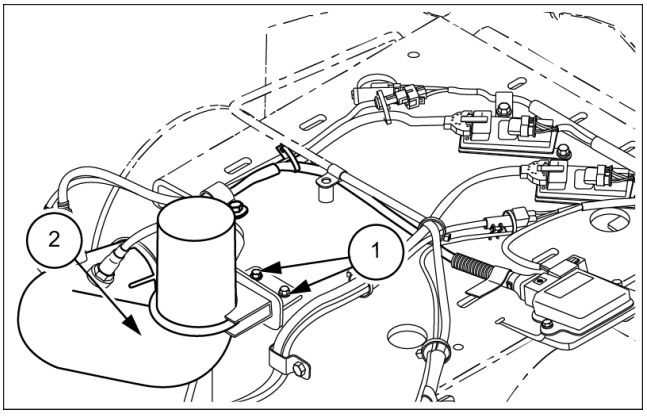
LEIL15WHL0334AB 7

10. Install the outlet temperature sensor **(1)** into the exhaust pipe on the Selective Catalytic Reduction (SCR) tightening the nut **(2)** . Tighten the nut of the sensor to **40 – 50 N·m** (**30 – 37 lb ft**).



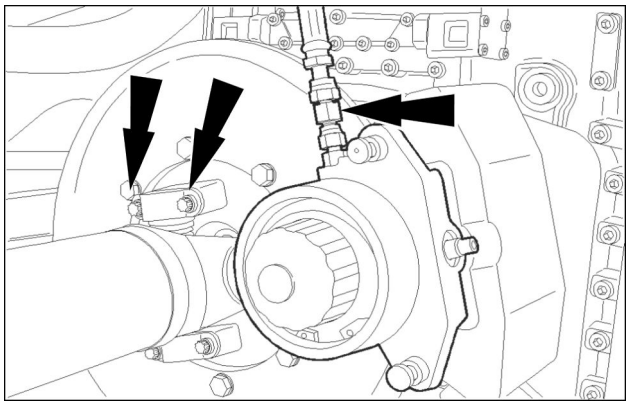
LEIL15WHL0333AB 8

11. Install the outlet pipe **(2)** on the catalyst mounting support bracket tightening bolts **(1)**.



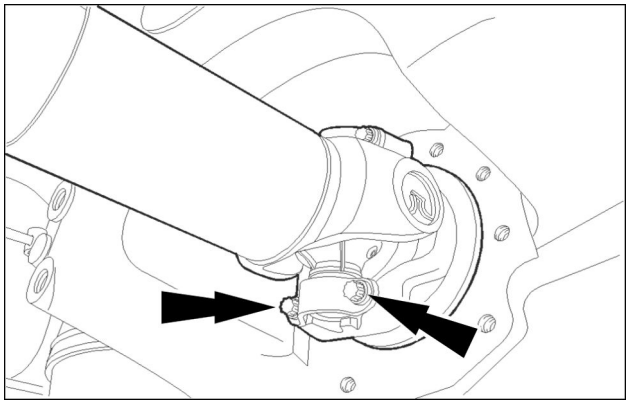
LEIL15WHL0229AB 9

14. Identify, tag, and disconnect parking brake hose from parking brake. Plug hose and cap fitting to prevent entry of foreign matter into hydraulic system. Move hose away from transmission. Remove four bolts and two straps securing center drive shaft to transmission output flange. Disconnect center drive shaft from transmission.



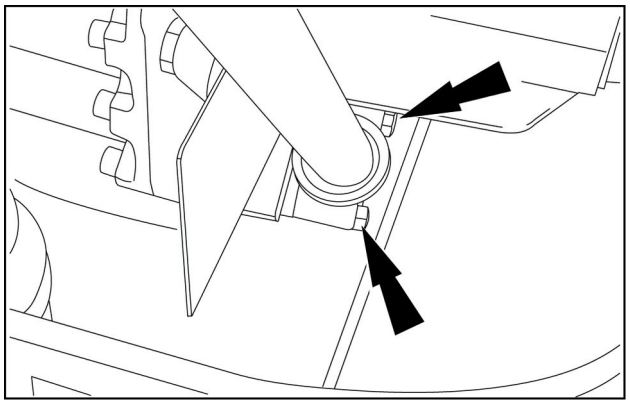
RAPH12WEL1976AA 8

15. Remove four bolts and two straps securing rear drive shaft to transmission output flange. Disconnect rear drive shaft from transmission.



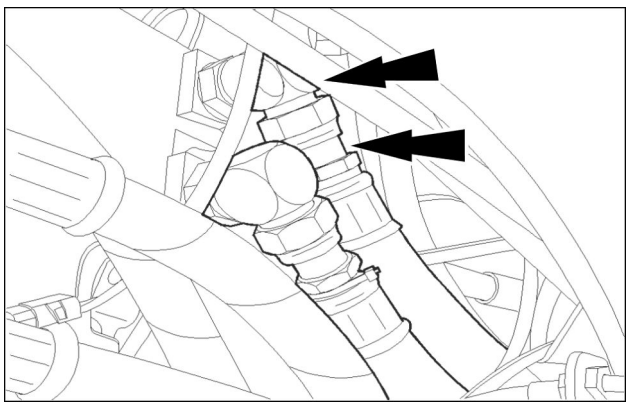
RAPH12WEL1971AA 9

16. Remove two bolts. Remove fill tube with cap and oil gauge assembled, two seals, and metal strainer. Discard seals.



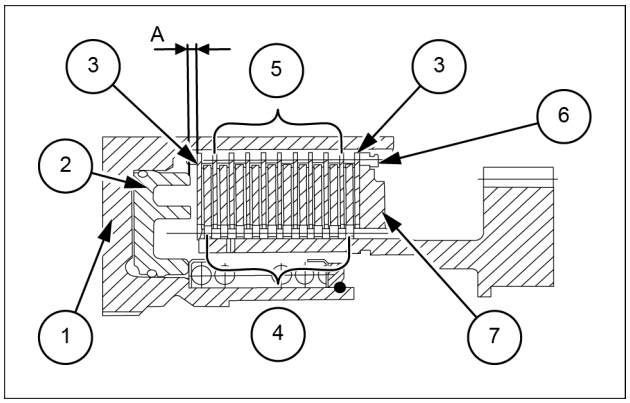
RAPH12WEL1983AA 10

17. Identify, tag, and disconnect the cooler hose from the fitting located in the left-hand side of the transmission. Install a plug in the hose. Remove and discard the O-ring face seal from the fitting.



RAPH12WEL1955AA 11

12. Install the clutch disc plates in KV and KR clutch disc carriers in position and sequence as illustrated. Install the outer plates **(3)** ensuring that the steel faced side is facing the piston and end shim **(7)**. Install the two inner plates **(4)** on the end shim side.



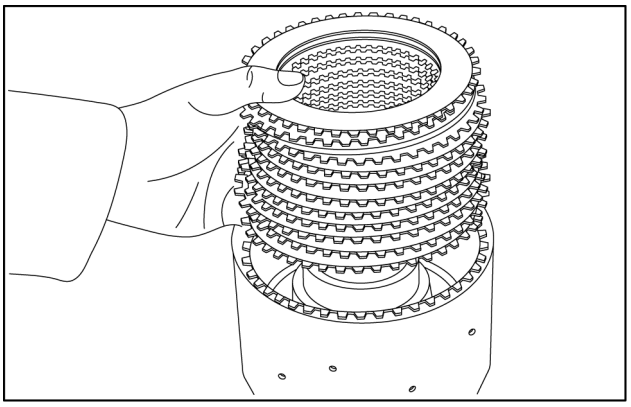
LEIL15WHL1563AB 12

1. Plate carrier
2. Piston
3. Outer plate
4. Inner plates
5. Outer plates
6. Snap ring
7. End shim

A. Running clearance

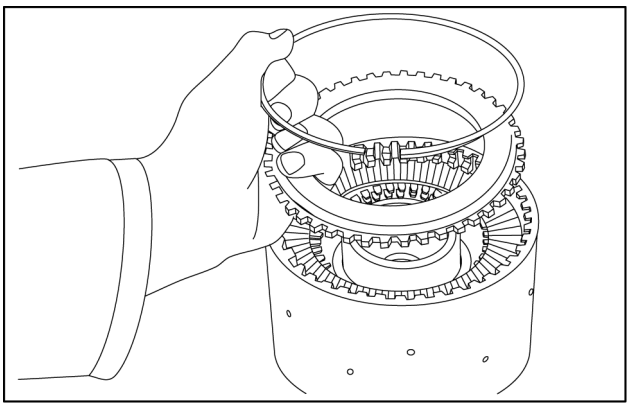
NOTE: *snap rings of different thicknesses are available for the adjustment of the running clearance. To ensure the correct adjustment, do not apply oil to the clutch discs until after the adjustment is completed.*

13. Install the clutch disc pack.



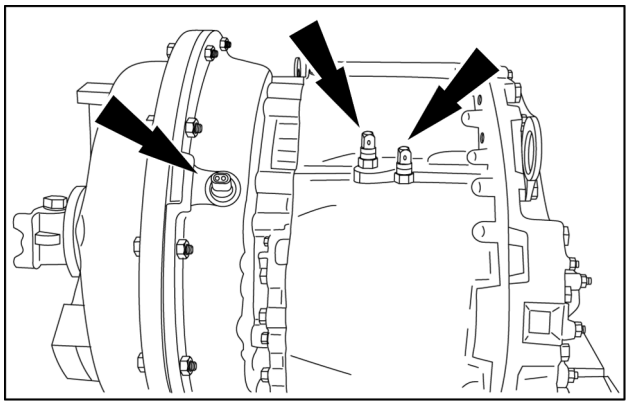
RAPH12WEL2031AA 13

14. Install the end shim and snap ring.



RAPH12WEL2032AA 14

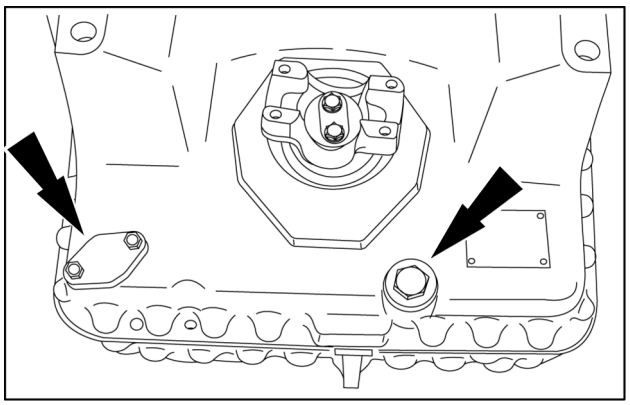
125. Install new O-rings on inductive transmitters. Install the inductive transmitters. Torque to **30 N·m** (**22 lb ft**).



RAPH12WEL2111AA 116

126. Install the breather.

127. Install the gasket and the cover plate. Torque to **23 N·m** (**17 lb ft**). Install a new O-ring to the screw plug. Install the screw plug. Torque to **140 N·m** (**103 lb ft**).



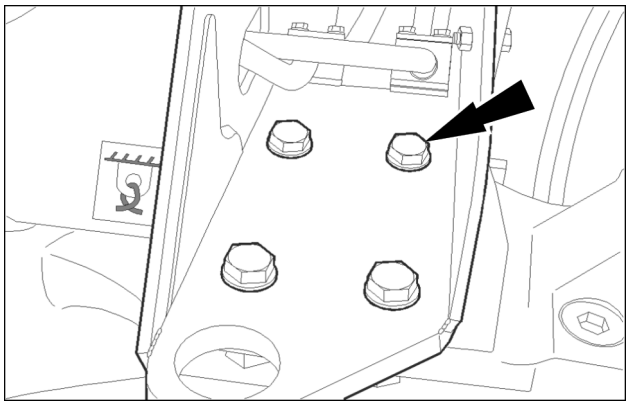
RAPH12WEL2112AA 117

Contents

Four-Wheel Drive (4WD) system - 23

Drive shaft - 314

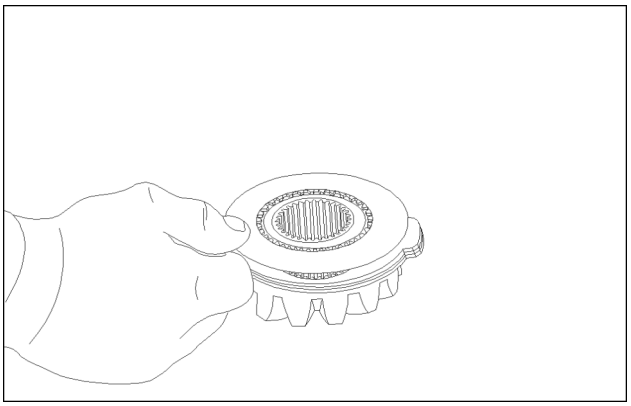
13. Remove the eight nut bolts and washers securing the front axle to the machine.



RAPH12WEL1965AA 12

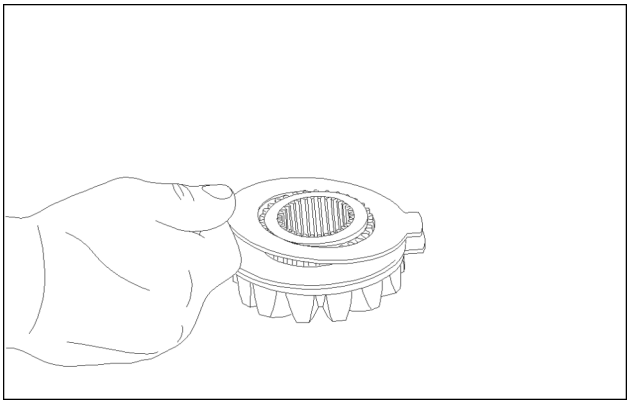
14. Carefully lower the front axle and remove from underneath the machine.

