

**821F**  
**921F**  
**Tier 4B (final)**  
Wheel Loader

**SERVICE MANUAL**

**Part number 47673352**

1<sup>st</sup> edition English

March 2014



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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 are slow. The machine does not have enough 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

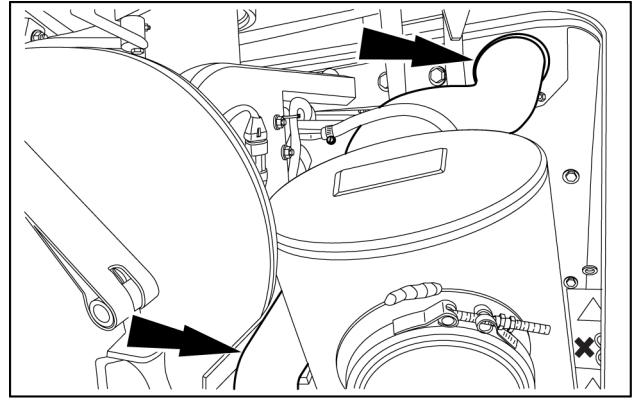
Visible contamination is foreign material that can be found by sight, touch, or odor. Visible contamination can cause a sudden failure of components.

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

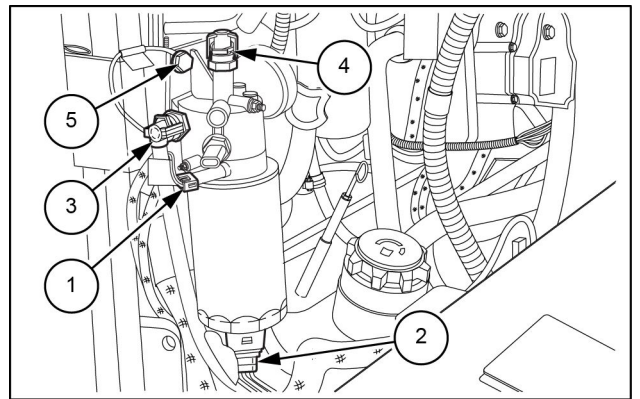
If you find contamination, use a portable filter to clean the hydraulic system.

51. Loosen the clamp on the after cooler, and remove the output hose of the after cooler from the machine.



LEIL13WHL0162AB 51

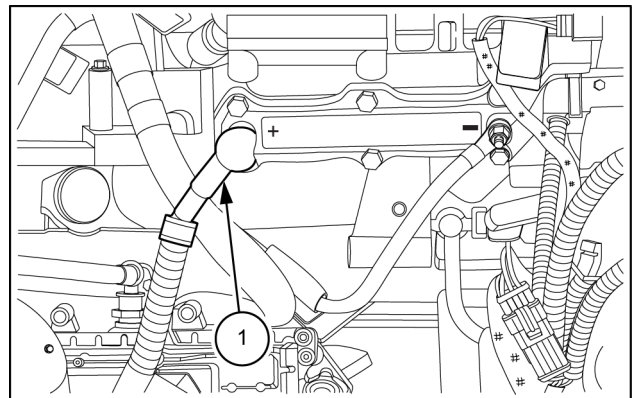
52. Tag and disconnect the fuel filter heater wire (1) and the water sensor (2). Then drain fuel filter and disconnect the inlet (3) and outlet (4) fuel lines from the fuel filter head. Plug the lines and cap the fittings. Remove the ground wire and the attachment bolt (5) of the fuel filter head.



LEIL13WHL0163AB 52

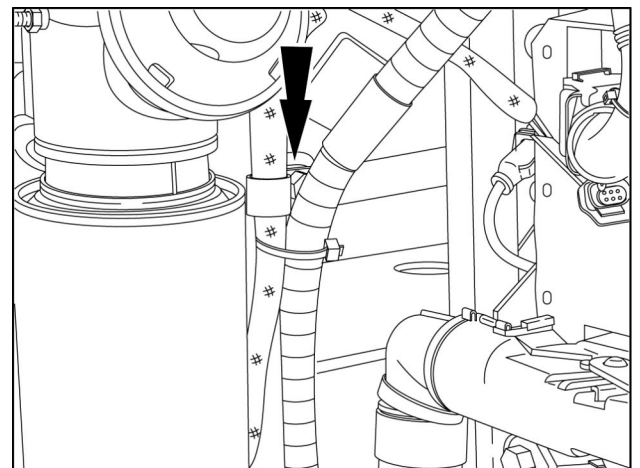
53. Tag and remove the grid heater cable (1).

**NOTE:** Hold the rear nut with a second wrench to prevent grid heater damage.



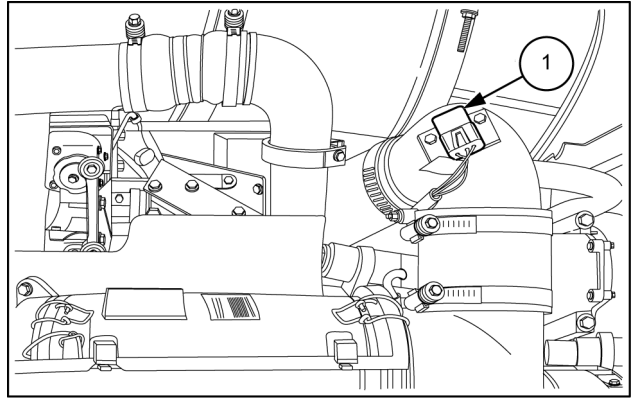
LEIL13WHL0164AB 53

54. Remove wire harness support clamp.



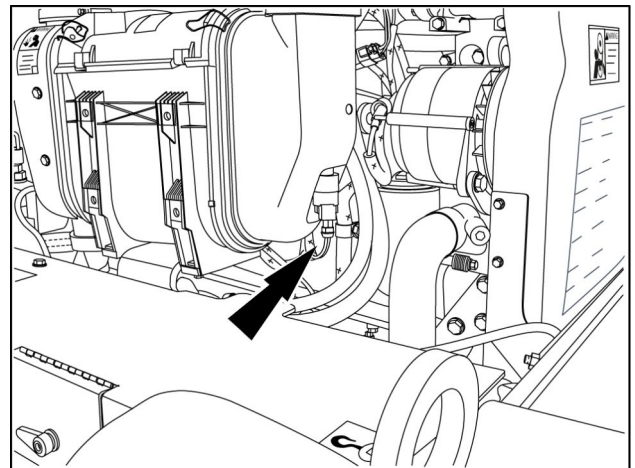
RAPH12WEL0064AA 54

57. Connect the wiring harness to the air inlet humidity sensor, then remove tag.



LEIL13WHL0143AB 57

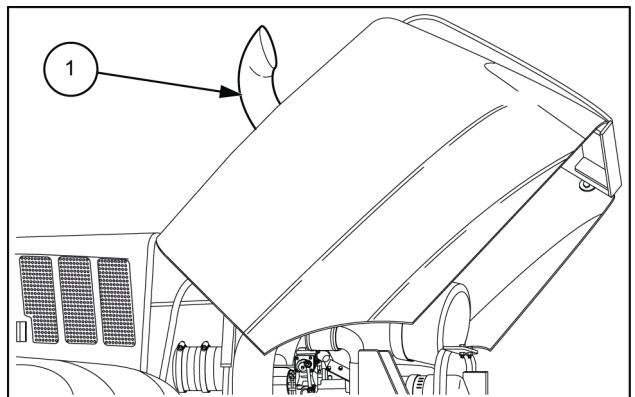
58. Connect the engine wiring harness to the air filter restriction switch and remove tag.



RAPH12WEL0610AA 58

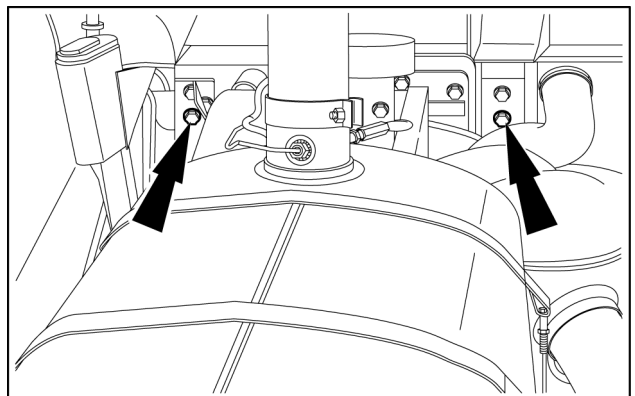
59. Connect a suitable lifting device to the hood and to the exhaust stack (1). Carefully raise the hood over the machine and lower it into position.

**NOTE:** Radiator overflow hose may interfere with left hand hood hinge movement and hood removal.



LEIL13WHL0552AB 59

60. Have another person to balance the hood and install the hood hinge mounting bolts to the cooler frame. Torque bolts to 65 - 79 N·m (48 - 58 lb ft).



LEIL13WHL0142AB 60

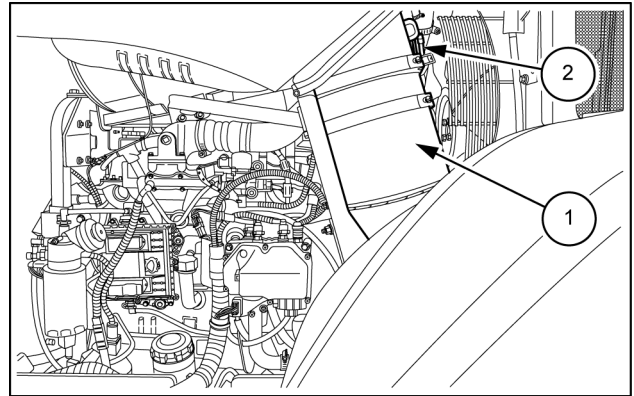
## Diesel Oxidation Catalyst (DOC)

The Diesel Oxidation Catalyst (DOC) (1) converts part of the NO to NO<sub>2</sub>.

The DOC is required to achieve as close as possible 50%/50% NO<sub>2</sub> /NO<sub>x</sub> ratio before the SCR.

The presence of NO<sub>2</sub> increases the NO<sub>x</sub> conversion efficiency of the SCR catalyst.

The DEF/AdBLUE® is injected in the DOC by the dosing module (2) connected to the DOC.

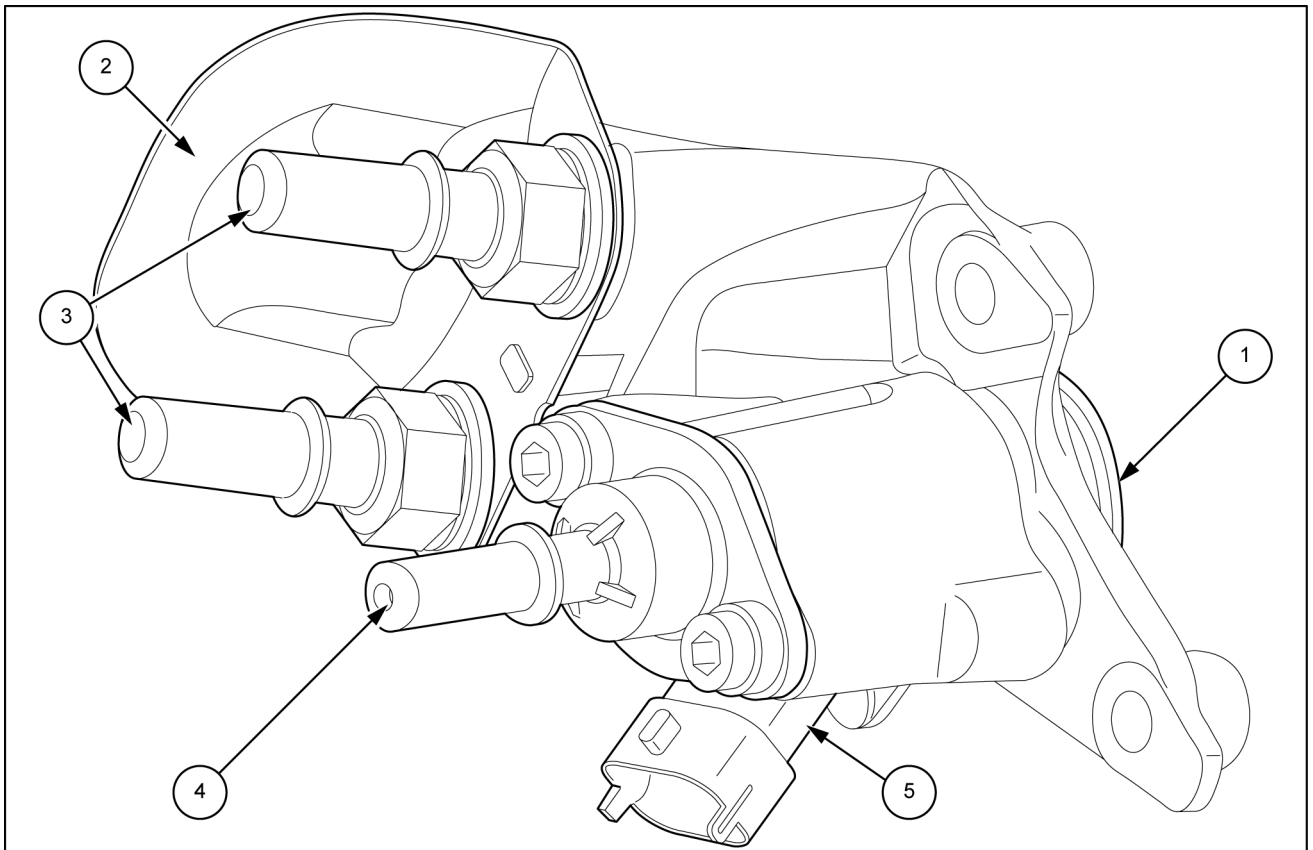


LEIL13WHL0251AB 5

## Dosing Module

The Dosing Module which reduces the nitrogen oxides in the exhaust gas.

The Dosing Module mixes with the exhaust gas the precise amount of the reduction agent DEF/AdBLUE® required for the chemical reaction in the SCR catalytic converter.



LEIL13WHL0192FB 6

- |  |  |
|--|--|
| 1. Gasket (replace the gasket when Dosing Module is removed) | 4. Valve keeper of the DEF/AdBLUE® connector |
| 2. Heat shield   | 5. Electrical connector                      |
| 3. Coolant connector   |  |

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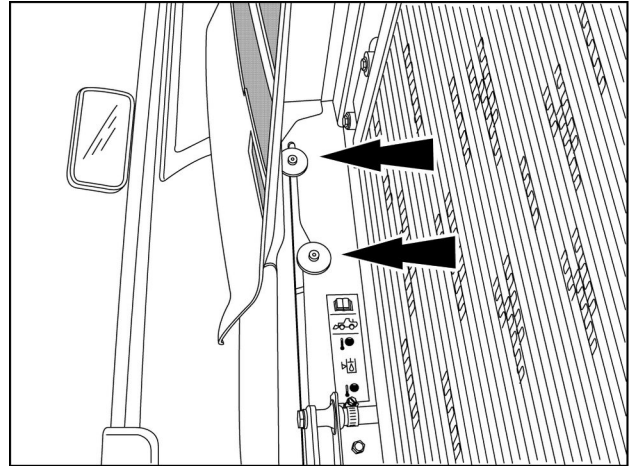
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## Engine - 10

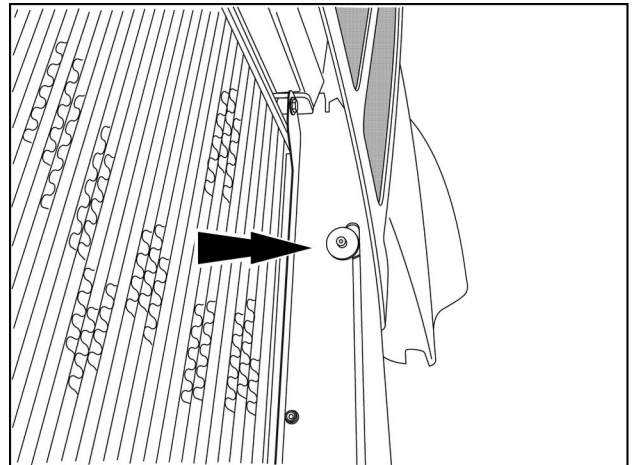
### Selective Catalytic Reduction (SCR) exhaust treatment - 500

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Selective Catalytic Reduction (SCR) muffler and catalyst - Install .....	18
Selective Catalytic Reduction (SCR) muffler and catalyst - Remove .....	15

15. Apply **LOCTITE® 242** to the threads, install the mounting screws for the side panel and torque to **3.5 - 9.5 N·m (31 - 84 lb in)**.

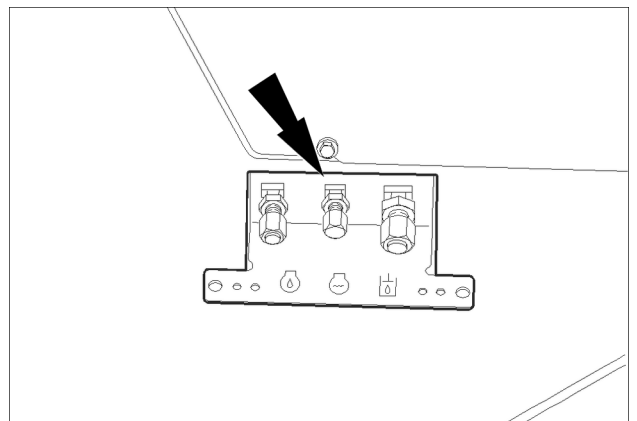


RAIL12WEL0097AA 15



RAIL12WEL0098AA 16

16. Check that the coolant drain cap is tightened.



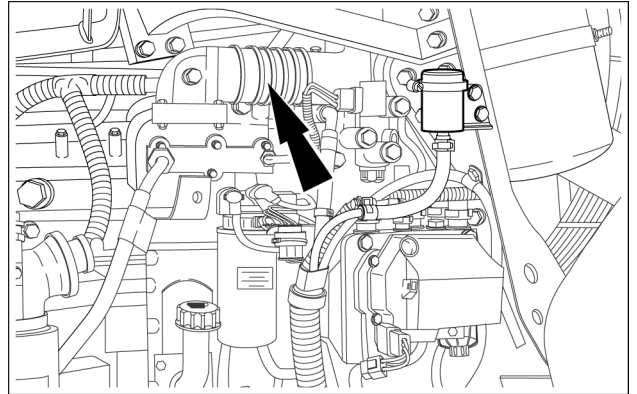
RCPH10WHL054BAL 17

17. Fill the engine coolant system with a solution of **50 % Ethylene Glycol** and **50 % water**. The cooling system capacity is **30.0 L (7.9 US gal)**.



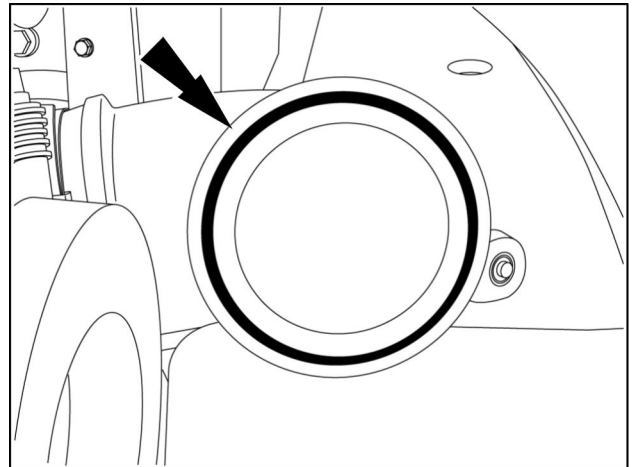
### Pressure test – Reassemble

8. Unplug and remove pressurized air system from manifold. Realign tube on manifold. Make sure there is clearance between the hood and exhaust stack on both sides of the tube. Tighten clamp and torque to **10.1 - 11.3 N·m (7.4 - 8.3 lb ft)**.



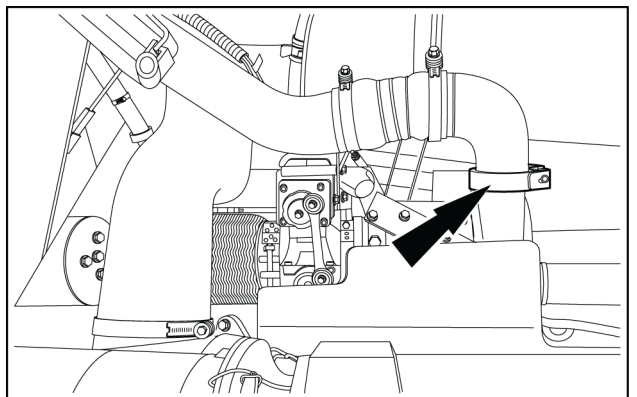
LEIL13WHL0613AA 8

9. Remove plug from turbocharger tube. Remove plug from turbocharger. Make sure gasket remained inside turbocharger tube.



RAPH12WEL0204AA 9

10. Align tube ends and secure in place with clamp. Torque to **10.1 - 11.3 N·m (7.4 - 8.3 lb ft)**.



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## Transmission Hydraulic Controls

The transmission hydraulic system consists of the following components:

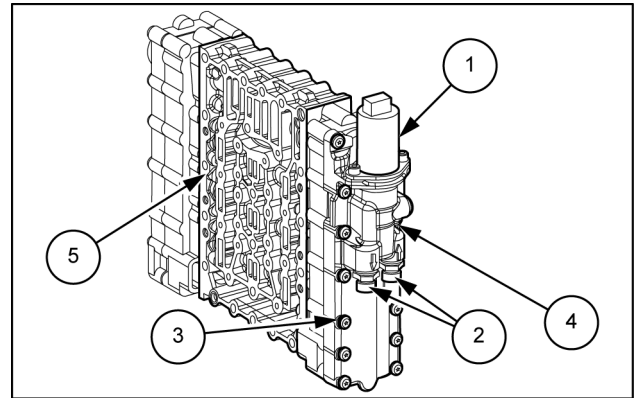
- The transmission hydraulic pump **(1)** is a gerotor type hydraulic pump. It is driven by the transmission input shaft.
- The transmission hydraulic filter **(2)** is located on the rear outside cover of the transmission.
- The filter bypass **(F)** is located in the head of the filter base.
- The transmission control valve directs the flow of oil into the appropriate clutches at the appropriate time to drive the machine. The valve is located on the back cover of the transmission.
- The transmission control valve consists of six PWM solenoid valves which control hydraulic spools that control the application of hydraulic pressure to the required clutches for the requested speeds. The PWM solenoids are gradually activated by the controller to provide smooth shifts.
- The control valve also has two more spools located inside of the assembly. The largest spool in the control valve is the main pressure spool (system pressure valve) **(3)**. It sets the regulated pressure at **16 - 18 bar (232 - 261 psi)**. Main regulated pressure is used to lock up the clutch packs inside the transmission.
- The second smaller spool, is the pressure reducing valve **(4)**. It reduces the main regulated pressure down to **9 bar (131 psi)**. The pilot oil is used to shift the spools inside the transmission control valve. There is no adjustment for either the main or pilot control spools. If it is not within the specification limits the spools and springs must be replaced.
- Excess pump flow not required for clutch activation flows through the main pressure spool **(3)** to the torque converter **(6)**. The torque converter is a fluid drive coupling that allows for slippage between the input from the engine and the output to the transmission. A torque converter lock-up clutch is fitted on the 5-speed models. When locked, there is no slippage between the input and output.
- The oil pressure within the torque converter is controlled by the outlet back-pressure valve **(7)**.
- Fluid returning from the torque converter flows through the cooler **(8)**.
- The clutches and bearings within the transmission are lubricated **(9)** by the return oil from the converter and cooler.

4-Speed Transmission Drive Paths		5-Speed Transmission Drive Paths	
Gear engaged	Activated clutches	Gear engaged	Activated clutches
1st gear FW	K1 + KV	1st gear FW	K1 + KV
2nd gear FW	K2 + KV	2nd gear FW	K2 + KV
3rd gear FW	K3 + KV	3rd gear FW	K2 + K4
4th gear FW	K3 + K4	4th gear FW	K3 + KV
		5th gear FW	K3 + K4
1st gear RV	K1 + KR	1st gear RV	K1 + KR
2nd gear RV	K2 + KR	2nd gear RV	K2 + KR
3rd gear RV	K3 + KR	3rd gear RV	K3 + KR

### Schematic Legend

1 - Transmission pump	51 - Converter inlet pressure	F - Filter by-pass valve
2 - Transmission filter	52 - Converter outlet pressure	G - PWM solenoid valves
3 - Main pressure regulator	53 - KV clutch pressure	– Y1 - KR clutch solenoid
4 - Pilot pressure regulator	55 - KR clutch pressure	– Y2 - KR clutch solenoid
5 - Converter pressure relief valve	56 - K1 clutch pressure	– Y3 - K1 clutch solenoid
6 - Torque converter	57 - K2 clutch pressure	– Y4 - K2 clutch solenoid
7 - Back pressure relief valve	58 - K3 clutch pressure	– Y5 - K3 clutch solenoid
8 - Oil cooler	60 - K4 clutch pressure	– Y6 - K4 clutch solenoid
9 - Transmission bearing lubrication	63 - Converter outlet temperature	
	67 - Converter lockup solenoid (option)	

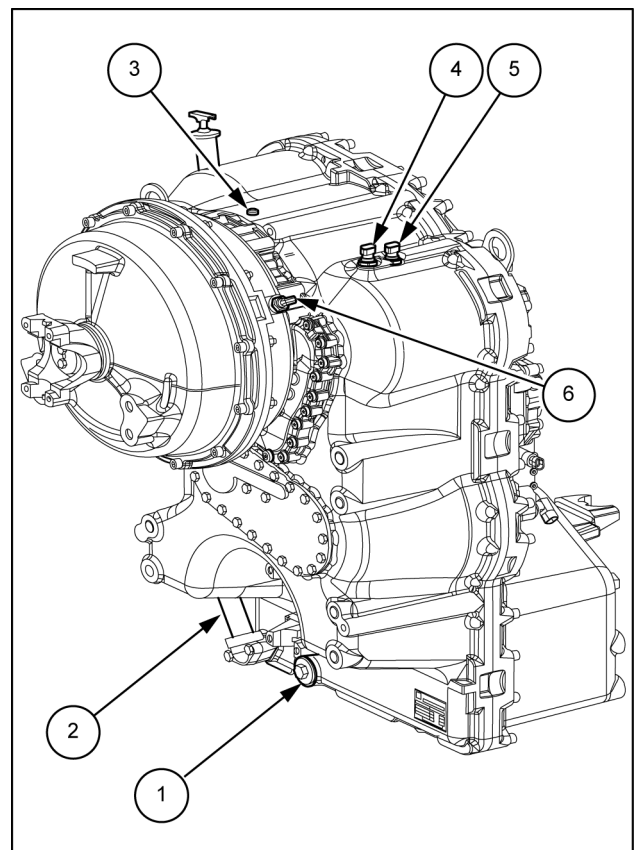
3. Mark installation position of connecting housing (4) towards valve block (5). Remove cylinder bolts (1) and lock-up clutch valve. Remove bolt neck (2) and discard O-rings. Remove Torx bolts (3), and the connecting housing.



LEIL13WHL0792AB 22

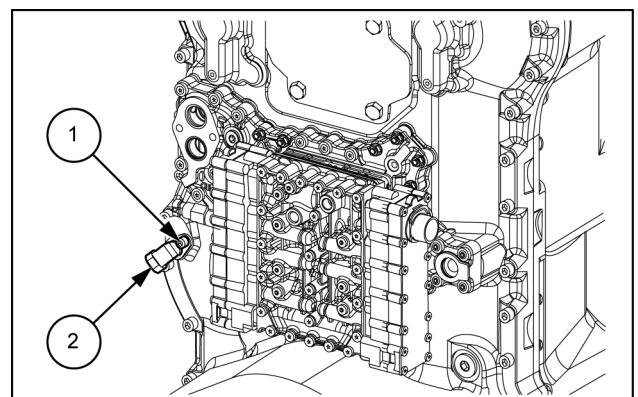
### Inductive sensor Hall effect sensor, breather, oil filler and oil drain plug

1. Attach transmission to assembly stand CAS2801. Remove oil drain plug (1), oil filler tube with oil dipstick (2), breather (3), inductive sensor - n central gear chain (4), inductive sensor - n turbine (5), inductive sensor - n engine (6).



