

SERVICE MANUAL

W110D Stage IV Wheel Loader

Part number 48083725

English
February 2017



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Hydraulic contamination

Contamination in the hydraulic system is a major cause of the malfunction of hydraulic components. Contamination is any foreign material in the hydraulic oil.

Contamination can enter the hydraulic system in several ways:

- When you drain the oil or disconnect any line
- When you disassemble a component
- From normal wear of the hydraulic components
- From damaged seals or worn seals
- From a damaged component in the hydraulic system

All hydraulic systems operate with some contamination. The design of the components in this hydraulic system permits efficient operation with a small amount of contamination. An increase in this amount of contamination can cause problems in the hydraulic system.

The following list includes some of these problems:

- Cylinder rod seals that leak
- Control valve spools that do not return to neutral
- Movement of control valve spools is difficult
- Hydraulic oil that becomes too hot
- Pump gears, housing, and other parts that wear rapidly
- Relief valves or check valves held open by dirt
- Quick failure of components that have been repaired
- Slow cycle times or a lack of power.

If your machine has any of these problems, check the hydraulic oil for contamination.

There are two types of contamination: microscopic and visible.

Microscopic contamination occurs when very fine particles of foreign material are suspended in the hydraulic oil. These particles are too small to see or feel. Microscopic contamination can be found by identification of the following problems or by testing in a laboratory.

Examples of problems caused by microscopic contamination:

- Cylinder rod seals that leak
- Control valve spools that do not return to neutral
- The hydraulic system has a high operating temperature

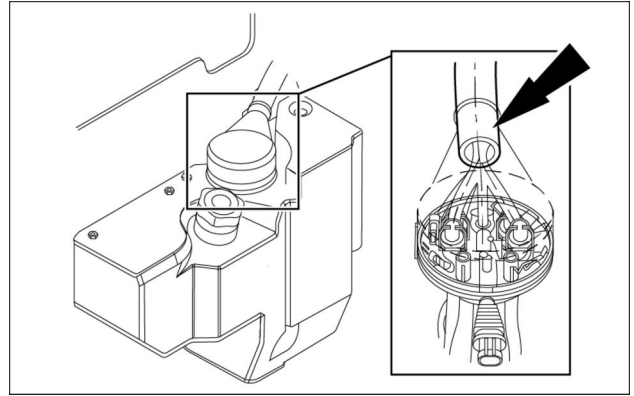
Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of components.

Examples of problems caused by visible contamination:

- Particles of metal or dirt in the oil
- Air in the oil
- Dark or thick oil
- Oil with an odor of burned oil
- Water in the oil

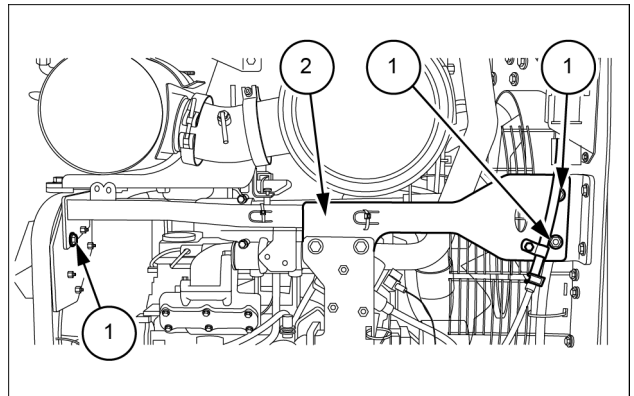
If you find contamination, use a portable filter to clean the hydraulic system.

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



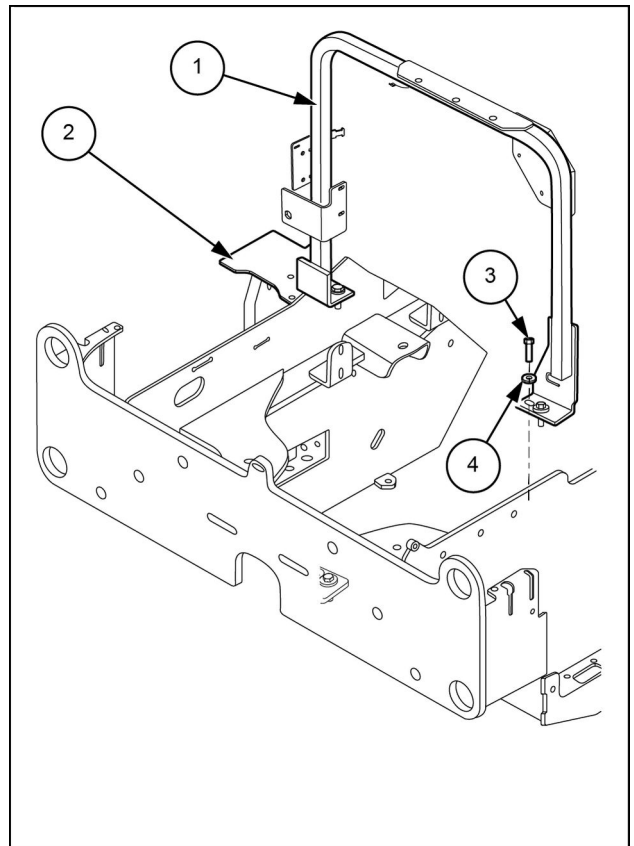
LEIL15WHL0304AA 58

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



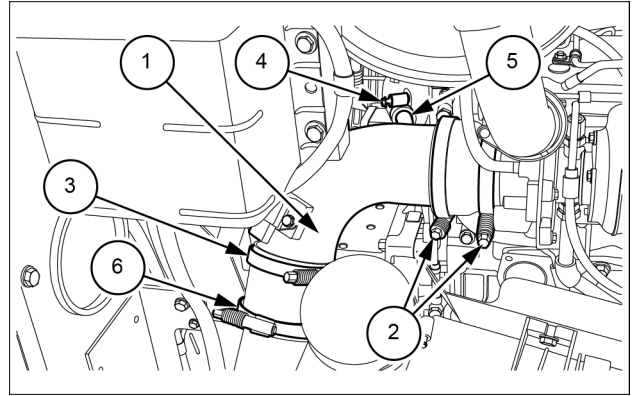
LEIL15WHL0276AB 59

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



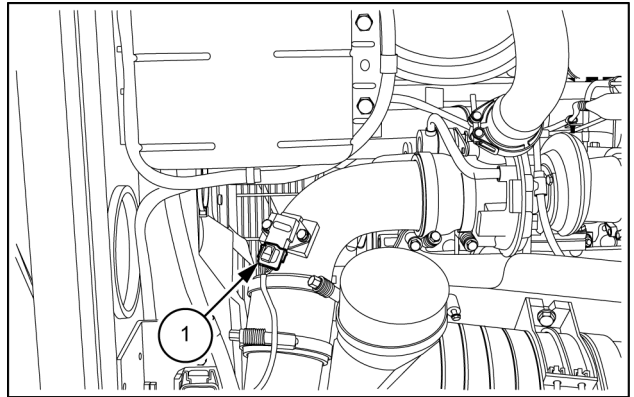
LEIL16WHL1344BB 60

71. Install the clamp (4) on the crankcase vent hose (5). Locate the air intake hose (1). Install the clamps (3) and (6) on the air filter housing. Tighten the clamp (6) to $3.7 - 4.5 \text{ N}\cdot\text{m}$ ($2.7 - 3.3 \text{ lb ft}$). Tighten the clamp (3) to $10.1 - 11.3 \text{ N}\cdot\text{m}$ ($7.4 - 8.3 \text{ lb ft}$). Install the clamps (2) on the turbocharger. Tighten the clamps (2) to $10.1 - 11.3 \text{ N}\cdot\text{m}$ ($7.4 - 8.3 \text{ lb ft}$).



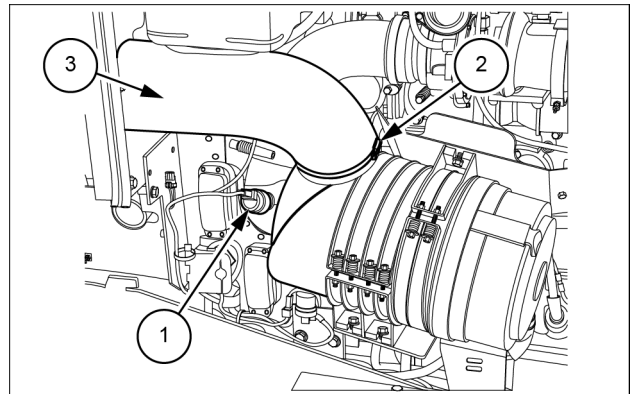
LEIL15WHL0310AB 57

72. Connect the engine wiring harness connector from the air inlet humidity sensor (1) and remove the tag.



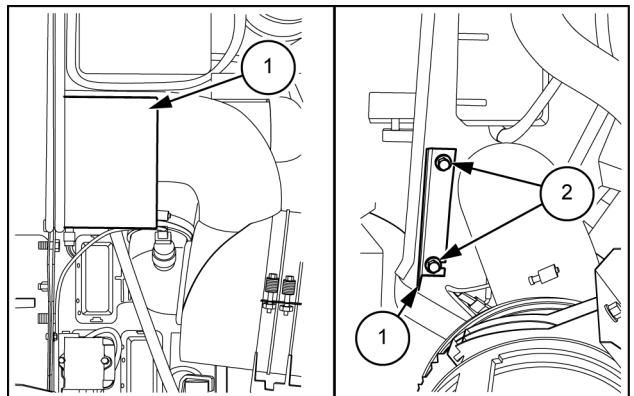
LEIL15WHL0197AB 58

73. Connect the air intake hose (3) to the rear plate of the cooling system frame and secure the clamp (2). Tighten the clamp (2) to $3.7 - 4.5 \text{ N}\cdot\text{m}$ ($2.7 - 3.3 \text{ lb ft}$). Connect the air inlet humidity sensor (1) and remove the tag.



LEIL15WHL0196AB 59

74. Install the bracket (1) of the relay decal tightening the two bolts (2) and the related washers.



LEIL15WHL0195AB 60

Contents

Engine - 10

Selective Catalytic Reduction (SCR) exhaust treatment - 500

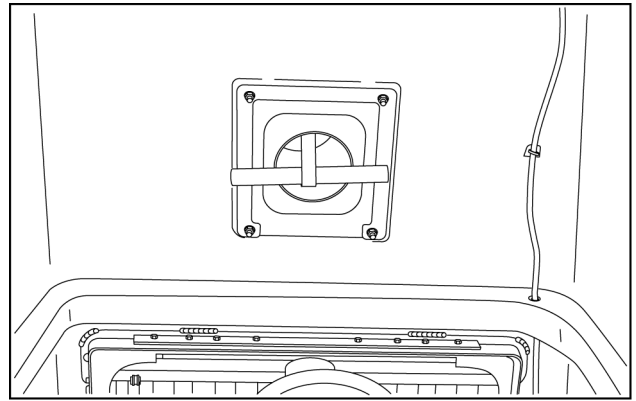
FUNCTIONAL DATA

Selective Catalytic Reduction (SCR) exhaust treatment	
Dynamic description	3

SERVICE

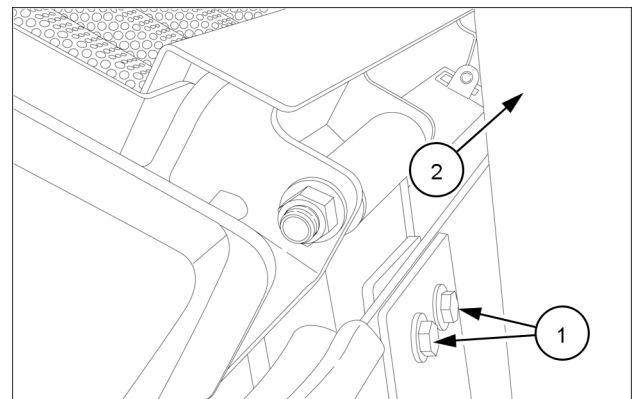
Selective Catalytic Reduction (SCR) muffler and catalyst	
Remove	15
Install	22
Diesel Exhaust Fluid (DEF)/AdBlue®/ARLA tank	
Remove	30
Install	34
Coolant control valve	
Remove	36
Install	38
Diesel Oxidation Catalyst (DOC)	
Remove	39
Install	42

20. Place a solid steel bar through the nylon strap. Lower the hood and release the tension on the lifting motor.



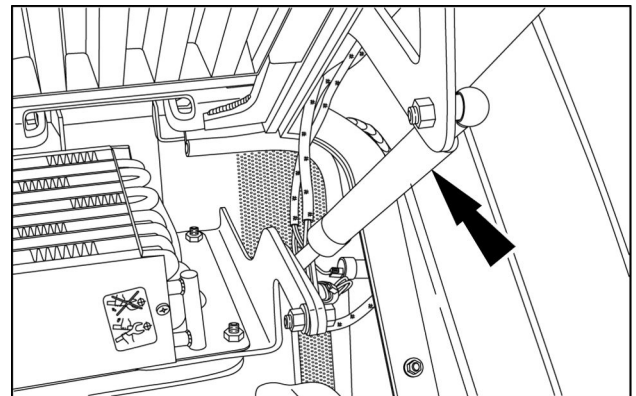
RAPH12WEL1458AA 18

21. With the assistance of another technician, balance the hood and install the hood hinge mounting bolts (1) to the cooler frame (2), located outside the hood. Repeat the procedure for the other side.



RAPH12WEL1461AA 19

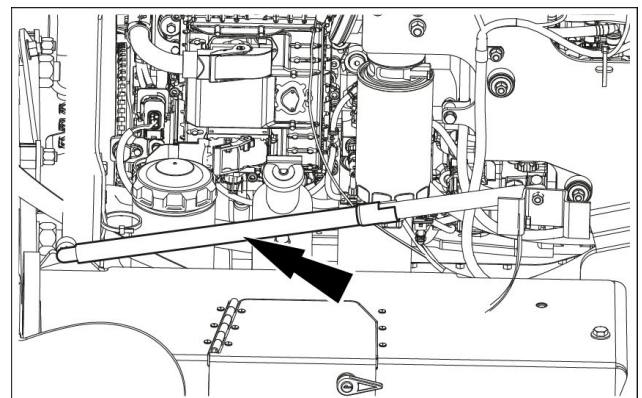
22. Install the right-hand gas strut from the hood. Install the left-hand gas strut from the hood.



RAPH12WEL1489AA 20

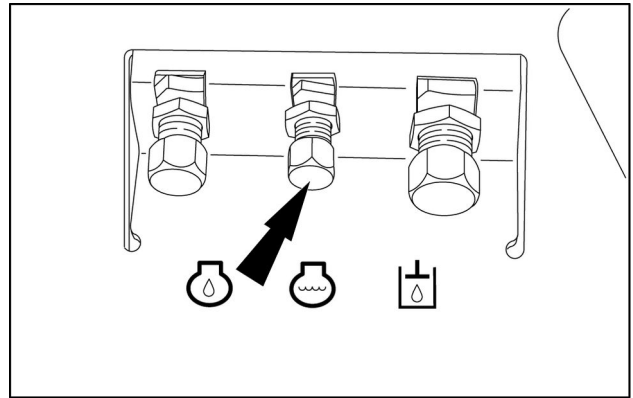
23. Install the spring gas.

NOTE: for clarify, the engine hood is in NO show.



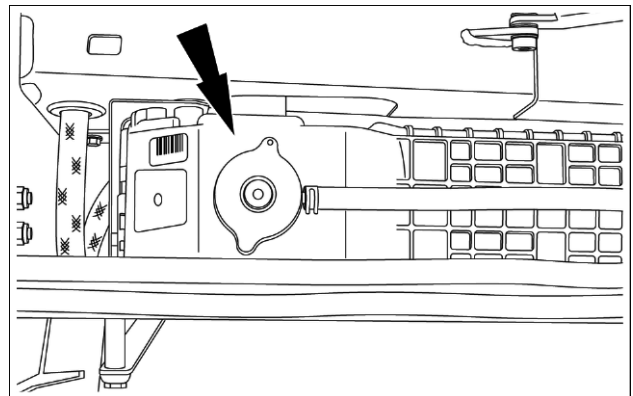
LEIL16WHL1432AB 21

8. Check that the coolant drain cap is tightened.
9. Fill the engine coolant system with a pre-diluted solution of **NEW HOLLAND AMBRA ACTIFULL™ OT EXTENDED LIFE COOLANT**.



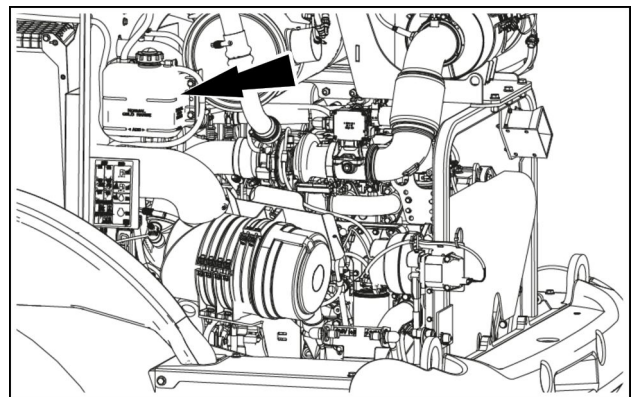
RAPH12WEL1411AA 7

10. Install the radiator cap.



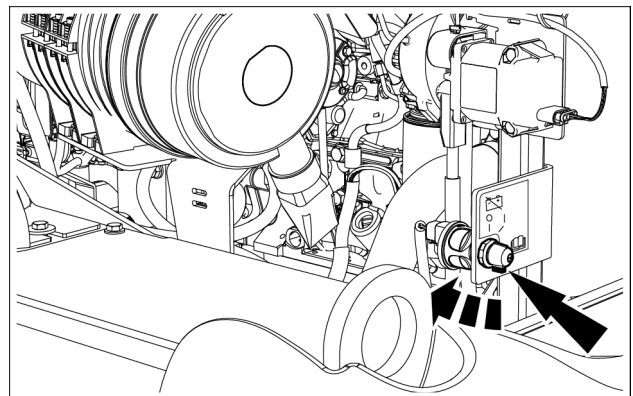
LEIL15WHL1441AB 8

11. Fill the coolant tank up to the FULL mark on the reservoir.



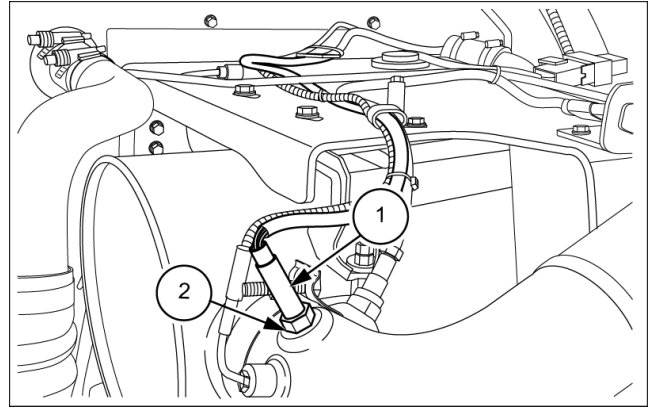
LEIL16WHL1261AA 9

12. Put the timed disconnect switch to the ON position.



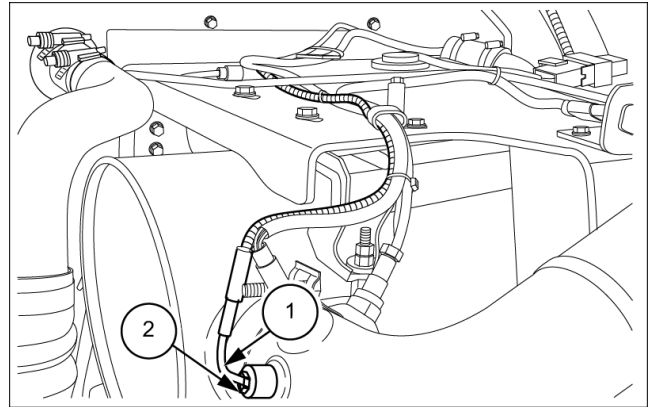
LEIL16WHL1382AB 10

14. 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)**.



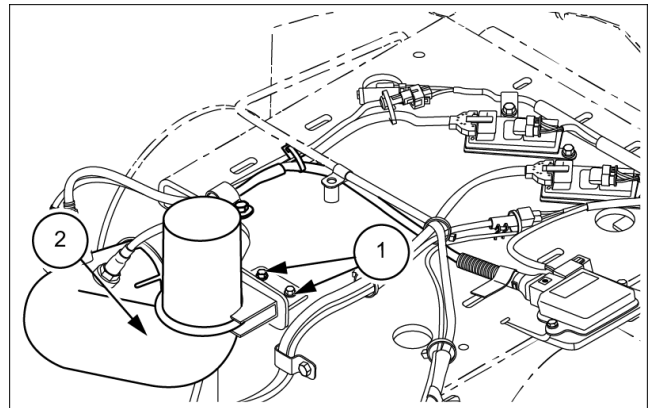
LEIL15WHL0334AB 12

15. 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)**.



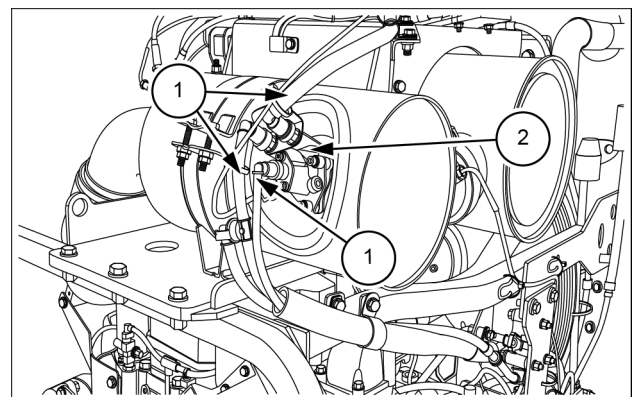
LEIL15WHL0333AB 13

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



LEIL15WHL0229AB 14

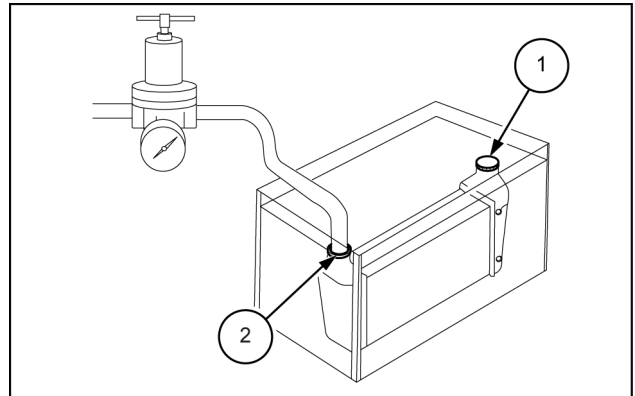
17. Connect the hoses (1) on the Dosing module (2).



LEIL15WHL0323AB 15

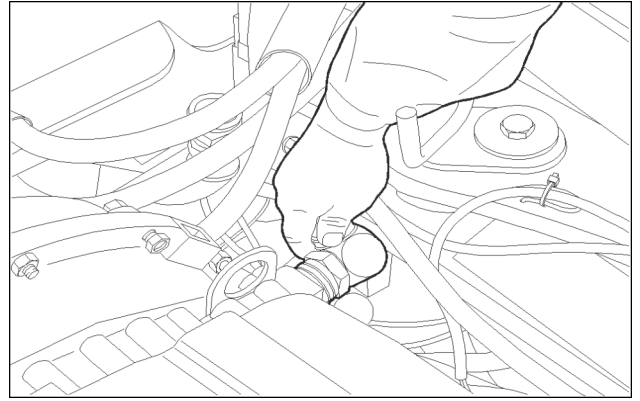
Aftercooler - Test

1. Check the core for leaks by closing off the outlet tube (1) and attaching regulated air pressure **550 kPa (80 psi)** to the inlet tube (2). Submerge the aftercooler in water and check for air leakage.
2. If leakage is detected replace the aftercooler.