5. Install one friction plate on the inner bevel gear.



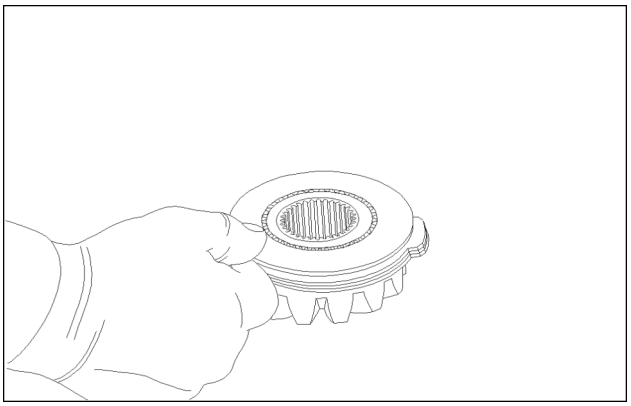
RAPH12WEL2280AA 4

6. Install two reaction plates on the inner bevel gear.



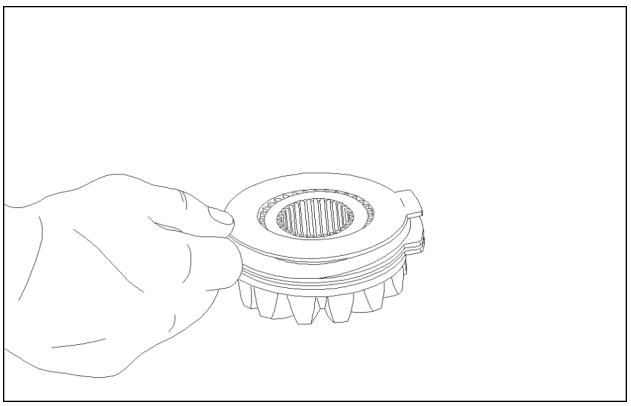
RAPH12WEL2281AA 5

7. Install two friction plates on the inner bevel gear.



RAPH12WEL2282AA 6

8. Install one reaction plate on the inner bevel gear.



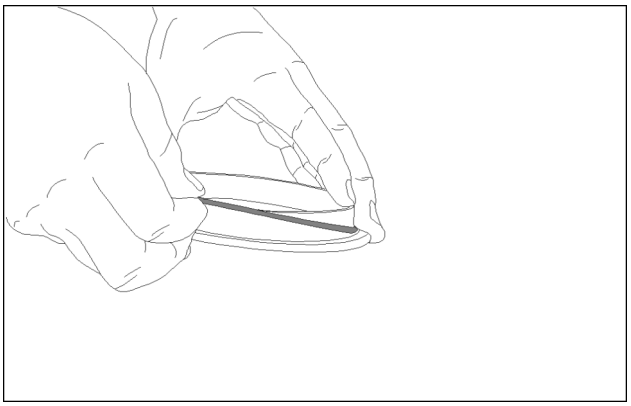
RAPH12WEL2283AA 7

Index

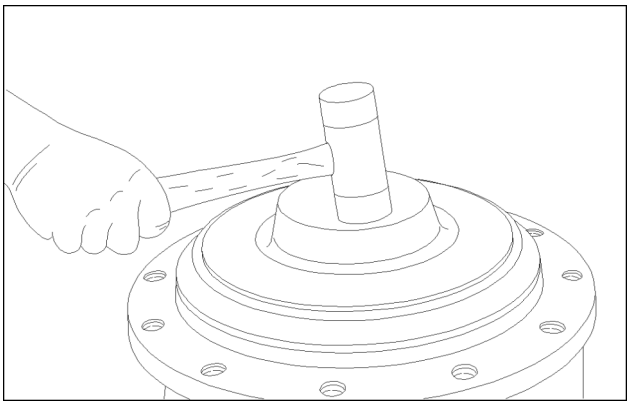
Front axle system - 25

Front bevel gear set and differential - 102

29. Install a new O-ring on the cover. Use a soft mallet to install the cover into the wheel end.

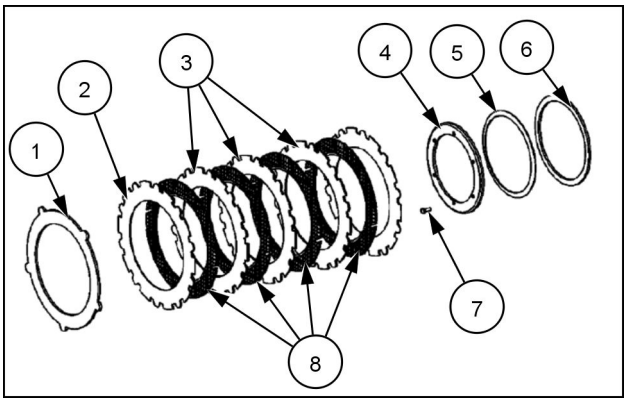


RAPH12WEL2266AA 32



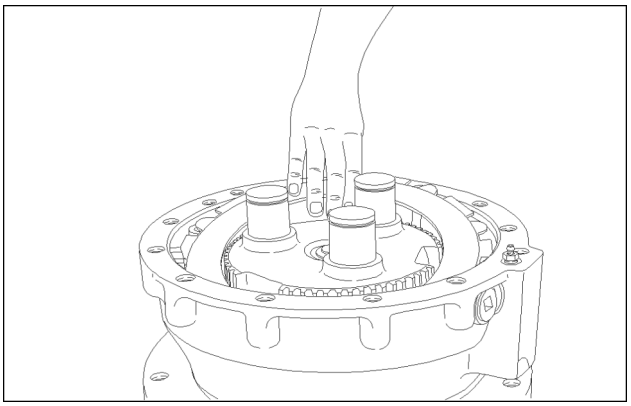
RAPH12WEL2267AA 33

1. End shim
2. Plate
3. Brake plate
4. Spring retainer
5. Return spring
6. Shim
7. Bolt
8. Brake disc



RAPH12WEL2168AB 34

30. Install a **2 mm** (**0.1 in**) plate into the brake housing.

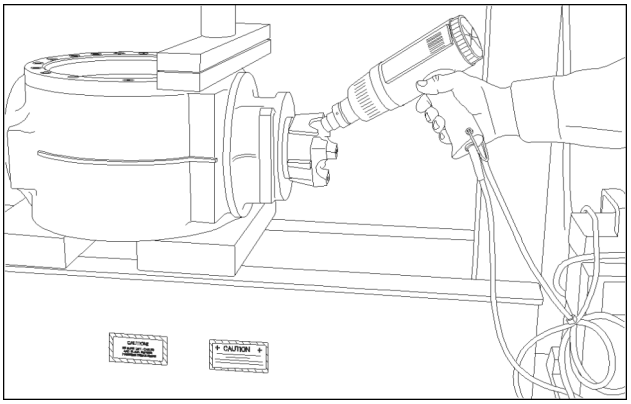


RAPH12WEL2271AA 35

Differential - Remove - Pinion

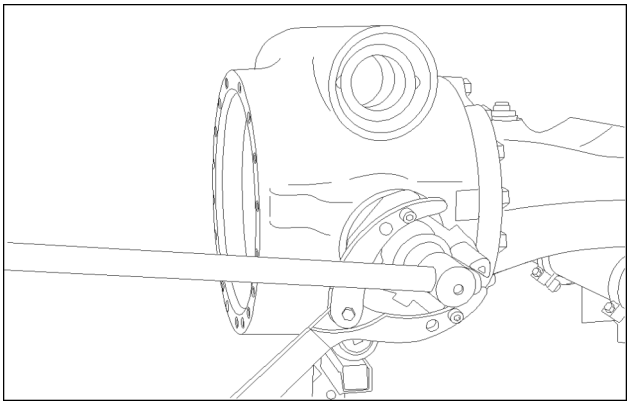
NOTE: *The ring gear and the drive pinion are a matched set. Do not service separately.*

1. Heat the lock nut securing the flange to loosen the Loctite. Use a hot air blower to achieve a temperature of approximately **120 °C** (**248 °F**).



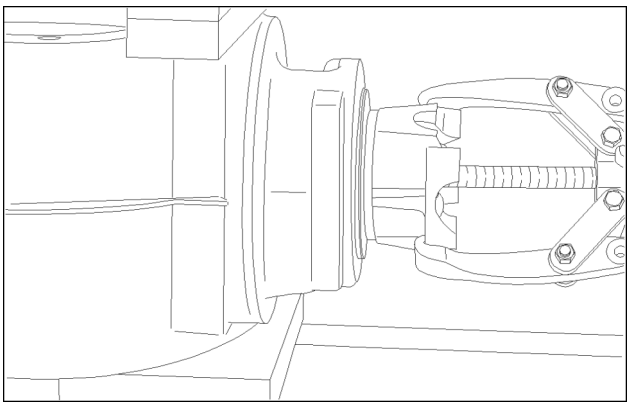
RAPH12WEL2314AA 1

2. Install a holding wrench on the input flange. Hold the flange and remove the lock nut and washer. Remove the holding tool from the flange.



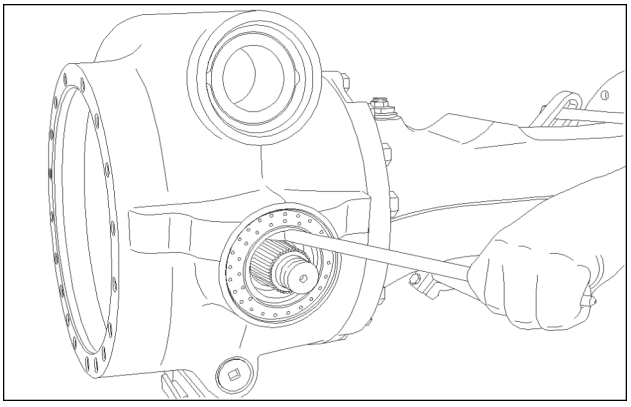
RAPH12WEL2435AA 2

3. Remove the input flange from the drive pinion.



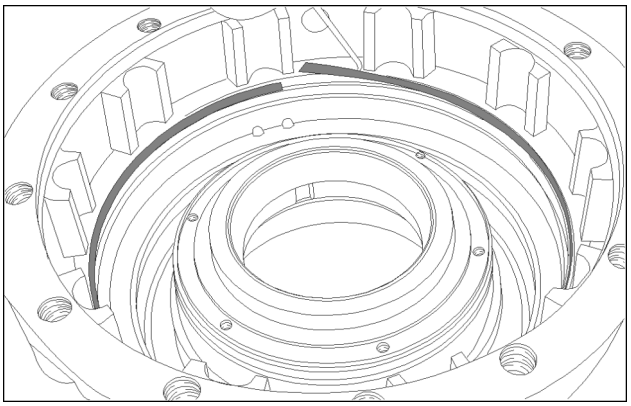
RAPH12WEL2318AA 3

4. Remove the shaft seal from the axle drive housing.



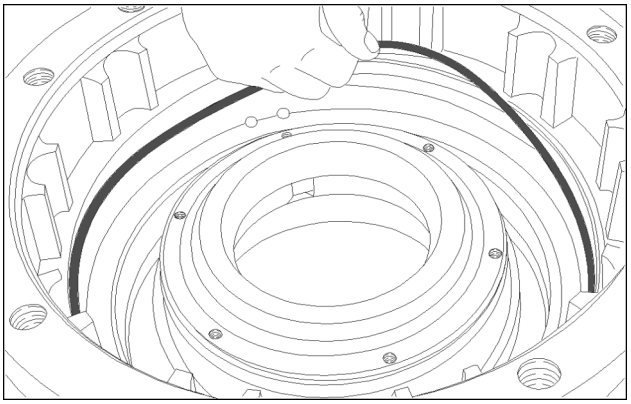
RAPH12WEL2436AA 4

25. Remove the wear ring from the brake housing.



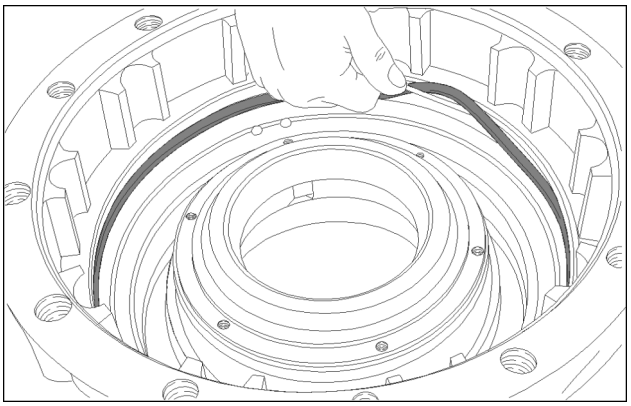
RAPH12WEL2247AA 28

26. Remove the upper backup ring from the brake housing, which is located in the same groove as the upper seal.



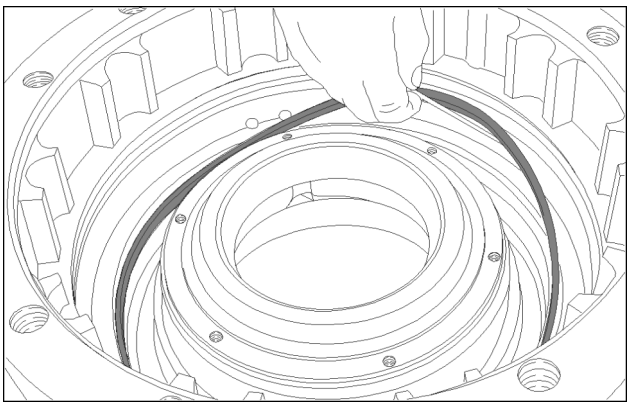
RAPH12WEL2244AA 29

27. Remove the upper seal from brake housing.



RAPH12WEL2243AA 30

28. Remove the lower seal from the brake housing, which is located in the same groove as the lower backup ring.



RAPH12WEL2245AA 31

Contents

Brakes and controls - 33

Brake pump - Inspect

1. Discard all seals and quad rings. Clean all parts in proper cleaning solvent. Inspect all machined surfaces for excessive wear or damage.
2. Measure the amount of wear caused by the gear teeth in the gear pocket. Hold a straightedge across each gear housing and use a feeler gauge to measure. If the wear in any gear pocket is greater than **0.18 mm** (**0.007 in**), replace with a new gear housing.
3. Inspect the thrust plates for excessive wear or damage (scoring, pitting, etc.). Replace as required.
4. Inspect gears for excessive wear or damage. Ensure that no scoring is present on the gear hubs or on the outside edges of the gear teeth. Ensure the wear in the seal area of the drive shaft does not exceed more than **0.05 mm** (**0.002 in**). If any gear is damaged, the pump must be replaced with a new hydraulic pump.

Contents

Brakes and controls - 33

Parking brake or parking lock - 110

SERVICE

Hydraulic Oil Supply Components

A single variable Pressure and Flow Compensated (PFC) hydraulic system controls both the steering **(24)** and the loader control **(22)** systems on the Wheel Loaders. When it appears that there are malfunctions in both the steering and loader control circuits consider there may be problems with one or both of the two pump PFC pumps **(33) (34)**.

Oil flows from the reservoir to the PFC piston pump. The large wheel loaders have two piston type PFC pumps. Both pumps directly supply oil to the steering priority valve **(35)**. The steering priority valve **(35)** first supplies oil to steering **(24)** with any excess flow then available to the loader valve **(22)**. On units equipped with two PFC pumps, each body of the piston pump has a compensator flow control system to deliver only the oil flow required by the hydraulic system. On units equipped with a single PFC pump, a single compensator flow control system delivers only the oil flow required by the hydraulic system. This control system requires a feedback signal (LS signal) from the loader control valve **(22)** and/or from the steering valve **(24)** to deliver the oil required by the system.

The steering priority valve assembly **(35)** is located at the outlet of the 2nd pump. The function of this valve is to first supply oil to the steering control system **(24)**. The steering control valve **(24)** is located at the base of the steering column.

The loader valve is mounted at the rear of the front chassis and can be accessed through the articulation joint or the access cover at the front of the chassis. As the oil enters the loader valve, it supplies oil to the EH manifold circuit and to the loader control spools. A pilot pressure regulator limits the maximum pilot pressure available to the EH manifold. The bucket and loader lift sections are both included in the mono-block assembly. If the machine is equipped with optional auxiliary hydraulic controls, each additional section consists of a separate section block. Each active spool throughout the loader control valve generates a load sense (LS) signal pressure.

The LS feedback signal system sends the highest operating pressure signal requirement back to the compensator flow regulator spool at the piston pump. The loader LS, as well as the steering LS signals, pass through the LS shuttle check valve **(35B)** in the steering priority valve **(35)**. From the LS shuttle check valve **(35B)** the LS signal is then connected to flow regulator spools **(33A) (34A)** of the PFC pump assembly **(32)**. This signals the pump to deliver only the quantity of oil required by the hydraulic system.

The smaller wheel loaders use one variable displacement PFC pump to deliver flow to the steering priority valve **(35)**, the steering control valve **(24)**, the loader valve **(22)**, and the EH manifold **(16)**. Included later in this section is a detailed functional explanation of a single PFC pump.

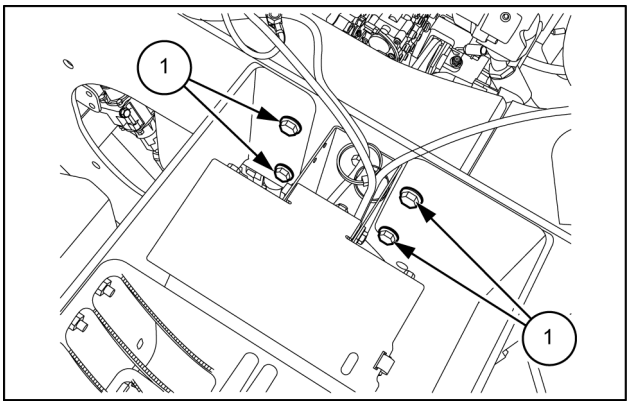
The larger wheel loaders use two variable PFC pumps **(35)** to deliver flow to the steering priority flow divider **(35)**, the steering control valve **(24)**, the loader valve **(22)** and the EH manifold **(16)**. On units equipped with two PFC hydraulic pumps, the first pump **(34)** is the only pump to supply the flow required to operate any of the hydraulic circuits at lower flow requirements until it reaches maximum delivery. The second pump **(33)** only begins to deliver flow when the total hydraulic flow requirements exceed the maximum capability of the first pump **(34)**. The second pump **(33)** is idling at no flow delivery until the first pump **(34)** reaches maximum delivery.

Both of the PFC pumps are mounted as an assembly **(32)** to the transmission towards the front of the wheel loader. The first pump **(34)** is located closest to the transmission. The second pump **(33)** is mounted to the back of the first pump **(34)** and is furthest from the transmission. The priority flow divider **(35)** is mounted directly to the second pump **(33)**. The outlet line from the first pump **(34)** is directly connected to the priority flow divider **(35)**.

Component Flow Chart Legend

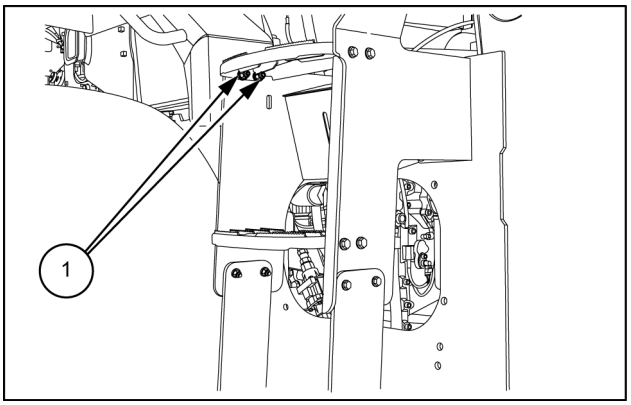
16 – EH manifold
22 – Loader valve
22A – Bucket
22B – Arm
22C – Auxiliary
24 – Steering orbitrol control valve
24A – Steering isolation check valve
33 – Second pump
33A – Second pump compensator flow regulator spool
33B – Second pump compensator pressure regulator spool
34 – First pump
34A – First pump compensator flow regulator spool
34B – First pump compensator pressure regulator spool
35 – Steering priority valve
35A – Steering priority spool
35B – Load sense (LS) signal shuttle check valve
35C – Second pump isolation check valve
35D – Differential pressure relief valve
35E – Steering relief valve

6. Place the right-hand ladder and steps assembly in position on the machine. Install the four bolts **(1)** with the related washers to secure the right-hand ladder and steps assembly to the machine.



LEIL15WHL1413AB 5

7. Install the bolts **(1)** with the related washers and nuts to secure the ladder to the right-hand fender.



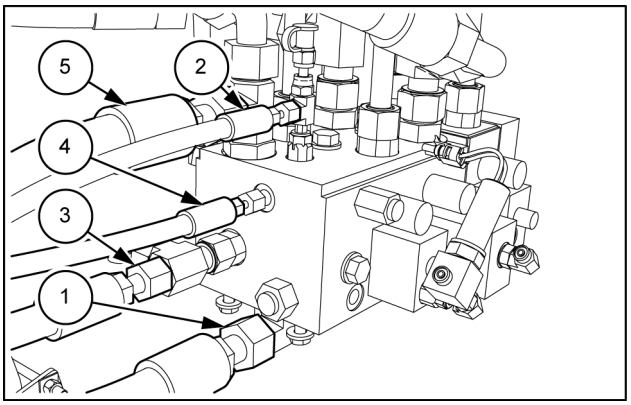
LEIL15WHL1412AB 6

8. Turn the vacuum pump OFF. Disconnect the vacuum pump from the hydraulic reservoir.
9. Check the level of the hydraulic oil in the reservoir. Ensure the level is to specification. Add oil as required.
10. Start the engine. Run the engine at low idle for **2 min**.
11. Turn the engine OFF. Inspect for hydraulic oil leaks at the thermal bypass valve.
12. Ensure the level of the hydraulic oil is to specification. Add oil as required. Tighten the filler cap on the reservoir.

10. Disconnect the hoses **(1)**, **(2)**, **(3)**, **(4)**, **(5)**, **(6)** from the control valve. Refer to Figure **5**, **6** and **7** for color coding.
    Disconnect the hoses **(7)** and **(8)** only for the machine equipped with the 3 spool main control valve and the 4 spool main control valve.
    Disconnect the hoses **(9)** and **(10)** only for the machine equipped with the 4 spool main control valve.
    Tag the hoses **(1)**, **(2)**, **(3)**, **(4)**, **(7)**, **(8)** **(9)** and **(10)** as right-hand or left-hand of the main control valve. Install a plug in each hose. Cap on each fitting.