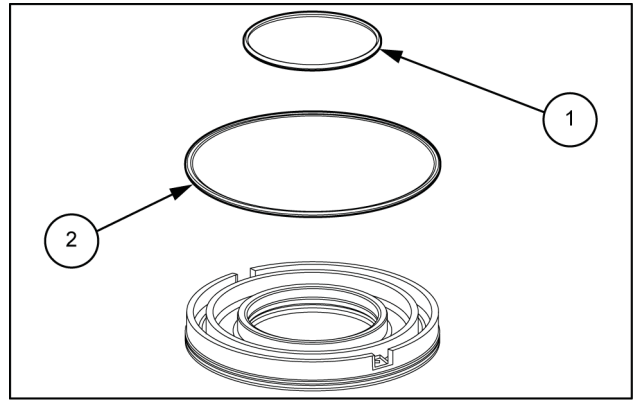
LEIL13WHL0793BB 23

2. Remove cylindrical bolt (1) and remove Hall effect speed sensor - n output and O-ring (2).



LEIL13WHL0794AB 24

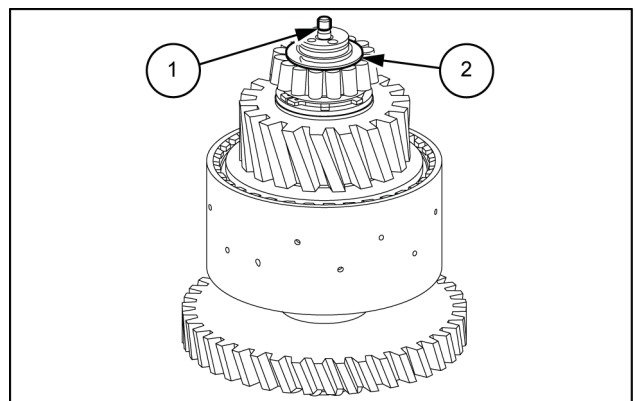
29. Remove both O-rings (1) and (2).



LEIL13WHL0850AB 109

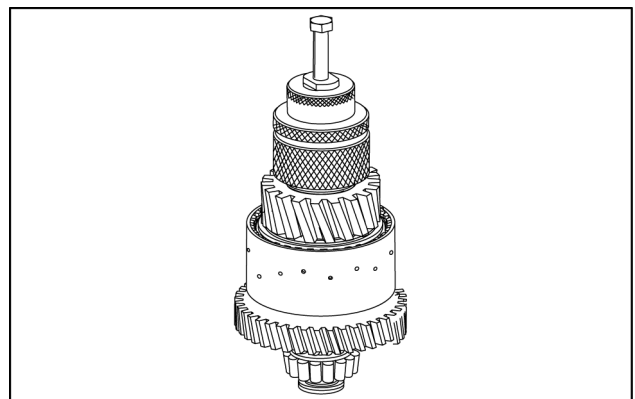
### K2 clutch

1. Remove stud bolt (1) and snap out piston ring (2).



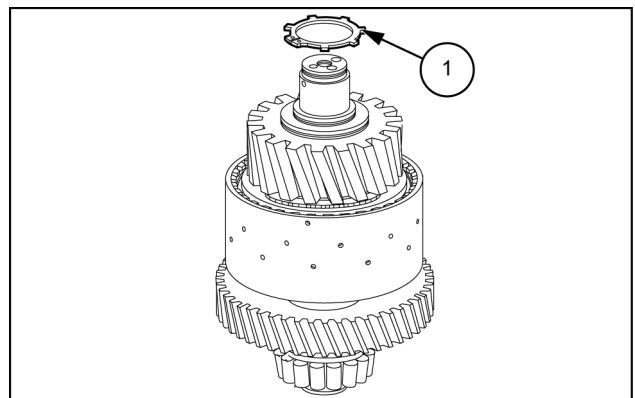
LEIL13WHL0851AB 110

2. Pull tapered roller bearing off the shaft using special tool CAS2798.



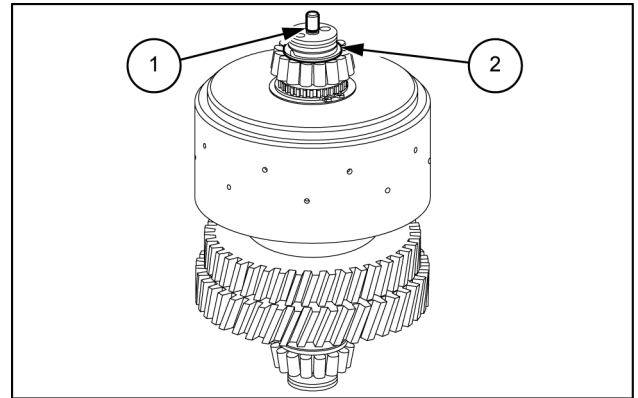
LEIL13WHL0860AA 111

3. Snap out retaining ring (1).



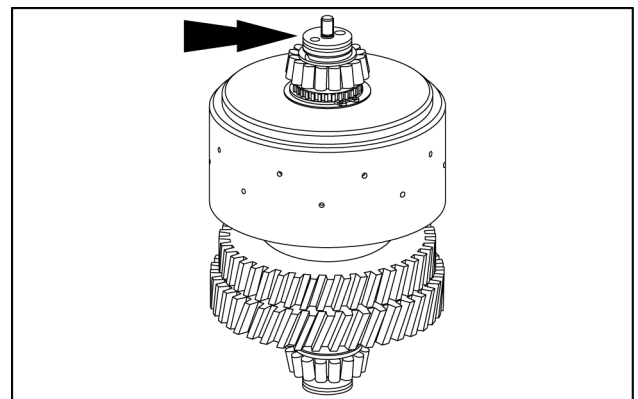
LEIL13WHL0861AB 112

21. Mount stud bolt (1) and torque to **17 N·m (150 lb in)**.  
Fit rectangular ring (2).



LEIL13WHL0905AB 44

22. Check clutch operation by using compressed air at the hole (see arrow). Closing and opening of the clutch must be clearly audible.

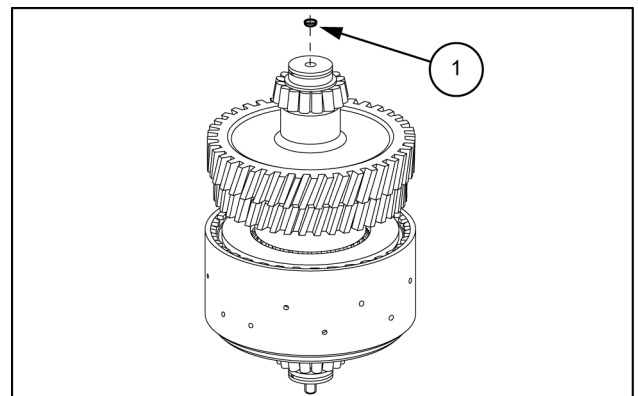


LEIL13WHL0906AB 45

23. Install sealing cap on orifice (1).

**NOTE:** Wet contact surface with Loctite (Type No. 262).

**NOTE:** The sealing cap is not mounted on all versions.  
Versions concerned, see corresponding spare parts list.

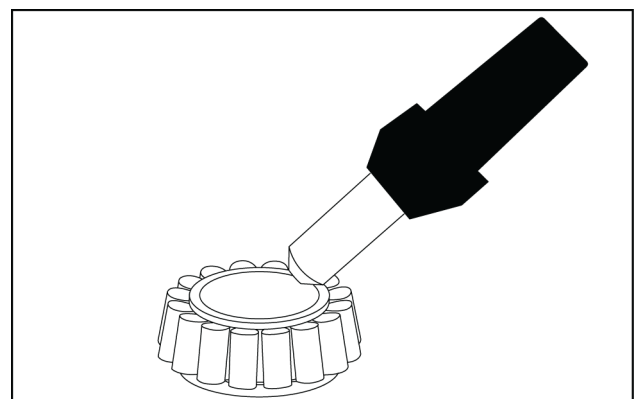


LEIL13WHL0907AB 46

## Clutch K1

24. Heat bearing to approximately **+120 °C (+248 °F)**.

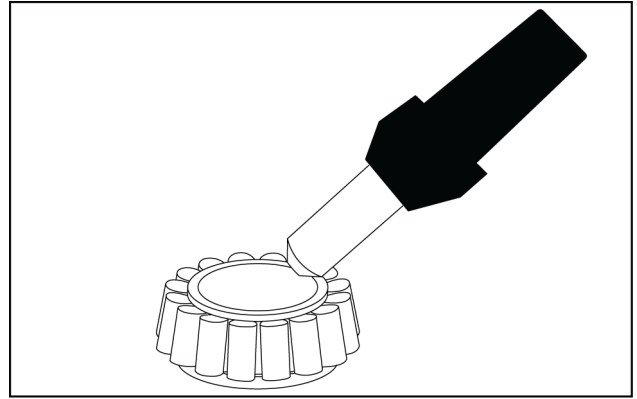
**NOTICE:** Always wear protective gloves to prevent burning your hands when handling heated parts.



LEIL13WHL0887AA 47

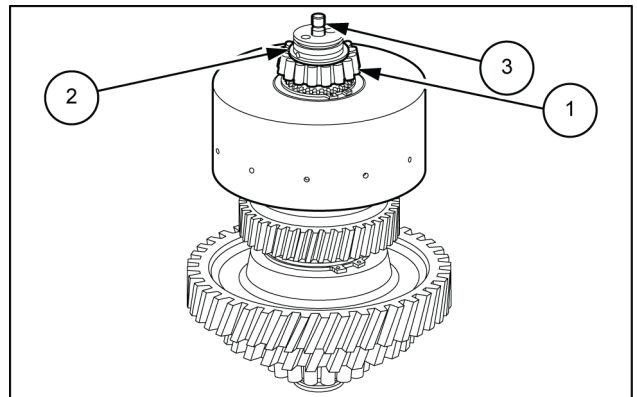
22. Heat bearing inner ring to approximately **+120 °C (+248 °F)**.

**NOTICE:** Always wear protective gloves to prevent burning your hands when handling heated parts.



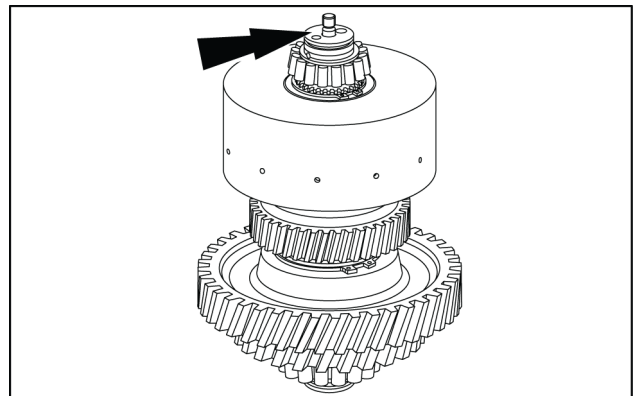
LEIL13WHL0887AA 136

23. Mount bearing (1) until contact is made. Adjust bearing after it cools. Fit rectangular ring (2). Mount stud bolt (3). Torque to **17 N·m (150 lb in)**.



LEIL13WHL0953AB 137

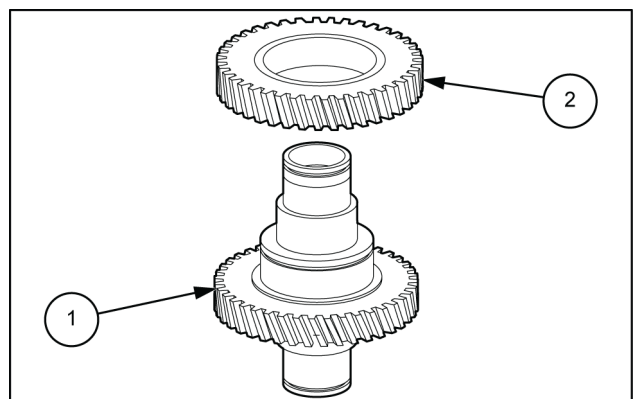
24. Check clutch operation by using compressed air at the hole (see arrow). Closing and opening of the clutch must be clearly audible.



LEIL13WHL0954AA 138

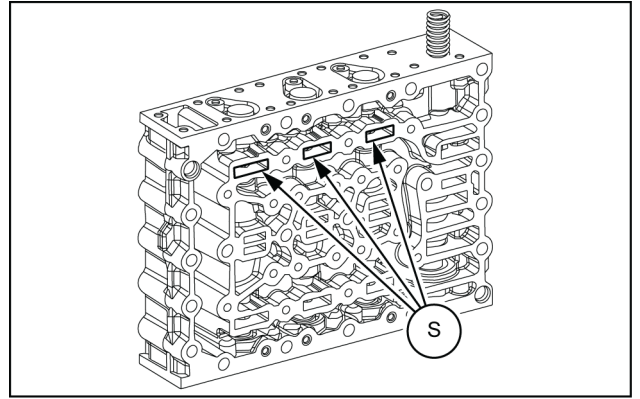
### Input shaft

1. Cool input shaft (1) to approximately **-80 °C (-112 °F)** and heat drive gear (2) to approximately **+120 °C (+248 °F)**. Mount until contact is made.



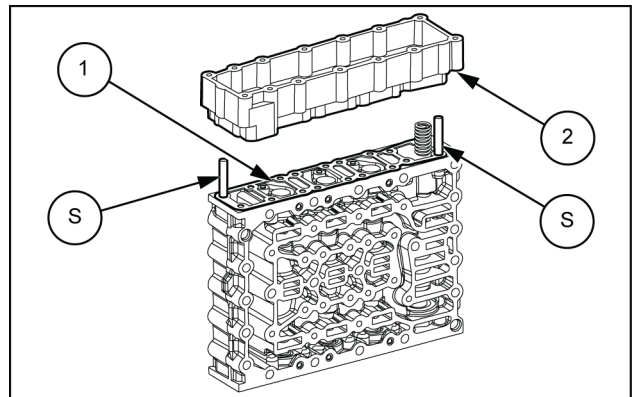
LEIL13WHL0955AB 139

3. Install the single parts shown in above step. Preload compression springs of the follow-on slides and temporarily secure pistons using 5.0 mm diameter cylindrical pins **(S)**.



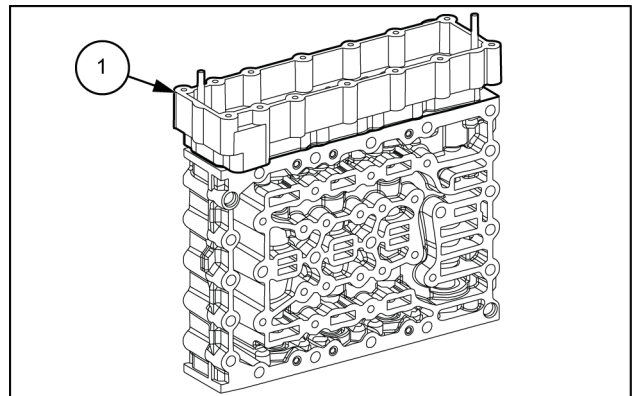
LEIL13WHL1034AB 222

4. Fit adjusting bolts 380001577 **(S)**. Mount seal **(1)** and housing **(2)**. Then position housing equally using the adjusting bolts until contact is made.



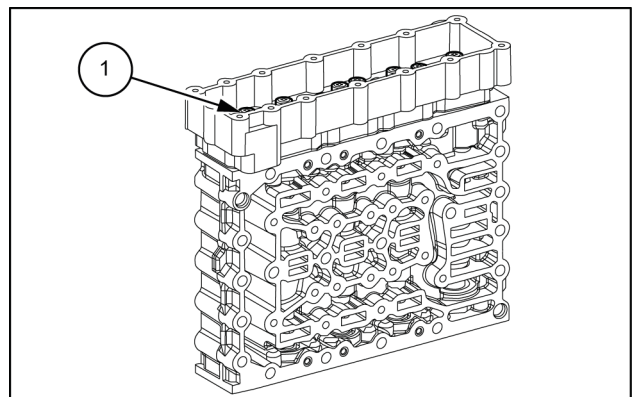
LEIL13WHL1035AB 223

5. Bring housing **(1)** into contact position using the Torx bolts. This preloads the pistons, allowing removal of the cylindrical pins (assembly aid).



LEIL13WHL1036AB 224

6. Secure housing using the Torx bolts **(1)** and torque to **5.5 N·m (48.7 lb in)**.



LEIL13WHL1037AB 225

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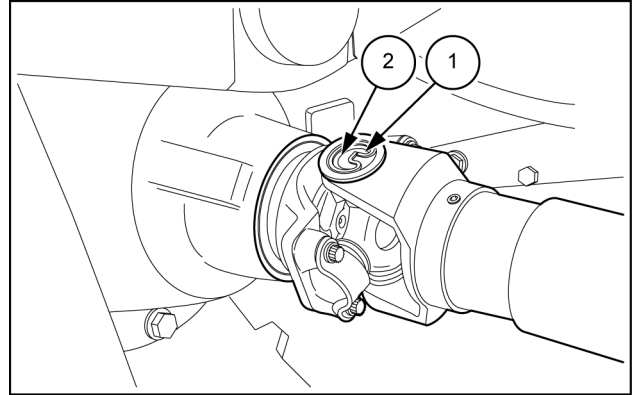
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## Drive shaft universal joint - Assemble

**NOTE:** The 921F Series machines use mechanical style yokes (no bearing straps) and may appear different from the machine pictured.

**NOTE:** The bearing race and journal that make up the universal joint are not serviced separately. If the bearing race or journal is worn or damaged, a new universal joint must be used.

1. Clean the slots in the yoke of the drive shaft.
2. Install the universal joint and install the bearings (2) and the rings (1).



LEIL13WHL1071AB 1

3. Install the drive shaft.

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#### TECHNICAL DATA

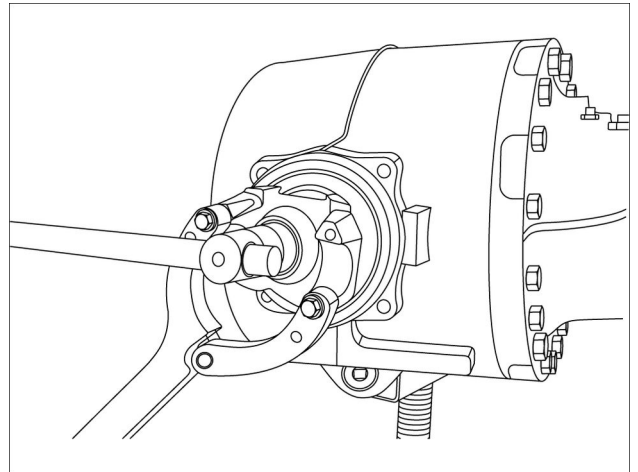
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#### SERVICE

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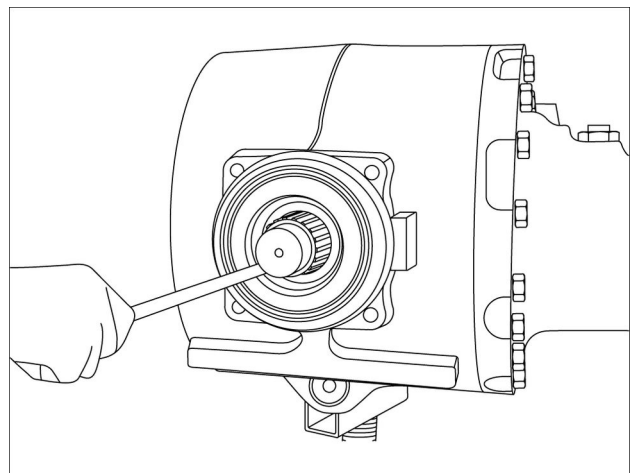
(\*) See content for specific models

16. Remove slotted nut and shim behind it. Use slotted nut wrench **CAS2842** and clamping device **380001546**.



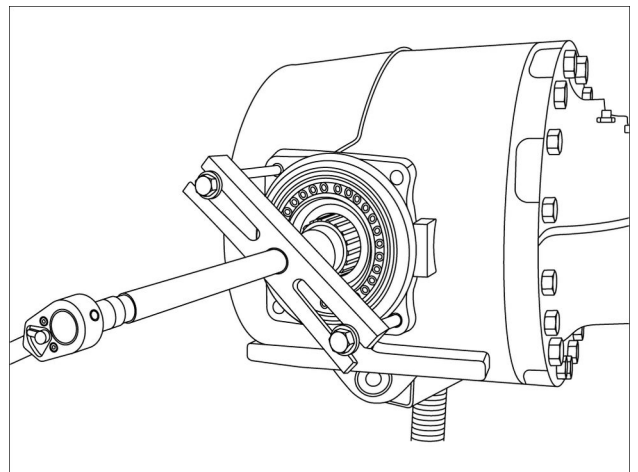
RAIL11WEL0237BA 16

17. Remove input flange from pinion. Use a lever to remove shaft seal.



RAIL11WEL0238BA 17

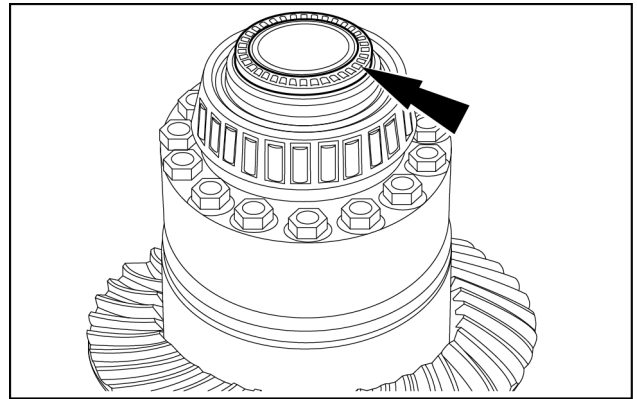
18. Press input pinion from axle drive housing and remove releasing tapered roller bearing.



RAIL11WEL0239BA 18

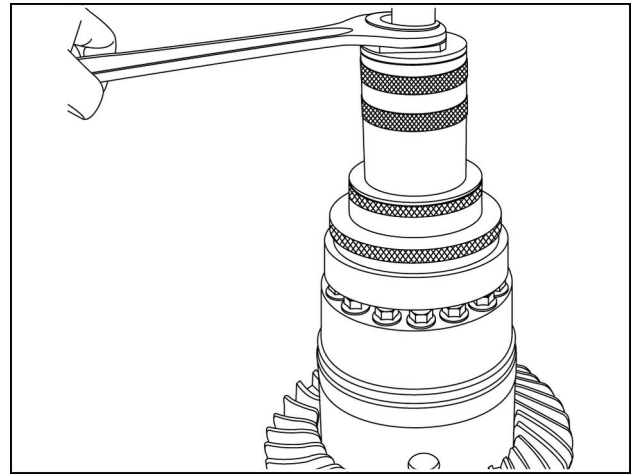
## Differential - Disassemble - DHL Version

1. Remove axial roller cage (arrow).



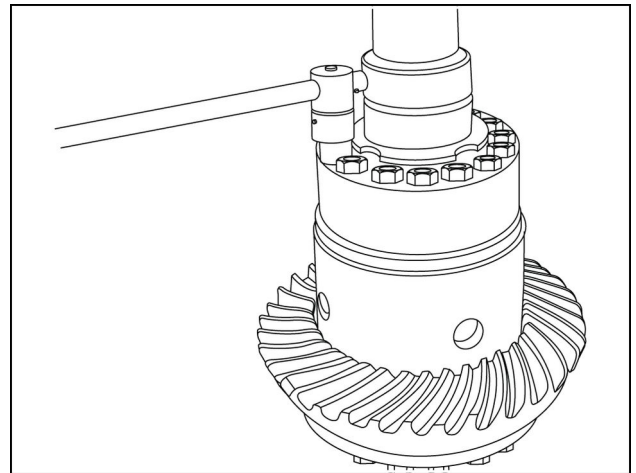
LEIL13WHL0583AB 1

2. Pull both tapered roller bearings from differential.



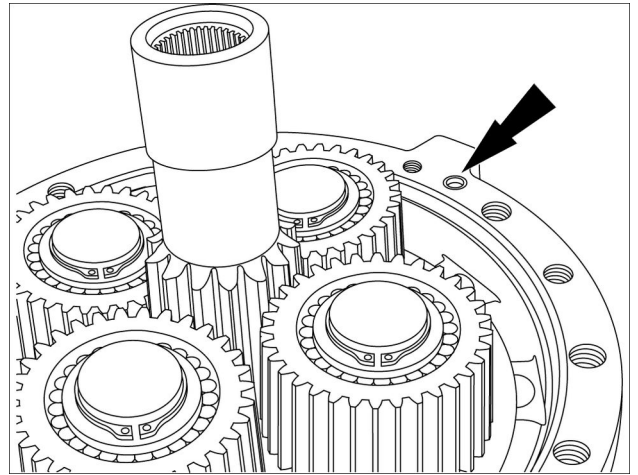
RCIL11WHL050BAF 2

3. Preload differential using a press. Remove hex bolts and releasing housing cover.



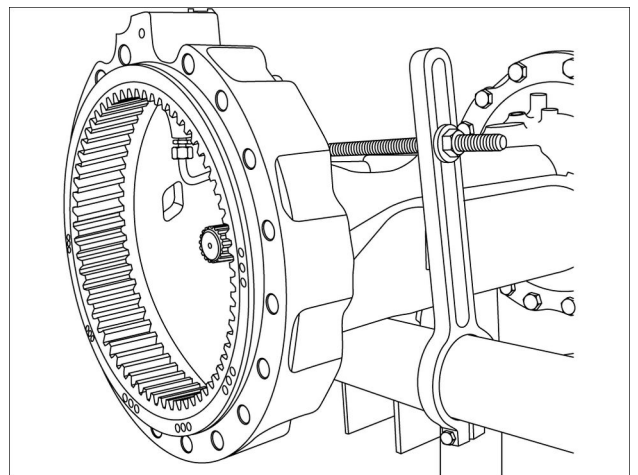
RCIL11WHL051BAF 3

7. Insert O-ring with grease into countersink of brake housing.



RAIL11WEL0456BA 7

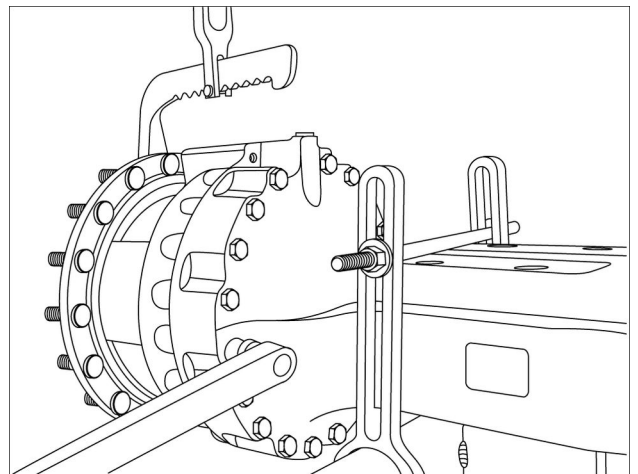
8. Grease O-ring and install it in axle housing.



RAIL11WEL0457BA 8

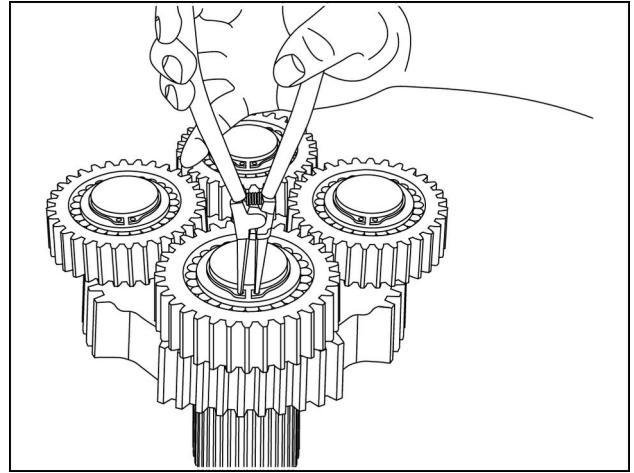
9. Mount adjusting bolts and use acceptable lifting device to bring output into contact position with axle housing. Secure output using hex bolts. Torque to **390 N·m (288 lb ft)**.