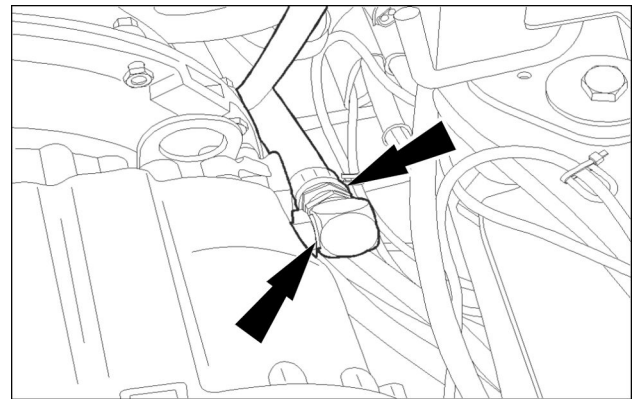
LEIL15WHL1549AB 1

18. Remove the fitting. Remove and discard the O-ring from the fitting. Install a plug in the transmission port.



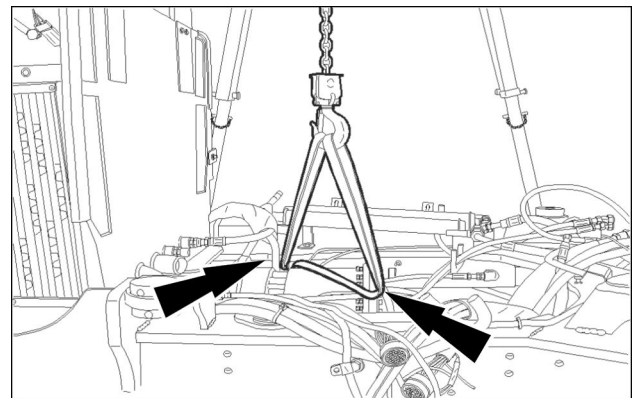
RAPH12WEL1972AA 12

19. Repeat the preceding two steps to disconnect the other cooler hose and remove the fitting.



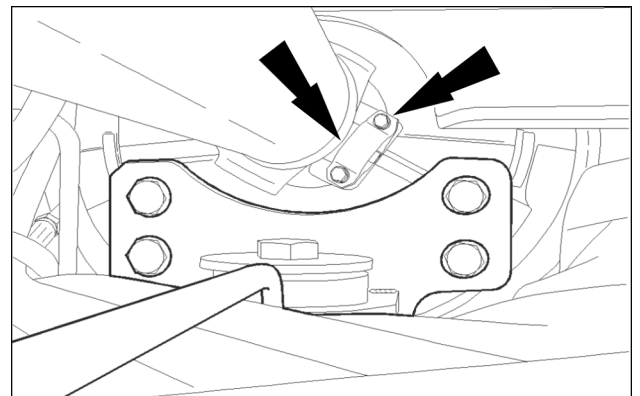
RAPH12WEL1956AA 13

20. Connect lifting equipment to transmission lifting eyes. Take up all slack in lifting equipment.



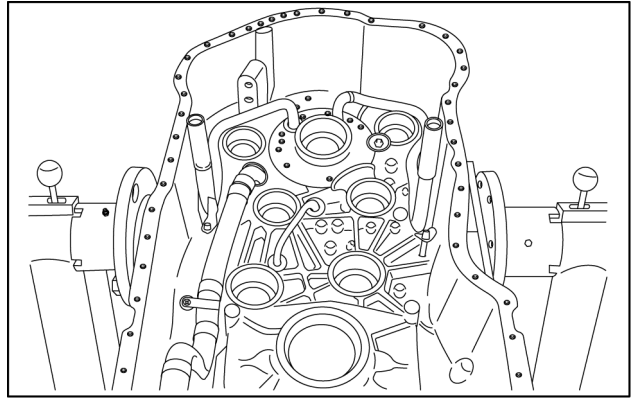
RAPH12WEL1958AA 14

21. In area between rear of transmission and engine, remove four bolts and two straps. Discard. Use pry bar to disconnect engine drive shaft from transmission. Using **3/4 in** drive socket, extensions, and impact wrench, remove four bolts and washers securing transmission to top mounting bracket.



RAPH12WEL1957AA 15

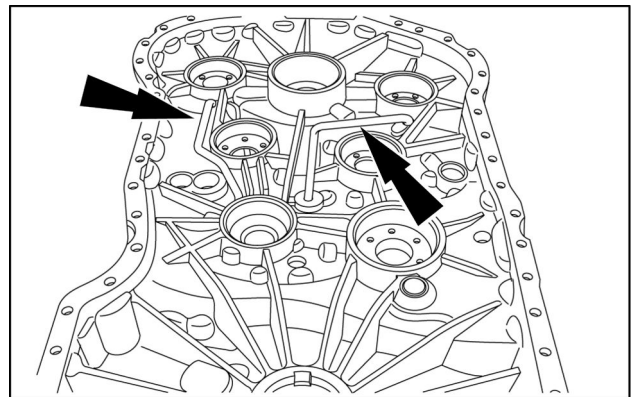
5. Install all the bearing outer races in the housing bores.



RAPH12WEL2026AA 4

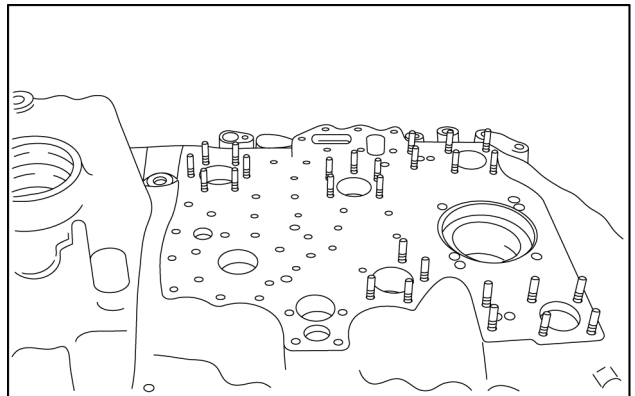
6. Install both of the oil pipes into the housing cover. Tilt the cover **180°**. Use a rolling tool to install the pipes into the housing bores.

NOTE: the pipe end of the pressure pipes must be slightly below the housing plane face.



RAPH12WEL2027AA 5

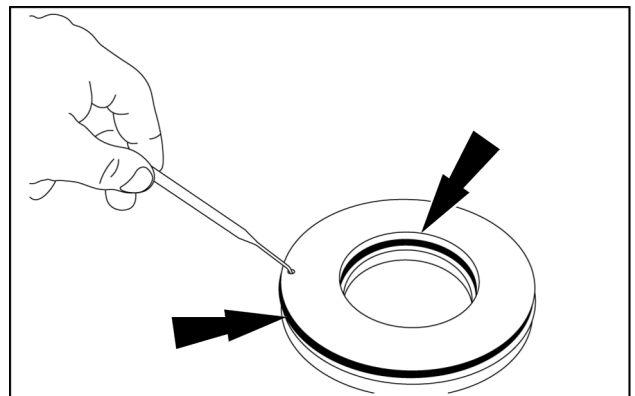
7. Install the studs. Torque the studs to **9 N·m (80 lb in)**.



RAPH12WEL2028AA 6

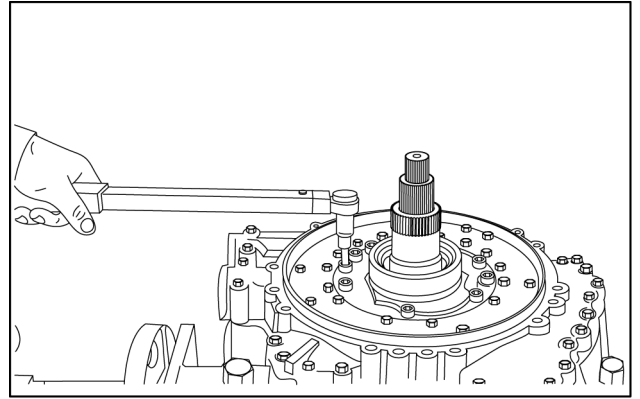
NOTE: the following steps are for the assembly of clutches KV and KR, beginning with the assembly of the clutch disc carrier.

8. Ensure that the drain hole is free and clear of debris. Install the O-rings into the piston grooves and apply oil.



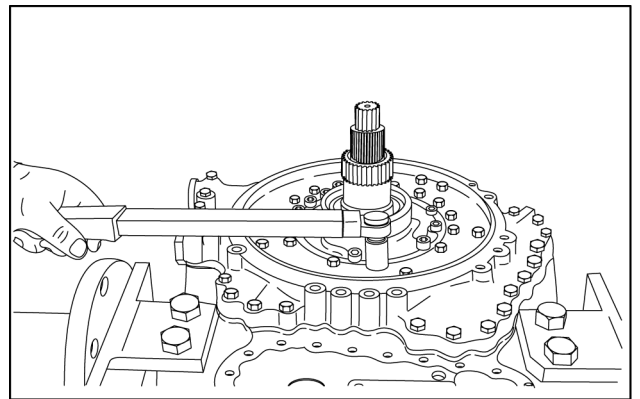
RAPH12WEL2029AA 7

105. Secure the transmission pump with the socket head screws. Torque the screws to **46 N·m (34 lb ft)**.



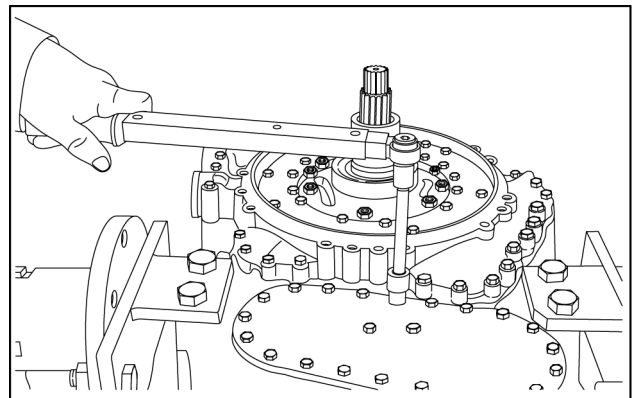
RAPH12WEL2092AA 96

106. Install the oil feed housing with the hex head screws and flat washers. Torque the screws to **68 N·m (50 lb ft)**.



RAPH12WEL2093AA 97

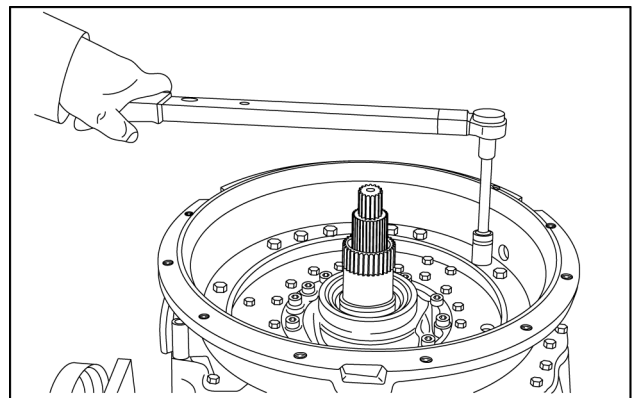
107. Position the gasket and cover. Secure the cover with the ex head screws. Torque the screws to **23 N·m (17 lb ft)**.



RAPH12WEL2094AA 98

NOTE: the following procedures are for the assembly of the engine connection and converter.

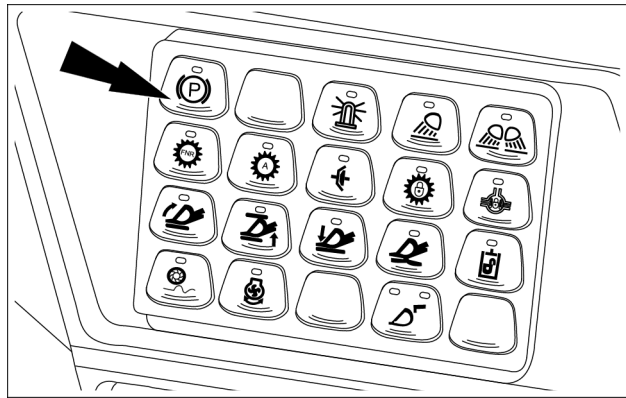
108. Position the converter housing. Secure with hex head screws. Torque the screws to **68 N·m (50 lb ft)**



RAPH12WEL2095AA 99

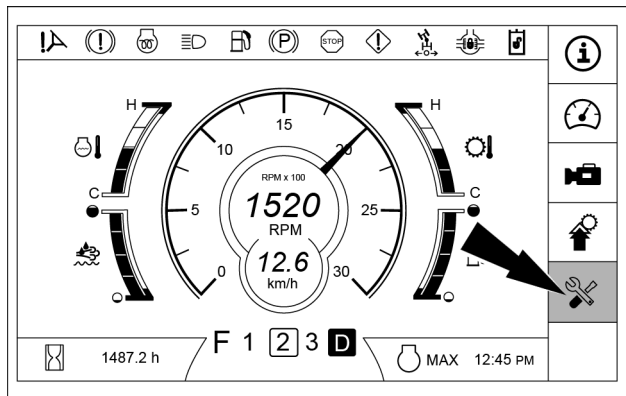
Accessing Clutch Calibration Feature

1. Park the machine on a level surface. Lower the bucket to the ground.
Start the machine.
Move the transmission control lever in NEUTRAL.
Push the parking brake switch on the multifunction keypad.



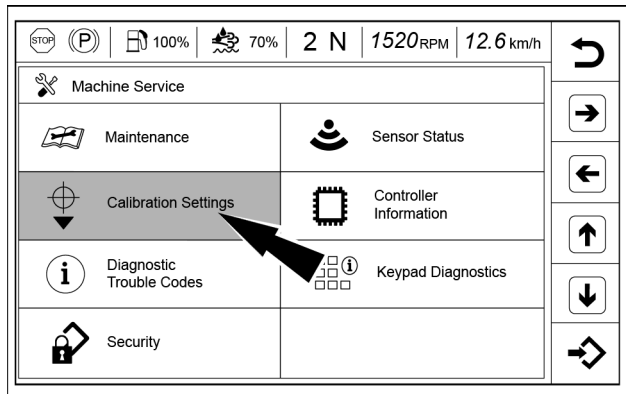
LEIL16WHL1125AA 2

2. Press the Machine Service key on the LCD multi-function display to access the Machine Service screen.



LEIL16WHL0908AA 3

3. Use up or down arrow to select the Calibration Settings item. Press the enter/confirm key to access the selection screen.



LEIL16WHL0874AA 4

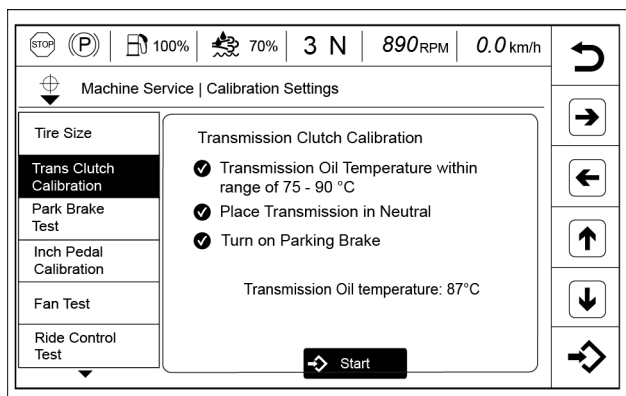
4. The screen displays the three conditions to be satisfied before starting the transmission clutch calibration.

- The transmission oil temperature must be within range of **75 – 90 °C (167 – 194 °F)**.
- The transmission control lever must be in **NEUTRAL**.
- The Parking Brake must be activated.

If the three machine conditions are not correct, a red signal will appear near the not satisfied condition and the calibration procedure will not start.

Moreover on the display appears also the value of the transmission.

If all conditions are verified a green signal appears near each conditions. Press the enter/confirm key to start the transmission clutch calibration.

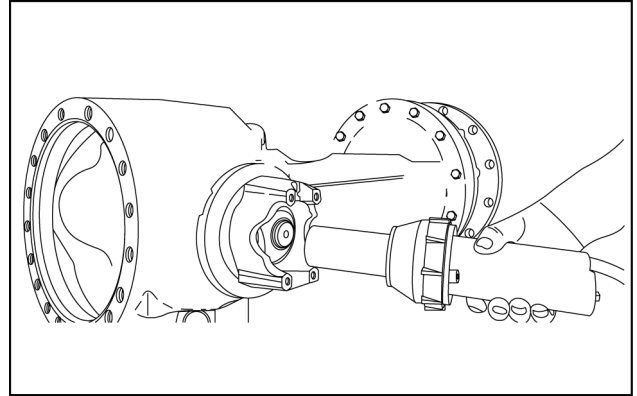


LEIL16WHL0905AA 5

Differential - Remove - Pinion

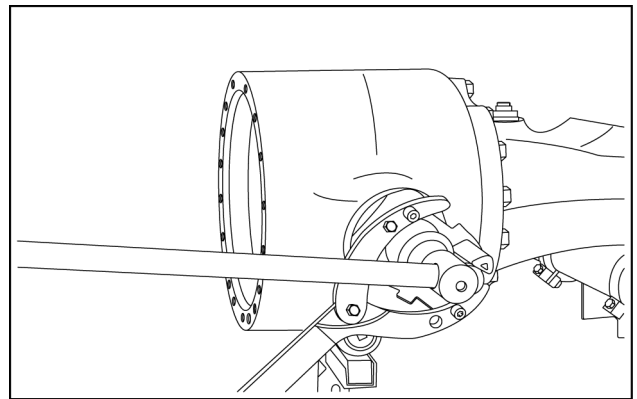
NOTE: The ring gear and the drive pinion are a matched set. Do not service separately.

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)**.



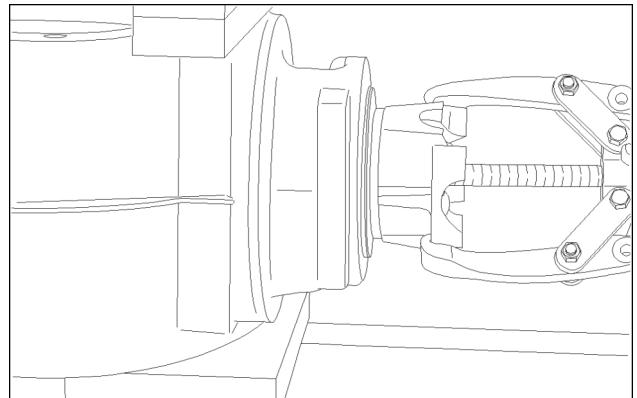
LEIL15WHL1256AA 1

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.



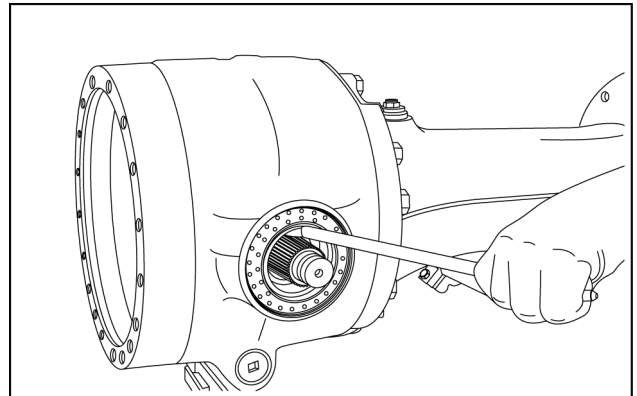
LEIL15WHL1242AA 2

3. Remove the input flange from the drive pinion.



RAPH12WEL2318AA 3

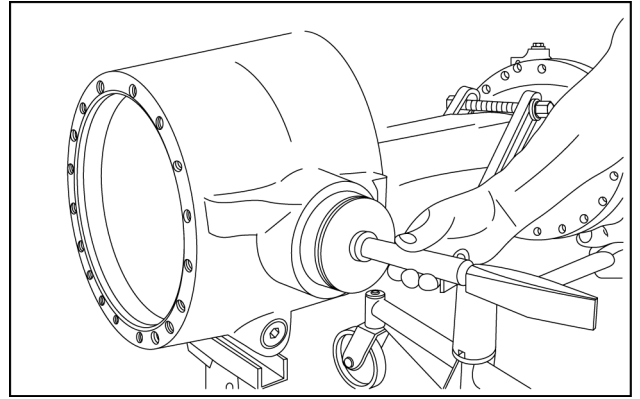
4. Remove the shaft seal from the axle drive housing.



LEIL15WHL1243AA 4

5. Install the shaft seal. Ensure the sealing lip is facing toward the sump. Use a suitable seal installer.

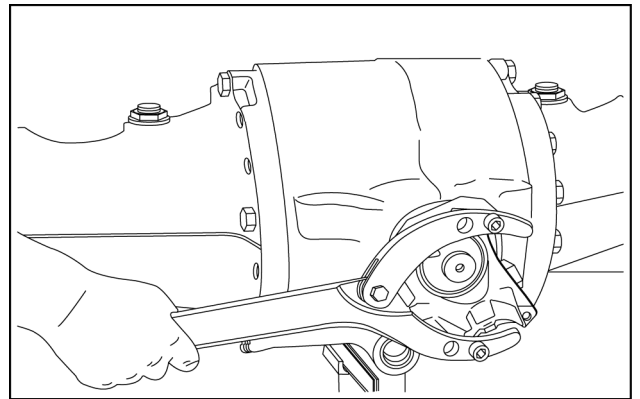
NOTE: wet the outer diameter of the seal with a solution of **50% water and 50% mineral spirits**. Fill the space between the sealing lip and dust lip with grease.



LEIL15WHL1251AA 5

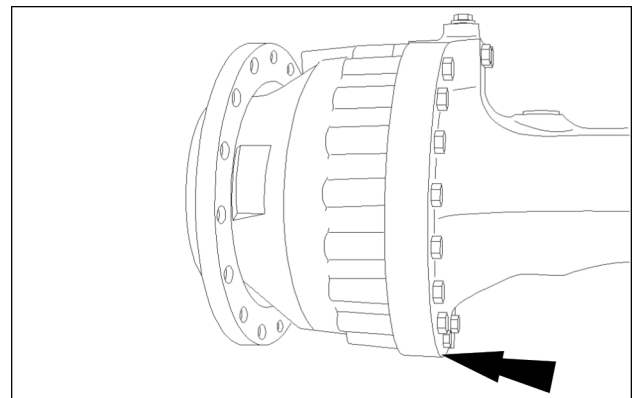
6. Install the input flange. Install a holding wrench on the input flange. Apply **LOCTITE® 262™** on the threads of the locknut. Install the washer and locknut by hand. Secure the flange in place using a holding tool and tighten the nut. Torque the flange to **700 N·m (516 lb ft)**.

NOTE: rotate the input pinion several times in both directions when tightening.

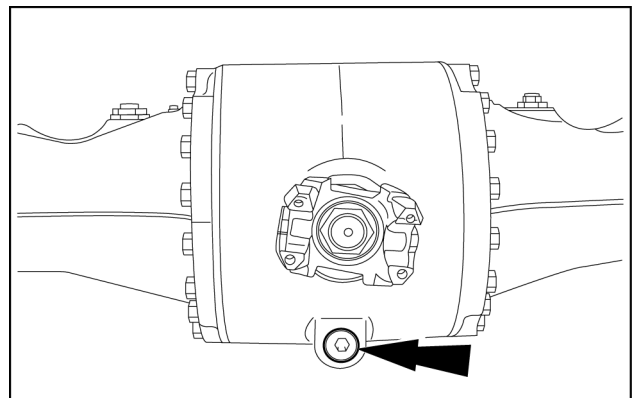


LEIL15WHL1248AA 6

7. Install the axle drain plugs. Torque the plugs to **50 N·m (37 lb ft)**.



RAPH12WEL2177AA 7



LEIL15WHL1250AB 8

8. Refill the axle using specified fluid. Refer to **Powered front axle - Lubricate (25.100)**.

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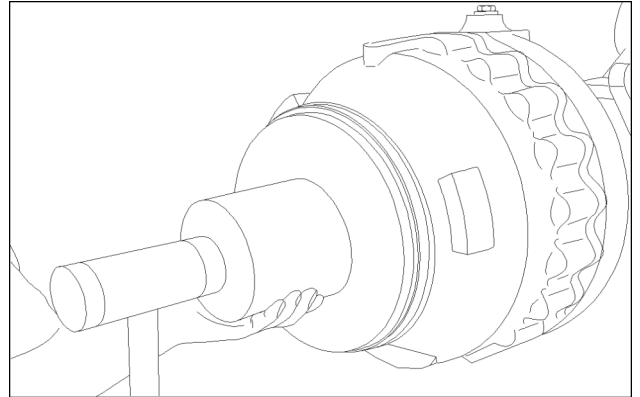
SERVICE

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Final drive - Install Hub Seal

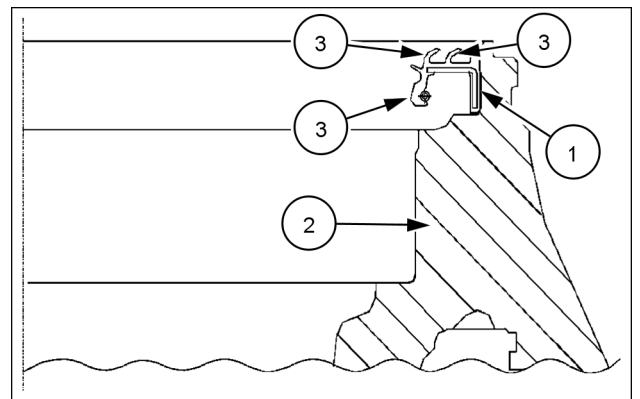
NOTE: Tools and axle shown in the following illustrations may appear different than tools and axles you may have. The following tools and procedures for disassembly and assembly of the axles is the same regardless of appearance.