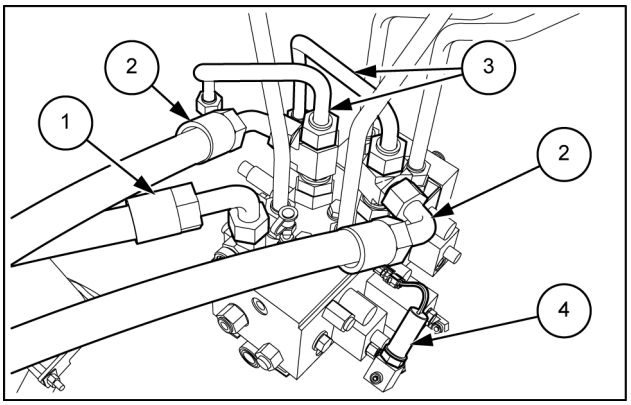
NOTE: *the procedure from step **11** to step **17** refers to a machine equipped with a 3 spool main control valve, but it is similar also for machine equipped with 2 spool main control valve and 4 spool main control valve.*

11. Tag and disconnect the pump pressure hose **(1)** and the load sensing hose **(2)**. Install a plug in each line and a cap on each fitting.
12. Tag and disconnect the steering pressure hose **(3)**, the steering hose **(4)** and the valve return hose **(5)**. Install a plug in each line and a cap on each fitting.



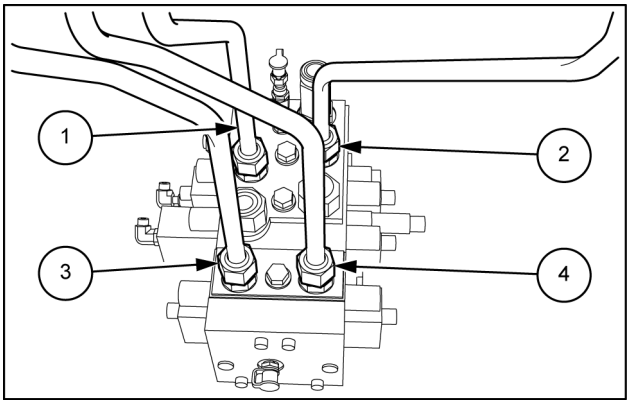
LEIL15WHL1419AB 8

13. Tag and disconnect the Ride control tank hose **(1)**, the Ride control hoses **(2)** and tubes **(3)**. Install a plug in each line and a cap on each fitting.
    Disconnect and remove the Ride control pressure switch **(4)**.



LEIL15WHL1420AB 9

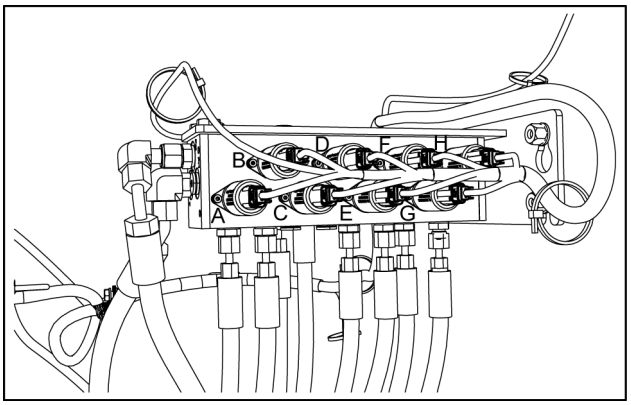
14. Tag and disconnect the tilt head end tube **(1)** and the tilt rod end tube **(2)**.
15. If equipped, tag and disconnect the auxiliary spool tubes **(3)** and **(4)**.



LEIL15WHL1432AB 10

16. Attach proper lifting equipment to lift the main control valve.

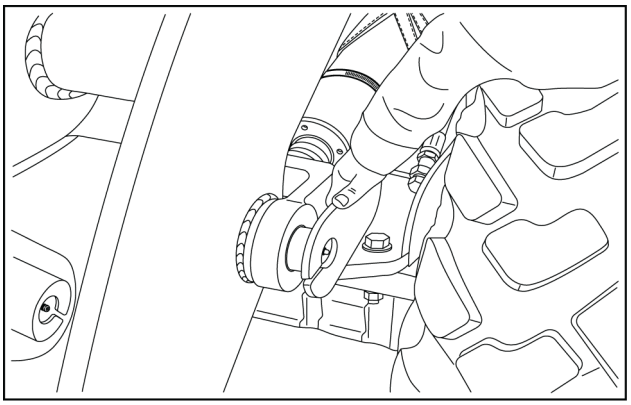
16. Connect the electrical wires to the electro-hydraulic control valve.



LEIL16WHL2040AB 8

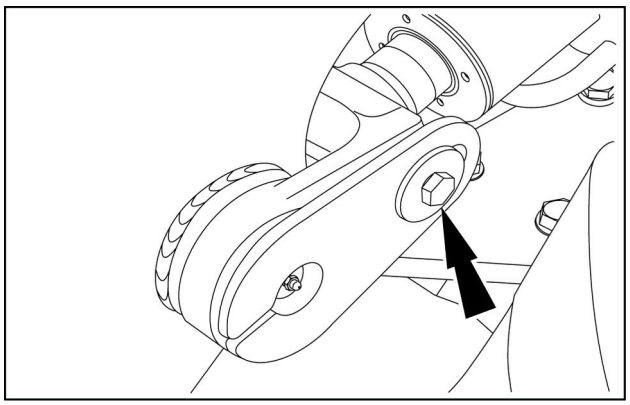
17. Turn off the vacuum pump **CAS10192**. Disconnect the vacuum pump **CAS10192** from the hydraulic reservoir.
18. Turn the timed disconnect switch to the ON position.
19. Start the engine. Run the engine at low idle for **2 min**.
20. Turn the engine OFF and check for hydraulic oil leaks.
21. Inspect the level of the hydraulic oil in the reservoir. If the oil level is not to specification, add oil as required. Tighten the filler cap on the hydraulic reservoir.
22. Put the articulation lock in the OPERATING position.

6. Turn off the vacuum pump **CAS10192**. Disconnect the vacuum pump **CAS10192** from the hydraulic reservoir.
7. If the yoke of the lift cylinder is not aligned with the loader frame, have another person start and run the engine at low idle and use the joystick to SLOWLY move the yoke into alignment with the loader frame.
8. Install the pivot pin for the yoke. Stop the engine.



LEIL13WHL1261AA 5

9. Align the pivot pin with the yoke and install the spacer, washer and bolt. Tighten the bolt.



LEIL13WHL1259AA 6

10. SLOWLY extend and retract the piston rod three times to remove any air from the lift cylinders.
11. Lubricate the pivot pins with molydisulfide grease.
12. Check the level of hydraulic oil in the reservoir and add as required. Tighten the filler cap on the hydraulic reservoir.

12. Open the shutoff valve A on the nitrogen supply tank. While observing the pressure on the gauge, slightly open the needle valve on the accumulator charge hose. By regulating the needle valve, fill the accumulator to pressure according to temperature chart below. Close the needle valve. Close the shutoff valve A on the nitrogen supply tank.

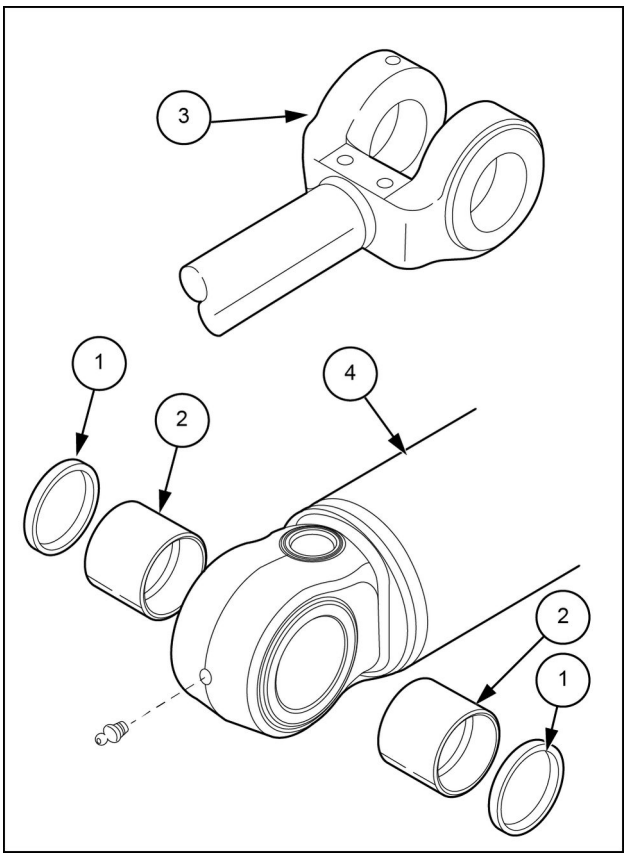
Temperature	Charge pressure
10 °C (**50 °F**)	**1606 kPa** (**233 psi**)
13 °C (**55 °F**)	**1634 kPa** (**237 psi**)
16 °C (**61 °F**)	**1669 kPa** (**242 psi**)
18 °C (**64 °F**)	**1696 kPa** (**246 psi**)
21 °C (**70 °F**)	**1724 kPa** (**250 psi**)
24 °C (**75 °F**)	**1751 kPa** (**254 psi**)
27 °C (**81 °F**)	**1779 kPa** (**258 psi**)
29 °C (**84 °F**)	**1813 kPa** (**263 psi**)
32 °C (**90 °F**)	**1841 kPa** (**267 psi**)
35 °C (**95 °F**)	**1868 kPa** (**271 psi**)
38 °C (**100 °F**)	**1896 kPa** (**275 psi**)

13. Close valve **(B)** by turning to the right (clockwise). After a few minutes, check the accumulator for leakage.
14. Back off the needle valve on the accumulator end of the charging hose by turning it counterclockwise the maximum amount. This will prevent nitrogen from escaping from the accumulator as the hose is removed. Remove the charging hose from the accumulator pressure valve **(12)**.
15. Install the valve cap onto the pressure valve **(12)** on the accumulator.
16. Install the protection bracket **(11)** over the pressure valve **(12)** and secure it with cap screws **(9)**.
17. Remove the charging hose from the nitrogen supply tank.

Loader bucket control cylinder - Install - Bushing

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

1. Use an acceptable driver to press new bushings **(2)** into the tube **(4)**.
2. Use an acceptable driver to install the wipers **(1)** into the tube **(4)**. The lips of the wipers **(1)** must be toward the outside of the bore.



LEIL15WHL1440BB 1

Articulation frame pivot - Install

Connecting the front frame to the rear frame

1. Release the parking brake.
2. Use a suitable hoisting equipment and move the rear frame into alignment with the front frame.
3. Move the steering cylinders as required to move the rear frame into alignment with the front frame.
4. Apply the parking brake.

Upper pivot pin installation

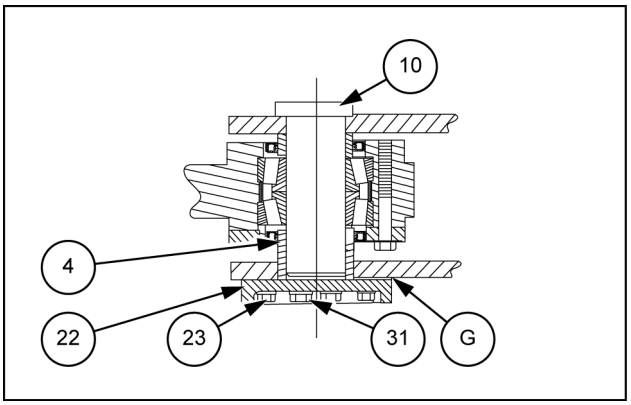
NOTE: *for the numbering, refer to* ***Articulation frame pivot - Exploded view (39.100)****.*

5. Apply grease to the upper pivot pin **(15)**.
6. Install the upper pivot pin **(1)**, the spacer **(16)**, the washer **(17)**, and the bolt **(18)**. Be careful not to damage the seal **(13)**.
   Apply on drop of 15W40 engine oil to the bolt.
   Tighten the bolt **(18)** to **224 – 278 N·m** (**165 – 205 lb ft**).

Lower pivot pin installation

NOTE: *for the numbering, refer to* ***Articulation frame pivot - Exploded view (39.100)****.*

7. Apply grease to the lower pivot pin **(10)** and install it from top, down through the frame articulation plates **(Y)** and **(Z)**.
8. Install the spacer **(4)** sliding through the lower plate of the front chassis lower joint **(Y)** until the spacer **(4)** is in contact with the bearing **(1)**.
9. Install the retainer plate **(22)** to the lower pivot pin **(10)**, using three inner screws **(31)**.
   Tighten the screws **(31)** to **69 N·m** (**51 lb ft**).
10. Measure the gap **(G)** between the lower plate **(Y)** and the bottom of the lower pivot pin **(10)**.
    Make a record of the measurement.
    Subtract **0.0762 – 0.1016 mm** (**0.003 – 0.004 in**) from the measurement.
    Select shims **(19)**, **(20)**, or **(21)** equal to that value.
11. Loosen the inner screws **(31)**.
12. Install the shims, the washers **(6)**, and the outer bolts **(23)**. Apply one drop of 15W40 engine oil to each bolt.
    Tighten the bolts **(23)** to **124 – 132 N·m** (**91 – 97 lb ft**).
13. Remove the inner screws **(31)**.
    Apply one drop of **LOCTITE® 243™** to each screw.
    Tighten the screws **(31)** to **224 – 278 N·m** (**165.2 – 205 lb ft**).

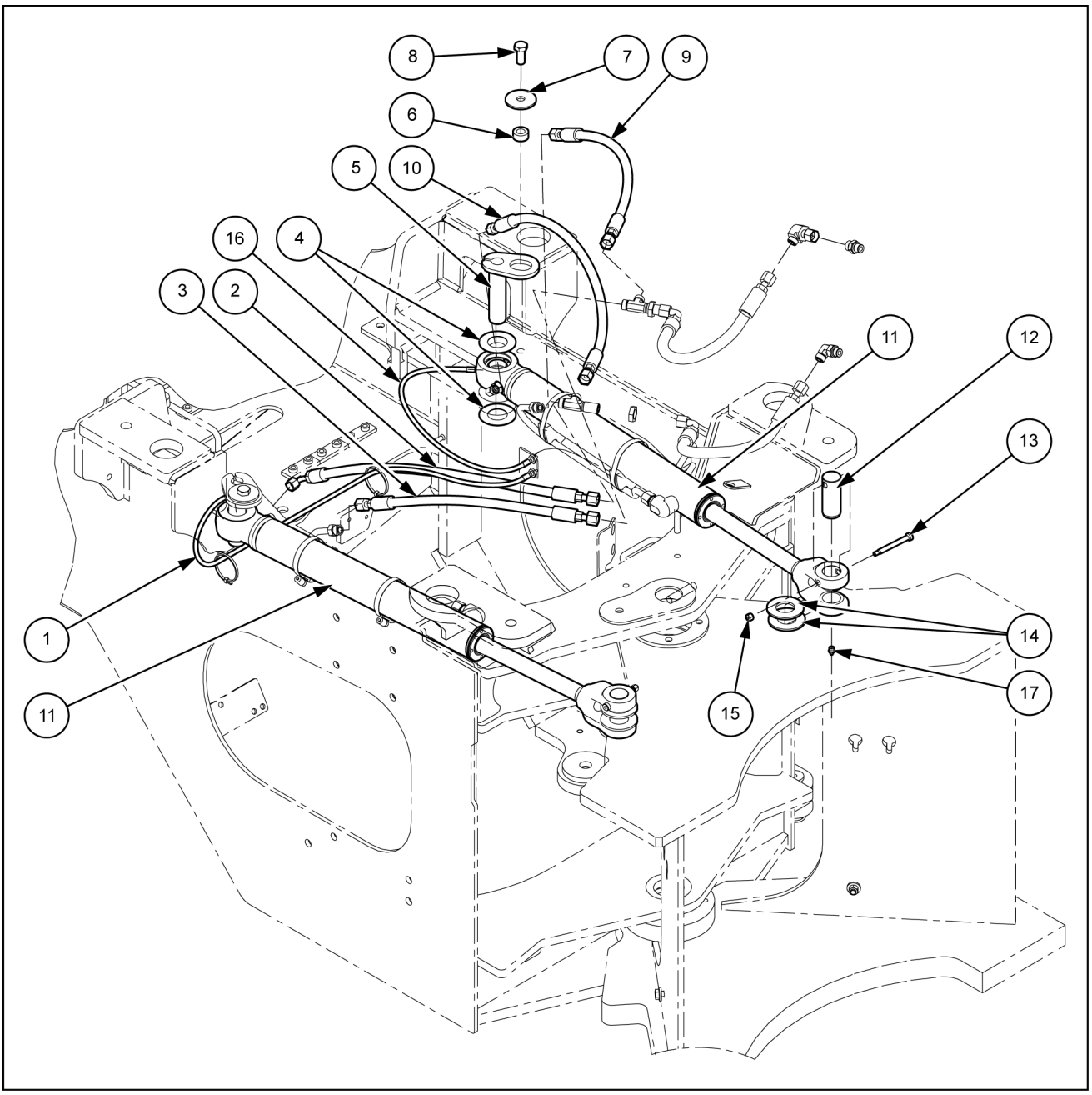


LEIL15WHL1353AB 1

HYDRAULIC COMPONENTS OF THE STEERING SYSTEM WITH AUXILIARY STEERING AND JSS - Sheet 3of 3

1. Steering EHPS valve
2. Bracket
3. Hydraulic connector
4. Hydraulic shuttle tee valve
5. **45°** elbow
6. **90°** elbow
7. **45°** elbow
8. Hydraulic connector
9. Hydraulic connector
10. **90°** elbow
11. Cut-off valve
12. **90°** elbow
13. T-joint
14. Hose (to tank)
15. T-joint
16. Hose (to steering cylinder)
17. Hose (to steering cylinder)
18. T-joint
19. Hose (to JSS load sense)
20. Washer, 13.5x28x4 mm
21. Bolt, M12x30 CL 10.9
22. Washer, 9x21x2.5 mm
23. Bolt, M8x20 CL 8.8
24. Hose (to return valve)
25. Sleeve hose 60x1200
26. Hose (to JSS pressure valve)
27. Hose (to steering right rod)
28. Hose (to steering right base)
29. Bracket
30. Washer, 9x16x1.6 mm
31. Bolt, M8x10 CL 8.8
32. Steering angle sensor
33. Nut
34. Bracket
35. Bracket
36. Washer, 9x17x2 mm
37. Bolt, M8x20 CL 10.9
38. Bolt, M8x25 CL 10.9
39. Washer, 6.6x12.5x2 mm
40. Washer, 6.6x12.5x1.6 mm
41. Bolt, M6x70 CL 10.9
42. Nut
43. Jump union
44. Hose (to steering load sensing)
45. Orbitrol valve
46. Loader valve
47. Rear chassis
48. Auxiliary steering solenoid valve

Steering cylinder - Install



LEIL16WHL1047GB 1

1. Grease hose
2. Hose assembly
3. Hose assembly
4. Washer
5. Pivot pin
6. Spacer
7. Washer
8. Bolt M16x35
9. Hose assembly
10. Hose assembly
11. Steering cylinder
12. Pin
13. Hexagonal screw
14. Washer
15. Nut
16. Grease hose
17. Grease fitting

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SERVICE - Technical Publications & Tools

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HFC-134a stable saturation pressure / temperature chart

Temperature °F (° C)	Pressure PSIG (Bar)
50 (10)	45 (3.1)
55 (13)	51 (3.5)
60 (16)	57 (3.9)
65 (18)	64 (4.4)
70 (21)	71 (4.9)
75 (24)	78 (5.4)
80 (27)	88 (6.1)
85 (29)	95 (6.6)
90 (32)	104 (7.2)
95 (35)	114 (7.9)
100 (38)	124 (8.6)
102 (39)	129 (8.9)
104 (40)	133 (9.2)
106 (41)	138 (9.5)
108 (42)	142 (9.8)
110 (43)	147 (10.1)
112 (44)	152 (10.5)
114 (46)	157 (10.8)
116 (47)	162 (11.2)
118 (48)	167 (11.5)
120 (49)	172 (11.9)

Problem: not enough cooling

See pressure - temperature chart on **Air conditioning - General specification (50.200)**

Temperature of low pressure gauge: normal to slightly high
Temperature of high pressure gauge: normal

Air in the system - Indications:

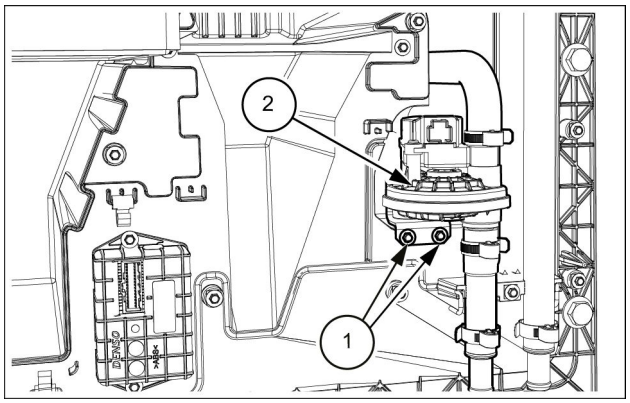
A. Suction line is warm to the touch. B. Discharge air from heater/evaporator is only a little cool.		1. Test system for leaks. 2. Discharge system of refrigerant. 3. Repair system leak as necessary. 4. Check compressor oil level. 5. Remove air and moisture from the system. 6. Charge system with new refrigerant.