**NOTE:** Attach lifting device with wheel stud.



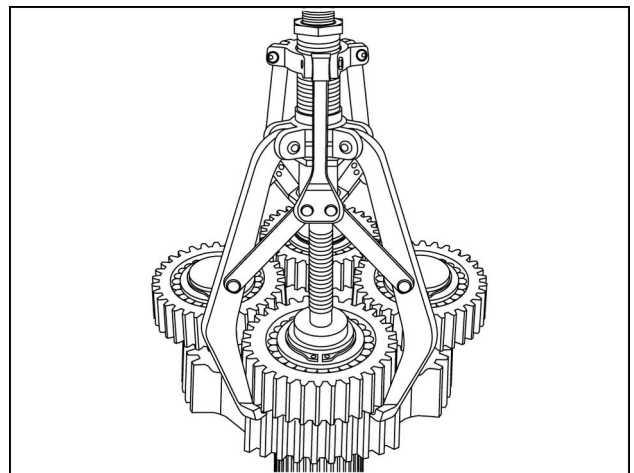
RAIL11WEL0458BA 9

7. Remove retaining rings.



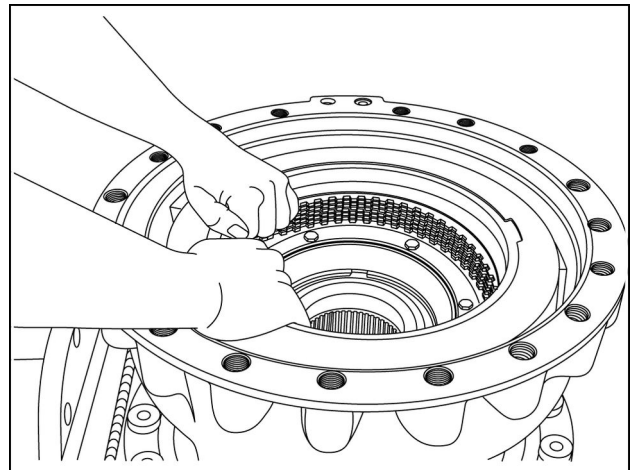
RCIL11WHL013BAF 7

8. Pull off planetary gears.



RCIL11WHL014BAF 8

9. Lift end plate out of brake housing.



RCIL11WHL015BAF 9

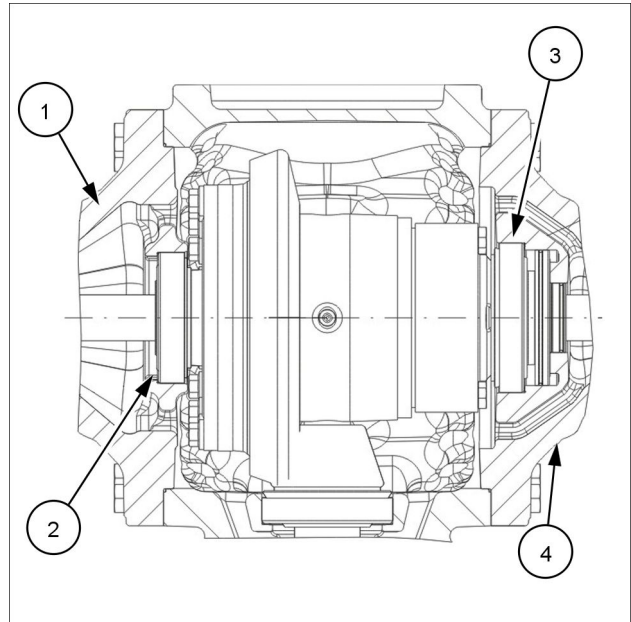


## **Rear axle system - 27**

### **Powered rear axle - 100**

**821F**  
**921F**

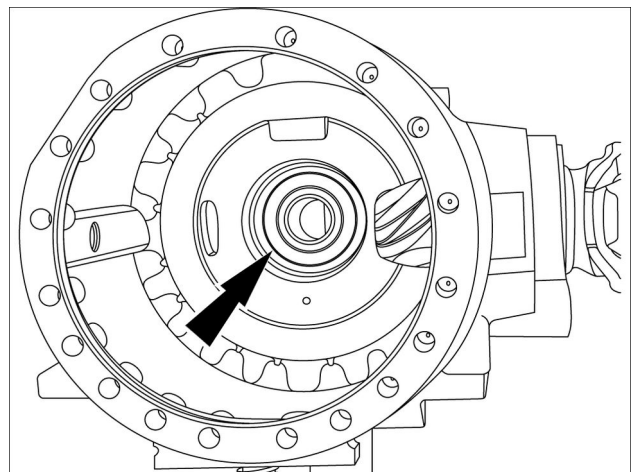
1. Axle housing
2. Shim (crown wheel side)
3. Shim (differential carrier side)
4. Axle housing



RAIL11WEL0364BA 16

Shims for differential D/DL and DHL-2400 in ZF axles MT-L 3085/3095 II				
Crown wheel marking	—20	-10		10
Deviation	-0.2	—0.1	0	0.1
Shim Diff. cage side Shim thickness	0.7	0.8	0.9	1.0
Shim DHL 2400 Order no.	84395193	84354725	84354726	84354727
Shim D/DL 2400 Order no.	84476078	84330538	84330539	84330540
Shim Crown wheel side Shim thickness	1.3	1.2	1.1	1.0
Shim D/DL/DHL 2400 Order no.	84476080	84330542	84330541	84330540

16. Insert selected shim e.g.  $s = 0.9 \text{ mm}$  (**0.035 in**) into hole of axle housing and adjust bearing outer ring (arrow) until contact is obtained.

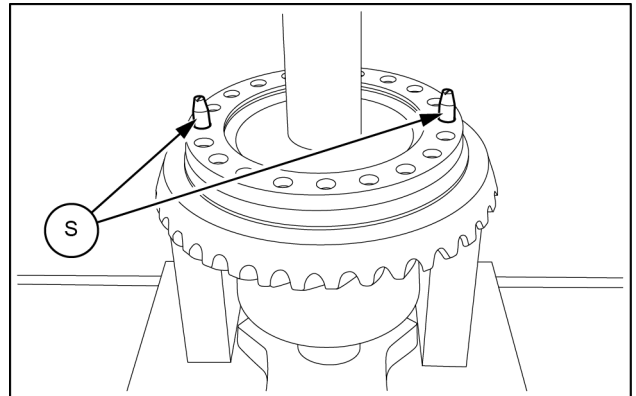


RAIL11WEL0365BA 17

## Differential - Assemble - DL Version

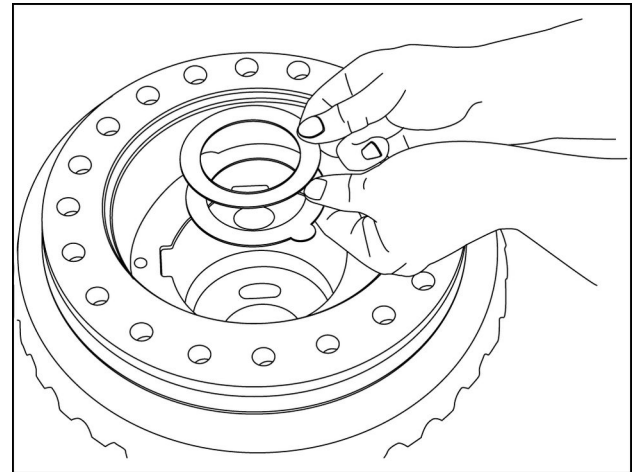
1. Mount two **M16 x 1.5** locating pins (**S**) and press heated crown wheel onto differential housing until contact is made.

**NOTICE:** Always wear protective gloves to prevent burning your hands when handling heated parts.



LEIL13WHL0596AB 1

2. Insert thrust washer into differential housing.

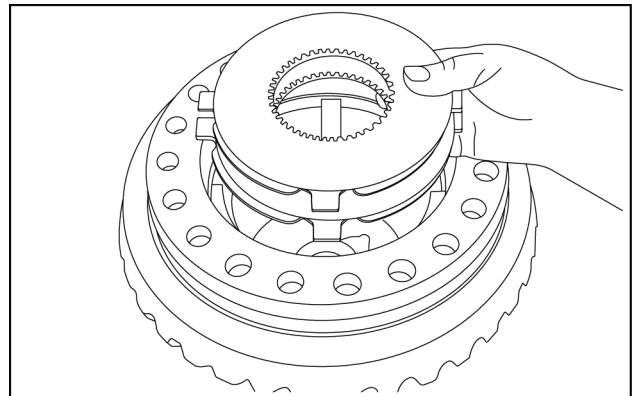


RCIL11WHL077BAF 2

3. Mount outer and inner discs in alternating order starting with an outer disk.

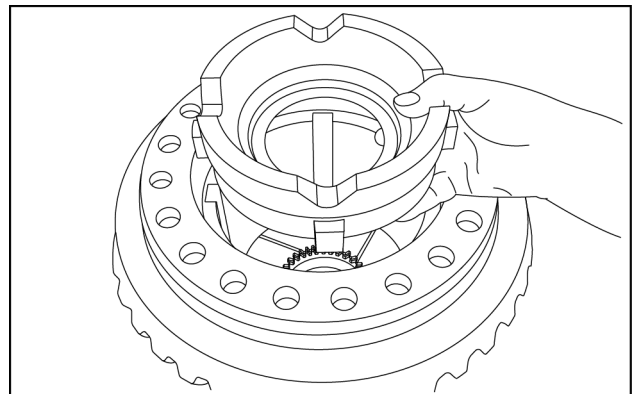
**NOTE:** The installation clearance of internal parts is corrected by mounting outer discs of different thicknesses.

**NOTE:** The difference in thickness between the left and right disc package must be less than **0.1 mm (0.004 in)**.



LEIL13WHL0597AA 3

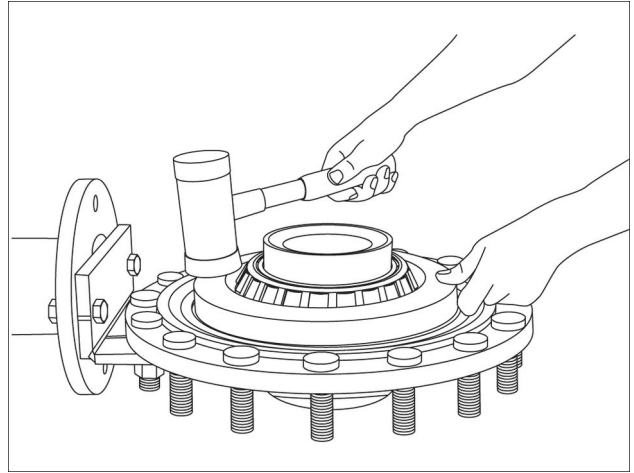
4. Install pressure ring.



LEIL13WHL0598AA 4

7. Heat slide bushing and position it at collar of output shaft. Then position slide bushing with pressure ring.

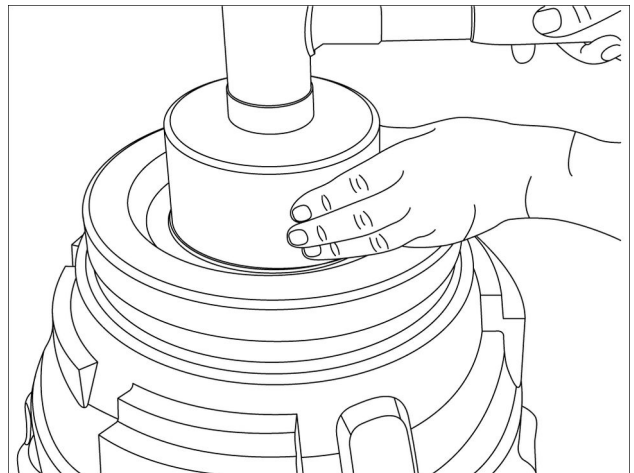
**NOTE:** Exact installation position is obtained when using the specified pressure ring.



RAIL11WEL0429BA 7

8. Insert shaft seal into brake housing using CAS2880 driver tool.

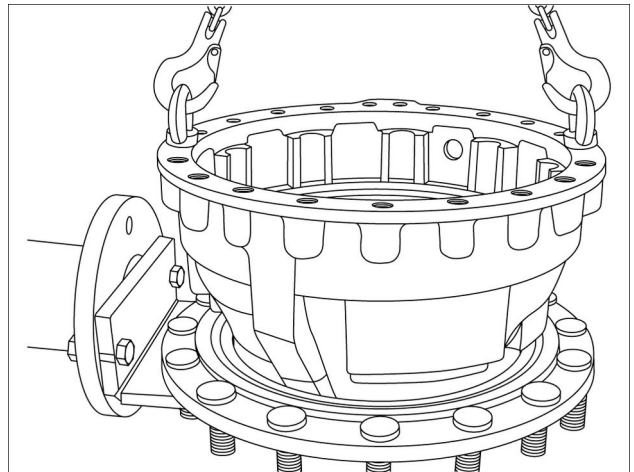
**NOTE:** Exact installation position is obtained when using specified driver tool. Make note of installation position (Step 6). Wet outer diameter of shaft seal with mineral spirits before assembly.



RAIL11WEL0430BA 8

9. Use suitable lifting device and insert premounted brake housing over output shaft until contact is made.

**NOTE:** Before clamping seal rings (slide ring seal) to installation dimension, clean sliding surfaces and apply an oil film. A leather cloth soaked in oil is recommended for this step.



RAIL11WEL0431BA 9

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## Hydraulic service brakes - Test

1. Check the oil level in the hydraulic reservoir; add oil as necessary.
2. Push and release the brake pedal many times with the engine stopped to remove all hydraulic pressure from the brake system until there is no pressure on the pedal.
3. Install two **207 bar (3002 psi)** pressure gauges to front and rear hydraulic brake accumulator test ports.
4. Make sure that the pressure gauge hoses are long enough so the gauges can be read while sitting in the operators seat.

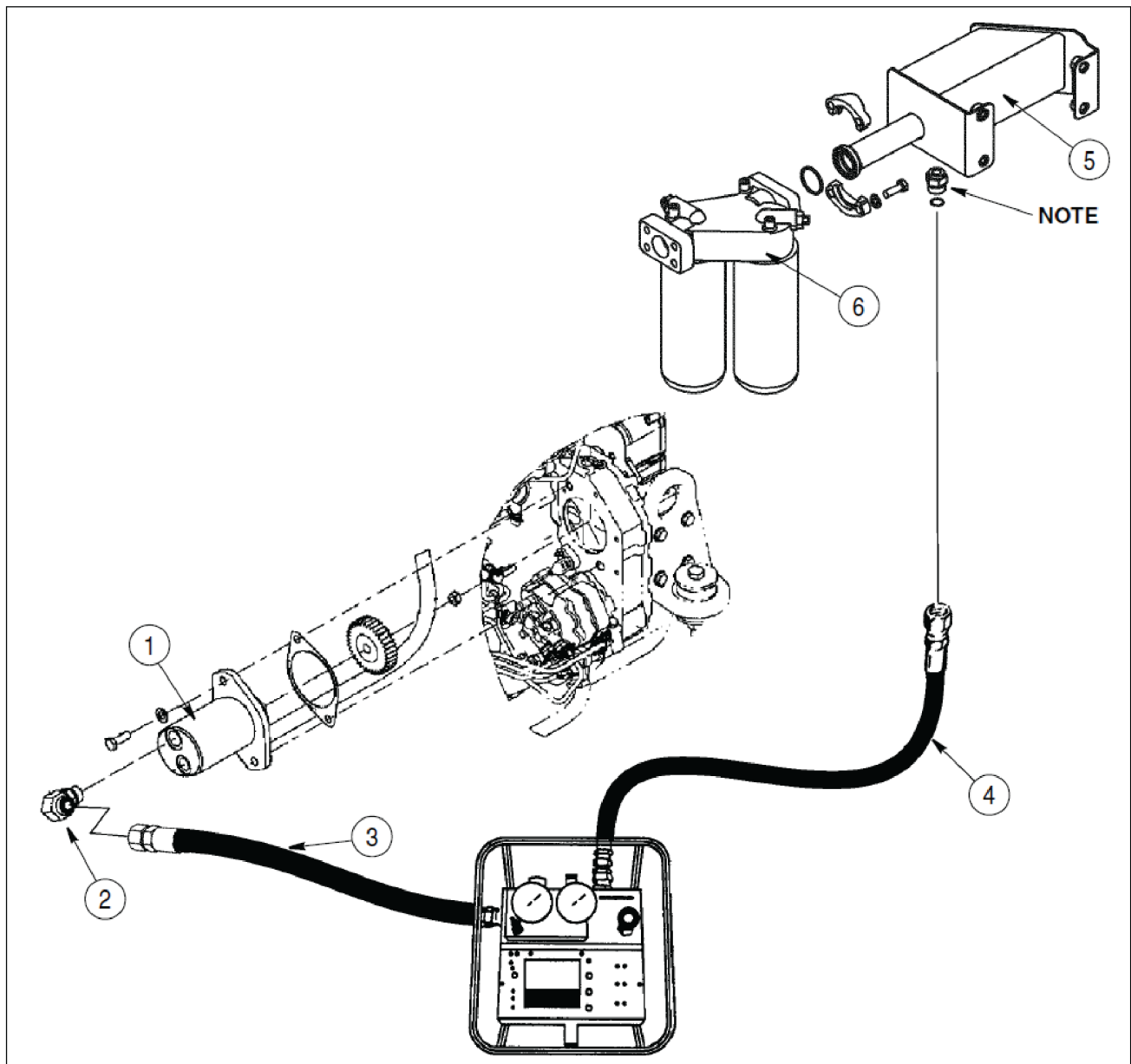
**NOTE:** *The gauges can not be connected to the test ports if hydraulic pressure remains in the system.*

5. Start the engine. Run the engine at low idle while reading the pressure gauges. The alarms (buzzer, master warning light and brake pressure warning light) should shut off when the accumulator with the lowest pressure reaches **106 - 115 bar (1537 - 1668 psi)**, approximately 40 seconds at any engine speed.
6. After the alarms stop, run the machine at high idle to finish charging the accumulators. The pressure must increase on both gauges until **190 - 196 bar (2755 - 2842 psi)** is reached. This is the accumulator valve cut-out pressure. It is normal for the pressure to drop slightly once the cut-out pressure is reached.
7. With the engine running at high idle, push and release the brake pedal rapidly while reading the drop in pressure on the gauges. The pressure drops may not be equal, but as the lowest pressure reaches **157 - 167 bar (2276 - 2422 psi)**, the system pressure must start to increase. This is the valve cut in pressure.

**NOTE:** *The brake cut-in and cut-out pressures of the brake system charge valve are factory preset and are not adjustable.*

**NOTE:** *If the pressure on one of the pressure gauges is lower than specified, the problem can be a bad accumulator valve.*

8. Stop the engine. Turn the ignition switch to the ON position. Push and release the brake several times while reading the pressure on the gauges. Each push and release of the pedal will result in a slight drop in pressure, but not necessarily equal on the two gauges. As the lowest pressure reaches **106 - 115 bar (1537 - 1668 psi)** the brake warning lamp and alarm buzzer must actuate. If the warning lamp and alarm buzzer fail to work, test the low brake pressure warning switches and electrical circuit. If the warning lamp and alarm buzzer actuate at a higher or lower pressure than specified, test the low brake pressure warning switches and replace as needed.



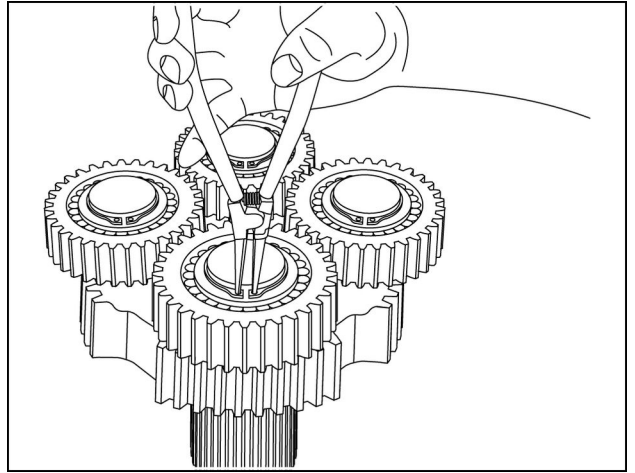
BS03B021

RAIL12WEL0135GA 1

- |                      |                          |                          |
|----------------------|--------------------------|--------------------------|
| 1. Brake pump        | 3. Flowmeter inlet hose  | 5. Filter inlet manifold |
| 2. Pump output elbow | 4. Flowmeter outlet hose | 6. Filters               |

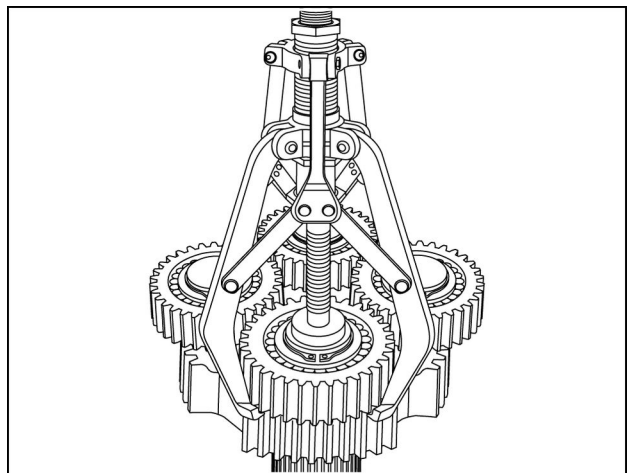
**NOTE:** If unit is equipped with auxiliary steering a tee fitting will have to be used in this location.

7. Remove retaining rings.



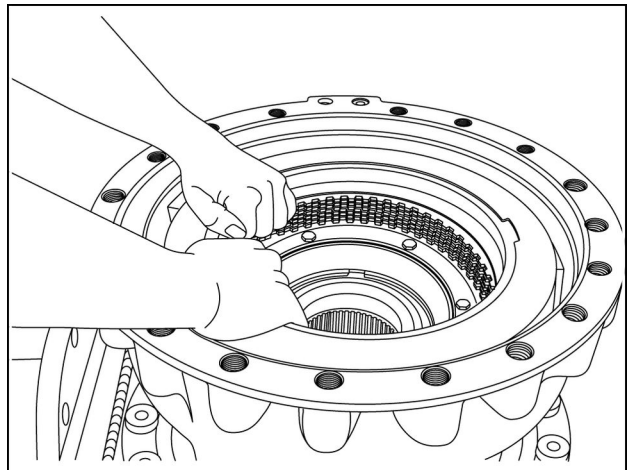
RCIL11WHL013BAF 7

8. Pull off planetary gears.



RCIL11WHL014BAF 8

9. Lift end plate out of brake housing.



RCIL11WHL015BAF 9

# Contents

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## Brakes and controls - 33

### Parking brake or parking lock - 110

#### SERVICE

Parking brake or parking lock	
Disassemble .....	3
Inspect .....	5
Assemble .....	6
Test .....	7

If the PFC pump control system malfunctions the pumps might deliver more flow than the hydraulic systems require, causing excessive pressure at the pump outlet. A differential pressure relief valve (**35D**) is installed in the steering priority valve limits this excessive pressure. The differential pressure relief (**35D**) provides a connection between the PFC pump outlet flow and tank. The differential pressure relief valve is spring biased to the closed position. Pump outlet pressure is ported to the non spring end of differential pressure relief valve spool. Load sense (LS) pressure is ported to the spring end of the spool. The differential pressure relief opens when the pump outlet pressure is about **40 bar (580 psi)** higher than load sense (LS) pressure.

The maximum steering pressure is lower than the maximum loader pressure. To limit this pressure in the steering system, a steering pressure relief valve (**35E**) is connected between the steering LS signal (**35B**) in the steering priority valve (**35**) and tank. This steering relief valve (**35E**) limits the maximum LS signal from the steering system and hence limits the maximum steering pressure. The maximum pressure in the loader circuit is regulated by the loader relief LS control valve located in the loader valve.

If only one of the complete steering or all of the loader circuits are malfunctioning, a quick check is to operate both steering and loader at the same time. If both systems then operate, the PFC pumps should be OK. If only one circuit of the loader valve malfunctions, the problem is in the loader valve only. If either the steering or all of the loader circuits malfunction and both systems function when operated at the same time. A possible problem is then the shuttle check valve (**35B**) in the steering priority valve (**35**).

### Component Flow Chart Legend

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

## Hydraulic systems - Decontaminating

### ⚠ DANGER

#### Crushing hazard!

Always install the safety lock before working under the raised attachment.  
Failure to comply will result in death or serious injury.

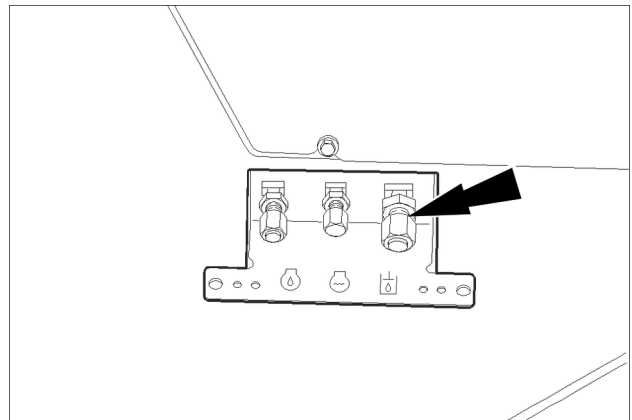
D0075A

1. Start and run the engine at **1500 rpm (r/min)**.
2. Completely retract the cylinders of all attachments on the machine. Angle the blade to the right, the right cylinder will be fully retracted and the left will be fully extended. Stop the engine.

**NOTICE:** If retracting the cylinder rods causes the attachment to be raised, block the attachment in place before proceeding to the next step.

**NOTE:** Any attachment or part of an attachment that is raised must be supported with acceptable equipment to prevent the attachment from falling.