1. Wet the outer diameter of the face seal with a solution of **50% water and 50% mineral spirits**. Use an appropriate tool to install the face seal with the seal lip positioned as illustrated. Apply grease to the seal in location **(A)** as illustrated.



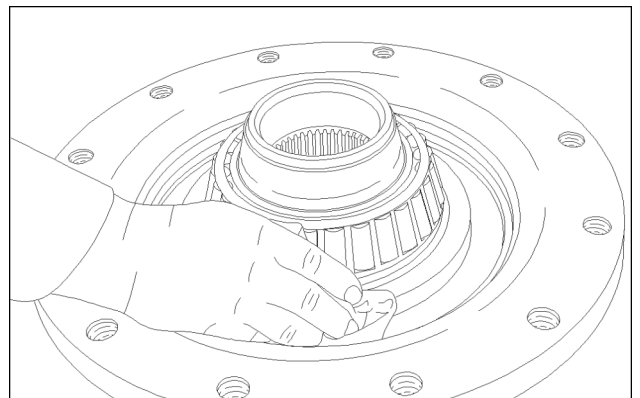
RAPH12WEL2188AA 1

1. Face seal
2. Brake housing
3. Grease location



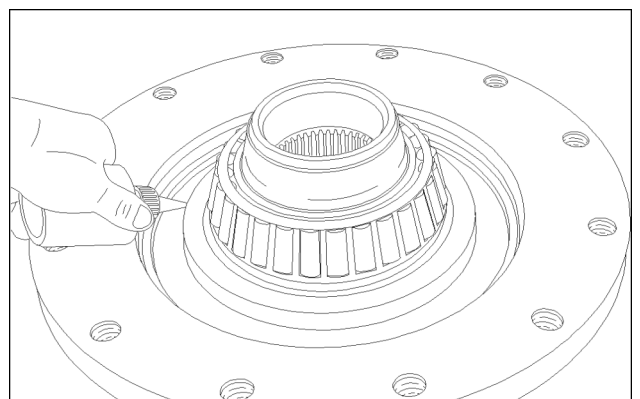
RAPH12WEL2811AA 2

2. Clean the seal ring mounting surface with an acceptable cleaning solvent.



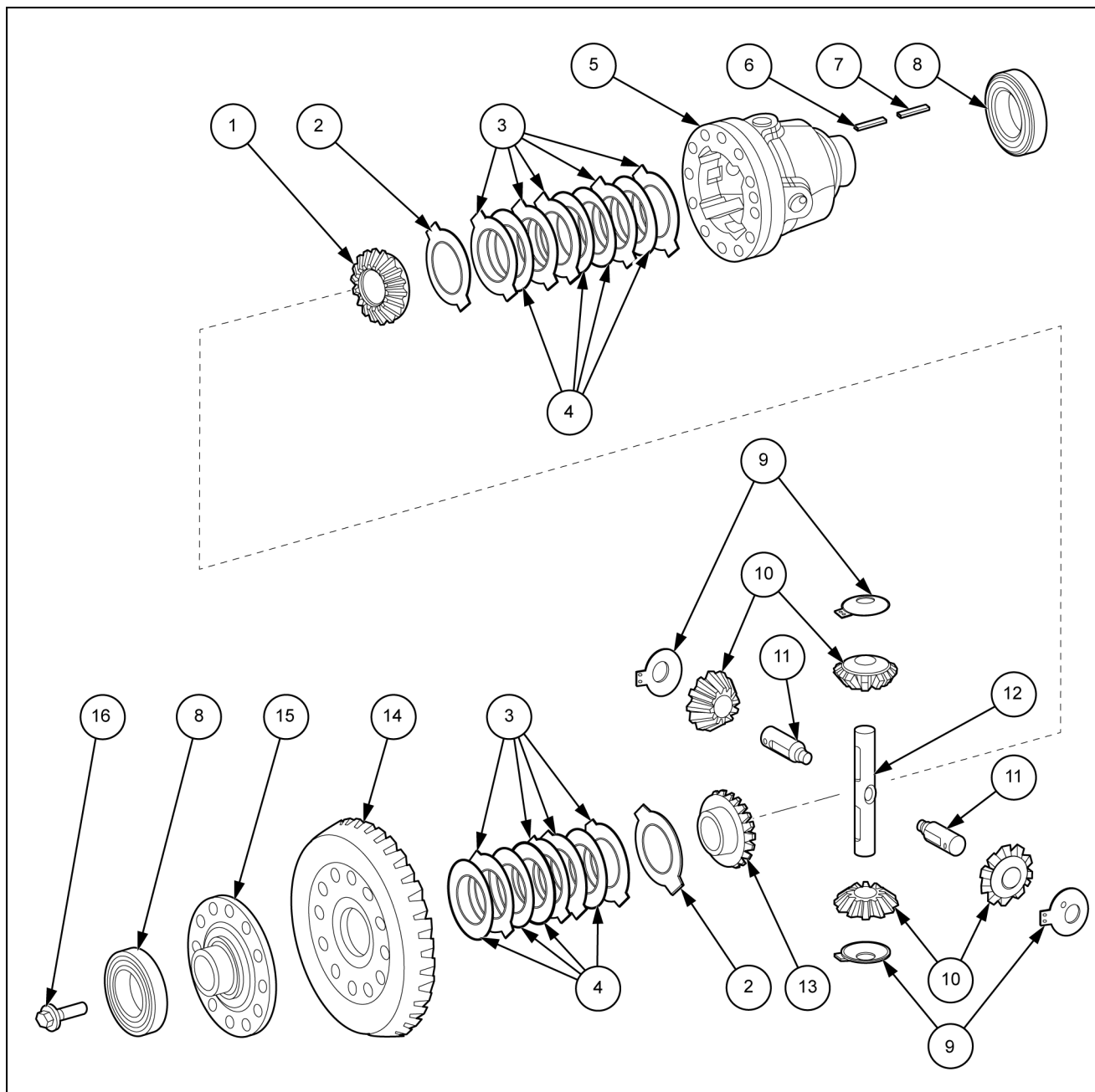
RAPH12WEL2225AA 3

3. Apply **LOCTITE® 574™** to the seal ring mounting surface.



RAPH12WEL2226AA 4

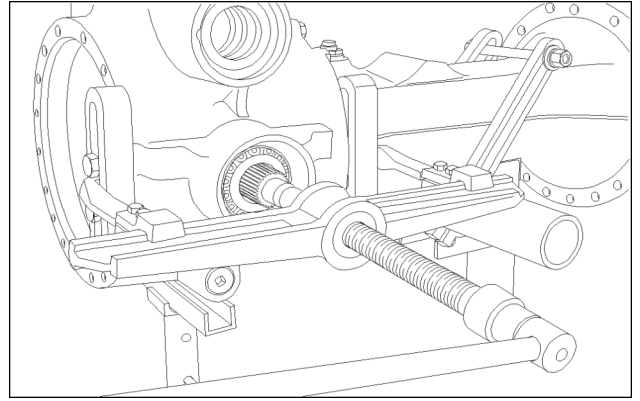
Limited slip differential - Exploded view



LEIL15WHL1252GB 1

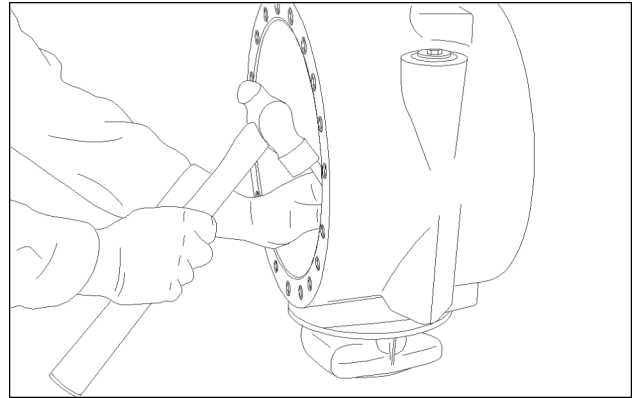
- | | | | |
|--------------------------|-----------------|------------------|------------------------|
| 1. Inner bevel gear axle | 5. Differential | 9. Thrust washer | 13. Outer bevel gear |
| 2. Thrust washer | 6. Roll pin | 10. Spider gear | 14. Ring gear |
| 3. Reaction plates | 7. Roll pin | 11. Half shaft | 15. Cover differential |
| 4. Friction plates | 8. Bearing | 12. Shaft | 16. Bolt |

5. Press the input pinion out of the housing.



RAPH12WEL2437AA 5

6. Drive the outer bearing cup from the differential housing.



RAPH12WEL2324AA 6

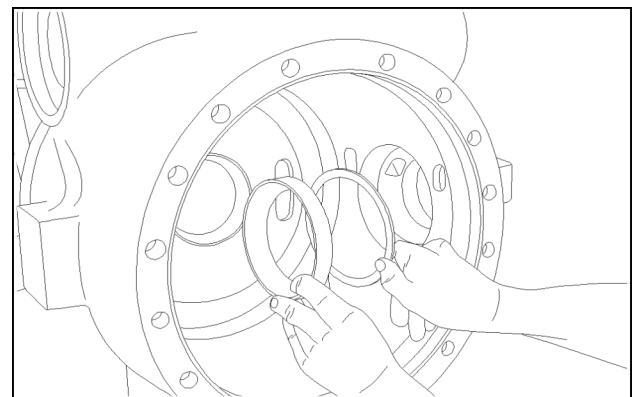
7. Drive the inner bearing cup from the differential housing.



RAPH12WEL2323AA 7

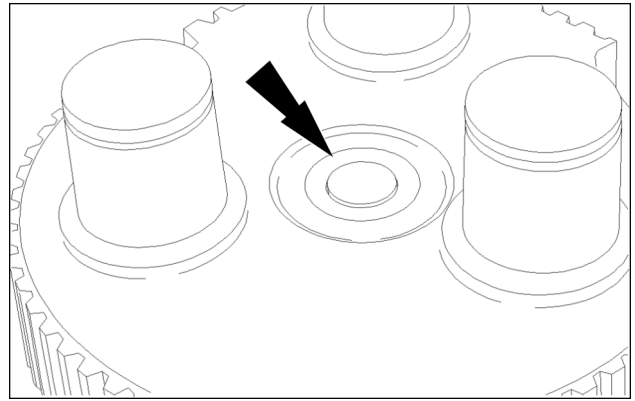
8. Remove the inner bearing cup and shim from the differential housing.

NOTE: Mark the shim and bearing cup location to aid in assembly.

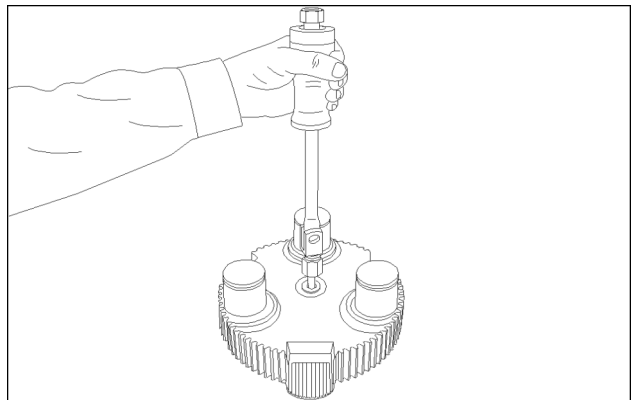


RAPH12WEL2198AA 8

18. Inspect the stop pin for excessive wear or damage. Remove the stop pin using a suitable adapter and a suitable striker. If necessary, drill a hole in the stop pin to aid in removal.

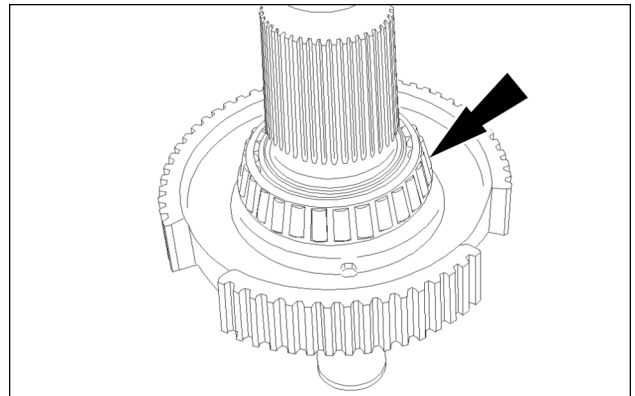


RAPH12WEL2230AA 20



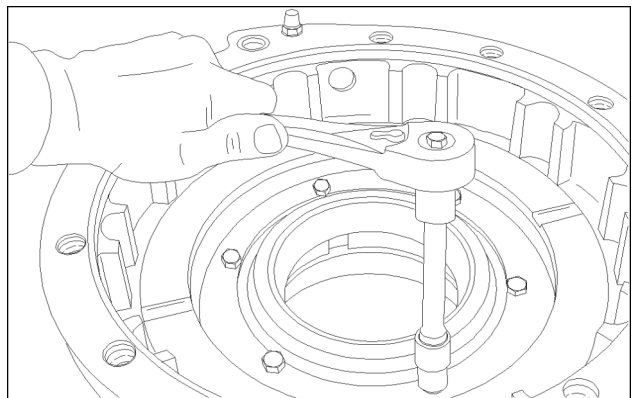
RAPH12WEL2806AA 21

19. Inspect the wheel bearing for excessive wear or damage. If damaged, use a die grinder to score and remove the bearing cage. Use a die grinder to score the bearing. Break the bearing free from the planetary carrier using a hammer and chisel.



RAPH12WEL2231AA 22

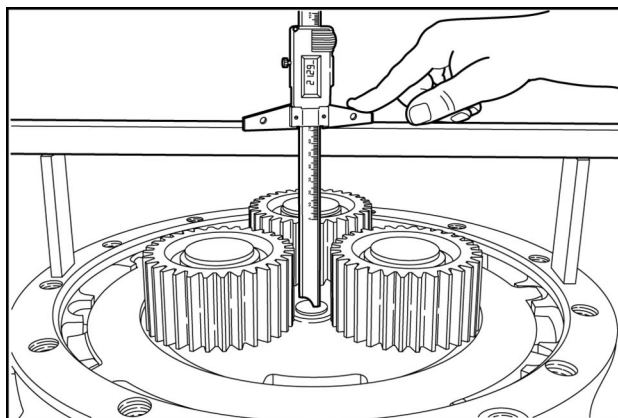
20. Loosen and remove the six bolts securing the return spring retainer to the brake housing.



RAPH12WEL2233AA 23

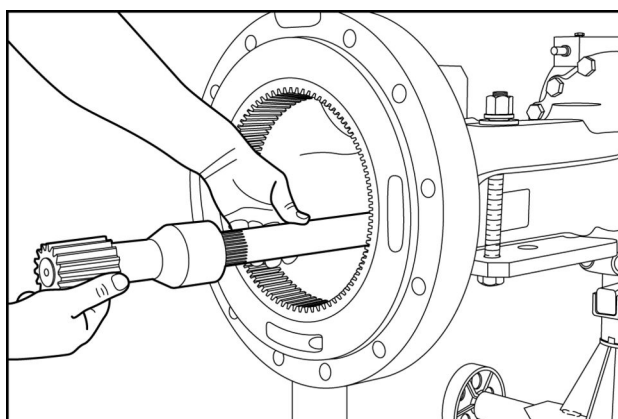
Axle shaft - Adjust - Shaft end play

1. Set the sun gear shaft axial play range to **0.5 – 2.0 mm (0.020 – 0.079 in)**. Use a straight edge to determine dimension I from the mounting face of the brake housing to the front face of the stop bolt. Dimension I example **21.25 mm (0.837 in)**.



RAIL11WEL0557BA 1

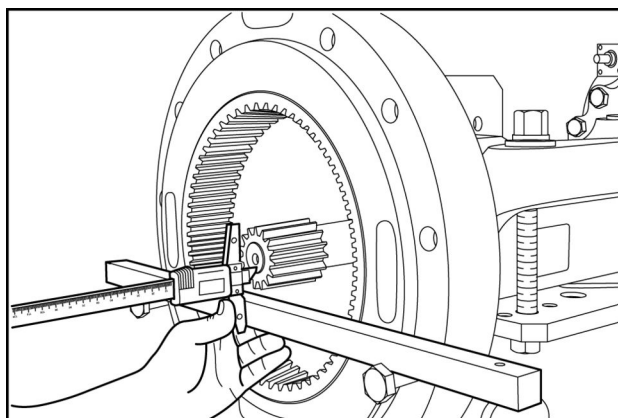
2. Insert the stub shaft with sun gear into the teeth of the axle bevel gear until it stops.



RAIL11WEL0558BA 2

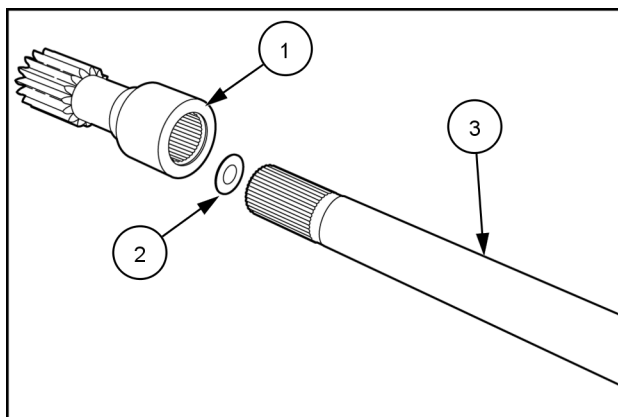
3. Using a straight edge, measure dimension II from the front face of the sun gear shaft to the mounting surface of the axle housing. Dimension II example **19.00 mm (0.748 in)**.

NOTE: calculation example: Dimension I **21.25 mm (0.837 in)** minus Dimension II **19.00 mm (0.748 in)** equals a difference of **2.25 mm (0.089 in)** minus the required axial play example of **1.25 mm (0.049 in)** which leaves a difference or required shim size of **1.00 mm (0.039 in)**.

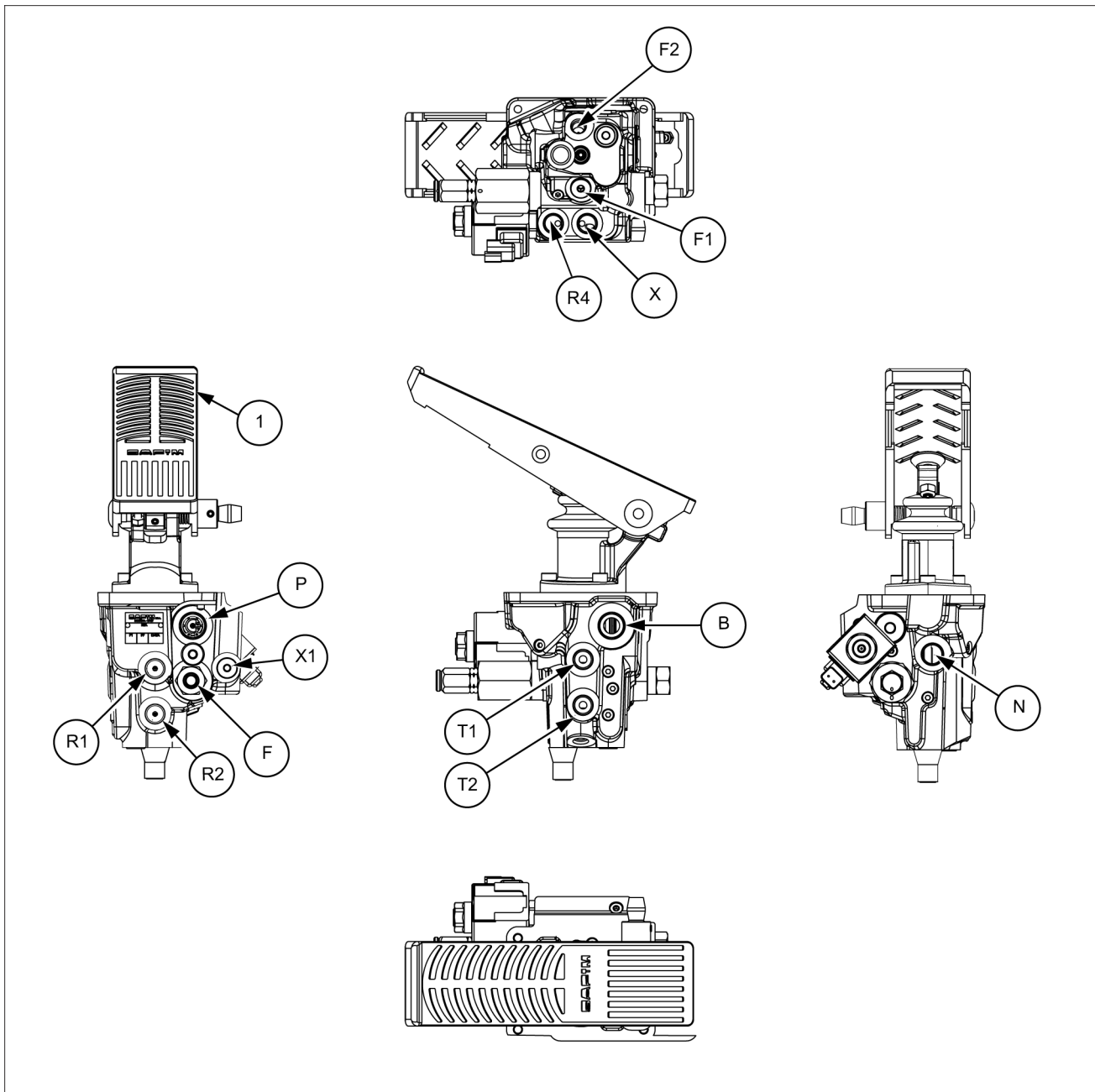


RAIL11WEL0559BA 3

4. Remove stub shaft with sun gear from the axle housing. Then insert the required shim (2) into the sun gear shaft (1) and mount the stub shaft (3).



RAIL11WEL0560BA 4



LEIL15WHL1504FB 4

3. Stop the vacuum pump and remove it.
4. Connect all the electrical connections.
5. Turn the timed disconnect switch to the ON position.
6. Bleed the brake system.
7. Install the cab skirts.
8. Check the hydraulic reservoir oil level and add oil as required.

Brake discs - Assemble - MT-L 3065 II / MT-L 3075 II

⚠ CAUTION

Burn hazard!

Always wear heat-resistant protective gloves when handling heated parts.

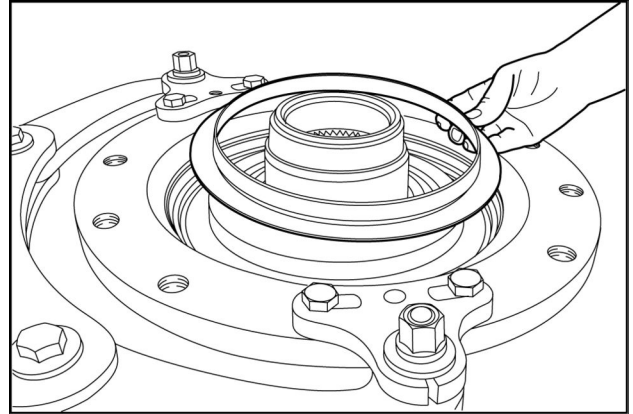
Failure to comply could result in minor or moderate injury.