See pressure - temperature chart on **Air conditioning - General specification (50.200)**.

Temperature of low pressure gauge: low
Temperature of high pressure gauge: low

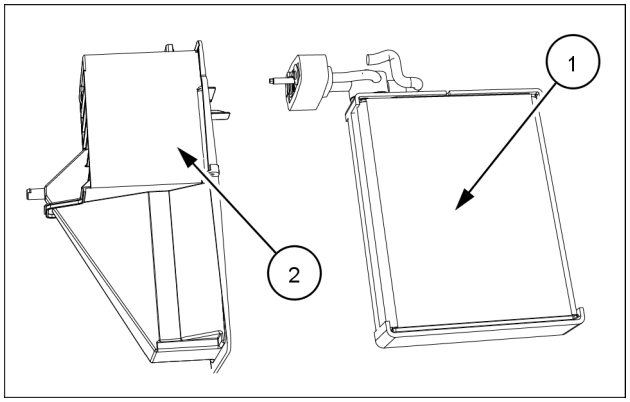
Air-conditioning evaporator - Install

1. Place the heat exchanger **(2)** in the correct position on the cab heater assembly. Install the bolts **(1)** to secure the heat exchanger **(2)** to the cab heater assembly.



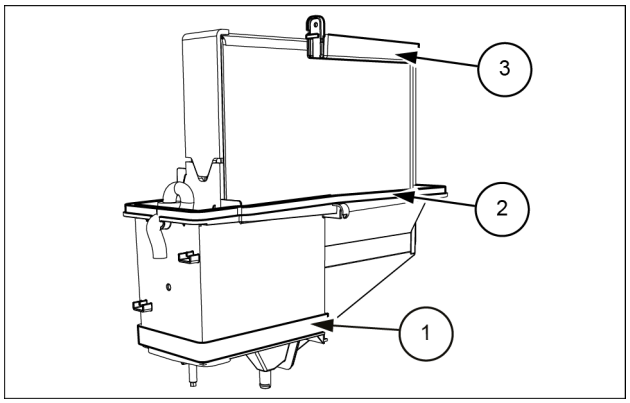
LEIL16WHL1247AB 1

2. Insert the air conditioning evaporator **(1)** to the water drain tank **(2)**.



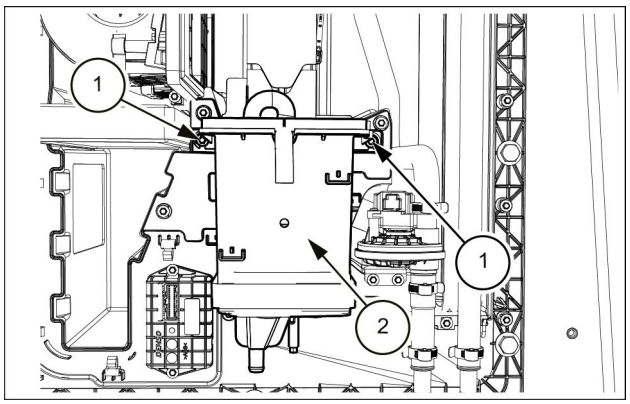
LEIL16WHL1249AB 2

3. Install the case gasket **(1)**, the water drain tank gasket **(2)** and the evaporator sensor bracket **(3)** to the air conditioning evaporator.



LEIL16WHL1246AB 3

4. Insert the water drain tank **(2)** from the cab heater assembly. Install the bolts **(1)** to secure the water drain tank **(2)**.



LEIL16WHL1245AB 4

F-4F8 - REAR DEFROST (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 09**

F-4F9 - SPARE (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 09**

F-5F1 - DISPLAY WK (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F10 - STALK/DIFF (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F2 - UCM (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F3 - TECM (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F4 - TELEMATICS (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F5 - SEC STRG (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F6 - IMP JOYSTICK (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F7 - KEY PAD (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F8 - JSS IGN (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

F-5F9 - REAR PWR (Fuse)

Component Type	Fuse
Wiring frames	**SHEET 10**

Wiring harnesses - Electrical schematic sheet 08 SH08 - POWER DISTRIBUTION (FUSE BLOCK LC3)

Type	Component	Connector / Link	Description
ECU	**A-MAIN JB CAB**		JUNCTION BLOCK INTO CAB
Fuse	**F-3F1**		12V PWR1
Fuse	**F-3F2**		12V SPARE
Fuse	**F-3F3**		12V RADIO
Fuse	**F-3F4**		12V SPARE
Fuse	**F-3F5**		SPARE
Fuse	**F-3F6**		SPARE
Fuse	**F-3F7**		SPARE
Fuse	**F-3F8**		12V CONVERTER
Relay	**K-3R1**		12V CONVERTER
Relay	**K-3R2**		SEC STEERING
Relay	**K-3R3**		REAR DEFROST
Connector	X-LC3	**X-LC3**	LOADCENTER 3
Connector	X-P1009	**X-P1009**	B+ POWER STUD
Connector	X-X3	**X-X3**	SFB

Wiring harnesses - Electrical schematic sheet 22 SH22 - UCM-LOADER BOOM CONTROL

Type	Component	Connector / Link	Description
ECU	**A-EH_VLV**	**X-PILOT_ENABLE** **X-BOOM_RAISE** **X-BOOM_LOWER** **X-BUCKET_ROLL** **X-BUCKET_DUMP** **X-AUX_1_LEFT** **X-AUX_1_RIGHT** **X-AUX_2_LEFT** **X-AUX_2_RIGHT**	ELECTROHYDRAULIC VALVE
ECU	**A-UCM**	**X-UCM3B X-UCM4B** **X-UCM2B**	47749442 WAS 84328725
Sensor	**B-BKT_ANG**	**X-BUA**	BUCKET ANGLE
Sensor	**B-BM_ANG**	**X-BOA**	BOOM ANGLE
Switch	**SW-PRB**	**X-PRB**	ROLL BACK PR SW
Connector	X-AUX_1_LEFT	**X-AUX_1_LEFT**	AUX 1 LEFT
Connector	X-AUX_1_RIGHT	**X-AUX_1_RIGHT**	AUX 1 RIGHT
Connector	X-AUX_2_LEFT	**X-AUX_2_LEFT**	AUX 2 LEFT
Connector	X-AUX_2_RIGHT	**X-AUX_2_RIGHT**	AUX 2 RIGHT
Connector	X-BOA	**X-BOA**	BOOM ANGLE SENSOR
Connector	X-BOOM_LOWER	**X-BOOM_LOWER**	BOOM LOWER SOLENOID
Connector	X-BOOM_RAISE	**X-BOOM_RAISE**	BOOM RAISE SOLENOID
Connector	X-BTM	**X-BTM**	BOTTOM TO CAB STD
Connector	X-BTM_EH	**X-BTM_EH**	BOTTOM TO CAB EH
Connector	X-BTM_F	**X-BTM_F**	BOTTOM TO FRONT STD
Connector	X-BTM_FEH	**X-BTM_FEH**	BOTTOM TO FRONT EH
Connector	X-BUA	**X-BUA**	BUCKET ANGLE SENSOR
Connector	X-BUCKET_DUMP	**X-BUCKET_DUMP**	BUCKET DUMP SOLENOID
Connector	X-BUCKET_ROLL	**X-BUCKET_ROLL**	BUCKET ROLL SOLENOID
Connector	X-CAB_B	**X-CAB_B**	CAB TO BOTTOM
Connector	X-CAB_EH	**X-CAB_EH**	CAB TO BOTTOM EH
Connector	X-FAX	**X-FAX**	FRONT AXLE TEMP SENSOR
Connector	X-FRNT	**X-FRNT**	FRONT TO BOTTOM STD
Connector	X-FRNT_EH	**X-FRNT_EH**	FRONT TO BOTTOM EH
Connector	X-PILOT_ENABLE	**X-PILOT_ENABLE**	PILOT ENABLE SOLENOID
Connector	X-PRB	**X-PRB**	ROLL BACK PRESSURE SWITCH
Connector	X-UCM1A	**X-UCM1A**	UCM
Connector	X-UCM1B	**X-UCM1B**	UCM
Connector	X-UCM2B	**X-UCM2B**	UCM
Connector	X-UCM3B	**X-UCM3B**	UCM
Connector	X-UCM4A	**X-UCM4A**	UCM
Connector	X-UCM4B	**X-UCM4B**	UCM
Connector	X-YPE	**X-YPE**	COUPLER VALVE
Connector	X-YRC	**X-YRC**	RIDE CONTROL SOLENOID
Solenoid	**Y-YPE**	**X-YPE**	COUPLER VALVE SOL.
Solenoid	**Y-YRC**	**X-YRC**	YRC RIDE CONTROL SOL

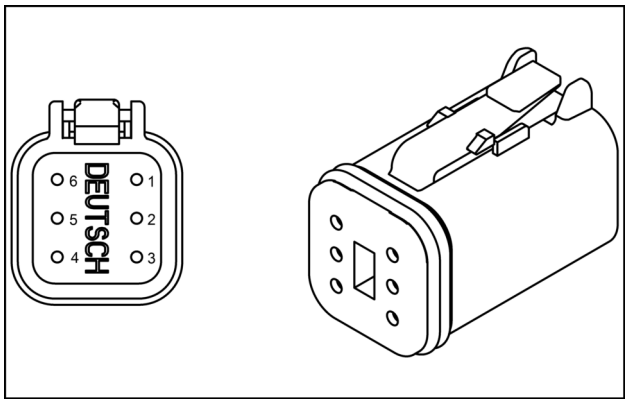
Wiring harnesses - Electrical schematic sheet 36 SH36 - REAR DEFROST, BACKUP ALARM

Type	Component	Connector / Link	Description
ECU	**A-SFB**	**X-X6**	SMART FUSE BOX
Ground	**GND-069**	GND-069	
Speaker	**H-BU_ALRM**	**X-BU2 X-BU1**	BACKUP ALARM
Resistor	**R-WND_HTR**	**X-RWHE1 X-RWHE2**	REAR WINDSHIELD HEATER ELEMENT
Switch	**SW-BCK_U_SW**	**X-S_BU**	BACKUP ALRM CANCEL SW
Switch	**SW-R_DEF_SW**	**X-S_RDF**	REAR DEFROST SWITCH
Connector	X-BU1	**X-BU1**	BACK UP ALARM
Connector	X-BU2	**X-BU2**	BACK UP ALARM
Connector	X-CAB_E	**X-CAB_E**	CAB TO ENGINE
Connector	X-EHD_23	**X-EHD_23**	ENG TO PL23 HOOD
Connector	X-ENG	**X-ENG**	ENGINE TO CAB
Connector	X-HD_23	**X-HD_23**	HOOD PL23
Connector	X-RWHE1	**X-RWHE1**	REAR WINDOW HEATER
Connector	X-RWHE2	**X-RWHE2**	REAR WINDOW HEATER
Connector	X-S_BU	**X-S_BU**	CANCEL BACKUP ALARM
Connector	X-S_RDF	**X-S_RDF**	SWITCH REAR DEFROST
Connector	X-X3	**X-X3**	SFB
Connector	X-X4	**X-X4**	SFB
Connector	X-X7	**X-X7**	SFB

Wire connectors - Component localization - Main cab harness / Pedestal harness

Pin	From	Wire	Description	Color-Size	Frame
1	**X-YPP (Plug) pin A** PILOT PRESSURE SOLENOID	344E	PILOT ENABLE PILOT	YE - 0.8	**SHEET 23**
2	**X-KDS (Plug) pin 2** CAN	309B	KICK DOWN SIGNAL	YE - 0.8	
2	**X-P_JS (Plug) pin 6** PILOT LOADER JOYSTICK	309A	KICK DOWN SIGNAL	YE - 0.8	
3	**X-P_JS (Plug) pin 2** PILOT LOADER JOYSTICK	306A	FOWARD SIGNAL	WH - 0.8	
4	**X-P_JS (Plug) pin 3** PILOT LOADER JOYSTICK	307A	NUETRAL SIGNAL	YE - 0.8	
5	**X-P_JS (Plug) pin 4** PILOT LOADER JOYSTICK	308A	REVERSE SIGNAL	GY - 0.8	
6	**X-EM (Receptacle) pin 3** ELECTROMAGNETIC DETENTS	297A	RTD DETENT	WH - 0.8	
7	**X-EM (Receptacle) pin 2** ELECTROMAGNETIC DETENTS	298A	HC DETENT	WH - 0.8	
8	**X-EM (Receptacle) pin 1** ELECTROMAGNETIC DETENTS	299A	RTT DETENT	WH - 0.8	
9	SP-677H-P-X	677H	5V REF 3+	PK - 0.8	
10	SP-967H-P-X	967H	5V REF3 GRND	BL - 0.8	
11	**X-A_RT3 (Plug) pin 1** RIGHT ARM PILOT	310A	FORWARD REVERSE SIGNAL	LB - 0.8	
12	**X-A_RT3 (Plug) pin 4** RIGHT ARM PILOT	311A	FORWARD REVERSE SIGNAL	WH - 0.8	

X-A_RT_P - ARM REST RIGHT HAND PILOT (87694112) (Receptacle)

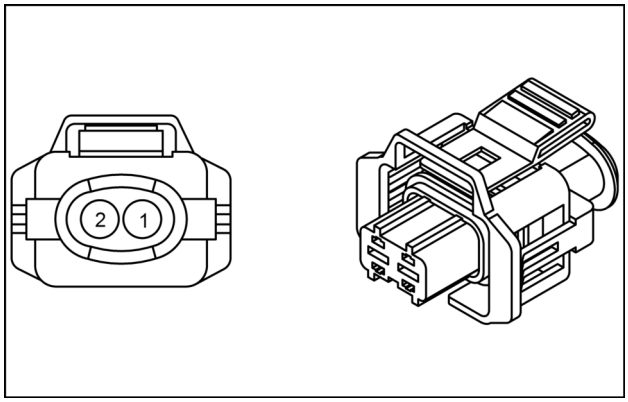


87694112 18

87694112

Pin	From	Wire	Description	Color-Size	Frame
1	**X-KDS (Plug) pin 4** CAN	792H	KICKDOWN SW PWR	OR - 0.8	**SHEET 23**
1	**X-P_JS (Plug) pin 1** PILOT LOADER JOYSTICK	792G	IMP JOYSTICK IGN PWR	OR - 0.8	
2	SP-954U-P-X	954U	CHASSIS GROUND	BK - 1.0	
5	**X-HN (Plug) pin 2** CAN	113E	HORN	BR - 0.8	

X-DSR - UREA DOSING VALVE [Y-DSV] (87709798) (Receptacle)

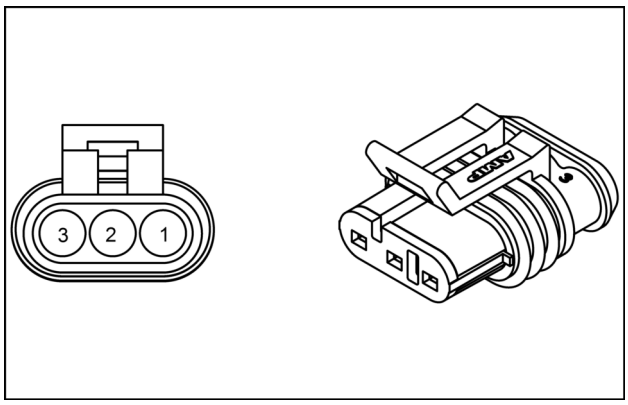


87709798 72

87709798

Pin	From	Wire	Description	Color-Size	Frame
1	**X-ECU (Receptacle) pin 96** ECU CONNECTOR	696B	DOSING VALVE	TN - 0.8	**SHEET 17**
1	**X-SCR2 (Plug) pin 5** INLINE FROM SCR SENSORS HARNESS	696A	DOSING VALVE	TN - 0.8	
2	**X-ECU (Receptacle) pin 23** ECU CONNECTOR	623B	DOSING VALVE	WH - 0.8	
2	**X-SCR2 (Plug) pin 6** INLINE FROM SCR SENSORS HARNESS	623A	UREA DOSING VALVE 2	WH - 0.8	