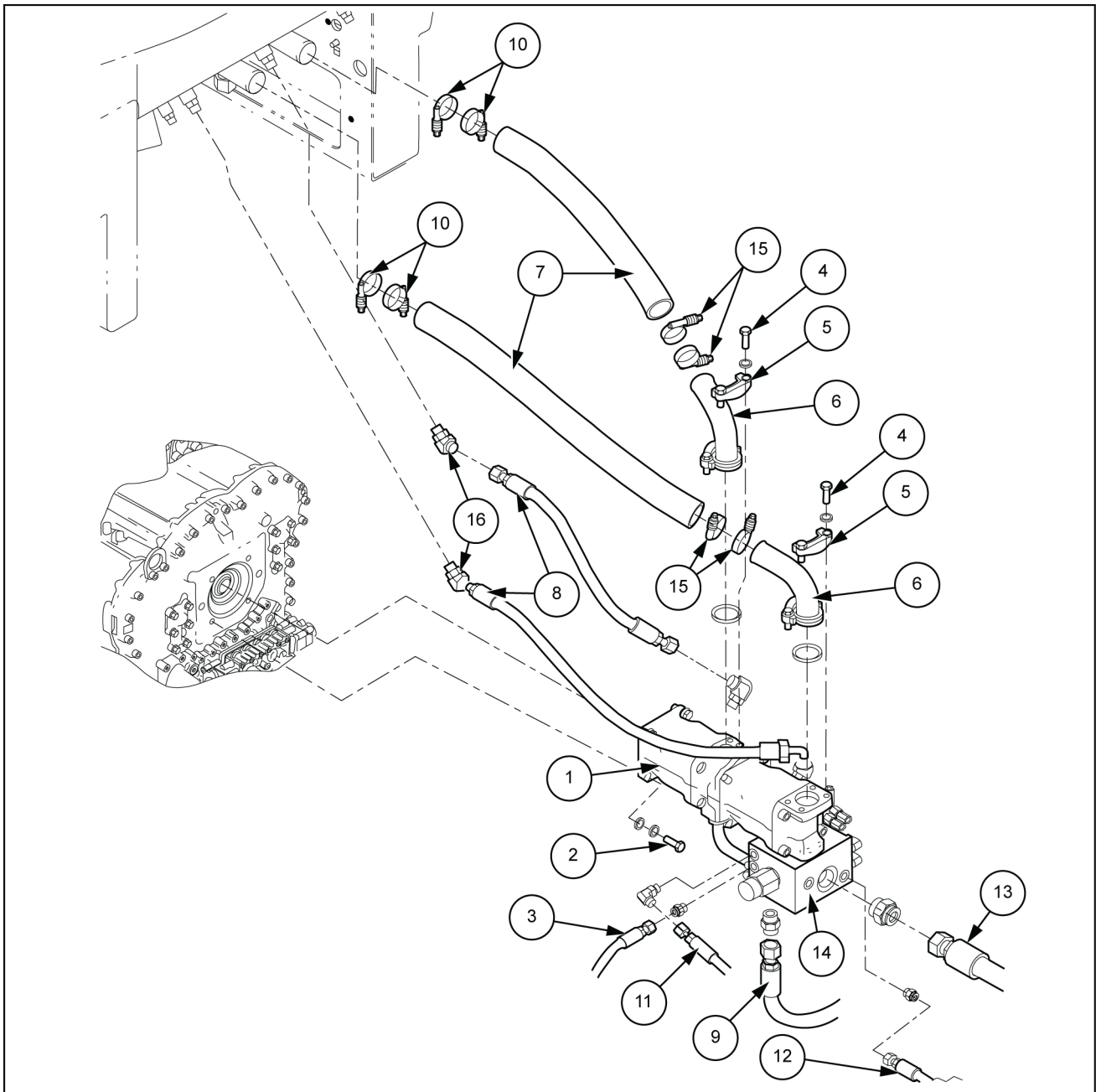
3. Move each control lever in both directions to release pressure in the hydraulic circuits.
4. Loosen and remove the filler cap from the reservoir.



RCPH10WHL054BAL 1

5. Drain the hydraulic oil from the reservoir.
  - A. The reservoir holds approximately **20 U.S. gallons (75.7 litres)** of hydraulic oil.
  - B. Have available acceptable equipment to drain the hydraulic oil.
  - C. Remove the drain cap from the remote drain.
6. Apply brakes at least 30 times to drain oil from accumulators.
7. Remove the hydraulic filter elements from the machine.
8. Install new hydraulic filter elements on the machine.
9. Install the drain cap in the remote drain.
10. Fill the hydraulic reservoir with **20 U.S. gallons (75.7 litres)** of hydraulic fluid.
11. Disconnect the line from the OPEN end and CLOSED end of each cylinder.
12. Be sure all control levers are in the NEUTRAL position.

## Variable displacement pump - Remove



LEIL13WHL1257GB 1

- |                        |                    |                              |                                |
|------------------------|--------------------|------------------------------|--------------------------------|
| 1. Pump main hydraulic | 5. Split flange    | 9. Steering high pressure    | 13. Loader high pressure       |
| 2. Mount bolts         | 6. Tube            | 10. Clamps                   | 14. Steering priority manifold |
| 3. Drain hose          | 7. Hose suction    | 11. Steering load sense hose | 15. Clamps                     |
| 4. Bolt                | 8. Hose case drain | 12. Loader load sense hose   | 16. Fittings                   |

**NOTE:** When disconnecting hydraulic fittings, plug hoses and cap fittings to prevent entry of foreign matter into hydraulic system.



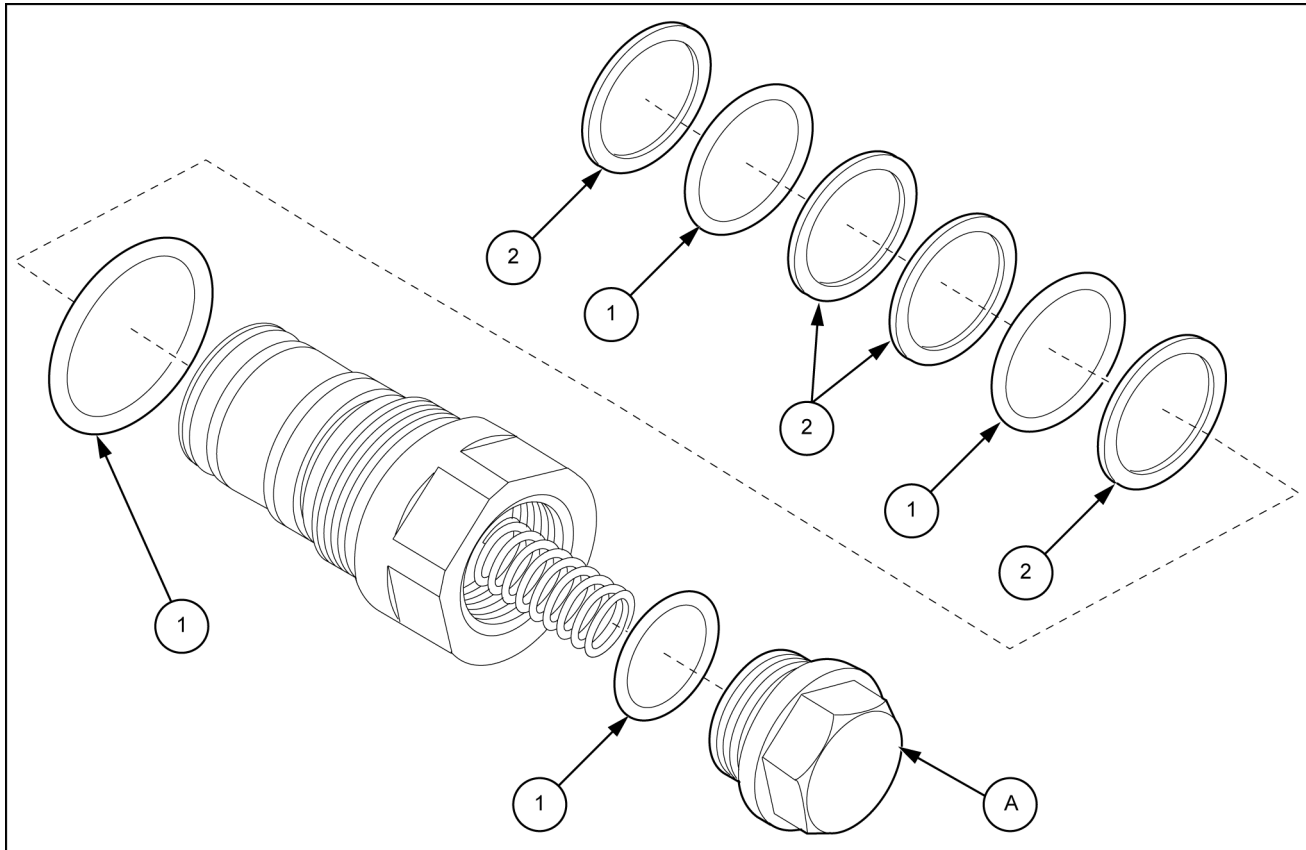


## **Hydraulic systems - 35**

**Front loader hydraulic system control - 724**

**821F  
921F**

3. Install new O-rings **(1)** and thrust rings **(2)** on anticavitation and pressure relief valves **(10)**. Torque cap **(A)** to **100 N·m (74 lb ft)**.



LEIL13WHL1349FB 3

1. O-rings

2. Thrust rings

## Lift arm cylinder - Disassemble

**NOTE:** Refer to the exploded view.

1. Clean exterior of cylinder. If hoses were removed with cylinder, remove hoses from cylinder.
2. Fasten tube **(1)** in an acceptable repair stand or other holding equipment. Do not damage tube **(1)**.
3. Loosen and remove self-tapping screw **(12)**.
4. Use a spanner wrench to loosen and remove gland **(4)** from tube **(1)**.
5. Pull piston rod **(13)** straight out of tube **(1)** to prevent damage to tube.
6. Fasten piston rod eye or yoke in a vise and put a support under piston rod **(13)** near piston **(15)**. Put a shop cloth between support and piston rod to prevent damage to piston rod.
7. Use a torque multiplier, CAS-1039, to loosen and remove bolt **(14)** that fastens piston **(15)** to piston rod **(13)**.
8. Remove piston **(15)** from piston rod **(13)**.
9. Remove gland **(4)** from piston rod **(13)**.
10. Remove and discard seal **(16)**, ring **(17)** and wear ring **(18)** from piston **(15)**.
11. Remove and discard O-ring **(10)**, backup ring **(9)**, O-ring **(11)**, wiper **(5)**, rod seal **(6)**, buffer seal **(7)** and bushing **(8)** from gland **(4)**.

## Ride control solenoid valve block - Disassemble

**NOTE:** Refer to "Ride control solenoid valve block - exploded view" for the callouts of this procedure.

1. Remove ride control valve.
2. Remove plugs **(1)**, **(8)**, **(9)** and **(11)**.
3. Remove the solenoid **(12)**.
4. Remove the spool **(7)** from the valve block **(16)**.
5. Remove cap screw **(2)**, bushing **(3)**, spring carrier **(4)**, springs **(5)** and **(6)** from spool **(7)**.
6. Remove orifice **(13)**, poppet **(14)** and orifice **(15)**.
7. Remove accumulator drain screw **(10)**.
8. Remove the pressure relief valve **(17)**.

## **Loader bucket control cylinder - Inspect**

1. Discard the parts that were removed from the piston and the gland.
2. Clean all parts in cleaning solvent. Use only lint free cloths for cleaning and drying.
3. Check to be sure that the piston rod is straight. If the piston rod is not straight, replace it with a new piston rod.
4. Illuminate the inside of the tube for deep grooves and other damage. If there is any damage to the tube, replace it with a new tube.
5. Remove any small scratches on the piston rod or inside the tube with emery cloth of medium grit. Use the emery cloth with a rotary motion.
6. Inspect the bushings in the piston rod eye or yoke and the tube. Replace as required.
7. Inspect the gland for rust and clean and remove rust as necessary.
8. Inspect the gland end of the tube for sharp edges that will cut the gland O-ring and remove as necessary.
9. Inspect the piston for damage and wear. If the piston is damaged or worn, replace it with a new piston.

## Frame - Install - Loader frame

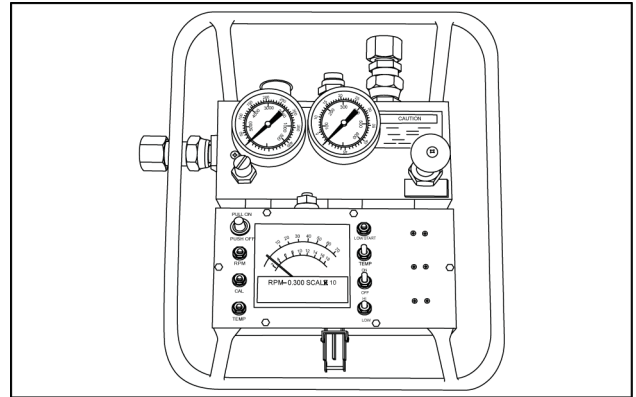
1. Apply antiseize compound to the inner bores and outer bores for the pivot pins of the front frame.
2. Move the machine into alignment with the loader frame (2).
3. Lower the loader frame (2) into alignment with the front frame.
4. Apply antiseize compound to the pivot pins (9) and (10) that fasten the loader frame (2) to the front frame.
5. Start the pivot pins (9) and (10) into the front frame. Install the washers (18) and new wipers (22) between the loader frame (2) and the front frame.
6. Install the pivot pins (9) and (10) all the way.
7. Install the bolt (19), washer (20) and spacer (21) that fasten the pivot pins (9) and (10). Tighten the bolt.
8. Install the proximity switch and cover. Left-hand side of the machine only.
9. Disconnect the chain hoist from the loader frame (2).
10. If the machine is equipped with front lamps, hold the front lamps in place and install the cap screws and lock washers that fasten the front lamps to the front frame. Tighten the cap screws.
11. If the machine is equipped with auxiliary hydraulics, remove the plugs from the tube fittings and the caps from the hoses. Connect the hoses to the tubes.
12. Connect the chain hoist to the bucket cylinder (8) and lower the bucket cylinder (8).
13. Start the engine and run the engine at low idle.
14. Have another person help you at this time. Move the bucket control lever as required to align the piston rod eye of the bucket cylinder (8) with the bell crank (11). Stop the engine.

**NOTICE:** Do not use your fingers to check the alignment of the cylinder rod . Personal injury can be the result.

15. Install the pivot pin (7) in the bell crank (11) and the piston rod eye of the bucket cylinder (8).
16. 16. Install the bolt (15), washer (16), and spacer (17) that fasten the pivot pin (7). Tighten the bolt.
17. Disconnect the chain hoist from the bucket cylinder (8).
18. Fasten the chain hoist to one of the lift cylinders (4) or (6).
19. Raise the piston rod yoke of the lift cylinder (4) or (6) so the piston rod yoke is aligned with the loader frame (2).
20. Install a driver in the piston rod yoke and the loader frame (2).
21. Repeat Steps 18, 19, and 20 for the other lift cylinder (4) or (6).

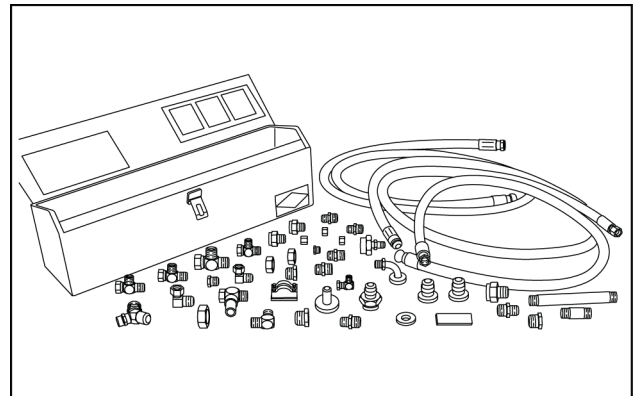
## Hydraulic control components - Special tools

OEM-1239 (CAS-10280) FLOWMETER



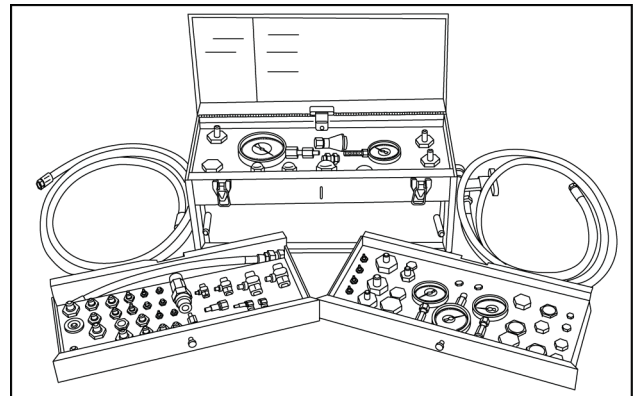
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CAS-1808 FLOWMETER FITTING KIT



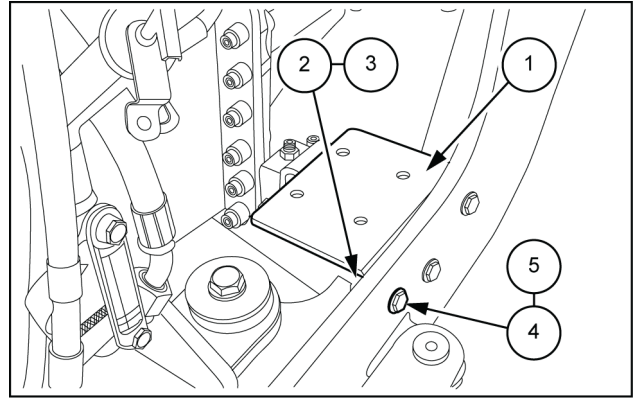
LEIL13WHL0656AA 2

CAS-1804 PRESSURE TEST FITTING KIT



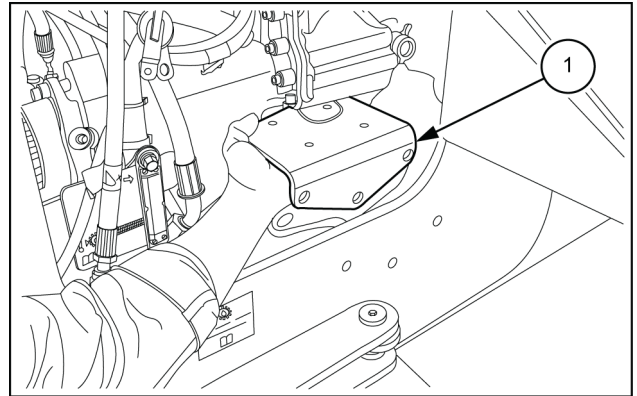
LEIL13WHL0657AA 3

9. Remove the mounting bracket (1) from the rear chassis removing the three nuts (2), the washers (3), the cap-screws (4) and the washers (5).



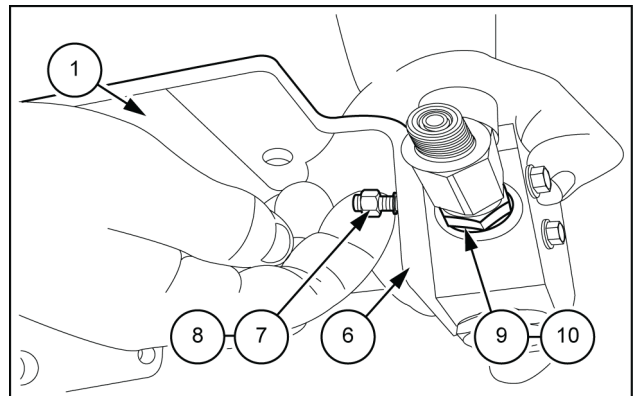
LEIL13WHL0695AB 8

10. Remove the mounting bracket (1).



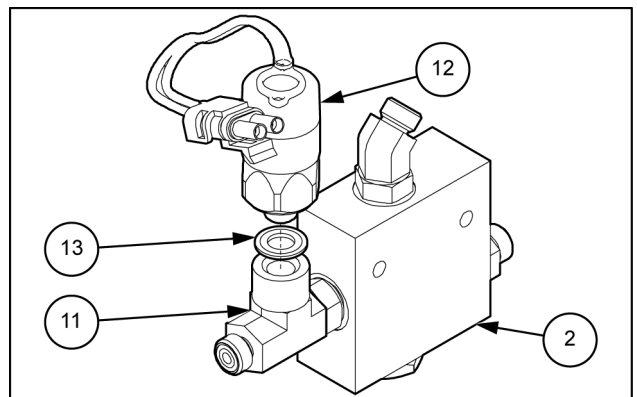
LEIL13WHL0696AB 9

11. Remove the steering valve PVFC (6) from the mounting bracket (1) by removing the two nuts (7), the washers (8), the capscrews (9) and the washers (10).



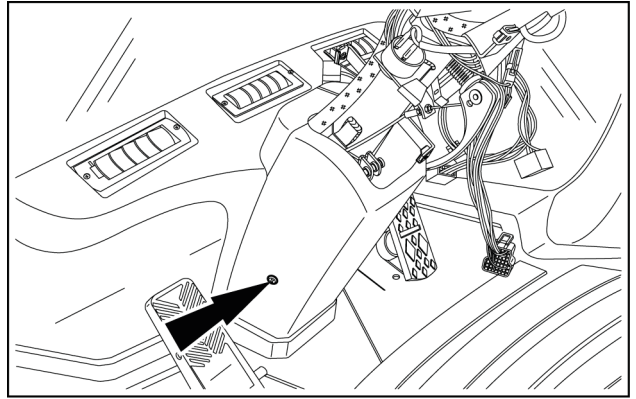
LEIL13WHL0697AB 10

12. Unscrew the pressure switch (12) with the seal (13) from the "T" fitting (11).



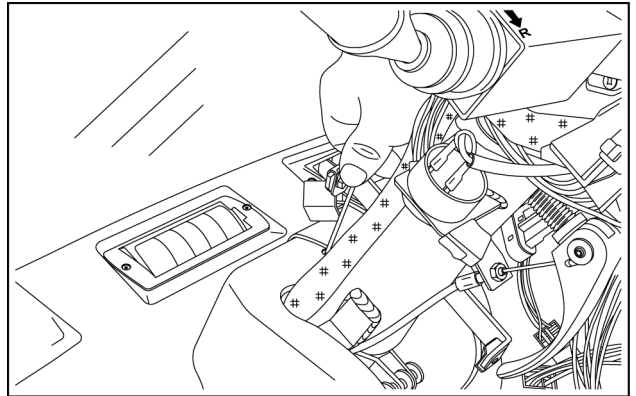
LEIL13WHL0698AB 11

6. Install the lower trim onto the column. Install and tighten the two mounting screws mounting the lower trim. Place the floor mat into position.



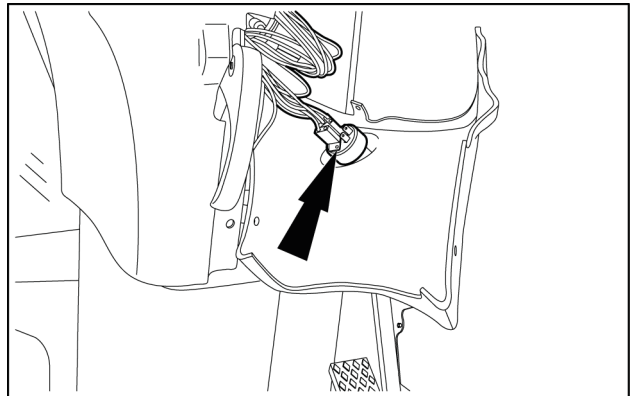
LEIL13WHL0644AB 5

7. Install the screw into the brace.



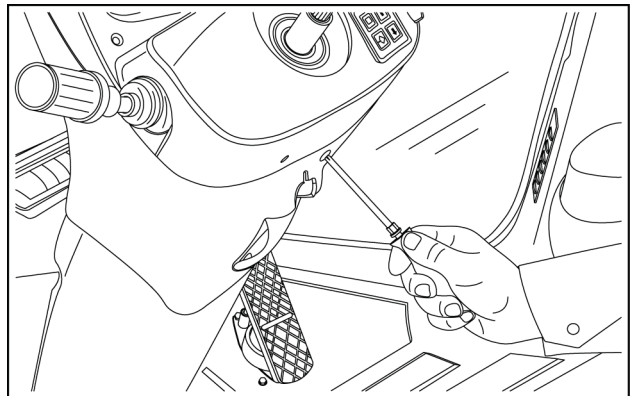
LEIL13WHL0643AA 6

8. Connect the ignition switch, install the right and left hand trim pieces onto the column.



LEIL13WHL0642AB 7

9. Install and tighten the five mounting screws for the left and the right hand trim.



LEIL13WHL0641AA 8

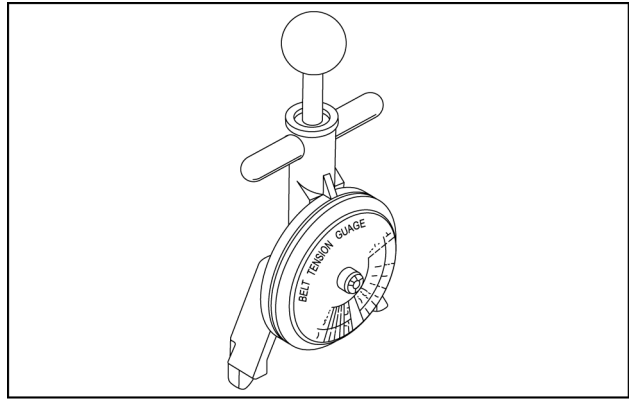
## Steering cylinder - Inspect

1. Clean all parts in cleaning solvent.
2. Check to be sure that piston rod **(14)** is straight. If piston rod is bent, install a new piston rod.
3. Inspect inside of tube **(18)** for deep grooves and other damage. If there is any damage to tube, a new tube must be used.
4. Remove small scratches on piston rod **(14)** or inside tube **(18)** with emery cloth of medium grit. Use emery cloth with a rotary motion.
5. Inspect bushing **(17)**. If bushing requires replacement, remove grease fitting **(15)** and retaining rings **(16)** then press bushing from tube end.

1. Connect the flow meter to the filter manifold as shown.
2. Disconnect steering pressure hose **(8)** from elbow **(7)**.
3. Cap elbow **(7)** and connect the flowmeter inlet hose **(6)** to the steering pressure hose **(8)**.
4. Make sure the load control of the flow meter is open. Start the engine. Run the engine at full throttle. Make sure the oil is at operating temperature.
5. Measure the flow at **0 bar ( 0 psi )**. Record the flow reading. Slowly close the load valve on the flow meter and read the flow at **170 bar ( 2500 psi )**. Record the flow reading.
6. Divide the flow reading at **170 bar ( 2500 psi )** by the reading at **0 bar ( 0 psi )**. Multiply the result by 100. This is the percent efficiency of the pump. If the efficiency of the pump is less than **85 %**, repair or replace the pump.
7. Stop the engine. Remove cap from elbow **(7)**.
8. Disconnect the flowmeter inlet hose **(6)** from the steering pressure hose **(8)**.
9. Connect steering pressure hose **(8)** to elbow **(7)**.

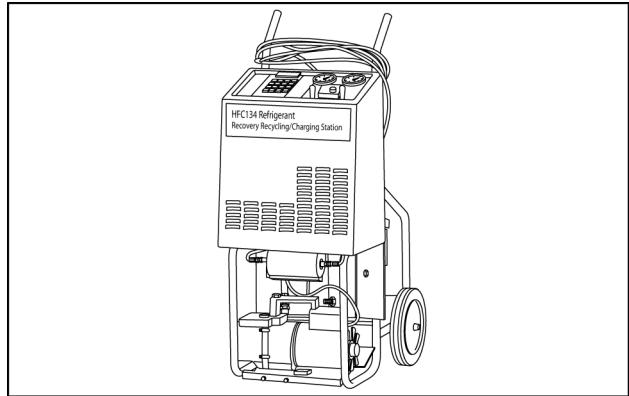
## Air conditioning - Special tools

Belt tension tool CAS-10808



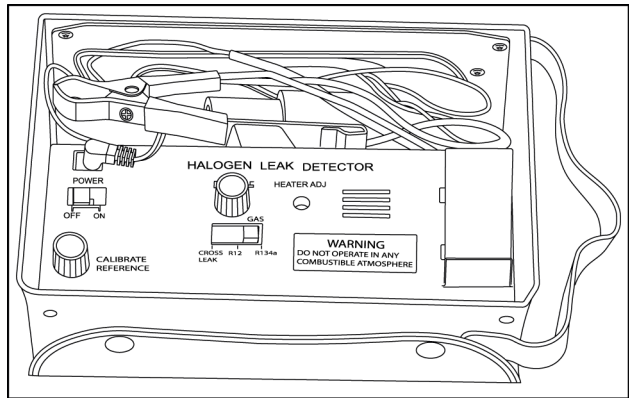
LEIL13WHL1088AA 1

Refrigerant recovery, recycling and charging station OEM-1415



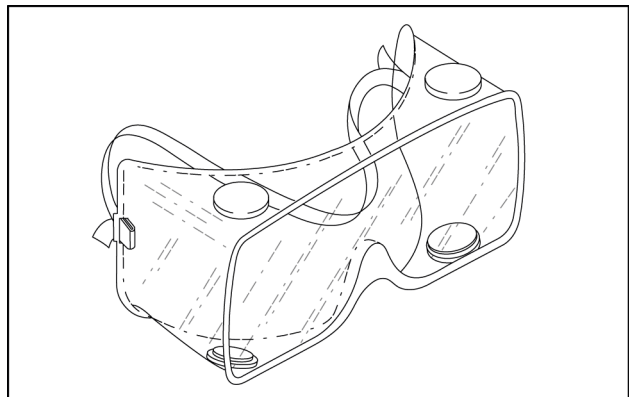
LEIL13WHL1085AA 2

Electronic leak detector OEM-1437



LEIL13WHL1086AA 3

Safety goggles CAS-10073-3



LEIL13WHL1087AA 4

## Blower and Compressor Clutch Check

Component	Correction
Compressor Clutch	<b>NOTE:</b> Check supply voltage with compressor lead plugged in and engaged. Voltage drops will not be apparent without current flow. 1. If there is electrical system voltage to the clutch, check for excessive voltage drop in the ground circuit, and replace the compressor.
Low and High Pressure Switches	Check the high and low pressure switches.
Blower Fuse ( 10 A)	Check for damaged blower fuse.
Blower Fan Switch	1. Check switch operation. Switch must give four different blower speeds: OFF, Low, High, and Purge. 2. Check for loose connections or broken wires. Repair or replace as necessary. 3. Check resistor board.
Blower Motor	1. Check the wiring to the blower motor. Make repairs or replace items as necessary. 2. Check motor ground wire. Make sure motor ground wire is making good contact with mounting bracket.
Temperature Control Switch	1. With key in ON position, turn switch to maximum cold. Compressor clutch must engage. <b>NOTE:</b> NOTE: Blower must be operating, since electrical power to temperature control switch is received from blower switch. 2. Turn the blower off. Disconnect the wires from the temperature control. Using an ohmmeter, check the continuity between switch terminals. If continuity is not present when switch is on maximum cold, replace switch.