C0047A

1. Heat the slide bushing and position it at the collar of the output shaft. Then position the slide bushing with a pressure ring special tool.

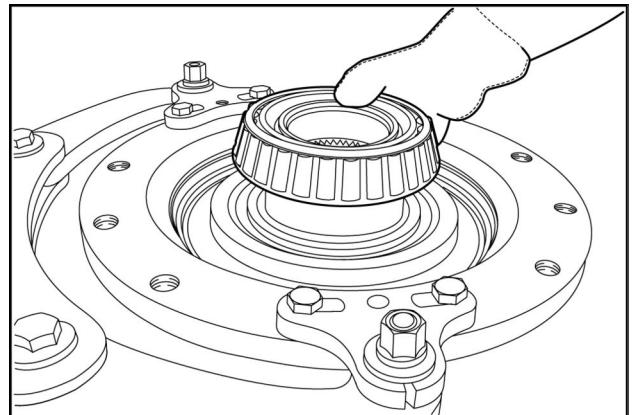
NOTE: pay attention to the installation position. Cover the contact faces of the slide bushing/output shaft with **LOCTITE® 574™**

NOTE: the exact installation position is obtained when using the specified pressure ring.



RAIL11WEL0535BA 1

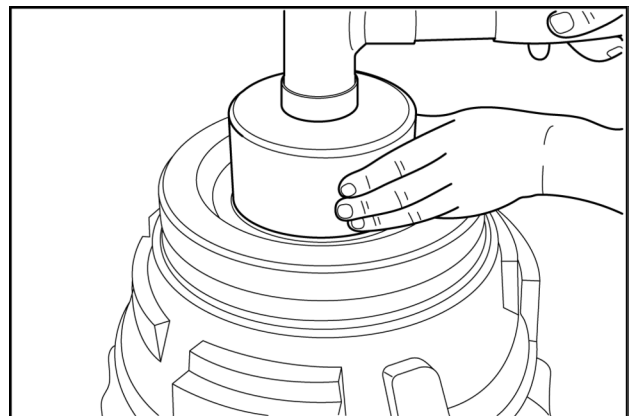
2. Heat the tapered roller bearing and insert it onto the output shaft until fully seated.



RAIL11WEL0536BA 2

3. Insert the shaft seal into the brake housing. Use a suitable device for the exact installation position of the seal.

NOTE: wet the outer diameter of the shaft seal with mineral spirits before assembly.



RAIL11WEL0537BA 3

Contents

Hydraulic systems - 35

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[35.359] Main control valve	35.4
[35.357] Pilot system	35.5
[35.204] Remote control valves	35.6
[35.752] Hydraulic fan drive cooling system.....	35.7
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[35.723] Front loader bucket hydraulic system	35.9
[35.734] Tool quick coupler hydraulic system	35.10

System Function Overview

This section provides a detailed explanation of how the Pressure and Flow Compensated (PFC) pump compensator controls the pump.

When the engine is off, the pressure regulator spool (**FR1**) and the flow regulator spool (**FR2**) are spring loaded to the closed position. The counterbalance spring pushes the swash plate to the full flow position. At start-up, pump output flow is available to the steering and loader valve. The steering and loader control systems are closed center design. The oil supply from the PFC pumps are blocked with the controls in neutral. With all controls in neutral, the LS pressure will be vented to tank pressure. Pump outlet pressure is internally ported to the non spring end of the flow regulator spool (**FR2**). Pump outlet pressure pushes on the left end of the flow regulator spool (**FR2**) overcoming the flow regulator spring (**5**). Pump outlet pressure is then ported through the flow regulator spools to the control piston (**2**). The control piston (**2**) then pushed the swash plate towards minimum displacement. The pump then delivers only the flow required to maintain the flow regulator spring (**5**) pressure.

The flow regulator spring (**5**) is adjustable. Typically this spring does not require adjustment. If adjustment is required, use the table below for the specifications. The flow regulator pressure of the first pump (**34A**) must be adjusted to specification. The adjustment of the flow regulator pressure of second pump (**33A**) is lower than the first pump. If one compensator is adjusted, the opposite compensator must also be checked and adjusted. Measure both the pump outlet pressure and the LS pressure for the pump. Adjust the flow regulator spool to the pressure differential specification. DO NOT activate any of the controls while making the adjustment, as the gauge may be damaged. It is preferable to have a shutoff valve at the gauge to protect it from overpressure. The first pump flow regulator pressure must **3 – 4 bar (44 – 58 psi)** higher than the adjustment of the second pump flow regulator. It is preferable to use the same gauge to make both of these adjustments to assure accuracy. The pump outlet pressure would be approximately **24 – 35 bar (348 – 508 psi)**.

Model	Pump 1 Delta P	Pump 2 Delta P
W110D and W130D	22 – 25 bar (319 – 362 psi)	Not applicable
W170D	28 – 30 bar (406 – 435 psi)	24 – 26 bar (348 – 377 psi)

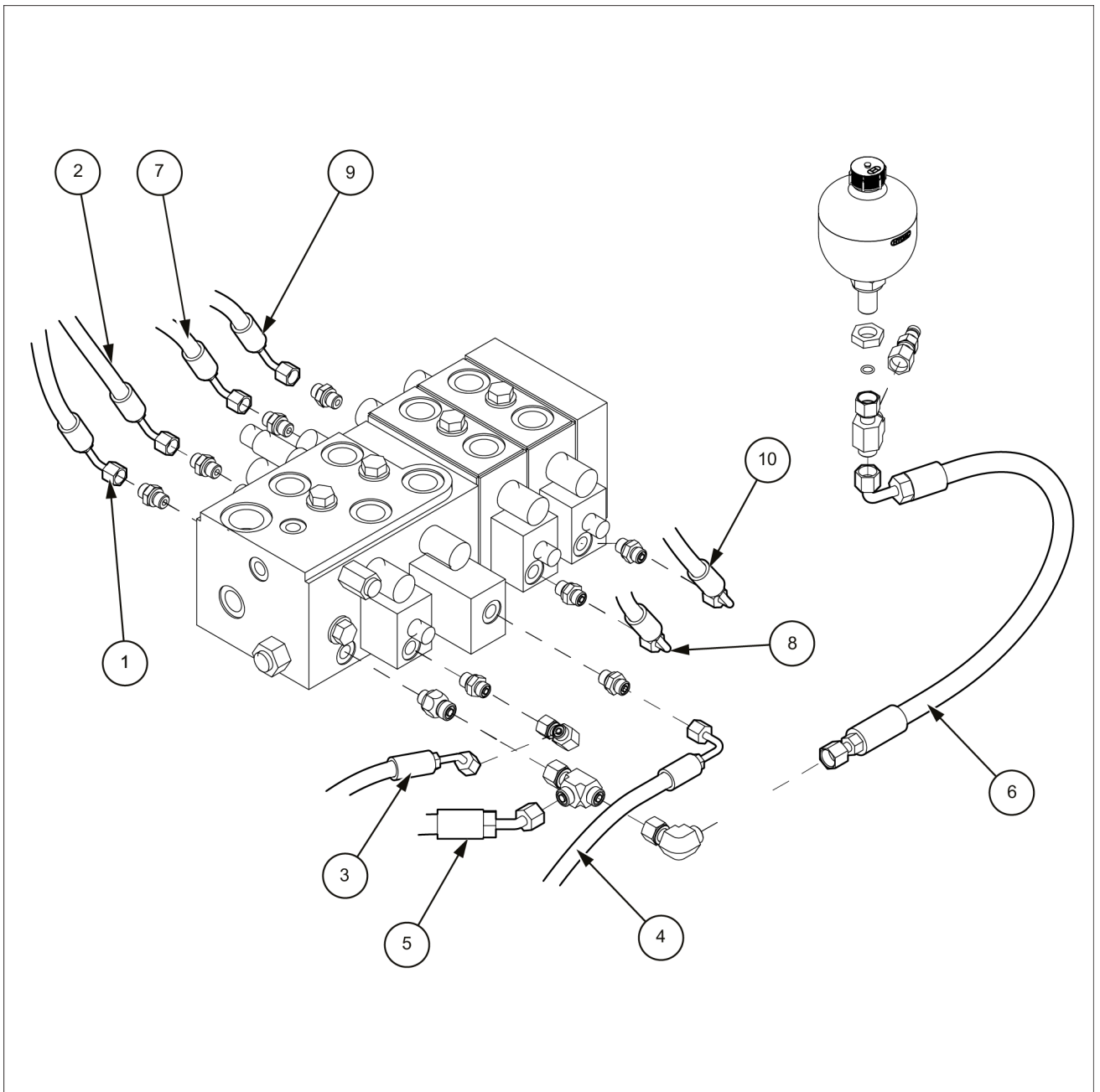
When the steering or loader control system is activated, pump output pressure is available to the control spools. When the loader circuit is activated, oil flow across the spool causes a pressure drop (Delta P) between the (PFC) pump outlet pressure (**4**) and the LS signal pressure (**6**) back to the pump compensator. Pump output flow is delivered to the inlet of the loader control valve through the steering priority valve.

When the pump outlet pressure (**4**) is higher than the LS signal pressure (**6**) plus the spring force (**5**), the flow regulator spool (**FR2**) will gradually shift to send pump outlet oil (**4**) to the control piston (**2**) to reduce the output of the pump. The flow regulator spool (**FR2**) will remain in balance between the pump outlet pressure (**4**) on the left end and the LS pressure (**6**) plus the spring force (**5**) on the right end of the spool. The control piston (**2**) will move the swash plate (**3**) so that the flow from the pump will maintain the specified differential pressure (Delta P).

The pressure at which the flow control spool (**2**) shuts the pump down is adjustable. The flow control spool of the second pump is to be adjusted approximately **4 bar (58 psi)** lower than the flow regulator on the first pump. Any time that the pump is at less than full displacement, the flow control spool (**2**) will maintain the Delta P. At less than full flow delivery of the 1st pump, the difference between pump outlet pressure and the LS pressure (Delta P) will be the higher pressure setting of the 1st pump compensator. When the 1st pump is at maximum flow, the difference between pump outlet pressure and the LS pressure (Delta P) will be the lower pressure setting of the 2nd pump. If the load in the bucket would require **138 bar (2000 psi)** pump outlet pressure to raise the load, the signal pressure would be **138 bar (2000 psi)** minus Delta P.

The maximum pressure available to loader hydraulic system is controlled by loader main relief valve located in the loader valve (**7**). The loader main relief connects between the LS signal pressure and the tank passage in the loader valve (**7**). When the LS signal pressure is restricted, the pump will not be able to deliver flow above that pressure. The steering signal relief valve located in the steering priority valve limits the maximum pressure available to the signal line from steering control circuit to the spring end of the piston pump flow control spool (**FR2**).

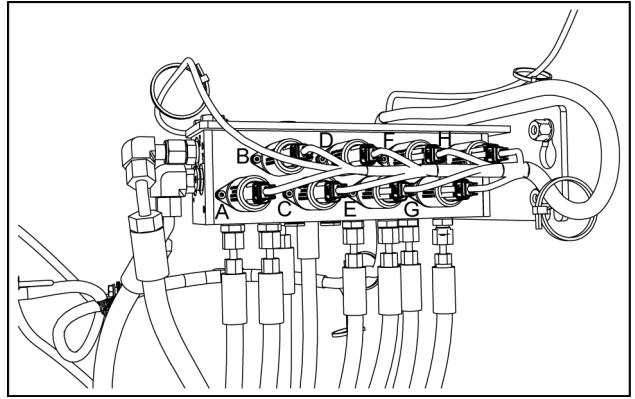
4 spool main control valve



LEIL16WHL1786GB 7

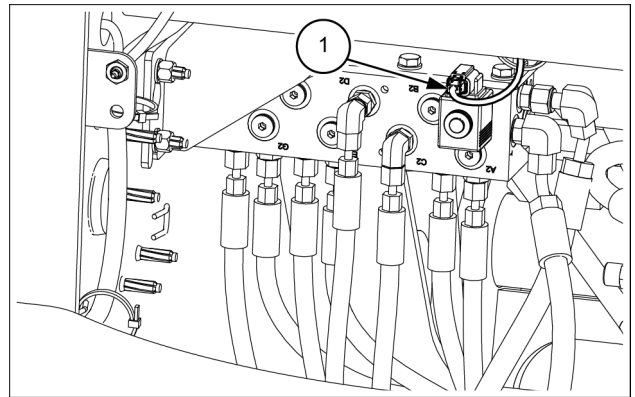
- | | |
|-----------------------------------|--|
| 1. Pilot tilt left hose (Green) | 6. Pilot accumulator hose |
| 2. Pilot lift left hose (Red) | 7. Pilot 3 spool left hose (Yellow white) |
| 3. Pilot tilt right hose (Orange) | 8. Pilot 3 spool right hose (Red white) |
| 4. Pilot lift right hose (Yellow) | 9. Pilot 4 spool left hose (Orange white) |
| 5. Pilot pressure hose | 10. Pilot 4 spool right hose (Green white) |

6. Disconnect all the electrical wires from the electro-hydraulic control valve.



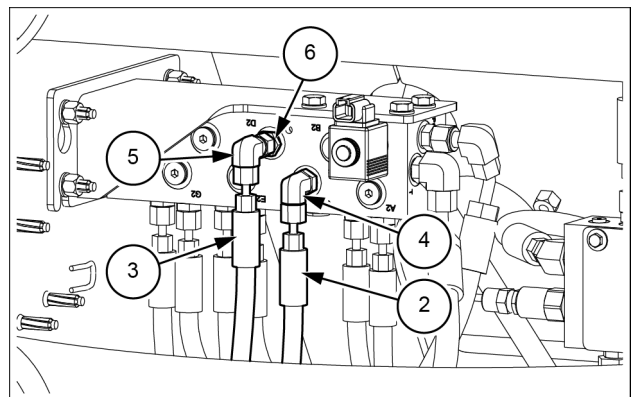
LEIL16WHL2040AB 3

7. Disconnect the electrical connector (1) (connector PST of the front frame harness) from the electro-hydraulic control valve.



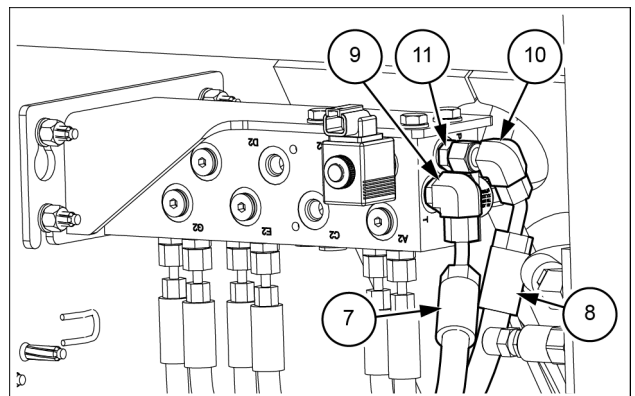
LEIL16WHL2726AB 4

8. Disconnect the pilot tilt right-hand hose (2) and the pilot lift right-hand hose (3) from the electro-hydraulic control valve.
9. Remove the 90° elbow (4), the 90° elbow (5) and the fitting (6) from the electro-hydraulic control valve.



LEIL16WHL2727AB 5

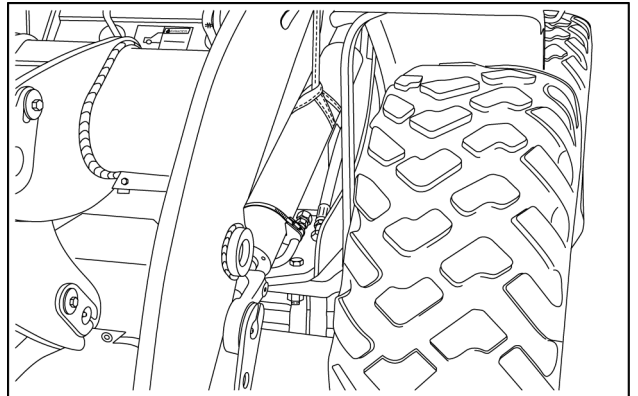
10. Disconnect the pilot tank hose (7) and the pilot pressure hose (8) from the electro-hydraulic control valve.
11. Remove the 90° elbow (9), the 90° elbow (10) and the fitting (11) from the electro-hydraulic control valve.



LEIL16WHL2728AB 6

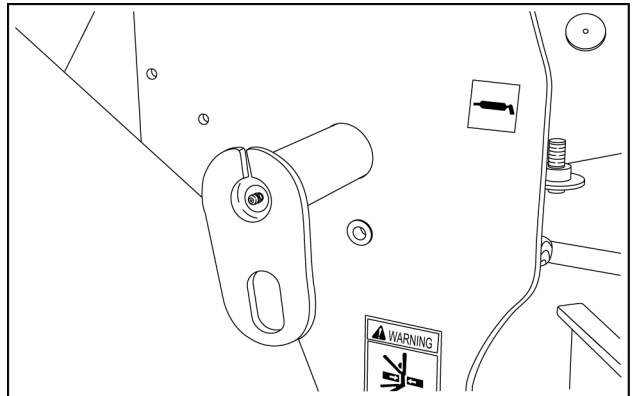
Lift arm cylinder - Install

1. Apply antiseize compound to the bores in the front frame and the yoke on the piston rod.
2. Use a proper lifting device and position the lift cylinder on the machine.



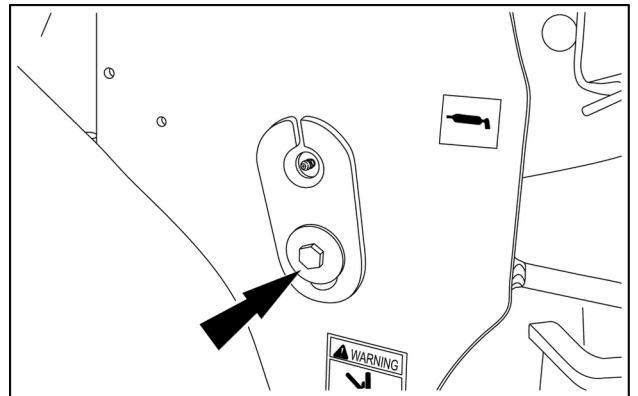
LEIL13WHL1264AA 1

3. Align the closed end of the lift cylinder with the front frame and install the pivot pin.



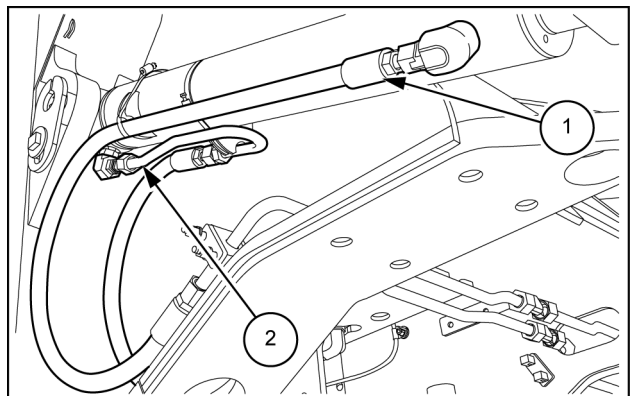
LEIL13WHL1263AA 2

4. Align the pivot pin with the front frame and install the spacer, washer and bolt. Tighten the bolt.



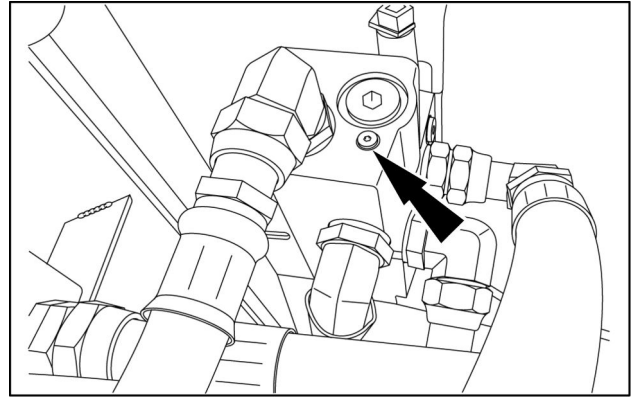
LEIL13WHL1262AA 3

5. Remove the caps and plugs and connect the hose (1) to the front end of the lift cylinder. Remove the caps and plugs and connect the tube (2) to the head of the lift cylinder.



LEIL15WHL1435AB 4

6. Tighten the accumulator manual bleeder valve, located on the bottom of the Ride control valve. Torque the valve to **3.5 N·m (31 lb in)**. Install the plug and tighten. Torque the plug to **7 N·m (62 lb in)**.



RAPH12WEL2604AA 4

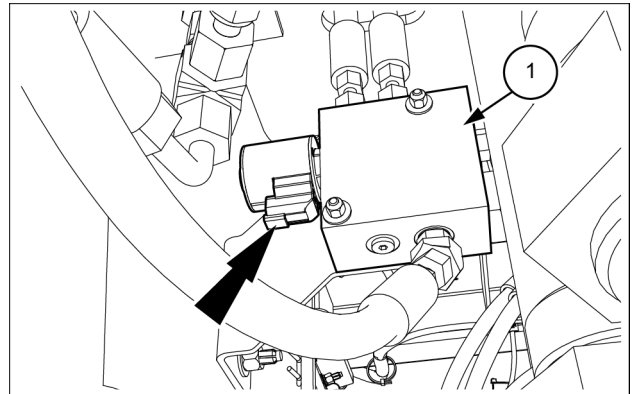
7. Put the articulation lock in the OPERATING position.
8. Check the level of the hydraulic oil in the reservoir. Add fluid as required. Tighten the filler cap on the hydraulic reservoir.
9. Bleed the Ride control valve and the Ride control accumulator. Refer to **Ride control solenoid valve block - Bleed (35.701)**.

Solenoid valve - Remove

1. Park the machine on a level surface and lower the loader bucket to the floor. Stop the engine.

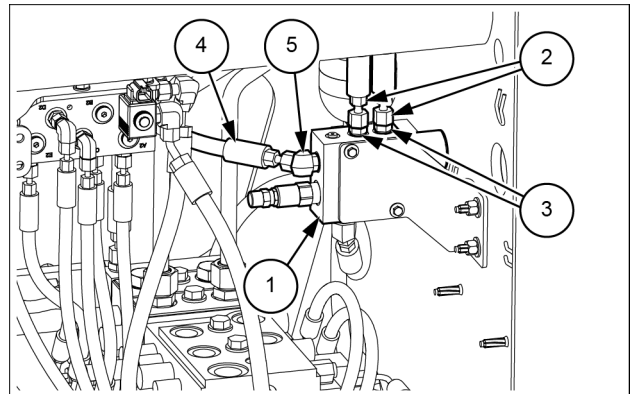
NOTICE: with the engine *NOT* running, pump the brake repeatedly to be sure the brake accumulators have no hydraulic pressure. Turn the ignition switch to the ON position and move the joystick in all directions several times to release any hydraulic pressure in the pilot control circuit. Turn the ignition key to the OFF position.

2. Place the timed disconnect switch in the OFF position.
3. Loosen the filler cap on the hydraulic reservoir to release any air in the reservoir. Connect a vacuum pump to the hydraulic reservoir, turn on the pump.
4. Gain access to the solenoid valve (1) located on the right-hand side of the front chassis.
5. Disconnect the electrical connector from the solenoid valve (1).



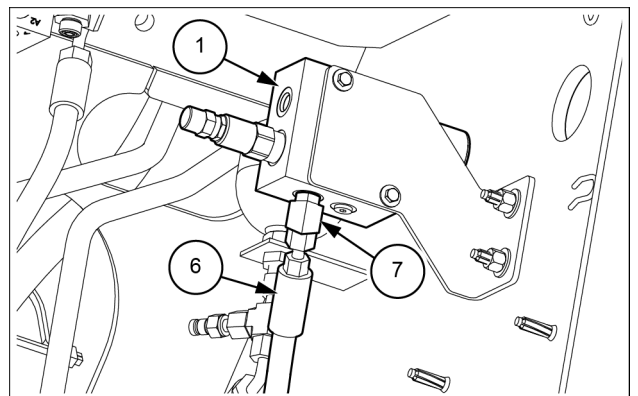
LEIL16WHL2527AB 1

6. Disconnect the two coupler hoses (2) from the solenoid valve (1). Remove the two fittings (3) from the solenoid valve (1).
7. Disconnect the tank hose (4) from the solenoid valve (1). Remove the 45° elbow (5) from the solenoid valve (1).