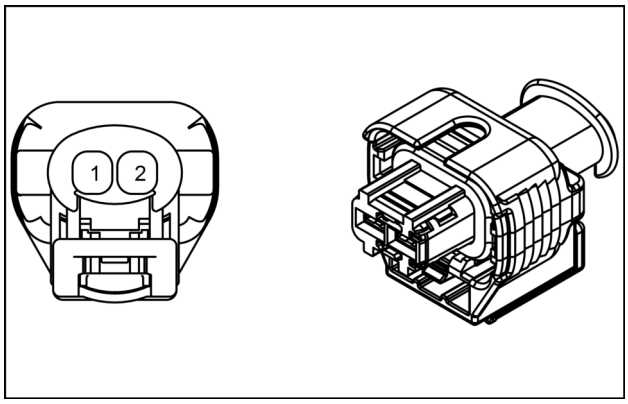
X-DTLTS - DEF LEVEL / TEMP [B-U_LVL] (84062580) (Plug)



84062580 73

84062580

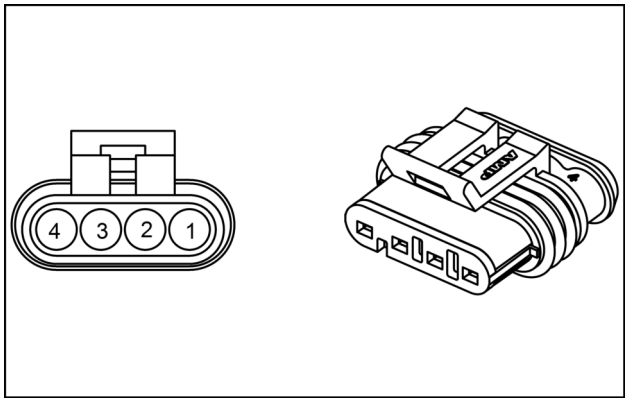
X-DTS - SCR DOWNSTREAM TEMP [B-D_TS] (84532147) (Receptacle)



84532147 74

84532147

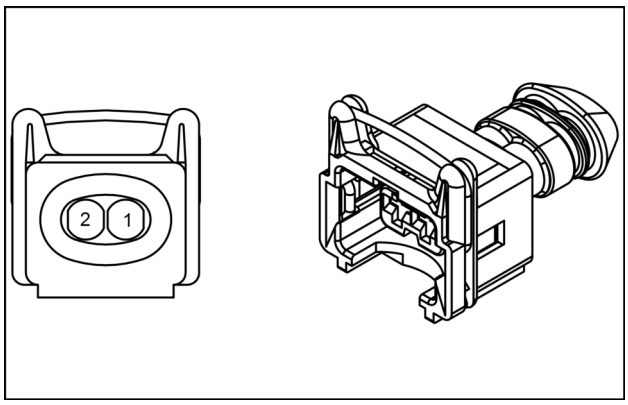
X-ISO - ISOLATOR [K-ISOLATOR] (87687242) (Plug)



87687242 127

87687242

X-ISS - SPEED SENSOR MIDDLE WHEEL CHAIN [B-IS_S] (84364854) (Receptacle)

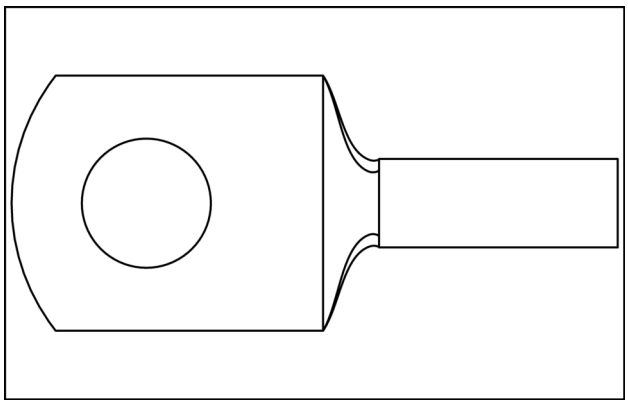


84364854 128

84364854

Pin	From	Wire	Description	Color-Size	Frame
1	**X-TRANS (Plug) pin 9** TRANSMISSION TO CAB	701A	INTERMEDIATE SPEED SENSOR	YE - 0.8	**SHEET 26**
2	**X-TRANS (Plug) pin 11** TRANSMISSION TO CAB	702B	SPEED SENSOR GRND	BL - 0.8	

X-JC1 - JUNCTION STUD OF B+ IN REAR (84399576) (Plug)

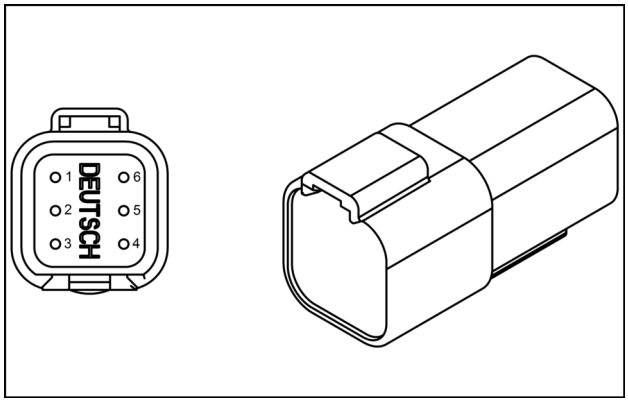


84399576 129

84399576

Pin	From	Wire	Description	Color-Size	Frame
1	**X-CPWR (Plug) pin 1** CAB POWER	235	B+ TO REAR JUNCTION BLOCK	RD - 19.0	**SHEET 03**

X-P_JS - PILOT LOADER JOYSTICK [SW-FNR] (87694152) (Plug)

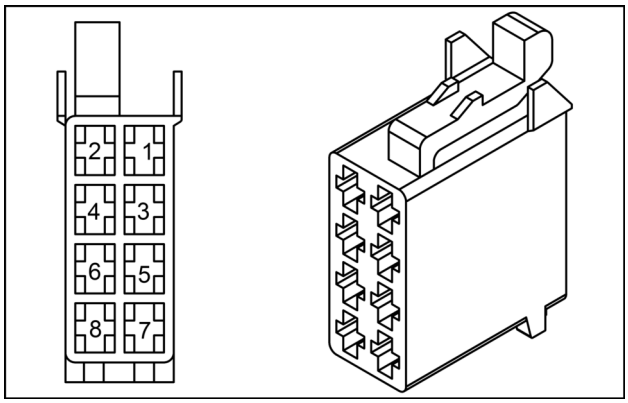


87694152 187

87694152

Pin	From	Wire	Description	Color-Size	Frame
1	**X-A_RT_P (Receptacle) pin 1** ARM REST RIGHT HAND PILOT	792G	IMP JOYSTICK IGN PWR	OR - 0.8	**SHEET 23**
2	**X-A_RT_2B (Receptacle) pin 3** ARM REST RIGHT PILOT 2	306A	FOWARD SIGNAL	WH - 0.8	
3	**X-A_RT_2B (Receptacle) pin 4** ARM REST RIGHT PILOT 2	307A	NUETRAL SIGNAL	YE - 0.8	
4	**X-A_RT_2B (Receptacle) pin 5** ARM REST RIGHT PILOT 2	308A	REVERSE SIGNAL	GY - 0.8	
6	**X-A_RT_2B (Receptacle) pin 2** ARM REST RIGHT PILOT 2	309A	KICK DOWN SIGNAL	YE - 0.8	

X-RAD - RADIO [H-RADIO] (87709660) (Receptacle)



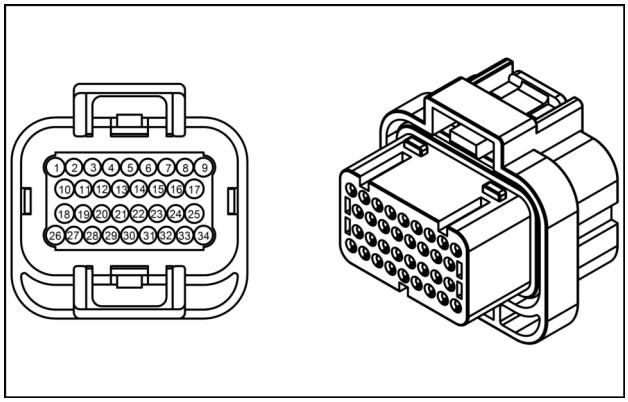
87709660 188

87709660

Pin	From	Wire	Description	Color-Size	Frame
7	**X-LC3 (Receptacle) pin F3_15** LOADCENTER 3	753	12V FUSED ACC PWR	OR - 0.8	**SHEET 35**
8	CG1-P-1 CAB GROUND RH HEADLINER	271	RADIO GRND	BK - 0.8	

Pin	From	Wire	Description	Color-Size	Frame
5	**X-CAB_E (Receptacle) pin 15** CAB TO ENGINE	663	OK TO START	YE - 0.8	**SHEET 20**
7	SP-454-P-X	454A	CAB ISOLATED B+	RD - 1.0	**SHEET 19**
12	**X-CAB_JSS (Receptacle) pin 2** CAB TO JSS FRAME HARNESS	676	JSS PILOT PRESS SIG	YE - 0.8	**SHEET 21**
13	SP-454-P-X	454B	CAB ISOLATED B+	RD - 1.0	**SHEET 19**
17	**X-CAB_TR (Receptacle) pin 23** CAB TO TRANSMISSION	636	HYD FILTER	YE - 0.8	
20	**X-SP_PK1 (Receptacle) pin X** SPLICE PACK	942	UCM CLEAN GROUND	BK - 0.8	
26	**X-SP_PK1 (Receptacle) pin X** SPLICE PACK	943	UCM CLEAN GROUND	BK - 0.8	

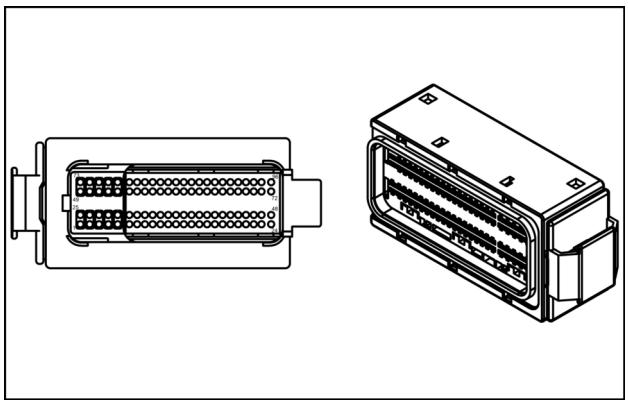
X-UCM3B - UCM [A-UCM] (84130760) (Receptacle)



84130760 247

84130760

Pin	From	Wire	Description	Color-Size	Frame
1	**X-CAB_TR (Receptacle) pin 27** CAB TO TRANSMISSION	390	DIFF LOCK SIGNAL	WH - 0.8	**SHEET 20**
2	SP-461-P-X	461A	CAB ISOLATED B+	RD - 1.0	**SHEET 19**
3	SP-461-P-X	461B	CAB ISOLATED B+	RD - 1.0	
4	**X-CAB_B (Plug) pin 9** CAB TO BOTTOM	368	COUPLER VALVE RTRN	BR - 0.8	**SHEET 22**
6	**X-CAB_B (Plug) pin 5** CAB TO BOTTOM	366	RIDE CONTROL SIG	WH - 0.8	
7	**X-CAB_B (Plug) pin 14** CAB TO BOTTOM	367	COUPLER VALVE SIG	WH - 0.8	
8	SP-454-P-X	454C	CAB ISOLATED B+	RD - 1.0	**SHEET 19**
9	SP-454-P-X	454D	CAB ISOLATED B+	RD - 1.0	
15	**X-CAB_JSS (Receptacle) pin 6** CAB TO JSS FRAME HARNESS	273	JSS CUTOFF SIG B	YE - 0.8	**SHEET 21**
16	**X-CAB_L (Receptacle) pin 9** CAB TO JSS L ARMREST	678	JSS ACTIVATION	WH - 0.8	
17	**X-CAB_EH (Plug) pin E** CAB TO BOTTOM EH	346	BUCKET ROLL	WH - 0.8	**SHEET 22**
18	**X-CAB_EH (Plug) pin A** CAB TO BOTTOM EH	344	PILOT ENABLE	WH - 0.8	
23	**X-CAB_L (Receptacle) pin 12** CAB TO JSS L ARMREST	682	JSS ACTIVATION NC	YE - 0.8	**SHEET 21**
24	**X-SDM pin 2** SWITCH DIFF LOCK	401	DIFF LOCK	WH - 0.8	**SHEET 20**
25	**X-CAB_EH (Plug) pin G** CAB TO BOTTOM EH	350	BUCKET DUMP	WH - 0.8	**SHEET 22**
26	**X-SP_PK2 (Receptacle) pin X** SPLICE PACK	929	UCM CLEAN GROUND	BK - 0.8	**SHEET 19**
27	**X-CAB_B (Plug) pin 18** CAB TO BOTTOM	388	PARK BRAKE SOL	WH - 0.8	**SHEET 20**
32	**X-CAB_EH (Plug) pin H** CAB TO BOTTOM EH	351	AUX 1 LEFT	WH - 0.8	**SHEET 22**
33	**X-CAB_EH (Plug) pin K** CAB TO BOTTOM EH	355	AUX 1 RIGHT	WH - 0.8	
34	**X-SP_PK2 (Receptacle) pin X** SPLICE PACK	930	UCM CLEAN GROUND	BK - 0.8	**SHEET 19**



84595906 1

Connector X-9025 NEF - Exhaust flap

CONNECTOR X-9025 NEF - Exhaust flap			
PIN NUMBER	**WIRE NUMBER**	**CIRCUIT REFERENCE**	**ELECTRICAL SCHEMATIC FRAME**
1	EN-049	Supply	**SHEET 04**
2	EN-050	Ground	
3	-	-	
4	EN-047A	CAN Low	**SHEET 04**
5	EN-048	CAN High	

Connector X-9124 - Auxiliary power relay

CONNECTOR X-9124 - Auxiliary power relay			
PIN NUMBER	**WIRE NUMBER**	**CIRCUIT REFERENCE**	**ELECTRICAL SCHEMATIC FRAME**
1	VE-179	High side driver	**SHEET 02**
2	VE-180	Low side driver	
3	VE-217	Battery voltage	
4	VE-219	Supply voltage to Electric water pump A-9105, Exhaust flap A-9001 / A-9002, EVGT actuator A-9003, NH3 sensor B-9110, DOC upstream NO_x sensor A-9103 and SCR downstream NO_x sensor A-9102	
4A	-		

Connector X-9189-6CYL - Injector, cylinder 2

CONNECTOR X-9189-6CYL - Injector, cylinder 2			
PIN NUMBER	**WIRE NUMBER**	**CIRCUIT REFERENCE**	**ELECTRICAL SCHEMATIC FRAME**
1	EN-578-6CYL	Low side driver	**SHEET 06**
2	EN-579-6CYL	High side driver	

Contents

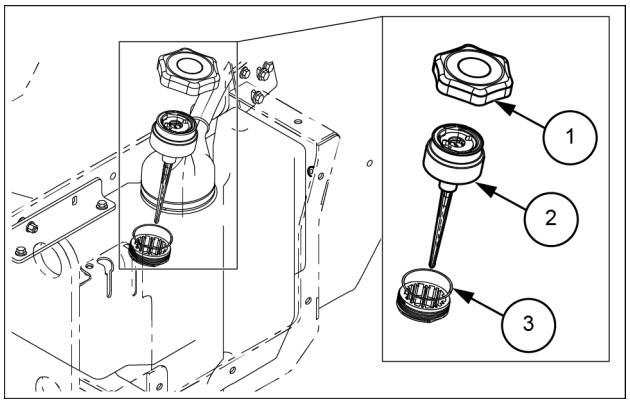
Electrical systems - 55

Alternator - 301

SERVICE

4. Remove the filler cap **(1)** from the filler neck of the **DEF/ADBLUE®** tank. Turn the twist filler neck **(2)** counterclockwise until it unlocks. Extract the filler neck out of the **DEF/ADBLUE®** tank. Remove the O-ring **(3)**.

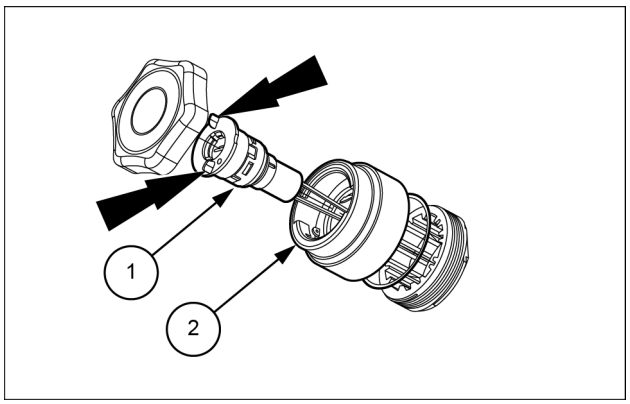
NOTE: *if the O-ring **(3)** is damaged replace it.*



LEIL15WHL1336AB 4

5. Press and turn on the two fins (arrows) to remove the **DEF/ADBLUE®** tank filter **(1)** from the twist filler neck **(2)**. Clean the **DEF/ADBLUE®** tank filter **(1)** with water to remove any debris.