## Cab Temperature Check

Component	Correction
Air Louvers	1. Make sure louvers and recirculation vents are fully open for most efficient air conditioning operation. Defrost louvers must be closed. 2. Check blower; blower must be running.
Air Conditioning	<b>NOTICE:</b> Use caution when feeling hoses. Hoses become very hot. Check temperature by slowly reaching for hose and touching briefly several times with finger tips, increasing the duration with each touch. 1. Feel the air conditioning hoses. The high pressure hoses (small line) must be warmer than the low pressure hose (large line). 2. If no temperature difference, the system is low on refrigerant, or compressor is not working correctly.
Duct Temperature	1. Put a thermometer in the air duct behind the seat and run the compressor for five minutes to make temperature stable. 2. Duct temperature must be below <b>25 °C (77 °F)</b> if the system is operating at maximum efficiency. 3. If temperature is above <b>25 °C (77 °F)</b> , system is low on refrigerant, there is a restriction in the system, compressor is not working correctly, or air ducts are not sealed correctly." <b>NOTE:</b> Ambient temperature must be <b>27 - 43 °C (81 - 109 °F)</b> .

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## **Harnesses and connectors - Electrical schematic frame 21**

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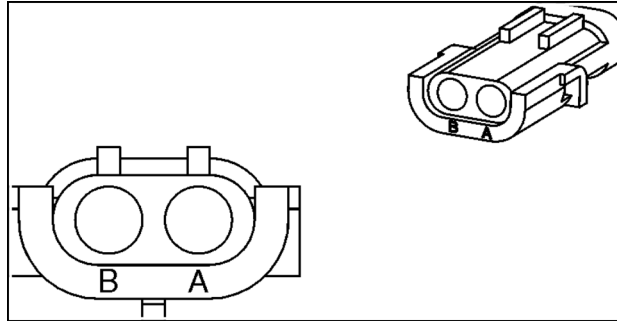
WIRE LIST						
WIRE INFORMATION			FROM CONNECTOR		TO CONNECTOR	
WIRE	CIRCUIT REF	COLOR, SIZE	REF DES, DESCRIPTION	CAV	REF DES, DESCRIPTION	CAV
57_C	PIN ENGAGE SOL PWR	WO.8-TXL	SPL_PINE, ULTRASONIC	A	AIC.2, ADV INSTR CLUSTER 2	16
57_D	PIN ENGAGE SOL PWR	W1.0-SXL	YPE1, PIN ENGAGE JUMPER	A	YPE2, PIN ENGAGE_OPT	A
58C	RIDE CTRL SW JUMPER	WO.8-GXL	SRC, RIDE_CONTROL_SW	5	SRC, RIDE_CONTROL_SW	3
58H_A	POWER VPS2	WO.8-TXL	TECM, TRANS	8	SPL_D19, ULTRASONIC	A
58H_B	POWER VPSL	WO.8-TXL	SPL_D19, ULTRASONIC	A	TECM, TRANS	53
58H_C	POWER	WO.8-GXL	ECD, ELEC CNTR D	D7	SPL_D19, ULTRASONIC	A
58L	RIDE CTRL RLY LSD	BKO.8-TXL	ECD, ELEC CNTR D	B8	TECM, TRANS	57
58T	RIDE CTRL RLY SW PWR	WO.8-GXL	ECD, ELEC CNTR D	B7	SRC, RIDE_CONTROL_SW	4
58_A	RIDE CTRL SOL PWR	W1.0-SXL	202M, ROLLBACK_JUMPER	A	202M, ROLLBACK_JUMPER	B
58_B	RIDE CONTROL SOL PWR	W1.0-SXL	FRONT, FRNT_CHAS-CAB	18	PRBF, ROLLBACK_PRES_SW	B
58_C	RIDE CTRL SOL PWR	WO.8-GXL	SPL_D26, ULTRASONIC	A	CAB_F, CAB_FRNT_CHAS	18
58_D	RIDE CTRL SOL PWR	WO.8-GXL	140M, DIODE_MODULE	D	SPL_D26, ULTRASONIC	A
58_E	RIDE CTRL SOL PWR	WO.8-GXL	ECD, ELEC CNTR D	D8	SPL_D26, ULTRASONIC	A
58_F	RIDE CTRL SOL PWR	WO.8-GXL	SRC, RIDE_CONTROL_SW	6	SPL_D26, ULTRASONIC	A
58_G	RIDE CONTROL SOL PWR	W1.0-SXL	FRONT, FRNT_CHAS-CAB	18	YRC, RIDE_CONTROL_OPT	1
58_H	RIDE CONTROL SIGNAL	W1.0-SXL	YRC_J, RIDE_CNTRL_JUMPER	1	YRC_J2, RIDE_CONTROL_OPT	1
59D_A	HOOD DOWN RLY CTRL	W1.0-SXL	ECF, GEP 48PIN HOLDER	46	HD, HOOD_SWITCH	A
59U_A	HOOD UP RLY CTRL	W1.0-SXL	ECF, GEP 48PIN HOLDER	48	HD, HOOD_SWITCH	C
60D_A	HOOD DOWN RLY OUT	W1.0-SXL	ECF, GEP 48PIN HOLDER	38	HDM, HOOD_LIFT_MOTOR	2
60U_A	HOOD UP RLY OUT	W1.0-SXL	ECF, GEP 48PIN HOLDER	40	HDM, HOOD_LIFT_MOTOR	1
61A	AC PRESS SW INPUT	W1.0-SXL	ENG, ENGINE-CAB1	30	SPL_ACP, ULTRASONIC	A
61A_B	TRINARY PRESS SW INPUT	WO.8-GXL	SPL_AC, ULTRASONIC	A	CAB_E, CAB-ENGINE	30
61A_C	AC SWITCH INPUT	W1.0-SXL	SPL_ACP, ULTRASONIC	A	ENG_B, CAB BTOM	8
61A_D	AC SWITCH INPUT	W1.0-SXL	SPL_ACP, ULTRASONIC	A	PRH, AC HIGH PRESS SW	A
61A_E	AC SWITCH INPUT	W1.0-SXL	PRL, AC LOW PRESS SW	A	BTM_E, CAB BTOM	8
61A_F	TRINARY PRESS SW INPUT	WO.8-GXL	HVAC1, HVAC1	1	SPL_AC, ULTRASONIC	A
61A_G	TRINARY PRESS SW INPUT	WO.8-GXL	ECD, ELEC CNTR D	B9	SPL_AC, ULTRASONIC	A
61B_A	AC SIGNAL	WO.8-GXL	HVAC1, HVAC1	4	AIC.2, ADV INSTR CLUSTER 2	12
61C	AC RELAY OUT	ORO.8-GXL	ECD, ELEC CNTR D	C10	CAB_E, CAB-ENGINE	2
61C_9	AC RELAY OUT	OR1.0-SXL	ENG, ENGINE-CAB1	2	ACT.9, AC_COMP_CLUTCH	1
61C_A	AC RELAY OUT	OR1.0-SXL	ENG, ENGINE-CAB1	2	ACT, AC_COMP_CLUTCH	1
61H	HEAT LOAD VLV SOL	ORO.8-TXL	CAB_E, CAB-ENGINE	8	AIC.1, ADV INSTR CLUSTER 1	19
61H_A	HEAT LOAD VLV SOL	OR1.0-SXL	ENG, ENGINE-CAB1	8	YLV, HEATED VALVE OPT	1
61H_B	HEAT LOAD VLV SOL	OR1.0-SXL	YLV2, HEATED VALVE OPT	1	YLV3, HEATED VALVE OPT	1
61R	AC RELAY CONTROL	W1.0-SXL	ENG, ENGINE-CAB1	29	SPL_ACS, ULTRASONIC	A
61R_B	AC RELAY CONTROL	WO.8-GXL	ECD, ELEC CNTR D	D9	CAB_E, CAB-ENGINE	29
61R_C	AC SWITCH OUTPUT	W1.0-SXL	SPL_ACS, ULTRASONIC	A	ENG_B, CAB BTOM	7
61R_D	AC SWITCH OUTPUT	W1.0-SXL	SPL_ACS, ULTRASONIC	A	PRH, AC HIGH PRESS SW	B
61R_E	AC SWITCH OUTPUT	W1.0-SXL	PRL, AC LOW PRESS SW	B	BTM_E, CAB BTOM	7
63C	FNT WPR PARK CTRL	WO.8-GXL	ECD, ELEC CNTR D	C4	FWM, FRONT-WIPER_MOTOR	D
63C2	FNT WPR PARK CTRL	WO.8-GXL	ECD, ELEC CNTR D	D4	ECD, ELEC CNTR D	C2
63C3	FNT WPR PARK CTRL	WO.8-GXL	ECB, ELECT CNTR B	C6	ECD, ELEC CNTR D	B3
63HC	FNT WPR HS RLY CTRL	WO.8-GXL	SFWM, FRONT WIPER/WASHER	9	SPL_HC, ULTRASONIC	A
63HC_A	WPR CUT OUT RLY CTRL	WO.8-GXL	ECB, ELECT CNTR B	B6	SPL_HC, ULTRASONIC	A
63HC_B	FNT WPR RLY HS	WO.8-GXL	ECD, ELEC CNTR D	B2	SPL_HC, ULTRASONIC	A
63H_A	FNT WPR HS RLY OUT	WO.8-GXL	FWM, FRONT-WIPER_MOTOR	A	SPL_WHS, ULTRASONIC	A
63H_B	FNT WPR RLY HS	WO.8-GXL	ECD, ELEC CNTR D	D2	SPL_WHS, ULTRASONIC	A
63H_C	FNT WPR HS RLY OUT	WO.8-GXL	140M, DIODE_MODULE	A	SPL_WHS, ULTRASONIC	A
63L	FNT WPR LS RLY CTRL	WO.8-GXL	ECD, ELEC CNTR D	B4	SFWM, FRONT WIPER/WASHER	3
63L_A	FNT WPR LS RLY OUT	WO.8-GXL	FWM, FRONT-WIPER_MOTOR	B	SPL_WLS, ULTRASONIC	A
63L_B	FNT WPR LS RLY OUT	WO.8-GXL	ECB, ELECT CNTR B	B5	SPL_WLS, ULTRASONIC	A
63L_C	FNT WPR LS RLY OUT	WO.8-GXL	140M, DIODE_MODULE	B	SPL_WLS, ULTRASONIC	A
63W	FNT WASHER PUMP	WO.8-GXL	SFWM, FRONT WIPER/WASHER	7	CAB_E, CAB-ENGINE	25
63W_A	FNT WASHER PUMP	W1.0-SXL	ENG, ENGINE-CAB1	25	FWM, FRONT-WASHER	31b
64C	HORN RLY CTRL	ORO.8-GXL	ECC, ELECT CNTR C	B8	SRHSTLK, RH STALK SWITCH	1
64_A	HORN POWER	ORO.8-GXL	ECC, ELECT CNTR C	D8	CAB_F, CAB_FRNT_CHAS	13
65L	LEFT SPEAKER	ORO.8-GXL	LSPK, LEFT_SPEAKER	A	SPK, SPEAKER	7
65R	RIGHT SPEAKER	ORO.8-GXL	RSPK, RIGHT_SPEAKER	A	SPK, SPEAKER	1
66A	RR CAMERA PWR	ORO.8-GXL	ECA, ELECT CNTR A	C9	MON, CAMERA/MONITOR	1
68C	REAR WPR PARK CTRL	OR1.0-GXL	SRWP, REAR_WIPER_SW	1	CAB_RF, CAB TO ROOF CONNECTION	K
68C_A	REAR WPR PARK CTRL	OR1.0-GXL	ROOF, ROOF TO CAB CONNECTION	K	RWM, REAR_WIPER_MTR	D
68L	REAR WPR SW PWR	OR1.0-GXL	SRWP, REAR_WIPER_SW	2	SPL_3, ULTRASONIC	A
68L_A	REAR WPR SW PWR	OR1.0-GXL	ROOF, ROOF TO CAB CONNECTION	L	RWM, REAR_WIPER_MTR	B
68L_B	REAR WPR SW PWR	OR1.0-GXL	SPL_3, ULTRASONIC	A	CAB_RF, CAB TO ROOF CONNECTION	L
68L_C	REAR WPR SW PWR	OR1.0-GXL	140M, DIODE_MODULE	F	SPL_3, ULTRASONIC	A
68W	REAR WSHR PUMP	WO.8-GXL	SRWP, REAR_WIPER_SW	6	CAB_E, CAB-ENGINE	24
68W_A	REAR WSHR PUMP	W1.0-SXL	ENG, ENGINE-CAB1	24	RWW, REAR_WASHER	1
69F	HTD MIRROR SIGNAL	W1.0-GXL	TRLY, TIMER RELAY	86	MHS, TRANS_ENABLE_SW	3
69_A	HEATED MIRROR SIGNAL	W1.0-GXL	SPL3, ULTRASONIC	A	TRLY, TIMER RELAY	87
69_B	HEATED MIRROR SIGNAL	W1.0-GXL	SPL3, ULTRASONIC	A	MHS, TRANS_ENABLE_SW	10
69_D	HEATED MIRROR SIGNAL	W1.0-GXL	SPL3, ULTRASONIC	A	MH_R, MIRROR_HTR	1

WIRE LIST						
WIRE INFORMATION			FROM CONNECTOR		TO CONNECTOR	
WIRE	CIRCUIT REF	COLOR, SIZE	REF DES, DESCRIPTION	CAV	REF DES, DESCRIPTION	CAV
69_E	HEATED MIRROR SIGNAL	W1.0-GXL	SPL3, ULTRASONIC	A	MH_L, MIRROR_HTR	1
CANB_H	CAN B HI	YO.8-TXL_TWIST	CAN, CAN PROTO	1	ECU, EDC17 ENG CNTRLR	71
CANB_L	CAN B LOW	GO.8-TXL_TWIST	CAN, CAN PROTO	2	ECU, EDC17 ENG CNTRLR	95
CANC_HA	CAN C HI	YO.8-TXL_TWIST	NOXD, NOX SENSOR	4	SPL_CAN_HA, ULTRASONIC	A
CANC_HB	CAN C HI	YO.8-TXL_TWIST	NH3, NH3 (51)	2	SPL_CAN_HB, ULTRASONIC	A
CANC_HC	CAN C HI	YO.8-TXL_TWIST	DEF1, DEF_QUALITY_JUMP	3	SPL_CAN_GC, ULTRASONIC	A
CANC_HD	CAN C HI	YO.8-TXL_TWIST	SCR1, ENG TO SCR	11	SPL_CAN_GC, ULTRASONIC	A
CANC_HE	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_HB, ULTRASONIC	A	SPL_CAN_GC, ULTRASONIC	A
CANC_HM	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_HB, ULTRASONIC	A	SCR2, SCR TO ENG	11
CANC_HN	CAN C HI	YO.8-TXL_TWIST	DEFO, DEF_QUALITY_UQS (58)	4	DEF2, DEF_QUALITY_JUMP	3
CANC_HT	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_HA, ULTRASONIC	A	SPL_CAN_HB, ULTRASONIC	A
CANC_HU	CAN2 HI, NOX	YO.8-TXL_TWIST	SPL_CAN_HU, ULTRASONIC	A	NOXS, NOX SENSOR	4
CANC_HV	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_HU, ULTRASONIC	A	TERM_CAN_C, CAN BULK HEAD	A
CANC_HW	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_GC, ULTRASONIC	A	DASH, DASH_TURBO	6
CANC_HZ	CAN C HI	YO.8-TXL_TWIST	SPL_CAN_HA, ULTRASONIC	A	SPL_CAN_HA, ULTRASONIC	A
CANCL_A	CAN C SCR LOW	GO.8-TXL_TWIST	NOXD, NOX SENSOR	3	SPL_CAN_LA, ULTRASONIC	A
CANCL_B	CAN C SCR LOW	GO.8-TXL_TWIST	NH3, NH3 (51)	3	SPL_CAN_LB, ULTRASONIC	A
CANCL_C	CAN C SCR LOW	GO.8-TXL_TWIST	DEF1, DEF_QUALITY_JUMP	2	SPL_CAN_LC, ULTRASONIC	A
CANCL_D	CAN C SCR LOW	GO.8-TXL_TWIST	SCR1, ENG TO SCR	12	SPL_CAN_LC, ULTRASONIC	A
CANCL_E	CAN C SCR LOW	GO.8-TXL_TWIST	SPL_CAN_LB, ULTRASONIC	A	SPL_CAN_LC, ULTRASONIC	A
CANCL_M	CAN C SCR LOW	GO.8-TXL_TWIST	SPL_CAN_LB, ULTRASONIC	A	SCR2, SCR TO ENG	12
CANCL_N	CAN C SCR LOW	GO.8-TXL_TWIST	DEFO, DEF_QUALITY_UQS (58)	5	DEF2, DEF_QUALITY_JUMP	2
CANCL_T	CAN C SCR LOW	GO.8-TXL_TWIST	SPL_CAN_LA, ULTRASONIC	A	SPL_CAN_LB, ULTRASONIC	A
CANCL_U	CAN C SCR LOW	GO.8-TXL_TWIST	NOXS, NOX SENSOR	3	SPL_CAN_LU, ULTRASONIC	A
CANCL_V	CAN C SCR LOW	GO.8-TXL_TWIST	TERM_CAN_C, CAN BULK HEAD	B	SPL_CAN_LU, ULTRASONIC	A
CANCL_W	CAN C SCR LOW	GO.8-TXL_TWIST	SPL_CAN_LC, ULTRASONIC	A	DASH, DASH_TURBO	5
CANCL_Z	CAN C SCR LOW	GO.8-TXL_TWIST	SPL_CAN_LA, ULTRASONIC	A	SPL_CAN_LU, ULTRASONIC	A
CANS_HA	CAN HI, CAN MOD2	YO.8-TXL_TWIST	JSS_ARM, JSS ARMREST TO CAB	1	CAN_MOD.2, JSS CAN MOD	7
CANS_HB	CAN HI, CAN MOD2	YO.8-TXL_TWIST	CAB_ARM_FRM, CAB TO ARM TO FRM	12	CAB_ARM, CAB TO ARMREST	1
CANS_HD	CAN HI, CAN MOD3	YO.8-TXL_TWIST	CAB_ARM_FRM, CAB TO ARM TO FRM	7	JSS_CNT, JSS CONTROLLER	1
CANS_LA	CAN LO, CAN MOD2	GO.8-TXL_TWIST	JSS_ARM, JSS ARMREST TO CAB	12	CAN_MOD.2, JSS CAN MOD	8
CANS_LB	CAN LO, CAN MOD2	GO.8-TXL_TWIST	CAB_ARM, CAB TO ARMREST	12	CAB_ARM_FRM, CAB TO ARM TO FRM	1
CANS_LD	CAN LO, CAN MOD3	GO.8-TXL_TWIST	CAB_ARM_FRM, CAB TO ARM TO FRM	6	JSS_CNT, JSS CONTROLLER	2
CAN_H	CAN HIGH	YO.8-TXL_TWIST	ENG, ENGINE-CAB1	14	ECU, EDC17 ENG CNTRLR	46
CAN_HA	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_JS_H1, ULTRASONIC	A	CAB_E, CAB-ENGINE	14
CAN_HB	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_DIAG, ULTRASONIC	A	DIA, DIAGNOSTIC	C
CAN_HC	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_TRANS, ULTRASONIC	A	SPL_CAN_DIAG, ULTRASONIC	A
CAN_HD	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_TRANS, ULTRASONIC	A	TECM, TRANS	25
CAN_HE	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN, ULTRASONIC	A	SPL_CAN_TRANS, ULTRASONIC	A
CAN_HF	CAN HIGH	YO.8-TXL_TWIST	SW_PD, SWITCH PAD	7	SPL_CAN, ULTRASONIC	A
CAN_HG	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN, ULTRASONIC	A	AIC.1, ADV INSTR CLUSTER 1	3
CAN_HH	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_TEL, ULTRASONIC	A	TEL, TELEMATICS	3
CAN_HJ	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_TEL, ULTRASONIC	A	SPL_CAN_JS_H2, ULTRASONIC	A
CAN_HL	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_TEL, ULTRASONIC	A	SPL_CAN_DIAG, ULTRASONIC	A
CAN_HN	CAN HIGH	YO.8-TXL_TWIST	SPL_CAN_JS_H1, ULTRASONIC	A	SPL_CAN_JS_H2, ULTRASONIC	A
CAN_HP	CAN HI, CAN MOD2	YO.8-TXL_TWIST	SPL_CAN_JS_H1, ULTRASONIC	A	JSS_CAB, JSS CAB	12
CAN_HR	CAN HI, CAN MOD3	YO.8-TXL_TWIST	SPL_CAN_JS_H2, ULTRASONIC	A	JSS_CAB, JSS CAB	7
CAN_L	CAN LOW	GO.8-TXL_TWIST	ENG, ENGINE-CAB1	13	ECU, EDC17 ENG CNTRLR	47
CAN_LA	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_JS_L1, ULTRASONIC	A	CAB_E, CAB-ENGINE	13
CAN_LB	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_DIAG_L, ULTRASONIC	A	DIA, DIAGNOSTIC	D
CAN_LC	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_TRANS_L, ULTRASONIC	A	SPL_CAN_DIAG_L, ULTRASONIC	A
CAN_LD	CAN LOW	GO.8-TXL_TWIST	TECM, TRANS	26	SPL_CAN_TRANS_L, ULTRASONIC	A
CAN_LE	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_L, ULTRASONIC	A	SPL_CAN_TRANS_L, ULTRASONIC	A
CAN_LF	CAN LOW	GO.8-TXL_TWIST	SW_PD, SWITCH PAD	8	SPL_CAN_L, ULTRASONIC	A
CAN_LG	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_L, ULTRASONIC	A	AIC.1, ADV INSTR CLUSTER 1	4
CAN_LH	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_TEL2, ULTRASONIC	A	SPL_CAN_JS_L2, ULTRASONIC	A
CAN_LM	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_TEL2, ULTRASONIC	A	TEL, TELEMATICS	4
CAN_LP	CAN LOW, CAN MOD3	GO.8-TXL_TWIST	SPL_CAN_JS_L1, ULTRASONIC	A	JSS_CAB, JSS CAB	1
CAN_LQ	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_JS_L1, ULTRASONIC	A	SPL_CAN_JS_L2, ULTRASONIC	A
CAN_LR	CAN LOW, CAN MOD2	GO.8-TXL_TWIST	SPL_CAN_JS_L2, ULTRASONIC	A	JSS_CAB, JSS CAB	6
CAN_LL	CAN LOW	GO.8-TXL_TWIST	SPL_CAN_TEL2, ULTRASONIC	A	SPL_CAN_DIAG_L, ULTRASONIC	A
ECC_L1	BEACON/DOME LT L1 ECC	BUSS	ECC, ELECT CNTR C	L1_1	L1_ECC, ECC BATT PWR	1
J1	TRANS ECM PWR	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	cs01
J2	TRANS ECM PWR	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J3	EMG STR AIC PWR	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J4	EMG STR AIC PWR	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J5	EMG STRG PLT EM DTNTS	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J6	PLTEW DTNTS PRK BRK SOL	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J7	PRK BRK SOL HRN	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1
J8	FAN RVSR TURN SGNL	ECA_BUSS	ECA, ELECT CNTR A	L1	ECA, ELECT CNTR A	L1

**Connector ENG-B -CAB bottom**

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	21F-C	EDC7 digital ground	(5)	24S	Throttle supply
(2)	0-BBR	Ground	(6)	24L	Low idle switch
(3)	24B	Throttle signal	(7)	61R-C	AC switch output
(4)	24R	Throttle ground	(8)	61A-C	AC switch input

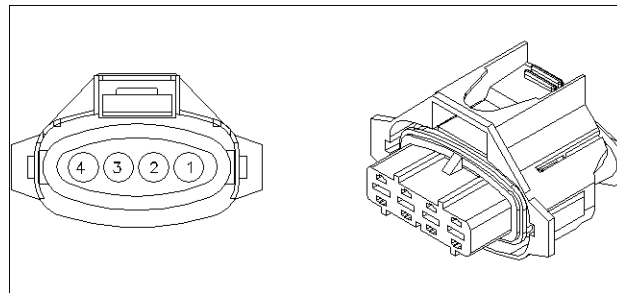
**Connector ENG-D - Disconnect harness**



245483C1 16

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(A)	13C-A	Fuel Shutoff Fused Power	(B)	13M-B	WIF ignition power

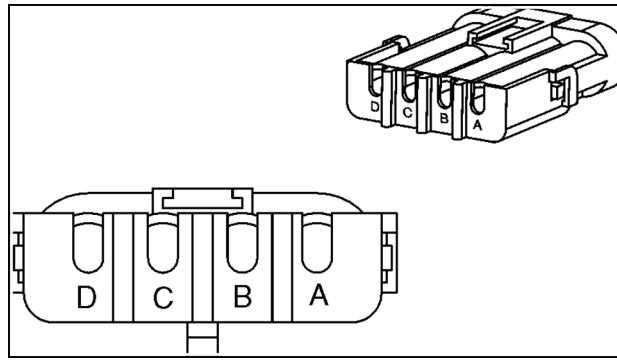
**Connector HTS - Humidity and ambient temperature**



87709809 17

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	23K-A	Temperature / Humidity B+	(3)	23K-E	Temperature / Humidity Humidity
(2)	23K-B	Temperature / Humidity Temperature	(4)	23K-C	Temperature / Humidity ground

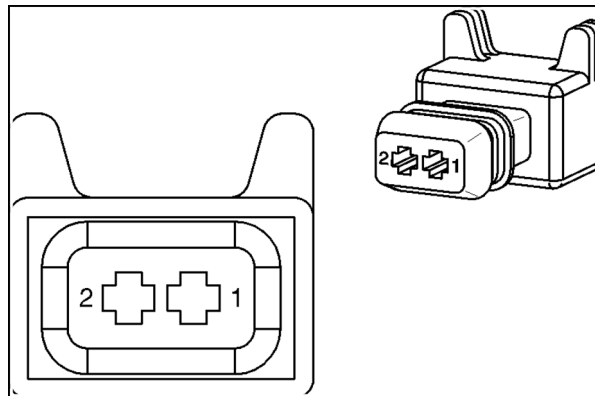
**Connector TS2 - Transmission shifter**