LEIL16WHL1438AB 2

8. Disconnect the coupler pressure hose (6) from the solenoid valve (1). Remove the 45° elbow (7) from the solenoid valve (1).



LEIL16WHL1439AB 3

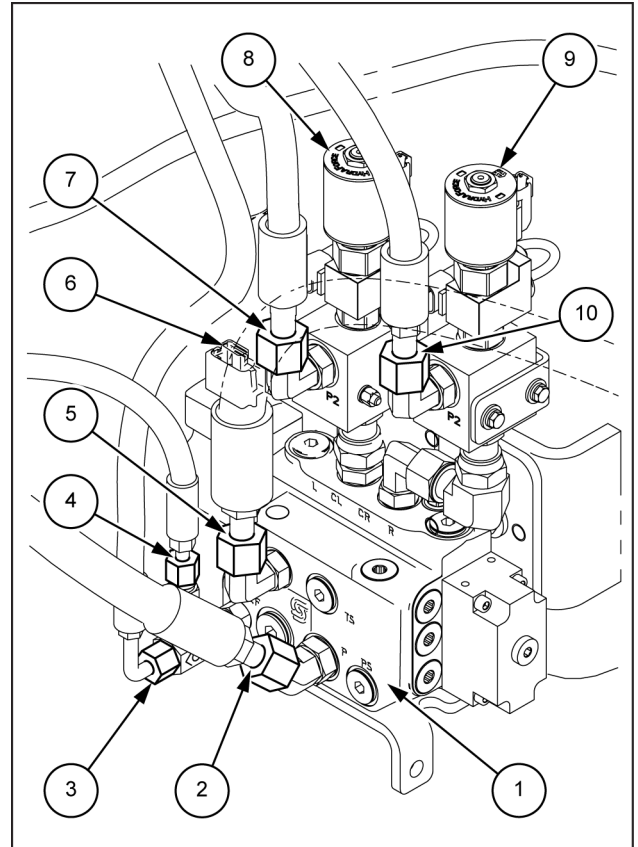
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Steering - 41

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[41.216] Cylinders	41.2
[41.910] Auxiliary steering	41.3

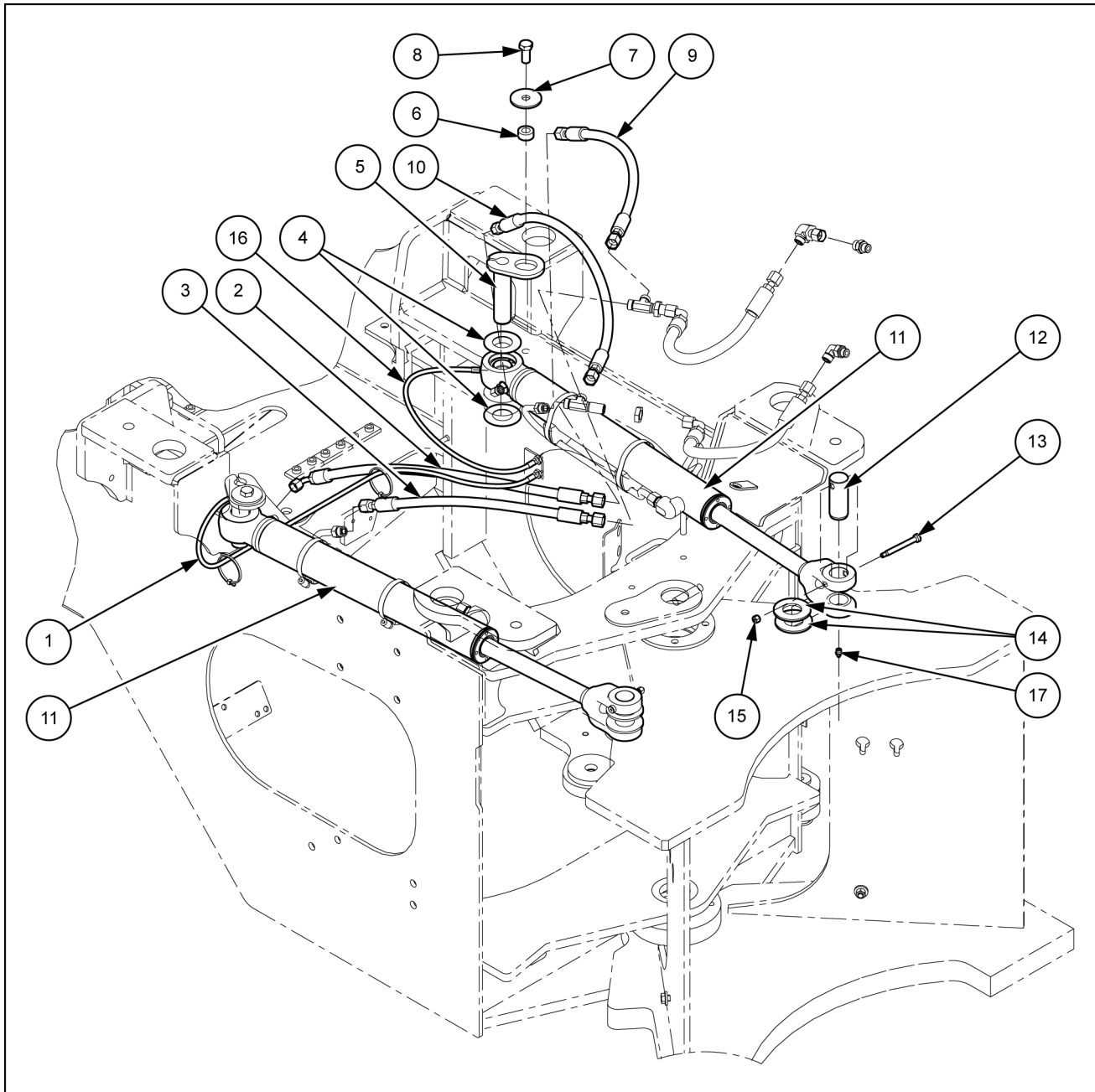
Hydraulic steering system - Remove - Steering EHPS and cut-off valves

1. Remove the fill cap of the hydraulic reservoir, attach a vacuum pump to the reservoir, start the pump.
2. Clean all dirt and grease from the steering valves and adjacent areas.
3. Disconnect the electrical connector from the connector **(6)** of the steering EHPS valve **(1)**.
4. Disconnect the electrical connectors from the cut-off valves **(8)** **(9)**.
5. Tag and disconnect the steering LS hoses **(3)** and **(4)** from the shuttle tee valve. Plug the hoses and cap the fittings.
6. Tag and disconnect the suction valve hose **(2)** and hose (to tank) **(5)** from the steering EHPS valve **(1)**. Plug the hoses and cap the fittings.
7. Tag and disconnect the hose (to cylinder) **(7)** from the cut-off valve **(8)** and the hose (to cylinder) **(10)** from the cut-off valve **(9)**. Plug the hoses and cap the fittings.



LEIL16WHL1032BB 1

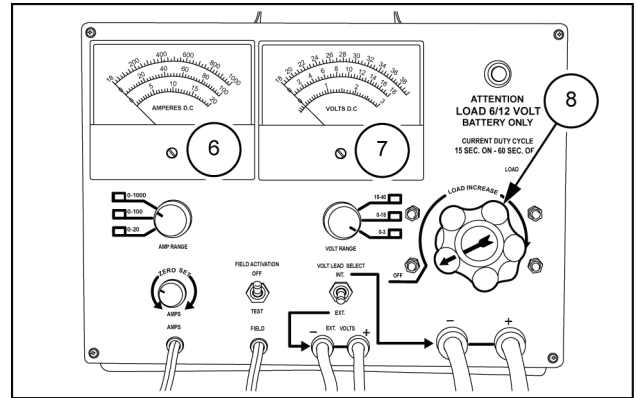
Steering cylinder - Install



LEIL16WHL1047GB 1

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

7. Turn the load control **(8)** until the voltmeter **(7)** indicates 24 volts. Look at the ammeter **(6)** in the tester. Make a record of the ammeter indication.



LEIL13WHL0660AB 3

8. Hold the tachometer against the armature shaft. Look at the tachometer. Make a record of the indication.
9. Release the button on the remote starter switch **(1)**.

Understanding the test results

1. If the ammeter indication in step 6 was **30 A** or less and the tachometer indication in step 7 was **6950 RPM** or more, the auxiliary steering motor is good.
2. If the armature speed was less than **6950 RPM** and the ammeter indication was higher than **30 A**, replace the motor.

Air conditioning - Dynamic description

The refrigerant circuit of the air conditioning system contains five major components: compressor (3), condenser (4), receiver-drier (5), expansion valve (1) and evaporator (2). These components are connected by tubes and hoses and operate as a closed system. The air conditioner system is charged with **HFC R134A** refrigerant.

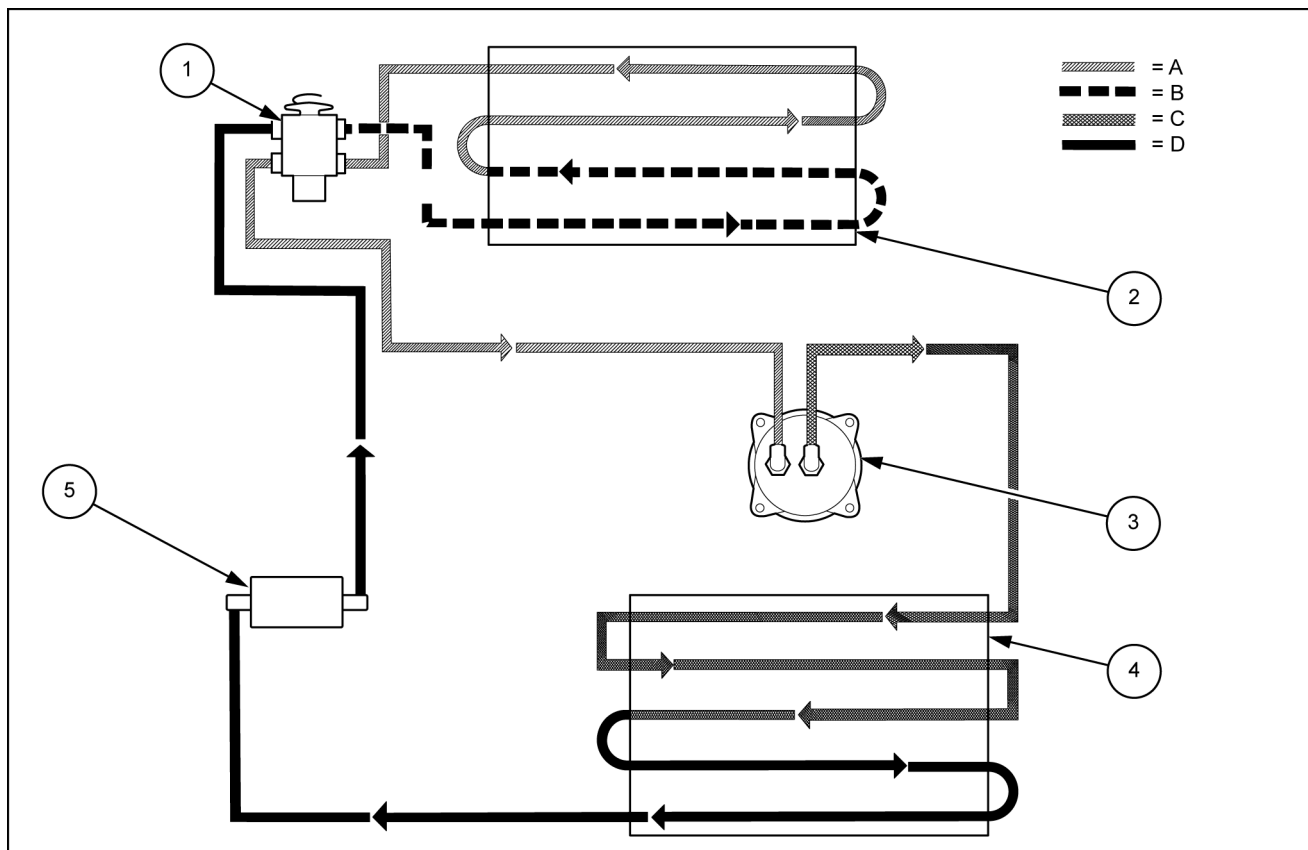
The compressor receives the refrigerant as a low pressure gas. The compressor then compresses the refrigerant and sends it in the form of a high pressure gas to the condenser. The air flow through the condenser then removes the heat from the refrigerant. As the heat is removed the refrigerant changes to a high pressure liquid.

The high pressure refrigerant liquid then flows from the condenser to the receiver-drier. The receiver-drier is a container filled with moisture removing material, which removes any moisture that may have entered the air conditioner system in order to prevent corrosion of the internal components of the air conditioner system.

The refrigerant, still in a high pressure liquid form, then flows from the receiver-drier to the expansion valve. The expansion valve then causes a restriction in flow of refrigerant to the evaporator core. The evaporator meters refrigerant flow based on evaporator heat load.

As the refrigerant flows through the evaporator core, the refrigerant is heated by the air around and flowing through the evaporator fins. The combination of increased heat and decreased pressure causes the air flow through the evaporator fins to become very cool and the liquid refrigerant to become a low pressure gas. The cooled air then passes from the evaporator to the cab for the operator's comfort.

The electrical circuit of the air conditioning system consists of a fan speed control, temperature control, one relay, a blower motor, blower resistor, Air Conditioning compressor clutch, Air Conditioning low pressure switch, Air Conditioning high pressure switch, and Air Conditioning warning light.



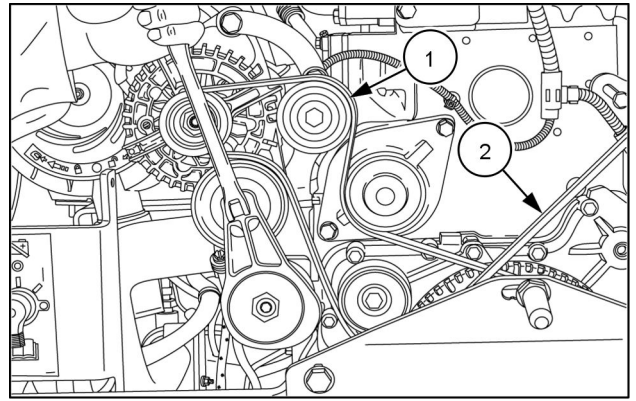
LEIL15WHL0770FB 1

- 1. Expansion valve
- 2. Evaporator
- 3. Compressor

- 4. Condenser
- 5. Dryer
- A. Low pressure gas

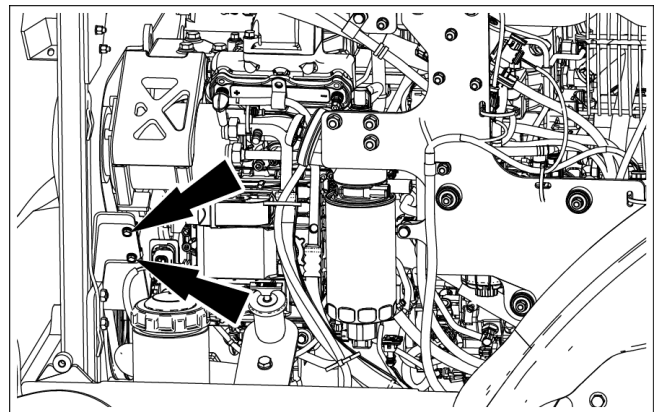
- B. Low pressure liquid
- C. High pressure gas
- D. High pressure liquid

6. Install the drive belt **(1)** first, then install the air-conditioning belt **(2)**. Check belt tension by squeezing the belt together with your hand midway between the pulleys. When properly installed, the belt should be able to be squeezed **20 mm (0.8 in)** maximum.

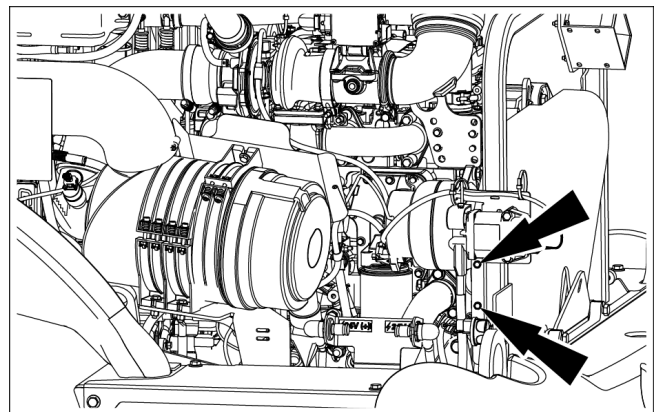


RAPH12WEL1469AA 4

7. Install the belt guard. Use the bolts M8x25 to secure the belt guard.



LEIL16WHL1362AB 5



LEIL16WHL1311AB 6

8. Charge the air conditioning system according to the specifications.

Electrical components - ECU description

A-108F - ZF DIAGNOSTIC CONNECTOR (ECU)

Component Type	ECU
Wiring frames	SHEET 25
Connectors	X-ZF_DI (Plug)

A-AC CONTROL PANEL - DENSO (ECU)

Component Type	ECU
Wiring frames	SHEET 33

A-DIA - DIAGNOSTIC PLUG (ECU)

Component Type	ECU
Wiring frames	SHEET 24
Connectors	X-DIA (Plug)

A-DISPLAY - (ECU)

Component Type	ECU
Wiring frames	SHEET 39

A-DRIVER 24V - DENSO (ECU)

Component Type	ECU
Wiring frames	SHEET 33

A-DSP - DISPLAY (ECU)

Component Type	ECU
Wiring frames	SHEET 24
Connectors	X-DSP (Receptacle)

A-ECU - ENGINE CONTROLLER (ECU)

Component Type	ECU
Wiring frames	SHEET 16 SHEET 17 SHEET 18
Connectors	X-ECU (Receptacle)

A-EH_VLV - ELECTROHYDRAULIC VALVE (ECU)

Component Type	ECU
Wiring frames	SHEET 22
Connectors	X-PILOT_ENABLE (Receptacle) X-BOOM_RAISE (Receptacle) X-BOOM_LOWER (Receptacle) X-BUCKET_ROLL (Receptacle) X-BUCKET_DUMP (Receptacle) X-AUX_1_LEFT (Receptacle) X-AUX_1_RIGHT (Receptacle) X-AUX_2_LEFT (Receptacle) X-AUX_2_RIGHT (Receptacle)

A-HVAC - DENSO (ECU)

Component Type	ECU
Wiring frames	SHEET 33

SW-HN_RH_ARM - RH ARMREST HORN SWITCH (Switch)

Component Type	Switch
Wiring frames	SHEET 34

SW-HN_STLK - RH STALK HORN SWITCH (Switch)

Component Type	Switch
Wiring frames	SHEET 34
Connectors	X-STLK (Receptacle)

SW-HORN - (Switch)

Component Type	Switch
Wiring frames	SHEET 23
Connectors	X-HN (Plug)

SW-HZD_SW - HAZARD SWITCH (Switch)

Component Type	Switch
Wiring frames	SHEET 28
Connectors	X-S_HZD (Receptacle)

SW-K/D - JOYSTICK INTERNAL (Switch)

Component Type	Switch
Wiring frames	SHEET 23

SW-KD - KICK DOWN SW (Switch)

Component Type	Switch
Wiring frames	SHEET 23

SW-KEY - IGNITION SWITCH (Switch)

Component Type	Switch
Wiring frames	SHEET 03
Connectors	X-KEY (Receptacle)

SW-LOW PRESSURE SWITCH N.C. - DENSO (Switch)

Component Type	Switch
Wiring frames	SHEET 33

SW-MD - MASTER DISCONNECT (Switch)

Component Type	Switch
Wiring frames	SHEET 03

SW-MH_SW - MIRROR HEATER SWITCH (Switch)

Component Type	Switch
Wiring frames	SHEET 34
Connectors	X-S_HMR (Receptacle)

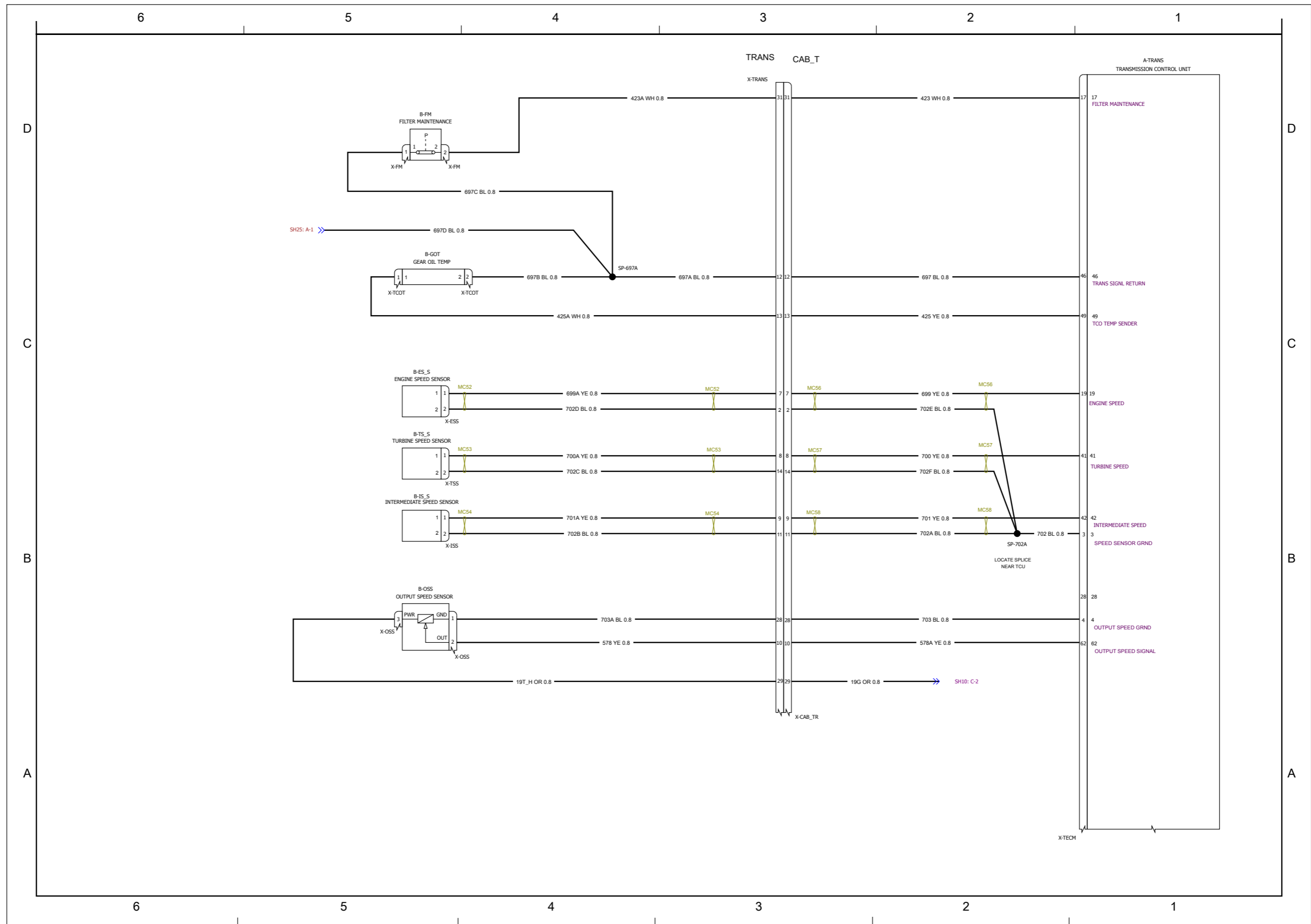
SW-PD - SWITCH/KEY PAD (Switch)

Component Type	Switch
Wiring frames	SHEET 24
Connectors	X-SW_PD (Receptacle)