NOTE: *cap opening of supply tank to prevent debris from entering tank.*

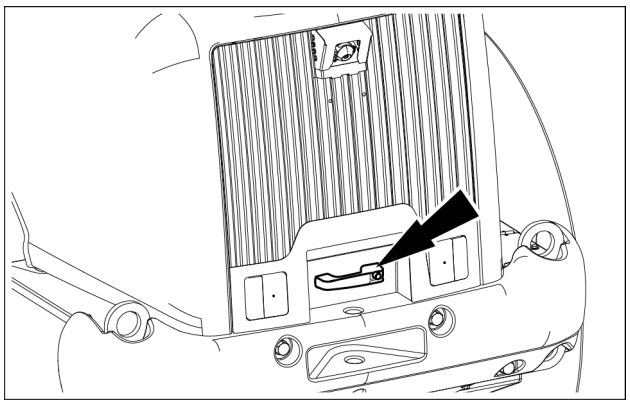


LEIL15WHL1337AB 5

Nitrogen Oxide (NOx) sensor - Remove - Catalyst outlet Nitrogen Oxides (NOx) sensor

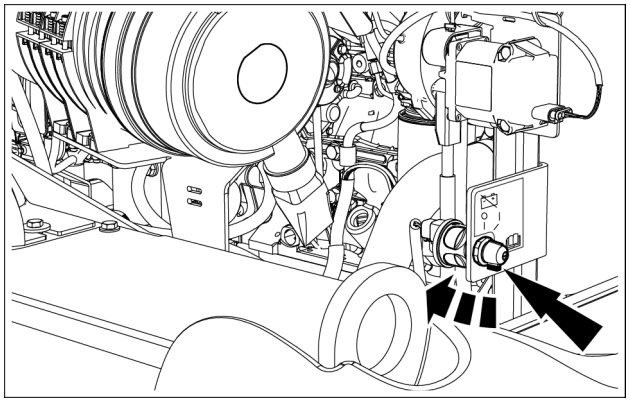
NOTICE: *emissions sensors in the exhaust system and on the vehicle may be damaged by vibrations from use of impact wrenches or hammers during service work. Avoid using these tools when servicing components close to the sensors. Remove the sensors with care if use of these tools cannot be avoided.*

1. Raise the machine hood using the handle hood under the rear grill.



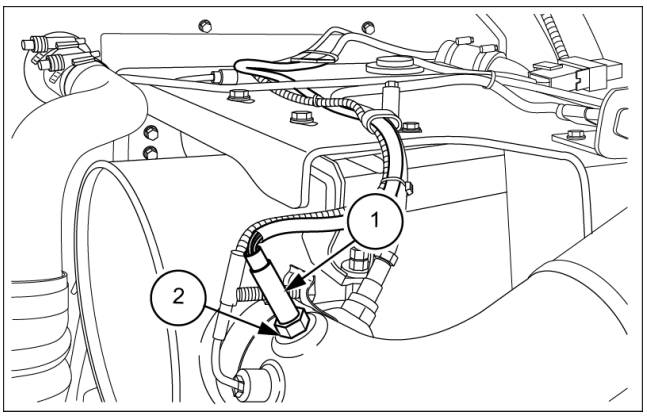
LEIL16WHL2000AB 1

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



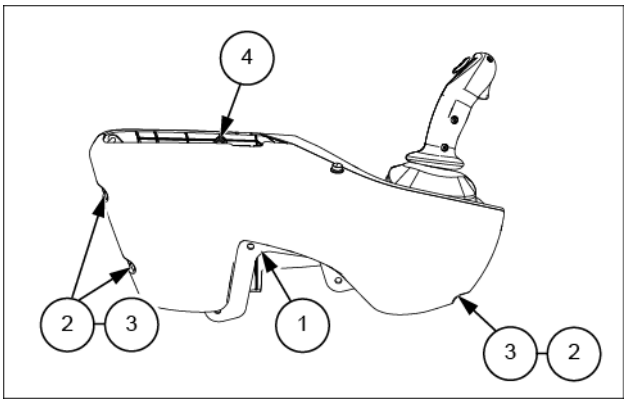
LEIL16WHL1382AB 2

3. Locate NOx sensor on the on the outlet of the Selective Catalytic Reduction (SCR).
   Loosen the hexagonal nut **(2)** and remove the NOx sensor **(1)**.



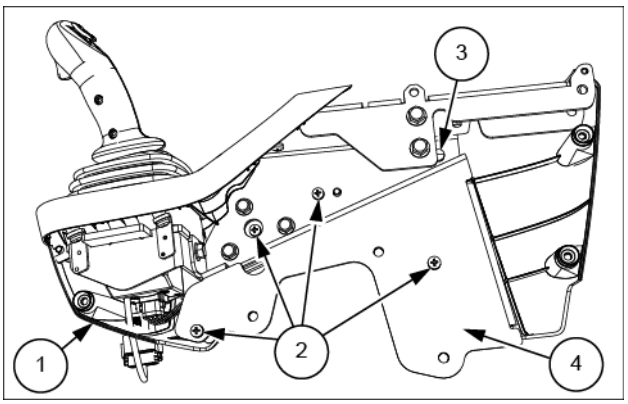
LEIL15WHL0334AB 3

8. Remove the left-hand shell **(1)** by removing the three mounting screws **(2)** and washers **(3)** located on the outside of the left-hand shell.
9. Remove the bolt **(4)** under the arm pad.



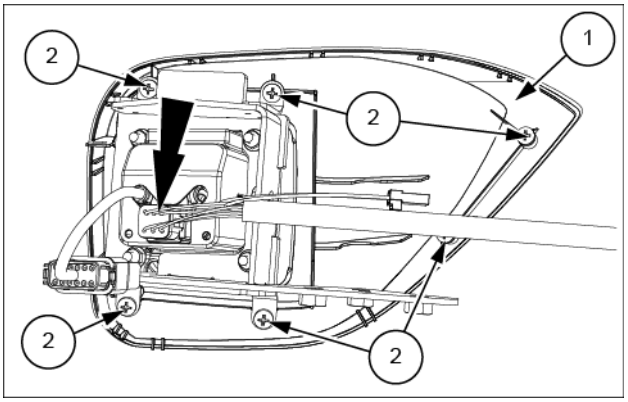
LEIL16WHL0485AB 3

10. Remove the right-hand shell **(1)** by removing the four mounting screws **(2)** and bolt **(3)** from the main support bracket **(4)**.



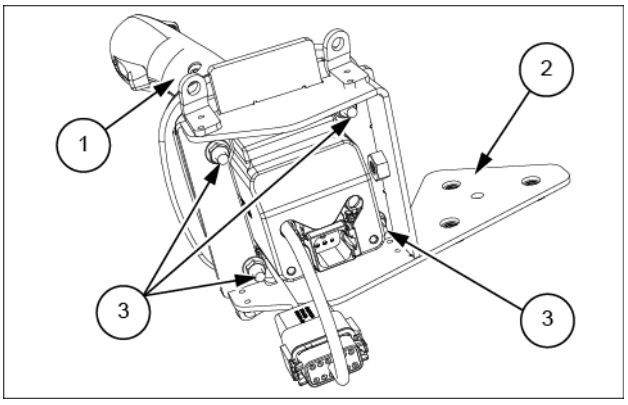
LEIL16WHL0486AB 4

11. Remove the bezel **(1)** by removing the six screws **(2)** from the back of the bezel.
    Disconnect the wire harness from the back of bezel **(1)**.



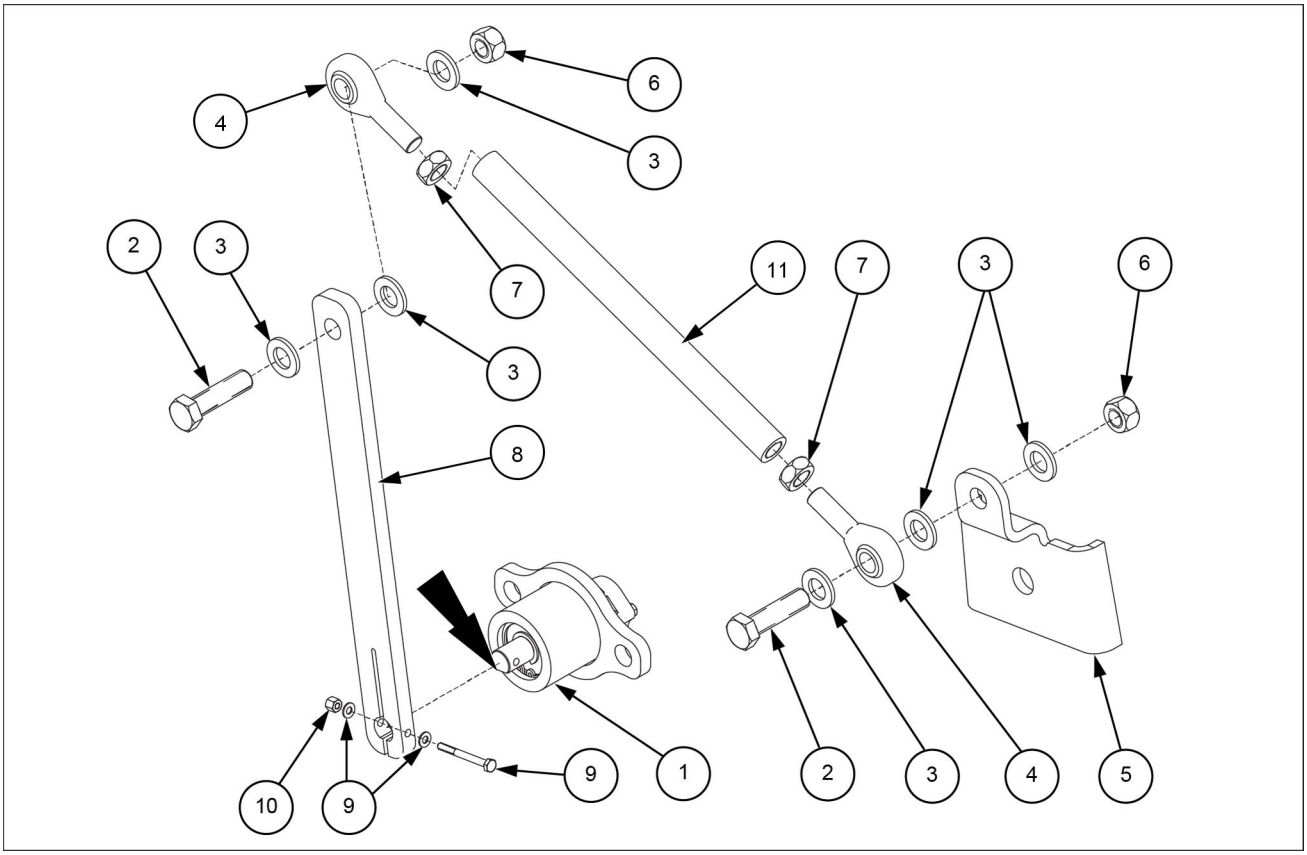
LEIL16WHL0487AB 5

12. Remove the joystick **(1)** from the mounting bracket **(2)** by removing the four flange nuts **(3)**.



LEIL17WHL1627AB 6

XT models



LEIL17WHL2169FB 2

1. Install the two rod ends **(4)** to the rod **(11)** with the two nuts **(7)**.
2. Use the bolt **(9)**, two washers **(9)**, and nut **(10)** to secure the Electro-Hydraulic (EH) tilt sensor **(1)** to the arm **(8)**. Tighten to **2.9 – 4 N·m** (**2.14 – 2.95 lb ft**).

NOTE: *after installation, make sure the flat side of sensor pin (see arrow) lines up with the bottom of the arm **(8)**.*

3. Install the bolt **(2)**, three washers **(3)**, and nut **(6)** to fix the rod end **(4)** to the arm mounting bracket **(5)**.
4. Install the bolt **(2)**, three washers **(3)**, and nut **(6)** to fix the rod end **(4)** to the arm **(8)**.

A. If the specified values are not measured, there is a failure in the turbine speed sensor wiring. Locate and repair the faulty conductor.

B. If the specified values are measured, leave the connectors disconnected and continue to Step **5**.

5. Check the turbine speed sensor wiring.

   The key must be in the OFF position for continuity and ON position for voltage.

   Use a multimeter to perform the following wiring checks:

From	To	Value
Connector **X-9002 pin 94**	Connector **X-9015 pin 2**	There should be continuity.
Connector **X-9002 pin 94**	Connector **X-9002 pin 93**	There should be no continuity.
Connector **X-9002 pin 94**	All pins in connector **X-9002**	There should be no continuity.
Connector **X-9002 pin 94**	Chassis ground	There should be no continuity.
Connector **X-9002 pin 94**	Chassis ground	There should be no voltage.

   A. If the specified values are not measured, there is a failure in the turbine speed sensor wiring. Locate and repair the faulty conductor.

   B. If the specified values are measured, continue to Step **6**.

6. Replace the Turbocharger.

   Use the EST to verify that the status of this fault.

   A. If the status of this fault has been resolved, return the machine to service.

   B. If the status of this fault has not been resolved, check the ECU for the appropriate software and re-flash, if necessary.

7. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 05 (55.100)

Check the integrity of the connector **X-TECM** and visually check for any damage to the connector and to the pins 3 and 19.

A. If a problem is found, replace the connector **X-TECM**.

B. If there are no problems, continue with Step **6**.

6. Check the harness between the engine speed sensor **B-ES_S** and the Transmission Control Unit **A-TRANS** for a short circuit to ground condition.

   The key must be in the OFF position.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-TECM** pin 19	Chassis ground	There should be no continuity

   A. If there is continuity, find and replace the wire 699 and/or 699A.

   B. If there is no continuity, continue with Step **7**.

7. Disconnect the **X-ESS** connector from the engine speed sensor **B-ES_S**.

   Check if the engine speed sensor **B-ES_S** is defective.

   A. If a problem is found, replace the engine speed sensor **B-ES_S**.

   B. If there are no problems, replace the Transmission Control Unit **A-TRANS**.

Wiring harnesses - Electrical schematic sheet 26 (55.100)

A. If a problem is found, replace the output speed sensor **B-OSS**.

B. If there are no problems, replace the Transmission Control Unit **A-TRANS**.

Wiring harnesses - Electrical schematic sheet 26 (55.100)

5270-09 - Jss Timeout =Vehicle_2 Timeout

Control Module: TCU

Context:
There is no failure detected in the transmission system or the failure has no or slight effects on the transmission control.
The Transmission Control Unit **A-TRANS** works without or, in special cases, with little limitations.
The Transmission Control Unit **A-TRANS** shifts the transmission to neutral position while the joystick steering valve Y-JSS_STRG_VLV is active.

Cause:
There is a timeout of the CAN-message JSS from the joystick steering valve Y-JSS_STRG_VLV.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The CAN connector or the harness are damaged or the connectors are not installed.
3. There are interference on the CAN-Bus.
4. The joystick steering valve Y-JSS_STRG_VLV is defective.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check the integrity of the CAN-Bus harnesses and connectors.

   Visually inspect the relevant harness and connectors for damage, bent or dislocated pins, corroded terminals or broken wires. Verify that the connectors are fully installed. Flex the harness involved to revel intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, continue with Step **3**.
3. Check the wires of CAN-Bus for a contact to vehicle ground condition.

   A. If a problem is found, find and replace the damaged wire.

   B. If there are no problems, continue with Step **4**.
4. Check the wires of CAN-Bus for a contact to battery voltage condition.

   A. If a problem is found, find and replace the damaged wire.

   B. If there are no problems, continue with Step **5**.
5. Check if there are interference on the CAN-Bus.

   A. If a problem is found, repair or replace the defective component.

   B. If there are no problems, continue with Step **6**.
6. Check the wire of the CAN harness connected to the joystick steering valve Y-JSS_STRG_VLV, connector **X-JSV** pins 4, 5, 9 and 10.

5500-03 - Short circuit to battery voltage at clutch K3

Control Module: TCU

Context:
The detected failure in the system has strong limitations to transmission control. The Transmission Control Unit **A-TRANS** can engage only one gear in each direction. In some cases only one direction will be possible.
The Transmission Control Unit **A-TRANS** will shift the transmission into neutral at the first occurrence of the failure. First, the operator must shift the gear selector into neutral position.
If output speed is less than a threshold for neutral to gear and the operator shifts the gear selector into forward or reverse, the Transmission Control Unit **A-TRANS** will select the limp-home gear.
If output speed is less than a threshold for reversal speed and the Transmission Control Unit **A-TRANS** has changed into the limp-home gear and the operator selects a shuttle shift, the Transmission Control Unit **A-TRANS** will shift immediately into the limp-home gear of the selected direction.
If output speed is greater than the threshold, the Transmission Control Unit **A-TRANS** will shift the transmission into neutral. The operator has to slow down the vehicle and must shift the gear selector into neutral position.
If a failure at another clutch is pending, the Transmission Control Unit **A-TRANS** detects a severe failure that disables control of system.
The Transmission Control Unit **A-TRANS** shuts off all solenoid valves and also both common power supplies (VPS1, VPS2). The park brake is operating, also all functions which use ADM 1 to ADM 8 are disabled.
The Transmission Control Unit **A-TRANS** shifts the transmission to neutral position.

Cause:
There is a short circuit to battery voltage at clutch K3 of the transmission controller of tranny **A-TRC**. The measured resistance value of the valve is out of limit, the voltage at K3 valve is too high.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harnesses or the connectors are damaged or the connectors are not installed.
3. The harness between the transmission controller of tranny **A-TRC** and the Transmission Control Unit **A-TRANS** is defective.
4. The transmission controller of tranny **A-TRC** is defective.
5. The Transmission Control Unit **A-TRANS** is defective.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check if the connector **X-TRC** is connected to the transmission controller of tranny **A-TRC**.

   Check if the connector **X-TRANS** is connected to the connector **X-CAB_TR**.

   Check if the connector **X-TECM** is connected to the Transmission Control Unit **A-TRANS**.

   A. If a problem is found, restore the connection.

   B. If there are no problems, continue with Step **3**.
3. Disconnect the connector **X-TRC** from the transmission controller of tranny **A-TRC**.

   Check the integrity of the connector **X-TRC** and visually check for any damage to the connector and to the pins.

   A. If a problem is found, replace the connector **X-TRC**.

5540-05 - Open circuit at converter clutch (regulator valve)

Control Module: TCU

Context:
There is no failure detected in the transmission system or the failure has no or slight effects on the transmission control.
The Transmission Control Unit **A-TRANS** works without or, in special cases, with little limitations.

Cause:
There is an opened circuit at the converter clutch.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harnesses or the connectors are damaged or the connectors are not installed.
3. The harness between the transmission controller of tranny **A-TRC** and the Transmission Control Unit **A-TRANS** is defective.
4. The transmission controller of tranny **A-TRC** is defective.
5. The Transmission Control Unit **A-TRANS** is defective.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check if the connector **X-TRC** is connected to the transmission controller of tranny **A-TRC**.

   Check if the connector **X-TRANS** is connected to the connector **X-CAB_TR**.

   Check if the connector **X-TECM** is connected to the Transmission Control Unit **A-TRANS**.

   A. If a problem is found, restore the connection.

   B. If there are no problems, continue with Step **3**.
3. Disconnect the connector **X-TRC** from the transmission controller of tranny **A-TRC**.

   Check the integrity of the connector **X-TRC** and visually check for any damage to the connector and to the pins.

   A. If a problem is found, replace the connector **X-TRC**.

   B. If there are no problems, connect the connector **X-TRC** to the transmission controller of tranny **A-TRC** and continue with Step **4**.
4. Disconnect the connector **X-TRANS** from the connector **X-CAB_TR**.

   Check the integrity of the connector **X-TRANS** and **X-CAB_TR**, visually check for any damage to the connectors and to the pin 5.