245487C1 11

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(A)		not used	(C)	25Z	1st and 4th Gear Signal
(B)	25W	3rd and 4th Gear Signal	(D)	25Y	Transmission Kick Down Signal

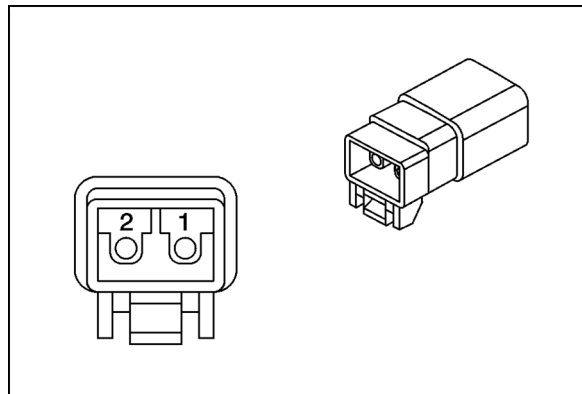
**Connector TSS - Turbine speed sensor**



291718A1 12

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	25C	Turbine Speed Signal	(2)	0-HH	Turbine Speed Sensor Ground

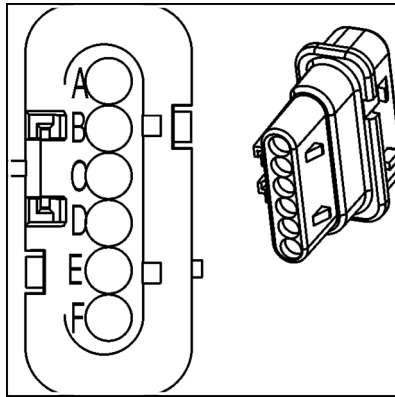
**Connector YDL - Diff lock solenoid**



225316C1 13

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	34A-D	Diff lock solenoid B+	(2)	34C-A	Diff lock solenoid ground

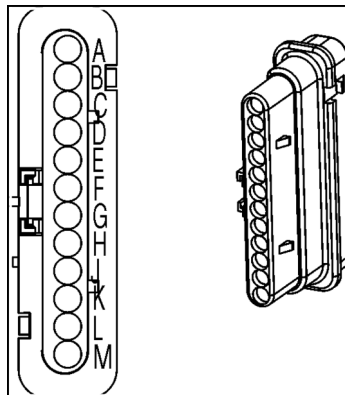
**Connector SPL-ROOF - Splice roof ground**



87324391 14

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(A)	0-MC	Beacon light ground	(D)	0-MN	Roof grounds
(B)	0-MB	Dome light ground	(E)	0-MK	Roof grounds
(C)	0-MA	Rear wiper motor ground	(F)		Not used

**Connector SPL-BCK-LGT - Splice back light power**

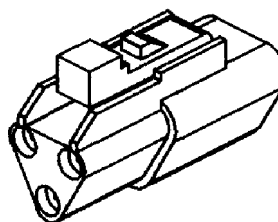
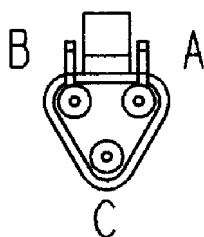


87324393 15

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(A)	49	Back light power	(G)	49-P	Back light power
(B)		Not used	(H)	49-R	Back light power
(C)	49-C	Back light power	(J)	49S	Back light power
(D)	49-H	Back light power	(K)	49-E	Back light power
(E)	49-L	Back light power	(L)	49-B	Back light power
(F)	49A	Back light power	(M)	49-A	Back light power

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	65R	Right speaker	(5)		Not used
(2)	O-PB	Right speaker ground	(6)		Not used
(3)		Not used	(7)	65L	Left speaker
(4)		Not used	(8)	O-PA	Left speaker ground

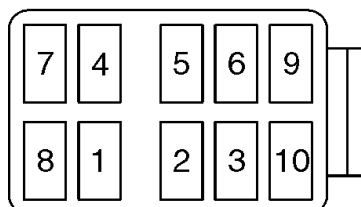
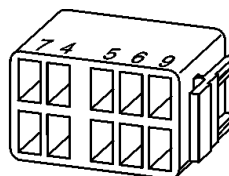
**Connector MH -Mirror Heater**



225295C1 12

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(A)	18V	Mirror heater power	(C)	49Y A	Mirror switch illumination power
(B)	O VA	Mirror heater ground			Not used

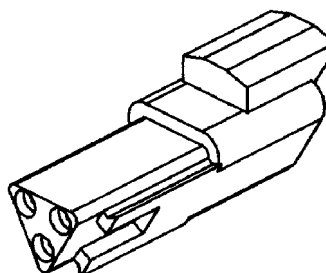
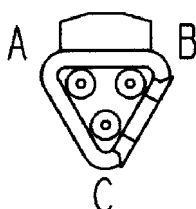
**Connector MHS - Mirror heat switch**



382391A1 13

Cavity	Wire ID	Circuit	Cavity	Wire ID	Circuit
(1)	Not used		(6)	Not used	
(2)	18V C	Mirror heat switch contact power	(7)	O VE	Mirror heat switch illumination ground
(3)	69F	Mirror heat switch signal	(8)	49Y B	Mirror heat switch illumination power
(4)	Not used		(9)	O VD	Mirror heat switch illumination output ground
(5)	Not used		(10)	69 B	Mirror heat timer signal output

**Connector MH C -Mirror heaters**



225294C1 14

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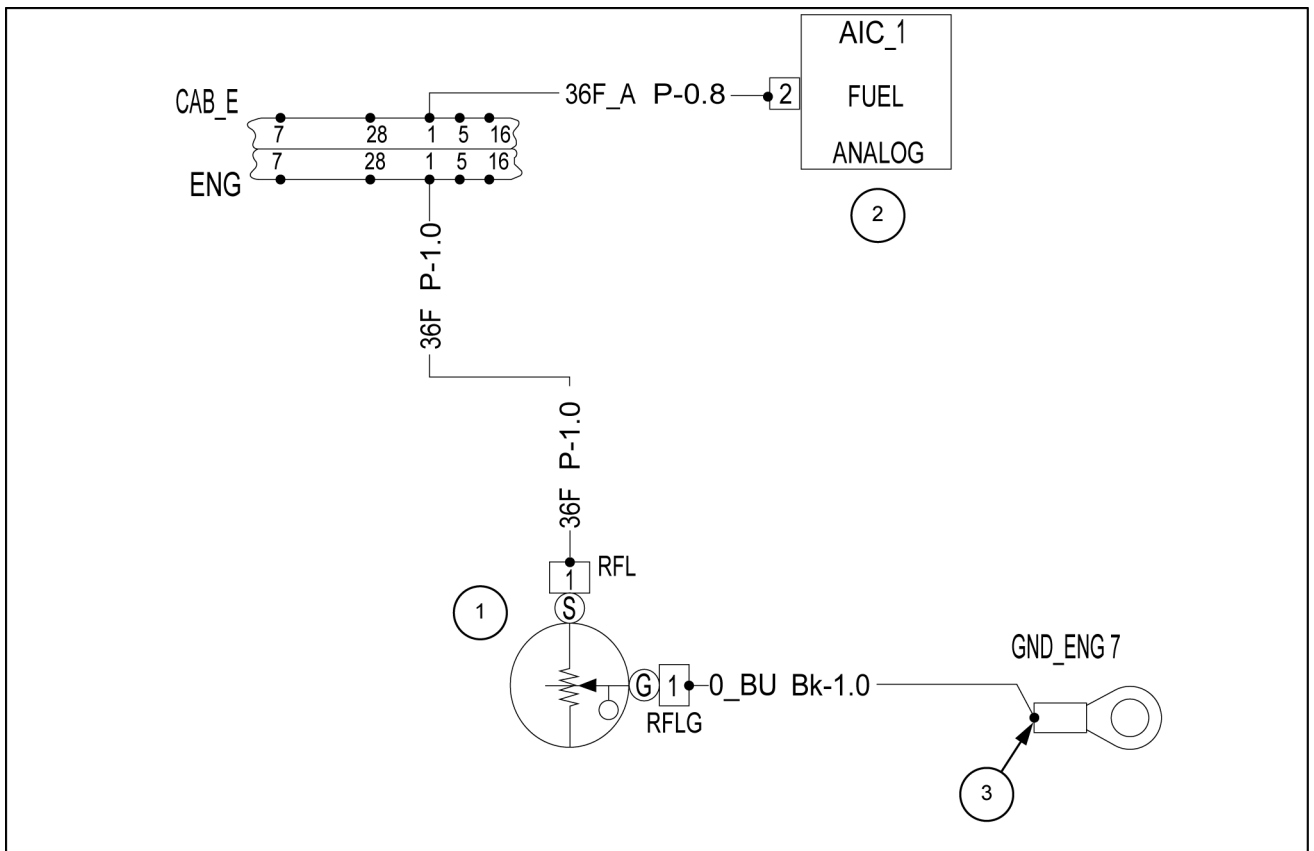
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## Fuel level sensor - Testing – Fuel level sender

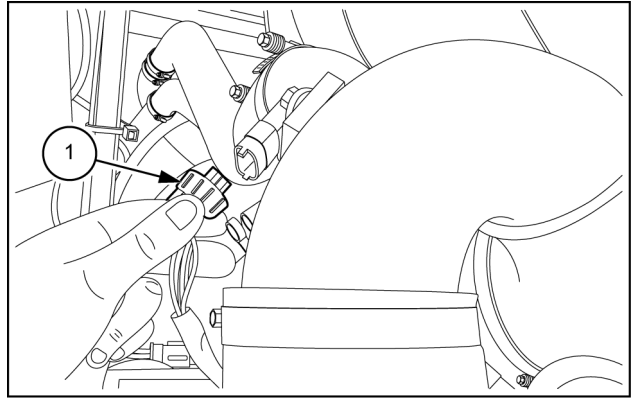
N°	Test Point	Expected Result	Other Result (Possible Cause)
1	<b>Condition</b> Turn the ignition key switch OFF. Remove the connector <b>RFL \ RFLG</b> . <b>Check</b> Measure the resistance across the fuel level sender.	<b>Result</b> The resistance should be between <b>33 - 240 Ω</b> .	<b>Action</b> If the resistance is outside of the expected results replace the fuel level sender.
2	<b>Check</b> Measure the resistance from the connector <b>RFLG</b> to the ground.	<b>Result</b> The resistance should be less than <b>10 Ω</b> .	<b>Action</b> If the resistance is greater than <b>10 Ω</b> or an open circuit is indicated, check the ground circuits for corrosion or damage. Repair or replace as necessary.
3	<b>Condition</b> Turn the ignition key switch ON. Remove the connector <b>RFL</b> . <b>Check</b> Measure the resistance from <b>RFL</b> pin 1 to ground.	<b>Result</b> The resistance should be approximately <b>20,000 Ω</b> .	<b>Action</b> If the resistance does not match the expected result, check connectors <b>CAB E \ ENG</b> pin 1 for corrosion or damage. Repair or replace wiring or faulty AIC module as necessary.



LEIL13WHL0237FB 1

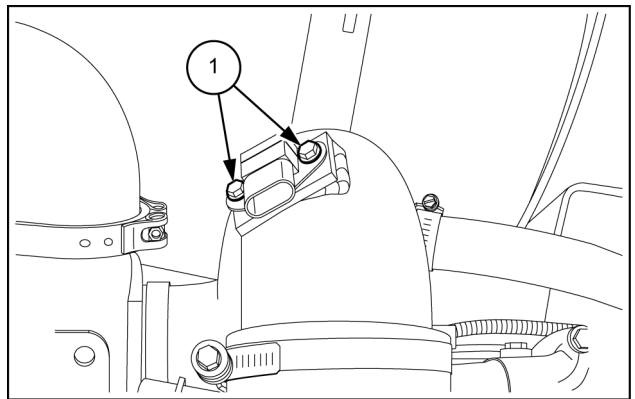
(1)	Fuel level sender ( <b>33 - 240 Ω</b> )
(2)	Advanced Instrument Cluster – analog input
(3)	Chassis ground – on engine block near oil filter

4. Disconnect the wiring harness plug (1).



LEIL13WHL0231AB 4

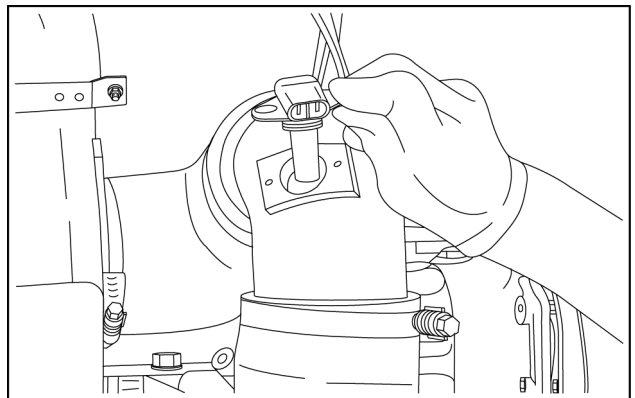
5. Remove the hexagonal bolts (1).



LEIL13WHL0232AB 5

6. Remove the sensor.

**NOTE:** Cover hole in the intake pipe to prevent debris from entering the system.

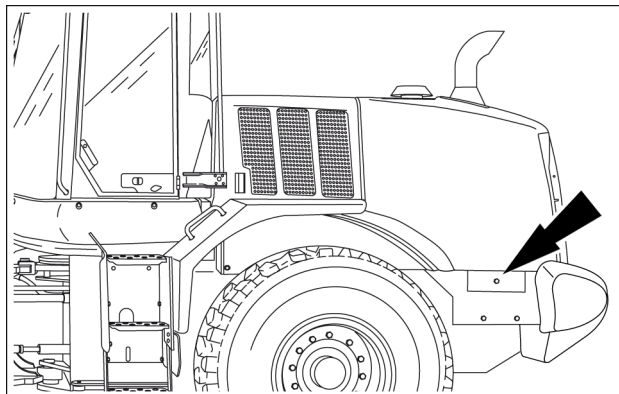


LEIL13WHL0233AA 6

## Ammonia (NH<sub>3</sub>) sensor - Remove - Catalyst outlet ammonia (NH<sub>3</sub>) sensor

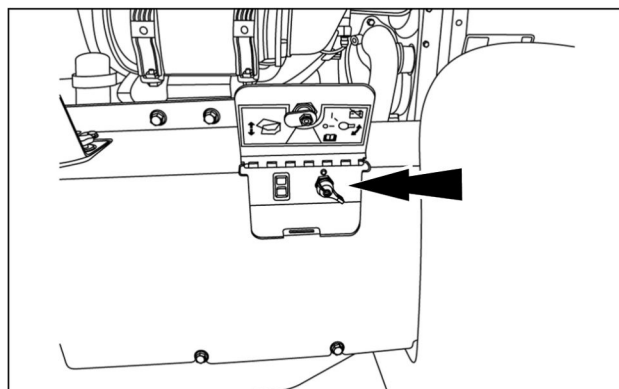
**NOTICE:** Emissions sensors in the exhaust system and on the vehicle may be damaged by vibrations from use of impact wrenches or hammers during service work. Avoid using these tools when servicing components close to the sensors. Remove the sensors with care if use of these tools cannot be avoided.

1. Raise the hood using controls located behind the access cover.



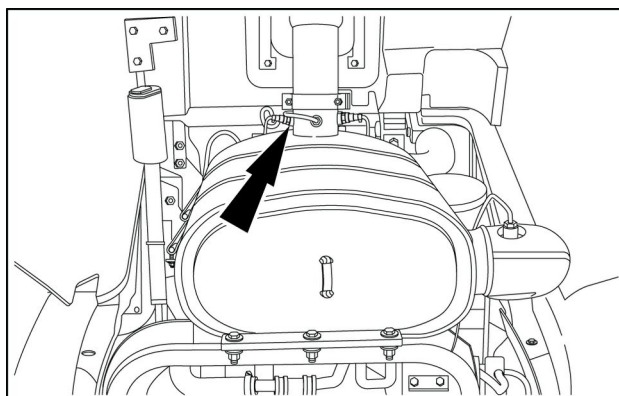
LEIL13WHL0554AA 1

2. Turn master electric switch to the "off" position.



RCPH11WHL653BAU 2

3. Locate the catalyst outlet ammonia (NH<sub>3</sub>) sensor on the exhaust system after Selective Catalytic Reduction (SCR).



LEIL13WHL0206AA 3

Electrical systems - Cab brake controls

<b>(3)</b>	Advanced Instrument Cluster <b>AIC</b> connector 2	<b>(9)</b>	Backlight power and ground source
<b>(4)</b>	Advanced Instrument Cluster <b>AIC</b> connector 1	<b>(10)</b>	To <b>TEL</b> connector pin E
<b>(5)</b>	Parking Brake Switch on pedestal	<b>(11)</b>	<b>GND_ENG3</b> , chassis ground connection
<b>(6)</b>	Parking Brake Relay, <b>K5</b>	<b>(12)</b>	<b>CAB_B/ BTM_C</b> connector

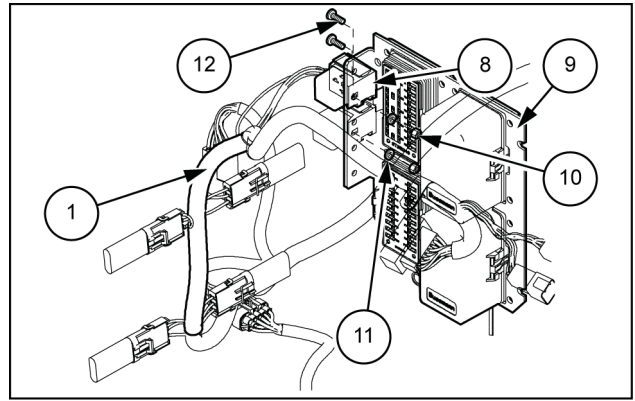


## **Electrical systems - 55**

**Cab Heating, Ventilation, and Air-Conditioning (HVAC) controls -  
051**

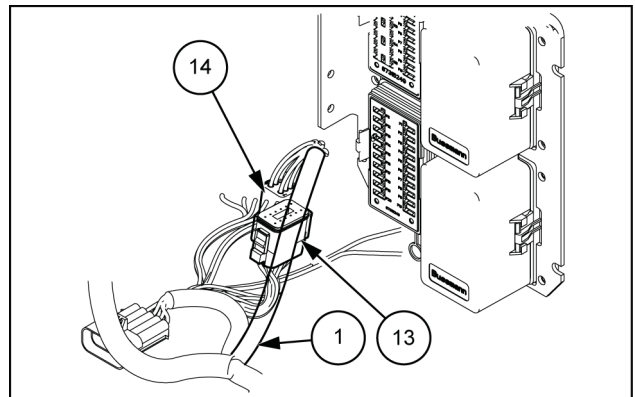
**821F  
921F**

5. Mount the joystick cable (1) to the fuse and relay panel (9) by installing the two nuts (10), the washers (11) and the capscrews (12). Tighten the capscrews.



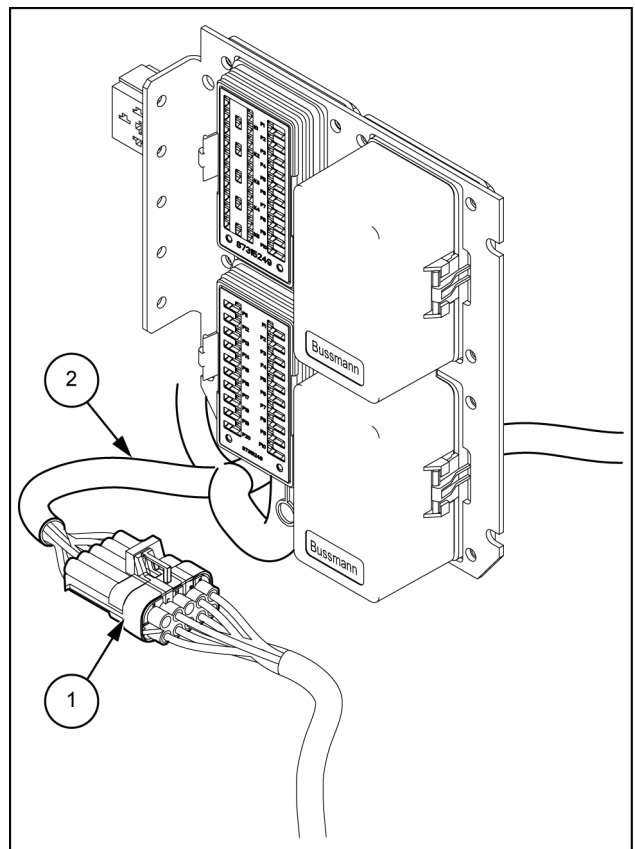
LEIL13WHL0682AB 5

6. Connect the joystick harness (1) to the cab harness (13) with the connector (14).



LEIL13WHL0683AB 6

7. Connect the connector (1) to the joystick harness (2).



LEIL13WHL0684BB 7

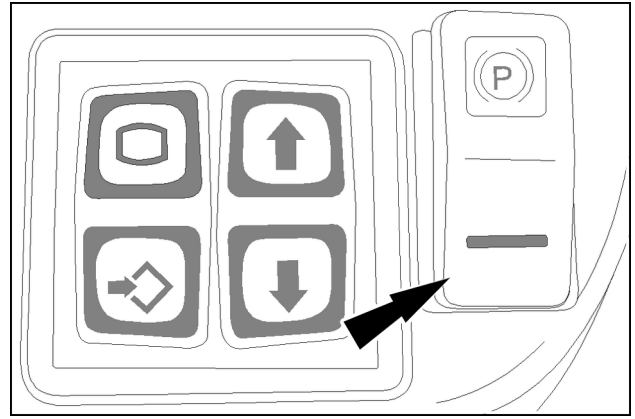
Electrical systems - Steering control system

(1)	Switched Battery, <b>24 V</b>	(11)	Secondary Starting Solenoid <b>39.3 <math>\Omega</math> 20 °C (68 °F)</b>
(2)	Switched Battery, <b>24 V</b>	(12)	Secondary Steering Module
(3)	Emerg Strg <b>ECA-F4</b> <b>7.5 A</b>	(13)	Secondary Steering Pressure Switch Normally Open contact closes at <b>241 kPa (35 psi)</b> Pin A — Normally Open Contact Pin B — Switch Common Pin C — Normally Closed Contact
(4)	Emerg Strg <b>ECA-F17</b> <b>7.5 A</b>	(14)	<b>GND_SSchAS</b> , Chassis Connection Near Motor/Pump Ground
(5)	<b>24 V</b> from Diode Module pin C	(15)	<b>GND_SSMOD</b> Chassis Connection Near SS Module Ground
(6)	Diode Module	(16)	Secondary Steering Module Chassis Ground
(7)	Instrument Cluster connector 2, pin 11 <b>AIC_2</b>	(17)	<b>CAB_T/ TRANS</b> connector
(8)	Diode Module, Flyback Protection	(18)	<b>Trans/ Sec Steer</b> connector
(9)	Secondary Steering Motor Power Relay	(19)	Unswitched <b>24 V</b> from Master Disconnect Switch, Starter Motor terminal.
(10)	Secondary Steering Motor	(20)	Secondary Steering Module <b>24 V</b> from Relay Module <b>PRM_B</b> , <b>SEC STRG</b> Fuse, F2. <b>20 A</b>

## Windshield wiper motor - Testing

N°	Test Point	Expected Result	Other Result (Possible Cause)
1	<p><b>Condition</b> Turn the key switch OFF.</p> <p><b>Check</b> Measure the resistance from the Rear Washer Motor pin 2 to chassis ground. Wiggle the harness during measurement to reveal an intermittent condition.</p>	<p><b>Result</b> The resistance should be less than <b>10 Ω</b>.</p>	<p><b>Action</b> The resistance is greater than <b>10 Ω</b>, there is a problem in the chassis ground circuit to the Rear Washer Motor. Verify that the wire and connection points are free of abrasion, corrosion or incorrect attachment. Repair as required.</p>
2	<p><b>Condition</b> Turn the key switch OFF.</p> <p><b>Check</b> Measure the resistance from the Rear Wiper Switch pin 6 to the Rear Washer Motor pin 1. Wiggle the harness during measurement to reveal an intermittent condition.</p>	<p><b>Result</b> The resistance should be less than <b>10 Ω</b>.</p>	<p><b>Action</b> The resistance is greater than <b>10 Ω</b>, there is a problem in the signal wire to the Rear Washer Motor. Verify that the wire and connection points are free of abrasion, corrosion or incorrect attachment. Repair as required.</p>
3	<p><b>Condition</b> Turn the key switch ON.</p> <p><b>Check</b> Measure the voltage from the Rear Wiper Switch pin 5 to chassis ground. Wiggle the harness during measurement to reveal an intermittent condition.</p>	<p><b>Result</b> The voltage should be approximately <b>24 V</b>.</p>	<p><b>Action</b> The voltage is less than <b>10 V</b>, there is a problem with the battery supply to the Rear Wiper Switch. Check fuse <b>ECA-F13</b> . Repair as required.</p>
4	<p><b>Condition</b> Turn the key switch ON. Activate the Rear Washer Switch.</p> <p><b>Check</b> Measure the voltage from the Rear Washer Motor, pin 1 to chassis ground.</p>	<p><b>Result</b> The voltage should be approximately <b>24 V</b>.</p> <p><b>Action</b> Temporarily replace the Washer Motor and retest.</p>	<p><b>Action</b> The voltage is less than <b>10 V</b>. Temporarily replace the Rear Washer Switch and retest.</p>

- Turn Park Brake switch to OFF position.



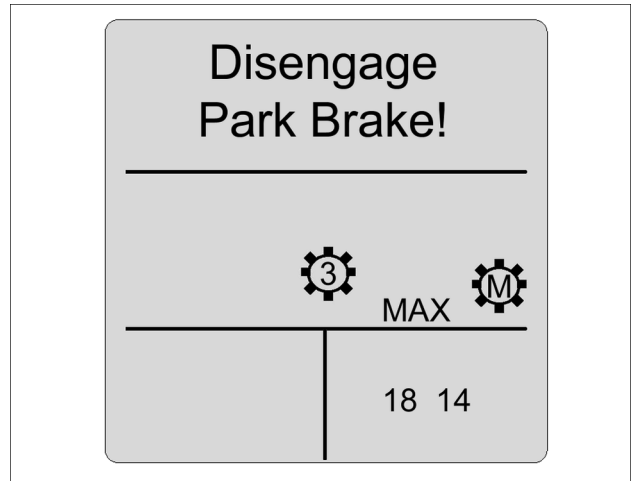
RCPH10WHL005BAL 3

- Apply the service brake. Put machine into gear (forward / reverse).  
Parking brake light on cluster will turn off at this time.

**NOTE:** *If the shifter is not in neutral or the park brake switch has not been turned to ON position, the AIC will instruct the operator to cycle the appropriate control to verify that the correct operation has been requested.*

- Place the transmission back into neutral before proceeding.

**NOTE:** *Park brake will not release until the machine shift control is placed in forward or reverse. This means that the park brake light will remain ON even when the park brake switch is placed in the OFF position.*



RCPH11WHL034BAN 4

## Parking Brake Function Check

Before operating machine, periodically check the parking brake functions.