**Wiring harnesses - Electrical schematic sheet 14 SH14 - CAB & CHASSIS
GROUND PWR DISTR**

Type	Component	Connector / Link	Description
Connector	X-GND_FRNT	X-GND_FRNT	CHASSIS GROUND
Connector	X-GND_GRL	X-GND_GRL	GROUND GRILL TERMINAL
Connector	X-GND_PED	X-GND_PED	GROUND PEDESTAL RING
Connector	X-GND_RR	X-GND_RR	CHASSIS GROUND
Connector	X-GND_RR2	X-GND_RR2	CHASSIS GROUND
Connector	X-GND_RR3	X-GND_RR3	SEC STRG CHASSIS GRND
Connector	X-GND_RR4	X-GND_RR4	
Connector	X-GRD_WIF	X-GRD_WIF	WATER IN FUEL GRND
Connector	X-SSG	X-SSG	SECONDARY STEERING GROUND RING
Connector	X-X31CF1-2	X-X31CF1-2	CAB GROUND BLOCK
Connector	X-X31CF1-3	X-X31CF1-3	CAB GROUND BLOCK
Connector	X-X31CF2-1	X-X31CF2-1	STEERING COLUMN GROUND
Connector	X-X31CF2-2	X-X31CF2-2	STEERING COLUMN GROUND
Connector	X-YSS	X-YSS	SEC STEERING VALVE SOL

Electrical systems - Harnesses and connectors

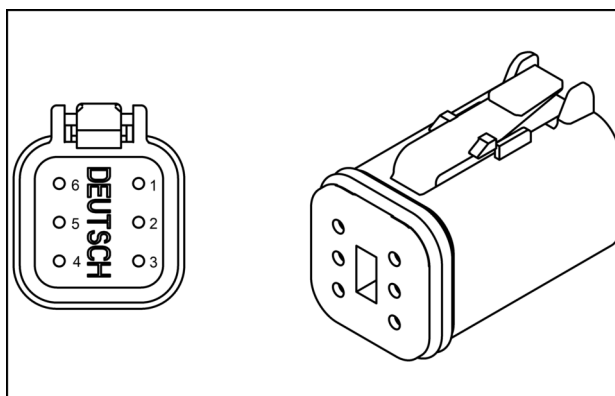


SHT_26 1

**Wiring harnesses - Electrical schematic sheet 39 SH39 -
MISCELLANOUS, REAR CAMERA**

Type	Component	Connector / Link	Description
ECU	A-DISPLAY		
ECU	A-ORLACO CAMERA		REAR VIEW CAMERA
ECU	A-SFB	X-X6	SMART FUSE BOX
Connector	X-CAB_E	X-CAB_E	CAB TO ENGINE
Connector	X-CAM	X-CAM	REAR CAMERA
Connector	X-CAM2	X-CAM2	CAMERA CHORD
Connector	X-ENG	X-ENG	ENGINE TO CAB
Connector	X-LC2	X-LC2	LOADCENTER 2
Connector	X-X6	X-X6	SFB

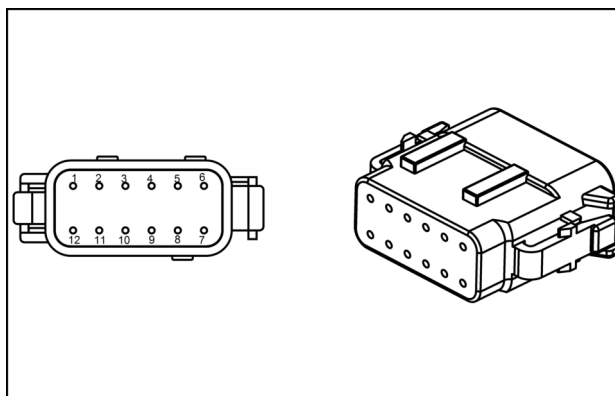
X-CAB_JSS - CAB TO JSS FRAME HARNESS [SH24: A-6] (87694112) (Receptacle)



87694112 41
87694112

Pin	From	Wire	Description	Color-Size	Frame
1	SP-799-P-X	799A	JSS PILOT DUMP	OR - 0.8	SHEET 10
2	X-UCM3A (Receptacle) pin 12 UCM	676	JSS PILOT PRESS SIG	YE - 0.8	SHEET 21
3	SP-677-P-X	677	5V REF3 OUT	PK - 0.8	
5	X-CG4 (Receptacle) pin B CAB GROUND	955X	JSS GROUND	BK - 0.8	
6	X-UCM3B (Receptacle) pin 15 UCM	273	JSS CUTOFF SIG B	YE - 0.8	

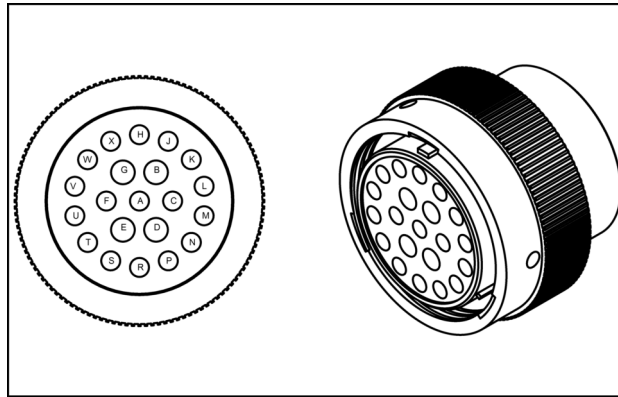
X-CAB_L - CAB TO JSS L ARMREST (87700156) (Receptacle)



87700156 42
87700156

Pin	From	Wire	Description	Color-Size	Frame
1	SP-471-P-X	471J	5V REF2	PK - 0.8	SHEET 21
2	X-UCM2A (Receptacle) pin 18 UCM	670	JSS JOYSTICK 1	YE - 0.8	
3	SP-651-P-X	651L	5V GND2	BL - 0.8	
4	X-UCM2B (Receptacle) pin 12 UCM	675	LH ARMREST POSITION UP	GY - 0.8	
5	X-UCM2A (Receptacle) pin 12 UCM	630	JSS JOYSTICK 2	YE - 0.8	
6	SP-967-P-X	967C	5 V REF GRND3	BL - 0.8	
7	SP-677-P-X	677C	5V REF3 OUT	PK - 0.8	
8	X-UCM2B (Receptacle) pin 20 UCM	673	LH ARMREST POSITION DWN	TN - 0.8	
9	X-UCM3B (Receptacle) pin 16 UCM	678	JSS ACTIVATION	WH - 0.8	
10	SP-799-P-X	799B	JSS IGNITION POWER	OR - 0.8	
11	X-CG4 (Receptacle) pin J CAB GROUND	954J	LH JSS GND	BK - 0.8	
12	X-UCM3B (Receptacle) pin 23 UCM	682	JSS ACTIVATION NC	YE - 0.8	

X-FRNT - FRONT TO BOTTOM STD (87704426) (Receptacle)



87704426 90

87704426

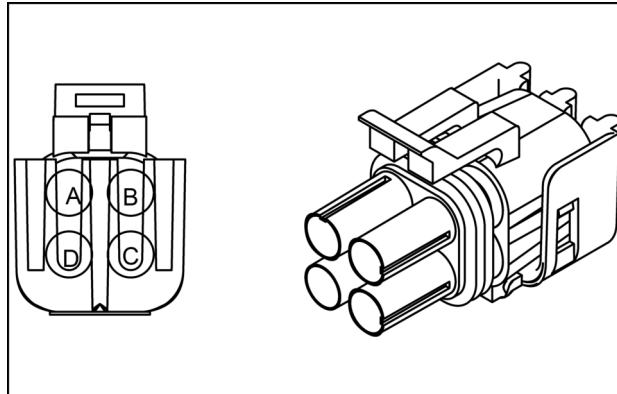
Pin	From	Wire	Description	Color-Size	Frame
A	X-FAX (Receptacle) pin 1 FRONT AXLE TEMP SENSOR	687B	FRONT AXLE TEMP	YE - 0.8	SHEET 20
B	X-PXF (Plug) pin A RETURN TO DIG PROX	294B	RTD SIG	YE - 0.8	SHEET 23
B	X-PXT (Plug) pin A RTD XT	294C	RTD XT SIGNAL	YE - 0.8	
C	X-LLF pin 3 FRONT COMBO LAMP LEFT	132E	LH HIGH BEAM LAMP	VT - 0.8	SHEET 28
F	X-LLF pin 2 FRONT COMBO LAMP LEFT	133B	LH LOW BEAM LAMP	VT - 0.8	
H	X-LLF pin 4 FRONT COMBO LAMP LEFT	127C	LH POSITION	VT - 0.8	
J	X-LLF pin 5 FRONT COMBO LAMP LEFT	136C	LH FRONT TURN	VT - 0.8	
K	X-LRF pin 3 FRONT COMBO LAMP RT	137B	RH HIGH BEAM LAMP	VT - 0.8	
L	X-LRF pin 2 FRONT COMBO LAMP RT	138B	RH LOW BEAM LAMP	VT - 0.8	
M	X-LRF pin 4 FRONT COMBO LAMP RT	130F	RH POSITION	VT - 0.8	
N	X-LRF pin 5 FRONT COMBO LAMP RT	135E	RH FRONT TURN	VT - 0.8	
P	X-YRC (Receptacle) pin 1 RIDE CONTROL SOLENOID	366B	RIDE CONTROL SOL PWR	WH - 0.8	SHEET 22
R	X-YPE (Receptacle) pin 1 COUPLER VALVE	367B	COUPLER SOL PWR	WH - 0.8	
S	X-YPE (Receptacle) pin 2 COUPLER VALVE	368B	COUPLER SOL RETURN	BR - 0.8	
T	X-HN1 (Plug) pin 1 HORN PWR	112B	HORN	YE - 0.8	SHEET 34
U	X-PRB (Plug) pin A ROLL BACK PRESSURE SWITCH	291B	ROLL BACK PRESSURE SW	YE - 0.8	SHEET 22
V	SP-651D-P-X	651D	5V GND2	BL - 0.8	
V	X-FAX (Receptacle) pin 2 FRONT AXLE TEMP SENSOR	651N	TEMP SENS PILOT	BL - 0.8	
W	SP-792D-P-X	792D	PILOT TARGETS	OR - 0.8	SHEET 23
X	X-PXH (Plug) pin A HEIGHT CNTRL PROX	295B	HT CNTRL SIGNAL	YE - 0.8	

Electrical systems - Harnesses and connectors

Pin	From	Wire	Description	Color-Size	Frame
F6_6	X-P1009 (Plug) pin 1 B+ POWER STUD	541	CAB ISOLATED POWER	RD - 2.0	SHEET 08
F6_6	SP-F6 6-P-X	WIRE6256	WIRE6256		
F8_4	F-3F8-P-2	WIRE6263	WIRE6263		
F8_4	X-LC3 (Receptacle) pin R1_30 LOADCENTER 3	191	SWBAT ISOLATOR SPARE SUPPLY	RD - 3.0	
F8_8	F-3F8-P-1	WIRE6262	WIRE6262		
F8_8	X-P1009 (Plug) pin 1 B+ POWER STUD	917	CAB ISOLATED POWER	RD - 3.0	
F1_13	F-3F1-P-2	WIRE6261	WIRE6261		
F1_13	X-X-PO1 (Receptacle) pin A POWER OUTLET	750	RH CONSOLE 12V PWR OUTLET	OR - 1.0	
F3_11	X-CNV (Receptacle) pin 5 24 TO 12 POWER CONVERTER	748	12V ACC POWER	OR - 2.0	
F3_11	SP-F3 11-P-X	WIRE6250	WIRE6250		
F3_15	F-3F3-P-2	WIRE6260	WIRE6260		
F3_15	X-RAD (Receptacle) pin 7 RADIO	753	12V FUSED ACC PWR	OR - 0.8	
R1_30	X-LC3 (Receptacle) pin F8_4 LOADCENTER 3	191	SWBAT ISOLATOR SPARE SUPPLY	RD - 3.0	
R1_30	K-3R1-P-30	WIRE6264	WIRE6264		
R1_85	X-LC3 (Receptacle) pin R1_85 LOADCENTER 3	WIRE6266	WIRE6266		
R1_85	X-CG4 (Receptacle) pin F CAB GROUND	954F	SPARE RELAY COIL GND	BK - 0.8	
R1_85	X-LC3 (Receptacle) pin R1_85 LOADCENTER 3	WIRE6266	WIRE6266		
R1_86	K-3R1-P-86	WIRE6275	WIRE6275		
R1_86	X-X3 (Receptacle) pin 15 SFB	192	SIG DC CONVERTER	OR - 0.8	
R1_87	K-3R1-P-87	WIRE6265	WIRE6265		
R1_87	SP-746-P-X	746	POWER CONVERTER ACC POWER	OR - 3.0	
R2_30	K-3R2-P-30	WIRE6274	WIRE6274		
R2_30	X-LC5 (Receptacle) pin 5A LOADCENTER 5	182	SEC STRG IGN PWR	OR - 0.8	
R2_85	K-3R2-P-85	WIRE6268	WIRE6268		
R2_85	SP-954S-P-X	954R	SEC STRG SIG GRND	BK - 0.8	
R2_86	K-3R2-P-86	WIRE6273	WIRE6273		
R2_87	K-3R2-P-87	WIRE6267	WIRE6267		
R2_87	X-CAB_B (Plug) pin 12 CAB TO BOTTOM	441	SEC STRG SOL PWR	OR - 0.8	
R3_30	K-3R3-P-30	WIRE6272	WIRE6272		
R3_30	X-LC4 (Receptacle) pin 8A LOADCENTER 4	877	REAR DEFROST ACCESSORY POWER	OR - 2.0	
R3_85	K-3R3-P-85	WIRE6270	WIRE6270		
R3_85	SP-954S-P-X	954M	REAR DEFROST RELAY GND	BK - 0.8	
R3_86	K-3R3-P-86	WIRE6271	WIRE6271		
R3_86	X-X3 (Receptacle) pin 7 SFB	120	REAR DEFROST	YE - 0.8	
R3_87	K-3R3-P-87	WIRE6269	WIRE6269		
R3_87	X-RWHE1 (Receptacle) pin 1 REAR WINDOW HEATER	801	REAR DEFROST PWR	OR - 2.0	
R4_30	SP-219A-P-X	219D	NON-ISOLATED PWR	RD - 0.8	SHEET 03
R4_85	SP-113-P-X	113F	HORN SIGNAL	BR - 0.8	SHEET 13
R4_86	SP-219A-P-X	219E	NON-ISOLATED PWR	RD - 0.8	
R4_87	X-CAB_B (Plug) pin 21 CAB TO BOTTOM	112	HORN	YE - 0.8	

Pin	From	Wire	Description	Color-Size	Frame
1	CG1-P-1 CAB GROUND RH HEADLINER	272	REAR DEFROST GND	BK - 2.0	SHEET 36

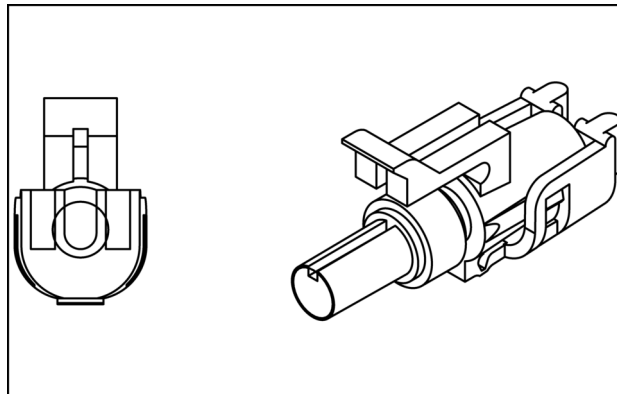
X-RWM - REAR WIPER MOTOR [M-R_WPR_M] (87692862) (Plug)



87692862 199
87692862

Pin	From	Wire	Description	Color-Size	Frame
B	X-X6 (Receptacle) pin 12 SFB	108	REAR WIPER MOTOR LOW	TN - 1.0	SHEET 32

X-RWM_G - REAR WIPER MOTOR GRND [SH13: C-2] (87693744) (Plug)

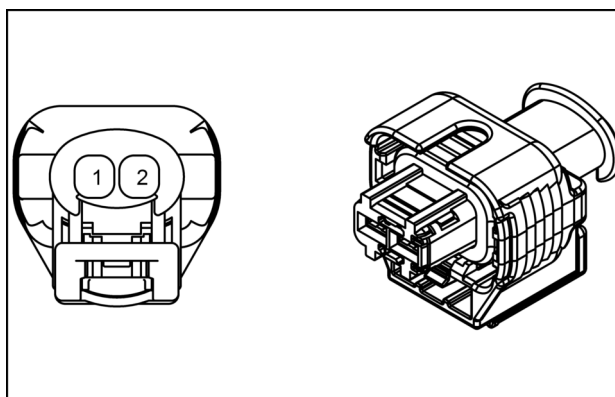


87693744 200
87693744

Pin	From	Wire	Description	Color-Size	Frame
A	X-CG3 (Receptacle) pin L CAB GROUND RH HEADLINER	955V	REAR WIPER MOTOR GND	BK - 1.0	SHEET 32

Pin	From	Wire	Description	Color-Size	Frame
30	X-CAB_E (Receptacle) pin 16 CAB TO ENGINE	400	FAN SPEED SENSOR SGNL	YE - 0.8	SHEET 20
32	X-SP_PK2 (Receptacle) pin X SPLICE PACK	933	UCM CLEAN GROUND	BK - 0.8	
34	X-SP_PK2 (Receptacle) pin X SPLICE PACK	934	UCM CLEAN GROUND	BK - 0.8	

X-UTS - UPSTREAM OF SCR TEMP SENSOR [B-U_TS] (84532147) (Receptacle)

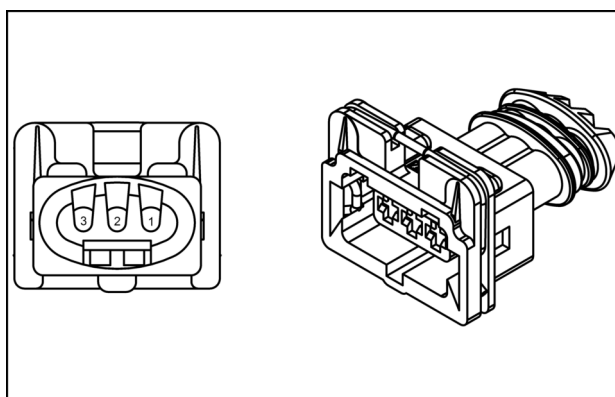


84532147 250

84532147

Pin	From	Wire	Description	Color-Size	Frame
1	X-ECU (Receptacle) pin 32 ECU CONNECTOR	632	SCR UPSTREAM TEMP	YE - 0.8	SHEET 17
2	SP-610-P-X	610A	TEMP SENSOR GROUND	BK - 0.8	

X-WIF - WATER IN FUEL [B-WIF] (87709663) (Receptacle)



87709663 251

87709663

Pin	From	Wire	Description	Color-Size	Frame
1	X-EDC7 (Plug) pin 42 ENGINE CONTROLLER T2/3	613A	WATER IN FUEL SIGNAL T2	YE - 0.8	SHEET 17
1	X-ECU (Receptacle) pin 13 ECU CONNECTOR	613	WATER IN FUEL	YE - 0.8	
2	SP-603-P-X	603K	WIF GRND T2	BK - 0.8	
2	SP-643-P-X	643B	WATER IN FUEL	BK - 0.8	
3	SP-850A-P-X	850E	KEY SWITCH FUSED POWER	OR - 0.8	

1. Too much gas causes the electrolyte to flow from the cells.
2. The temperature of the electrolyte rises above **52 °C (126 °F)**.

NOTE: for the best charge, use the slow charging rates.

The battery is fully charged when, over a three hour period at a low charging rate, no cell is giving too much gas, and the specific gravity does not change.

Charging Guide For Maintenance Free Batteries

Recommended Rate* and Time for Fully Discharged Battery		
Battery capacity – See Reserve Capacity under Specifications	Slow Charge	Fast Charge
80 min or Less	10 h at 5 A 5 h at 10 A	2.5 h at 20 A 1.5 h at 30 A
Above 80 min to 125 min	15 h at 5 A 7.5 h at 10 A	3.75 h at 20 A 1.5 h at 50 A
Above 125 min to 170 min	20 h at 5 A 10 h at 10 A	5 h at 20 A 2 h at 50 A
Above 170 min to 250 min	30 h at 5 A 15 h at 10 A	7.5 h at 20 A 3 h at 50 A
*initial rate for standard taper charger.		

NOTE: a maintenance free battery will have the words *Maintenance Free* on the decal on the top of the battery. If the center part of the decal has been removed to get access to the battery caps, it is possible the words *Maintenance Free* will have been removed from the decal.

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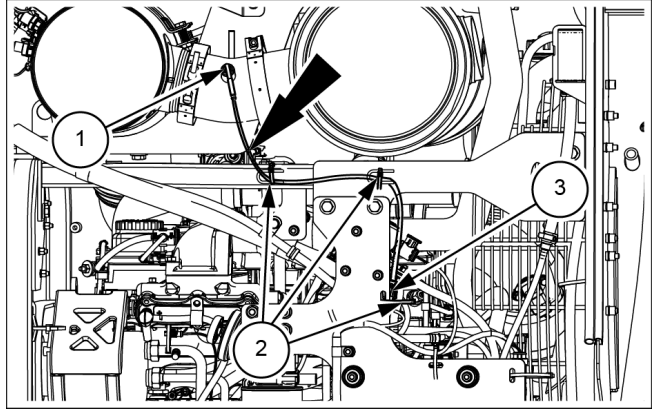
- Thank you very much for reading the preview of the manual.
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- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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4. Loosen the hexagonal nut **(1)** of the catalyst inlet temperature sensor. Remove the temperature sensor from the exhaust system.
5. Cut the straps **(2)** securing wire harness to the catalyst mounting support bracket.
6. Unplug the sensor from machine wiring harness **(3)** and remove it.

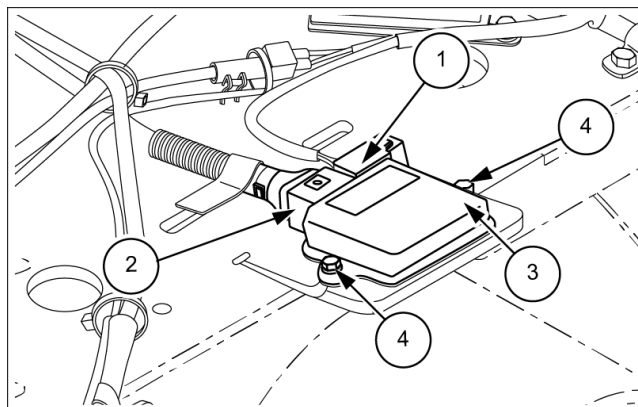


LEIL16WHL1348AB 4

Ammonia (NH₃) sensor - Install - NH₃ Electronic Control Unit

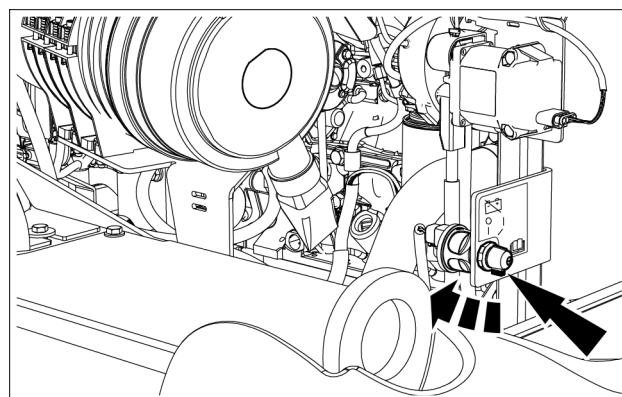
NOTICE: emissions sensors in the exhaust system and on the vehicle may be damaged by vibrations from use of impact wrenches or hammers during service work. Avoid using these tools when servicing components close to the sensors. Remove the sensors with care if use of these tools cannot be avoided.

1. Reconnect the NH₃ Electronic Control Unit (3) to the machine.
Install the hexagonal screws (4)
Reconnect the machine connector (1) and the NH₃ connector sensor (2) to the NH₃ Electronic Control Unit (3).



LEIL15WHL0219AB 1

2. Turn the timed disconnect switch to the ON position.
Lower the engine hood.
Clear any fault code. Start the engine and check to see if problem has been corrected.