   A. If a problem is found, replace the damaged connector.

   B. If there are no problems, connect the connector **X-CAB_TR** to the connector **X-TRANS** and continue with Step **5**.
5. Disconnect the connector **X-TECM** from the Transmission Control Unit **A-TRANS**.

5720-00 - Overspeed Engine

Control Module: TCU

Context:
There is no failure detected in the transmission system or the failure has no or slight effects on the transmission control.
The Transmission Control Unit **A-TRANS** works without or, in special cases, with little limitations.

Cause:
The Transmission Control Unit **A-TRANS** measures an engine speed above the defined threshold.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harnesses or the connectors are damaged or the connectors are not installed.
3. The harness between the engine speed sensor **B-ES_S** and the Transmission Control Unit **A-TRANS** is defective.
4. The engine speed sensor **B-ES_S** is defective.
5. The Transmission Control Unit **A-TRANS** is defective.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check if the connector **X-ESS** is connected to the engine speed sensor **B-ES_S**.

   Check if the connector **X-TRANS** is connected to the connector **X-CAB_TR**.

   Check if the connector **X-TECM** is connected to the Transmission Control Unit **A-TRANS**.

   A. If a problem is found, restore the connection.

   B. If there are no problems, continue with Step **3**.
3. Disconnect the connector **X-ESS** from the engine speed sensor **B-ES_S**.

   Check the integrity of the connector **X-ESS** and visually check for any damage to the connector and to the pins.

   A. If a problem is found, replace the connector **X-ESS**.

   B. If there are no problems, connect the connector **X-ESS** to the engine speed sensor **B-ES_S** and continue with Step **4**.
4. Disconnect the connector **X-TRANS** from the connector **X-CAB_TR**.

   Check the integrity of the connector **X-TRANS** and **X-CAB_TR**, visually check for any damage to the connectors and to the pins 2 and 7.

   A. If a problem is found, replace the damaged connector.

   B. If there are no problems, connect the connector **X-CAB_TR** to the connector **X-TRANS** and continue with Step **5**.
5. Disconnect the connector **X-TECM** from the Transmission Control Unit **A-TRANS**.

   Check the integrity of the connector **X-TECM** and visually check for any damage to the connector and to the pins 3 and 19.

The key must be in the ON position.

Use a multimeter to perform the following voltage check:

From	To	Value
X-9002 pin 16	Chassis ground	There should be no voltage.

A. If there is voltage, there is a short to key power condition in the B-9005 pressure signal circuit, wire EN-035. Locate and repair the shorted conductor.

B. If there is no voltage, continue to Step **5**.

5. Replace the B-9005.

   Use the EST to verify that this fault code has been resolved.

   A. If it has been resolved, return the machine to service.

   B. If it has not been resolved, check the ECU for the appropriate software and re-flash, if necessary.

6. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 02 (55.100)

A. If the fan does not operate, the fan clutch assembly has failed. Replace the fan clutch Y-9103.

B. If the fan operates, leave the connector disconnected and continue to Step **5**.

5. Check the fan speed sensor B-9103 wiring for a short circuit condition.

   Disconnect connector **X-9001**.

   The key must be in the OFF position for continuity and ON position for voltage.

   Use a multimeter to perform the following wiring checks:

From	To	Value
X-9001 pin 64	**X-9001 pin 67**	There should be no continuity.
X-9001 pin 64	All pins in connector **X-9001**	There should be no continuity.
X-9001 pin 64	Chassis ground	There should be no voltage.

   A. If the specified values are not measured, there is a short circuit condition in the fan speed sensor B-9103 wiring. Locate and repair the shorted conductor.

   B. If the specified values are measured, continue to Step **6**.

6. Replace the fan speed sensor B-9103.

   Use the EST to verify that the fault has been resolved.

   A. If the fault has been resolved, return the machine to service.

   B. If the fault has not been resolved, check the ECU for the appropriate software and re-flash, if necessary.

7. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 02 (55.100)

8910 - (DTC 22CE)-Upstream NOx sensor self-diagnosis result is lower than the limit

NOTE: *refer to the Engine Service Manual for more details.*

Context:
For information regarding the functional operation of the smart Diesel Oxidation Catalyst (DOC) upstream NO_x sensor refer to **Nitrogen Oxide (NOx) sensor - Dynamic description (55.988)**. Self diagnosis is requested and performed during Engine Control Unit (ECU) afterrun, as long as the DOC upstream NO_x sensor reached dew point, the engine is stopped, and self diagnosis is not inhibited by another failure. If the value resulting from self diagnosis is below low limit (less than **75%**), this fault will occur.

Cause:
The DOC upstream NO_x sensor has too high negative drift.

Possible failure modes:

1. Faulty DOC upstream NO_x sensor, hardware or firmware.

Solution:

1. As there is no method for field testing or re-flashing the sensor controller, replace the DOC upstream NO_x sensor.

   Then use the Electronic Service Tool (EST), refer to **Nitrogen Oxide (NOx) sensor - Configure - Reset ECU data (Upstream sensor) (55.988)** if necessary, to perform the Replacement of Nox Upstream Sensor - Reset ECU Data configuration.

   Then check to see that the fault is resolved.

   A. If the fault is resolved, return the machine to service.

   B. If the fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

158-03 - Short to Power at Key Switch Crank

Control Module: UCM

Context:
The **A-UCM** detects a voltage on the Key Switch Crank greater than the expected one; as a consequence is disabled the cracking request.

Cause:
The system detects, on 14 of connector **X-UCM2B**, a > **15 V**.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The connector **X-UCM2B** is damaged.
3. The **A-UCM** component is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connectors **X-UCM2B** and **X-X3** for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of connector **X-UCM2B**.

   Disconnect the connector **X-UCM2B** from the **A-UCM** and visually check the integrity of pin 14.

   A. If the pin is damaged, replace the relevant harness.

   B. If the pin is not damaged, continue with Step **4**.
4. Check the integrity of harness between the **A-UCM** and the connector **X-X3**.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-UCM2B** pin 14	Ground	≤ **15 V**

   A. If the measurement is correct, replace the **A-UCM**.

   B. If the measurement is not correct, check the correct functioning of the circuit relevant to the SMART FUSE BOX (see procedure **518150-03 – Electrical Crank Power Relay- Short Circuit to B+**).

Wiring harnesses - Electrical schematic sheet 03 (55.100)
Wiring harnesses - Electrical schematic sheet 20 (55.100)

4. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 17 (55.100)

11710 - (DTC 2DBE)-Downstream NOx sensor self-diagnosis result is lower than the limit

NOTE: *refer to the Engine Service Manual for more details.*

Context:
For information regarding the functional operation of the smart Selective Catalytic Reduction (SCR) downstream NO_x sensor refer to **Nitrogen Oxide (NOx) sensor - Dynamic description (55.988)**. Self diagnosis is requested and performed during Engine Control Unit (ECU) afterrun, as long as the SCR downstream NO_x sensor reached dew point, the engine is stopped, and self diagnosis is not inhibited by another failure. If the value resulting from self diagnosis is below low limit (less than **75%**), this fault will occur.

Cause:
The SCR downstream NO_x sensor has too high negative drift.

Possible failure modes:

1. Faulty SCR downstream NO_x sensor, hardware or firmware.

Solution:

1. As there is no method for field testing or re-flashing the sensor controller, replace the SCR downstream NO_x sensor.

   Then use the Electronic Service Tool (EST), refer to **Nitrogen Oxide (NOx) sensor - Configure - Reset ECU data (Downstream sensor) (55.988)** if necessary, to perform the Replacement of Nox Downstream Sensor - Reset ECU Data configuration.

   Then check to see that the fault is resolved.

   A. If the fault is resolved, use the EST, refer to **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)** if necessary, to perform the Engine Restart Counter Reset / Unlock Inducement configuration, then return the machine to service.

   B. If the fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

B. If no other faults exist, the vehicle (VE) or engine (EN) harness wiring is damaged between the network harness splice and the eVGT actuator A-9003 controller connector **X-9012 pin 4** and/or **X-9012 pin 3** for supply power and ground or **X-9012 pin 2** and/or **X-9012 pin 1** for CAN signal. Locate and repair the damage to the supply or CAN circuit wiring.

5. Check for mechanical binding and/or damage.

   Verify that the eVGT mechanism and linkage is properly attached and is not restricted or blocked in any way.

   Manually move the linkage to assure that it operates freely.

   A. If the eVGT mechanism is free of debris and operates freely, continue with Step **6**.

   B. If the eVGT mechanism contains debris or is hard to operate, clean, adjust, repair or replace, as required.

6. As there is no method for field testing or re-flashing the eVGT actuator A-9003 controller, replace the eVGT actuator A-9003 controller. Check to see that the fault is resolved.

   A. If the fault is resolved, return the machine to service.

   B. If the fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

7. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 04 (55.100)

15534 - (DTC 3CAE)-Downstream NOx sensor lambda signal deviation - NOx sensor possible removal detected

NOTE: *because this fault causes inducement, it is necessary to perform the SCR Fault Repair Verification Test once the fault has been resolved. See* ***Selective Catalytic Reduction (SCR) exhaust treatment - Service instruction - SCR fault repair verification test (10.500)*** *if necessary.*

NOTE: *because this fault causes inducement, it is necessary to perform the Engine Restart Counter Reset / Unlock Inducement configuration with the Electronic Service Tool (EST) before you return the machine to service. See* ***Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)*** *if necessary.*

Context:
For information regarding the functional operation of the smart Selective Catalytic Reduction (SCR) downstream NO_x sensor see **Nitrogen Oxide (NOx) sensor - Dynamic description (55.988)**. The SCR downstream NO_x sensor has internal monitoring for operating conditions and reports status along with sensed data. If the sensor lambda data value is outside the values established by the minimum/maximum curves specified in the Engine Control Unit (ECU), dependent on the lambda value itself, this fault will occur.

Cause:
The ECU has determined that the SCR downstream NO_x sensor is not measuring correct lambda values.

Possible failure modes:

1. Faulty SCR downstream NO_x sensor, hardware or firmware.
2. Faulty software of the ECU.

Solution:

1. Determine proper installation of the SCR downstream NO_x sensor.

   Remove and re-install, if necessary, the SCR downstream NO_x sensor to assure that it is properly aligned and securely installed.

   Then check to see that the fault is resolved.

   A. If the fault is resolved, use EST, see **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)**, if necessary, to perform the Engine Restart Counter Reset / Unlock Inducement configuration. Then perform the SCR Fault Repair Verification Test, see **Selective Catalytic Reduction (SCR) exhaust treatment - Service instruction - SCR fault repair verification test (10.500)**, if necessary. Then return the machine to service.

   B. If the fault is not resolved, continue with Step **2**.
2. As there is no method for field testing or re-flashing the sensor controller, replace the SCR downstream NO_x sensor.

   Then use the EST, see **Nitrogen Oxide (NOx) sensor - Configure - Reset ECU data (Downstream sensor) (55.988)** if necessary, to perform the Replacement of Nox Downstream Sensor - Reset ECU Data configuration.

   A. If the fault is resolved, use EST to perform the SCR Fault Repair Verification Test, see **Selective Catalytic Reduction (SCR) exhaust treatment - Service instruction - SCR fault repair verification test (10.500)**, if necessary. Then return the machine to service.

   B. If the fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

B. If the fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

8. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 03 (55.100)
Wiring harnesses - Electrical schematic sheet 17 (55.100)

8. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 05 (55.100)

A. If the fault has been resolved, return the machine to service.

B. If the fault has not been resolved, check the ECU for the appropriate software and re-flash, if necessary.

5. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 18 (55.100)

26197 - (DTC 6655)-Fuel metering unit is shorted to battery voltage at the low side

NOTE: *refer to the Engine Service Manual for more details.*

Context:
For more information on the fuel metering unit Y-9000 refer to **Injection control - Dynamic description (55.010)**. The power stage of the fuel metering unit Y-9000 at low side is monitored by the Engine Control Unit (ECU) for electric failures. If the ECU detects a short to a high source on the power stage of the Y-9000 at low side, this fault will occur.

Cause:
The ECU has detected a short to high source in the Y-9000 low side circuit.

Possible failure modes:

1. Fuel metering unit Y-9000 internal failure.
2. Short to high source condition in the Y-9000 to ECU engine (EN) harness.
3. Faulty software of the ECU.

Solution:

1. Verify that the fault code is active.

   Use the Electronic Service Tool (EST) to verify this fault.

   A. If the fault is present and active, continue to Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue to Step **5**.
2. Check the fuel metering unit Y-9000 for an internal short.

   Disconnect the connector **X-9007**.

   Use a multimeter to perform the following resistance check:

From	To	Value
X-9007 pin 1	**X-9007 pin 2**	The value should be between **2.8 – 3.2 Ω** (**2.8 – 3.2 Ω**).

   A. If the value is in the specified range, leave the connector **X-9007** disconnected and continue to Step **3**.

   B. If the value is not in the specified range, the fuel metering unit has failed internally. Replace the fuel metering unit then refer to **Pressure regulating valve - Configure - Reset ECU data (10.218)** if necessary, to perform the Replacement of the Rail Pressure Metering Unit - Reset ECU Data.
3. Check the voltage on the fuel metering unit circuit, low side.

   Disconnect the connector **X-9002**.

   The key must be in the ON position.

   Use a multimeter to perform the following test:

To	From	Value
X-9002 pin 83	Chassis ground	There should be no voltage.

   A. If there is voltage, there is a short to high a voltage source in the fuel metering unit circuit, low side. Refer to the appropriate service manual to locate and repair the shorted conductor.

   B. If there is no voltage, go to Step **4**.
4. Check for continuity between all pins in connector **X-9002**.

B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 18 (55.100)

A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 11 (55.100)
Wiring harnesses - Electrical schematic sheet 16 (55.100)

34836 - (DTC 8814)-Intake air heater ECU driver has an over-temperature

Context:
The Engine Control Unit (ECU) monitors the Grid heater relay control circuit for an over temperature condition. If an over temperature condition is detected, this fault will occur.

Cause:
The ECU has detected an over temperature condition in the Grid heater relay control circuit.

Possible failure modes:

1. Faulty coil of the grid heater relay.
2. Faulty grid heater relay control circuit, short to high source condition.
3. Faulty of the software of the ECU.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step **6**.
2. Check the status of the following possible related faults:

   27156 – (DTC 6A14)-Intake air heater actuator is shorted to battery voltage

   A. If the fault is active, diagnose them first and then return to this fault.

   B. If the fault is not active, continue to Step **3**.
3. Check the grid heater relay coil for an internal failure.

   Remove the grid heater relay.

   Use a multimeter to perform the following resistance test:

From	To	Value
Grid heater relay, pin 85	Grid heater relay, pin 86	The coil resistance should be between **70.0 – 130.0 Ω** (**70.0 – 130.0 Ω**)

   A. If the value is not within the specified value, the grid heater relay has failed internally. Replace the grid heater relay.

   B. If the value is within the specified range, leave the grid heater relay disconnected and continue to Step **4**.
4. Check the grid heater relay signal circuit for a short to high source condition.

   Disconnect the connector **X-ECU**.

   The key must be in the OFF position.

   Use a multimeter to perform the following continuity check:

From	To	Value
Connector **X-ECU** pin 83	Connector **X-ECU** pin 74	There should be no continuity
Connector **X-ECU** pin 83	All other pins	There should be no continuity

38139 - (DTC 94FB)-External engine shutdown request received

Context:
This fault is for informational purposes and requires no action. This fault is the result of a request for engine shutdown via Controller Area Network (CAN) to the Engine Control Unit (ECU).

Then use the EST, see **Nitrogen Oxide (NOx) sensor - Configure - Reset ECU data (Upstream sensor) (55.988)** if necessary, to perform the Replacement of Nox Upstream Sensor - Reset ECU Data configuration.

Then check to see that this fault is resolved.

A. If this fault is resolved, use the EST, see **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)** if necessary, to perform the Engine Restart Counter Reset / Unlock Inducement configuration. Then return the machine to service.

B. If this fault is not resolved, check the ECU for the appropriate software and re-flash, if necessary.

5. Check for other engine ATS CAN faults.

   Use EST to determine if other ATS CAN faults exist.

   A. If other faults do exist, see **Controller Area Network (CAN) data bus - Test (55.640)** to locate and repair the faulted condition.

   B. If no other faults exist, the ATS vehicle (VE) harness wiring is damaged between the network harness splice and the connector **X-NOXD** pin 3 and/or connector **X-NOXD** pin 4. Locate and repair the damage to the ATS CAN circuit wiring.

6. Visually inspect the relevant harnesses and connectors for damage, bent or dislocated pins, corroded terminals, or broken wires. Verify that the connectors are fully installed. Flex the harnesses involved to reveal intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 18 (55.100)

58413 - (DTC E42D)-ECU internal failure - Sensor 5 Volt supply 3

NOTE: *refer to the Engine Service Manual for more details.*

Context:
The Engine Control Unit (ECU) provides three independent **5.0 V** voltage supplies for sensors. These voltages are monitored by hardware within the ECU to make sure they are within a given range. If sensor supply 3 reference voltage is out of range, this fault will occur.

Cause:
The ECU sensor supply 3 reference voltage is out of range.

Possible failure modes:

1. Faulty intake air humidity and ambient temperature sensor B-9105 or sensor supply wire.
2. Faulty rail pressure sensor B-9004 or sensor supply wire.
3. Faulty secondary cooling system outlet intercooler temperature and pressure sensor B-9012 or sensor supply wire. (if equipped)
4. Faulty software of the ECU.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step **4**.
2. The ECU monitors this fault continuously. Disconnect each connector one at a time and use the EST to monitor the status of this fault code.

   - Intake air humidity and ambient temperature sensor B-9105,connector **X-9105**
   - Rail pressure sensor B-9004, connector **X-9026**
   - Outlet intercooler temperature and pressure sensor B-9012, connector **X-9028**

   A. If the fault code is eliminated after a connector disconnection, the relevant component has failed. Replace the relevant component.

   B. If the fault code has not been eliminated after connector disconnection, leave all of the connectors disconnected and continue to Step **3**.
3. Check the all of the supply 3 circuits for a short circuit condition.

   The key must be in the ON position.

   Use a multimeter to perform the following voltage check:

From	To	Value
X-9105 pin 1	Chassis ground	There should be between **4.5 – 5.5 V**.
X-9026 pin 3	Chassis ground	There should be between **4.5 – 5.5 V**.
X-9028 pin 3	Chassis ground	There should be between **4.5 – 5.5 V**.