**NOTE:** *Test the parking brake at a maximum of every 250 hours.*

### **⚠ WARNING**

**Improper operation or service of this machine can result in an accident.**

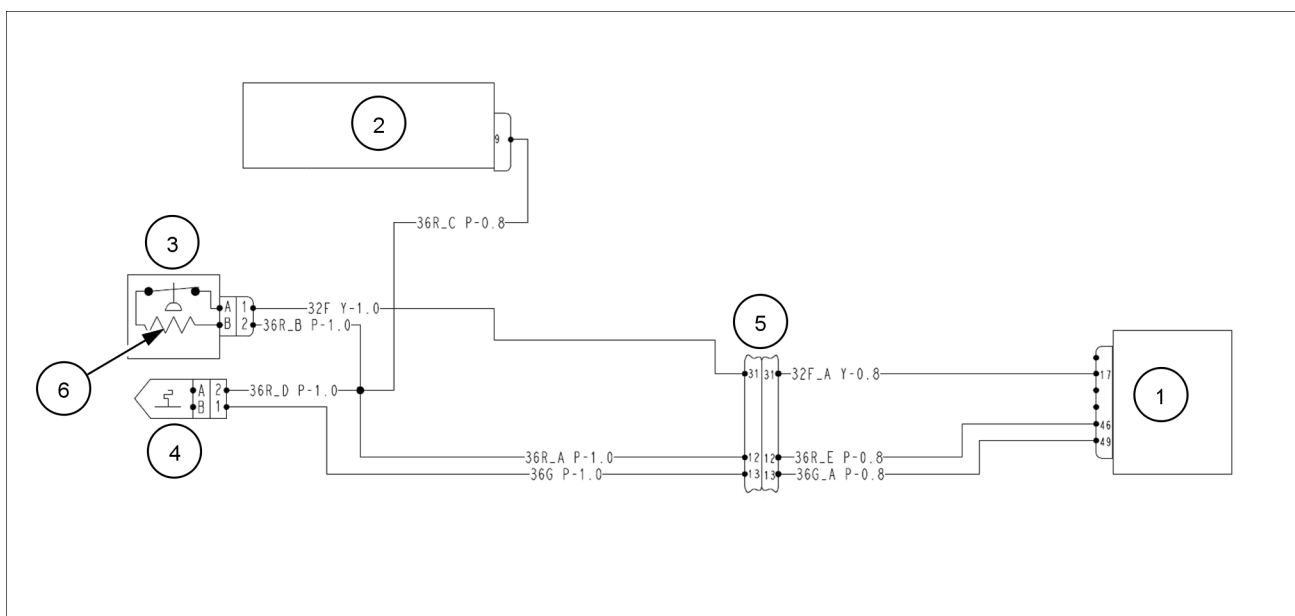
**Make sure you perform the required service and adjustments correctly to avoid injury and machine damage.**

**Failure to comply could result in death or serious injury.**

W0352A

## Multifunction Navigation Key Pad

The multifunction navigation key pad is located on operator console, below the steering wheel. This key pad enables users to navigate from screen to screen, select menu options, monitor machine functions, or retrieve information.



RCPH11WHL002FAL 1

**Schematic legend**

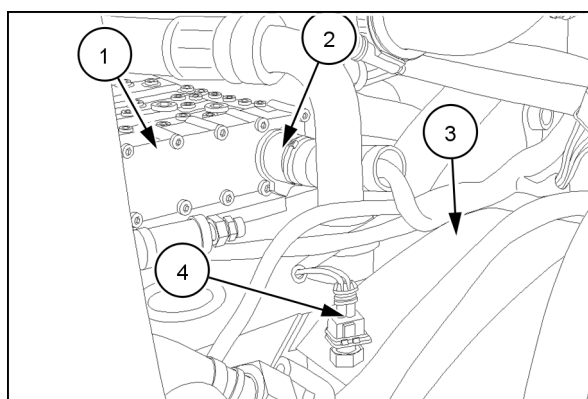
(1)	TECM	(4)	Torque converter output temperature sender 3521 ohms at 20 °C (68 °F).
(2)	TRC Trans Control	(5)	Cab T/ Trans Connector
(3)	Filter maintenance switch	(6)	510 ohm resistor

A. The wiring is free of corrosion, damage, abrasion and incorrect attachment. Go to Step 4.

B. The wiring is not free of corrosion, damage, abrasion and incorrect attachment. Repair or replace the harness as required. Go to Step 1 to confirm elimination of the fault.

4. Measure the resistance of the temp sender.

(1) Disconnect Connector TCOT from the Torque Converter Output temperature sending unit.

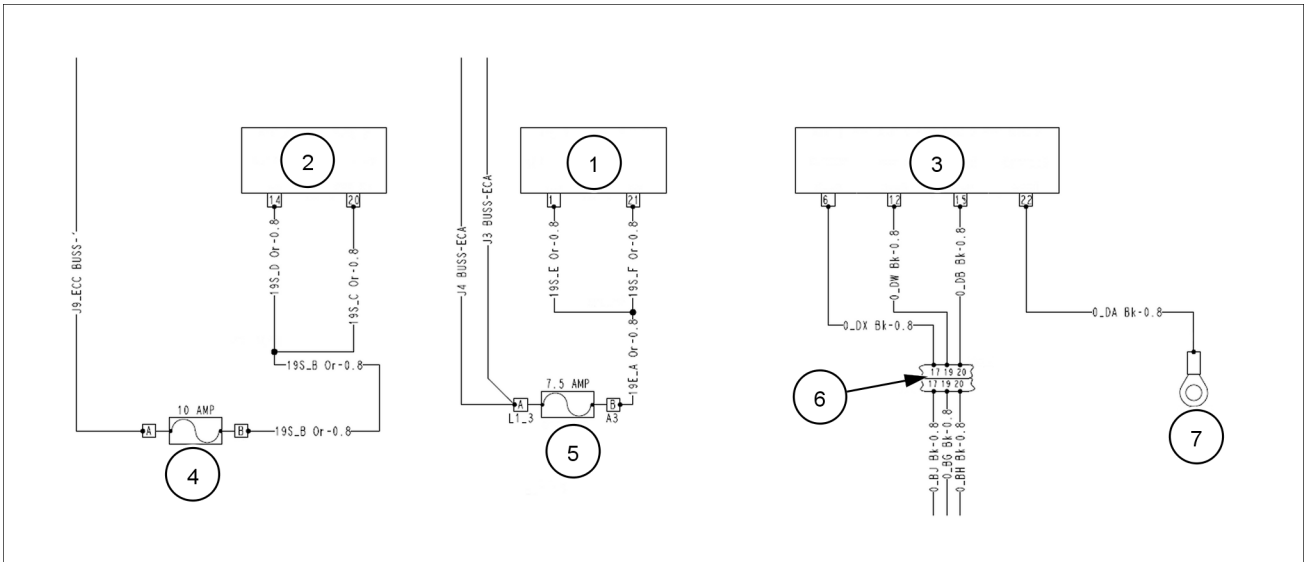


BD07F017-01 2

(1)	Valve body
(2)	Connector TRC
(3)	Bell housing
(4)	Connector TCOT

(2) Measure the resistance across pin A and B on the Torque Converter Output Temperature Sender. The resistance should be approximately 3520 Ω at 20 °C (68.0 °F).

A. The resistance is not within the specifications. Temporarily replace sending unit and retest. Return to Step 1 to confirm elimination of fault.



RCPH11WHL009FAL 1

Schematic legend			
(1)	Instrument Cluster key switch connections	(5)	Instrument Cluster Power, AIC Power, ECC-F3 7.5 Amp Fuse
(2)	Instrument Cluster unswitched battery connections	(6)	CAB_E/ Trans connector
(3)	Instrument Cluster ground connections	(7)	GND_PDST1, Within 4 inches of the Instrument Cluster
(4)	Instrument Cluster Power, AIC Power, ECC-F8 10 Amp Fuse		

Instrument Cluster Connections		
AIC 1 pin-1	19S_E Or-0.8	Key Switch B+
AIC 1 pin-6	0_DX Bk-0.8	Sensor Ground
AIC 1 pin-12	0_DW Bk-0.8	Ground
AIC 2 pin-14	19S-D Or-0.8	Unswitched Battery
AIC 2 pin-15	0_DB Bk-0.8	Ground
AIC 2 pin-20	19S-C Or-0.8	Unswitched Battery
AIC 2 pin-21	19S-F Or-0.8	Key Switch B+
AIC 2 pin-22	0_DA Bk-0.8	Chassis Ground

- A. The wiring is free of corrosion, damage, abrasion and incorrect attachment. Go to Step 3.
  - B. The wiring is not free of corrosion, damage, abrasion and incorrect attachment. Repair or replace the harness as required. Go to Step 1 to confirm elimination of the fault.
3. Measure the voltage at instrument cluster.

## 4114-Logical error at direction select signal

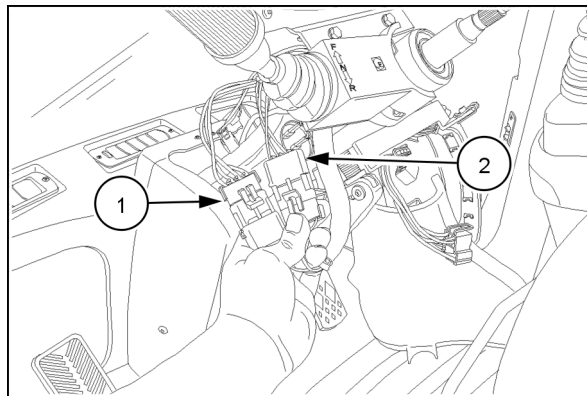
**NOTICE:** Check fuses ECA F1 and ECC F10, replace as needed.

### Cause:

1. FNR switch faulty.
2. Faulty reading from component.
3. Connectors not mated fully, pins not pushed into connector fully, bent pin or broken wire at rear of connector.
4. Wiring or circuits open.
5. Wiring or circuits shorted.

### Solution:

1. Verify that the fault code is still active, refer to **0000 - Retrieving fault codes, Wheel Loaders**.  
Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.
  - (1) Turn ignition switch to RUN position.
  - (2) Clear all fault codes.
  - (3) To check for fault code: Start and operate machine.
    - A. OK – Fault is not recorded again. OK for return to service.
    - B. NOT OK – Fault code 4114 is recorded again. Go to Step 2.
2. Check power circuit to FNR switch.



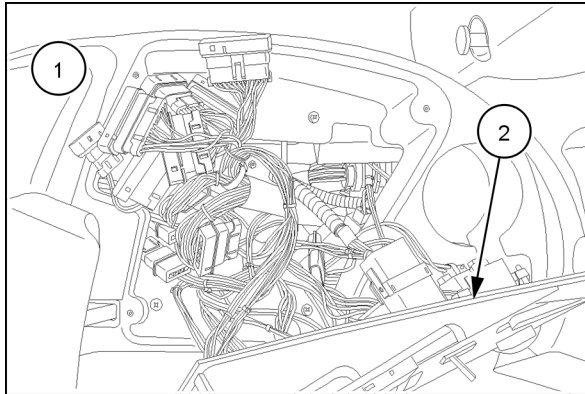
BD07D168-01 1

(1)	Connector TS1
(2)	Connector TS2

- (1) Disconnect Connector TS1, turn ignition switch on.
- (2) Inspect pin A on Connector TS1. Clean connections.
- (3) Take a voltage reading at pin A Connector TS1, a reading of 24 volts should be obtained.
  - A. OK — Go to step 3.
  - B. NOT OK — Check fuse ECA F1 in (electrical center A). Return to Step1 to confirm elimination of fault.
3. Check circuit 19A.

- A. NOT OK— Check fuse F5 in connector ECA. Return to Step 1 to confirm elimination of fault.
- B. OK— Go to Step 4.

4. Check function of ride control switch.



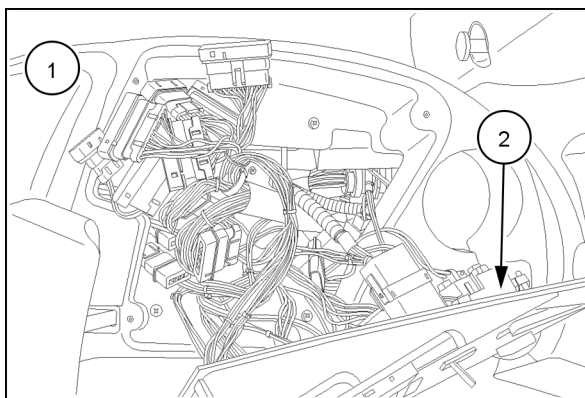
BD07E035-01 2

(1)	Right side console
(2)	Switch panel

- (1). Disconnect connector SRC.
- (2). Inspect all pins on connector SRC. Clean connections.
- (3). Place ride control switch in always on, (forward) position, check between pins 2 and 3 and pins 5 and 6 on switch.
- (4). Place ride control switch in automatic, (center) position, check between pins 2 and 3 and pins 4 and 5 on switch.
- (5). Place ride control switch in off (rear) position, check between pins 4 and 5 on switch.

- A. NOT OK— Replace ride control switch. Return to Step 1 to confirm elimination of fault.
- B. OK— Go to Step 5.

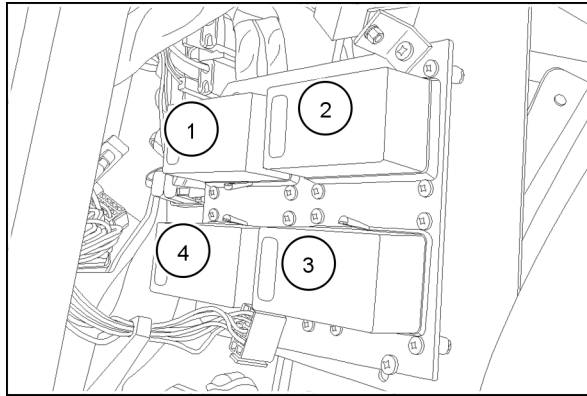
5. Check power to ride control switch.



BD07E035-01 3

(1)	Right side console
(2)	Switch panel

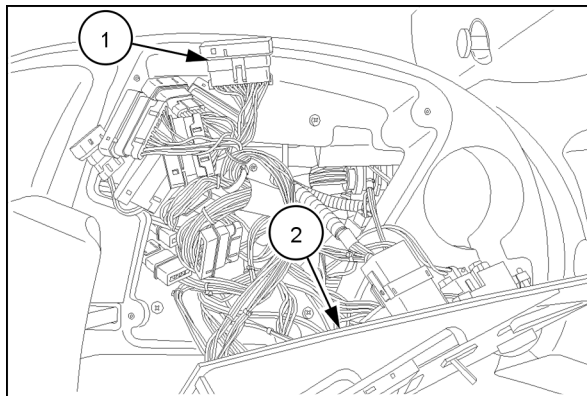
- (1). Disconnect connector SRC, turn ignition switch on.
- (2). Take a voltage reading at pin 2 connector SRC, a reading of 24 volts should be obtained.
- A. NOT OK— Check fuse F5 in connector ECA, if fuse is not blown go to Step 6, if fuse is blown replace and return to Step 1 to confirm elimination of fault.



BD07E018-01 4

(1)	Electrical center A
(2)	Electrical center C
(3)	Electrical center D
(4)	Electrical center B

(1) Take an Ohm reading from pin 2 Connector SPB to pin A1 Connector ECA.



BD07E035-01 5

(1)	Connector SPL-TRNS-PWR
(2)	Switch console.

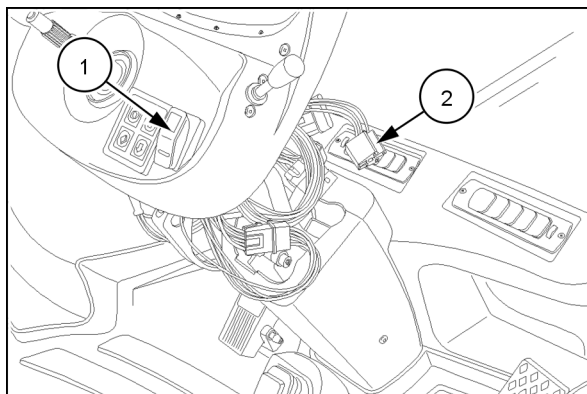
(2) If circuit is open, take an Ohm reading from pin 2 Connector SPB to pin L Connector SPL-TRNS-PWR.

(3) From pin A Connector SPL-TRNS-PWR to pin A1 Connector ECA.

A. NOT OK – Determine the break between connectors and repair. Return to Step 1 to confirm elimination of fault.

B. OK – Go to Step 7.

7. Check circuit between park brake switch and instrument cluster.



BD07E012-01 6

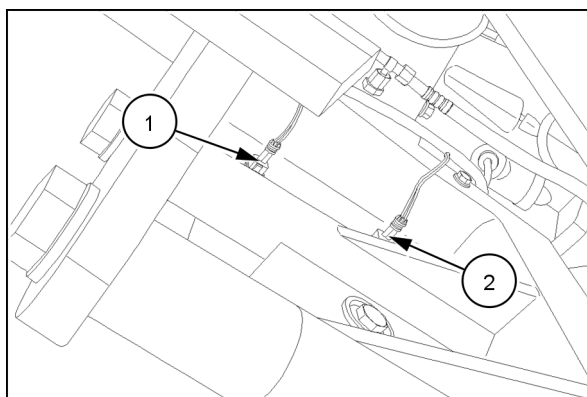
## 4151-Short circuit to battery voltage or open circuit at internal speed input

### Cause:

1. Failed intermediate speed sensor.
2. Faulty reading from component.
3. Connectors not mated fully, pins not pushed into connector fully, bent pin or broken wire at rear of connector.
4. Wiring or circuits open.
5. Wiring or circuits shorted.

### Solution:

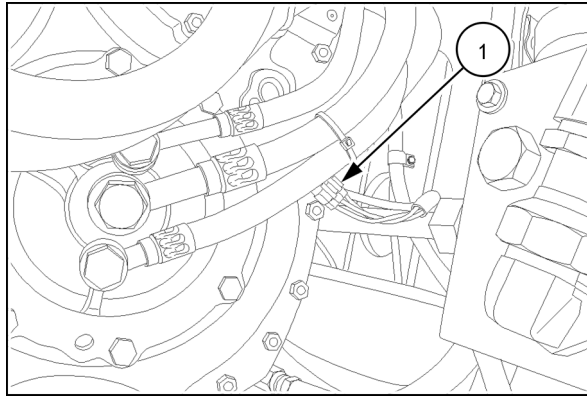
1. Verify that the fault code is still active, refer to **0000 - Retrieving fault codes, Wheel Loaders**.  
Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.
  - (1) Turn ignition switch to RUN position.
  - (2) Clear all fault codes.
  - (3) To check for fault code: Start and operate machine.
    - A. NOT OK – Fault code 4151 is recorded again. Go to Step 2.
    - B. OK – Fault is not recorded again. OK for return to service.
2. Check circuit.



BD07F019-01 1

(1)	Connector TSS
(2)	Connector ISS

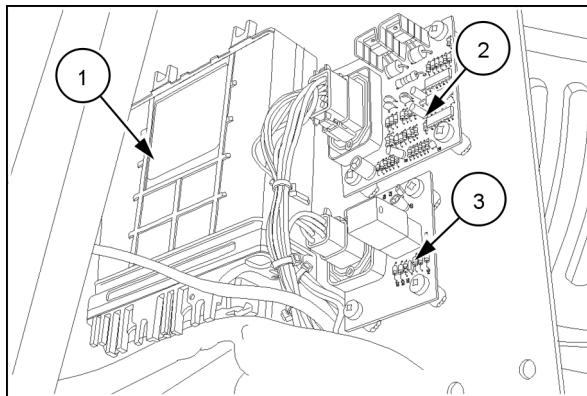
- (1) Disconnect Connector ISS at intermediate speed sensor.
- (2) Inspect pins on Connector ISS. Clean connections.



BD07F018-01 4

(1)	Connector OSS
-----	---------------

(1) Disconnect Connector OSS at output speed sensor.



BD07E019-01 5

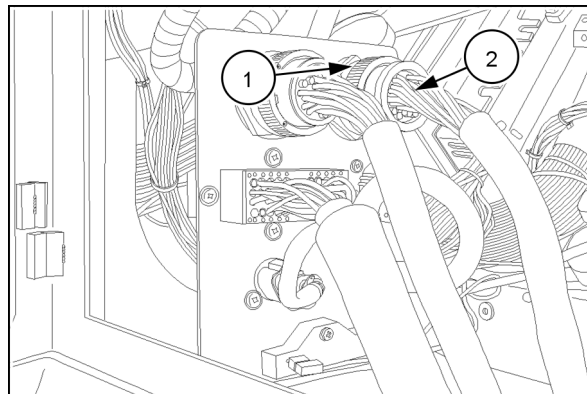
(1)	Transmission control module
(2)	Flasher module
(3)	Time delay module

(2) Disconnect Connector TECM from the transmission control module.

(3) Inspect pins 4 and 62 on Connector TECM. Clean connections.

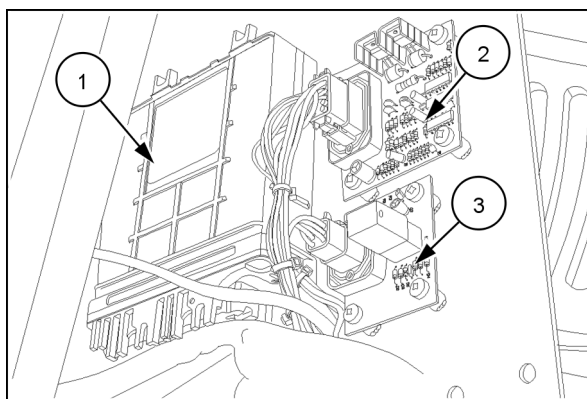
(4) Check from pin 1 Connector OSS to pin 4 Connector TECM.

(5) Check from pin 2 Connector OSS to pin 62 Connector TECM.



BD07E021-01 6

(1)	Connector CAB-T
(2)	Connector TRANS



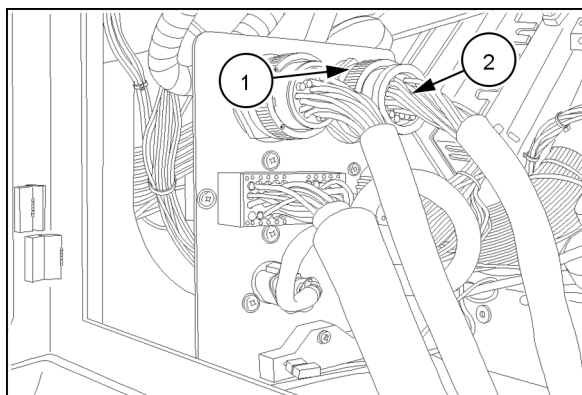
BD07E019-01 2

(1)	Transmission control module
(2)	Flasher module
(3)	Time delay module

(1) Disconnect Connector TECM from the transmission control module.

(2) Inspect pin 55 on Connector TECM. Clean connections.

(3) Check from pin 4 Connector TRC to pin 55 Connector TECM.



BD07E021-01 3

(1)	Connector CAB-T
(2)	Connector TRANS

(4) If circuit is open check from pin 4 Connector TRC to pin 19 Connector TRANS.

(5) From pin 19 Connector CAB-T to pin 55 Connector TECM.

A. NOT OK – Determine the break between connectors and repair. Return to Step 1 to confirm elimination of fault.

B. OK – Go to Step 4.

4. Replace the transmission control module.

(1) Remove and replace control module.

A. Return to Step 1 to confirm elimination of fault.

**Wire harnesses - Electrical schematic frame 08 (55.100.DP-C.20.E.08)**

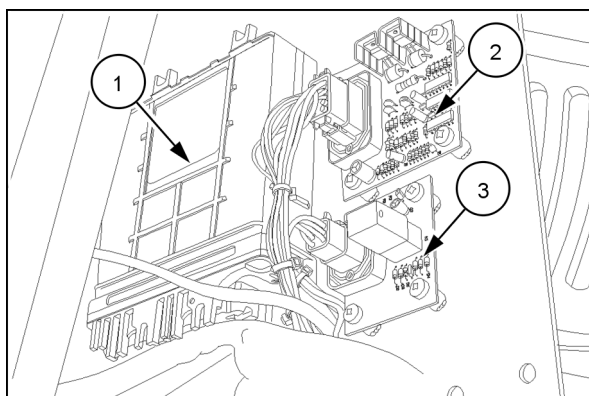
(2) If there is no voltage, remove relay and fuse ECA F14.

(3) Check from pin C4 Connector ECA to pin A10 Connector ECD.

A. NOT OK – Determine the break between connectors and repair. Return to Step 1 to confirm elimination of fault.

B. OK – Go to Step 4.

4. Check control circuit.



BD07E019-01 2

(1)	Transmission control module
(2)	Flasher module
(3)	Time delay module

(1) Turn the ignition switch on, place the FNR selector in the R position, release parking brake and press foot brake.

(2) Check for ground at pin A9 Connector ECD, a reading of continuity should be obtained.

(3) Disconnect Connector TECM from the transmission control module.

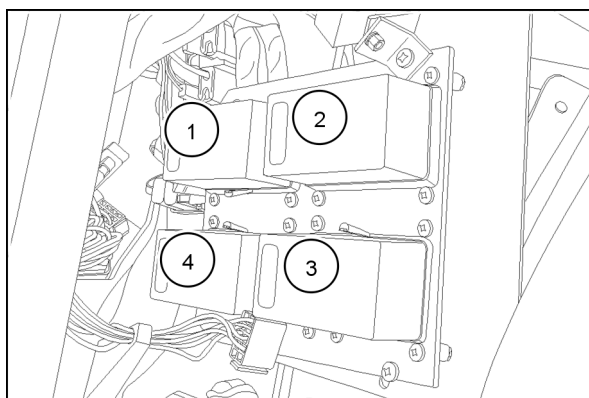
(4) Inspect pin 7 on Connector TECM. Clean connections.

(5) Check from pin A9 Connector ECD to pin 7 Connector TECM.

A. NOT OK – Determine the break between connectors and repair. Return to Step 1 to confirm elimination of fault.

B. OK – Go to Step 5.

5. Check power circuit.



BD07E018-01 3

(1)	Electrical center A
(2)	Electrical center C
(3)	Electrical center D
(4)	Electrical center B

## 4290-Transmission input torque overload

### Cause:

1. TECM calculates a transmission input torque above the defined thresholds.
2. Faulty reading from component.
3. Connectors not mated fully, pins not pushed into connector fully, bent pin or broken wire at rear of connector.
4. Wiring or circuits open.
5. Wiring or circuits shorted.

### Solution:

1. Verify that the fault code is still active, refer to **0000 - Retrieving fault codes, Wheel Loaders**.  
Prior to clearing fault codes write down all fault codes, number of occurrences, and engine hours at last occurrence.
  - (1) Turn ignition switch to RUN position.
  - (2) Clear all fault codes.
  - (3) To check for fault code: Start and operate machine.
    - A. OK – Fault is not recorded again. OK for return to service.
    - B. NOT OK – Fault code 4290 is recorded again. Go to Step 2.
2. Calibrate clutches.
  - (1) Calibrate clutches accord to instructions.
    - A. OK – Return to Step 1 to confirm the elimination of fault.
    - B. NOT OK – Repair or replace transmission as needed.
3. Perform engine stall test.
  - (1) Check engine stall speeds according to instructions in **Engine - Test (10.001)**.
    - A. OK – Go to Step 4.
    - B. NOT OK – Repair or replace engine or transmission as needed.
4. Replace the transmission control module.
  - (1). Remove and replace transmission control module.
    - A. Return to Step 1 to confirm the elimination of fault.

**(4)** If circuit is open check circuit from pin 15 Connector AIC-2 to pin 20 Connector CAB-E.

**(5)** Check circuit from pin 20 of Connector ENG to ground.

**(6)** Check circuit from pin 6 Connector AIC-1 to pin 17 Connector CAB-E.

**(7)** Check circuit from pin 17 of Connector ENG to ground on engine near oil filter.

**(8)** Check circuit from pin 12 Connector AIC-1 to pin 19 Connector CAB-E.

**(9)** Check circuit from pin 19 of Connector ENG to ground on engine near oil filter.

**(10)** Check circuit from pin 22 Connector AIC-1 to ground on the steering pedestal.

A. NOT OK— Determine the break and repair. Return to Step 1 to confirm elimination of fault.

B. OK — Go to Step 5.

5. Replace instrument cluster.

**(1)** Remove and replace instrument cluster.

A. Return to Step 1 to confirm elimination of fault.

B. NOT OK— If fault is recorded again go to Step 6.

6. Replace the transmission control module.

**(1)** Remove and replace transmission control module.

A. Return to Step 1 to confirm elimination of fault.

## 19010-(DTC 161A)-Downstream SCR catalyst temperature sensor voltage is higher than expected

### Control Module : ECU

**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:

The Electronic Control Unit (ECU) **A-9000** monitors the downstream SCR catalyst temperature sensor **B-9104** circuit. Temperature signal is converted by the analog to digital converter which converts the raw voltage signal into a physical temperature value. If the **A-9000** detects a voltage greater than **3.30 V** in the **B-9104** signal circuit, this fault will occur.