LEIL16WHL1382AB 2

8801 - (DTC 2261)-Battery voltage is lower than expected	286
8805 - (DTC 2265) - Fuel rail pressure has exceeded maximum positive deviation limits	288
8858 - (DTC 229A)-DEF/AdBlue tank level sensor voltage too low	289
8867 - (DTC 22A3)-Crankcase pressure too low	291
8910 - (DTC 22CE)-Upstream NOx sensor self-diagnosis result is lower than the limit	292
8931 - (DTC 22E3)-Oil temperature sensor voltage is lower than expected	293
8997 - (DTC 2325)-Rail pressure sensor value is below minimum offset	295
9053 - (DTC 235D)-ECU temperature sensor 1 is too low	296
9309 - (DTC 245D)-ECU temperature sensor 2 is too low	297
9313 - (DTC 2461)-Battery voltage is lower than expected	298
9332 - (DTC 2474)-Intake manifold temperature sensor voltage is lower than expected	300
9347 - (DTC 2483)-Water pump inlet pressure sensor voltage is lower than expected	302
9379 - (DTC 24A3)-Crankcase pressure sensor voltage is lower than expected	304
9412 - (DTC 24C4)-ECU internal failure - Ambient pressure sensor voltage is lower than expected	306
9498 - (DTC 251A)-Downstream SCR catalyst temperature is too low	307
9509 - (DTC 2525)-Fuel rail pressure sensor voltage is lower than expected	309
9550 - (DTC 254E)-DEF/AdBlue quality sensor internal failure (Concentration value is lower than expected)	311
9582 - (DTC 256E)-Upstream NOx sensor internal failure (Heater Short Circuit Error)	312
9614 - (DTC 258E)-Upstream NOx sensor internal failure (short circuit error)	313
9619 - (DTC 2593)-High pressure intercooler outlet temperature sensor voltage is lower than expected	314
96-00 - Fuel Level Sensor Over Resistance [UCM]	316
96-01 - Fuel Level Sensor Under Resistance [UCM]	318
158-03 - Short to Power at Key Switch Crank [UCM]	320
9898 - (DTC 26AA)-DEF/AdBlue temperature sensor voltage is lower than expected	321
9939 - (DTC 26D3)-Oil pressure is too low	323
10010 - (DTC 271A)-Downstream SCR catalyst temperature sensor voltage is lower than expected	324
10077 - (DTC 275D)-ECU temperature sensor voltage is lower than expected	326
10085 - (DTC 2765)-Fuel rail pressure has exceeded minimum limit	327
10328 - (DTC 275D)-Exhaust gas pressure sensor voltage is lower than expected	328
10410 - (DTC 28AA)-DEF/AdBlue tank temperature sensor plausibility min threshold	330
10417 - (DTC 28B1)-Signal range check low for acceleration pedal position device driver sensor 1	331
10522 - (DTC 291A)-Upstream SCR catalyst temperature too low	333
1052-03 - Short to Power at Rear Brake Accumulator Pressure Sensor [UCM]	335
1052-04 - Short to Ground at Rear Brake Accumulator Pressure Sensor [UCM]	336
1565-02 - Armrest Signals not plausible [UCM]	339
3651-02 - Primary FNR Fault [UCM]	342
10570 - (DTC 294A)-DEF/AdBlue under pressure failure	344
10649 - (DTC 2999)-Upstream oxidation catalyst temperature sensor voltage is lower than expected	347
10707 - (DTC 29D3)-Oil pressure sensor voltage is lower than expected	349
10842 - (DTC 2A5A)-DEF/AdBlue supply module pump motor pressure sensor voltage is lower than expected	351

4445 - (DTC 115D)-ECU temperature sensor 1 is too high

Context:

The Engine Control Unit (ECU) monitors ECU internal temperature by the use of two internal temperature sensors. If temperature sensor 1 monitors a temperature greater than **175 °C (347 °F)**, this fault will occur.

Cause:

The ECU temperature sensor 1 has monitored a temperature greater than **175 °C (347 °F)**.

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.

5060 - (DTC 13C4)-ECU internal failure - Ambient pressure sensor voltage is higher than expected

Context:

The Engine Control Unit (ECU) monitors ambient pressure by the ambient pressure sensor which is internal to the ECU. If the ECU detects a voltage greater than **4.88 V** for a period greater than **800 ms**, this fault will occur. If this fault occurs, the ECU will be frozen at the last valid ambient pressure value for a preliminary failure and a replacement ambient pressure of **0.97 bar (14.06 psi)** if the failure is validated. As this fault can occur from abnormal altitude, verify that the machine is not being operating in extreme altitude conditions before diagnosing this fault.

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.

5160-03 - Short circuit to battery voltage or open circuit at internal speed input

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:

There is a short circuit to battery voltage or an open circuit at the supply circuit of the intermediate speed sensor **B-IS_S**. The Transmission Control Unit **A-TRANS** measures a voltage higher than **7.00 V** at speed input pin.

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 intermediate speed sensor **B-IS_S** and the Transmission Control Unit **A-TRANS** is defective.
4. The intermediate speed sensor **B-IS_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-ISS** is connected to the intermediate speed sensor **B-IS_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-ISS** from the intermediate speed sensor **B-IS_S**.

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

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

B. If there are no problems, connect the connector **X-ISS** to the intermediate speed sensor **B-IS_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 9 and 11.

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.

746-03 - Short to Power at Differential Lock Valve

Control Module: UCM

Context:

The **A-UCM** detects the supply voltage on pin 3 of connector **X-UCM3B**.

Cause:

The DIFF LOCK SOLENOID is not correctly working.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the DIFF LOCK SOLENOID is damaged.
3. The DIFF LOCK SOLENOID is damaged.
4. The connector **X-TRANS** is damaged.
5. The harness between connector **X-TRANS** and component **A-UCM** is damaged.

Solution:

1. Disable Differential Lock function.
ZFTC1DisengageDifflockRequest = On (TBC if 2 is possible).
Icon and keypad LED blink (indicating always active) TBC.
Set the key in OFF position.

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 **A-UCM** and the DIFF LOCK SOLENOID.

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 DIFF LOCK SOLENOID integrity.

Remove the DIFF LOCK SOLENOID sensor.

Use a multimeter to perform the resistance measurement of the solenoid.

A. If the resistance is an open circuit, replace the DIFF LOCK SOLENOID.

B. If the resistance is not an open circuit, continue with Step 4.
4. Check the integrity of connector **X-TRANS**.

Disconnect **X-TRANS** connector and visually check the integrity of pin 27.

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

B. If the pin is not damaged, continue with Step 5.
5. Check the integrity of harness between connector **X-TRANS** and **A-UCM**.

Use a multimeter to perform the following check:

B. If there are no problems, replace the Engine Control Unit **A-ECU**.

Wiring harnesses - Electrical schematic sheet 18 (55.100)

5500-05 - Open circuit 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 an open circuit at clutch K3 of the transmission controller of tranny **A-TRC**. The measured resistance value of the valve is out of limit.

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**.

Check the integrity of the connector **X-TECM** and visually check for any damage to the connector and to the pin 39.

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 transmission controller of tranny **A-TRC** and the Transmission Control Unit **A-TRANS** for an open circuit condition.

Disconnect the connector **X-TRC** from the transmission controller of tranny **A-TRC**.

The key must be in the OFF position.

Use a multimeter to perform the following check:

From	To	Value
Connector X-TECM pin 39	Connector X-TRC pin 8	There should be continuity

A. If there is no continuity, find and repair or replace the wire 842 and/or 842A.

B. If there is continuity, continue with Step 7.

7. Check if the transmission controller of tranny **A-TRC** is defective.

Check the resistance of the transmission controller of tranny **A-TRC**.

A. If a problem is found, replace the transmission controller of tranny **A-TRC**.

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

Wiring harnesses - Electrical schematic sheet 25 (55.100)

5700-00 - Overtemp Sump

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 a temperature in the oil sump that is over the allowed threshold.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. Incorrect level of oil into the transmission.
3. The hydraulic oil temperature sensor **B-HOT** 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. Cool down the machine.

Check the oil level of the transmission.

A. If a problem is found, restore the oil level of the transmission.

B. If there are no problems, continue with Step 3.

3. Check if the hydraulic oil temperature sensor **B-HOT** is defective and replace if necessary.

Wiring harnesses - Electrical schematic sheet 19 (55.100)

5861 - (DTC 16E5)-Prefilter fuel pressure sensor voltage is lower than expected

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

Context:

The Engine Control Unit (ECU) monitors the fuel prefilter pressure sensor B-9006 signal circuit for a voltage lower than expected condition. If the ECU detects a voltage less than **203.00 mV**, this fault will occur.

Cause:

The ECU has detected a voltage less than **203.00 mV** in the fuel prefilter pressure sensor B-9006 signal circuit.

Possible failure modes:

1. Faulty fuel prefilter pressure sensor B-9006, internal failure.
2. Faulty fuel prefilter pressure sensor B-9006 wiring, short to ground condition.
3. 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. Check the fuel prefilter pressure sensor B-9006 signal circuit for a short to ground condition.

Disconnect connector **X-9002**.

Disconnect connector **X-9019**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-9002 pin 62	X-9002 pin 19	There should be no continuity.
X-9002 pin 62	Chassis ground	There should be no continuity.

A. If there is continuity, there is a short to ground condition in the fuel prefilter pressure sensor B-9006 signal circuit. Locate and repair the shorted conductor.

B. If there is no continuity, continue to Step 3.

3. Replace the fuel prefilter pressure sensor B-9006.

Use the EST to verify the status of this fault.

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.

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.

Use a multimeter to perform the following test:

From	To	Value
Connector X-9020 pin 2	Connector X-9002 pin 79	There should be continuity.

A. If there is no continuity, there is an open in the signal wiring in the engine harness between connector **X-9020 pin 2** and connector **X-9002 pin 79**. Locate and repair the open wiring.

B. If there is continuity, the signal wiring is ok. Continue with Step 6.

6. Check the fuel filter clogging switch ground wiring for an open circuit.

Use a multimeter to perform the following test:

From	To	Value
Connector X-9020 pin 1	Connector X-9002 pin 78	There should be continuity.

A. If there is no continuity, there is an open in the ground wiring in the engine harness between connector **X-9020 pin 1** and connector **X-9002 pin 78**. Locate and repair the open wiring.

B. If there is continuity, the signal wiring is ok. 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 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)

7524 - (DTC 1D64)-Intake manifold pressure sensor voltage is higher than expected

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

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.

Context:

The Engine Control Unit (ECU) monitors the intake manifold pressure sensor B-9001 pressure signal circuit. If the ECU determines that the voltage in the pressure signal circuit is higher than expected, this fault will occur.

Cause:

The ECU has detected a voltage greater than **4.91 V** for a period greater than **500 ms** in the B-9001 pressure signal circuit.

Possible failure modes:

1. Faulty intake manifold pressure sensor , internal failure.
2. Faulty signal circuit of the intake manifold pressure sensor, open or short to high source condition.
3. 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 5.

2. Check the B-9001 pressure signal circuit for an open circuit condition.

Disconnect connector **X-9003**.

Disconnect connector **X-9002** from the ECU

From	To	Value
X-9002 pin 86	X-9003 pin 4	There should be continuity.

A. If there is continuity, leave both connectors disconnected and continue to Step 3.

B. If there is no continuity, there is an open circuit condition in the B-9001 pressure signal circuit. Locate and repair the broken conductor.

3. Check the signal circuit of the intake manifold pressure sensor for a short to high source condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-9002 pin 86	X-9002 pin 7	There should be no continuity.
X-9002 pin 86	All other pins	There should be no continuity.

A. If there is continuity, there is a short to high source condition in the B-9001 pressure signal circuit, wire EN-006. Locate and repair the shorted conductor.

B. If there is no continuity, continue to Step 4.

9412 - (DTC 24C4)-ECU internal failure - Ambient pressure sensor voltage is lower than expected

Context:

The Engine Control Unit (ECU) monitors ambient pressure by the ambient pressure sensor which is internal to the ECU. If the ECU detects a voltage less than **190.00 mV** for a period greater than **800 ms**, this fault will occur. If this fault occurs, the ECU will be frozen at the last valid ambient pressure value for a preliminary failure and a replacement ambient pressure of **0.97 bar (14.06 psi)** if the failure is validated. As this fault can occur from to higher than normal altitude, verify that the machine is not being operating in extreme altitude conditions before diagnosing this fault.

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.

10417 - (DTC 28B1)-Signal range check low for acceleration pedal position device driver sensor 1

Context:

The Engine Control Unit (ECU) monitors the potentiometer/switch for the accelerator pedal.

Cause:

The ECU has detected an implausible signal for the accelerator pedal, less than **0.2 V**.

Possible failure modes:

1. Faulty accelerator pedal position sensor circuit wiring.
2. Faulty accelerator pedal position sensor.
3. Faulty software of the ECU.

Solution:

1. Verify that the fault code 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 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. Verify that the wiring harness and connectors are free of damage.

Inspect the wiring harness from the ECU to the accelerator pedal position sensor.

Verify that the wiring harness is free of damage, corrosion, abrasion and incorrect attachment.

A. If the connectors are secure and the wiring harness is free of damage. Continue with Step 3.

B. If the connectors or the wiring harness has damage. Repair or replace the wiring harness or connectors as required.

3. Check the accelerator pedal position sensor wiring for a short circuit.

The key switch must be in the OFF position.

Disconnect the wiring harness from the accelerator position sensor.

Disconnect the vehicle (VE) harness from the ECU at connector **X-ECU**.

With the key switch in the OFF position, use a multimeter to perform the following tests, on the vehicle (VE) harness:

From	To	Value
Accelerator position sensor wiring harness connector pin 1	Connector X-ECU pin 79	There should be continuity.
Accelerator position sensor wiring harness connector pin 3	Connector X-ECU pin 80	There should be continuity.
Connector X-ECU pin 79	All other pins on connector X-ECU	There should be no continuity.
Connector X-ECU pin 80	All other pins on connector X-ECU	There should be no continuity.
Connector X-ECU pin 79	Chassis ground	There should be no continuity.
Connector X-ECU pin 80	Chassis ground	There should be no continuity.

- A. If the results are not as expected for any of the wiring tests listed above, there is an open, short or grounded circuit condition in the wiring. Use the appropriate vehicle service manual and schematics to diagnose and repair the wiring.

- 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)

- B. If it has not been resolved, check the ECU for the appropriate software and re-flash, if necessary.
- 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 05 (55.100)

13642 - (DTC 354A)-DEF/AdBlue general pressure check failure

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

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 DEF/AdBlue® system see **Selective Catalytic Reduction (SCR) exhaust treatment - Dynamic description (10.500)**. After the DEF/AdBlue® pressure has stabilized **8.5 – 9.5 bar (123.2 – 137.8 psi)** the dosing module is energized for **1.0 s**. If the sensed pressure provided by the supply module pressure sensor exceeds **8.5 bar (123.2 psi)** while the dosing module solenoid is energized (valve open) and the maximum number of heating cycles has been reached, this fault will occur. If the maximum number of heating cycles has not been reached, an additional heating cycle will be performed.

Cause:

The Engine Control Unit (ECU) is sensing a pressure greater than **8.5 bar (123.2 psi)** while the Dosing module solenoid is energized.

Possible failure modes:

1. Faulty DEF/AdBlue® system pressure lines (tubing), restricted.
2. Faulty DEF/AdBlue® heating system, ineffective.
3. Faulty solenoid valve of the dosing module, restricted or damaged.
4. Faulty supply module, restricted or damaged.
5. Faulty software of the ECU.

Solution:

1. Check for freezing, blockage, or damage to DEF/AdBlue® system pressure lines (tubing).

Visually and tactually inspect the system pressure lines for blockage and damage.

There should be no blockage or damage.

A. If blockage or damage is found, repair or replace the affected line (tube).

B. If no blockage or damage is found, continue with Step 2.

2. Check operation of the engine coolant heating system lines (tubing).

Visually and tactually inspect the heating system lines to determine that the system is providing sufficient heating.

There should be adequate heating.

A. If ineffective heating is found, locate and repair the heating problem.

B. If adequate heating is found, continue with Step 3.

3. Test the DEF/AdBlue® system.

Use the Electronic Service Tool (EST) to perform the Urea Dosing System Test (UDST) and follow the on screen instructions.

Use the UDST Trouble Shooting Guideline, as required, to identify and resolve the problem.

15644 - (DTC 3D1C)-DOC upstream temperature sensor signal drift at cold start

Context:

The Engine Control Unit (ECU) monitors the DOC upstream temperature sensor signal. If the ECU determines that ambient pressure is at least **0.8 bar (11.6 psi)** and the last driving cycle was for longer than **5.00 s** with a temperature of at least **70.0 °C (157.9 °F)** at least once, this fault will occur.

Cause:

The ECU determines that the temperature signal of the DOC upstream temperature sensor has drifted at cold start.

Possible failure modes:

1. Sudden change in ambient temperature.
2. Faulty DOC upstream temperature sensor, wiring or internal failure.
3. 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 5.

2. Check the following related faults:

6297 – (DTC 1899)-Upstream oxidation catalyst temperature sensor voltage is higher than expected

10649 – (DTC 2999)-Upstream oxidation catalyst temperature sensor voltage is lower than expected

13612 – (DTC 352C)-Upstream oxidation catalyst temperature sensor comparison to a calculated temperature value failure

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

B. If none of the listed faults are active, continue to Step 3.

3. Use the EST to compare the temperature value of the DOC upstream temperature sensor to the temperature values of the SCR downstream temperature sensor and of the SCR upstream temperature sensor. Monitor for possible signal drift due to a rapid change in ambient temperature. The sensors should have similar characteristics.

Monitoring must be done after a cold soak condition to avoid any residual heat.

A. If no faults are found, continue to Step 4.

B. If any faults are found, verify that a rapid change in ambient temperature has not occurred that has caused this fault to occur.

4. Replace the DOC upstream temperature sensor.

Use the EST to verify the status of this fault.

Perform an engine cold start to verify that this 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.

17429 - (DTC 4415)-Water in fuel detected or water in fuel circuit failure

NOTE: this fault code is for the Water in Fuel sensor with black connector housing. If the connector housing of the sensor is white take care that the pins 2 and 3 are reversed.

Context:

The Engine Control Unit (ECU) monitors the voltage output from the water in fuel sensor to determine if water is present in the fuel supply. If water is detected in the fuel, warnings will be displayed to alert the operator of potential engine damage if operation continues. High voltage signal from the water in fuel sensor indicates water present.

Cause:

This fault code is displayed to warn the operator that the ECU has detected excess water in the fuel system or a fault in the water in fuel sensor circuit.

Possible failure modes:

1. Excess water in the fuel supply.
2. Faulty water in fuel sensor, wiring or internal (mechanical and/or electrical) failure.
3. Faulty software of the ECU.

Solution:

1. Verify that this fault code is still present and in an active state.

Use the Easy Engine software provided on the Electronic Service Tool (EST) to check the fault status.

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

B. If the fault is no longer present or is in an inactive state, Continue with Step 8 .

2. Check fuel for water contamination.

A. If there is water contamination, continue with Step 3.

B. If there is no water contamination, Continue with Step 4.

3. Verify proper water in fuel sensor operation.

Purge fuel supply system, replace fuel filter(s) and refill with fuel that is free of water contamination.

Start and run engine for 5 minutes.

Check for code to return to active status.

A. If code returns in an active status, replace water in fuel sensor.

B. If code remains inactive, return the machine to service.

4. Check for open, short and grounded circuit conditions in the water in fuel sensor circuit.

Disconnect the water in fuel sensor at connector **X-WIF**.

Disconnect the vehicle (VE) harness from the ECU at connector **X-ECU**.

Disconnect the connector **X-ENG** from the connector **X-CAB_E**.

With the key switch in the OFF position, use a multimeter to perform the following tests, on the vehicle (VE) harness:

From	To	Value
Connector X-WIF pin 1	Connector X-ECU pin 13	There should be continuity
Connector X-WIF pin 2	Connector X-ECU pin 43	There should be continuity

19139 - (DTC 4AC3)-Crankcase pressure too high and oil pressure too low - Fuel in oil suspected

Context:

The Engine Control Unit (ECU) monitors crankcase pressure using the crankcase pressure sensor and the engine oil pressure using the oil pressure sensor. If the ECU determines that oil pressure is lower than expected and a high crankcase pressure fault was detected in the previous driving cycle, this fault will occur.

Cause:

Oil pressure is lower than expected and crankcase pressure has exceeded **1019.74 cm H₂O (401.47 in H₂O)** for at least **20.00 s**.

Possible failure modes:

1. Faulty engine oil, fuel contamination or level low.
2. Faulty blow by filter, clogged.
3. Faulty the software of the ECU.

20245 - (DTC 4F15)-Water in fuel sensor or sensor circuit failure

NOTE: this fault code is for the Water in Fuel sensor with black connector housing. If the connector housing of the sensor is white take care that the pins 2 and 3 are reversed.

Context:

The water in fuel sensor provides a diagnostic self-test signal (less than **3.9 V** for **2.5 s +/- 20%**) at key-ON. If the Engine Control Unit (ECU) does not sense the diagnostic self-test signal, this fault will occur and there will be no monitoring of water content in the fuel supply.

Cause:

The ECU has not received an acceptable water in fuel sensor self-test signal.

Possible failure modes:

1. Faulty water in fuel sensor circuit wiring, damaged.
2. Faulty water in fuel sensor, internal failure.
3. Faulty software of the ECU.

Solution:

1. Verify that this fault code is still present and in an active state.

Use the Easy Engine software provided on the Electronic Service Tool (EST) to check the fault status.

- A. If the fault is still present and active, continue with Step 2.
- B. If the fault is no longer present or is in an inactive state, Continue with Step 7.

2. Use the EST to check the status of the related fault

17429 – (DTC 4415)-Water in fuel detected or water in fuel circuit failure

- A. If fault **17429 – (DTC 4415)-Water in fuel detected or water in fuel circuit failure** is active, resolve fault **17429 – (DTC 4415)-Water in fuel detected or water in fuel circuit failure**, then determine if this fault is also resolved.
 - B. If fault **17429 – (DTC 4415)-Water in fuel detected or water in fuel circuit failure** is not active, continue with Step 3.
3. Check the water in fuel sensor for the initial self-test voltage pulse.

Carefully back probe the water in fuel sensor at connector **X-WIF** pin 1.

With the help of an assistant, use a multimeter to perform the following test at Key-ON:

From	To	Value
Connector X-WIF pin 1	Ground	There should be less than 3.9 V for 2.5 s +/- 20%

NOTE: the signal line should switch to battery voltage after the self-test period.

- A. If the self-test is successful, continue with Step 4.
 - B. If the self-test is not successful, the water in fuel sensor has failed internally. Replace the sensor.
4. Check for open, short and grounded circuit conditions in the water in fuel sensor circuit.

Disconnect the water in fuel sensor at connector **X-WIF**.

Disconnect the vehicle (VE) harness from the ECU at the connector **X-ECU**.

Disconnect the connector **X-ENG** from the connector **X-CAB_E**.

22170 - (DTC 569A)-DEF/AdBlue tank heater actuator open load failure

Context:

The Engine Control Unit (ECU) monitors the circuit of the **DEF/AdBLUE®** tank heating valve. If the ECU detects an open circuit condition in the circuit of the **DEF/AdBLUE®** tank heating valve, this fault will occur.

Cause:

The ECU has detected an open circuit condition in the circuit of the **DEF/AdBLUE®** tank heating valve.

Possible failure modes:

1. Faulty **DEF/AdBLUE®** tank heating valve, internal failure.
2. Faulty **DEF/AdBLUE®** tank heating valve, wiring.
3. 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. Check the **DEF/AdBLUE®** tank heating valve for an internal failure.

Disconnect the connector **X-THV**.

Use a multimeter to perform the following resistance check:

From	To	Value
Connector X-THV pin 1	Connector X-THV pin 3	There should be between 11 – 16 Ω

A. If the value is within the specified range, leave the connector disconnected and continue to Step 3.

B. If the value is not within the specified range, the **DEF/AdBLUE®** tank heating valve has failed internally. Replace the **DEF/AdBLUE®** tank heating valve.

3. Check the **DEF/AdBLUE®** tank heating valve for an open circuit 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 72	Connector X-THV pin 3	There should be continuity

A. If there is no continuity, there is an open circuit condition in the circuit of the **DEF/AdBLUE®** tank heating valve, wire 38C. Locate and repair the shorted conductor.

B. If there is continuity, check the ECU for the appropriate software and re-flash, if necessary.

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.

25638 - (DTC 6426) - Short circuit error of injector in cylinder 4

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

Context:

Hardware errors in the injectors and their respective Engine Control Unit (ECU) power stages are investigated within the ECU. The ECU diagnostic procedure uses pattern detection to identify specific errors. When an expected combination of errors is detected, the associated fault occurs.