   A. If any of the circuits are not in the specified range, there is a short circuit condition in the relevant circuit. Locate and repair the shorted conductor.

   B. If all of the circuits are within the specified range, check the ECU for the appropriate software and re-flash, if necessary.

5940-11 - Substitute clutch control

Control Module: TCU

Context:
The Transmission Control Unit **A-TRANS** can not change the gears or the direction under the control of the normal clutch modulation. The Transmission Control Unit **A-TRANS** uses the substitute strategy for clutch control. All modulations are only time controlled.

Cause:
The transmission input torque is out of allowed range.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The engine retarder torque is wrong.
3. The engine torque is wrong.
4. The engine speed signal is defective.

Solution:

1. Verify that fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check for the following related faults:

   5120-03 - Short circuit to battery voltage or open circuit at retarder / torque converter temperature sensor input (55.640)

   5120-04 - Short circuit to ground at retarder / torque converter temperature sensor input (55.640)

   5430-02 - Enginge torque signal defective (55.640)

   5140-03 - Short circuit to battery voltage or open circuit at engine speed input (55.640)

   5140-04 - Short circuit to ground at engine speed input (55.640)

   5140-12 - Logical error at engine speed input (55.640)

   A. If any of the listed faults are active, diagnose them first and then return to this fault.

60637 - (DTC ECDD)-ECU 5 volt supply voltage is lower than expected

Context:
The Engine Control Unit (ECU) monitors for a voltage error of the internal **5 V** supply. If the voltage supply is below the internal maximal limit, this fault will occur.

Solution:

1. Check the ECU for the appropriate software and re-flash, if necessary.
   A. If the fault has been resolved, return the machine to service.
   B. If the fault has not been resolved, escalate an ASIST concern.

624-03 - Short to Power at Warning LED High Side Driver

Control Module: UCM

Context:
The **A-UCM**, driving of the Warning LED, detects an output high level.

Cause:
The **A-UCM** detects, on pin 9 of connector **X-UCM4B**, a short circuit to power risen by BSP.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the LED WARNING is damaged.
3. The LED WARNING is damaged.
4. The connectors **X-CAB_B** or **X-PED** or **X-TT** or **X-UCM4B** are damaged.
5. The harness between connectors **X-TT** and ground is damaged.
6. The harness between connectors **X-PED** and the TELL TALE INDICATOR (LMP-TTI) is damaged.
7. The harness between connectors **X-UCM4A** and **X-CAB_P** is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connector **X-UCM4B** and the connector X-XTT for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Replace the LED WARNING.

   A. If the functionality is restored, the procedure ends.

   B. If the functionality is not restored, continue with Step **4**.
4. Check the integrity of connector **X-TT**.

   Disconnect the connector **X-TT** from the TELL TALE INDICATOR and visually check the integrity of pins 4 and 1 of the connector.

   A. If one pin is damaged, replace the harness relevant to the connector.

   B. If the pins are not damaged, continue with Step **5**.
5. Check the integrity of harness of the connector **X-TT**.

   Disconnect the connector **X-TT** from the TELL TALE INDICATOR.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-TT** pin 1	Ground	Short circuit

   A. If the measurement is not correct, replace the harness.

5536-16 - Hydraulic oil temperature is high

Control Module: GHMI - Faults list

Context:
Hydraulic oil temperature is high.

Cause:

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The Hydraulic oil temperature is between **110 – 115 °C**.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Idle the machine and monitor the temperature. Wait until the hydraulic oil temperature reach the proper temperature and restart the machine.

   A. If the hydraulic oil temperature rises again, idle the machine and continue with Step **3**.

   B. If the hydraulic oil temperature within proper range continue to work monitoring the temperature.
3. Clean the radiator or operate the fan reverser. Wait until the hydraulic oil temperature reach the proper temperature and restart the machine.

   A. If the hydraulic oil temperature rises again, idle the machine and continue with Step **4**.

   B. If the hydraulic oil temperature within proper range continue to work monitoring the temperature.
4. Check the hydraulic oil level. Wait until the hydraulic oil temperature reach the proper temperature and restart the machine.

   A. If the hydraulic oil temperature rises again, idle the machine and replace the hydraulic oil temperature sensor.

   B. If the hydraulic oil temperature within proper range continue to work monitoring the temperature.

64239 - (DTC FAEF)-Torque limitation active

Context:
This failure path is only for information, that there was an active performance limitation. One or more torque reductions are present. No actions necessary due to this failure alone. If power reduction occurred due to actual defect, the failure triggering the torque limitation should also be in the failure memory. Follow troubleshooting of the actual defect.

Use a multimeter to perform the following check:

From	To	Value
Connector **X-FRNT** pin P	Connector **X-YRC** pin 1	Short circuit

A. If the measurement is not correct, replace the harness.

B. If the measurement is correct, continue with Step **6**.

6. Check the integrity of connectors **X-CAB_B** and **X-BTM**.

   Disconnect the connector **X-BTM** from the connector **X-CAB_B** and visually check the integrity of pin 5 of both connectors.

   A. If one pin is damaged, replace the harness relevant to the damaged connector.

   B. If all pins are not damaged, continue with Step **7**.

7. Check the integrity of harness between connectors **X-BTM** and **X-BTM_F**.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-BTM** pin 5	Connector **X-BTM_F** pin P	Short circuit

   A. If the measurement is not correct, replace the harness.

   B. If the measurement is correct, continue with Step **8**.

8. Check the integrity of harness between connector **X-CAB_B** and **A-UCM**.

   Disconnect the connector **X-UCM3B** from **A-UCM** and visually check the integrity of pin 6 of **X-UCM3B**.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-UCM3B** pin 6	Connector **X-CAB_B** pin 5	Short circuit

   A. If the measurement is not correct, replace the harness.

   B. If the measurement is correct, replace the **A-UCM**.

Wiring harnesses - Electrical schematic sheet 22 (55.100)

Use a multimeter to perform the following resistance check:

From	To	Value
Connector **X-ENG** pin 5	Connector **X-ENG** pin 9	Resistance < **2000 Ω**

A. If the value is not correct, replace the harness between the connector and the sensor.

B. If the value is correct, continue to Step **6**.

6. Check the integrity of harness between connector **X-ENG** and component **A-UCM**.

   The key must be in the OFF position.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-ENG** pin 5	Connector **X-UCM4A** pin 12	Short circuit

A. If there is not a short circuit, replace the harness.

B. If there is a short circuit, replace the **A-UCM** component.

Wiring harnesses - Electrical schematic sheet 19 (55.100)

B. If the functionality is not restored, replace the **A-UCM**.

Wiring harnesses - Electrical schematic sheet 20 (55.100)

518132-05 - Open Circuit at Bucket Roll Valve High Side Driver

Control Module: UCM

Context:

The **A-UCM**, driving the boom lower, detects a grounding connection; as a consequence:

- Boom Function disabled;
- Open Boom LSD;
- Command Bucket HSD PWM to **0%**;
- Disabled advanced EH features (RTD).

Cause:
The **A-UCM** detects, on pin 17 of connector **X-UCM3B**, an open circuit or a low current risen by BSP.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the connector **X-BUCKET_ROLL** is damaged.
3. The connectors **X-BUCKET_ROLL** or **X-FRNT_EH** or **X-BTM_FEH** or **X-BTM_EH** or **X-CAB_EH** or **X-UCM1B** or **X-UCM3B** are damaged.
4. The harness between connectors **X-FRNT_EH** and **X-BUCKET_ROLL** is damaged.
5. The harness between connectors **X-BTM_EH** and **X-BTM_FEH** is damaged.
6. The harness between **A-UCM** and the connector **X-CAB_EH** is damaged.
7. The BUCKET ROLL SOLENOID is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connectors **X-UCM3B**, **X-UCM1B** and **X-BUCKET_ROLL** for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of connector **X-BUCKET_ROLL**.

   Disconnect the connector **X-BUCKET_ROLL** from the ELECTROHYDRAULIC VALVE (**A-EH_VLV**) and visually check the integrity of pins 1 and 2 of the connector.

   A. If one pin is damaged, replace the harness relevant to the connector.

   B. If the pins are not damaged, continue with Step **4**.
4. Check the integrity of connectors **X-BTM_FEH** and **X-FRNT_EH**.

   Disconnect the connector **X-BTM_FEH** from the connector **X-FRNT_EH** and visually check the integrity of pins E and F of both connectors.

   A. If one pin is damaged, replace the harness relevant to the damaged connector.

518137-05 - Open Circuit at AUX 1 Left High Side Driver

Control Module: UCM

Context:

The **A-UCM**, driving the AUX 1 Left, detects an open circuit or a low current; as a consequence:

- AUX I Function disabled;
- Open AUX 1 LSD ;
- Command AUX I HSD PWMs to **0%** Bucket Function disabled.

Cause:
The **A-UCM** detects, on pin 32 of connector **X-UCM3B**, an open circuit or a low current risen by BSP.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the connector **X-AUX_1_LEFT** is damaged.
3. The connectors **X-AUX_1_LEFT** or **X-FRNT_EH** or **X-BTM_FEH** or **X-BTM_EH** or **X-CAB_EH** or **X-UCM1B** or **X-UCM3B** are damaged.
4. The harness between connectors **X-FRNT_EH** and **X-AUX_1_LEFT** is damaged.
5. The harness between connectors **X-BTM_EH** and **X-BTM_FEH** is damaged.
6. The harness between **A-UCM** and the connector **X-CAB_EH** is damaged.
7. The AUX 1 LEFT SOLENOID is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connectors **X-UCM3B**, **X-UCM1B** and **X-AUX_1_LEFT** for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of connector **X-AUX_1_LEFT**.

   Disconnect the connector **X-AUX_1_LEFT** from the ELECTROHYDRAULIC VALVE (**A-EH_VLV**) and visually check the integrity of pins 1 and 2 of the connector.

   A. If one pin is damaged, replace the harness relevant to the connector.

   B. If the pins are not damaged, continue with Step **4**.
4. Check the integrity of connectors **X-BTM_FEH** and **X-FRNT_EH**.

   Disconnect the connector **X-BTM_FEH** from the connector **X-FRNT_EH** and visually check the integrity of pins H and J of both connectors.

   A. If one pin is damaged, replace the harness relevant to the damaged connector.

   B. If all pins are not damaged, continue with Step **5**.

518142-03 - Short to Power/Open Circuit at AUX 2 Low Side Driver

Control Module: UCM

Context:

The **A-UCM** detects a short circuit to power or an open circuit or a low current when drives an AUX 2 Solenoid; as a consequence:

- AUX II Function disabled
- Open AUX II LSD
- Command AUX II HSD PWMs to **0%**

Cause:
The **A-UCM** detects, on pin 21 of connector **X-UCM1A**, a short circuit to power or an open circuit or a low current risen by BSP.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between the **A-UCM** and the connectors **X-AUX_2_LEFT** and **X-AUX_2_RIGHT** is visually damaged.
3. The connector **X-UCM1A** is damaged.
4. The harness between **A-UCM** and the connectors **X-AUX_2_LEFT** and **X-AUX_2_RIGHT** is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connectors **X-UCM1A**, **X-AUX_2_LEFT** and **X-AUX_2_RIGHT** for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of connector **X-UCM1A**.

   Disconnect the connector **X-UCM1A** from the **A-UCM** and visually check the integrity of pin 21.

   A. If the pin is damaged, replace the harness.

   B. If the pin is not damaged, continue with Step **4**.
4. Check the integrity of harness between the **A-UCM** and the connectors **X-AUX_2_LEFT** and **X-AUX_2_RIGHT**.

   Use a multimeter to perform the following check:

From	To	Value
Connector **X-UCM1A** pin 21	Ground	**0 V**

   A. If the measurement is correct, replace the **A-UCM**.

   B. If the measurement is not correct, check the correct functioning of the circuits relevant to:
   - the AUX 2 Left High Side Driver (see procedure **518140-03 – Short to Power at AUX 2 Left High Side Driver**).

518150-03 - Electrical Crank Power Relay- Short Circuit to B+

Control Module: SFB

Context:
Short Circuit to B+ of the Electrical Crank Power Relay.

Cause:
The Smart Fuse box measure a Short Circuit to B+ Electrical Crank Power Relay (X3-5) when the key is OFF.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between Smart Fuse Box and UCM is damaged.
3. The key switch Crank connector is damaged.
4. The Smart Fuse Box connector is damaged.
5. The Crank Power Relay is defective.
6. The Smart Fuse Box is defective.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Check the integrity of the harness between Smart Fuse Box and key switch Crank (**X-UCM2B** pin 14).

   Visually check the integrity of the harness and check for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of the key switch Crank connector (**X-UCM2B** pin 14).

   The key must be in the OFF position.

   Disconnect key switch Crank connector and visually check the integrity of the pin.

   A. If the pin is damaged, replace the connector.

   B. If the pin is not damaged, continue with following step.
4. Check the integrity of the Smart Fuse Box connector.

   The key must be in the OFF position.

   Disconnect **X-X3** connector and visually check the integrity of the pin 5.

   A. If the pin 5 is damaged, replace the **X-X3** connector.

   B. If the pin 5 is not damaged, continue with Step **5**.
5. Check the signal circuit for an open circuit condition on the harness between key switch Crank pin (**X-UCM2B** pin 14) and + **5 V** voltage.

   Use a multimeter to perform the following voltage check:

518177-05 - Open Circuit at Pilot Enable Valve High Side Driver

Control Module: UCM

Context:

The **A-UCM**, driving the Pilot Enable Valve, detects an open circuit or a low current; as a consequence:

- Pilot Lock valve disabled;
- Command Pilot lock Valve HSD PWM to **0%** Bucket Function disabled.

Cause:
The **A-UCM** detects, on pin 18 of connector **X-UCM3B**, an open circuit or a low current risen by BSP.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the connector **X-PILOT_ENABLE** is damaged.
3. The connectors **X-PILOT_ENABLE** or **X-FRNT_EH** or **X-BTM_FEH** or **X-BTM_EH** or **X-CAB_EH** or **X-UCM3B** are damaged.
4. The harness between **X-FRNT_EH** and ground is damaged.
5. The harness between connector **X-PILOT_ENABLE** is damaged.
6. The harness between connectors **X-BTM_EH** and **X-BTM_FEH** is damaged.
7. The harness between **A-UCM** and the connector **X-CAB_EH** is damaged.
8. The PILOT ENABLE SOLENOID is damaged.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Visually check the integrity of the harness between the connectors **X-UCM3B** and **X-PILOT_ENABLE** for any damage.

   A. If the harness is damaged, replace the harness.

   B. If the harness is not damaged, continue with Step **3**.
3. Check the integrity of connector **X-PILOT_ENABLE**.

   Disconnect the connector **X-PILOT_ENABLE** from the ELECTROHYDRAULIC VALVE (**A-EH_VLV**) and visually check the integrity of pins 1 and 2 of the connector.

   A. If one pin is damaged, replace the harness relevant to the connector.

   B. If the pins are not damaged, continue with Step **4**.
4. Check the integrity of connectors **X-BTM_FEH** and **X-FRNT_EH**.

   Disconnect the connector **X-BTM_FEH** from the connector **X-FRNT_EH** and visually check the integrity of pin A of both connectors.

   A. If one pin is damaged, replace the harness relevant to the damaged connector.

   B. If all pins are not damaged, continue with Step **5**.

518293-31 - Error at 2.5V Ref1 Supply

Control Module: UCM

Context:

The **A-UCM** detects an error on the **2.5 V** Ref1; as a consequence:

- Loss of FIN_1, FIN_2, FIN_3, FIN_4;
- Command the FAN as open loop.

Cause:
IcVREF_2V5REF1_mV <= 2350 mV or IcVREF_2V5REF1_mV >= **2650 mV**

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The **A-UCM** is not functioning.

Solution:

1. Verify that the fault is present and active.

   Use the Electronic Service Tool (EST) to check the status of this fault.

   A. If the fault is present and active, continue with Step **2**.

   B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.
2. Replace the UCM.
3. Send the UCM to the manufacturer for its repairing (if possible).

Use a multimeter to perform the following voltage check:

From	To	Value
Connector K-3R1 pin 86	Chassis ground	There should be a resistance

A. If there is an open circuit, replace the **24 V** to **12 V** Converter.

B. If there is a resistance value, continue to Step **6**.

6. Check the Smart Fuse Box signal circuit.

The key must be in the OFF position.

Use a multimeter to perform the following voltage check:

From	To	Value
Connector **A-SFB** pin OUT_06_H	Chassis ground	There should be a resistance

A. If there is an open circuit, replace the Smart Fuse Box.

Wiring harnesses - Electrical schematic sheet 03 (55.100)
Wiring harnesses - Electrical schematic sheet 08 (55.100)

From	To	Value
Connector **X-X3** pin 12	Connector **X-CAB_E** pin 21	There should be a short circuit
Connector **X-CAB_E** pin 21	Connector **X-ENG** pin 21	There should be a short circuit
Connector **X-ENG** pin 21	Connector **X-ENG_H** pin 7	There should be a short circuit
Connector **X-ENG_H** pin 7	Connector **X-RH-TAIL** pin 2	There should be a short circuit

A. If there is an open circuit, replace the harness.

B. If there is a short circuit, continue to Step **6**.

6. Check the Electrical Ignition Power Relay pin (LMP-R-NA-TAIL pin 2) circuit for an open circuit.

   The key must be in the OFF position.

   Use a multimeter to perform the following voltage check:

From	To	Value
Connector LMP-R-NA-TAIL pin 2	LMP-R-NA-TAIL pin 1	There should be a short circuit

A. If there is an open circuit, replace the L-NA-TAIL.

Wiring harnesses - Electrical schematic sheet 29 (55.100)

A. If the fuse is damaged, replace the fuse.

B. If the fuse is not damaged, continue with following step.

6. Check the Battery K Isolator.

   The key must be in the OFF position.

   Use a multimeter to perform the following voltage check:

From	To	Value
Connector **X-ISO** pin 1	Chassis ground	There should be an open circuit
Connector **X-ISO** pin 2	Chassis ground	There should be an open circuit
Connector **X-ISO** pin 3	Chassis ground	There should be a short

   A. Verify the Battery K Isolator Power supply (pin X-D)

   B. If Battery K Isolator is right functioning, replace the Smart Fuse Box.

Wiring harnesses - Electrical schematic sheet 03 (55.100)
Wiring harnesses - Electrical schematic sheet 04 (55.100)
Wiring harnesses - Electrical schematic sheet 06 (55.100)

Contents

Front loader and bucket - 82

Bucket - 300

SERVICE