#### Cause:

The **A-9000** has detected a voltage greater than **3.30 V** in the **B-9104** signal circuit.

#### Possible failure modes:

1. Faulty **B-9104**, wiring.
2. Faulty **B-9104**, internal failure.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify fault is present and active.

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

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

B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step 6.

2. Check the **B-9104** signal circuit for an open circuit condition.

Disconnect connector **X-9001**.

Disconnect connector **X-9104**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9001 pin 9</b>	<b>X-9104 pin 1</b>	There should be continuity.

A. If there is no continuity, there is an open circuit condition in the **B-9104** signal circuit, wire VE-109. Locate and repair the broken conductor.

B. If there is continuity, leave the connectors disconnected and continue to Step 3.

3. Check the **B-9104** signal circuit 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
<b>X-9001 pin 9</b>	<b>X-9001 pin 16</b>	There should be no continuity.
<b>X-9001 pin 9</b>	<b>X-9001 pin 32</b>	There should be no continuity.

- A. If other faults do exist, use the appropriate vehicle service manual information to locate and repair the faulted CAN condition.
  - B. If no other faults exist, the vehicle (VE) or engine (EN) harness wiring is damaged between the network harness splice and the exhaust flap **A-9001** actuator controller connector **X-9025 NEF pin 1** and/or **X-9025 NEF pin 2**, wire VE-218 or EN-049 and/or VE-189B or EN-050 for supply power and ground or **X-9025 NEF pin 4** and/or **X-9025 NEF pin 5**, wire VE-194B or EN-047 and/or VE-201F or EN-048A for CAN signal. Locate and repair the damage to the CAN circuit wiring.
5. As there is no method for field testing or re-flashing the sensor controller, replace the exhaust flap **A-9001** actuator 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 **A-9000** 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, 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.

**Wire harnesses - Electrical schematic frame 04 (55.100.DP-C.20.E.04)**

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## 19051-(DTC E46E)-Upstream NO<sub>x</sub> sensor internal failure (Heater Open Circuit Error)

### Control Module : ECU

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

#### Context:

For information regarding the functional operation of the smart Diesel Oxidation Catalyst (DOC) upstream NO<sub>x</sub> sensor **A-9103** see **Nitrogen Oxides (NO<sub>x</sub>) sensor - Dynamic description (55.988)**. The DOC upstream NO<sub>x</sub> sensor **A-9103** has internal monitoring for open wire or short circuit and sends an error status in case of a detected failure. This failure is the result of an open circuit error in the sensor heater circuit.

#### Cause:

The DOC upstream NO<sub>x</sub> sensor **A-9103** has reported, via CAN, to the ECU **A-9000** that an open circuit condition exists in the heater control circuit.

#### Possible failure modes:

1. Faulty DOC upstream NO<sub>x</sub> sensor **A-9103**, hardware or firmware.
2. Faulty ECU **A-9000**, software.

#### Solution:

1. Verify 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 3.
2. As there is no method for field testing or re-flashing the sensor controller, replace the DOC upstream NO<sub>x</sub> sensor **A-9103**.

Then use the EST, see **Nitrogen Oxides (NO<sub>x</sub>) sensor - Configure - Reset ECU data (Upstream sensor) (55.988)** if necessary, to perform the Replacement of the Nox Upstream Sensor - Reset ECU Data configuration.

Then check to see that this fault is resolved.

- A. If this fault is resolved, use the EST, see **Selective Catalytic Reduction (SCR) exhaust treatment - Configure - Engine restart counter reset (10.500)** if necessary, to perform the Engine Restart Counter Reset / Unlock Inducement configuration then return the machine to service.
  - B. If this fault is not resolved, check the ECU **A-9000** 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, 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.

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## 19080-(DTC 294A)-DEF/AdBlue under pressure failure

### Control Module : ECU

**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 Diesel Exhaust Fluid (DEF/AdBlue®) system see **Selective Catalytic Reduction (SCR) exhaust treatment - Dynamic description (10.500)**. If during DEF/AdBlue® system normal operation the pressure drops below **5.50 bar (79.75 psi)**, but not below **0.55 bar (7.98 psi)**, and does not exceed **5.75 bar (83.38 psi)** within **10.0 s**, this fault will occur.

#### Cause:

The Engine Control Unit (ECU) **A-9000** has determined that a low pressure condition exists in the DEF/AdBlue® system.

#### Possible failure modes:

1. Faulty DEF/AdBlue® tank level, too low a fluid level.
2. Faulty DEF/AdBlue® system, leakage.
3. Faulty DEF/AdBlue® tank suction (inlet) line (tube), restricted.
4. Faulty supply module, pump not delivering or pressure sensor values too low.

#### Solution:

1. Verify 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 8.

2. Check fluid level in DEF/AdBlue® system supply tank.

As air in the DEF/AdBlue® system will cause the pressure level to decrease, visually check the fluid level in the supply tank.

There should be an adequate level of fluid.

- A. If a less than adequate level is found, fill the DEF/AdBlue® system supply tank to an acceptable level.
- B. If an adequate level is found, continue with Step 3.

3. Check for external leakage in DEF/AdBlue® system.

Visually and tactually inspect the system pressure and back flow lines (tubes) and connections for leakage and/or damage.

There should be no leakage or damage.

- A. If leakage or damage is found, repair or replace the line (tube) and/or connector, as required.
- B. If no leakage or damage is found, continue with Step 4.

## 19113-(DTC 8F5A)-DEF/AdBlue reverting driver circuit over temperature failure

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the DEF/Adblue reverting valve **Y-9100** circuit for an over temperature/current condition. If the **A-9000** detects an over temperature/current condition, this fault will occur.

#### Cause:

The **A-9000** has detected an over temperature/current condition in the **Y-9100** circuit.

#### Possible failure modes:

1. Faulty **Y-9100**, wiring.
2. Faulty **Y-9100**, internal failure.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify fault is present and active.

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

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

B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step 6.

2. Check the following related faults:

#### **DTC 6C5A - DEF/AdBlue reverting valve driver circuit short to battery failure**

A. If the listed fault is active, diagnose it first and then return to this fault, **DTC 8F5A - DEF/AdBlue reverting valve driver circuit over temperature failure**.

B. If the fault is not active, continue to Step 3.

3. Check the **Y-9100** wiring for a short to battery power condition.

Disconnect connector **X-9001**.

Disconnect connector **X-9108**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9001 pin 85</b>	<b>X-9001 pin 50</b>	There should be no continuity.
<b>X-9001 pin 85</b>	All pins in connector <b>X-9001</b>	There should be no continuity.

A. If there is continuity, there is a short circuit condition in the **Y-9100** circuit, wire VE-122. Locate and repair the shorted conductor.

B. If there is no continuity, leave both connectors disconnected and continue to Step 4.

4. Check the **Y-9100** wiring for short to key battery power condition.

The key must be in the ON position.

Use a multimeter to perform the following voltage check:

## 19173-(DTC 627A)-DEF/AdBlue dosing valve actuator short circuit to battery in high side failure

### Control Module : ECU

**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 Selective Catalytic Reduction (SCR) system see **Selective Catalytic Reduction (SCR) exhaust treatment - Dynamic description (10.500)**. The Engine Control Unit (ECU) **A-9000** monitors the electrical current used to energize the DEF/AdBlue® dosing module (valve) **Y-9103**. If the ECU **A-9000** internal sensing circuit does not sense current flow when it is requested, the ECU **A-9000** interrupts the current flow circuit and this fault occurs.

#### Cause:

The ECU **A-9000** detects a short to high source (battery voltage) or open circuit condition in the dosing module (valve) **Y-9103** high side driver control circuit.

#### Possible failure modes:

1. Faulty DEF/AdBlue® dosing module **Y-9103** solenoid coil, open.
2. Faulty DEF/AdBlue® dosing module **Y-9103** high side control circuit wiring, shorted to a voltage source or open.
3. Faulty ECU **A-9000**, software.

#### Solution:

1. Verify 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. Verify the condition of the DEF/AdBlue® dosing module **Y-9103**.

Disconnect the vehicle (VE) harness from the DEF/AdBlue® dosing module **Y-9103** at connector **X-9110**.

Use a multimeter to measure the resistance of the DEF/AdBlue® dosing module **Y-9103** solenoid coil:

From	To	Value
X-9110 pin 1	X-9110 pin 2	There should be between 11.4 - 12.6 Ω.

- A. If the measured resistance is within the specified range, leave connector **X-9110** disconnected and continue with Step 3.
  - B. If there is infinite resistance, the DEF/AdBlue® dosing module **Y-9103** solenoid coil is open, replace the DEF/AdBlue® dosing module **Y-9103**.
3. Check high side driver control wiring for a short to voltage source condition.

Disconnect the vehicle (VE) harness from the ECU **A-9000** at connector **X-9001**.

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

## 19436-(DTC E46D)-ECU internal failure - EEPROM write error

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** has the capability of reading and writing values to flash or EEPROM. The **A-9000** monitors the reading and writing capability of this function. If the **A-9000** determines that if one memory block can not be written at least three times during this monitoring, this fault will occur.

#### Solution:

1. Check the ECU **A-9000** 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.

## 3007-(DTC 1113)-Engine coolant temperature sensor voltage is higher than expected

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the engine coolant temperature **B-9003** circuit for a voltage higher than expected condition. If the **A-9000** detects a voltage greater than **4.93 V** in the **B-9003** signal circuit, this fault will occur.

#### Cause:

The **A-9000** has detected a voltage greater than **4.93 V** in the **B-9003** signal circuit.

#### Possible failure modes:

1. Faulty **B-9003**, wiring.
2. Faulty **B-9003**, internal failure.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify fault is present and active.

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

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

B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step 6.

2. Check the **B-9003** circuit for an open circuit condition.

Disconnect connector **X-9002**.

Disconnect connector **X-9006**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9001 pin 39</b>	<b>X-9006 pin 1</b>	There should be continuity.

A. If there is no continuity, there is an open circuit condition in the **B-9003** signal circuit, wire VE-014. Locate and repair the broken conductor.

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

3. Check the **B-9003** signal circuit for a short circuit condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9001 pin 39</b>	All pins in connector <b>X-9001</b>	There should be no continuity.

A. If there is continuity, there is a short circuit condition in the **B-9003** signal circuit, wire EN-014. Locate and repair the shorted conductor.

B. If there is no continuity, leave both connectors disconnected and continue to Step 4.

## 3035-(DTC 22E3)-Oil temperature sensor voltage is lower than expected

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the oil temperature sensor **B-9000** signal circuit. If the **A-9000** determines that the voltage in the temperature signal circuit voltage is lower than expected, this fault will occur.

#### Cause:

The **A-9000** has detected a voltage less than **235 mV** for a period greater than **500 ms** in the **B-9000** temperature signal circuit.

#### Possible failure modes:

1. Faulty **B-9000**, internal failure.
2. Faulty **B-9000** temperature signal circuit, short to ground condition.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify 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 **B-9000** temperature signal circuit for a short to ground condition.

Disconnect connector **X-9004**.

Disconnect connector **X-9002** from the **A-9000**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9002 pin 13</b>	Chassis ground	There should be no continuity.
<b>X-9002 pin 13</b>	<b>X-9002 pin 6</b>	There should be no continuity.
<b>X-9002 pin 13</b>	All other pins	There should be no continuity.

A. If there is continuity, there is a short to ground in the **B-9000** temperature signal circuit, wire EN-009. Locate and repair the shorted conductor.

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

3. Replace the **B-9000**.

Use the EST to verify that **DTC 22E3 - Oil temperature sensor voltage is lower than expected** has been resolved.

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

B. If it has not been resolved, check the **A-9000** 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.

## 3091-(DTC 4112)-Camshaft speed sensor pattern is not plausible

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** is responsible for evaluating the signals received from the camshaft and crankshaft speed sensors. Angle and speed determination, signal plausibility and quality are all evaluated. If the **A-9000** determines that the camshaft signal does not match the correct pattern (edge distance, level) or not all expected camshaft edges are detected during engine revolution more than six times, this fault will occur. Different monitoring strategies are used by the **A-9000** during engine start and normal engine running. If the problem is detected at engine start, a redundant synchronization of the angular system is performed using only the crankshaft increment signal and test injections to determine engine phase. If this procedure fails, the injection is aborted and the system waits for a restart.

#### Cause:

The **A-9000** has detected a camshaft signal implausibility more than six times.

#### Possible failure modes:

1. Faulty phonic wheel timing. (Cursor engines)
2. Faulty tone wheel timing. (NEF engines)
3. Faulty camshaft speed sensor **B-9008**.
4. Faulty camshaft speed sensor **B-9008**, wiring or electrical disturbances due to damaged isolation of wiring harness or special electrical features.
5. Faulty **A-9000**, software.

#### Solution:

1. Verify 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 7.

2. Check the **B-9008** signal circuit for an open circuit condition.

Disconnect connector **X-9002**.

Disconnect connector **X-9022**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check while shaking the harness to promote an intermittent connection:

From	To	Value
<b>X-9002 pin 68</b>	<b>X-9022 pin 2</b>	There should be continuity.

A. If there is no continuity when shaking the harness or without shaking the harness there is an open circuit condition in the **B-9008** signal circuit, wire EN-042. Locate and repair the broken conductor.

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

3. Check the **B-9008** signal circuit for a short circuit condition.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

- 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.

**Wire harnesses - Electrical schematic frame 02 (55.100.DP-C.20.E.02)**

## 3179-(DTC 956B)-CAN communication failure between vehicle controller and ECU - BC2ECU2 message

### Control Module : ECU

#### Context:

The Engine Control Unit (ECU) **A-9000** is capable of connecting to and communicating on three separate Controller Area Networks (CAN). Proper configuration and monitoring of the three twisted pair configured networks is also a function of the ECU **A-9000**. CAN Node A Bus is the main vehicle interface bus. The ECU **A-9000** provides a CAN termination resistor for the CAN Node A Bus, internal to the ECU **A-9000**. The ECU **A-9000** receives and responds to proprietary Body Computer (BC) information. If the ECU **A-9000** senses a message timeout, this fault will occur.

#### Cause:

ECU **A-9000** has sensed a BC message timeout.

#### Possible failure modes:

1. Faulty vehicle system, related CAN fault.
2. Faulty supply voltage or ground, missing.
3. Faulty CAN circuit wiring, open circuit, short to ground, or short circuit.
4. Faulty ECU **A-9000**, termination resistor or software.

#### Solution:

1. Verify fault is present and in active state.

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 is in an inactive state, the fault may be intermittent and not currently active. Continue with Step 6.

2. Check for related vehicle CAN faults.

Use the EST to determine if related vehicle CAN faults exist.

A. If related vehicle CAN faults do exist, resolve the vehicle CAN faults, then check to see that **DTC 956B - CAN communication failure between vehicle controller and ECU - BC2ECU2 message** is also resolved.

B. If related vehicle CAN faults do not exist, continue with Step 3.

3. Check the ECU **A-9000** supply voltage.

Disconnect the vehicle (VE) harness from the ECU **A-9000** at connector **X-9001**.

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

From	To	Value
<b>X-9001 pin 1</b>	chassis ground	There should be <b>12.0 V</b> .
<b>X-9001 pin 25</b>	chassis ground	There should be <b>12.0 V</b> .
<b>X-9001 pin 26</b>	chassis ground	There should be <b>12.0 V</b> .
<b>X-9001 pin 49</b>	chassis ground	There should be <b>12.0 V</b> .
<b>X-9001 pin 73</b>	chassis ground	There should be <b>12.0 V</b> .

A. If the voltage is present on all of the checks, leave connector **X-9001** disconnected and continue with Step 4.

B. If the voltage is not present for one or more of the checks, refer to the appropriate vehicle service manual and electrical schematics to locate and restore supply power to the ECU **A-9000**.

4. Check the ECU **A-9000** grounding.

From	To	Value
X-9001 pin 3	chassis ground	There should be continuity.
X-9001 pin 5	chassis ground	There should be continuity.
X-9001 pin 28	chassis ground	There should be continuity.
X-9001 pin 52	chassis ground	There should be continuity.
X-9001 pin 75	chassis ground	There should be continuity.

- A. If there is continuity on all five checks, check the ECU **A-9000** for the appropriate software and re-flash, if necessary.
  - B. If there is no continuity on one or more of the checks, use the appropriate vehicle electrical schematics to locate and repair the failure.
9. 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.

**Wire harnesses - Electrical schematic frame 02 (55.100.DP-C.20.E.02)**

**Wire harnesses - Electrical schematic frame 06 (55.100.DP-C.20.E.06)**

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, 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.

**Wire harnesses - Electrical schematic frame 01 (55.100.DP-C.20.E.01)**

**Wire harnesses - Electrical schematic frame 02 (55.100.DP-C.20.E.02)**

B. If the voltage is not present for one or more of the checks, refer to the appropriate vehicle service manual and electrical schematics to locate and restore supply power to the ECU **A-9000**.

4. Check the ECU **A-9000** grounding.

With the key switch in the "OFF" position, use a multimeter to check for continuity on the vehicle (VE) harness side:

From	To	Value
X-9001 pin 3	chassis ground	There should be continuity.
X-9001 pin 5	chassis ground	There should be continuity.
X-9001 pin 28	chassis ground	There should be continuity.
X-9001 pin 52	chassis ground	There should be continuity.
X-9001 pin 75	chassis ground	There should be continuity.

A. If there is continuity on all of the checks, leave connector **X-9001** 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 **A-9000**.

5. Determine the condition of the ECU **A-9000** 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
X-9001 pin 46	X-9001 pin 47	There should be <b>120 Ω</b> .
X-9001 pin 46	chassis ground	There should not be continuity
X-9001 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 **A-9000**:

From	To	Value
X-9001 pin 46	X-9001 pin 47	There should be <b>120 Ω</b> .

A. If the measured resistances are correct and neither conductor is grounded, check the ECU **A-9000** 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.

## **3445-(DTC F5A2)-Torque limitation due to excessive fuel temperature**

### **Control Module : ECU**

#### **Context:**

This failure path is only for information. There was an active performance limitation due to high fuel temperature with a duration longer than **50.0 ms**. This failure confirms there was a temporary torque limitation present. This failure does not require any action except to check if another failure that influences fuel temperature is present in the failure memory. No actions are necessary due to this failure alone. If another fault is present, follow the troubleshooting procedure for that fault.

#### **Cause:**

One or more of the following failure modes may be the reason for the occurrence of this fault.

#### **Possible failure modes:**

1. Low fuel
2. Fuel cooler, if equipped
3. Internal high pressure fuel leak
4. Fuel filter heat, if equipped, stuck on
5. Fuel system air leak
6. Extreme environmental conditions

## 3518-(DTC 2AC4)-Ambient temperature sensor voltage is lower than expected

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the intake air temperature sensor **B-9105** signal circuit. If the **A-9000** determines that the voltage in the **B-9105** temperature signal circuit is lower than expected or if the machine is being operating in extremely low ambient conditions, this fault will occur. If this fault occurs, the ambient temperature value will be frozen by the **A-9000** at the last valid value or to a fixed replacement value of **38.96 °** if the failure is validated. Before diagnosing this fault as an electrical failure, verify that this fault is active in normal operating ambient temperatures.

#### Cause:

The **A-9000** has detected a voltage less than **200 mV** for longer than **500 ms** in the **B-9105** temperature signal circuit.

#### Possible failure modes:

1. Extremely low ambient operating temperatures.
2. Faulty **B-9105** temperature signal wire, shorted to ground.
3. Faulty **B-9105**, internal failure.
4. Faulty **A-9000**, software.

#### Solution:

1. Verify 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 **4**.

2. Check the **B-9105** temperature signal circuit for a short to ground condition.

Disconnect connector **X-9105**.

Disconnect connector **X-9001** from the **A-9000**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9001 pin 40</b>	Chassis ground	There should be no continuity.
<b>X-9001 pin 40</b>	All other pins	There should be no continuity.

A. If there is continuity, there is short to ground condition in the **B-9105** temperature signal circuit, wire VE-103. Locate and repair the shorted conductor.

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

3. Replace the **B-9105**.

Use the EST to verify that **DTC 2AC4 - Ambient temperature sensor voltage is lower than expected** 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 **A-9000** for the appropriate software and re-flash, if necessary.

## 3624-(DTC 13A3)-Crankcase pressure sensor voltage is higher than expected

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the crankcase pressure sensor **B-9009** signal circuit. If the **A-9000** determines that the voltage in the pressure signal circuit is higher than expected, this fault will occur.

#### Cause:

The **A-9000** has detected a voltage greater than **4.80 V** for a period greater than **150 ms** in the **B-9009** pressure signal circuit.

#### Possible failure modes:

1. Faulty **B-9009**, internal failure.
2. Faulty **B-9009** pressure signal circuit, short to high source or open circuit condition.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify fault is present and active.

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

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

B. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active. Continue with Step 6.

2. Check the **B-9009** pressure signal circuit for an open circuit condition.

Disconnect connector **X-9023**.

Disconnect connector **X-9002** from the **A-9000**

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9002 pin 61</b>	<b>X-9023 pin 3</b>	There should be continuity.

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

B. If there is no continuity, there is an open circuit condition in the **B-9009** pressure signal circuit, wire EN-045. Locate and repair the broken conductor.

3. Check the **B-9009** signal circuit 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
<b>X-9002 pin 61</b>	<b>X-9001 pin 32</b>	There should be no continuity.
<b>X-9002 pin 61</b>	All other pins	There should be no continuity.

A. If there is continuity, there is a short to high source condition in the **B-9009** signal circuit, wire EN-045. Locate and repair the shorted conductor.

B. If there is no continuity, leave the connectors disconnected and continue to Step 4.

## **3750-(DTC EC36)-ECU internal failure - Fuel injection energizing time is not plausible**

### **Control Module : ECU**

#### **Context:**

The Electronic Control Unit (ECU) **A-9000** monitors injector energizing time. If the **A-9000** determines that the energizing time for either the pilot injection, main injection or post injection is implausible, this fault will occur.

#### **Solution:**

1. Check the ECU **A-9000** 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.

## **3812-(DTC 115D)-ECU temperature sensor 1 is too high**

### **Control Module : ECU**

**Context:**

The Electronic Control Unit (ECU) **A-9000** monitors **A-9000** 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 **A-9000** temperature sensor 1 has monitored a temperature greater than **175 °C (347 °F)**.

**Solution:**

1. Check the ECU **A-9000** 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.

## 3911-(DTC 6455)-Fuel metering unit is shorted to battery voltage at the high side

### Control Module : ECU

#### Context:

The Electronic Control Unit (ECU) **A-9000** monitors the fuel metering unit **Y-9000** high side driver circuit for a short to battery power condition. If the **A-9000** detects a short to battery power, this fault will occur.

#### Cause:

The **A-9000** has detected a short to battery power in the **Y-9000** high side driver circuit.

#### Possible failure modes:

1. Faulty **Y-9000**, internal failure.
2. Faulty **Y-9000** wiring, short to battery power condition.
3. Faulty **A-9000**, software.

#### Solution:

1. Verify 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 **Y-9000** for an internal short.

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

Use a multimeter to perform the following resistance check:

From	To	Value
<b>X-9007 pin 1</b>	<b>X-9007 pin 2</b>	The value should be between <b>2.8 - 3.2 Ω (2.8 - 3.2 Ω)</b> .

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

B. If the value is not in the specified range, the **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 the **Y-9000** high side driver circuit for a short to battery power condition.

Disconnect connector **X-9002**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
<b>X-9002 pin 58</b>	All pins in connector <b>X-9002</b>	There should be no continuity.

A. If there is continuity, there is a short circuit condition in the **Y-9000** high side driver circuit, wire EN-015. Locate and repair the shorted conductor.

B. If there is no continuity, leave both connectors disconnected and continue to Step 4.

4. Check the **Y-9000** high side driver circuit for a short to key power condition.

Use a multimeter to perform the following resistance test:

From	To	Value
X-9123 pin 1	X-9123 pin 2	There should be between 70 - 130 Ω.

A. If the value is within the specified range, continue to Step 4.

B. If the value is not within the specified range, the after run disconnection relay **K-9106** has failed internally. Replace the after run disconnection relay **K-9106**.

4. Check the after run disconnection relay **K-9106** low side circuit for a short to high source condition.

Disconnect connector **X-9123**.

The key must be in the OFF position.

Use a multimeter to perform the following continuity check:

From	To	Value
X-9001 pin 24	X-9001 pin 22	There should be no continuity.
X-9001 pin 24	All other pins	There should be no continuity.

A. If there is continuity, there is a short to high source condition in the after run disconnection relay **K-9106** low side circuit, wire VE-178. Locate and repair the shorted conductor.

B. If there is no continuity, leave the connectors disconnected and continue to Step 5.

5. Check the after run disconnection relay **K-9106** low side circuit for a short to key power condition.

The key must be in the ON position.

Use a multimeter to perform the following voltage check:

From	To	Value
X-9001 pin 24	Chassis ground	There should be no voltage.

A. If there is voltage, there is short to key power condition in the after run disconnection relay **K-9106** low side circuit, wire VE-178. Locate and repair the shorted conductor.

B. If there is no voltage, check the ECU **A-9000** 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, 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.

**Wire harnesses - Electrical schematic frame 01 (55.100.DP-C.20.E.01)**

**Wire harnesses - Electrical schematic frame 02 (55.100.DP-C.20.E.02)**

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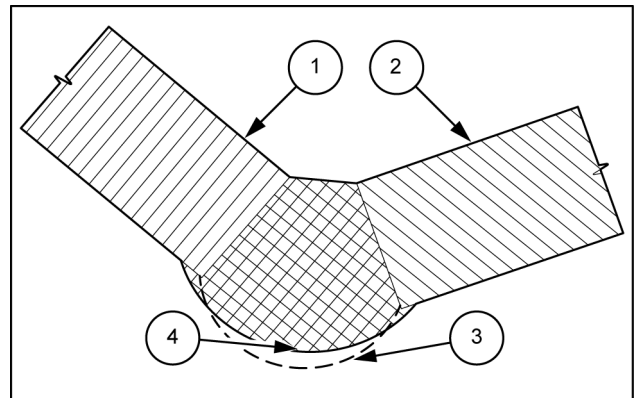
5. The tape must be smooth to get the best result when using the silicone forming tool.
6. Fill the joint with the clear silicone sealant (114328A1). The silicone must completely penetrate and fill the gap between the glass sections. The sealant must extend at least **1.5 mm (0.1 in)** above the outside surface of the glass section for the length of the gap. Be sure the sealant fills against the adhesive at each end of the joint.
7. Remove the polyester tape from the inside joint.

Remove the extra silicone from the outside joint by carefully sliding the forming tool down the length of the joint. The tool must remain in contact with the glass sections during this process.

1. Front RH side glass
2. Front center glass
3. Silicone before smoothing
4. Silicone after smoothing

**NOTE:** Make the forming tool from **10 mm (0.4 in)** plexi-glass, or wood. Sand all radius and edges smooth.

8. Remove all the silicone from the forming tool immediately after use.
9. Remove the outside tape from the glass sections.
10. Remove the extra silicone sealant from the inside joint by carefully sliding the forming tool down the length of the joint.
11. Remove all the silicone from the forming tool immediately after use.
12. Remove the inside joint masking tape.
13. If two or more glass sections are being replaced, use the procedure on the second joint.
14. Apply the gray silicone sealant above the front center, front side or rear windows for additional leak protection.
15. Apply the gray silicone sealant (345-174) down approximately **50 mm (2.0 in)** from the top on each front side window replaced.
16. Apply the gray silicone sealant (345-174) down approximately **50 mm (2.0 in)** from the top edge of the rear glass, if replaced.



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