Cause:

During cylinder 4 injector Y-9004 evaluation, the pattern for short circuit was detected.

Possible failure modes:

1. Faulty cylinder 4 injector Y-9004 solenoid windings, shorted or grounded.
2. Faulty electrical wiring, short high side to either low side or ground (damaged wiring harness).
3. Faulty software of the ECU.

Solution:

1. Verify that this fault code is still present and in an active state.

Use the Easy Engine software provided on the Electronic Service Tool (EST) to check the fault status and to perform the cylinder cut-out test.

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

B. If the fault is no longer present or is in an inactive state, the fault may be intermittent and not currently active. Continue with Step 10.

2. Check the integrity of the cylinder 4 injector Y-9004 control circuit.

Disconnect the engine harness from the ECU at the engine plug connector **X-9002**.

Use a multimeter to measure the resistance on the EN harness side:

From	To	Value
X-9002 pin 50	X-9002 pin 74	There should be greater than 0.1 Ω

A. If there is greater than **0.1 Ω**, leave the engine plug connector **X-9002** disconnected and continue with Step 3.

B. If there is less than **0.1 Ω**, continue with Step 6.

NOTE: The measured amount of injector coil resistance is a very small value, typically between **0.2 – 0.5 Ω**.

3. Check the cylinder 4 injector Y-9004 high side control circuit for a short to ground condition.

Use a multimeter to check for continuity on the EN harness side:

From	To	Value
X-9002 pin 50	chassis ground	There should be no continuity

A. If there is continuity, continue with Step 4.

B. If there is no continuity, continue with Step 8.

4. Determine location of the short to ground condition.

Disconnect the engine cylinder harness from the injector (valve) cover at connector **X-9185**.

Use a multimeter to check for continuity, on the injector (valve) cover side:

From	To	Value
X-9185 pin 1	chassis ground	There should be no continuity

Use a multimeter to perform the following voltage test:

From	To	Value
X-9123 pin 2	Chassis ground	There should be no voltage.

- A. If there is voltage, there is a short to high source condition in the vehicle (VE) harness. Refer to the appropriate service manual to locate and repair the shorted conductor.
 - B. If there is no voltage, 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 01 (55.100)

30037 - (DTC 7555)-Fuel metering unit is shorted to ground at the high 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)**. If the Engine Control Unit (ECU) detects a short circuit to ground in the Y-9000 high side, this fault will occur.

Cause:

The A-9000 has detected a short to ground in the Y-9000 circuit, high side.

Possible failure modes:

1. Y-9000 internal short to ground condition.
2. Short to ground condition in the Y-9000 circuit, high side.
3. Faulty software of the ECU.

Solution:

1. Verify that the fault code is active.

Connect the Electronic Service Tool (EST) to the diagnostic port.

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 4.

2. Check the Y-9000 for an internal short to ground condition.

Disconnect the Y-9000 connector **X-9007**.

The key must be in the OFF position.

Use a multimeter to perform the following resistance check:

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

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

B. If the value is not in the specified range, the Y-9000 has failed internally. Replace the Y-9000 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 for a short to ground condition in the (EN) harness at the ECU connector **X-9002**.

Disconnect the ECU connector **X-9002**.

The key must be at the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-9002 pin 58	Chassis ground	There should be no continuity.
X-9002 pin 58	All pins in connector X-9002	There should be no continuity.

A. If there is continuity, there is a short to ground condition in the engine (EN) harness, wire EN-015. Use the appropriate service manual to locate and repair the shorted conductor.

31778 - (DTC 7C22)-Starter relay low side driver circuit short to ground failure

Context:

The Engine Control Unit (ECU) controls the voltage to the crank control relay K-LC6R4. The crank control relay controls the voltage to the starting relay. The ECU monitors the crank control relay low side control circuit for a short to ground condition. If the ECU detects a short to ground condition in the crank control relay low side control circuit for a period greater than **90 ms**, this fault will occur.

Cause:

The ECU has detected a short to ground condition for a period greater than **90 ms** in the low side control circuit of the crank control relay.

Possible failure modes:

1. Faulty low side control circuit of the crank control relay K-LC6R4, short to ground condition.
2. 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 **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 **3**.

2. Check the low side control circuit of the crank control relay K-LC6R4 for a short to ground condition.

Remove the crank control relay K-LC6R4.

Disconnect the connector **X-ECU** from the 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 88	Chassis ground	There should be no continuity
Connector X-ECU pin 88	All other pins	There should be no continuity

A. If there is continuity, there is a short to ground condition in the low side control circuit of the crank control relay. Locate and repair the shorted conductor.

B. If there is no continuity, check the ECU for the appropriate software and re-flash, if necessary.

3. 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.

35224 - (DTC 8998)-eVGT actuator over temperature error

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

NOTE: the eVGT actuator A-9003 controller uses an internal temperature sensor to determine if an electrical overload condition exists. An excessively hot environment could influence this fault, as all of the temperature rise may not be exclusively current draw.

Context:

The eVGT actuator A-9003 controller sends and receives information at regular intervals to and from the Engine Control Unit (ECU) via the engine Controller Area Network (CAN). If the eVGT actuator A-9003 controller determines that an over temperature, greater than **145.0 °C (293.0 °F)**, condition exists, this fault will occur.

Cause:

The ECU has reported, via the engine sensor CAN bus, that the eVGT actuator A-9003 controller has reported that an over temperature condition exists.

Possible failure modes:

1. Faulty supply voltage, out of required range.
2. Faulty eVGT actuator A-9003 controller, hardware or firmware.
3. 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 .

2. Check the eVGT actuator A-9003 controller supply voltage.

Disconnect the engine (EN) harness from the eVGT actuator A-9003 controller at connector **X-9012**.

With the key switch in the ON position, use a multimeter to check for voltage on the engine (EN harness side):

From	To	Value
X-9012 pin 4	X-9012 pin 3	There should be between 10.0 – 15.0 V .

A. If the voltage is within range, leave connector **X-9012** disconnected and continue with Step 3.

B. If the voltage is not within range, continue with Step 5.

3. 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 4.

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

4. 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.

From	To	Value
Connector X-ECU pin 3	Chassis ground	There should be continuity
Connector X-ECU pin 5	Chassis ground	There should be continuity
Connector X-ECU pin 28	Chassis ground	There should be continuity
Connector X-ECU pin 52	Chassis ground	There should be continuity
Connector X-ECU pin 75	Chassis ground	There should be continuity

- A. If there is continuity on all of the checks, leave the connector **X-ECU** disconnected and continue with Step 5.
- B. If there is no continuity for one or more of the checks, refer to the appropriate vehicle service manual and electrical schematics to locate and restore the grounding circuit to the ECU.
5. Determine the condition of the ECU CAN circuit.

With the key switch in the "OFF" position, use a multimeter to measure the resistance of the CAN connection on the vehicle (VE) harness side:

From	To	Value
Connector X-ECU pin 46	Connector X-ECU pin 47	There should be 120 Ω
Connector X-ECU pin 46	Chassis ground	There should not be continuity
Connector X-ECU pin 47	Chassis ground	There should not be continuity

Use a multimeter to measure the resistance of the CAN termination resistor, internal to the ECU:

From	To	Value
Connector X-ECU pin 46	Connector X-ECU pin 47	There should be 120 Ω

- A. If the measured resistances are correct and neither conductor is grounded, check the ECU for the appropriate software and re-flash, if necessary.
- B. If the measured resistances are not correct or one or both of the conductors is grounded, refer to the appropriate vehicle service manual and electrical schematics to locate and restore the termination resistance to the CAN circuit.
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, then 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, then erase the fault code and continue operation.

Wiring harnesses - Electrical schematic sheet 18 (55.100) Wiring harnesses - Electrical schematic sheet 16 (55.100)

- A. If other faults do exist, refer to **Controller Area Network (CAN) data bus - Test (55.640)** to locate and repair the faulted condition.
 - B. If no other faults exist, the VE harness wiring is damaged between the power, ground, or network harness splice and the Electric water pump A-9105 controller connector **X-9126 pin 3**, **X-9126 pin 4** and/or **X-9126 pin 2**, for supply power and ground or **X-9126 pin 1** and/or **X-9126 pin 6**, for CAN signal. Locate and repair the damage to the ATS CAN circuit wiring.
5. As there is no method for field testing or re-flashing the Electric water pump controller, replace the Electric water pump unit.
- 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.
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 04 (55.100)

58157 - (DTC E32D)-ECU internal failure - Sensor 5 volt supply 2

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 2 reference voltage is out of range, this fault will occur.

Cause:

The ECU sensor supply reference voltage is out of range.

Possible failure modes:

1. Faulty fuel filter pressure sensor B-9112 or sensor supply wire.
2. Faulty fan speed sensor B-9103 or sensor supply wire. (if equipped)
3. Faulty fuel filter clogging pressure sensor B-9006 or sensor supply wire.
4. Faulty inlet water pump pressure sensor B-9011 or sensor supply wire.
5. Faulty accelerator pedal position sensor B-9011 or sensor supply wire. (if equipped)
6. Faulty exhaust gas absolute pressure sensor B-9005 or sensor supply wire. (if equipped)

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.

- Pre filter pressure sensor B-9112 connector **X-9179**

- Fan speed sensor B-9103 connector **X-9103**

- Pre filter clogging pressure sensor B-9006 connector **X-9019**

- Inlet water pump pressure sensor B-9011 connector **X-9027**

- Accelerator pedal position sensor B-9011 connector **X-9100** (if equipped)

- Exhaust gas absolute pressure sensor B-9005 connector **X-9018**

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 2 circuits for a short circuit condition.

The key must be in the ON position.

Use a multimeter to perform the following voltage check:

5900-13 - Configuration lost

Control Module: TCU

Context:

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:

The Transmission Control Unit **A-TRANS** has lost the correct configuration and can not control the transmission.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. Interference during the saving of the data on the non volatile memory.
3. The Transmission Control Unit **A-TRANS** is brand new.
4. The Transmission Control Unit **A-TRANS** is taken from another vehicle.

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. Reprogram the correct configuration for the vehicle (e.g. with cluster controller, ...)

59693 - (DTC E92D)-Internal 12V supply voltage is too low

Context:

The Engine Control Unit (ECU) monitors internal **12 V** supply voltage. If the ECU determines that this value is lower than expected, 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.

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

2662-03 - Hall cell X1/X2 voltage abnormally high

Control Module: Keypad and Joystick

Context:

Hall cell X1/X2 voltage abnormally high.

Cause:

Possible failure modes:

1. The fault is intermittent and not currently active.

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, make calibration.

B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.

62817 - (DTC F561)-ECU after run power interruption

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

Context:

The Engine Control Unit (ECU) monitors the ignition switch. When the ECU determines that the ignition switch has been turned OFF, it will go into after run. The after run disconnection relay K-9106 controls the voltage to the main relay which allows the ECU to store failures into memory (and other relevant machine operating parameters) before being turned OFF. If the ECU determines that the after run cycle was interrupted three consecutive times, this fault will occur.

Cause:

The ECU has detected an interruption in the after run process.

Possible failure modes:

1. Improper use of the Timed Disconnect Switch.
2. Faulty battery voltage.
3. Faulty K-9106, internal failure or loose connection.
4. Faulty K-9102, internal failure or loose connection.
5. Faulty fuse F-9105.
6. Faulty K-9106, wiring.
7. 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 11.

2. Check the battery voltage.

Use a multimeter to perform the following voltage check:

From	To	Value
Battery post (+)	Battery post (-)	There should be approximately 12 V .

A. If there is approximately **12 V**, continue to Step 3.

B. If there is not approximately **12 V**, there is a battery or charging system fault. Repair as necessary.

3. Check for the following related faults:

22897 – (DTC 5971)-After run relay low side driver circuit open or short to ground failure

20849 – (DTC 5171)-After run relay high side driver circuit open failure

26481 – (DTC 6771)-After run relay low side driver circuit short to battery failure

34417 – (DTC 8671)-After run relay low side ECU drive circuit over temperature failure

33393 – (DTC 8271)-After run relay high side ECU driver circuit over temperature failure

25713 – (DTC 6471)-After run relay high side drive circuit short to ground failure

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

65183 - (DTC FE9F)-SCR Inducement: Level 3 (creep mode), triggered by tampering fault

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

NOTE: since this fault is part of the inducement strategy, it may be necessary to perform the Engine Restart Counter Reset / Unlock Inducement configuration with the Electronic Service Tool (EST) before you return the machine to service, unless this was accomplished as part of the resolution of the fault causing this fault. See **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)**, if necessary.

Context:

This fault is only for informational purposes and requires no action other than the resolution of the active fault causing this fault to occur. Any one of many Selective Catalytic Reduction (SCR) **DEF/AdBLUE®** technical failure tampering detection faults that remains active for more than **100 h** will cause this fault to occur.

Use a multimeter to perform the following check:

From	To	Value
Connector X-YRC pin 2	Connector SP-624D	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-FRNT** and **X-BTM_F**.

Disconnect the connector **X-BTM_F** from the connector **X-FRNT** and visually check the integrity of pin P 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 hardness between the connector **X-FRNT** and the connector **X-YRC**.

Remove the connector **X-YRC** from YRC RIDE CONTROL SOL.

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 8.

8. 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 9.

9. Check the integrity of hardness 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 10.

10. Check the integrity of hardness 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) Wiring harnesses - Electrical schematic sheet 28 (55.100)

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

5. Check the B-RECTD COOLANT TEMP sensor hardness for a proper condition.

The key must be in the OFF position.

Use a multimeter to perform the following resistance check:

From	To	Value
Connector X-ENG pin 5	Connector X-ENG pin 9	Resistance > 500 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 hardness 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-UCM4A pin 12	Connector X-ENG pin 5	Short circuit
Connector X-UCM4A pin 12	Connector X-ENG pin 9	Open circuit

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

B. If both measurements is are correct, replace the **A-UCM** component.

Wiring harnesses - Electrical schematic sheet 19 (55.100)

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

B. If the measurement is correct, continue with Step 5.

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

Disconnect the connector **X-BTM** from the connector **X-CAB_B** and visually check the integrity of pin 17 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 6.

6. Check the integrity of connectors **X-BTM_F** and **X-FRNT**.

Disconnect the connector **X-BTM_F** from the connector **X-FRNT** 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 7.

7. Check the integrity of connector **X-UCM4A**.

Disconnect the connector **X-UCM4A** from the **A-UCM** and visually check the integrity of pin 17.

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

B. If the pin is not damaged, continue with Step 8.

8. Check the integrity of hardness between the connector **X-FRNT** and the FRONT AXLE OIL TEMP.

Remove the FRONT AXLE OIL TEMP.

Use a multimeter to perform the following check:

From	To	Value
Connector X-FRNT pin A	Connector X-FAX pin 1	Short circuit

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

B. If the measurement is correct, continue with Step 9.

9. Check the integrity of hardness between the connectors **X-BTM** and **X-BTM_F**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-BTM pin 17	Connector X-BTM_F pin A	Short circuit

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

B. If the measurement is correct, continue with Step 10.

10. Check the integrity of hardness between the connectors **X-UCM4A** and **X-CAB_B**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-UCM4A pin 17	Connector X-CAB_B pin 17	Short circuit

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

B. If the measurement is correct, continue with Step 11.

11. Replace the FRONT AXLE OIL TEMP.

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

518132-03 - Short to Power at Bucket Roll Valve High Side Driver

Control Module: UCM

Context:

The **A-UCM**, driving the bucket roll valve, detects a short circuit to power; as a consequence:

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

Cause:

The **A-UCM** detects, on pin 17 of connector **X-UCM3B**, 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 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 **A-UCM** and the connector **X-BUCKET_ROLL** is damaged.
5. The harness between connectors **X-BTM_EH** and **X-BUCKET_ROLL** is damaged.
6. The harness between connectors **X-FRNT_EH** and **X-BUCKET_ROLL** 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-UCM3B**.

Disconnect the connector **X-UCM3B** from the **A-UCM** and visually check the integrity of pin 17.

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 connector **X-UCM1B**.

Disconnect the connector **X-UCM1B** from the **A-UCM** and visually check the integrity of pin 30.

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

B. If the pin is not damaged, continue with Step 5.
5. Check the integrity of harness between the **A-UCM** and the connector **X-BUCKET_ROLL**.

518136-04 - Bucket Angle Sensor Channel 2 Under Voltage

Control Module: UCM

Context:

The **A-UCM** detects a value from the Channel 2 of the BUCKET ANGLE (**B-BKT_ANG**) greater than the lower limit.

Cause:

The **A-UCM** detects, on pin 23 of connector **X-UCM1B**, a voltage < **0.25 V**; as a consequence, the advanced EH bucket features (RTD) is disabled.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between the **A-UCM** and the BUCKET ANGLE is damaged.
3. The connectors **X-BUA** or **X-FRNT_EH** or **X-BTM_FEH** or **X-BTM_EH** or **X-CAB_EH** or **X-UCM1B** are damaged.
4. The BUCKET ANGLE is not correctly supplied.
5. The BUCKET ANGLE sensor is damaged.
6. The hardness between the connectors **X-BUA** and **X-FRNT_EH** is damaged.
7. The hardness between the connectors **X-BTM_FEH** and **X-BTM_EH** is damaged.
8. The hardness between the connectors **X-CAB_EH** and **X-UCM1B** 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. Check the integrity of the harness between the **A-UCM** and the BUCKET ANGLE.

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 connector **X-BUA**.

Disconnect the connector **X-BUA** from the BUCKET ANGLE.

Visually check the integrity of pins F, E and D of the connector.

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

B. If all pins are not damaged, continue with Step 4.

4. Check the BUCKET ANGLE power supply.

Use a multimeter to perform the following check:

From	To	Value
Connector X-BUA pin F	Connector X-BUA pin E	+ 5 V

A. If the value is not correct, check the hardness between the connectors **X-BUA**, **X-FRNT_EH** and **X-FRNT**.

B. If the value is correct, continue with Step 5.

5. Check the integrity of hardness between the connectors **X-FRNT_EH** and **X-AUX_2_LEFT**.

Disconnect the connector **X-AUX_2_LEFT** from the ELECTROHYDRAULIC VALVE.

Use a multimeter to perform the following check:

From	To	Value
Connector X-FRNT_EH pin L	Connector X-AUX_2_LEFT pin 1	Short circuit
Connector X-FRNT_EH pin M	Connector X-AUX_2_LEFT pin 2	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_EH** and **X-BTM_EH**.
- Disconnect the connector **X-CAB_EH** from the connector **X-BTM_EH** and visually check the integrity of pins L and M 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 hardness between the connectors **X-BTM_FEH** and **X-BTM_EH**.

Disconnect the connector **X-FRNT_EH** from the connector **X-BTM_FEH**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-BTM_FEH pin L	Connector X-BTM_EH pin L	Short circuit
Connector X-BTM_FEH pin M	Connector X-BTM_EH pin M	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 connector **X-UCM4A**.
- Disconnect the connector **X-UCM4A** from the **A-UCM** and visually check the integrity of pin 19.
- A. If the pin is damaged, replace the harness.
- B. If the pin is not damaged, continue with Step 9.
9. 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 10.
10. Check the integrity of hardness between the **A-UCM** and the connector **X-CAB_EH**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-UCM4A pin 19	Connector X-CAB_EH pin L	Short circuit
Connector X-UCM1A pin 21	Connector X-CAB_EH pin M	Short circuit

- A. If the measurement is not correct, replace the harness.
- B. If the measurement is correct, continue with Step 11.
11. Replace the AUX 2 LEFT SOLENOID.
- A. If the functionality is restored, the procedure ends.

From	To	Value
Connector X-BTM pin 19	Ground	Open 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 harness of connector **X-CAB_B**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-CAB_B pin 19	Ground	Open 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 20 (55.100)

518176-03 - Joystick Steering Signal 2 High voltage

Control Module: UCM

Context:

The **A-UCM** detects a value from LH JOYSTICK STEERING (**B-JSS**) out of higher limit.

Cause:

The **A-UCM** detects on pin 18 of connector **X-UCM2A** a voltage < **4.75 V** for T> **250 ms**.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between **A-UCM** and the LH JOYSTICK STEERING (**B-JSS**) is damaged.
3. The LH JOYSTICK STEERING is damaged.

Solution:

1. JSS Function Disabled
 - Set Joystick Position to Neutral
 - Command PVED to cut Supply Pressure

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 the **A-UCM** and the LH JOYSTICK STEERING (**B-JSS**).

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 LH JOYSTICK STEERING.

Set the key in OFF position.

Replace the LH JOYSTICK STEERING.

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

Wiring harnesses - Electrical schematic sheet 21 (55.100)

- A. If the measurements are correct, replace the **A-UCM**.
- B. If the measurements are not correct, continue with Step 5.

5. Check the integrity of connector **X-LC2**.

Disconnect the connector **X-LC2** from LC2 and visually check the integrity of pins 2A and 2B.

- A. If one pin is damaged, replace the relevant harness.
- B. If the pins are not damaged, continue with Step 6.

6. Check the integrity of harness between the connectors **X-LC2** and **X-UCM4A**.

Use a multimeter to perform the following check:

From	To	Value
Connector X-LC2 pin A	Ground	$\geq + 19.6 \text{ V}$

- A. If the measurement is correct, replace the harness between the connectors **X-LC2** and **X-UCM4A**.
- B. If the measurement is not correct, continue with Step 7.

7. Check the integrity of fuse UCM VF2/3 (**F-2F2**) of LC2.

Remove the fuse from the LC2 and, by means of a multimeter, check the status of the fuse.

- A. If the fuse is burnt (open circuit between the terminals), replace the fuse UCM VF2/3 .
- B. If the fuse is integer (short circuit between the terminals), continue with Step 8.

8. Check the integrity of harness between LC2 and the power supply.

Use a multimeter to perform the following check:

From	To	Value
Connector X-P1196	Ground	$\geq + 19.6 \text{ V}$

- A. If the measurement is correct, replace the harness between the LC2 and the JUNCTION BLOCK INTO CAB (**A-MAIN JB CAB**).
- B. If the measurement is not correct, check the circuits generating the + 24 V.

Wiring harnesses - Electrical schematic sheet 07 (55.100) Wiring harnesses - Electrical schematic sheet 19 (55.100)

518499-18 - Engine Oil pressure Low

Control Module: GHMI - Faults list

Context:

Engine Oil pressure Low.

Cause:

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The UCM reports that engine oil pressure is over.

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. Bring the machine to a safe stop, and turn the engine OFF immediately. Replace the engine oil pressure sensor.

520578-06 - Battery Isolator SET - Short Circuit to GND

Control Module: SFB

Context:

Battery voltage on K Isolator set (short circuit to GND).

Cause:

The Smart Fuse box detects a short circuit to GND on K isolator signal (**X-X4** pin 17) when the key is ON.

Possible failure modes:

1. The fault is intermittent and not currently active.
2. The harness between Smart Fuse Box and Battery Isolator is damaged.
3. The Battery Isolator connector is damaged.
4. The **X-ENG-2** connector is damaged.
5. The **X-CAB_E-2** connector is damaged.
6. The Smart Fuse Box connector is damaged.
7. The Battery isolator is defective.
8. The harness between Battery Isolator and **X-ENG-2** connector is defective.
9. The harness between Smart Fuse Box and **X-CAB_E-2** connector is defective.
10. 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 Battery Isolator.

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 Battery Isolator connector.

The key must be in the OFF position.

Disconnect Battery Isolator connector **X-ISO** and visually check the integrity of the pin 2.

A. If the pin 1 is damaged, replace the **X-ISO** connector.

B. If the pin 1 is not damaged, continue with Step 4.

4. Check the integrity of the **X-ENG-2** connector.

The key must be in the OFF position.

Disconnect **X-ENG-2** connector and visually check the integrity of the pin F.

A. If the pin F is damaged, replace the **X-ENG-2** connector.

B. If the pin F is not damaged, continue with Step 5.

Use a multimeter to perform the following voltage check:

From	To	Value
Connector G-G1 pin 15	Chassis ground	There should be an open circuit

A. If there is a short circuit to GND, replace Alternator.

B. If there is an open circuit, 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_07_H	Chassis ground	There should be an open circuit

A. If there is a short circuit to GND, replace the Smart Fuse Box.

Wiring harnesses - Electrical schematic sheet 03 (55.100)

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